



# Clean Energy Investment in Central Appalachia

Accelerating Growth with Catalytic Capital

A REPORT BY  
NEW RESOURCE  
SOLUTIONS



New Resource Solutions

COMMISSIONED BY THE  
CENTRAL APPALACHIAN  
NETWORK



February 2020

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## About This Document

This white paper is meant to assess the current landscape for financial investment in the clean energy industry in Central Appalachia, with a particular focus on solar energy generation. It is part of an ongoing effort to increase investment in this sector regionally, by identifying and addressing current obstacles and lifting up ways to accelerate investment opportunities.

## About the Author

New Resource Solutions (NRS) is accelerating clean energy finance, with an initial focus on the commercial solar industry. For more information, please visit <https://newresourcesolutions.com>.

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## About CAN

The Central Appalachian Network (CAN) is a regional collaborative of non-profit organizations working to strengthen and diversify Appalachian economies through community-based and environmentally sustainable strategies. Clean Energy is a core sector of focus for CAN, and the Clean Energy Practitioner Network includes non-profits and allies working to advance the clean energy economy across our 6-state region (OH, WV, KY, VA, TN, NC). For publications and analysis related to clean energy policy priorities, messaging tools, and economic impact, visit: <https://www.cannetwork.org/focus-areas/clean-energy/>. For more information on the CAN Clean Energy Network and next steps for this project, contact [hvargason@conservationfund.org](mailto:hvargason@conservationfund.org).

## Acknowledgments

The author is solely responsible for the content of this report. The project advisory team consisted of Hannah Vargason, Natural Capital Investment Fund (NCIFund) and Andrew Crosson, Rural Support Partners. New Resources Solutions and CAN are grateful to the various practitioners and experts who contributed their insights and experiences to this effort. This project is made possible through funding from the New York Community Trust.



## Introduction

Clean energy, and particularly solar energy, is booming in many areas of the United States, but Central Appalachia lags behind. This paper is a practical guide to inform funders and investors interested in accelerating clean energy growth in the region under current economic conditions. Though it is critical to address enabling forces such as major policy or regulatory changes, it is not a short-term solution due to the time and effort to effect that type of change; furthermore, demonstrating demand and economic viability of clean energy in Central Appalachia would support those long-term efforts. The goal of this paper is to help funders/investors navigate this emerging market as it stands today: work around the given regulatory and policy barriers in the region, leverage market-rate investment structures, and partner with businesses and other development partners in the region, in an effort to transition Central Appalachia from being a cautious follower to a market maker and innovator in the clean energy industry.

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*Catalytic Capital will play a leadership role in solving solar's "chicken and egg" problem in the region*

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## Central Appalachia vs. the rest of the United States

The success of clean energy, particularly solar energy, in a state or region is determined by two primary drivers:

1. **Market Fundamentals.** Availability of the resource/opportunity, underlying labor costs and sophistication to complete projects, and comparable prices (e.g., coal-fired power vs. solar power). These are very challenging factors to change but nevertheless relevant for considering development in a region.
2. **Regulatory and Policy Support.** The entire country benefits from Federal tax credits like the solar Investment Tax Credit (26% in 2020), but state and utility driven regulatory and policy efforts push the major market players to focus efforts in certain states vs. others. Mandated Renewable Portfolio Standards; allowing third-party ownership; feed-in-tariffs; market-rate net metering policies; streamlined permitting processes; utility or state rebates and incentives; and a straightforward interconnection process are all examples of how regulatory and policy support can catalyze clean energy growth.

This is not an exclusive list of what is required for rapid clean energy development in a region, but it does highlight some primary barriers holding clean energy development back across the Central Appalachian region. Most of the region remains persistently weak in both areas, making it very difficult to drive clean energy growth without additional outside forces. Rather than accept this status quo, Central Appalachia can transform this situation with a dedicated focus on a third driver of clean energy development: Catalytic Capital.



# How to Accelerate Clean Energy Development in Central Appalachia

## Short-Term Goal: Unlock Capital

Central Appalachia needs to create a third driver to generate positive momentum and enable more clean energy development, starting in 2020.

3. **Catalytic Capital.** Some combination of flexible, patient, and low-cost capital which, when paired with market-rate investments, unlocks clean energy projects that wouldn't otherwise be developed and constructed. This proves regional demand and capabilities, and also grows the constituency to drive fundamental forces needed for transformational change in the region.

The body of this paper will dive deeper into the concept of Catalytic Capital, providing recommendations for how to maximize new clean energy projects into the region by combining 1) simple, efficient mechanisms to plug the gap from poor fundamentals, regulatory support, and policy support with 2) existing infrastructure and momentum already present in the commercial solar industry. Given the tailwinds supporting solar uptake in central Appalachia, such as the federal tax credit, opportunity on abandoned/degraded lands and consumer demand, this analysis will focus on the Commercial and Industrial (C&I) solar market to maximize impact of dollars deployed.

## Long-term Goal: Shift the Investment Ecosystem

Central Appalachia should drive change in financial, regulatory and policy support for the region by applying the recommendations laid out in the Appalachia Funders Network Energy Investment Roadmap (forthcoming) and the Central Appalachia Clean Energy Policy Toolkit<sup>1</sup>. Organized, grassroots advocacy efforts are often effective ways to influence this type of change. Additionally, momentum generated in the commercial solar industry will facilitate growth in other sectors of the solar market (residential and utility), as well as other clean technologies such as energy efficiency, energy storage, and electric vehicle charging stations.

## The Importance of Clean Energy in Central Appalachia

Clean energy provides positive environmental, social, and economic impacts to a community and region. Central Appalachia, with its strong history and identity as an energy-producing region, has even more to gain from being a leader in the clean energy sector. Here are a few highlights:

- ❖ **Environmental:** Reduced greenhouse gas emissions and air pollution<sup>2</sup>
- ❖ **Social:** Community-building, narrative change, and STEM education opportunities
- ❖ **Economic:** Job creation, reduced energy costs, and non-extractive investment into the community

### Getting Specific: Expected Benefits of a 700kW Solar Installation

- ❖ \$1MM of economic benefit via jobs & local equipment procurement
- ❖ \$400k in lifetime energy savings to the host entity
- ❖ 850 MWh of solar energy produced annually
- ❖ 610 equivalent metric tons of GHG saved, the carbon sequestration of ~800

<sup>1</sup> [Central Appalachia Clean Energy Policy Toolkit](#)

<sup>2</sup> <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>



## Solar: Strike While the Iron is Hot!

A variety of factors led us to recommend pursuing Catalytic Capital focused on the commercial solar market as the initial strategy:

1. While many clean energy sectors are worth exploring (e.g., energy efficiency, biomass, wind, geothermal, hydro, etc.), relatively mature technology, capacity, and markets combine to position solar as the most relevant and scalable in Appalachia.
2. Developing and constructing solar power projects has never been more affordable. Commercial solar install costs have decreased 67% since 2010 and 36% since 2014<sup>3</sup> and the market is expected to see continued technological improvements and price reductions over the next five years.
3. The federal Investment Tax Credit (ITC) is set to step down over the next few years (30% in 2019; 26% in 2020, 22% in 2021, and 10% in 2022+).
4. Numerous companies already focus on developing and installing solar in the Central Appalachian region (e.g., Third Sun Solar, Solar Energy Solution, Wilderness Trace Solar, Mountain View Solar, Solar Holler, SolFarm, Sugar Hollow Solar) but have largely refrained from pursuing commercial solar projects due to lack of viable funding sources.
5. Commercial-scale solar balances efficiencies of scale and profitability with complexity, timeline, and at-risk capital compared with residential and utility scale solar projects. With projects costing between \$100k - \$2MM, they are often too expensive to complete via a direct purchase but too small to warrant efficient financing options. There is interest from major utility-scale installers such as Cypress Creek Renewables, but they need demonstration projects approaching this scale to warrant a major investment in the region. Most importantly, developers and investors want certainty around the regulatory process and pricing – capital does not flow to uncertainty.

A substantial motivator for any larger grassroots effort, such as the effort suggested in this paper for long-term regulatory and policy change, can be triggered by proving the demand for solar would be present if solar were more readily available and economical. Injecting Catalytic Capital into the market will drive significant growth and momentum into the market, providing the motivation for stronger advocacy efforts. Without Catalytic Capital leading the way, it is more likely that the Central Appalachian region will doggedly lag behind other states' solar development efforts and the region will miss out on the opportunity to create local jobs and local wealth as a result of sector development.

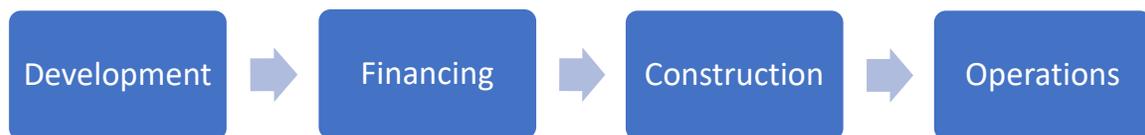


Figure 1: Lifecycle of a Solar Project.

<sup>3</sup> NREL PV System Cost Benchmark Study (inflation adjusted)

## CASE STUDY: RURAL ACTION



Investor-owned project facilitated by New Resource Solutions

**Location:** Athens, OH

**Completion:** August 2019

**Project Size:** 16 kW DC

**Project Cost:** ~\$35k

**Installer:** Third Sun Solar

**Host:** Non-profit organization

**Catalytic Capital:**

- Catalytic Grant
- Catalytic Equity

## CASE STUDY: NCIFUND



Host-owned project assisted by Natural Capital Investment Fund

**Location:** Glendale, WV

**Completion:** November 2019

**Project Size:** 624 kW DC

**Project Cost:** ~\$1.0MM

**Installer:** Mountain View Solar

**Host:** For-profit business

**Catalytic Capital:**

- Catalytic Grant

## CASE STUDY: MACED



Host-owned project facilitated by MACED

**Location:** Ashland, KY

**Completion:** September 2019

**Project Size:** 39 kW DC

**Project Cost:** ~\$80k

**Installer:** Solar Energy Solutions

**Host:** For-profit business

**Catalytic Capital:**

- Catalytic Grant

## Solving Solar's "Chicken and Egg" Problem Through Catalytic Capital

The average sales cycle for a commercial solar project ranges from 6-12 months. Given the weak nature of solar fundamentals, regulatory support, and policy support in the majority of the region, developers aren't spending their precious time and resources generating a pipeline of commercial solar projects. Unfortunately, without a robust project pipeline, there is a dearth of investment capital to support them. Hence solar's "chicken and egg" problem: which to focus on first, project pipeline or project capital?

Catalytic Capital will play a leading role in solving solar's "chicken and egg" problem in the region, by 1) supporting projects that generate additional jobs, 2) allowing communities to gain control over their power prices via schools, municipalities, non-profits and others, 3) promoting resilience, 4) building momentum for grassroots advocacy efforts, and 5) changing the narrative around extractive forms of economic development. While the environmental benefits are a plus, typically a commercial host entity will only choose to go solar if it will save on their bottom line. Given the existing regional challenges, commercial solar does not typically result in sufficient return on investment for a commercial host entity relative to other investment opportunities/needs. In order to attract market-rate capital and encourage solar developers to build a commercial solar pipeline, Catalytic Capital needs to first commit to bridging the gap in commercial solar projects.

## Existing Commercial Solar Market Overview

The commercial solar market across the US is approximately \$5B per year, with approximately \$4B of that market accounted for via investor-owned financing structures. It's important to partner with these existing market funding sources to maximize additionality with and Catalytic Capital deployed.



Commercial solar can be segmented into two categories: host-owned and investor-owned, both of which come with advantages and disadvantages, as further outlined below. The major difference between host-owned and investor-owned solar revolves around the increased complexity, and therefore timeline, for investor-owned projects to complete the “financing” step. Despite its complexity, however, it’s necessary for solar’s growth and can provide value to both the host and investor.

	Host-Owned	Investor-Owned
Description	The Host pays for, owns, operates, and receives all financial benefits, including tax benefits, from the solar system and, as a result, receives the power generated for free.	A third-party Investor pays for, owns, operates, and receives the tax benefits from the solar system. A Host agrees to pay a pre-agreed rate for the power generated over a long period time (typically 20-25 years) and captures financial benefits via savings on their future power bills.
Comparative Advantages	<ul style="list-style-type: none"> <li>• Simple with few parties involved.</li> <li>• Host takes all risk and receives all upside/downside.</li> </ul>	<ul style="list-style-type: none"> <li>• Investor’s primary business is operating solar systems, resulting in more optimal system performance.</li> <li>• Investor can monetize available tax benefits.</li> <li>• Host fixes future operational expenses for budgetary purposes</li> </ul>
Comparative Disadvantages	<ul style="list-style-type: none"> <li>• Requires big up-front cash outlays and some financial savviness.</li> <li>• Many entities are unable to use available tax benefits (e.g., non-profits).</li> <li>• The payback is not significant or fast enough to compete with other investment opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>• Complicated and lengthy process to understand and structure.</li> <li>• Requires Host to exist and buy power for 20+ years.</li> <li>• In the unexpected event of declining utility power prices, the Host would be locked into paying a higher rate.</li> </ul>

Regardless of host-owned or investor-owned structures, no entity typically wants to pay for the entire system outright. As a result, various market-rate financing structures exist today. This paper isn’t intended to illuminate each and every financing option or structure available. Rather, it’s intended to provide a flavor of the most common existing market-rate financing structures across the country. Here are several frequently used financing mechanisms, commonly used in some combination, to make up the capital stack:

Financing Option	Explanation	Primary Providers	Host or Investor-owned?
Debt	Loans based on the expected performance of the solar system.	Banks or bank-like entities, insurance companies, CDFIs, Non-profit PRLs, impact investment funds	Both. For host-owned, typically tied to a Host’s balance sheet
Grants	Grants or rebates which incentivize solar construction without repayment requirements.	USDA, foundations, utility and state programs, impact investment funds	Typically, only host-owned
Tax Equity	A tax-driven investment that monetizes tax credits and depreciation, notoriously difficult to obtain for small projects.	Banks, insurance companies, HNW individuals, family offices, widely-held C-Corps (e.g., Google, Facebook, Patagonia)	Typically, only investor-owned
Owner Equity	Manages the system and subordinates all cash and tax benefits until the other financing parties receive their allotments.	Host entities or Investment funds, High Net Worth (HNW) individuals, family offices, CDFIs	Both

# How Catalytic Capital Will Fill the Gaps in Central Appalachian Commercial Solar

## Catalytic Capital Investment Options

Given the varied nature of regulations and policy across the region, there is no “one size fits all” solution for Catalytic Capital to disrupt the pipeline and capital problem. Numerous solutions could work within the region; the least complex should be applied in the short-term.

Catalytic Option	Description	Examples	Complexity	Risk	Impact	Financial Return
Catalytic Debt	Fund debt at 0-2% interest rates, e.g. made as PRI	PRI, sub-market rate debt	Medium	Medium	High	Low
Catalytic Tax Equity	Dedicated pool of capital able to act in the Tax Equity investor role for investor-owned projects	C-Corp or individual with substantial passive income	Very High	Low	Very High	High
Catalytic Equity	Invest in a subordinate or disproportional equity position, allowing the Owner Equity to realize an earlier return on investment	PRI, First-loss equity position, sub-market rate returns	Medium	High	Medium	Medium
Catalytic Grants	Grant dollars with no repayment obligations, to be deployed by a trusted entity at their discretion to unlock more solar projects	Credit enhancements, interest rate buy-downs, host-raised crowd funding grants	Low	N/A – funded up front	Varies, depending on \$s needed and structure	None
Catalytic Support	Dedicated pool of capital to support development costs, legal work and analyses, workforce training programs, etc.	Project-based grants, operational grants	Low	N/A – funded up front	Medium	None

## Assumptions

1. Catalytic Capital will be used as leverage to maximize the amount of new solar constructed per dollar provided (Impact).
2. Catalytic Capital will be deployed through partnerships with market-rate investors who make solar a core focus. This will minimize risk, minimize complexity, and ensure incentives are aligned to stretch Catalytic Capital as far as possible.



## Recommendations and Next Steps

If a clear and simple answer were available to unlock commercial solar for Central Appalachia, it would have been understood long ago! As a result, focus, leadership, and financial support from those most passionate about clean energy are required for success in the region.

In an effort to balance complexity and impact with immediacy and scalability across the region, the recommended next steps to propel commercial solar forward include the following:

- ❖ Further develop and fund the lowest complexity Catalytic options: **Catalytic Grants**, **Catalytic Debt**, and **Catalytic Support**.
- ❖ Commit capital to each Catalytic Option and break free of the solar “chicken and egg” problem.
- ❖ Select strategic partners:
  - Trusted non-profits to act as regional “hubs” for building pipeline, interacting with local Hosts, and serving as a gatekeeper to deploy the Catalytic Capital (e.g. members of the CAN Clean Energy Practitioner Group).
  - Solar-focused, mission-aligned, management and consulting entities to structure specific solutions so that the Catalytic Capital is deployed in a risk-adjusted fashion (e.g., New Resource Solutions, Coalition for Green Capital).
  - Market-rate investors to deploy the balance of capital needed for investor-owned projects (e.g., mission-aligned Owner Equity, CDFIs, mission-aligned Tax Equity).
- ❖ When appropriate, spread the word to regional developers and interested Hosts regarding available solutions for Catalytic Capital.
  - Host-Owned: Initially focus on medium-sized projects (\$50k-\$200k) to maximize number of beneficiaries.
  - Investor-Owned: Initially focus on larger projects (>\$300k) with long-standing Host entities to compensate for the more complicated structure.
- ❖ Encourage beneficiaries of Catalytic Capital to play a leadership role in the grassroots efforts to influence more sustainable change.

