

# **Here Comes the Sun: Community Benefits to be Leveraged on Central Appalachian Solar Developments**

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## Executive Summary

For decades, the Appalachian region has been characterized by underdevelopment compared to other areas across the United States (US). This has been modeled in its propensity for higher rates of poverty, lower educational attainment, employment, and median income than other rural counties spanning the country (Srygley et al., 2024). While many have pointed towards a lack of economic diversity, or a “resource curse” for this lagged progress, it would seem much of the issue falls back on the sheer amount of land held in large parcels by outside corporate owners (Brumfield, 2019). Due to the speculative nature of this land, it sits unused and often degraded by historic coal or strip mining. As such, these parcels hold little value and are taxed at excessively low rates. Further, due to legislation in Central Appalachian states like Virginia or Tennessee, large parcels are often classified as “agricultural land,” and thus subject to further tax breaks (Payne, 2016; Stammers, 2022). Absentee ownership has robbed entire communities of the property tax base necessary to provide sufficient public goods (Eisenberg, 2017). Due to the speculative nature of these parcels, there are also no opportunities to profit from the land by the community, and fewer employment opportunities (Schwartzman, 2022).

Since the decline of coal, the Appalachian economy and employment have suffered immensely. The entire Appalachian region was beholden to a boom/bust cycle during the coal economy. Because this tended to be the domineering industry across the area, as many coal companies have since gone bankrupt, communities are left with few opportunities to forge a better life (Bowen et al., 2020). Now, as landowners are beginning to realize coal may not reemerge as the dominant industry it once was, they are leasing their land to clean energy developments, like solar. The issue now is that solar threatens to perpetuate some of the same inequities that coal did during a bust period, with few job opportunities, sub-union wages, and a continued legacy of minuscule tax revenue (Marchant & Smith, 2025; Richardson, 2023; Scheiber, 2021).

While the situation appears bleak, there is also a positive economic opportunity in solar developments for Central Appalachian communities, if they can leverage certain community benefits. In this report, I evaluated four of these community benefit schemes:

1. Community benefit agreements,
2. Community benefit ordinances,
3. Rezoning of agricultural land,
4. And revenue share ordinances.

Each alternative was evaluated and compared to one another based on three criteria:

1. Political feasibility,
2. Administrative feasibility,
3. And cost effectiveness.

After a thorough evaluation of the pros and cons of each policy alternative, I recommend that Central Appalachian localities facing a proposal for new solar development implement a revenue share ordinance.

## **Mandatory Disclaimer**

The author conducted this study as part of the professional education program at the Frank Batten School of Leadership and Public Policy, at the University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author and are not necessarily endorsed by the Batten School, the University of Virginia, the Appalachian Citizens Law Center, or by any other agency.

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## Introduction

As the climate warms and climate-related disasters take entire communities with them, the United States (US) must invest in more clean energy alternatives. While solar developments crop up across the Central Appalachian region, it is important that we are honest about the reality of solar development as a mechanism of economic growth. Even though solar farms seldom create many long-term jobs, there is an opportunity to prop up host communities via community benefits (RENEW Wisconsin, 2024). As Central Appalachian localities navigate the solar landscape, they should know how solar can benefit them as well as the climate. Knowledge is power, and this policy analysis should guide localities interested in observing how utility-scale solar can not only benefit the world at large, but also their communities.

## Problem Statement

For well over a century, the Appalachian region has been marked by themes of dispossession and extraction. From timber to coal and natural gas, the Appalachian region has contributed its natural resources to the entire country's development, yet the region itself remains largely underdeveloped (Payne, 2016; Zipper et al., 2020). In an area where about 75% of surface land and 80% of mineral rights are owned by actors outside the region, and such land is taxed at exceedingly low rates, Appalachian communities suffer from little tax revenue to fund public facilities (Eisenberg, 2017). These ownership patterns have been associated with higher poverty rates, fewer opportunities, and suffering public works (Appalachian Land Ownership Task Force, 1993; Thomas & Kelly, 2022). The coal industry, which primarily operated on this absentee-owned land, helped keep many Appalachian communities propped up for years. However, with a boom/bust economy, employment and wages were unstable and unpredictable. Further, the coal industry has significantly declined, with West Virginia and Kentucky losing 38,000 coal jobs over the last 30 years (Eisenberg, 2017). In 2005, coal comprised less than 20% of the labor force in 13 Central Appalachian counties, the decline of which has contributed to economic hardships and rampant poverty for entire communities (Blonz et al., 2023; Zipper et al., 2020). **As demand for coal has waned, partly due to an increase in demand for cleaner alternatives, clean energy developments risk exacerbating the same inequities that existed under the coal economy (Bowen et al., 2020).**

## About the Appalachian Citizens Law Center

The Appalachian Citizens Law Center (ACLC) conducts policy research, nonprofit litigation and legal services, and advocacy work. Most of their law work concerns environmental justice, linked to coal and extractive industries in the Appalachian region. Their policy research spans a variety of topics regarding economic and environmental justice. They integrate their knowledge of the law in their research to find legal and feasible solutions to wicked policy problems (Appalachian Citizens' Law Center, 2022). The ACLC has requested research into why community benefit agreements have not been leveraged in Appalachian communities and what might hold them back. This research is being done in conjunction with a solar impact study by Karen Rignal from the University of Kentucky, and other organizations also interested in the impact that community benefits can have.

## Review of the Literature

### Background

For decades, the Appalachian region has been characterized by underdevelopment compared to the other regions across the United States. Researchers and historians have cited a lack of economic diversity, “culture of poverty,” resource curse, etc., for this widespread underdevelopment (Brumfield, 2019; Appalachian Land Ownership Task Force, 1993). However, research over the past few decades tells a deeper story. Through its analysis of 80 counties spanning the region, the 1981 Land Study highlighted the severity of absentee and corporate-owned land across the Appalachian Region (Appalachian Land Ownership Task Force, 1983). Absentee-owned land, as understood by the Land Ownership Task Force, is the ownership of land by actors outside of the communities in which it exists. More specifically, absentee-owned land is not only held by actors outside of the county in which it exists, but most often outside of the state, or the Appalachian region altogether (Appalachian Land Ownership Task Force, 1981). Across the region, an estimated 75% of surface land and 80% of mineral rights were found to be absentee-owned (Appalachian Land Ownership Taskforce, 1983). Corporations are the largest subgroup of absentee ownership, and most likely group to own land absentee (Appalachian Land Ownership Taskforce, 1983).

While a comprehensive land study the size of the Appalachian Land Ownership Taskforce has not been conducted since, a 2012 land study in West Virginia shows that while the amount of absentee-owned land has decreased in the last several decades, the amount of land still absentee and corporately held remains significant. At the time of the 1981 Appalachian land study and West Virginia’s 1974 land study, two-thirds of the state’s surface acres were absentee-owned. Now, the top 25 corporate absentee owners hold only 17.6% of the state's surface land (Spence et al., 2013). While this is a large decline, this still represents a rather significant portion of absentee-owned land that has severe economic impacts on West Virginian localities. In six West Virginia counties, absentee owners hold over 50% of the land (Spence et al., 2013). This story is not exceptional to West Virginia, but is common across the Central Appalachian region (Appalachian Land Ownership Task Force, 1983; Counts, 2020; Spence et al., 2013). Large corporate owners hold land in speculation, often for their natural resource potential, whether coal, natural gas, timber, etc. The incentives to give up the land are extremely low, given that taxes on the land remain lower than those of even family farms (Counts, 2020). Large parcels are often zoned agricultural, which is taxed at lower rates than industrial or commercial. Additionally, much of the speculatively held land is degraded by past uses and lacks reclamation. To sit in speculation means the land remains idle and unimproved. This, often coupled with degradation caused by mining, keeps property values low (Payne, 2016; Stammers, 2022). Further, while these parcels have shown to change hands occasionally, these transactions occur between corporations, often off the market. As a result, the market value of the land is kept artificially low, further influencing the tax rate (Payne, 2016; Spence et al., 2013).

Since the decline of coal, the Appalachian economy and employment have suffered immensely. By 2017, West Virginia and Kentucky alone had lost about 38,000 coal jobs over a 30 year period (Eisenberg, 2017). This figure has likely risen since. During the coal economy, the entire Appalachian region was beholden to a boom/bust cycle. Because this tended to be the domineering industry across the region, as many coal companies have since gone bankrupt, communities are left with few opportunities or ways to make a better life (Bowen et al., 2020). The decline of coal came with increased rates of poverty and widespread economic hardship (Blonz et al., 2023; Zipper et al., 2020). As landowners are beginning to realize coal may not

come back, they are leasing their land to a new profit venture: clean energy developments, such as solar. The issue now is that solar threatens to perpetuate the same inequities that coal did during a bust period, with few job opportunities, sub-union wages, and a continued legacy of minuscule tax revenue (Marchant & Smith, 2025; Richardson, 2023; Scheiber, 2021).

These large Appalachian parcels become attractive to solar developers for several important reasons. First, the most important thing to any solar development is access to transmission lines for connection to the grid (Dustin Mulvaney, personal communication, November 20, 2024). Access to transmission lines is one of the biggest hurdles holding solar and any new energy developments back from expanding their reach. A Department of Energy (DOE) report estimated that to meet clean energy demands, the number of transmission lines across the United States (US) would need to increase by 60% by 2030. However, this is incredibly complicated work, requiring immense funds and organization between states, localities, and the federal government (*Queued Up... But in Need of Transmission*, n.d.). Because former mine sites were built near transmission lines, they are some of the few places to locate new solar developments. Solar developments also require level land, something many of these large parcels are, especially those once used for strip mining. Among other things, solar developers want relatively inexpensive land to develop and occupy. While former mine sites can require a significant investment, due to the need for reclamation, there have been federal tax incentives through the Inflation Reduction Act (IRA) to redevelop former mine sites. Further, many states provide incentives for redevelopment of brownfields, the combination of which can sometimes bring the costs down to what they would have been on a greenfield, or lower (The Nature Conservancy, 2024). While it is unclear what loss of funds due to the new administration might mean for solar development on brownfields, developers will also benefit from lower property taxes, for all of the aforementioned reasons. The land is zoned agricultural, will be degraded upon beginning the lease agreement, and seldom goes on the market (Counts, 2020; Eisenberg, 2017; Payne, 2016; Stammers, 2022).

The timber, coal, and natural gas industries in Appalachia have all been extractive in two significant ways. First, they have been physically extractive, as valuable natural resources are being taken and supplied elsewhere for profit. This has led to environmental degradation, much of which is on land that has yet to be reclaimed. In Central Appalachia alone, *at least* 233,000 acres of land were damaged by mining before 1977, and continue to need reclamation (Payne, 2016). Second, as mentioned above, these industries sit atop land owned by outside actors, much of which by corporations (Appalachian Land Ownership Task Force, 1983). Not only does this mean that much of the profits for these industries flow outside of the communities being extracted from, but this land is taxed at excessively inexpensive rates due to lower rate structures and assessment practices (Eisenberg, 2017). According to the 1981 land study, greater than 25% of mineral rights owners across Appalachia pay less than 25 cents per acre in property taxes (The Land Ownership Task Force, 1983). Though the value of land and minerals has increased rapidly over the years, the communities where these resources exist have not experienced a proportional increase in property tax revenue (Eisenberg, 2017).

Though not often considered extractive, clean energy developments in the Appalachian context present unique challenges to local communities. Like formerly extractive industries in the region, solar energy will be taking a natural resource (sunlight), to which benefits and profits will likely flow outside of the region because of continued absentee control of the land. Contrary to what many hoped, solar does not create many jobs for host communities either. With solar in particular, the only jobs forged will be less than 2 people per megawatt of electricity in the



roughly eight-to-18-month construction period, assuming that labor is not outsourced to those more experienced (Marchant & Smith, 2025; RENEW Wisconsin, 2024; Richardson, 2023; Scheiber, 2021). After the project's construction, only a handful of people will be employed by these companies, except perhaps for occasional maintenance or inspections if they choose not to outsource these jobs as well. It is estimated that once fully operational, a 500 MW solar facility will only employ about five operations and maintenance workers (RENEW Wisconsin, 2024).

## Consequences of the Problem

It should be noted that solar developments, especially on brownfield sites, can potentially increase assessment rates, as the development could constitute an improvement to the land. Thus, these clean energy developments can help increase the property tax base for host communities (The Nature Conservancy, 2024). While the impact of solar will ultimately depend on an amalgamation of state and local policies, there is substantial evidence that solar developments would significantly increase property tax revenue, especially for rural counties (Mangum, 2020; Reality Check on Ross's Stop Solar Claim, 2021; The Nature Conservancy, 2024). Additionally, some studies have looked at the effect of utility-scale solar on the property values of surrounding homes, though the results are extremely varied. Some studies suggest a positive impact on property values, and thus tax revenue for the county, while others suggest a negative or no effect at all (Elmallah et al., 2023; Gaur & Lang, 2020; Hao & Michaud, 2024; Lines & McGarr, 2021; Marin, 2019; Al-Hamoodah et al., 2018). One study separated the effect of utility-scale solar on property values of low-income vs. higher-income housing in North Carolina within a three-mile radius of a solar farm. This study found the impact on low-income housing property values was negative, while it was positive for higher and middle-income housing (Wang, 2022). Given the socioeconomic standing of most Central Appalachian counties, it is most likely that these homes would fall under the low-income category. Additionally, the Western part of North Carolina is part of the Appalachian region, perhaps making the results of this study slightly more generalizable to the case of Central Appalachian host communities.

Even given the increased property value of the land on which solar is developed, this increase is unlikely to substantially change property taxes, even if the developer reclaims the land. In states like Virginia and Tennessee, there are exemptions and abatement policies that exempt solar developers from paying a certain amount of their property taxes on their solar facilities, though not necessarily the land on which it sits (Hintz et al., 2021). States like this are unable to reap the full benefits of solar energy. For example, a 100 MW solar farm under Virginia's automatic Machinery and Tools Tax scheme might contribute an average of only about \$100,000 a year in property tax revenue to its host community (Mangum et al., 2020). To put this into perspective, this is about the average price of one gas-powered school bus (2022 *State School Bus Contract*, n.d.). In Virginia, local governments obtain about 66% of their overall revenue from property taxes, making this contribution unsubstantial (Mangum et al., 2020). Local tax revenues pay for public works, such as schools, local employees, solid waste management, water, etc. As Appalachian communities have lived for decades without a sufficient property tax base, these public resources and subsequent opportunities suffer (Eisenberg, 2017).

Further, aside from their initial construction, clean energy industries like solar create minimal long-term jobs, and the jobs they create often pay sub-union wages (RENEW Wisconsin, 2024; Scheiber, 2021). Even during the initial construction of the project, it is likely that developers will outsource the construction to people outside the community, with more



experience installing solar facilities (Marchant & Smith, 2025). While it is clear that solar farms improve the tax base of the localities that host them, put into perspective, this improvement is not as impactful as it could be, especially when they contribute few long-term jobs. While host communities in the Central Appalachian region will likely benefit from large landowners leasing out to solar developers, these benefits do not constitute substantial change for a region marred by poverty and low educational attainment due to a lack of opportunity by historic dispossession of land (Schwartzman, 2022; Srygley et al., 2024). Thus, while they should continue to entertain solar developments in their localities, measures can and should be taken to improve the benefits to host communities.

## **Evidence on Potential Solutions**

The United States has a long history of developing agreements to address neighborhood concerns over new developments. Whether it be through negotiated exactions beginning in the 1920's, conditional rezonings, development agreements, conditional negative declarations in environmental impact reviews, compensated sitting agreements, etc., these types of agreements have been pivotal in establishing the idea that communities can benefit from a development in ways not inherent to the development itself (Been, 2010; Ellickson et al., 2021; Federal Highway Administration, 2021). Community benefit schemes commonly refer to project agreements such as community benefit agreements (CBAs), community benefit plans (CBPs), host community agreements, project labor agreements, good neighbor agreements, etc. However, for the purpose of this discussion, we will also consider any policy that awards additional benefits to communities, not otherwise guaranteed by the original development plan (Riedl et al., 2025; Said et al., 2023). Thus, we will include conversations on “benefits” gained from rezoning and revenue share policies.

### ***Community Benefit Agreements (CBAs)***

Community benefit agreements are legally binding agreements between a developer and a community organization that require some benefit be paid to a community in exchange for support on a development. Benefits might include ensuring local hiring and job creation, funding public projects, providing cash payments to the local government, etc. (Been, 2010; Dustin Mulvaney, personal communication, November 20, 2024). Interestingly, these agreements have been used in places like California to compensate for lost property tax revenue due to solar development. While the lack of tax revenue in Appalachia is due to lower rate structures on “agricultural” land, solar energy developments in California are exempt from property taxes altogether. Thus, CBAs have been required by the state to compensate for lost public funds (Dustin Mulvaney, personal communication, November 20, 2024). On the face of it, these types of agreements could give host communities more agency over their economic development futures; however, more analysis must be done to estimate how these agreements could play out in the Central Appalachian context.

In 2001, the first community benefit agreement was signed by Los Angeles (LA) community organizations to leverage benefits for their community from the new LA Staples Center development (Been, 2010). This began a wave of community benefit agreements being leveraged on developments across the US. Two decades later, the Biden administration signed the Inflation Reduction Act and Bipartisan Infrastructure Bill into law, which would invest in clean energy developments across the country. As part of these large pieces of legislation, it was stipulated that any developments that obtain funding through these programs via the DOE would

be required to submit a community benefit plan to prove compliance with these just transition initiatives. The idea was to bring more agency and community benefits to those who have been historically marginalized, especially by prior efforts at industrialization (Said et al., 2023). While community benefit plans differ from CBAs in that they are not legally binding, many CBPs lay the groundwork to leverage a CBA (Carbon Action Alliance, 2024).

Despite this, community benefit agreements have not been particularly prevalent in the Appalachian region. There may be a few important reasons for this. First, among the literature, a constant best practice for leveraging a CBA is that ideally, many community coalitions would come together in an attempt to negotiate their conditions, long before approval for a development is given by their municipality (Bechtel, 2008; Key Reforms: Community Benefits Agreements, n.d.). This allows residents to have more of a say in what happens with a development than if they start negotiating after the project has already been approved. At that point, developers do not need the community's support, and are thus unlikely to look for it. CBAs generally require voluntary take-up (Said et al., 2023). Unless a solar development receives funding from the Department of Energy or is mandated by the state, a CBA is not required of developers (Mills et al., 2023). For developers to enter into a CBA in the first place, it needs to benefit them in their ability to get the project moving along quicker. Opposition could lead to stops or delays in the development process, which can be costly to the developer. If the development has community support, they are more likely to get the project moving along sooner (Been, 2010). With this in mind, it becomes extremely important that residents know about a development in order to coalesce around an issue. However, in a study done to record the perspectives of solar and wind developers on community engagement, 78% of solar developer respondents agreed that they typically wait to announce a project to a host community until after they know for sure they have enough land to develop. When developers make important decisions before public opinion, it leaves minimal time for host communities to respond and leverage potential agreements (Nilson et al., 2024).

Second, negotiations can take three to ten months, depending on the situation's complexity and the number of stakeholders involved (Lee, 2022). In Central Appalachian communities that are already economically strapped, both monetarily and in terms of resources, the feasibility of leveraging such an agreement seems difficult to imagine. Third, it is often a best practice of CBAs that host communities have many organizations with differing viewpoints and stakes in the project come together to leverage the agreement (Been, 2010; Fazio & Wallace, 2010). While CBAs are alive and well in other states, like California, in New York, they have been decreasing in popularity due to government influence in the process, exclusion of relevant community stakeholders, and the performative nature of past agreements (Demaue, 2022). Central Appalachian communities would likely not be immune to this, especially in areas where those in government are wealthier than the average regional population and have more connections (Brumfeild, 2019). Fourth, developers generally have much more power in CBA negotiations than local communities, as they have the money and organization to afford good legal representation. For rural communities, like those in Appalachia, populations are more sparse, less populous, and there are fewer organizations and resources to leverage an agreement (Ferguson-Oles, 2017). To circumvent some of this asymmetry in leveraging a CBA, a local ordinance or state law might require developers to enter into one. However, this presents its own set of challenges.

The community would need a firm grasp of who would even be negotiating the CBA with the developer. If this specification excludes other community groups or organizers, it can

cause conflict and limit the number of voices involved. Further, suppose a developer sees a CBA as something imposed on them by the government. In that case, this can fracture the relationship between the developer and community in ways that can hurt the negotiation process. For these reasons, Gross (2009) suggests that local and state governments have better options to involve the community in land use developments, such as requiring “community impact reports” or broad cost/benefit analysis before project approval. However, these alone do not yield community benefits, and rural communities often lack the expertise that may be required in crafting zoning ordinances or comprehensive plans addressing utility-scale solar developments (Daniels & Wagner, 2022). This might be especially pronounced in Central Appalachia, where a legal desert exists.

While CBAs have the potential to award host communities large sums of money, jobs, etc., the follow-through on these types of programs has, in some cases, been less than adequate. In the Northern Appalachian County of Beaver, Pennsylvania, a CBA was leveraged against developer Shell as a mechanism of economic development for the locality. Shell promised to create thousands of new jobs for the community and renew local business investments. However, over a decade later, Beaver County has a shrinking population, higher unemployment rates, and a diminishing GDP (Stone & De Place, 2025). It is unclear how much of this effect was due to a lack of follow-through, vs. people not wanting to live next to a petrochemical plant. The context of concern in this report is solar development, which does not have the negative impacts on the environment that fossil fuels and petrochemicals do, which may cause people to leave the area. All of this being said, it should be noted that there are not many reports on the success of CBAs. It is possible this is not due to their lack of success, but the fact that they are first challenging to track and research, considering every CBA looks different, and second, that a contract that works will not raise alarms like a poor one might. Thus, further research is needed to explore the impact of CBAs across a larger sample size.

### ***Community Benefit Ordinance (CBO)***

A community benefit ordinance resembles community benefit agreements, when addressing some of the shortcomings of a regular CBA. Communities that have utilized CBAs in the past for multiple developments have had to run multiple negotiations and convene whole community groups for each CBA separately. Each negotiation takes immense time and resources, and it has been questionable whether the costs justify the means. After realizing how inefficient this was and noticing other relevant shortfalls of CBAs, Detroit, Michigan, implemented an ordinance to codify CBAs into local code. So far, this is the only record of a CBO. While it has also seen its fair share of successes and failures, results have proven somewhat more hopeful than those of other popular CBAs.

A community benefit ordinance is an ordinance in a municipality’s code that stipulates any development meeting a specific criterion must undergo negotiation with community stakeholders to establish a CBA. In Detroit, this looks like any project that is \$75 million or more in value and receives either \$1 million or more in property tax abatement or a City-held land sale or transfer valued at \$1 million or greater (Saha et al., 2024). The City’s Planning and Development Department arranges the meetings for negotiations, and said negotiations take place between nine members of an established neighborhood advisory council (NAC) (made up of seven appointed and two elected officials from the impacted census tract) and the developer (Saha et al., 2024). Since Detroit’s CBO has been established, it has triggered 14 CBAs, 11 of which have gone through, and 4 are still in the negotiation process (Saha et al., 2024).

While Detroit's CBO has brought in millions of dollars of benefits towards city improvements and economic development measures, some who have participated in these negotiations claim the benefits pale compared to the subsidies the development receives, and some benefits are even overestimated. For instance, one study of the first ten CBAs found that about 20% of the benefits recorded as gained from the development were pre-existing conditions that would have existed with or without the development (Berglund, 2020). This is an ongoing issue with the CBO and standalone CBAs, where developers may find loopholes or ways not to provide substantial benefits (Williamson, 2021). Like standalone CBAs, the agreements made under Detroit's CBO suffered from what community participants posited as a lack of representation given to the whole community and unfair negotiation proceedings. Because the neighborhood advisory council only has two elected community members on it, while the rest are appointed, some community members believe those negotiating for benefits are not representative of the whole community. Additionally, those selected tend to be people who are not experts in land use law, policy, or procedures, nor are they technical experts on the proposed developments. This, along with little time to negotiate benefits, causes NAC members to ask for fewer benefits than they probably could (Saha et al., 2024). This asymmetry in power and knowledge between the developer and the community is something Appalachian communities would likely face as well if a CBO were to be implemented.

Like CBAs, a CBO would be expensive to implement and require legal and technical support that most Appalachian communities could not access. While one of the biggest criticisms facing Detroit's CBO is a lack of enforcement mechanisms compared to a CBA, it does seem in the Appalachian context that a CBO might be more administratively feasible, given the slightly greater resources available to a local government, as opposed to the community at large. In the case of Detroit, some experts have argued that because the municipality would be in charge of enforcing the ordinance, deciding whether to impose penalties might come into play (Gross et al., 2005). Because the local government may not want to fracture relationships with the developer, they may stand down and shy away from imposing any penalties, at the expense of the community they are supposed to serve (Gargaro, 2023; Gross, 2009; Saha et al., 2024). While this is a negative aspect of a CBO, especially when there is cronyism within the local government, for a Central Appalachian community, it would seem unlikely community members alone would have a coalition strong enough, or the necessary expertise to impose penalties on a developer in noncompliance of their contract, as would be the case under a CBA. This is especially true if even community organizations in larger cities could not (Williamson, 2021). While Central Appalachian communities are not immune to local cronyism, a CBO might be more administratively feasible than a standalone CBA, given the need for fewer people involved in negotiations, and shorter time tables for negotiation. Additionally, local governments would likely be more equipped to punish noncompliance than community members.

### ***Rezoning Agricultural Land***

As discussed previously, Central Appalachian localities have long struggled to collect sufficient property tax revenues, partly due to lower rate structures on agriculturally zoned land. With the higher proportions of absentee owned land being anywhere from 30% to even 90% of a county's surface land, taxation, aside from absentee ownership as a whole, is one of the overarching issues concerning Central Appalachian underdevelopment (Appalachian Land Ownership Task Force, 1983; Brumfield, 2019; Counts, 2020; Spence et al., 2013). In the absence of true land reform, tax policies can be changed to mitigate the effects of absentee

ownership until larger-scale reformations can occur (Appalachian Land Ownership Task Force, 1983).

The decision of states like Virginia to use value taxation of agricultural land is meant to benefit small farmers, but inadvertently benefits large corporate landholders. Use value taxation, as the name implies, allows landowners to tax their land based on its use classification, rather than its fair market value (Groover & Bruce, 2011). In Virginia, agricultural land on which the locality chooses to utilize use-value taxation tends to be assessed at less than a third of the rate of already low agriculturally assessed land under a fair market assessment (Mangum et al., 2020). However, as we have seen, even the fair market value of these large parcels remains low due to the fact that they seldom go on the market (Payne, 2016). Regardless of the name or particular policy mechanism, across Central Appalachian states, agricultural land is assessed at a much lower rate than industrial land. Furthermore, despite its industrial use, energy production has historically been conducted on agriculturally zoned land.

A recent policy analysis by Mangum et al (2020) has suggested that rezoning property from use value taxed agricultural land in Virginia, to industrial, could increase property tax revenue per acre elevenfold. This estimate would indicate that rezoning land to industrial use could be an especially salient solution to low assessment rates. While solar development itself could improve land, which is already increasing its assessed value, rezoning to industrial would significantly increase the tax rate. Places like Madison County, Virginia, have already caught on to the zoning issue for solar developments. As such, they have required by local ordinances that new solar developments be sited on land zoned industrial, as opposed to agricultural (Daniels & Wagner, 2022).

Given how obvious this solution may seem, it would be fair to assume there are reasons this has not been done on a broader scale. In many rural and Central Appalachian counties, changing the zoning designation for open land from anything other than agricultural can be jarring for communities that have historically been taken advantage of by industrial development (Harley & Wexner, 2022; *Industrialization in Appalachia*, n.d.; Paul Pelish, personal communication, January 4, 2025). Many rural areas do not want to see land developed, worried it might impact the character of their community, or even infringe on their freedom, despite absentee-owned land having done that already (Abdalla et al., 1997; Paul Pelish, personal communication, January 4, 2025). Thus, even if the use of the land is for solar production, no matter the way it is zoned, citizens may still be opposed to changing the zoning designation, especially out of concern for what may take solar's spot once it has been decommissioned.

### ***Revenue Share Ordinance***

The option for localities to implement a revenue share ordinance into their local codes was written into Virginia law in 2020 (Weldon Cooper Center for Public Service, n.d.). Once a municipality implements a revenue share ordinance, they are entitled to up to \$1,400 per MW of electricity generated by the solar development, under the condition that taxes on equipment are no longer levied on the developer. Any solar project above 20 MW for which this program has been implemented after January 1st of 2021, will experience a 10% increase to their revenue share on July 1st, 2026, and then every five years thereafter (§ 58.1-2636. *Revenue share for solar energy projects and energy storage systems*, n.d.). As of March 2024, 26 Virginia localities have implemented a revenue share ordinance on solar developments. Five of these 26 localities are in Southwestern Virginia and part of the Central Appalachian region.



While not implemented in any other Central Appalachian state laws, the option for a Revenue Share ordinance is exciting, as it resembles coal severance taxes, something that has been used to prop up the Central Appalachian region for decades. Severance taxes require coal companies to record how much coal they produce, and sever a percentage of their revenue to be redistributed back to their state. A 1990 study on the effects of coal severance suggested that counties that received coal severance tax benefits and had economic development programs experienced higher improvement rates across five indicators. Counties receiving severance taxes and economic development programs saw increased per capita income, decreased poverty rates, increased employment growth, decreased unemployment rates, and increased bank deposits. It should be noted, however, that the only Central Appalachian states included in this study were Kentucky, Virginia, and West Virginia. The rest were Western states. While Kentucky was counted as having sufficient coal severance, Virginia and West Virginia were not (Lenzi, 1990). A more recent article on coal severance in Kentucky would suggest, however, that the impact of coal severance tax is difficult to measure given the impact of the 2008 recession and busts in coal production (*Kentucky, USA: A Coal Mining Tax Supporting Economic Diversification in Appalachia*, n.d.).

Despite its supposed success, coal severance, particularly in Kentucky, has been criticized for benefits not being distributed proportionately according to production. While the share of severance going to coal-producing counties has increased dramatically with more recent legislation, this only comes as coal severance is no longer bringing in as much revenue, due to falling production (*Kentucky, USA: A Coal Mining Tax Supporting Economic Diversification in Appalachia*, n.d.). Similarly, 75% of coal severance taxes in West Virginia are still only allocated to coal-producing counties (West Virginia State Treasurer, n.d.). A revenue share ordinance on solar developments would address this essential problem by being applied at the local level via ordinance, rather than the state level. Thus, all revenue share would be invested back into the host community instead of going to a general state fund for benefits to be spread across the state. In a recent policy report, Mangum et al. estimated the net annual effect of Virginia's revenue share ordinance on three regions of Virginia (notably not Southwestern Virginia). In this policy report, it was estimated that from a 100 MW solar farm, a revenue share ordinance would generate more revenue for a host community than other Virginia programs.

## Areas for Future Research

While CBAs have been around for several decades, very few studies have been conducted on the effectiveness of such programs. This is likely partly because it would be difficult to generalize the effects across many different programs, due to the lack of reporting on the impacts after implementation, and perhaps a subjective idea of success by those involved. Additionally, it is most likely that communities implementing a CBA already have certain financial constraints that incentivize entering such agreements. Hiring a consultant group to conduct a study might be difficult. In the future, employing a local university could be a potential solution to this problem. An effort towards better reporting, defined metrics of success, and hopefully a study across multiple programs would be needed to understand better the impacts these agreements have. Perhaps even a panel data analysis on metrics such as poverty and employment should be conducted by localities that have implemented CBAs, starting before implementation, and recording the impacts for several years after implementation. While only one CBO has been reported, it does seem there has been more of an effort to track the impact of Detroit's CBO. Particularly regarding revenue share ordinances, because this program is so new,

studies have not yet examined the impact these programs have had on Virginia municipalities. For those considering implementing such a program, it would be interesting to see a regression analysis of how this program impacts local GDP, employment, poverty, etc. Conversely, for programs that have already been implemented, a difference in difference analysis with a related locality could be conducted to estimate the relative impact a revenue share ordinance has had after several years of its implementation.

## **Main Takeaways**

Corporate absentee land ownership across the Central Appalachian region has robbed entire communities of the tax base necessary to fund public works (Eisenberg, 2017). As a result of these land ownership patterns, the region has experienced widespread poverty, low educational attainment, and lack of job opportunities (Appalachian Land Ownership Task Force, 1993; Thomas & Kelly, 2022). These negative impacts have only been compounded by the fall of the coal industry, which despite its unreliable employment, provided some economic base for the area (Blonz et al., 2023; Zipper et al., 2020). Now as hundreds of thousands of acres of previously mined land sit in need of reclamation, solar developments are finding homes on Central Appalachian brownfields (Payne, 2016; The Nature Conservancy, 2024). While a new solar development will improve the assessed value of the land, increasing the property taxes to be gained from the new development, this ultimately does not amount to anything substantial. Additionally, solar developments will seldom create long term or well paying jobs (RENEW Wisconsin, 2024; Scheiber, 2021). Communities might look towards community benefits to fill this gap.

While community benefit agreements have been around for several decades, they have not been widely explored in the Central Appalachian region. This could be due to lack of technical or financial resources of Appalachian localities. Community benefit ordinances address some of the administrative shortfalls of CBAs, but still present many of the same challenges regarding adequate representation of community needs and leveraging power against developers (Saha et al., 2024; Williamson, 2021). While not traditionally considered community benefits, rezoning agricultural land and revenue share ordinances present opportunities for communities to use the resources they have to leverage more benefits from developers. That being said, rezoning agricultural land could turn off many community members out of fear it might alter the character and future use of the land. Revenue share ordinances are still very new, but present similarities to coal severance that could make it an attractive option for Appalachian localities. While more research should be done to explore the generalizable effects of each of these alternatives, a policy analysis could employ available information to determine what options are most salient to the Central Appalachian context.



## Alternatives and Criteria for Evaluation

While solar may threaten to perpetuate many of the inequities experienced under the coal economy, it might also pose an opportunity for economic development, if done carefully and in conjunction with strong policy initiatives (Bowen et al., 2020). Because solar ultimately will not yield much long-term employment for local Appalachian communities, it is important that localities find other ways to benefit from new developments (Marchant & Smith, 2025; RENEW Wisconsin, 2024). While there is some evidence that solar has the opportunity to bring in more tax revenue to local communities, exploring mechanisms for community benefits will allow Appalachian communities more economic agency and development opportunities (Brockett et al., 2025). This could help correct a historic wrong, where Appalachian communities have been exploited with little to no agency over economic operations (Thomas & Kelly, 2022). The four community benefit opportunities to be explored include community benefit agreements, community benefit ordinances, rezoning of agricultural land, and revenue sharing ordinances. While all of these opportunities offer benefits to localities, they all come with varying amounts of risk and reward.

To sift through some of these pros and cons, we will evaluate each alternative on the criteria of political feasibility, administrative feasibility, and cost effectiveness. Political feasibility asks how relevant stakeholders will react to the policy. These stakeholders include community members, local government, and developers. Administrative feasibility refers to whether or not local governments will have the staff and financial resources to implement the policy in question. Finally, cost effectiveness gives us the ratio of financial costs over financial benefits that may ensue if the project were to be implemented. Both political and administrative feasibility will be measured on a scale of one through five, one being the most politically/administratively feasible, and five being the least. These alternatives will also be weighted based on their importance to the overall decision. Administrative feasibility will be weighted the highest at 50% of the equation. If a community cannot physically implement the policy, given resource or financial constraints, it will not be a policy option worth recommending.

Second, I weigh cost effectiveness at 30%, as it is important, based on the fact that these communities are historically disadvantaged, that they get the most benefits for what money and resources they are able to put into the program. Third, I weigh political feasibility at 20% because benefit schemes are becoming more common and thus more accepted among developers. While I think it is important to consider the opinion of all relevant stakeholders, I do not believe political feasibility will play as heavy a role in most of our alternatives as administrative. That being said, the opinions and feelings of all relevant stakeholders will impact the ultimate implementation of the policy, and thus the likelihood of success.

For cost effectiveness, I gathered all information I could find regarding how much the project would cost the community vs. how much it would monetarily make for the community, and divided costs by benefits. If any costs/benefits exceeded the timeline of a year, I converted these values to their present value before comparing the alternatives. I utilized a 3% discount rate, given the 25-year timeline for the benefit schemes. Additionally, any number I got from the literature was adjusted for inflation to the current year. In the end, I added up the results for each alternative, according to the three criteria. Implementation of a revenue share ordinance ultimately received the *lowest score* and is thus deemed the recommended course of action.

## Context for Evaluation

In order to evaluate the information we had gathered, a few more general assumptions were to be made. I would be evaluating the criteria as if they were to apply to a Central Appalachian community eligible for a solar development built within their jurisdiction. This paper considers the Central Appalachian states of Virginia, West Virginia, Kentucky, and Tennessee due to their historic similarities in land use, ownership patterns, and taxation (Land Ownership Task Force, 1983). Given the propensity for large corporate landowners in Appalachia to keep their property taxes low, we will assume the new development will exist on brownfield or otherwise degraded land, with an agricultural zoning designation (Eisenberg, 2017). Because the most available data on Appalachian solar developments was for those in Virginia, I averaged the acreage for all solar developments in Southwestern Virginia to come up with an average acreage of about 250 acres (*Weldon Cooper Center for Public Service at the University of Virginia*, 2025). For this reason, we will assume a case study on a parcel of 250 acres. Assuming it takes ten acres of solar to produce 1 MW of electricity, a 250-acre solar farm should produce about 25 MW (Wyatt & Kristian, 2021). Lastly, we will assume that our new solar development's lease agreement will last 25 years, as this is the industry standard (Roussel & Guest, 2024).

Appalachian communities are economically disadvantaged and often exist in a legal desert. This makes it difficult for them to access resources that may be necessary for the implementation of alternatives, which require legal counsel or lengthy negotiations. Because many communities exist in a legal desert, we assume it is less likely they will have a county/city attorney readily at their disposal. Thus, any alternative that requires legal help, such as counsel, will be outsourced, and thus, costs will be accounted for. While government officials are often paid, part-time workers, we did not incur wages for such workers, under the assumption that if they are not working on one of these programs, they will be working on another necessary project for the locality. Thus, the number of hours they work will remain unchanged, regardless of program implementation.

## Outcomes Matrix

	Political Feasibility (1-5) (20%)	Administrative Feasibility (1-5) (50%)	Cost Effectiveness (\$ cost/\$ benefits) (30%)	Total Scores (Lower Score>Higher Score)
Community Benefit Agreement	3	5	.01 .019 .007	3.103 3.157 3.1021 8.01
Community Benefit Ordinance	2.5	3	.007 .014 .003	2.20021 2.0042 2.0009 5.507
Rezone Agricultural Lands	5	1.5	0 0 0	1.75 1.75 1.75 6.5
<b>Revenue Share Ordinance</b>	2.5	2	.032 .066	<b>1.5096</b> <b>1.698</b> <b>4.532</b>

\* The **purple** numbers show the same analysis done initially, but with a 6% discount rate rather than 3%. The **green** numbers show the effects of using the higher end of our benefit range for the cost-effectiveness ratio rather than the average, on the overall score. The **brown** numbers show the overall analysis with no weights on our criteria..

## Community Benefit Agreements (CBA)

A contractual agreement between developers and community members/organizations that hold developers accountable for providing specific benefits to a community, in exchange for the community's cooperation with the development of a given parcel.

### *Political Feasibility = 3*

CBAs received a score of 3, slightly above a neutral score of 2.5, due to the project developer's likely resistance to such an agreement. While CBAs and other community benefit schemes are becoming more expected of developers, CBAs require more time and resources than other alternatives. Though CBAs are often used to get people on board with a project, and thus can be used by developers to move projects along quicker, compared to our other alternatives, they will likely be the longest and most challenging to implement. Additionally, while there are plenty of success stories with CBAs, a frequent concern is the community's ability to enforce the contract and the likely follow-through of developers (Fazio & Wallace, 2010). Because developers have the upper hand, there may be an unwillingness to be part of such agreements if negotiations go on too long. On the contrary, citizens in rural areas tend to be more likely to

oppose solar developments than in urban areas, which could indicate that political will is there among citizens (Tyson & Kennedy, 2024). The issue for citizens will lie more in their systematic barriers to information and organization around community benefit agreements.

#### *Administrative Feasibility = 5*

As discussed previously, Appalachian communities will likely exist in a legal desert. This means access to legal counsel can prove challenging. Further, access to legal counsel with expertise in community benefit agreements will prove even less likely. CBAs require lengthy negotiations, which extend the time needed to pay for legal counsel extensively. Also extending the timeline is the number of stakeholders involved in negotiating CBAs, and the time needed to organize people. CBAs are contracts between community organizations and a developer. To have the most successful CBA possible, *Been (2010)* suggests that there be a variety of community stakeholders with different opinions and needs. Because Appalachian communities have fewer people and thus fewer organizations to advocate for a CBA, not only will they have less leverage with the developer, but the needs of all citizens may not be fairly represented. While it is possible that fewer people could mean more homogeneity in community opinion, it will still mean less people to leverage the agreement against a large developer. Assuming negotiations for CBAs will take about a year to complete, and that lawyers will be needed for about a third of that time, the cost of legal counsel is estimated to be almost \$67,000<sup>1</sup>. Further, even if a CBA were successfully implemented, the community would unlikely have the necessary resources to enforce the contract against a more powerful developer.

#### *Cost Effectiveness = .01*

While CBAs would prove the most costly, due to their drawn-out timelines and requirement of more resources, they do have the potential to provide the most benefits if done well. To estimate the benefits a 250-acre solar farm could obtain, 3 scenarios from past CBAs for solar developments were observed. These three examples provided various benefits ranging from almost 2 million to 18 million over 25 years, scaled (*Community Benefits Agreements Database | SABIN Center for Climate Change Law*, n.d.). For benefits, the results from these three scenarios averaged over \$6.7 million<sup>2</sup>. As described above, costs consisted only of legal fees required to guide negotiations and create a contract. While technical support can be important to a smoother CBA process, communities can request developers to pay for technical support (Eisenson & Webb, 2023). It is thus assumed that this would be the case, especially given the lack of monetary resources available to smaller localities, such as those that concern this report. Thus, the costs of legal services are estimated to come out to almost \$67 thousand<sup>3</sup>. By dividing costs by benefits, there is a cost-effectiveness ratio of .01<sup>4</sup>. A similar test was run as part of a sensitivity analysis, using the maximum benefits in the cost-effectiveness ratio rather than an average. This reduced the ratio to .007<sup>5</sup>. While not as cost-effective as some other alternatives, this is still a fairly cost-effective option, barring all other risks associated with the program.

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<sup>1</sup> See Figure 1 in Appendix

<sup>2</sup> See Figure 1 in Appendix

<sup>3</sup> See Figure 1 in Appendix

<sup>4</sup> See Figure 1 in Appendix

<sup>5</sup> See Figure 1 in Appendix

## Community Benefit Ordinance (CBO)

An ordinance that requires specified new developments to enter into CBA negotiations with a neighborhood advisory council (NAC).

### *Political Feasibility = 2.5*

Community benefit ordinances received a score of 2.5 for political feasibility. CBOs received a slightly better score than CBAs because agreements and negotiations for CBOs take less time. CBOs occur between fewer stakeholders, as they are between the NAC and the developer, rather than multiple organizations and developers. Thus, they require less organization and time for negotiation. This means there are fewer people to please, and thus more politically feasible. Additionally, because negotiations with developers will take less time, developers may not be as turned off to the process, worried that it could push back important milestones for their development.

### *Administrative Feasibility = 3*

Administrative feasibility receives a three, because while CBOs still have similar requirements to CBAs, they require these resources for a fewer amount of time. The creation of a CBO will require significant spending on legal counsel both for the development of the CBO and development of a contractual agreement between developer and local government. However, once the CBO is in place, the actual negotiations can take far less time, as a good amount of the groundwork has already been laid. There is already a system in place for who from the local government, and what elected or appointed individuals will be speaking to the developer, and when. While having community benefits partially laid out in an ordinance could help simplify the process of negotiating benefits, there are still few levers to enforce these contracts, once created (Saha et al., 2024).

### *Cost Effectiveness = .007*

CBOs received a cost effectiveness score of .007<sup>6</sup>. The reason a CBO ends up receiving a slightly better cost effectiveness score than a CBA has again to do with the fact that the costs come out to be \$49 thousand rather than \$67 thousand<sup>7</sup>. Once an ordinance is in place, the negotiations for a benefit agreement between a local government and developer will require less time and counsel. Though there is still immense variability in the benefits that can be received from any kind of negotiated contract, it is assumed the average benefits from a CBO and CBA come out to be the same.

## Rezoning Agricultural Land

Rezoning of agricultural land to industrial for the purpose of increased tax revenue.

### *Political Feasibility = 5*

Rezoning the parcel which a development will sit upon has the highest political feasibility score, signaling it is the most politically fraught option. While the previous two alternatives face issues with the wishes of developers, this option would likely face some backlash from multiple stakeholders. Developers, just as with any option, would likely not prefer

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<sup>6</sup> See Figure 2 in Appendix

<sup>7</sup> See Figure 2 in Appendix

to pay higher property taxes on the land they lease the development for. But in addition to this, community members and local governments may also oppose the decision to rezone the land to commercial or industrial. While it would increase the property tax rate paid to the local government, rezoning agricultural land to commercial or industrial can prove quite jarring to locals, even if the use is ultimately the same. Many individuals are already opposed to this land being used for solar rather than an agricultural use. By rezoning the land, people might feel their rural land is being taken away and infringed upon even more. They might feel this impacts the character of the locality in a negative way (Paul Pelish, personal communication, January 4, 2025). Further, there would be very fair concerns over what the land could then be used for once the 25 year lease is up and the solar farm has been decommissioned. Rezoning to commercial or industrial might open up the parcel to being used for other uses which locals might feel even less connected to, again disrupting the character of their community. Because this alternative would be opposed to some capacity by every relevant stakeholder, we score this negatively for political feasibility.

#### *Administrative Feasibility = 1.5*

Administrative feasibility gets a very low score of 1.5, making it very administratively feasible for Appalachian communities to implement. The reason this alternative gets such a good score is because it requires no outsourcing of labor, and the process is not extremely complicated. The planning commission for the local government would be in charge of changing the zoning designation, and if the state requires it, a public hearing would need to be held where the public can give their thoughts on the proposal. The locality already has the structures and people in place to complete this task, thus making it extremely administratively feasible. The only reason it gets an additional .5 points, is that in the worst case scenario, if developers or community members chose to fight the decision to rezone the property, this could potentially incentivise the planning commission to change their decision, or in the worse case scenario, go to court over the decision.

#### *Cost Effectiveness = 0*

Rezoning gets a cost effectiveness score of 0. This is because no additional costs are incurred to complete the rezoning. The planning commission, which works for the city government doing rezoning and ordinance drafting regardless, would be the ones to implement this decision, thus adding no additional costs to the locality. This is under the assumption that if they were not putting hours into this project, they would be working equally on something else. That being said, it should be noted that while this is the most cost effective option, it also does provide the city the least amount of benefits, by far. The present value adjusted benefits for this program is a mere \$115 thousand over the course of 25 years<sup>8</sup>.

### **Revenue Share Ordinance**

A form of legislative exaction, in which an ordinance implemented by a locality requests a transfer of a specified amount of money per MW of electricity produced by a solar development.

#### *Political Feasibility = 2.5*

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<sup>8</sup> See Figure 3 in Appendix

Similar to the community benefit ordinance, the revenue share ordinance will get a pretty neutral political feasibility score. This is because revenue share ordinances, at least in Virginia, are becoming pretty commonplace, with 26 already implemented for solar developments across the state (Callen & Marshall, 2024). Thus, developers are becoming more accustomed and likely accepting of them. Of course, the acceptability may vary in other states, where this has not yet become a common practice. Further, this alternative bears a lot of similarity to coal severance taxes, which has been used to prop up Appalachian communities for decades (*Coal Severance Taxes - Other States*, n.d.). This similarity might make solar in and of itself more appealing to citizens, and this alternative more politically feasible.

#### *Administrative Feasibility = 2*

Unlike the CBO or CBA options, a revenue share ordinance would not require negotiation with a developer, ahead of a project. Using a revenue share ordinance as a preemptive measure, negotiation should not be necessary. While localities would still need to pay for legal counsel to review the ordinance before publishing it, this is standard for any ordinance drafting process. Although this alternative is estimated to cost about \$16 thousand<sup>9</sup>, this is likely to be an overestimate, considering many localities have already implemented such a measure, and these ordinances are not very complicated. That being said, this will vary across states. In Virginia where this has already become fairly standard, it should not take very long to draft and review the ordinance, as there are plenty of samples to use as templates, and even the state code. The only thing that would potentially need adjustment is the language to match the rest of a locality's codebook. In other states, drafting a new ordinance based on this model may take longer, as revenue share ordinances do not appear to be expressly written into the state code of Kentucky, West Virginia, or Tennessee.

#### *Cost Effectiveness = .023*

Given the estimated cost of \$16 thousand and present value adjusted benefits of \$500 thousand over the course of 25 years, this alternative shows moderate cost effectiveness as compared to our other options<sup>10</sup>. While this is significantly less than the CBO and CBA options, it does also cost a lot less, perhaps making it a less risky alternative.

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<sup>9</sup> See Figure 4 in Appendix

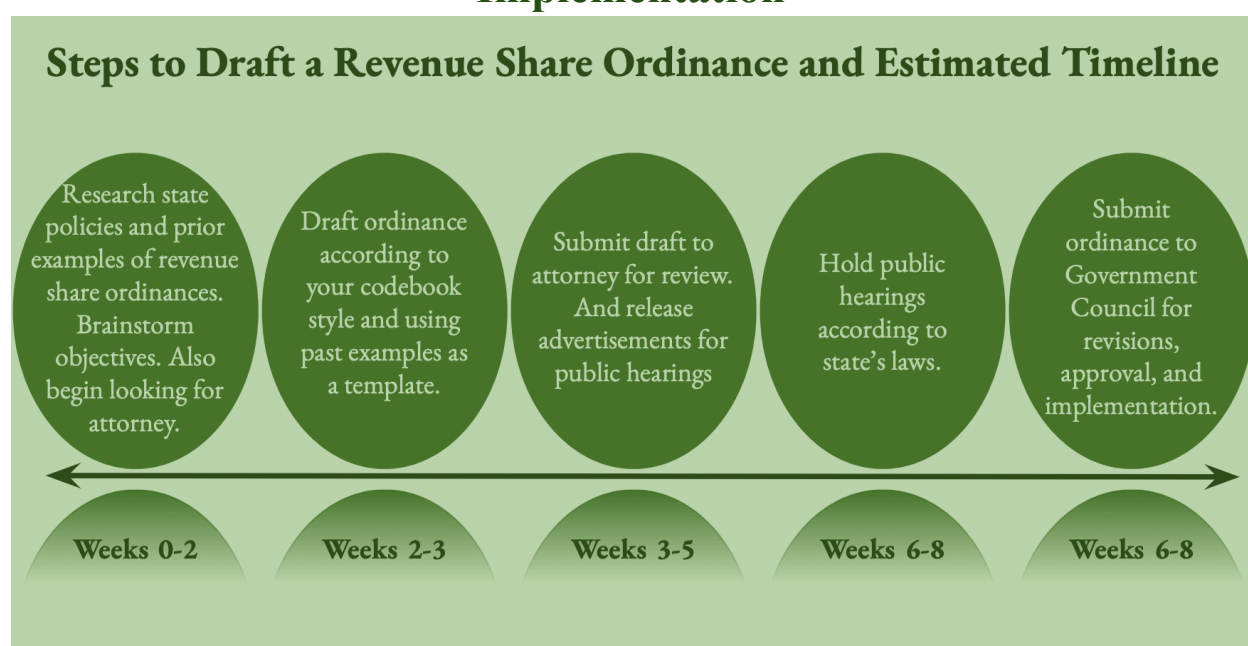
<sup>10</sup> See Figure 4 in Appendix



## Recommendation

Based on my findings, I recommend Central Appalachian communities implement revenue share ordinances as their primary benefit scheme. This recommendation was decided based on the criteria of political feasibility, administrative feasibility, and cost effectiveness. For already financially and resource-burdened communities, this option balances the need to be often more conservative with spending, and still benefit significantly from the program. Because the revenue share ordinance does not involve lengthy negotiations or reliance on a community benefit contract with developers, this alternative mitigates some of the costs and risks associated with our more complicated options. Additionally, to maximize benefits for localities that have the political feasibility from both the community and developers, I recommend pairing this policy with rezoning their agricultural parcel to industrial.<sup>11</sup>

## Implementation



**\* This process should take place upon notice by the developer of their interest in sitting in your locality (Alliance for the Shenandoah Valley, 2023).**

Like any ordinance, the local government council would be in charge of drafting the ordinance itself, and the municipality would likely be required to outsource a lawyer to review it. While some localities might have their city attorney to do this, it is assumed in this paper that an Appalachian locality would not, given that they are positioned in a legal desert. Having a lawyer review the ordinance ensures it complies with the language outlined in their code of ordinances and with state and federal law. For this report, it is also assumed that the drafting process would take a month at most, with the review taking an additional month. In states like Virginia and Kentucky, localities must give public notice of the proposal or enactment of local ordinances. This in itself can add one to three months, respectively, to the process of implementation (*General Assembly of the Commonwealth of Kentucky*, n.d.; *Code of Virginia Code - Article 4. Ordinances and Other Actions by the Local Governing Body*, n.d.).

<sup>11</sup> See Figure 3 and Sensitivity Analysis in Appendix

Just as with any benefits scheme, timing is of utmost importance. In Virginia localities, any solar development that had its permits approved before January 1st, 2021, may not impose a revenue share ordinance, unless it is negotiated by the developer and local government (§ 58.1-2636. *Revenue Share for Solar Energy Projects and Energy Storage Systems*, n.d.). Further, in states like Virginia, when solar developers first show interest in siting their development in a particular locality, they must submit a written notice of intent. Following this, they will meet with the locality to negotiate a siting agreement. This will be the time for a locality to implement an ordinance, as this is often the point at which any kind of community benefits would be negotiated (§ 15.2-2316.7. *Negotiations; siting agreement*, n.d.). Depending on how long the siting agreement takes to finalize, it may be important to implement the revenue share ordinance before the permit is given to the developer. This may increase transparency between the developer and the community, leading to a more harmonious partnership. Some communities might even decide to implement an ordinance prior to a siting agreement negotiation, by identifying whether or not their locality has a parcel that is an attractive location for future solar development. If so, they may use tools like the EPA's RE-Powering Mapper, which maps brownfields with access to transmission lines that could be candidates for future solar development (Dustin Mulvaney, personal communication, November 20, 2024; *RE-Powering Mapper 3.0*, n.d.). While this could make the siting process smoother, passing an ordinance can cost the locality unnecessary funds if there is no guarantee a development will be sited there.

How a revenue share ordinance will be implemented will vary vastly depending on the state. For Virginia in particular, because there are already 26 examples of localities utilizing this type of ordinance, and the writing for the ordinance itself is already incorporated within state code, creating the revenue share ordinance would be fairly easy (Callen & Marshall, 2024). For this reason, prospective localities may not need to pay the lawyer for as long as other states' localities might. In other states, where no state code outlines a revenue share ordinance for the state's localities, the implementation process might require slightly more time. More time will also mean higher costs. While other states might still be able to use Virginia's local ordinances as an example or template, it might have to undergo even more changes for the policy to comply with their states' rules and their localities' language. These costs would not come close to surpassing, or even equating, an alternative that would involve a negotiation, or a more complicated revenue stream.

Also significantly impacting implementation will be whether or not the locality of adoption exists within a Dillon's Rule state. Virginia is a Dillon's Rule state, which means localities have slightly less freedom in their interpretations of policy (*Dillon Rule*, n.d.). For the revenue share ordinance in particular, because it is also expressly written in the state's code that the maximum amount of benefits a municipality can initially ask a developer for, is \$1,400, Virginia cities and counties can not implement a revenue share ordinance and ask for a rate higher than the ones given by the state (§ 58.1-2636. *Revenue Share for Solar Energy Projects and Energy Storage Systems*, n.d.). In other states, however, where the option for a revenue share ordinance is not expressly written into the state's code, localities may have more freedom to create a revenue share ordinance that asks for more money, or a higher rate of increase per x number of years. It is also for this reason that Virginia cannot ask for a revenue share ordinance on a solar project that is not greater than 20 MW, given that this is a rule expressly written into the state's code (§ 58.1-2636. *Revenue Share for Solar Energy Projects and Energy Storage Systems*, n.d.). In other states, they might be able to benefit from smaller developments. The lawyer who reviews the locality's ordinance will check whether or not an ordinance violates

Dillon's Rule if it applies in their state and make adjustments accordingly. Suppose local governments in other states choose to implement a revenue share ordinance. Depending on the size and relative wealth of the developer, communities should be mindful that asking for too much could drive the developer away or increase tensions. This, however, should not be too much of a problem, seeing as in smaller communities, less money goes a long way. While localities should forge steadfastly and request the amount of funds that would most benefit their community, it is important to consider the limited funds of the developer.

In order to track the effectiveness of the revenue share ordinance, communities should begin taking note of their annual tax revenue before the policy is implemented and continue tracking it into the years following implementation. Municipalities should also note what facilities and programs the revenue is invested in, if possible. What municipalities choose to invest in will ultimately decide their definition of success. If they plan to invest solely in education for example, they might observe how improved resources are impacting students' academic achievement in their local public school.

## Conclusion

While clean energy developments like solar do not contribute so much to the environmental degradation of land, they perpetuate the same pattern of minuscule property tax revenue seen under industries like coal. In Appalachia, solar farms are cropping up over brownfields left after the fall of coal (The Nature Conservancy, 2024). These primarily exist on the same land, under the same ownership as before. While these developments do still constitute an increase to the locality's property tax base, put into perspective, such an increase is marginal at best. At a time when a move to cleaner energy alternatives is imperative to combat climate change, Central Appalachian localities should be made aware of how they can benefit from such developments more substantially. Because a clean transition must also mean a just transition, a revenue share ordinance levied on solar developments is just one step in the right direction.

## References

- Abdalla, C. W., Armbruster, W. J., Ayres, J. S., Edelman, M. A., Foster, H. H., Jr., Hite, J., Jacobs, H., Kinghorn, J. R., Libby, L. W., Patton, D. B., Sokolow, A. D., Weber, B. A., & Farm Foundation. (1997). *Land use at the Rural-Urban fringe*.  
[https://farmlandinfo.org/wp-content/uploads/sites/2/2019/09/Land\\_Use\\_at\\_the\\_\\_Rural-Urban\\_Fringe\\_1.pdf](https://farmlandinfo.org/wp-content/uploads/sites/2/2019/09/Land_Use_at_the__Rural-Urban_Fringe_1.pdf)
- Al-Hamoodah, L., Koppa, K., Schieve, E., Reeves, D. C., Hoen, B., Seel, J., & Rai, V. (2018). *Property Value Impacts Near Utility Scale Solar Installations*.  
<https://dis.puc.state.oh.us/ViewDocument.aspx?DocID=9496d117-2b8e-4af7-af6d-6b22e6b6e543&No=4>
- Alliance for the Shenandoah Valley. (2023). *Utility Scale Solar Ordinance and policy recommendations*.  
<https://shenandoahalliance.org/wp-content/uploads/2023/09/ASV-Recommendations-US-S-July-2023-FIN.pdf>
- Appalachian Land Ownership Task Force. (1983). *Who Owns Appalachia?: Landownership and its impact*. University Press of Kentucky.
- Bechtel, D. (2007). Forming Entities to Negotiate Community Benefits Agreements. *Journal of Affordable Housing & Community Development Law*, 17(1/2), 145–154.  
<http://www.jstor.org/stable/25782807>
- Been, V. (2010). *Community Benefits agreements: a new local government tool or another variation on the Exactions theme?*[Report]. New York University.  
[https://furmancenter.org/files/publications/Community\\_Benefits\\_Agreements\\_Working\\_Paper.pdf](https://furmancenter.org/files/publications/Community_Benefits_Agreements_Working_Paper.pdf)

- Berglund, L. (2020). Early lessons from Detroit's community benefits Ordinance. *Journal of the American Planning Association*, 87(2), 254–265.  
<https://doi.org/10.1080/01944363.2020.1823243>
- Blonz, J., Tran, B. R., & Troland, E. (2023). *The Canary in the Coal Decline: Appalachian Household Finance and the Transition from Fossil Fuels*. <https://doi.org/10.3386/w31072>
- Bowen, E., Christiadi, Deskins, J., & West Virginia University. (2020). *An overview of coal and the economy in Appalachia* (By Appalachian Regional Commission).  
[https://www.arc.gov/wp-content/uploads/2021/04/Coal-and-the-Economy-in-Appalachia\\_Q4\\_2020-Update.pdf](https://www.arc.gov/wp-content/uploads/2021/04/Coal-and-the-Economy-in-Appalachia_Q4_2020-Update.pdf)
- Brock, C. (2024, November 12). *How much is a lawyer? hourly rates by state and more*. Law Pay. <https://www.lawpay.com/about/blog/lawyer-hourly-rate-by-state/>
- Brockett, D., Conklin, J., Ollendyke, D., Beresnyak, T., Svetz, M., & Laughner, J. (2025, January 24). *Localized economic impacts of Grid-Scale solar development*.  
<https://extension.psu.edu/localized-economic-impacts-of-grid-scale-solar-development>
- Brumfield, N. (2019, September 19). *Why is Appalachia Poor? - expatalachians*. Expatalachians. <http://expatalachians.com/explaining-why-appalachia-is-poor>
- Callahan, S. (2025, January 5). *Land Use, Land Value & Tenure - Farmland Value | Economic Research Service*.  
<https://www.ers.usda.gov/topics/farm-economy/land-use-land-value-tenure/farmland-value>
- Callen, T., & Marshall, E. (2024). *ETI Revenue Share inventory*.  
[https://coopercenter.github.io/revenue\\_share\\_inventory/](https://coopercenter.github.io/revenue_share_inventory/)

Carbon Action Alliance. (2024). Community benefits plans and agreements in carbon management. In *Carbon Action*.

<https://carbonactionalliance.org/wp-content/uploads/08-CBP-and-CBA.pdf>

*Coal severance taxes – other states*. (n.d.).

<https://www.tax.virginia.gov/sites/default/files/inline-files/Coal%20Severance%20Tax%20States%20Matrix.pdf>

Clio. (2017). Legal Trends Report 2017. In *Legal Trends Report*.

<https://www.clio.com/wp-content/uploads/2023/02/2017-Legal-Trends-Report.pdf>

*Code of Virginia Code - Article 4. Ordinances and other actions by the local governing body*.

(n.d.). <https://law.lis.virginia.gov/vacodefull/title15.2/chapter14/article4/>

*Community Benefits Agreements Database | SABIN Center for Climate Change Law*. (n.d.).

<https://climate.law.columbia.edu/content/community-benefits-agreements-database>

Counts, A. (2020, December 11). *Fighting for equitable land access in Southwest Virginia*.

Appalachian Voices.

<https://appvoices.org/2020/12/11/fighting-for-equitable-land-access-in-southwest-virginia/>

Daniels, T., & Wagner, H. (2022, August 11). *Regulating Utility-Scale Solar Projects on*

*Agricultural Land*. Kleinman Center for Energy Policy.

<https://kleinmanenergy.upenn.edu/research/publications/regulating-utility-scale-solar-projects-on-agricultural-land/>

De Mause, N. (2022, January 18). *What ever happened to CBAs? The rise and fall of*

*'Community Benefits agreements' in NYC - city limits*. City Limits.

<https://citylimits.org/the-rise-and-fall-of-community-benefits-agreements-in-nyc/>

*Dillon Rule*. (n.d.). <https://www.williamsburgva.gov/173/Dillon-Rule>

Eisenberg, E. (2017, July 20). *Citizens begin reclaiming coal country after decades of corporate land grabs*. YES! Magazine.

<https://www.yesmagazine.org/economy/2017/07/20/citizens-begin-reclaiming-coal-count-ry-after-decades-of-corporate-land-grabs>

Eisenenson, M., & Webb, R. (2023). *Expert insights on best practices for community BenefiFITs agreements*.

[https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1207&context=sabin\\_climate\\_change](https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1207&context=sabin_climate_change)

Ellickson, R. C., Been, V. L., Hills, R. M., & Serkin, C. (2020). *Land use controls: Cases and Materials*. Aspen Publishing.

Elmallah, S., Hoen, B., Fujita, K. S., Robson, D., & Brunner, E. (2023). Shedding light on large-scale solar impacts: An analysis of property values and proximity to photovoltaics across six U.S. states. *Energy Policy*, 175, 113425.

<https://doi.org/10.1016/j.enpol.2023.113425>

Fazio, C. A., & Wallace, J. (2010). Legal and policy issues related to community benefits agreements. In Fordham University School of Law & Fordham University School of Law, *Fordham Environmental Law Review* (Vol. 21, Issue 3, p. Article 2). The Berkeley Electronic Press (bepress). <https://core.ac.uk/download/pdf/144232184.pdf>

Federal Highway Administration. (2021). *Value capture: negotiated exactions*.

[https://www.fhwa.dot.gov/ipd/pdfs/value\\_capture/faq\\_negotiated\\_exactions.pdf](https://www.fhwa.dot.gov/ipd/pdfs/value_capture/faq_negotiated_exactions.pdf)

Ferguson-Oles, L. & Mountain Association for Community Economic Development. (2017). *Community Benefits Agreements: a potential negotiating tool for rural communities*.



[https://mtassociation.org/wp-content/uploads/2018/05/MACED\\_Community\\_Benefits\\_Agreements\\_2017.pdf](https://mtassociation.org/wp-content/uploads/2018/05/MACED_Community_Benefits_Agreements_2017.pdf)

§ 15.2-2316.7. *Negotiations; siting agreement.* (n.d.).

[https://law.lis.virginia.gov/vacode/title15.2/chapter22/section15.2-2316.7/#:~:text=The%20siting%20agreement%20may%20include,b\)%20current%20fiscal%20budget%20of](https://law.lis.virginia.gov/vacode/title15.2/chapter22/section15.2-2316.7/#:~:text=The%20siting%20agreement%20may%20include,b)%20current%20fiscal%20budget%20of)

§ 58.1-2636. *Revenue share for solar energy projects and energy storage systems.* (n.d.).

<https://law.lis.virginia.gov/vacode/title58.1/chapter26/section58.1-2636/>

Gargaro, S. (2024). A seat at whose table? Analyzing Detroit’s community benefit ordinance as a tool for environmental justice. *Michigan Journal of Environmental & Administrative Law*, 13.1, 218. <https://doi.org/10.36640/mjeal.13.1.seat>

Gaur, V., & Lang, C. (2020). Property value impacts of Commercial-Scale solar Energy in Massachusetts and Rhode Island. In University of Rhode Island, *University of Rhode Island*.

<https://www.uri.edu/news/wp-content/uploads/news/sites/16/2020/09/PropertyValueImpactsOfSolar.pdf>

General Assembly of the Commonwealth of Kentucky. (n.d.). AN ACT relating to the publication of local government legal advertisements. In *UNOFFICIAL COPY 20 RS HB 195/VO* (pp. 1–9).

<https://apps.legislature.ky.gov/recorddocuments/bill/20RS/hb195/bill.pdf>

Groover, G., Bruce, L., & Department of Agricultural & Applied Economics, Virginia Tech. (2011). Virginia’s Use-Value Taxation Program. In *Virginia’s Use-Value Taxation Program*. Virginia Tech.

[https://aaec.vt.edu/content/dam/aaec\\_vt\\_edu/extension/use-value/groover%202011%20Landowners%20workshop.pdf](https://aaec.vt.edu/content/dam/aaec_vt_edu/extension/use-value/groover%202011%20Landowners%20workshop.pdf)

Gross, J. (2009). Community benefits agreements [CHAPTER]. In *Building Healthy Communities: A Guide to Community Economic Development for Advocates, Lawyers, and Policymakers* (pp. 215–217). Forum on Affordable Housing & Community Development of the American Bar Association.

<https://juliangross.net/wp-content/uploads/2024/09/CBA-Chapter-Gross-CLEAN.pdf>

Gross, J., LeRoy, G., & Janis-Aparicio, M. (2005). *Community benefits agreements: making development projects accountable*.

<https://goodjobsfirst.org/wp-content/uploads/docs/pdf/cba2005final.pdf>

Hao, S., & Michaud, G. (2024). Assessing property value impacts near Utility-Scale Solar in the Midwestern United States. *Solar Compass*, 12, 100090.

<https://doi.org/10.1016/j.solcom.2024.100090>

Harley, A., & Wexner, H. (2022). *The struggle for sustainable development in Appalachia's mineral rich mountains* (Report No. 184). Mossavar-Rahmani Center for Business & Government. [https://www.hks.harvard.edu/sites/default/files/184\\_AWP\\_final.pdf](https://www.hks.harvard.edu/sites/default/files/184_AWP_final.pdf)

Hintz, O., Uebelhor, E., Gold, E., & Center for Local, State, and Urban Policy. (2021). Inventory of state solar property tax treatments. In *CLOSUP Working Paper Series* (Report No. 54). University of Michigan.

<https://closup.umich.edu/sites/closup/files/2021-08/closup-wp-54-Hintz-Uebelhor-Gold-Inventory-of-State-Solar-Property-Tax-Treatments.pdf>

*Industrialization in Appalachia*. (n.d.). Digital Scholarship and Initiatives.

<https://dsi.appstate.edu/projects/mountain-music/topics/industrialization>

*Kentucky, USA: A coal mining tax supporting economic diversification in Appalachia.* (2021, April 1). World Resources Institute.

<https://www.wri.org/update/kentucky-usa-coal-mining-tax-supporting-economic-diversification-appalachia>

*Key reforms: community benefits agreements.* (n.d.). Good Jobs First.

<https://goodjobsfirst.org/key-reforms-community-benefits-agreements/>

Lee, A. (2022, August 11). *Holding banks accountable to communities: A breakdown of community benefit agreements - The Greenlining Institute.* The Greenlining Institute.

<https://greenlining.org/2022/community-benefit-agreement/>

Lenzi, R. (1990, January). *Coal severance taxes: A new social justice and community/ economic development tool for Coal-Producing areas.* DigitalCommons@WayneState.

[http://digitalcommons.wayne.edu/socprac/vol8/iss1/20?utm\\_source=digitalcommons.wayne.edu%2Fsocprac%2Fvol8%2Fiss1%2F20&utm\\_medium=PDF&utm\\_campaign=PDFCoverPages](http://digitalcommons.wayne.edu/socprac/vol8/iss1/20?utm_source=digitalcommons.wayne.edu%2Fsocprac%2Fvol8%2Fiss1%2F20&utm_medium=PDF&utm_campaign=PDFCoverPages)

Lines, A., & McGarr, P. (2021). ADJACENT PROPERTY VALUE IMPACT STUDY. In *NextEra Energy Resources* (pp. 1–2).

[https://www.nexteraenergyresources.com/content/dam/neer/us/en/pdf/CohnReznick%20Solar%20Impact%20Study\\_7.26.21.pdf](https://www.nexteraenergyresources.com/content/dam/neer/us/en/pdf/CohnReznick%20Solar%20Impact%20Study_7.26.21.pdf)

Lydersen, K. (2012, September 5). Recovered coal mine land creates bargain rural retreats - but at what cost? *Canary Media.*

[https://www.canarymedia.com/articles/enn/want-prime-farmland-or-private-hunting-grounds-try-a-former-coal-mine?utm\\_source=chatgpt.com](https://www.canarymedia.com/articles/enn/want-prime-farmland-or-private-hunting-grounds-try-a-former-coal-mine?utm_source=chatgpt.com)

Mangum, A. F., Zorn, D., Arel, M., & Mangum Economics, LLC. (2020). *The economic contribution of utility scale solar development to Virginia*.

<https://mdvseia.org/wp-content/uploads/2020/06/MDVSEIA-Report-.pdf>

Marchant, G., & Smith, D. (2025, April 2). Fluke survey reveals growing trend with 55% of companies outsourcing solar maintenance, citing critical In-House skill gap. *CBS 4 Indianapolis*.

<https://cbs4indy.com/business/press-releases/globenewswire/9415723/fluke-survey-reveals-growing-trend-with-55-of-companies-outsourcing-solar-maintenance-citing-critical-in-house-skill-gap/#:~:text=55%25%20of%20companies%20surveyed%20outsource,and%2048%25%20in%20the%20UK>

Marin, B. (2019). *Solar Installations and Property Values An Examination of Ground Mounted, Primary Land Use, Two Plus Megawatt Solar Installations on the Total Estimated Market Value of Abutting Residential Parcels*.

<https://conservancy.umn.edu/server/api/core/bitstreams/fee60b8d-3174-4dd9-83e6-1561fe126a7e/content>

Marshall, E., & Callen, T. (2024, March). *ETI Revenue Share inventory*.

[https://coopercenter.github.io/revenue\\_share\\_inventory/](https://coopercenter.github.io/revenue_share_inventory/)

Mills, R., Draklellis, E., & Richardson, J. (2023, September 22). *Community Benefits Plans: Driving Equitable clean energy development*. RMI.

[https://rmi.org/community-benefits-plans-driving-equitable-clean-energy-development/#:~:text=DOE%20requires%20community%20benefits%20plans,Act%20\(IRA\)%20of%202022](https://rmi.org/community-benefits-plans-driving-equitable-clean-energy-development/#:~:text=DOE%20requires%20community%20benefits%20plans,Act%20(IRA)%20of%202022).

Nilson, R., Rand, J., Hoen, B., & Elmallah, S. (2024). Halfway up the ladder: Developer practices and perspectives on community engagement for utility-scale renewable energy in the United States. *Energy Research & Social Science*, 117, 103706.

<https://doi.org/10.1016/j.erss.2024.103706>

Office of Property Valuation. (n.d.). Equalized Assessment for Martin County 080. *Kentucky Department of Revenue*.

[https://docs.google.com/spreadsheets/d/1aDcf1XqyvNqBq\\_53zICO1hBL-dmm0m8v/edit?gid=1525886025#gid=1525886025](https://docs.google.com/spreadsheets/d/1aDcf1XqyvNqBq_53zICO1hBL-dmm0m8v/edit?gid=1525886025#gid=1525886025)

Payne, E. (2024, June 21). *Owning the Mountains: Appalachia's history of corporate control*. Appalachian Voices.

<https://appvoices.org/2016/02/18/corporate-land-ownership-appalachia/>

*Queued up. . . but in need of transmission*. (n.d.). Energy.gov.

<https://www.energy.gov/policy/queued-need-transmission>

*Reality check on Ross's stop solar claims*. (2021, November 18). Solar for Mason County.

<https://solarformasoncounty.com/solar-tax-contributions-to-schools/>

RENEW Wisconsin. (2024, May 14). *Solar Farms - RENEW Wisconsin*.

<https://www.renewwisconsin.org/solarfarms/>

*RE-Powering Mapper 3.0*. (n.d.). <https://geopub.epa.gov/repoweringApp/?page=Page-1>

Richardson, M. (2023, November 10). *How Long Does it Take to Construct a Solar Farm - US Light Energy*. US Light Energy.

<https://uslightenergy.com/how-long-does-it-take-to-build-a-solar-farm/#:~:text=Solar%20farms%20generally%20take%20eight,size%20of%20the%20solar%20farm.>

Riedl, D., Carlsen, W., Said, E., Saha, D., Adcox, G., & Fraser, C. (2025, March 26). *Community Benefits Frameworks: Shortcomings and Opportunities for Greater impact*. World Resources Institute.

<https://www.wri.org/technical-perspectives/community-benefits-frameworks-database-takeaways#:~:text=While%20not%20a%20silver%20bullet,generate%20benefits%20for%20host%20communities.>

Rossi-Keen, D., Wolovich, S., & Niebler, M. (2024, August 27). *A guide to community benefits in southwestern Pennsylvania*. Issuu.

[https://issuu.com/x7qsebjueaw3dm/docs/community\\_benefits\\_](https://issuu.com/x7qsebjueaw3dm/docs/community_benefits_)

Roussel, R., & Guest, P. (2024, December 23). *What Landowners Need to Know about Solar Leases*. Phelps - What Landowners Need to Know About Solar Leases.

<https://www.phelps.com/insights/what-landowners-need-to-know-about-solar-leases.html#:~:text=The%20lease%20period%20is%20typically,last%2050%20years%20or%20longer.>

Saha, D., Fraser, C., Adcox, G., Scott, C., Said, E., Kenyon, M., & World Resources Institute.

(2024, November). *Detroit's Community Benefits Ordinance: Lessons learned about the community engagement process and its outcomes* [Report]. World Resources Institute.

[https://files.wri.org/d8/s3fs-public/2024-11/detroit-community-benefits-ordinance-lessons-learned.pdf?VersionId=zieLZcf.SToE0vgP.oxcQCgv1cfaT1rO&\\_gl=1\\*19n5fj7\\*\\_gcl\\_au\\*MjAxNDg5NTMxNy4xNzQzNjQ5MDIz](https://files.wri.org/d8/s3fs-public/2024-11/detroit-community-benefits-ordinance-lessons-learned.pdf?VersionId=zieLZcf.SToE0vgP.oxcQCgv1cfaT1rO&_gl=1*19n5fj7*_gcl_au*MjAxNDg5NTMxNy4xNzQzNjQ5MDIz)

Scheiber, N. (2021, July 16). Building solar farms may not build the middle class. *New York Times*.

<https://www.nytimes.com/2021/07/16/business/economy/green-energy-jobs-economy.htm>

1

Schwartzman, G. (2022). Climate rentierism after coal: forests, carbon offsets, and post-coal politics in the Appalachian coalfields. *The Journal of Peasant Studies*, 49(5), 924–944.

<https://doi.org/10.1080/03066150.2022.2078710>

Spence, B., Kunkel, C., Schewel, E., Boettner, T., Martin, L., American Friends Service Committee, Kunkel Energy Research, West Virginia Center on Budget and Policy, Chatham University, Charleston Gazette, InsideOut Creative, & West Virginia Center on Budget and Policy. (2013). *Who owns West Virginia?*

<https://wvpolicy.org/wp-content/uploads/2018/5/land-study-paper-final3.pdf>

Srygley, S., Khairunnisa, N., Elliott, D., & Population Reference Bureau. (2024). THE APPALACHIAN REGION: A DATA OVERVIEW FROM THE 2018-2022 AMERICAN COMMUNITY SURVEY Chartbook. In *Appalachian Regional Commission*.

[https://www.arc.gov/wp-content/uploads/2024/06/PRB\\_ARC\\_Chartbook\\_ACS\\_2018-2022\\_FINAL\\_2024-06.pdf#page=186](https://www.arc.gov/wp-content/uploads/2024/06/PRB_ARC_Chartbook_ACS_2018-2022_FINAL_2024-06.pdf#page=186)

Stammers, R. (2022, May 20). *Top Things that Determine a Home's Value*. Investopedia.

<https://www.investopedia.com/articles/mortgages-real-estate/08/housing-appreciation.asp#:~:text=Land%20appreciates%20because%20it%20is,its%20price%20up%20over%20time.>

*2022 State school bus contract base bus prices*. (2022).

<https://www.transform.ar.gov/wp-content/uploads/2020/12/2022-Contract-At-A-Glance-Final.pdf>



Stone, J., & De Place, E. (2008). *Beaver County Data Analysis: 2025 update*.

<https://ohiorivervalleyinstitute.org/wp-content/uploads/2025/02/Beaver-County-2025-Update-FINAL-1.pdf>

The Nature Conservancy. (2024). Mining the sun. In *Transforming Mine Lands and Brownfields Into Clean Energy Hubs*.

[https://www.nature.org/content/dam/tnc/nature/en/documents/Mining\\_the\\_Sun\\_Report\\_Final\\_5.23.24.pdf](https://www.nature.org/content/dam/tnc/nature/en/documents/Mining_the_Sun_Report_Final_5.23.24.pdf)

Thomas, K., & Kelly, E. (2022, September 6). *Reckoning with land ownership as Central Appalachia moves away from coal*. Appalachian Voices.

<https://appvoices.org/2022/09/06/reckoning-with-land-ownership-as-central-appalachia-moves-away-from-coal/>

Tyson, A., & Kennedy, B. (2024, June 27). *2. Americans' views on local wind and solar power development*. Pew Research Center.

<https://www.pewresearch.org/science/2024/06/27/americans-views-on-local-wind-and-solar-power-development/>

*The Virginia SolTax Tool*. (2023, July 17). <https://solar-tax-webapp.azurewebsites.net/>

Wang, M. (2022). *Impact of Utility-Scale solar farms on property values in North Carolina*.

<https://dukespace.lib.duke.edu/server/api/core/bitstreams/e4498ca1-a21a-4e78-8888-605dba3fe4fb/content>

Weldon Cooper Center for Public Service. (n.d.). *Solar Revenue Share Inventory*.

<https://www.coopercenter.org/solar-revenue-share-inventory#:~:text=Under%20the%20Revenue%20Share%20model,of%20generation%20capacity%20per%20year.>

Weldon Cooper Center for Public Service at the University of Virginia. March 11, 2025.

“Virginia Solar Database.” <https://solardatabase.coopercenter.org/>.

West Virginia State Treasurer. (n.d.). *Coal Severance Tax*.

<https://wvtreasury.gov/Transparency/Revenue-Distributions/Coal-Severance-Tax#:~:text=This%20additional%20tax%20on%20coal,distributed%20to%20coal%2Dproducing%20counties.>

Williamson, A. (2021, August 31). *Which community benefits agreements really delivered?*

Shelterforce.

<https://shelterforce.org/2021/08/31/which-community-benefits-agreements-really-delivered/>

Wyatt, J., & Kristian, M. (2021, September 14). *The true land footprint of solar energy - Great*

*Plains Institute*. Great Plains Institute.

<https://betterenergy.org/blog/the-true-land-footprint-of-solar-energy/>

Zipper, C. E., Adams, M. B., & Skousen, J. (2020). The Appalachian Coalfield in historical

context. In *Springer eBooks* (pp. 1–26). [https://doi.org/10.1007/978-3-030-57780-3\\_1](https://doi.org/10.1007/978-3-030-57780-3_1)

## Appendix

### Figure 1: CBA

#### Benefits:

- Town of Byron, NY Total Benefits→ Annual payments starting at \$1,006,522 and increase by 2% each year for 20 years for 280 MW solar farm.
- Adjust for inflation→ \$1,202,614.65 in 2025
  - Scaled to our example→ Geometric series formula→  $S_n = a_1 \left( \frac{(1-r)^n}{(1-r)} \right) \rightarrow S_n = \$1,202,614.65 \left( \frac{(1-1.02^{25})}{(1-1.02)} \right)$
  - $S_n = \$38,520,107.6911 \approx \$38,520,107.69$
  - Finding Present Value with 6% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = \$38,520,107.69 / (1 + .03)^{25} = \$18,397,417.9613 \approx$   
**\$18,397,417.96 over 25 years**
  - Finding Present Value with 6% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = 38520107.69 / (1 + .06)^{25} = 8,975,132.339 \approx$   
**\$8,975,132.34**
- Town of Riverhead, NY Total Benefits→ \$1.5 million upfront
  - Adjusted for inflation → **\$1,777,978.79**
- County of Merced, CA Total Benefits→ Flat rate of \$25,000 annually for 20 year period, in addition to all sales tax associated with construction projects. Solar Farm is 200 MW.
  - Adjusted for inflation→ \$33,985.10
  - Scaled to our example→ \$33,985.10 x 25 years = \$849,627.5 total for 25 year period
  - $\$849,627.5 / 200MW = X / 25 MW \rightarrow X = \$106,203.4375 \approx \$106,203.43$  total benefits, scaled to our model
  - Finding Present Value with 3% Discount Rate→  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = 106203.43 / (1+.03)^{25} = \$50,723.35$  over 25 years
  - Finding Present Value with 6% Discount Rate→  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = 106203.43 / (1+.03)^{25} = \$50,723.35$
- Average of the three scenarios with 3% discount→  $(18,397,417.96 + 1,777,978.79 + 50,723.35) / 3 \approx$  **\$6,742,040.03**
- Average of 3 scenarios with 6% discount →  $(8975132.34 + 1777978.79 + 50723.35) / 3 =$  **\$3,601,278.16**

#### Costs:

- Lawyers record 2.3 hours of billable time per day (Clio, 2017). For the sake of these calculations, we will assume a lawyer is spending the full 2.3 hours on a single client. It

should be noted that contrary to this assumption, most lawyers handle many cases at once. That being said, there are often crunched timelines for projects like CBAs where negotiations need to happen before the developer begins construction. Thus, a lawyer would need to prioritize such a contract, spending more time on it for a shorter timeline.

- Cost of legal council →
  - In VA, municipal lawyers cost an average of about \$295 an hour (Brock, 2024)
  - In WV, municipal lawyers cost an average of about \$162 an hour (Brock, 2024)
  - In KY, municipal lawyers cost an average of about \$204 an hour (Brock, 2024)
  - In TN, municipal lawyers cost an average of about \$233 an hour (Brock, 2024)
    - Average of these three states →  $295+162+204+233= 894/4= \$223.5$  an hour
    - Inflation adjusted rate: \$238.38
- CBA done in Beaver County, PA took over a year to develop (Rossi-Keen et al., 2024). We will assume then that a CBA takes about a year to develop.
  - Because a CBA done over the course of a year is a less expedited timeline, we might assume an attorney would not work everyday on the agreement. Thus, we will assume they work only a third of the days on the agreement (122 days). A lawyer would likely be needed for more time for negotiations of a CBA than with a CBA under a CBO, because there are more stakeholders involved for which the agreement would need to consider.
- Cost of legal council for CBA → 2.3 hours a day x 122 days = 280.6 hours → 280.6 hours x \$238.38 = \$66,889.428 ≈ **\$66,889.42**
- Cost of technical expert → (Could get developer to cover this cost.)

*CEA:*

- Using the 3% discount rate →  $66889.42/6742040.03 = \underline{\underline{0.01}}$
- Taking the max benefits with 3% discount →  $66889.42/18397417.96 = 0.004$
- Using the 6% discount rate →  $66889.42/3601278.16 = 0.019$

## Figure 2: CBO

*Benefits:*

- Same as CBA

*Costs:*

- For the purpose of this document and due to lack of information on the topic, we will assume the production of a CBO and revenue share ordinance would also take at least 60 days to complete. (A month to draft, and a month to conduct revisions.)
  - For a CBO, the government council will be in charge of drafting the ordinance, and a lawyer would be in charge of reviewing the document and adding revisions. For this reason, we will assume the attorney would be needed for 30 days.
- Cost of legal council for ordinance development → 2.3 hours a day x 30 days = 69 hours → 69 hours x \$238.38 = \$16,448.22

- The Detroit government took at least 60 days to draft CBA with one company on expedited timeline, with a CBO already in place (Saha et al., 2024).
- Cost of legal council for CBA development under CBO → 2.3 hours a day x 60 days = 138 hours → 138 hours x \$238.38 = \$32,889.54
- $16,448.22 + 32,889.54 = \mathbf{\$49,337.76}$
- Cost of technical expert → (Could get developer to cover this cost.)

CEA:

- Using the 3% discount rate →  $49337.76/6742040.03 = \mathbf{0.007}$
- If I had taken the max benefits →  $49337.76/18397417.96 = 0.003$
- Using the 6% discount rate →  $49337.76/3601278.16 = 0.014$

### Figure 3: Rezoning

Benefits:

- Average number of acres of proposed SWVA solar projects (*Weldon Cooper Center for Public Service at the University of Virginia*, 2025) →  $68+30+20+34+21+17+22+220+92+36+35+9+42+40+58+154+322+378+130+211+120+100+844+154+250+76+465+50+2253+700+1200+14+100 = 8265/33 \approx 250.45$  acres. Thus, we will assume the number of acres for a proposed solar development to be 250 acres, for simplicity.
- Illinois brownfield over an abandoned coal mine sold for 3,750 per acre (Lydersen, 2012).
  - This equates to about \$5,170.79 in 2025 dollars.
  - The cost of farmland in the Central Appalachian region we are focused on, would likely average out as a bit less than Illinois. Further, brownfields should be assessed at lower rates than farmland, due to its degraded nature. Thus, we will assume the cost of land to be **\$5,012.82 per acre**. This number is the inflation adjusted cost of farmland on the upper end of the lower bracket for assessed farmland in our region of interest (Callahan, 2025).
- $250 \text{ acres} \times \$5,012.82 = \$1,253,205$
- We will assume property value to be assessed based on Virginia's use value assessment strategy.
- The 1981 Appalachian land study found that the property tax rate on agriculturally zoned land was about \$.68 per acre and the property tax rate for commercial/industrial zoned land to be \$1.45 per acre (Land Ownership Task Force, 1983). While the study this information came from is from 1981, I was able to cross check this with more recent information from a Virginia Tech slide show presentation on how to assess agricultural property, and property assessment information from Martin County, Kentucky (Groover & Bruce, 2011; Office of Property Valuation, n.d.).
  - Thus, using all of this information, we will assume property tax for agriculturally zoned land to be \$.68 per \$100 of assessed value. We will assume commercially zoned land to be \$1.45 per \$100 of assessed value.

- Average property tax revenue for solar project on land zoned ag →
  - $\$1,253,205 / 100 = \$12,532.05$
  - $\$12,532.05 \times .68 = \$8,521.794$
  - $\approx \$8,521.79$
- Average property tax revenue for solar project on land zoned commercial/industrial →
  - $\$12,532.05 \times 1.45 = \$18,171.4725$
  - $\approx \$18,171.47$
- Find the difference →  $\$18,171.47 - \$8,521.79 \approx \$9,649.68$  a year
- $\$9,649.68 \times 25 = \$241,242$  over 25 years
- Finding Present Value with a 3% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
  - $PV = 241,242 / (1+.03)^{25} = 115218.52274 \approx \$115,218.52$
- Finding Present Value with a 6% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
  - $PV = 241242 / (1+.06)^{25} = 56209.056 \approx \$56,209.05$
- Assuming now that reassessing the parcel from agricultural to industrial actually resulted in an increase in property tax revenue that was eleven fold that of the original assessment, we'd find the benefits to equate to (Mangum et al., 2020; Reality Check on Ross's Stop Solar Claim, 2021)...
  - Average property tax revenue for solar project on land zoned ag →
    - $\$1,253,205 / 100 = \$12,532.05$
    - $\$12,532.05 \times .68 = \$8,521.794$
    - $\approx \$8,521.79$
  - Average property tax revenue for solar project on land zoned commercial/industrial →
    - $.68 \times 11 = 7.48$
    - $\$12,532.05 \times 7.48 = \$93,739.734$
    - $\approx \$93,739.73$
  - Find the difference →  $93739.73 - 8521.79 = \$85,217.94$
  - $85217.94 \times 25 = \$2,130,448.5$  over 25 years
  - Finding Present Value With 3% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = 2130448.5 / (1+.03)^{25} = \$1,017,514.069 \approx \$1,017,514.06$
  - Finding Present Value With 6% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
    - $PV = 2130448.5 / (1+.06)^{25} = 496391.583 \approx \$496,391.58$

#### *Costs:*

- We assume **no costs**, because government council workers and planners would be working regardless of this rezoning decision.

#### *CEA:*

- For original scenario, where tax rate for industrial = 1.45
  - $0/115218.52 = 0$

- For second scenario where tax rate for industrial is 11 fold the tax rate for agricultural = 7.48
  - $0/1017514.06 = 0$

#### Figure 4: Revenue Share Ordinance (Based on Virginia's Code)

##### Benefits:

- Benefits start at \$1,400, and increase by 10% every 5 years after implementation (§ 58.1-2636. Revenue Share for Solar Energy Projects and Energy Storage Systems, n.d.).
- 250 acre solar farm produces about 25 megawatts of electricity.
- Max benefits in first year = \$1,400 per MW  $\rightarrow 1400 \times 25 = \$35,000$  per MW
- Every five years, this number increases 10%
- Benefits for first five years  $\rightarrow$ 
  - 1)  $\$35,000 \times 5 = \$175,000$
- Benefits for second 5 years  $\rightarrow \$1,400 \times .10 = 140 \rightarrow 140 + 1,400 = \$1,540$  per MW
  - $\$1,540 \times 25 \text{ MW} = \$38,500$  per year
  - 2)  $38,500 \times 5 = \$192,500$
- Benefits for third 5 years  $\rightarrow \$1,540 \times .10 = 154 \rightarrow 154 + 1,540 = \$1,694$  per MW
  - $\$1,694 \times 25 \text{ MW} = \$42,350$  per year
  - 3)  $\$42,35 \times 5 = \$211,750$
- Benefits for fourth 5 years  $\rightarrow 1,694 \times .10 = 169.4 + 1,694 = \$1863.4$  per MW
  - $\$1863.4 \times 25 \text{ MW} = \$46,585$  per year
  - 4)  $\$46,585 \times 5 = \$232,925$
- Benefits for fifth 5 years  $\rightarrow 1863.4 \times .10 = 186.34 + 1863.4 = \$2049.74$  per MW
  - $\$2049.74 \times 25 \text{ MW} = \$51,243.5$  per year
  - 5)  $\$51,243.5 \times 5 = \$256,217.5$
- Total benefits after 25 years  $\rightarrow 175000+192500+211750+232925+256217.5 = \$1,075,480$
- Finding Present Value With 3% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
  - $PV = 1,075,480 / (1+.03)^{25} = 513655.23763 \approx \$513,655.23$
- Finding Present Value With 6% Discount Rate:  $PV = FV / (1+r)^n \rightarrow$ 
  - $PV = 1075480 / (1+.06)^{25} = \$250,585.367 \approx \$250,585.36$

##### Cost:

- Cost of legal council for ordinance development  $\rightarrow 2.3 \text{ hours a day} \times 30 \text{ days} = 69 \text{ hours} \rightarrow 69 \text{ hours} \times \$238.38 = \$16,448.22$
- No additional hours of legal council, due to lack of need for negotiation. Once ordinance is in place, it applies to all future solar developments.

##### CEA:

- With the 3% discount rate  $\rightarrow 16448.22/513655.23 = \underline{0.032}$
- With the 6% discount rate  $\rightarrow 16448.22/250585.36 = 0.066$



## Sensitivity Analysis

In conducting a sensitivity analysis, a few different variations of the original computation were tested. The original formula was weighted and all present value calculations utilized a 3% discount rate. In order to test what might happen with a higher discount rate, a 6% discount rate was also tested (*The Virginia SolTax Tool*, 2023). For the alternatives that came with a range of benefits, I also tested the optimal outcome if the maximum benefits were obtained. Last, I observed the original calculation, but with zero weights on any of the criteria. All of these scenarios yielded the same outcome, as the revenue share ordinance was awarded the lowest score every time. While this also did not impact the analysis, I would like to point attention to the very dramatic difference between the two calculations I had for benefits that could be gained from rezoning. Because we looked at these benefits only in the context of a cost/benefit analysis where the costs were zero, the cost effectiveness came out as zero regardless of whether we used a smaller or larger benefit calculation. That being said, it should be noted that had this analysis added a standalone benefit criteria, this could have yielded a slightly different outcome.