



REIMAGINING PENNSYLVANIA'S COAL COMMUNITIES

STAKEHOLDER
PERSPECTIVES AND
STRATEGIES FOR
ECONOMIC
REVITALIZATION

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EXECUTIVE SUMMARY

PENNSYLVANIA'S COAL MINING INDUSTRY BEGAN IN THE MID-1700S AND GREW TO WARM COUNTLESS HOMES, POWER THE NATION, AND FUEL THE STEEL INDUSTRY AND THE INDUSTRIAL AGE. In turn, coal's importance to Pennsylvania's economy grew, as homes, businesses, and towns developed around coal mines—much like factory towns. But over time, as is typical in manufacturing, technology improves and enables machines to more efficiently and cost effectively do the work of people. Slowly, the coal mining industry also began using more machines and employing fewer laborers.

This employment reduction trend has been occurring for decades, even as the amount of coal mined increased. The U.S. steel industry began to slow in the late 1970s into the early 1980s, as economic recessions softened steel demand, and competition from foreign steel producers increased. Scientists learned more about the public health and environmental impacts of coal mining and combustion, which led to increased regulations.

Appalachian coal is buried deep underground, making it more expensive to mine than coal in other parts of the country. As regulations and market factors changed, production of cheaper coal from other areas of the country increased and Appalachian coal production declined. These trends contributed to the ongoing erosion of coal mining employment, further depressing Pennsylvania's small, rural coal towns.

While coal mining unemployment and the depression of Pennsylvania's coal towns has been gradually occurring for decades, the rise of Pennsylvania's Marcellus Shale natural gas resource resulted in rapid decline. Cheap and abundant natural gas extracted from the earth by machines—aided by a comparably small number of workers—quickly reduced coal demand, production,

and employment, sending economic shockwaves through already struggling coal communities. And while Pennsylvania's natural gas development has lowered energy costs for consumers and created new economic development opportunities, it has been devastating for the people, businesses, and towns still dependent on coal mining.

Pennsylvania's coal industry is unique because it produces two types of coal that are used in two different sectors. Bituminous coal in the west and northeast is used as fuel to produce electric power, whereas anthracite coal in the northeast is used by the iron and steel industry. The persistent national downturn in coal demand primarily affects bituminous coal, while anthracite coal is exposed to a large, international export market.

However the future demand for coal is unknown. As such, the strategies in this report focus on economic diversification to enable the potential for success, regardless of coal industry dynamics.

In 2015, direct coal mining represented less than 0.1% of total non-farm employment in Pennsylvania. But the coal industry supports additional indirect jobs (e.g. supply chain businesses) and induced jobs (e.g. stores or restaurants) that support individuals and communities. While each community is unique, many of these distressed coal communities share similar characteristics, including high unemployment, aging populations, deteriorating or insufficient infrastructure, and educational attainment levels that are lower than state and national averages. As people born, raised, and educated in these communities are moving out, new, educated populations are generally not moving in, leading to a “brain drain” of educated workers. These and other factors make it difficult to attract new business into these communities.



What can be done to help these people and places?

This report attempts to capture and categorize local and regional strategies being pursued to assist distressed workers, businesses, and communities. The report captures current information from on-the-ground stakeholders—surveys with small-business owners, outreach for interviews with more than 125 stakeholders, and two regional meetings in coal producing areas of the state. This input is augmented with research into Pennsylvania's demographics, coal market data and trends, unfunded programs proposed in grant applications, and grant-funded programs.

The report captures many, not all, strategies being employed or proposed in Pennsylvania. Some of these strategies are still in the planning phase; others are in development; a few have been recently implemented. Most projects, however, are too early in their infancy to determine long-term efficacy.

It goes without saying that financial resources available to assist people and places impacted by the coal downturn are scarce. This reality often hinders the ability to implement revitalization or redevelopment strategies. Exploring, evaluating, and leveraging multiple strategies may be the best way to test for success, prior to deploying capital. When exploring development strategies, communities should weigh key place-specific variables to determine strategic leverage points—such as county location, resource availability, pre-existing strengths and weaknesses, and others.

Assistance strategies in Pennsylvania tend to fall under five key categories:

- **Planning and Development** – using planning and development efforts to convert community liabilities into assets that can be leveraged for broader economic benefit.
- **Training** – providing education and workforce development strategies, including promotion of entrepreneurship, to enhance and diversify employment opportunities.
- **Technology** – enabling the greater use of technology to enrich business opportunities.
- **Financing Options** – employing innovative approaches to increase the availability of financial resources that target coal community revitalization.
- **Exploring Other Industries** – encouraging individuals, businesses and communities to diversify into new opportunities in growth industries or industries where there is a potential local competitive advantage.

The report provides a review of the above categories, and outlines related sub-categories. For each sub-category strategy identified, the report highlights foreseeable implementation challenges, though additional challenges should be expected. Examples of implemented or proposed programs are provided for most identified strategies. Insight boxes are included throughout the report to provide complementary data or perspectives to enable a deeper understanding of issues.

The report concludes by identifying key principles to employ when determining the best portfolio of strategies to implement, including developing a community-specific approach, emphasizing stakeholder collaboration and cooperation, leveraging financial resources, and promoting organizational connections and individuals who are skilled connectors. Applying these four principles to local governments and economic development organizations, four specific next steps are identified to help these entities lead coal community transition and diversification. These steps include: complement regional economic development planning with community-specific plans, promote a culture of collaboration (not competition) among leadership organizations, develop partnerships to identify and secure economic development resources, and serve as matchmakers to make connections within, across, and beyond target communities.

The process of reimagining lives, enterprises, and communities must by definition be forward-looking, embracing change as an opportunity. For Pennsylvania's coal regions, any vision of the future and plan for transition must respect and honor the past. For many people, the changes underway are not opportunities; they are real-life crises. Coal mining jobs pay large wage premiums. Although these are difficult jobs that present health hazards, they are often some of the best paying jobs around (when available). More fundamentally, coal and coal mining served as the foundation for the initial development of these coal towns. It is a proud part of the history and culture of these places and the generations of people who've lived there.

Between honoring the past and envisioning the future, comes the painful reality of transition. The most powerful messages heard from stakeholders concerned the agonizing human experience of transition. Stories of prolonged unemployment, crushing financial debt, plummeting home values, and inability to relocate, understandably went hand-in-hand with stories about unhealthy levels of stress,



deteriorating mental health, and even substance abuse. Revitalization is a long-term goal that may or may not be realized, but transition is underway and the needs are immediate. The various strategies identified have short, medium, and long term horizons to realization, but do not fully explore the transitional needs of Pennsylvania's hardest-hit coal dependent populations.

This report brings together important information—connecting on-the-ground stakeholder input, coal market trends, coal country demographics, regional economic development strategies, and supportive research on current and proposed initiatives to improve distressed coal community economics—in order to identify a menu of diverse strategies to potentially revitalize Pennsylvania's struggling coal communities.

READ THE FULL REPORT:

kleinmanenergy.upenn.edu/paper/reimagining-pennsylvanias-coal-communities



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STAKEHOLDER PERSPECTIVES AND STRATEGIES

FOR ECONOMIC REVITALIZATION

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INTRODUCTION

The research report has been developed by the Kleinman Center for Energy Policy (Kleinman Center) at the University of Pennsylvania. This research is funded, in part, by a federal grant from the U.S. Economic Development Administration (EDA) and obtained by the Pennsylvania Small Business Development Center's (SBDC) to help identify strategies to assist communities in Pennsylvania impacted by changes in Pennsylvania's coal economy. This report serves as an input to help shape the development of new programs or services for potential implementation.

The regions in Pennsylvania most impacted by the changes in the coal economy include the southwest part of the state, the Southern Alleghenies, and north-central parts of the state (Armstrong, Bedford, Cambria, Clarion, Elk, Fayette, Greene, Indiana, Jefferson, Somerset, Washington, and Westmoreland counties), and the Northeastern Region (Luzerne, Northumberland, and Schuylkill counties). Other counties that also have coal mining operations include: Allegheny, Beaver, Blair, Butler, Carbon, Columbia, Dauphin, Huntingdon, Lackawanna, Lycoming, Mercer, and Venango.

Goals and Objectives

The purpose of this report is to explore the economic issues facing financially distressed coal communities, miners, and the small businesses in these impacted regions, while identifying potential opportunities for economic revitalization.

These research efforts aim to:

- Identify business development services for businesses and individuals negatively impacted from the downturn in the coal economy.
- Support dislocated coal workers, supply chains, and multiplier businesses.
- Plan for the future. Whether the downturn in the coal economy continues or there is improvement in the coal economy, it is critical to help small businesses be more resilient to withstand potential disruptions.

Methodology and Overview

As part of this research, the SBDC conducted a survey of small-business owners to gather some baseline information for the project. The SBDC sent an online survey to clients in counties and markets impacted by coal activity downsizing to determine needs and potential opportunities. The survey was sent to 2,333 businesses in 14 counties. Survey results confirmed that many business owners in these areas are concerned about the recent closings, loss of jobs, and reduced sales in the energy industry. These changes not only affect employees but also customers who gradually change their spending habits due to the declining need for coal.

Section 1 provides an overview of market trends and other factors driving the downturn in coal demand for Pennsylvania's coal types, and how this downturn has impacted coal-sector employment in Pennsylvania and beyond.



Section 2 presents the bulk of the research observations. The Kleinman Center reached out to approximately 125 stakeholders to schedule phone interviews. To maximize candor and open dialogue, researchers gathered input but did not attribute it to organizations or individuals.

These stakeholders represented professionals from five sectors, including state and local economic development agencies, policy makers, Appalachian Regional Commission (ARC) Power Grant applicants (both funded and unfunded)¹, trade associations, and business owners. Semi-structured interviews took place and consisted of a series of questions tailored to the five categories of stakeholders listed, along with open dialogue. Interviewers collected information on the effects of the downturn, existing redevelopment programs, suggestions to improve the economic outlook, and further relevant input. These data were complemented by literature review and other background research to develop a preliminary set of observations and recommendations.

Preliminary findings were augmented by regional stakeholder outreach meetings in the Pennsylvania towns of Latrobe and Wilkes-Barre. These meetings served to gather input for framing research, as well as to collect additional expertise and ethnographic research. Relevant data has accordingly been compiled in this report.

Section 3 presents additional information and observations gathered from key stakeholders during regional outreach meetings that are important to consider in developing viable economic revitalization strategies targeting coal communities.

Section 4 closes with conclusions and recommended next steps.

In addition, the Appendix reviews demographic information for the relevant coal regions and counties in Pennsylvania.

¹ The main goal of the ARC, and thereby its strategic grants, is to invest in entrepreneurial and business development strategies that strengthen Appalachia's economy (Source: <https://www.arc.gov/images/newsroom/publications/sp/InvestinginAppalachiasFutureARCs2016-2020StrategicPlan.pdf>)



Insights: Living Through the Coal Downturn

The impacts of the downturn of Pennsylvania's coal economy have been all encompassing for local economies. The insights below attempt to convey some of these impacts, as told by stakeholders interviewed in the research process.

"It is impossible to live in these areas of the state and not be impacted in some shape or form by the downturn," said one stakeholder.

Unemployment. Extended unemployment is the most identified and ubiquitous impact of the coal downturn. According to a stakeholder, in the past two years, there have been hundreds of displaced miners in Green County alone. At its peak, Corsa Coal in Somerset County had 1,200 employees. At the time of the stakeholder interview, it was asserted the company was down to 200 employees.

Supply Chain. Coal company cutbacks have caused a trickle-down effect for ancillary or support businesses. In the summer of 2016, Joy Mining in the City of Franklin in Venango County, a company serving the coal industry that manufactures hardware and machinery needed for coal mining, closed and laid off all 1,200 of its employees. Many of these workers had been employed at the company for nearly forty years. Throughout the coal supply chain, long-time workers experienced similar lay offs across Pennsylvania's coal counties. Stakeholders at the regional meetings further corroborated these hardships, and stated that more jobs have been lost in the coal supply chain than in the direct coal-job industry.

Retail. Broad economic impacts to communities have set in as unrelated businesses—such as fire extinguisher suppliers—have also seen their sales dwindle. Car dealerships, restaurants, trucking, rail transportation, and many segments of everyday life have seen dire economic effects. A town resident recounted how he has to drive miles to other towns for simple things such as servicing his refrigerator and other appliances. Such businesses, unrelated to coal, have had to shutter due to the loss in personal income from coal dollars.

Tax Revenue. All of this local wholesale and retail decline manifests itself in lower revenues for local companies. This leads to lower tax revenues for the local township, which then leads to reduced budgets and reductions in community programs and services.

Real Estate. From an infrastructure development standpoint, the closing of mines and plants has resulted in dilapidated and abandoned buildings, languishing properties with no economic use to the communities. To compound all of this, there are few new town residents to alleviate the stagnant economy, as the downturn does not attract outsiders. Reduced property values further add to the economic hardships of unemployed coal and non-coal workers in these areas. Some stakeholders note the property-value decreases have in some cases resulted in home-owners owing more on their mortgages than their homes are worth, creating further economic hardship and barriers to relocation.

Mental Health. At the end of this long list of challenges, it seems inevitable that mental health issues would surface. Former miners experience a loss of identity coupled with their economic anxiety. Some stakeholders assert it is difficult to accept that coal is not coming back nor returning to its heyday. Especially given the cultural history of coal in these communities, and the fact that coal jobs pay an average \$80,000, a significant premium above the average Pennsylvania industrial wage.

Stakeholders assert the impacts of the coal economy downturn go beyond coal mining companies and miners. These negative impacts broadly reach out through local economies and communities, with the potential for widespread socio-economic implications.



SECTION I

INTRODUCTION TO PENNSYLVANIA'S COAL ECONOMY

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THE UNITED STATES IS SECOND ONLY TO CHINA IN THE AMOUNT OF “PROVED RECOVERABLE RESERVES” OF COAL, a measure used by the World Energy Council indicating resources remaining in known coal deposits that are accessible under current local economic and technologic conditions (U.S. Energy Information Administration 2017). In 2015, Pennsylvania was the fifth largest producer of coal in the United States, mining over 5.5% of total U.S. coal production, and had the sixth largest coal reserves in the nation.² In 2001, domestic coal production was almost 1.13 billion short tons per year, but by 2016 domestic production dropped by over 35% to just 728 million short tons per year (U.S. Department of Energy 2016).

Over the past decade, a series of events has resulted in reduced demand for coal, with negative impacts for coal mining companies, employees, and communities. This section explains Pennsylvania's coal types and respective markets, the events that have led to the downturn in coal demand, how the demand downturn has impacted employment in the coal mining sector, and factors to consider when thinking about the future of coal.

PENNSYLVANIA'S TWO COAL TYPES

Pennsylvania has been home to coal mining for over two centuries, and remains one of the largest coal producing states in the country (Edmunds 2002). Pennsylvania is unique because it boasts two types of high-value coal: anthracite and bituminous. In fact, Pennsylvania is the only source of Anthracite coal mines in the United States. *Figure 1* on the following

page shows where anthracite coal (in pink) is located in the northeast and eastern-central portion of the state, while bituminous coal (in yellow and orange) is located in western and southwestern Pennsylvania. These coal types feed two different industries and trade in two different markets—resulting in two different prices.

The most abundant form of coal in Pennsylvania is bituminous coal—also called soft coal or thermal coal—which is used for electric power production. Bituminous coal is the most abundant coal type in the United States. For quality, it is ranked just below anthracite coal, with relatively high levels of carbon and energy content. Bituminous coal is primarily used in the electric power industry, as a fuel source that is combusted to convert water into pressurized steam that spins turbines to create electricity. Bituminous coal in Pennsylvania is predominately extracted through underground mining methods, but can also be extracted through surface mining. Certain high-quality bituminous coal can also be used as an input to steel making (i.e. metallurgic coal).

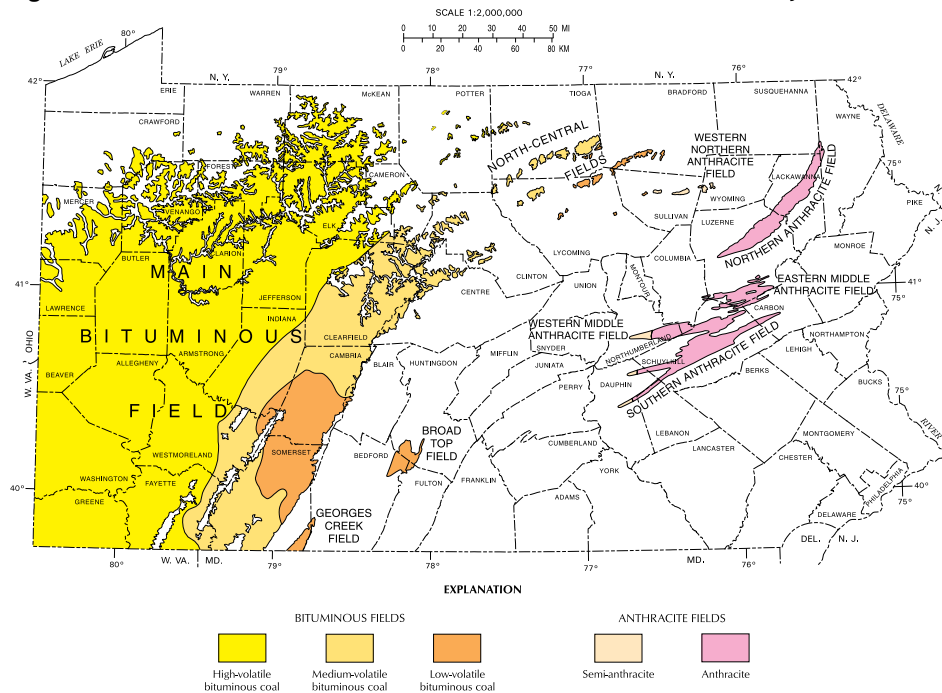
Pennsylvania's other coal type is anthracite coal—also called hard coal, metallurgic coal, or met coal—which is used in the steel making process. Anthracite is the highest “ranking” or quality coal type, meaning it has high carbon and energy content, with low levels of moisture. These properties make anthracite coal ideal for processing into “coke,” which is a key input for steel making because it enables iron ore to be reduced to iron.³ Anthracite coal is typically extracted by surface mining, but can also be obtained through underground mining. Small amounts of anthracite coal are used for home heating purposes in rural areas of Pennsylvania.

² According to 2015 data from the U.S. Energy Information Administration, the greatest coal producing states are Wyoming, West Virginia, Kentucky, Illinois, and Pennsylvania; and the largest demonstrated reserve base is found in Montana, Illinois, Wyoming, West Virginia, Kentucky and Pennsylvania.

³ Anthracite coal is baked in an airless oven or furnace to remove impurities (e.g. coal-tar, coal-gas, moisture) in order to produce coke.



Figure 1: Distribution of Bituminous and Anthracite Coal Formations in Pennsylvania



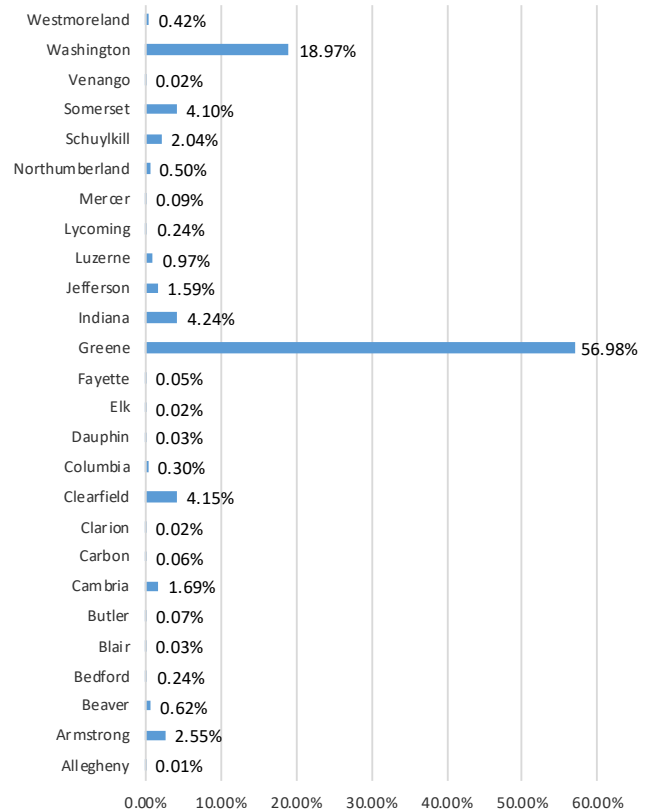
Graphic Source: Edmunds 2002

WHERE DOES MOST OF PENNSYLVANIA'S COAL PRODUCTION OCCUR?

In 2015, Pennsylvania produced 48,077,000 short tons of bituminous coal, and 1,953,000 short tons of anthracite coal (U.S. Energy Information Administration 2016). As shown in *Figure 2*, in 2015, almost 57% of Pennsylvania's coal was produced in Greene County, about 19% produced in Washington County, 4.24% in Indiana County, and 4.15% in Clearfield County (U.S. Energy Information Administration 2016). Notice these counties are all situated over Pennsylvania's bituminous coal fields.

In general terms, when people refer to the downturn in the coal economy, they are likely referring to reduced demand for bituminous coal used in the electric power industry.

Figure 2: Percent of Total PA Coal Production by County, 2015



Data Source: U.S. Energy Information Administration 2016, 6-7

NATIONAL COAL DOWNTURN HITS APPALACHIA PARTICULARLY HARD

There are three main coal producing regions in the U.S.—the Appalachian (in the Mid-Atlantic, including Pennsylvania), Interior, and Western Region. As can be seen in *Figure 3*, coal production has declined overall in the U.S., but this decline has not been experienced evenly throughout coal mining regions.

Coal mining in the Appalachian region has been hit particularly hard, decreasing 45% in the past ten years, more than twice the national decrease of 21% (Hodge 2016, 3). *Figure 4* shows that within the coal producing regions of Appalachia, Kentucky, and West Virginia coal production has decreased most severely.

WHY IS THERE A DOWNTURN IN COAL DEMAND?

Demand for Pennsylvania anthracite coal comes primarily from the domestic and international steel coal market (i.e. the metallurgic coal market), whereas demand for bituminous coal is driven by the domestic electric power coal market (i.e. the thermal coal market). This section provides an overview of trends in these two very different markets, providing insights into why coal demand is depressed in both.

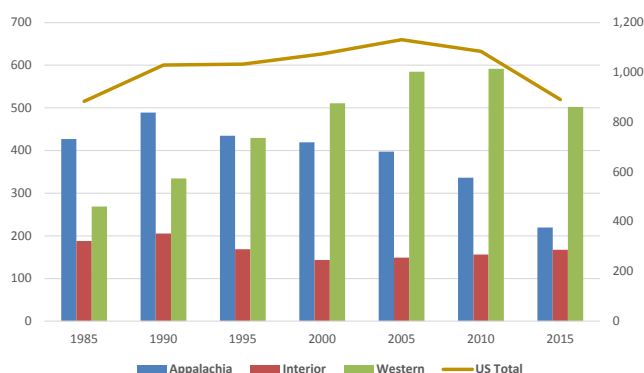
Less Coal Being Used in the Electric Power Sector

In 2005, coal supplied over 55% of Pennsylvania's power, but by 2014 coal power supply dropped to less than 36%, losing market share to natural gas-fired power generators (Simeone and Hanger 2016). This phenomenon has resulted in reduced coal demand from the power sector. The following factors explain what is driving this trend.

Decreased Natural Gas Prices. As a result of horizontal hydraulic fracturing (i.e. “fracking”) technology developments—which reduced the cost of extracting natural gas from shale rock formations—abundant new supplies of shale-based gas have entered the market, resulting in reduced and stable gas prices.

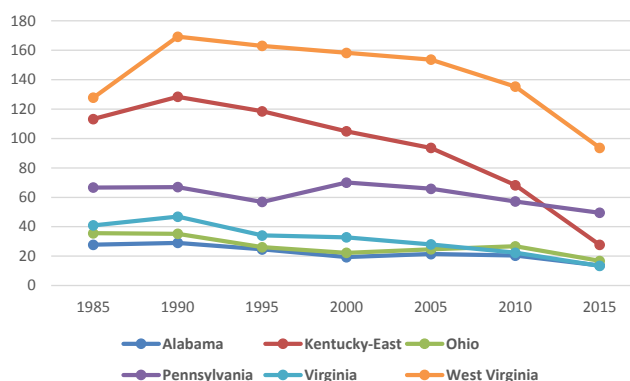
The yellow line in *Figure 5* shows how shale-based gas has contributed significantly to the increase in overall domestic production of U.S. natural gas. In 2015, over 29% of all U.S. shale-based natural gas was produced in Pennsylvania (U.S. Energy Information Administration 2017). In 2016, the average annual price of natural gas at the Henry Hub—a national benchmark for determining gas prices—was \$2.49 per million British thermal units (MMBtu), the lowest annual average price since 1999 on a nominal basis (Tsai, Upchurch 2017).

Figure 3: Coal Mining Production, 1985 - 2015
(millions of short tons)



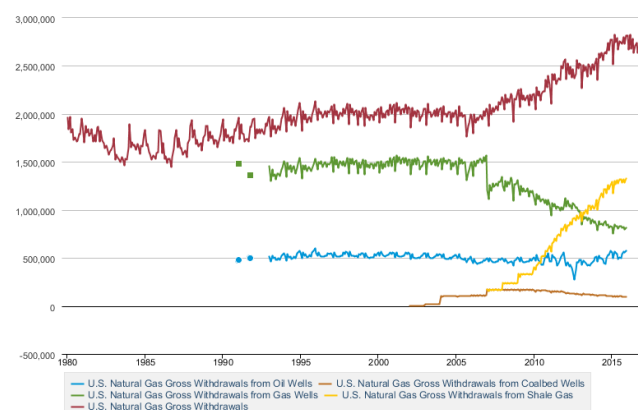
Graphic Source: Hodge 2016, 4

Figure 4: Coal Mining Production in Key Appalachian States, 1985 - 2015 (millions of short tons)



Graphic Source: Hodge 2016, 5

Figure 5: U.S. Natural Gas Gross Withdraws and Production (MMcf)



Graphic Source: U.S. Energy Information Administration 2017



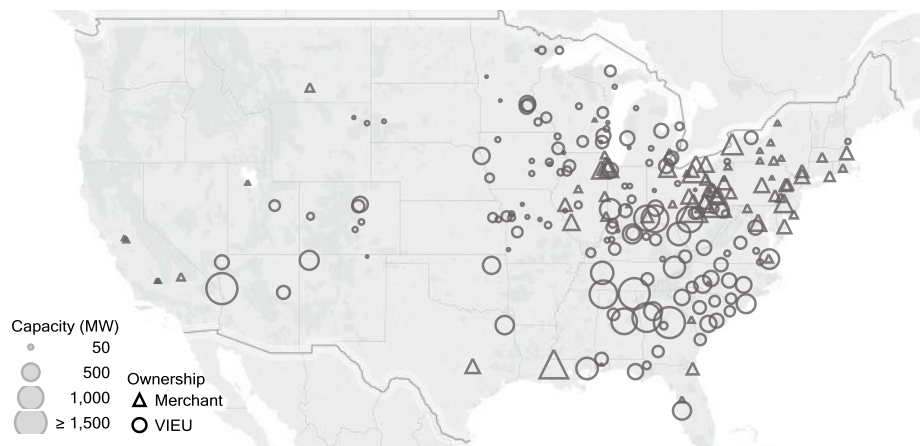
This cheap natural gas was quickly incorporated into electric power markets, making many existing natural gas plants less costly to run. By enhancing their cost competitiveness, the existing fleet of generally underutilized natural gas plants began to provide power to the grid more often. Given relatively flat growth in electric power demand (discussed below) this additional supply of now relatively cheap power resulted in relatively higher-cost coal plants providing less power to the grid, therefore generating less revenues. In time, this led to the retirement of coal-fired power plants (discussed below), which reduced the demand for coal. In more simple terms, natural gas can be considered a substitute fuel for bituminous coal in power markets. As natural gas prices decreased, gas use increased and coal use decreased.

Environmental Regulations. Around the same time natural gas prices began to drop, environmental regulations impacting coal-fired power plants and coal mines began to become more stringent. For example, coal-fired power plants were required to limit emissions of mercury, ozone-forming chemicals, particulate matter, and other air pollutants. These plants also faced the potential need to reduce carbon emissions that contribute to climate change. Regulations applying to water discharges from coal-fired power plants and management and disposal of coal ash (the material left over from when coal is combusted) were also moving forward. There were also regulations impacting coal mining that resulted in increased coal mining costs and/or making some areas infeasible for mining. The general result of these regulations was to continue operating the coal-fired power plant, albeit at higher operating costs (i.e. higher fuel costs) and/or capital investments (i.e. pollution controls). If economically infeasible, the alternative was to retire the unit.

Lack of Electricity Demand Growth. Demand for electricity is a major driver in electricity market economics. As demand increases, existing electricity plants need to run more often, and opportunities arise to build new plants. In the past, as the economy grew, electricity demand also grew. However, since 2007, the economy has grown by 10%, while electricity use has actually fallen by 2.4% (Bloomberg New Energy Finance 2016). This is due to changes in the nature of the economy—less manufacturing and more services—as well as increased emphasis on consumer energy efficiency. In general, this lack of demand growth is good for electricity consumers, but reduces opportunities for electricity producers to increase revenues or invest in new power generation projects.

Coal Plant Retirements. Low natural gas prices, increased environmental regulations, and lack of electricity demand growth have led to a significant amount of coal power plant retirements, and more are expected.⁴ Natural gas plants are becoming more competitive compared to coal plants. In the more competitive environment, some coal plants have chosen to close instead of making costly upgrades for environmental compliance. Lastly, the electric power market is not growing, and there is increasing competition among market participants (e.g. natural gas versus coal-fired power). Most of the coal plants that have retired are older, smaller units that had not yet installed pollution controls. In 2015 alone, approximately 18 gigawatts (GW) or a little under 5% of the nation's coal capacity retired (Comstock 2016). As shown in *Figure 6*, many of the coal plants that have retired are in the Mid-Atlantic region.

Figure 6: Location of Coal Plant Retirements, 2002 - 2016



VIEU = Vertically integrated electric utilities (Graphic Source: U.S. Department of Energy 2017)

⁴ For more information about the potential for future coal-fired power plant retirements in Pennsylvania, please review the Kleinman Center for Energy Policy's blog post, entitled, "Once in a lifetime investment opportunity to trigger more baseload retirements in PJM", available at <http://kleinmanenergy.upenn.edu/blog/2017/06/01/once-lifetime-investment-opportunity-trigger-more-baseload-retirements-pjm>

Coal Region Switching. As shown in *Table 1*, Appalachian coal prices are higher than coal prices from other areas of the country, mainly due to the increased costs associated with accessing these harder-to-reach coal seams. On a per ton basis, Appalachian coal has higher energy content compared to other regions, and lower sulfur content compared to Illinois Basin coal. Many older coal plants that lacked air pollution control scrubbers relied on higher-priced Appalachian coal in order to meet regulatory limits on air pollution (e.g. sulfur dioxide).

As older coal plants retired, demand for Appalachian coal decreased. The remaining coal plants either had invested or decided to invest in pollution controls equipment. These investments enabled the plants to shift away from high-priced Appalachian coal to lower-priced coals (e.g. from the Illinois Basin), while still meeting emissions limits and reducing operating costs. This coal region switching further reduced demand for Appalachian coal, especially the higher priced Central Appalachian coal, which is one of the reasons coal production in Kentucky and West Virginia have decreased more significantly than in other areas of Appalachia (as shown in *Figure 4*).

In conclusion, natural gas price is the main factor. There are many factors that have contributed to the downturn of the thermal coal economy:

- Natural gas-fired power plants have become more competitive because their costs—mainly fuel costs—have gone down.
- Coal-fired power plants have become less competitive because their costs have gone up.
- Lack of growth in electricity demand has made the market environment more competitive, as resources are competing to serve a market that is stagnant or decreasing, rather than growing.
- Many coal plants have been forced to retire as revenues decrease and costs increase.
- The remaining coal plants have air pollution controls, enabling them to use cheap, low-quality coal rather than expensive, high-quality Appalachian coal.

However, low natural gas price is the main factor. In *Figure 7*, Dr. James Stock of Harvard University graphically illustrated how a variety of different factors have impacted thermal and metallurgic coal production. The light blue section represents the change in natural gas and thermal coal prices, which is clearly the dominant factor driving coal decreases in coal demand.

Table 1: Average Weekly Coal Commodity Spot Prices and Quality Details by Region (\$/short ton)

Week ending	
03/16/18	
Central Appalachia 12,500 Btu, 1.2 SO ₂	\$63.00
Northern Appalachia 13,000 Btu, < 3.0 SO ₂	\$46.45
Illinois Basin 11,800 Btu, 5.0 SO ₂	\$33.20
Powder River Basin 8,800 Btu, 0.8 SO ₂	\$12.40
Uinta Basin 11,700 Btu, 0.8 SO ₂	\$42.15

Graphic Source: U.S. Department of Energy 2017

Other factors like air quality regulations, changes in electricity demand, and changes in industrial sector demand have contributed to the decline in market demand for coal.

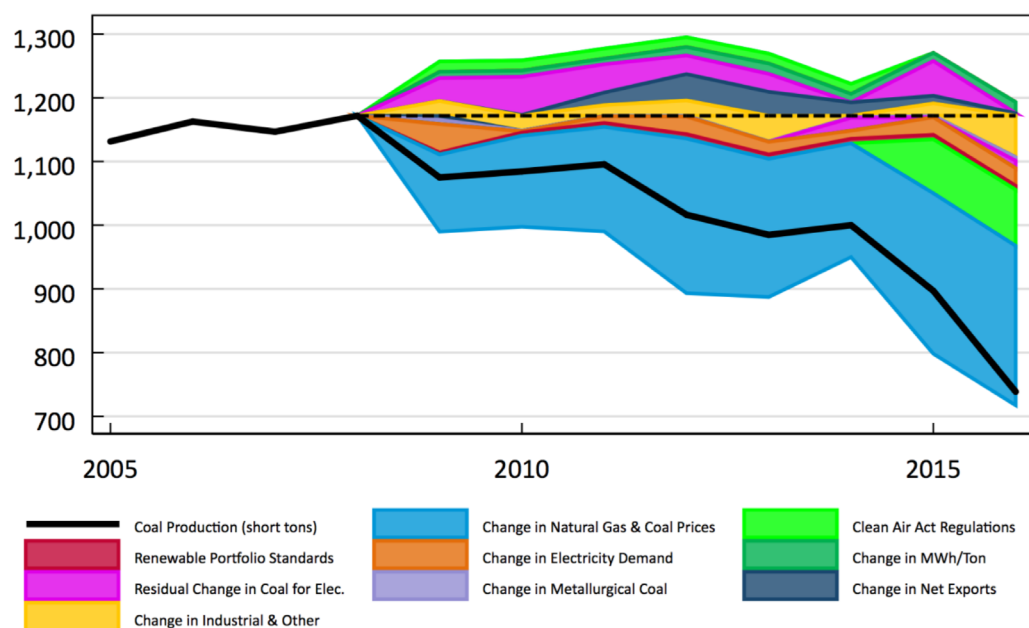
Metallurgic Coal Market Is Viable, but Volatile

The metallurgic coal market is driven by domestic and international demand for coke or coking coal—a key input into the iron and steel making process. Coke is formed by baking metallurgic coal in an oxygen-depleted environment. As such, the demand for iron and steel production drives the demand for metallurgic coal.

Demand Drivers. The main drivers of demand for steel include activities like building construction, infrastructure development, oil and gas pipelines, etc. In 2016, China consumed almost 50% (808.4 million tonnes or Mt) of total global steel production (1630 Mt). As such, China's demand for steel—which is impacted by the country's economic growth rate—has significant impacts on the demand for and price of metallurgic coal (WorldSteel Association 2017). By comparison, U.S. demand for steel is less significant (110.6 Mt), prompting U.S. metallurgic coal producers—most of which are located in Pennsylvania—to seek out international market opportunities (WorldSteel Association 2017).

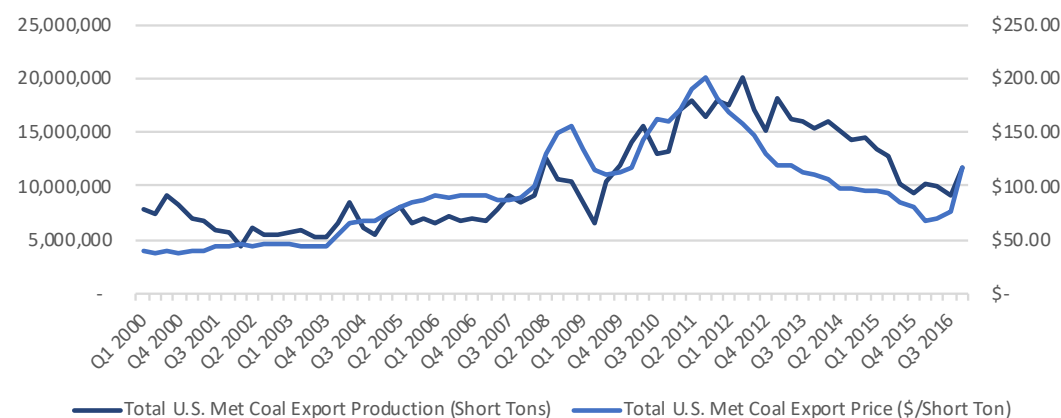


Figure 7: Decomposition of Changes in the Market for Coal, 2008 - 2016 (million of short tons)



Natural gas price change is the primary factor driving thermal coal market downturn.
(Graphic Source: Stock 2017)

Figure 8: U.S. Total Metallurgic Coal Export Production and Average Price by Quarter, 2000 - 2016



Data Source: U.S. Energy Information Administration 2017

Supply Drivers. China is the world's largest producer of coking coal (611 Mt in 2015), followed by Australia (191 Mt in 2015) (International Energy Agency 2016). However, Australia is the world's greatest exporter of coking coal (188 Mt in 2015), followed by the United States (42 Mt in 2015) (International Energy Agency 2016). As a result, disruptions in supply from China (e.g. if the central government chooses to curtail coal production) or Australia (e.g. if mining or transportation

of coal can't occur due to damage from flooding or storms) have meaningful impacts on the international market price of coking coal.

Prices. Given the supply and demand drivers discussed, international coking coal prices can be subject to volatility, impacting market opportunities for Pennsylvania mines and exports. Figure 8 shows U.S. metallurgic coal export price trends and volatility.

EXPORTS

About 9% of U.S. coal is exported per year, based on a five-year average from 2011 to 2015 (Park 2017). Based on 2011 data from a 2013 report by Ernst & Young (the best data available at the level of granularity needed), about 25% of the coal produced in Pennsylvania was exported. As seen in *Figure 9*, of total Pennsylvania coal exports, approximately 81% was metallurgic coal and 19% was thermal coal for power production. By contrast, for the entire U.S., approximately 65% of all exported coal is metallurgic and 35% is thermal (Ernst & Young 2013, 59). These data reinforce the importance of Pennsylvania's metallurgic coal supply to overall U.S. coal exports, and the importance of export markets for Pennsylvania's metallurgic coal producers.

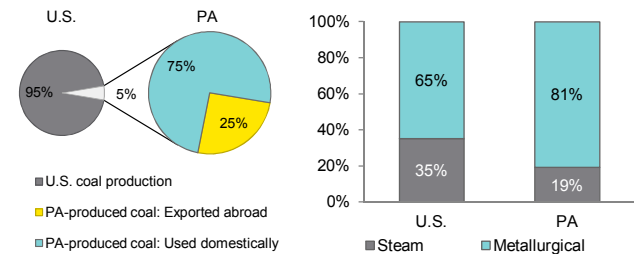
DETAILS ON COAL MINING EMPLOYMENT TRENDS

Figures 10 and 11 show that: 1) employment in the coal mining sector has been decreasing for decades, and 2) while employment has been steadily decreasing, production steadily increased, until recently. The phenomenon of decreasing coal mining employment while increasing the amount of coal produced resulted from increased use of machinery in mining operations (hence reducing the need for human labor).

In 2005, Pennsylvania employed 7,609 people in the coal mining industry (U.S. Energy Information Administration 2006). In 2015, Pennsylvania employed approximately 6,633 people in the coal mining industry, including all employees engaged in production, processing, development, maintenance, repair shop, or yard work at mining operations, as well as office workers (U.S. Energy Information Administration 2016). This represents a loss of just under 1,000 direct jobs in over a decade. As shown in *Table 2*, most of Pennsylvania's coal mining employment is in underground bituminous mines (U.S. Energy Information Administration 2016). For context, Pennsylvania's total non-farm employment in 2015 was around 5.8 million, making direct coal mining jobs responsible for less than 0.1% of total non-farm employment in the commonwealth that year.

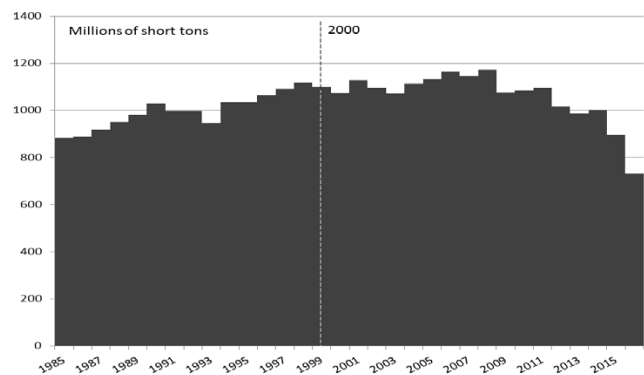
These data do not factor in indirect and multiplier jobs related to coal mining. Stakeholders assert that more of these jobs have been lost in the coal supply chain, compared to direct coal mining job loss. More research is needed to better qualify and quantify how changes in direct coal mining employment impact employment

Figure 9: Comparison of Total U.S. and PA Coal Production and Exports by Coal Type, 2011



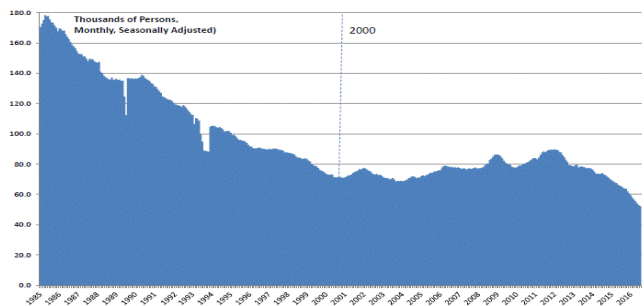
Graphic Source: Ernst & Young 2013

Figure 10: U.S. Coal Production, 1985 - 2016 (millions of short tons)



Graphic Source: Tierney 2016, 10

Figure 11: Coal Mining Employment, Q1 1985 - Q2 2016 (thousands of persons)



Graphic Source: Tierney 2016, 10

Table 2: Pennsylvania Coal Mining Employment by Coal and Mine Type, 2015

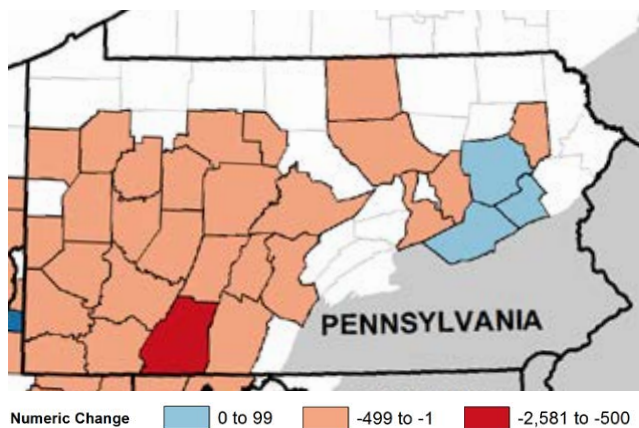
	Anthracite	Bituminous
Underground	82	4,698
Surface	923	930

Data Source: U.S. Energy Information Administration 2016

in other industries and businesses. For example, how are coal supply chain businesses (i.e. indirect employment) and local restaurants and retail stores (i.e. multiplier businesses) impacted? Although coal mining directly employs only a small number of Pennsylvania's residents, it is expected that the downturn in coal use has effected employment through the coal industry's supply chain.

Figure 12 shows changes in coal mining employment, by Pennsylvania county, from 2011 to 2015. The pink and red areas show that reductions in employment were generally experienced in Pennsylvania's bituminous coal fields, which were susceptible to reduced demand for coal from electric power markets. On the other hand, coal mining employment increased in a few Pennsylvania counties that produce metallurgic coal.

Figure 12: Change in Coal Mining Jobs by County, 2011 - 2015



Graphic Source: Hodge 2016, 12

Table 3 provides county-level detail on direct coal mining employment—defined here as employees of coal mining operators—in Pennsylvania for 2009 and 2015, as reported by the Mine Safety and Health Administration (MSHA).

Table 3: Direct Coal Mining Employment in PA Counties, 2009, 2015

County	2009	2015	Change
Allegheny	38	15	(23)
Armstrong	404	277	(127)
Beaver	27	18	(9)
Bedford	19	16	(3)
Berks	2	2	-
Blair	7	8	1
Butler	70	59	(11)
Cambria	281	210	(71)
Cameron	6	-	(6)
Carbon	19	24	5
Centre	8	-	(8)
Clarion	93	3	(90)
Clearfield	675	426	(249)
Columbia	60	50	(10)
Dauphin	18	16	(2)
Elk	57	11	(46)
Erie	-	3	3
Fayette	64	35	(29)
Greene	2,432	2,478	46
Huntingdon	2	-	(2)
Indiana	508	428	(80)
Jefferson	127	122	(5)
Lackawanna	19	8	(11)
Lawrence	7	-	(7)
Luzerne	336	348	12
Lycoming	34	32	(2)
Mercer	5	5	-
Montgomery	6	5	(1)
Northumberland	170	185	15
Schuylkill	585	577	(8)
Somerset	1,009	602	(407)
Tioga	2	-	(2)
Venango	12	11	(1)
Washington	922	677	(245)
Westmoreland	52	39	(13)
Total	8,076	6,690	(1,386)

Data Source: Mine Safety and Health Administration 2016

COAL INDUSTRY COMPENSATION AND RISK PREMIUMS

According to the National Mining Association, the average “all industries” annual wage for Pennsylvania in 2015 was \$51,848, whereas the Pennsylvania average annual coal mining wage was \$81,517 (National Mining Association 2016). This near \$30,000 wage differential makes coal mining jobs extremely financially attractive compared to employment in many other fields. In addition, some coal jobs offer health and pension plans and miners can earn additional revenues from overtime opportunities.

Unlike jobs that provide wage premiums that represent returns on years of education (e.g. engineers, doctors, lawyers), this wage differential can be seen as a premium for acceptance of certain risks and dangers inherent in the coal employment sector, including but not limited to:

Risk of Fatality. Fatalities in the coal mining industry have been drastically reduced compared to a century ago, as mines have improved safety and increased reliance on machinery. However low, the risk of death still exists in the mining industry. In 1990, approximately 0.04% (66 persons) of U.S. miners were killed on the job, compared to only 0.01% (9 persons) in 2016 (U.S. Department of Labor 2016). For reference, in 2016 there were 5,190 total U.S. fatal work injuries (U.S. Bureau of Labor Statistics 2017).

Negative Health Effects. According to the U.S. Center for Disease Control and Prevention, there are a variety of negative health effects associated with coal mining that can lead to impairment, disability, and premature death, including:

- Exposure to coal mine dust that causes various pulmonary diseases, including coal workers’ pneumoconiosis (CWP) and chronic obstructive pulmonary disease (COPD).
- Exposure to crystalline silica dust that causes silicosis, COPD, and other diseases (U.S. Department of Health and Human Services 2011).

Poor Working Conditions. Coal mining can take place underground, where lighting and air quality are poor, temperature and humidity is not controlled, and working conditions are generally inhospitable.

In Pennsylvania, less than 28% of mining jobs are union represented, according to the U.S. EIA (*U.S. Energy Information Administration 2016, 13*). By comparison, union workers accounted for 12% of all Pennsylvania wage and salaried workers in 2016 (*U.S. Bureau of Labor Statistics 2017*).

WHAT IS THE FUTURE OF PENNSYLVANIA’S COAL?

Although there is no way to predict the future with certainty, there are factors that can contribute to increases or decreases in demand for Pennsylvania’s coal. This section focuses on factors that impact demand for thermal coal.

Some Factors Increasing Thermal Coal Demand

The following factors have the potential to increase demand for Pennsylvania’s bituminous coal:

- Sustained increases in the price of natural gas (e.g. over \$3.50/MMBtu)
- New subsidies to keep coal-fired power plants from retiring
- More cost-competitive coal-fired power plants (e.g. reduced operating costs and/or new construction costs)
- Lower-cost northern Appalachian coal (e.g. reduced cost of regulatory compliance, technology improvements on extraction techniques)
- Deployment of cost-effective carbon capture and storage or utilization technology

Some Factors Decreasing Thermal Coal Demand

The following factors have the potential to decrease demand for Pennsylvania’s bituminous coal:

- Long-term, sustained low natural gas prices
- New combined cycle natural gas and renewable energy (i.e. utility scale wind and solar) electricity capacity remain the least cost new-build resources
- Subsidies to prevent Pennsylvania’s existing nuclear capacity from retiring
- Continued public opposition to air pollution (e.g. mercury, greenhouse gases)
- Imposition of a carbon price or carbon regulation on the electric power sector

Overall, the market-driven factors reducing coal demand are largely and widely expected to continue. Many of the factors that would increase coal demand require political intervention, rather than market forces. Insofar as there are delays in implementing political interventions, market forces are likely to prevail, at least in the short term.



SECTION II

STAKEHOLDER PERSPECTIVES AND RESEARCH OBSERVATIONS

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Based upon the data collected through stakeholder outreach and accompanying research, five main areas of development opportunity were identified and explored to classify potential strategies for economic revitalization: Planning and Development, Training, Technology, Exploring Other Industries, and Financing Options. Each of these five strategy areas is detailed below, along with sub-areas of development. For many sub-areas, examples are provided of different programs that have been implemented or could be implemented in order to directly address the economic issues faced by distressed coal communities. Lastly, potential challenges to implementation are detailed for each sub-area strategy.

This report and section recognizes the obvious—that financial resources are limited. If funding was available and abundant, these and many other strategies could be quickly deployed to assist distressed communities and workers. The identified strategies were culled from on-the-ground stakeholder input, to whom the reality of financial resource scarcity is particularly salient.

It must be stressed that the strategies identified—while all viable options—are not mutually exclusive. There is not one path to economic growth. Accordingly, this report stresses a multi-pronged approach.

VARIABLES AND CONSIDERATIONS

It is important to note that the potential development strategies identified to improve community economic performance may not uniformly address the issues facing each community, and some may not be appropriate for all communities. There are numerous

variables to consider when trying to address the economic situation of these coal communities. A list of considerations that might affect the approaches and feasibility of the recommendations is presented below.

Community Location. While each community has potential, the feasibility of each identified development strategy can be affected by the location of the community. It is thereby vital to augment the suggested strategies to fit the specific community and location. For instance, Somerset County is situated about two to three hours from the D.C. metropolitan area, creating potential logistical, residential, and other opportunities upon which to capitalize.

Available Resources. This relates to the financial resources and human capital necessary to implement the strategies. Every community has a varying amount of financial and human capital, so the feasibility to implement some of the strategies may vary depending on the access to these resources.

Regional Strengths. It is important to take advantage of a region's existing assets in order to coordinate future economic development projects. Improving the region's economic outlook may hinge on such leverage. For instance, a stakeholder with the Somerset Chamber of Commerce discussed their method of seeking economic diversification contingencies for the county. Apparently, the chamber is well aware of the county's prior and existing strengths in outdoor recreation attractions and specialty manufacturing. As such, they have sought resources to fund and promote such industries for the county. It is important to know the strengths of the community and to build on these by leveraging, reinvesting, and allocating resources.



Table 4: Five Areas and Sub-Areas of Development Strategies

Planning & Development	Training	Technology	Financing Options	Exploring Other Industries
Revitalization and Adaptive Use	Entrepreneurship Skills	Information Technology and Broadband Infrastructure	Business Financing	Agriculture
Tourism Partnerships	Education and Workforce Development	Technology Innovation	Impact Investing	Other Extractive Industries
Reclamation				Realignment of Existing Skills
				Tourism-Related Business
				Healthcare

Collaboration Efforts. To avoid the fragmentation of economic and intellectual resources, it is critical for business sectors to work together across jurisdictions and political regions. While each county is unique in its coal history, the effects of the downturn are somewhat uniform across bituminous coal-producing areas of rural Pennsylvania. As a result, there is an opportunity for a shared knowledge among the economic development organizations of the counties. Strategically building on the collaboration of schools, government, businesses, and workforce development organizations—such as local small business centers and chambers of commerce—will expand and diversify the opportunities each region is offered. Some stakeholders acknowledge there are many economic development organizations in place (e.g. sometimes so many that missions and goals can be overlapping and confusing), but it seems these groups have been known to compete against each other rather than collaborate. While competition—for example to attract new businesses and employers—is beneficial in a variety of ways, stakeholders perceive a culture of collaboration as being key to designing and implementing a successful community development strategy.

Territoriality. Federal and state economic impact-focused programs require the collaboration of local organizations. Some stakeholders note that healthy competition between organizations can sometimes lead to the unintended consequence of territorial behavior that may inhibit collaboration.

Leadership and Elected Officials. The preliminary implementation plans to support these strategies will likely involve the mobilization of social and political capital. Such mobilization is crucially carried out by elected officials and town leadership. “Mobilization is how you get it all started,” stated one stakeholder.

Short-Term vs. Long-Term Approach. Is the chosen strategy intended as a stop-gap response or to be sustained on a long-term basis? This question must be answered before the implementation process.

Demographics. The impact of the downturn is manifested in different ways among the demographics of a community. For example, older miners may be reluctant to relocate for a new employment opportunity, whereas younger miners may be more willing to leave the region. Evaluating each strategy should include consideration of how it may impact different demographic groups.



Insights: Perspectives on Competition Over Collaboration

Many stakeholders interviewed said that too often revitalization opportunities are missed, because key economic development constituencies compete to attract investments, rather than collaborate. These stakeholders believe—rightly or wrongly—that greater overall investments could be secured if these groups work together.

Stakeholders experienced in the inner workings of municipal economic development lamented that it is nearly impossible to surmount competitive forces in these scenarios because it is a “winner-takes-all” game. For example, municipalities compete against each other to convince businesses to locate within their boundaries. The municipality that successfully attracts the new business will see an increase in “ratables”—namely an increase in property and income tax revenues—from the new business investment and an increase in wages from new job creation.

The losing municipalities may or may not experience benefits associated with the multiplier effect (depending on the size and nature of the effect, and geographic proximity to the new business), and may or may not experience losses related to out-migration as opportunities increase near the host community. The phenomenon is similar for economic development organizations that are geographically focused, and whose funding is tied to municipal revenues, grants, or through attracting tenants (e.g. industrial parks).

In this sense, the underlying competitive nature of economic development may place some limits on collaboration. One suggestion was offered as a way to overcome this limitation, which is to change the law (i.e. the Pennsylvania Local Tax Enabling Act) that identifies what municipalities can and can't tax. However, the stakeholder acknowledges this is an unlikely outcome.

STRATEGY #1: PLANNING & DEVELOPMENT

The downturn in the coal industry has contributed to some negative community outcomes relevant to planning and development. Stakeholders identified some of these negative outcomes as: inhibiting civic engagement, creating barriers to improved public sanitation, and limiting or foregoing economic development opportunities for the communities.

Accordingly, planning and development (P&D), is the first category of strategies aimed at addressing these unfavorable outcomes. In the P&D strategy, there are three sub-strategy areas: revitalization and adaptive use, tourism partnerships, and reclamation. These sub-areas will be analyzed to show how languishing former coal structures can be turned into attractions for outside visitors through a concerted P&D effort.

As appropriate and available, brief examples of the applicable strategy will be used to highlight successes or challenges. These examples were generally identified by a stakeholder(s). As such, the examples provided may be consistent with the overlying strategy, but may not reflect a diversity of viewpoints about the successes, failures, or complexities of the example.

P&D Sub-Area 1: Revitalization and Adaptive Use Examples

The adaptive use and revitalization model consists of effectively revitalizing abandoned land and infrastructure that were once utilized by the coal industry—such as retired coal plants and mines—and adapting them for new purposes. The goal of the strategy is to target dilapidated and abandoned former coal liabilities, converting them into assets. Sample programs that utilize this form of land-use planning are described below.

Creation of the Anthracite Outdoor Adventure Area

(AOAA). Many stakeholders believe the creation of the Anthracite Outdoor Adventure Area in Northumberland County—an example of an adaptive reuse project—has been extremely successful. This project was funded by the Appalachian Regional Commission (ARC) with SEDA-Council of Government (SEDA-COG)⁶ as the lead applicant. Two coal-fired power plants in the county closed successively within the past few years. One plant, owned by Sunbury Generation, located on the border of Snyder and Northumberland County closed its doors in May 2014 and laid off 66 full time employees (SEDA-COG 2016).

⁶ SEDA-COG is a regional multi-county development agency, which, under the guidance of a public policy board, provides leadership, expertise, and services to communities, businesses, institutions, and residents. (Source: <http://www.seda-cog.org/Pages/Home.aspx>). SEDA-COG was designated as a Local Development District by ARC and as an Economic Development District by EDA and has served as a regional coordinator for the Partnership for Regional Economic Performance since the program's inception (SEDA-COG, 2016).



When the lands became abandoned and were no longer being mined, they fell under the stewardship of Northumberland County and its commissioners. Subsequently, these former coal properties became dumping grounds, drag race land for illegal all-terrain vehicle (ATV) riders, and an ensuing public sanitation problem for the town. It was reported that some residents of the area believed the land would be better utilized as an outdoor recreation facility. A stakeholder marveled that, “they [the residents] turned a previous county liability into a source of wealth.”

The AOAA was created in 2013 by Northumberland County Commissioners on these abandoned lands. The county sought to develop the county-owned coal lands by providing a safe, regulated ATV riding area, and a better experience for visitors. A planning and development strategy was borne with the help of SEDA-COG by utilizing the 7,000 acres of abandoned coal mine lands as well as lands that formerly accommodated coal-fired power plants to create an off-road paradise, the AOAA.

Many stakeholders asserted that the park has been very successful both in concept and in practice. In 2015, the AOAA was lauded by the *ATV Rider*—an influential sport magazine—as one of the nation’s best destinations for ATV sporting (Trails 2016). In the same year, the park was awarded a “Trail Sharing Award” by the American Trails Association, a national non-profit devoted to hiking and trails interest. Since the opening of the AOAA, the grant applicants have annually seen an increase in participation and visits from around the world. With its conception, the AOAA has helped revitalize formerly abandoned lands while attracting visitors and associated economic activity to the local economy. In part due to its initial success, the AOAA was expanded by approximately 200 acres after receiving a state grant for \$117,000 (Trails 2016).

Butler Forest Property Acquisition and the AOAA Expansion of Off-Highway Vehicle Trails. Pennsylvania’s Department of Conservation and Natural Resources (DCNR) proposed to purchase 5,541 acres of land on the edge of Schuylkill County (part being former coal land) in order to expand the AOAA. The goal of this initiative is to expand the legal off-highway vehicle use in the area. This expansion would further develop access to the trails for increased ATV usage. The DCNR recognizes the potential of this endeavor and hopes to partner with other organizations to host outdoor camps, create more hiking trails, build ziplines, and add additional features that would attract tourists by connecting them to the outdoors.

The Albright Revitalization Proposal in West Virginia. A similar endeavor to AOAA was explored in the West Virginia ARC Power Grant application, The Albright Revitalization. Although unfunded, the proposal contains key economic insights and projections that can easily be transferrable to Pennsylvania communities.

A coal-fired power plant in West Virginia was left languishing and deteriorating in a local town, after it ceased operations. The County of Albright experienced a downturn in its overall economy due to the loss of jobs and tax revenue associated with the 2012 deactivation of the coal-fired power plant at Albright (The West Virginia Military Authority 2016).

The National Guard of West Virginia proposed revitalizing the old plant into an emergency response training center. The associated grant project proposed modifying the plant (and related facilities) and preparing it to operate as a fully staffed emergency response and military unconventional operations training center. The new facility would support a training and exercise program that would simulate real-world emergency response scenarios. The program would create new jobs in the community and utilize West Virginia’s terrain and infrastructure.

The facility would support National Guard emergency response training, cyber defense training, and unconventional military training (The West Virginia Military Authority 2016). Former coal miners would be able to use the computer labs and training centers located at the remodeled plant. Such an undertaking could serve to encourage civic engagement and boost the local economy, while also promoting a strategic and consequential response to blighted and underutilized land.

Challenges to Implementation of a P&D Adaptive Use and Revitalization Program

The following implementation challenges have been identified for this sub-area strategy:

Land Ownership. The AOAA recreation center became a possibility because the coal land was county owned, while The Albright Revitalization project encountered barriers due to the private ownership of the coal land.

Local Zoning Laws and Codes. Some local zoning laws and ordinances could prevent the installation of new infrastructure on former coal lands and mining grounds. It is important to examine these codes prior to selecting and embarking on an adaptive use and revitalization strategy.



Environmental Assessments. The financial backing for the AOAA was not released until the environmental review and assessment was completed. This environmental review can last for months, so strategies should incorporate time for this review in the implementation phase.

P&D Sub-Area 2: Tourism Partnerships Examples

Developing a planning roadmap is beneficial to achieving increased levels of tourism activity. Developing a network of partnerships among stakeholders is valuable in the establishment of such planning. The mobilization of these stakeholders is especially important when planning and developing a local tourism strategy, which should involve identifying the strategic steps necessary to make use of existing assets for counties historically reliant on the coal economy.

Conservation Landscape Initiative. The Pennsylvania DCNR developed its conservation landscape initiative (CLI) to broaden its focus from working exclusively within state forest or park boundaries towards a regional approach, in order to better address contemporary challenges facing the state's natural resources and surrounding communities. The CLI sought to engage community leaders, local government, nonprofits, philanthropies, and other state agencies to better address land use planning, attract investments, involve citizens, and promote economic development. One of the core strategies of the CLI was leveraging partnerships to promote nature-based tourism to the seven CLI landscape regions, including: Pennsylvania Wilds, Laurel Highlands, South Mountain, Lower Susquehanna Riverlands, Schuylkill Highlands, Lehigh Valley Greenway, and Pocono Forests and Waters (PA DCNR 2010).

Although the CLI's regional approach was predicated on the existence and promotion of state-owned lands, the principles may be more widely applicable. Specifically, this effort meant that:

- Regions were defined by a sense of place rather than political boundaries.
- Communities agreed to participate in a region-wide effort.
- The DCNR cultivated active civic engagement opportunities.
- The state provided leadership, financial support, and technical assistance.

Take for example, the Pennsylvania Wilds (PA Wilds) region. Some in the community believed more planning was required before launching the initiative—including tourism promotion. DCNR's CLI was able to facilitate 12 county governments coming together to sign an intergovernmental cooperative agreement committing to work together to address common planning issues (e.g. infrastructure needs), and to ensure the community character of the region did not suffer as tourism increased (PA DCNR 2010).

Partnerships of the AOAA. The AOAA turned a liability into an asset by converting a forgotten coal mine into a desirable outdoor tourist destination. The AOAA took advantage of the decline in the coal mining industry to bolster outdoor tourism (Trails 2016). Stakeholders asserted the existence of the AOAA simply came down to resident consensus. Residents in Northumberland County felt that the former coal mine land could be better served as an outdoor recreation center rather than a dumping ground and local eyesore.

Several organizations in the public and private sectors partnered with the Northumberland County Commissioners and SEDA-COG to create the AOAA. State and regional groups such as the Appalachian Regional Commission, DCNR and local organizations such as the local SBDC, and the Susquehanna River Valley Visitor's Bureau were all mobilized for their expertise and experience in creating and maintaining a blueprint for local Pennsylvania tourism sectors. The reported success of the AOAA has been attributed in part to the broad stakeholder support garnered through partnerships and collaboration among these groups.

The AOAA continues to partner with regional businesses for sponsorship opportunities with Yamaha Motor Corporation, Can-Am, Kawasaki Motors Corporation, and Polaris Industries. These manufacturers use the facility as a proving ground to test their products prior to release (SEDA-COG 2016). Such partnerships encourage market expansion and diversification.

Challenges to the Implementation of a P&D Tourism Partnerships Strategy

Some challenges that must be recognized prior to or during the mobilization process of this P&D strategy include:

Marketing. After planning and development, there needs to be a robust publicity effort, which will be outlined later in this section of the report.



Local Infrastructure. The capabilities of the counties to accommodate new visitors must be reassessed continually. For instance, can the local roads handle the inevitable increase in wear and tear of new tourist traffic? Is there sufficient infrastructure capacity (e.g. water, sewer, electric) to accommodate an influx of new visitors to the community?

State Leadership. Absence of state leadership and financial and technical resources may inhibit the ability to achieve large scale buy-in, broad partnerships, and attract investments.

Developing an Upfront Planning Roadmap. Developing a planning roadmap is critical to establishing a network of stakeholder partners and increasing levels of tourism activity. The mobilization of these stakeholders is especially important when planning and developing a local tourism strategy, which should involve identifying the strategic steps necessary to make use of existing assets for counties historically reliant on the coal economy. The blueprint for developing this planning roadmap should include, but should not be limited to:

- **Identify Existing Assets.** This involves recognizing the potential attractions that exist in the area. According to a stakeholder in the tourism industry, “Pennsylvania has more public land than Yellowstone.” The assets exist, but the development and marketing angle is important to cultivate by aligning various community interests and considering the viewpoints of all involved.
- **Evaluate the Market.** The feasibility of the marketable economy must be assessed. Key questions should be answered, such as: what is the theoretical tourism potential? How much of this tourism potential can the region reasonably support given existing assets (e.g. infrastructure, lodging, restaurants)?
- **Facilitate Partnerships.** Such relationships should consist of the support of government offices both on the federal, state, and local levels. State agencies such as the DCNR and the Department of Community and Economic Development (DCED) are particularly relevant.
- **Outreach and Communications.** A well-developed communications and outreach effort is vital to receive the local buy-in of the residents and local government. The support of the residents and their elected officials is required. This strategy is discussed in the “considerations” section above.

- **Maintain Stewardship.** The longevity and success of the tourism requires dedicated management and supervision. The building and upkeep of such a sector requires the involvement of future generations.

P&D Sub-Area #3: Reclamation Examples

One estimate mentioned by a stakeholder in the reclamation industry is that, “Pennsylvania currently has \$14 billion worth of reclamation to do.” In fact, government sources confirm that Pennsylvania’s environmental liabilities from a combination of legacy coal, oil and gas, and industrial minerals extractions were quantified at \$15 billion (not inflation adjusted) (Pennsylvania Department of Environmental Protection 2000). The adaptive use and revitalization strategies previously discussed are intended to rehabilitate land and/or infrastructure, typically to establish some sort of attraction.

The reclamation strategy focuses on restoring and cultivating terrain, land, and water that has been negatively impacted by coal mining. The benefits of reclamation include, but are not limited to, reducing legacy coal liabilities that inhibit economic revitalization. These restored lands can subsequently be used for agriculture, development, or other purposes.

Organizations such as the Western Pennsylvania Coalition for Abandoned Mine Reclamation (WPCAMR) are conducting such reclamation projects across some affected counties. Reclaimed sites could serve as locations for long-term economic opportunities. In addition, it may be reasonable to recruit former miners to utilize the same tools and machinery in coal mining for purposes of reclamation activities. Given the legacy nature of Pennsylvania’s abandoned mine lands problem, and the existence of industry-supported programs to help fund reclamation activities, the support of both state and federal government is required for the success of reclamation programs.

Patriot Guardens Golden Delicious Apple Project.

This pilot program was initiated by the West Virginia National Guard. In 2016, the State Department of Environmental Protection (DEP), the U.S Department of Agriculture and West Virginia Department of Environmental Protection’s Office of Abandoned Mine Lands and Reclamation (AML) announced that the Patriot Guardens Golden Delicious Apple Project—a community development pilot project—would receive

\$5.3 million as part of a \$90 million abandoned mine lands reclamation program. The project involves planting 100,000 apple trees on 500 acres in Nicholas and Clay Counties of West Virginia, and some locations in Kentucky (Associated Press 2016). Displaced coal miners and veterans would be hired as part of an apple tree-planting project, though information about the number of jobs or duration of employment was not readily available.

Challenges to Implementation of a Reclamation Program

Some challenges that must be recognized prior to or during the reclamation process of this P&D strategy include:

Navigating the Political Landscape. Reclamation may involve legislative support. The success of such legislative effort can be difficult to predict.

Financial Capabilities. Due to the typically large scope of reclamation processes, these projects can be very costly.

STRATEGY #2: TRAINING

Training efforts assist residents of coal communities—including former coal miners and small businesses—in establishing new skills that can expand and diversify employment and revenue opportunities. This strategy section consists of two sub-areas: developing entrepreneurship skills, and education and workforce development. In the data collected, a significant amount of existing and proposed training programs were observed, including programs to develop workforce skills, entrepreneurial expertise, further education, and provide training in the trades (e.g. electrical, plumbing, general contracting).

Training Sub-Area #1: Entrepreneurship Skills Examples

Entrepreneurs can create new business ventures to meet the employment needs of themselves and others, as well as help to grow and sustain the economy. Data indicates that entrepreneurs play an important role in job creation, with job hiring from these smaller businesses outpacing large corporation workforce increases (Ernst & Young 2015).

Revitalization of Southwestern Pennsylvania Coal-Impacted Communities through Innovation and Entrepreneurship. A \$500,000 grant was

Insights: Pennsylvania's Abandoned Mine Reclamation Pilot Program

In July 2016, Pennsylvania's Governor Tom Wolf awarded \$30 million to 14 abandoned mine reclamation projects located in ten counties within the commonwealth as part of the congressionally-authorized Abandoned Mine Lands (AML) Pilot Program funded by the U.S. Treasury (Press Office of Governor Wolf 2016). The AML Pilot Program was intended to demonstrate the benefits of the proposed RECLAIM Act, which if approved by the U.S. Congress, would increase funding to Pennsylvania and other coal states to reclaim abandoned coal lands and hasten economic development in coal communities.⁷

Projects were chosen for their potential to create long-term economic benefits in the coal communities in which they are located. The 14 AML pilot projects selected in Pennsylvania reportedly have the potential to leverage an additional \$4 for every \$1 of federal funding. (This money could come from other mining reclamation fund programs or public and private economic development funds).

14 Funded Projects:

5	Surface Mine Reclamation
3	Acid Mine Drainage Treatment
2	Water Supply Replacement
2	Coal Refuse Pile Remediation
1	Underground Fire Remediation

More information about the Pennsylvania AML Pilot Program can be found on the Pennsylvania Department of Environmental Protection's website at: <http://www.dep.pa.gov/business/land/mining/abandonedminereclamation/amlprograminformation/pages/abandoned-mine-reclamation-pilot-project.aspx>

awarded by the ARC to Innovation Works, Inc.⁸—an entrepreneurship investment company located in Pittsburgh, Pennsylvania—for this project. The

⁷ The RECLAIM Act was sponsored in the U.S. House as H.R. 1731 by Representative Harold Rogers (R-KY) and in the Senate as S. 728 by Senator Mitch McConnell (R-KY). As similar bill, also called the RECLAIM Act, was sponsored in the U.S. Senate by Senator Joe Manchin (D-WV).

⁸ Innovation Works invests capital, business expertise and other resources into high-potential companies with the greatest likelihood for regional economic impact. (Source: <https://www.innovationworks.org/About-Us>)

ARC funds will be used to implement five different programs designed to deliver a variety of benefits to entrepreneurs and small businesses in a nine-county region in southwestern Pennsylvania.

Currently, Innovation Works offers programs to accelerate entrepreneurial business growth in Southwestern Pennsylvania by infusing business expertise and funding into early-stage companies, with an emphasis on technology companies. Their programs help with university grants for research, seed funding for start-ups, business assistance, Alpha Lab Accelerators for technology start-ups, manufacturing funds and connections for small manufactures, help with human resource teams to find the best talent, and assistance with accelerating and de-risking the commercialization of new product technologies (Innovation Works 2017).

The project also includes the provision of human resource services to early-stage companies, and training services for existing small businesses. Additionally, the program will seek to target entrepreneurs formerly employed in the coal industry and suppliers to the coal industry. The project is expected to create 65 new jobs and seven new businesses, leverage \$1,100,000 in additional investment, and retain 30 existing jobs (Appalachian Regional Commission 2017).

Southern Alleghenies Entrepreneurial Ecosystem. In this ARC-funded project, the Southern Alleghenies Planning & Development Commission (SAP&DC) and collaborating partners plan to transition the economies of three coal-impacted communities in Southwestern Pennsylvania by developing and launching “The Alleghenies Entrepreneurial Ecosystem.” This project seeks to grow and expand the innovation economy and capabilities of three major counties impacted by the downturn: Somerset, Cambria, and Blair. The foundation of the ecosystem will be built on identifying, connecting, and encouraging innovative and entrepreneurial individuals. Potential entrepreneurs will have access to a wide array of business support services facilitated via the ecosystem coaches and mentors (SAP&DC 2016).

The primary goal of the project is to create new businesses with new jobs and investments by engaging with community leaders, non-profit organizations, and educational institutions that in turn will connect entrepreneurial residents to these new opportunities.

Implementation Challenges to Developing Entrepreneurship Skills

One fundamental challenge related to implementing an entrepreneurship skills strategy is having a sufficient supply of entrepreneurs. There might be foreseen challenges in recruiting enough entrepreneurs to participate in these programs. For example, Pennsylvania discontinued its “Self-Employment Assistance Program” in 2012—a program designed to allow dislocated workers to continue receiving government assistance while they began to assist themselves by creating companies or other self-started business venture options.⁹ As a result, some people receiving unemployment benefits may be hesitant to explore entrepreneurial opportunities for fear of losing government assistance.

Training Sub-Area #2: Education & Workforce Development Examples

Training presents an opportunity to expand the knowledge base and skills of participants, allowing trainees to develop marketable skills and expertise. Training increases employment opportunities, and can also enhance broader economic stability by closing skill gaps in needed fields and decreasing the shortage of skilled workers.

Regional Center for Technical Education and Workforce Development. The co-applicants of this ARC project include a partnership between the Oil Region Alliance of Business, Industry and Tourism Inc. (ORA), Community College of Allegheny County (CCAC), and the Keystone Community Education Council (Keystone CEC). The initial objective of this project is to purchase the former “Verizon” Maintenance Building in Venango County, and develop it into the Regional Center for Technical Education and Workforce Development. The goal of this project, according to the grant applicants, is to bridge the educational attainment gap in the region. Specifically, the lack of one-year certificates and two-year associate degrees in rural Northwestern and North Central Pennsylvania.

As noted in the grant application, this lack of educational opportunity has contributed to the exodus of jobs and people from the region, and crucially contributed to the inability of the town residents to rebound from the coal downturn. The applicants envision this center to deliver the much needed post-secondary and technical trainings for the region’s

⁹ For more information about the Self-Employment Assistance Program please visit the following link <https://workforcesecurity.doleta.gov/unemploy/self.asp> and at <http://pa-unemployment-office.com/2011/06/pennsylvanias-self-employment-assistance-program/>



residents. Training would be offered in high-priority, high-demand occupations to those especially affected by the changes in the coal industry. The center would award four certificate programs: Cybersecurity, Heating & Air Conditioning, Technology, and Business Management. Some additional services include:

- Skill and aptitude assessments
- Career coaching and planning
- Job placement support
- Educational counseling—for those seeking more education

Advanced Manufacturing Excellence Training Center (ETC). Youngstown State University (YSU) in Ohio is the grant applicant for this unfunded ARC project. The university seeks to address the region's high levels of unemployment by increasing training opportunities for students and displaced seasoned workers. This goal would be achieved through the creation of the "Excellence Training Center" (ETC). The services at the ETC would include the provision of advanced manufacturing knowledge and skills, as well as creating a pipeline of skilled workers prepared to take on high-demand advanced manufacturing jobs.

ETC would also bring together manufacturing equipment (e.g. 3D printing, numerically controlled machining, state-of-the-art welding, robotics, programmable logic controllers, advanced electronics) and a variety of other advanced manufacturing technologies that would provide clients with hands-on advanced manufacturing experience. The ETC would notably be an environment that offers workforce development, new product development, education, and technical certification all in the same space for the benefit of displaced workers and students who live within a 70-mile radius of YSU.

New Start Retraining Initiative for Displaced Coal Industry Workers. A \$1,200,000 ARC grant was awarded to the United Mine Workers of America (UMWA) Career Centers Inc. in Prosperity, Pennsylvania, for the "New Start Retraining Initiative for Displaced Coal Industry Workers" project. The project plans to deliver workforce training and job placement services to unemployed coal mine workers in eight southwestern Pennsylvania counties and two southern West Virginia counties. UMWA will partner with the Pittsburgh Institute of Aeronautics, the Allegany College of Maryland, and the Pennsylvania

Highlands Community College to design and implement training programs for regionally in-demand career sectors including: commercial trucking, cybersecurity, and advanced manufacturing. This training will be complemented by job placement and other wrap-around support to ensure that each trainee has maximum potential for securing employment. The project will serve 400 trainees (Appalachian Regional Commission 2017).

Southern Alleghenies Planning and Development Commission (SAP&DC) Re-Training Service.

In an existing program within the SAP&DC, a laid-off miner was hired to do outreach and convince former miners to participate in retraining opportunities. SAP&DC found this tactic to be highly successful and influential in reaching out to displaced workers that have not sought the services of local workforce development organizations.

Power Community Energy Plan. The Corporation for Ohio Appalachian Development (COAD) applied for this unfunded ARC grant in support of Ohio's Appalachian coal distressed region. With this proposal, COAD aims to assist the region's workforce in transitioning to economic security in the clean energy economy (COAD 2016). The project proposal involves the development of a regional coalition which will design a comprehensive POWER Community Energy Plan for the Appalachian region. This Community Energy Plan would serve as a blueprint for transforming the region's transitioning coal-economy. The energy plan will include (COAD 2016):

- Identifying workers dislocated by coal mining production and related-supply chain closures across the region.
- Linking and/or providing dislocated workers to existing supportive services.
- Identifying high-growth, high-wage job opportunities in the clean energy economy, including energy efficiency, solar, geothermal, wind, energy efficient housing, and manufacturing in related supply-chain avenues for employment.
- Providing dislocated workers with job training and re-training, and employment placement support into those identified jobs.
- Supporting a comprehensive Community Energy Plan to spur job growth in the clean energy economy and related industries across the region.



The Southwestern Pennsylvania Power COALition. The Southwestern Pennsylvania Commission (SPC) is leading this ARC grant funded project that seeks to provide careers for “dislocated coal-sector workers.” This comprehensive approach would educate young adults on new skills, retrain laid-off coal miners, and boost entrepreneurship activity. The COALition’s goal is for 50 dislocated coal miners to obtain support in career alternatives. The project additionally seeks to retrain dislocated coal workers in emerging job sectors. This COALition is also expected to produce positive benefits and outcomes including:

- Serving up to 150 businesses, including small and medium manufacturers.
- Boosting, improving, and expanding services and support in market diversification, innovation and product development, entrepreneurial activities, strategic human resources, leverage of capital, mini-grants, broadband improvements, and data-industry skills development.

- Leading the creation of five new products and more than 25 new businesses.

Challenges to Implementing Education & Workforce Development Strategies

Some challenges that must be recognized related to implementing education and workforce development strategies include:

Ever-Changing Workforce. Future employment opportunities are unclear given the rapid changes in workforce and economy.

Automation. The manufacturing sector is changing rapidly, becoming more automated, digital, and incorporating new technologies. Human capital seems less important.

Resource Availability. It is unclear how training programs can secure funding for long-term relevance and provision of needed services.

Insights: Early Challenges with Retraining Efforts

Many stakeholders expressed uncertainty about retrained coal-industry workers finding jobs in new industries. Given the limited amount of time these coal-community focused programs have been in existence, it may be too soon to determine success or failure.

Some education and workforce development programs have been criticized for being ineffective. For example, in late 2017, a class action lawsuit was filed in West Virginia against a non-profit organization called Mined Minds, which focused on retraining coal miners and others for high-paying computer-coding jobs. Mined Minds was supported by federal funds and hosted training in West Virginia and Pennsylvania. The organization left Pennsylvania after it declined to obtain school licensure (Moore 2017).

Critics of Mined Minds assert the program was poorly run, teachers were unqualified, and that students emerged underqualified for positions in the industry. Mined Minds asserts many graduates found jobs, and that the plaintiffs in the class action lost their jobs due to inappropriate behavior (Moore 2017).

Also in West Virginia, employment increases in the extractive shale industry have not been robust enough to replace job loss in the coal industry. Retrained coal workers looking to transition to the shale industry have been met with mixed success, especially since more gas is being produced with fewer workers. Since 2014, gas production in West Virginia has risen by 50 percent while oil and gas extraction sector employment has dropped from 9,000 to less than 6,000 (Flatley 2017).

As a result of political changes, some miners in Pennsylvania are reportedly rejecting free, federally-funded retraining efforts altogether. These miners believe their high-paying coal jobs will be coming back as a result of the Trump administration’s commitment to revitalizing the domestic coal industry (Schlanger 2017). Some reports indicate that federally-funded job retraining programs for coal workers in southern Pennsylvania see sign-up rates below 20 percent, whereas rates in southern Virginia are about 50 percent (Volcovici 2017). One retraining program targeting 700 people in Green and Washington counties had only 120 sign ups. Another in Westmoreland and Fayette counties had only 15 percent of its capacity signed up (Volcovici 2017).

Immediate vs. Long-term Needs. There is a need and demand to retrain workers, but it is unclear how these workers survive and support families while they are being retrained.

Glut of Skilled Workers. There has been a history of under-education in some counties that has resulted in job relocations and eradication. Training efforts may lead to an over-supply of education and skills compared to the local availability and demand for jobs.

Disinterest in Lower Pay. Stakeholders conveyed on multiple occasions that there was a lack of interest in education programs due to perceptions of lower wage earning potential, compared to jobs in the coal industry. As discussed in Section 1, coal mining jobs in Pennsylvania offer a \$30,000 wage premium compared to other industry jobs in the state. Some stakeholders opined that coal workers are accustomed to boom-and-bust cycles and that greater public and coal worker education is needed on the changing dynamics of the coal industry, as a result of the shale-gas revolution.

STRATEGY #3: TECHNOLOGY

This strategy refers to the innovative tools that can serve to enhance the capabilities of small businesses or be utilized by former miners to broaden their marketable skillsets. As it stands, there are currently barriers to technology strategies, due to the lack of internet access in rural parts of Pennsylvania. There is also an inability to utilize information technology to its full impactful advantage, creating a need for outside support in innovations such as telecommunications and broadband. Connectivity to these areas must be expanded if it is to be a viable tool to power the economic engine of these counties. Accordingly, this section is comprised of two sub-areas that can help bridge this divide: information technology and broadband infrastructure, and technology innovation.

Technology Sub-Area #1: Information Technology and Broadband Infrastructure Examples

Lack of broadband and other modern technology has been mentioned as a major barrier to business growth and expansion in these areas. Data from broadband advocacy group, BroadbandNow, ranks Pennsylvania as the twelfth most connected state, with 95% broadband coverage and only 8% of the population underserved (BroadbandNow 2017). Lack of broadband, coupled with the coal downturn, may cause

a sobering reality for many small businesses in these areas and for former coal miners searching for jobs. Discussed below are ARC application projects seeking to address the technological barriers to business restructuring.

Greene County Broadband Infrastructure Strategic Plan.

The County Clerk of Greene County applied for this unfunded ARC project. The lack of high-speed internet availability in Greene County is interrelated to the trends of economic distress and declining population in the region. The applicants heard from businesses that sought to improve their connectivity capabilities and required resources to eventually flourish. The strategic plan of the project proposal is to establish a working broadband infrastructure project team that will serve to guide the installation project and meet regularly to review findings and the project's progress. The team would additionally facilitate stakeholder meetings, conduct provider interviews to find a suitable internet provider, and finally review state and federal broadband data to ensure the long-term success of the broadband infrastructure.

Local business owners identified the limited cell phone service and lack of broadband as a main factor that hindered their economic rebound from the coal downturn. As stated by one stakeholder, the lack of broadband severely limited his business plan and capabilities. Those living in the central part of the county, he reported, have rebounded much faster due to strong cell and internet service. Broadband could theoretically assist these businesses in marketing and communicating their services beyond the county. And it is the one thing businesses generally agree needs improvement.

Furthermore, the catalytic nature of broadband internet is impeded by the lack of its access and adoption (Greene County Chief Clerk 2016). This is exacerbated by broadband providers avoiding sparsely populated areas that yield lower return on investment. The effects of this lack of access to an effective broadband infrastructure are far-reaching for the local economy. A sparse broadband internet availability limits access to education, workforce training, and quality health care. It also reduces access to markets for its businesses (Greene County Chief Clerk 2016). In essence, economic development is continuing to lag, in part, because of the lack of internet infrastructure. This contributes to the county's businesses and residents' inability to combat the effects of the coal downturn.



Somerset County Fiber Extension Project. A \$948,673 ARC grant was awarded to Somerset County, Pennsylvania, for the Somerset County Fiber Extension Project. These ARC funds will be used to install 22 miles of fiber optic cable on existing pole lines that will allow a variety of business, residential, medical, and educational customers in Somerset County to access broadband services. The area does not currently have cable broadband available and DSL service is not offered ubiquitously. The project will serve 1,094 businesses and 3,962 households, and will act as an economic and tourism driver in the county (Appalachian Regional Commission 2017).

Challenges to Implementing an Information Technology and Broadband Infrastructure Strategy

Implementing an information technology and broadband infrastructure strategy poses some challenges, including:

Capital Intensive. Limited financial resources for capital intensive infrastructure construction

Construction Timeframe. Lengthy construction timetables

Regulatory Structure. According to the stakeholders at the regional meetings, public investment in broadband can be difficult in Pennsylvania. Carriers (e.g. Verizon) have a monopoly over certain territories and have to actively opt-out of building before anyone else can come in.

Technology Sub-Area #2: Technology Innovation Examples

Technology Innovation is often reducible to an innovation in the marketing or conceptualization of an underlying technology. Technology innovation is often focused on making a thing or process easier or better for the end user. With more and more items being converted to a technology system, technology and technology innovations are becoming the wave of the future.

Appalachian Hatchery. ARC awarded \$1,500,000 to Marshall University Research Corporation¹⁰ in Huntington, West Virginia, for the “Appalachian Hatchery” project. The project, operated through the Robert C. Byrd Institute,¹¹ will assist specific

Insights: Research Note on Financial Viability of Municipal Broadband

In May 2017, University of Pennsylvania Law School Professor Christopher Yoo and co-author Timothy Pfenninger released a comprehensive study of the financial viability of America’s municipal fiber networks called “Municipal Fiber in the United States: An Empirical Assessment of Financial Performance.” Understanding the importance of financial solvency of municipally-owned broadband projects (as shortfalls may require greater contribution from local taxpayers or result in the municipality defaulting on loan obligations), the study found that of the 20 municipally owned broadband projects that reported data on the financial performance of broadband operations, 11 were cash flow negative. Of the nine that were cash flow positive, seven projects would need over sixty years to break even (Yoo and Pfenninger 2017). These data suggest municipalities should carefully consider the financial viability and long-term costs and benefits of funding broadband.

Yoo and Pfenninger’s paper can be found at <https://www.law.upenn.edu/live/files/6611-report-municipal-fiber-in-the-united-states-an>

businesses affected by the decline in coal production in returning to profitability through the adoption and

deployment of emerging advanced manufacturing technologies—primarily 3D printing and additive manufacturing. In addition, the program will provide other business assistance services, including shared equipment options, modern workforce development strategies, and the establishment of better networks between large and small manufacturers.

The program will serve a 20-county region in southern West Virginia, including 13 distressed or at-risk counties. It is expected to create or retain 375 jobs, and will leverage \$750,000 in private investment.

¹⁰ According to the organization’s website, “The Marshall University Research Corporation is a not-for-profit corporation chartered under the laws of the State of West Virginia, committed to an active, growing and successful research enterprise that will help address today’s challenges, improve the quality of life in the community and provide an engine for economic development.” (Source: <http://www.marshall.edu/murc/>)

¹¹ According to the organization’s website, “The Robert C. Byrd Institute offers a comprehensive stable of resources to support economic development and growth across the Mid-Atlantic region. Leveraging its expertise in manufacturing, technology and workforce development with a full complement of leading-edge equipment, RCBI enables manufacturers and makers to move their innovative ideas and creative solutions from concept to market.” (Source: <http://www.rcbi.org/>)

¹² The Claude Worthington Benedum Foundation is a non-profit organization whose mission is to encourage human development in West Virginia and Southwestern Pennsylvania through strategically placed charitable resources (Source: <http://www.benedum.org/about/mission.shtml>)



Additional funding is being provided by the Claude Worthington Benedum Foundation (Appalachian Regional Commission 2017).¹²

Challenges to the Implementation of a Technology Innovation Process

Some challenges that must be recognized related to implementing a technology innovation strategy include:

Financial Resources. The development of an innovative technology model requires lofty financial backing that may not always be accessible.

Lack of Trained Workforce. With the implementation of advanced technologies, businesses may lack qualified workers to operate these new technologies.

Elimination of Jobs. Advanced manufacturing technology might eliminate jobs (e.g. through automation), which could result in push-back from company employees.

STRATEGY #4: FINANCING OPTIONS

The fourth strategy is composed of two sub-areas: business financing and impact investing. This strategy connects a far-reaching network of investors to support businesses ancillary to the coal industry. This is pertinent because the impact of the downturn has also affected local lending. Former miners and coal-supported small businesses reported negative economic consequences for this lack of access.

However, the financial standing of lending institutions in the regions has also been negatively impacted, because of the unstable local economy. For example, as mining activity decreases in coal dependent communities, employment, tax revenues, and local consumer spending also tends to decrease. Correspondingly, as mining activity decreases, the risk of loan delinquencies increases, placing increased credit pressure on local lending institutions. This also creates deleterious credit pressure on municipal debt (Conference of State Bank Supervisors 2017).

According to a loan officer at a local lending institution in a coal-dependent community, the bank is less willing to partake in risky loans or lending, and will only lend to select residents and businesses at much shorter terms than in the past. It is entirely too risky to do otherwise at the moment, because businesses cannot afford the payback. This risk-averse lending environment may only offer very high interest rates to new business ventures, effectively pricing these ventures out of the market.

Many local banks may also be at or near their lending capacity. It is therefore important to not only galvanize the local financial economy, but also to seek outside financing options.

Financing Options Sub-Area #1: Business Financing Examples

The existing sample projects below offer vital opportunities for local businesses. Such outside business financing connections are critical, because according to one stakeholder, "It is difficult to find and fund capital when living in Appalachia or Central Pennsylvania." Some innovative community projects that seek to respond to this need are described below:

Appalachia Velocity Tour. This unfunded ARC grant application project was submitted by Village Capital, a venture capital firm. The project proposed a partnership with the ARC as well as foundations, entrepreneur support organizations, and municipalities across Appalachia, in order to celebrate and support entrepreneurs across the region. The partnership promoted the idea of a multi-city bus tour where prospective entrepreneurs from across the region would showcase their talents. The tour would eventually elevate those entrepreneurs to win grant prizes, and make relevant connections to future investors and other supporters outside their networks (Village Capital 2016).

Each stop would feature a tour of the city's entrepreneurial ecosystem and successful businesses, as well as a public pitch competition where one entrepreneur receives up to a \$100,000 grant prize awarded by a panel of local judges. The main purpose of the partnership is to promote Appalachia as a region where local and outside investors should direct resources. The project also seeks to encourage local communities to embrace and support these entrepreneurs, and persuade local investors and high-net-worth individuals to invest in the region, particularly in startups (Village Capital 2016). The bus tour importantly features efforts to revitalize these communities and residents who are committed to the future of their longtime neighborhoods. Showcasing entrepreneurship skills to outside networks can help align unmet local financing needs with sources of capital that can help make revitalization a reality.

Challenges to Implementing Business Financing Options

Some challenges that must be recognized related to implementing a business financing strategy include:



Equity Debt. Former miners and entrepreneurs may not be properly educated on the risks involved in financing and pay-back options to investors.

Risk-Reward Hurdle. Some potential new businesses may not meet or exceed an investors cost-benefit test. In absence of local subsidies or support from additional investors, this would preclude investment.

Availability of Local Subsidies. The availability of local subsidies, such as tax abatements or other support, may be an important component to helping reduce project costs and attract investors.

Financing Options Sub-Area #2: Impact Investing Examples

Impact investing connects a far-reaching network of investors with businesses that provide social or environmental benefits, in addition to delivering financial returns.

Rain Source Capital. The objective of this ARC funded activity is to ensure more communities take advantage of the opportunity to create a high-performance angel group. An angel investment group is a network of investors (either in the community or outsiders) who pool their investment capital—sometimes online—in order to provide access to syndicated capital for businesses in exchange for ownership equity in the business. In the case of one high-performance angel group formed by Rain Source Capital, investors inside and outside of the community will pool their resources for the benefit of start up businesses in these communities. The ARC funds will enable the awardee to work with existing and new angel investment funds to enhance the capability of coal-impacted communities across nine Appalachian states to make investments in start up, early stage, and growth companies. Specifically, the project will create at least four new angel funds in target communities, and will provide tools, training, and support services to existing angel funds and networks already operating in Appalachia (Rain Source Capital 2016).

Challenges to Implementing Impact Investing Options

Some challenges to implementing an impact investing strategy include:

Uncertainty for Investors. The businesses of these areas may be deemed too risky for outside investment.

Online Investment Preference. Since angel investing is increasingly done online, participation may prove a challenge for counties that lack access to broadband

infrastructure and information technology.

STRATEGY #5: EXPLORING OTHER INDUSTRIES

The final strategy involves the economic potential related to industry diversification. Such diversification entails the utilization of skills that may or may not already exist in former miners and small businesses. The strategy to explore other industries is comprised of five sub-areas: agriculture, other extractive industries, realignment of existing skills, tourism related businesses, and healthcare.

Exploring Other Industries Sub-Area #1: Agriculture Examples

Diversification towards Pennsylvania's agricultural economy can be a worthwhile strategy, which can go hand-in-hand with other strategies identified in this report (e.g. reclamation).

Penn's Corner Farm Alliance. Penn's Corner Farm Alliance is a farmer-owned cooperative in Southwestern Pennsylvania. Founded in 1999, its mission is to provide high-quality, farm-fresh products directly to customers while providing a sustainable rate of return to the local farmers. The alliance delivers fruits, vegetables, and other farm-raised foods directly to customers in the Pittsburgh area through their Community Supported Agriculture (CSA) program. The group also delivers weekly boxes of farm-fresh produce to neighborhoods all around Pittsburgh, year round. In addition to their CSA, the alliance also markets to fine restaurants in the Pittsburgh vicinity, and hosts an online farm stand (Penn's Corner Farm Alliance n.d.).

Patriot Gardens Golden Delicious Apple Project. This project features small-scale farming at the county level that can be replicated in Pennsylvania. DEP awarded the Patriot Gardens Golden Delicious Apple Project in West Virginia and Kentucky a \$5.3 million grant for former miners and veterans to assist in planting 100,000 apple trees on 500 acres in Nicholas and Clay Counties. This project was also discussed in depth in the P&D section on page 23.

Challenges to Implementing an Agriculture Strategy

Some challenges that must be recognized related to implementing an agriculture strategy include:



Inarable Land. Location is important for implementing agriculture strategies. Many areas affected by the coal downturn are located in places where building an agriculture industry is impossible due to local terrain and soil quality. As such, many areas cannot be cultivated.

Underpriced Crops. In order to stay competitive with large producers and suppliers, local farmers must often underprice their products, which results in lost revenue that limits financial viability. The economies of scale achieved by large farming operations may render some smaller agricultural operations economically uncompetitive.

Limited Demand. Price premiums from smaller farming operations are acceptable to local customers and markets if value is perceived, and if customers are willing to pay for it. For example, some customers may have a higher willingness to pay for products that are locally grown, organic, sustainably harvested, etc. Local demand for such products must exist or be created to support higher-cost products.

Exploring Other Industries Sub-Area #2: Other Extractive Industries Examples

This sub-category concerns the diversification into other industries that are substitutes for or competitors with coal. As noted by a stakeholder, laid-off miners are accustomed to working with heavy machinery and working outdoors. They have adapted to labor-intensive professions, such as in manufacturing or the resource extraction industries. The program below features this diversification of industries:

Manufacturing Value Stream for Shale (MAVS). The West Virginia University's Manufacturing Extension Partnership (WVU MEP) is a non-profit entity that helps West Virginia businesses, including small and medium manufacturers and suppliers, improve competitiveness in local and global markets. Led by the four Manufacturing Extension Partnership (MEP) centers¹³ in this region, this Manufacturing Value Stream for Shale (MAVS) project will identify companies serving the coal industry that are ready and willing to shift their products and services into the shale-manufacturing sector. The project will identify key segments of the shale-manufacturing sector that will need additional suppliers and allied industries.

This will be achieved through a regional roundtable, a series of six workshops to support the transition of

supplier companies into the emerging manufacturing value stream, and direct training and engagement with these companies to support their successful diversification. This comprehensive research and manufacturing support project will identify how companies and suppliers in struggling coal communities can enter the value stream of the manufacturing industries. The ARC grant applicant, West Virginia Research Corporation, was awarded \$400,000. It is leveraging additional foundation funding and expects the project to create 400 new jobs and 12 new businesses (Appalachian Regional Commission 2017).

Challenges to Implementing an Extractive Industries Strategy

Some challenges to implementing an extractive industries strategy may include:

Commodity Market Volatility. The boom-and-bust cycle of coal and other energy commodities leads to cycles of unemployment.

Regulatory Compliance Costs. Impacts of regulations on extraction costs may or may not impact business opportunities.

Investment Uncertainty. Uncertainty about prices and demand from domestic and international markets can inhibit opportunities and investments in supply chain businesses and diversification strategies.

Exploring Other Industries Sub-Area #3: Realignment of Existing Skills Examples

"The workforce is eager," stated an economic development stakeholder partner. "But how do we make the jobs come? We need to entice potential industries with [our] eager and attractive workforce with proven work ethic," he said.

Capitalizing on the skills of former miners in order to attract firms willing to build upon these existing skills may be a viable option. At this critical junction is where the local Chambers of Commerce, Small Business Development Centers, and workforce development groups can collaborate. Specifically, assistance in re-orientating skilled workers towards different industries that may value their skills.

Exploring Advanced Manufacturing in SW Pennsylvania and NW Virginia's Coal Communities. In 2015, the EDA designated a 20-county region of southwestern Pennsylvania and northwestern Virginia as the

¹³ These four centers located in West Virginia, Ohio, Pennsylvania, and Pittsburgh.



Insights: A Rare Earth Minerals Industry in Pennsylvania's Coal Lands?

Pennsylvania's anthracite coal basins have been found to have high levels (i.e. over 300 parts per million) of rare earth elements (REEs), which are used in the development of many technologies and electronic devices (National Energy Technology Laboratory 2017). These high concentration levels increase the likelihood that REEs can be economically extracted from these coals and coal by-products, and therefore support a viable domestic REE industry.

There are seventeen REEs,¹⁴ which can be used in technology applications including cell phones, solar panels, medical devices, defense applications, and more. Though REEs are abundant in the earth's crust, they are generally not available in concentrations sufficient to make extraction economically viable. A 2013 report from the Congressional Research Service found that although the United States was once self-reliance on domestically produced REEs, over the past 15 years the nation had become 100% reliant on REE imports, primarily from China (Humphries 2013).

In addition, global demand for REEs is rising, further fueling concerns about U.S. vulnerability to REE supply vulnerability and costs. As a result, fostering an economically viable domestic industry has become a priority for federal policymakers.

Not only does Pennsylvania have high concentrations of REE's in its anthracite coal fields, Penn State University researchers have also been funded by the U.S. Department of Energy to advance their innovative approach to extracting REEs from coal by-products (Penn State University 2017). Penn State researchers and a consortium of industry partners are developing a pilot program at Jeddo Coal Company-owned site to test ion exchange methods to economically extract REEs from coal-byproducts in an environmentally friendly manner.

Though the opportunity is still speculative at the time, the potential is exciting. Pennsylvania could become a source of domestically supplied REEs, improving supply security for the nation and creating economic development opportunities for the local communities.

Greater Pittsburgh Metals Manufacturing Community (GPMMC) (Catalyst Connection 2015). This designation recognizes the region's strengths in metals, available brownfield sites and manufacturers who seek to boost advanced manufacturing in the metals and advanced materials sectors. The designation provides federal support for long-term economic development growth in regional manufacturing. This GPMMC initiative is a partnership of government, university, industry, workforce, and economic development organizations, led by Catalyst Connection, a non-profit economic development organization located in Pittsburgh.

In 2016, the EDA provided Catalyst Connection and its partners with an additional \$400,000 grant to implement a portion of the GPMMC long-term plan (Catalyst Connection 2016). A major portion of the plan involves helping transition unemployed coal workers into the advanced manufacturing sector, or training them to become entrepreneurs. The goal of the project is to ensure that the growth in the manufacturing sector

also coincides with the revitalization of the supply chains of coal-impacted communities and workers. The scope of work involves: project administration and coalition management, outreach and engagement, research and analysis, and then the overall action plan.

Challenges to Implementing the Realignment of Existing Skills Strategy

Some perceived challenges include:

Relocation. The results of retraining may require relocation. Most people are rooted in the community and are unwilling to leave.

Lower Wages. The wages in non-coal industries are generally less than coal mining wages.

Aging Workforce. The aging workforce is sometimes unwilling to learn new skills.

Changing the Mindset. The psychological impact of the downturn is real and can serve to stall motivation towards other opportunities.

¹⁴ The seventeen REE's are metals that include: lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.



Lack of Awareness. Many in the community do not realize that the economy is shifting from manufacturing to service jobs. Others don't fully understand the enhanced competitiveness of shale gas. The lack of public education and awareness inhibits acceptance of the need to acquire new skills.

Exploring Other Industries Sub-Area #4: Tourism-Related Businesses Examples

The business of tourism requires attracting, entertaining, and accommodating outside visitors. This allows for the creation or promotion of local small businesses. Accordingly, tourism has the potential to become a major source of economic prosperity and growth in certain counties. But prior to this becoming a reality, communities need assistance on re-branding and marketing themselves, to attract new businesses, visitors, and residents. Tourist promotional agencies and other organizations can help market areas and attract more people. ***A switch to and reliance on tourism as an economic sector is likely contingent on the successful implementation of strategies enumerated in the planning and development section.***

As seen in the Anthracite Outdoor Adventure Area (AOAA) case studies previously discussed, many stakeholders maintain that new tourism created by this outdoor facility in Northumberland County has reaped economic dividends for existing businesses, and will lead to the development of supplemental businesses. The financial capabilities for the facility, as noted by stakeholders, are numerous. Examples of ancillary businesses for the tourism economy include: lodging (such as bed and breakfasts and hotels), craft wineries and breweries, gift shops, and restaurants. Many of these are the same businesses that have been negatively impacted by the coal downturn.

The Commonwealth of Pennsylvania's Tourism Office releases annual visitor spending reports titled "The Economic Impact of Travel in PA," which in 2015 was developed by Tourism Economics (Tourism Economics 2015). This visitor spending report shows the existing economic potential in investing in tourism as a viable sector for Pennsylvania small town communities. According to recent trends in the most recent report of 2015, traveler spending generated an estimated \$69.6 billion in total economic activity (including indirect and induced impacts) throughout all industries in Pennsylvania in 2015—a 1.8% increase from 2014 (Tourism Economics 2015).

For the affected communities impacted by the downturn—such as in the southwestern counties of Somerset, Fayette and Westmoreland, collectively known as "The Laurel Highlands"—there is already a significant but loose community of tourism and outdoor activity related businesses in the area including vineyard tours, bass fishing tournaments, hiking and biking, hunting and camping, kayaking, and waterskiing. The 2015 report notes that travelers spent over \$1.8 billion in the region in 2015, mostly related to transportation (27.8%), food & beverage (22.2%), recreation (18.4%), shopping (17.8%), and lodging (13.9%) (Tourism Economics 2015). This shows the existing economic contributions to the area from tourism, however. The theoretical potential for the tourism sector to contribute to the local economy is unknown.

Development and implementation of a robust tourism marketing strategy has been identified by many stakeholders as a key component of a successful strategy to promote an area as a destination for travel, recreation, and tourism. Many stakeholders asserted that a tourism attraction cannot become a destination without marketing investments, which should include a regional brand strategy.

Promoting the Anthracite Outdoor Adventure Area (AOAA) in Northumberland County. According to the grant applicant, the AOAA initially relied on word of mouth and new visitors to promote the facility. However, as the financial potential of the center became more clear, a targeted marketing strategy was developed. Two tourism promotion agencies serving the project region actively promoted the AOAA. The strategy was to market the AOAA as a destination by describing the experience the AOAA user would discover and enjoy at the off-highway facility that is open year-round. The AOAA was also featured in online articles and trail magazines worldwide (SEDA-COG 2016). A website was also launched to promote the facility and user experience.

Additional organizations helped the AOAA facility expand and grow including the ARC, DCNR and the Pennsylvania Department of Transportation (PENNDOT). Together, these groups pooled resources to enhance the economic development potential of the facility by further marketing the resource nationally and working with local individuals looking to fill needs generated by increased tourism in the area. Northumberland County also worked with the SBDC at Bucknell University, holding workshops in the area



to create businesses that will capitalize on the new tourism industry, for instance, repair shops for the ATVs, camp ground facilities, and local lodgings.

Increasing the number of AOAA visitors means there will be new demand for hotels, restaurants, and places to repair ATVs. The AOAA aims to provide access to the larger “market” of outdoor enthusiasts through the existing or new local ancillary support businesses for the site (SEDA-COG 2016). In a thriving tourism economy, visitors frequently try other activities, beyond the destination’s main attraction. As such, it was conceived that the visitors will also need activities for off-hours and for those in their family who would prefer not to participate in ATV activities. Such potential activities include farmer’s markets, wellness spas, music festivals, summer camps, nature education, bird watching, boating, biking, hiking, and golfing (SEDA-COG 2016). These various needs provide new opportunities for local businesses, entrepreneurs, and job seekers.

Challenges to Developing a Tourism-Related Business Strategy

The potential challenges listed below should be considered during the implementation of this strategy:

Financial Resources. Communities may not have access to the funds needed to develop and implement a regional branding and marketing strategy—essential to a successful tourism-related business strategy.

Infrastructure. Insufficient or deteriorating infrastructure (i.e. broadband, sewer, roads) can be a barrier to serving increased volumes of visitors to the area.

Image. Overcoming potential preconceived notions or perceptions that rural areas may not have much to offer the tourist may be a difficult barrier to surmount. Persuading the potential tourist to reimagine rural Pennsylvania will require development of attractions and effective marketing strategies.

Uncertainty. It is unclear if tourism-related business opportunities will materialize. These opportunities may depend on an anchor attraction, robust marketing and advertising investments, and consistent realization of new and repeat visitors to the area.

Exploring Other Industries Sub-Area #5: Healthcare Sector Opportunities Examples

As indicated in the Appendix the health care sector is one of the leading employers in most counties studied. There is also a trend of an aging demographic in these

counties as well. With an aging demographic, there will be a continued need for health care assistance such as hospice, veteran’s assistance, retirement homes, etc. In some rural areas of the commonwealth, there is a lack of health care access, as well as a shortage of health care professionals.

According to a health rankings report of Pennsylvania counties, the statewide average ratio of population to primary care physicians is 1,220 to one, whereas for some rural areas the ratio is as high as 3,670 to one (Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute 2016). These needs can create opportunities for employment and businesses within the healthcare sector.

In addition, compared to other areas of the state, many of the rural counties where distressed coal communities are located suffer from worse health outcomes and health factors (Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute 2016). Specifically, on health outcomes, populations in Cambria, Fayette, Greene, Luzerne, Northumberland, and Schuylkill counties were scored among the lowest counties in the state. For health factors, Bedford, Cambria, Fayette, Greene, Indiana, Jefferson, Luzerne, Northumberland, and Somerset were among the lowest ranked counties. Health outcomes were generally measured by length and quality of life. The health factors that influence health outcomes include health behaviors (i.e. tobacco, alcohol, and drug use; diet and exercise; sexual activity), clinical care (i.e. access and quality of care), social and economic factors (i.e. education, employment, income, family and social support, community safety), and the physical environment (i.e. air and water quality, and housing and transit).

Marshall University Research Corporation Health Grant. Marshall University Research Corporation received a \$1.3 million grant from the ARC to train community health workers in several West Virginia counties. The grant aims to improve public health and access to care in rural communities. A team from Marshall University will train 26 new community health workers to help improve care and treatment plans for high-risk patients with diabetes, congestive heart failure, COPD, and other illnesses (Holdren 2017).

Challenges to Developing a Strategy Focused on Healthcare Opportunities

The potential challenges listed below should be considered during the implementation of this strategy:



Lack of Access. With parts of the commonwealth being in rural areas, certain communities lack access to health care or have access to poor quality care. An economic development strategy focused on healthcare sector opportunities where access or quality is limited may require non-standard approaches to overcome access barriers.

Lack of Skilled Workers. With the workforce continuing to age, the number of qualified workers who can provide health care assistance may continue to decrease unless there is an emphasis on talent recruitment, training, and retraining.

Outdated Policies. Employment opportunities in the rural healthcare sector may depend on new state

Insights: Appalachia, Mental Health, and Diseases of Despair

In 2008, the University of Chicago released a report commissioned by the ARC analyzing mental health and substance abuse disparities in the Appalachian region. (Zhang, et al. 2008) The report found a higher prevalence of mental health disorders—such as serious psychological distress and major depressive disorder—in Appalachia compared to the rest of the nation. Furthermore, these mental health diagnoses were independent from substance abuse, and were particularly acute in economically distressed areas of Appalachia. Also of note, the study found hospital admission rates for abuse of opiates and morphine-like synthetics were higher in Appalachia compared to the rest of the nation, especially in coal-mining areas.

In 2017, the University of Chicago released a report commissioned by the ARC examining trends associated with three “diseases of despair” in Appalachia. (Meit, et al. 2017) The report examined morbidity and mortality related to three diseases of despair—substance abuse (alcohol, prescription drug, and illegal drug use), suicide, and liver cirrhosis (alcoholic liver disease). The study found the combined mortality rate from diseases

of despair was 37 percent higher in Appalachia compared to other areas in the United States. Most notably, those aged 25 to 44 in Appalachia had a 70 percent higher mortality rate from diseases of despair than those living elsewhere in the United States. The report notes this has significant implications for economic development, as individuals in their prime working years are most heavily impacted by these diseases.

The difference between the Appalachian U.S. and non-Appalachian U.S. mortality rate from diseases of despair has been growing over the past two decades, but this rate significantly increased by 13 percentage points between 2009 and 2015. The study doesn’t directly associate this increased rate to the downturn in the coal economy, but the timing coincides.

In Pennsylvania, the study found the 15-64 year olds living in the Appalachian portion of the state had a 28 percent higher mortality rate associated with diseases of despair, compared to Pennsylvanians living outside the Appalachian region. In Pennsylvania, the highest proportion of deaths related to diseases of despair were caused by overdoses, followed by suicide. In Pennsylvania, 59 percent of overdose-related deaths were associated with opioid use.

¹⁵ For more information, see The Center for Rural Pennsylvania’s paper entitled “Exploring Healthcare Alliances in Rural Pennsylvania” located at http://www.rural.palegislature.us/documents/reports/Healthcare_Alliances_Final_Report.pdf

¹⁶ For more information, see the news release from the Pennsylvania Coalition of Nurse Practitioners, at <http://www.pacnp.org/news/216539/Rural-PA-Facing-Health-Care-Provider-Shortage.htm>

¹⁷ For more information, see the Pennsylvania Department of Health’s “Rural Health Redesign in Pennsylvania” implementation plan at http://www.health.pa.gov/Your-Department-of-Health/innovation/Documents/External%20Plan_Rural%20Health.pdf



SECTION III

ADDITIONAL STAKEHOLDER PERSPECTIVES AND OBSERVATIONS

Christina Simeone, Theodora Okiro, DeShaun Bennett May 23, 2018 kleinmanenergy.upenn.edu

policies to promote or enable innovative or non-standard approaches to delivering healthcare to rural communities. A few examples of proposed innovative approaches include: exploring rural healthcare alliances,¹⁵ allowing nurse practitioners to work independently from doctors,¹⁶ and state government initiatives to redesign rural healthcare in Pennsylvania.¹⁷

Stakeholders participating in the SBDC-hosted regional meetings held in Latrobe and Wilkes-Barre offered valuable insights and suggestions regarding the five strategies presented in Section 2. In addition, they offered broader insights into the challenges facing distressed coal communities and related small businesses.

IDENTIFYING UNIQUE COMMUNITY NEEDS

Greater education on Pennsylvania's new energy economy is needed. Opportunity exists to educate coal-dependent workers on reasonably anticipated future scenarios for Pennsylvania's energy industries and related employment. Specifically, if the past is a good predictor of the future, identifying key changes and uncertainties in the industry, etc.

In the coal mining industry, there is a cultural acceptance of boom-bust cycles, but perhaps not an appreciation for how these cycles may change in the post-shale era. There is the opportunity to highlight the tradeoffs between high-pay, high-volatility employment opportunities in the coal industry versus lower-pay yet more stable career opportunities in other sectors.

Regional organizations should endeavor to produce career coaching workshops and events. Education needs to be provided on future expectations for jobs and wages in coal (and other energy) industries. Education should happen as early as high school. There is a need to educate the educators on the skills needed for today's workforce, especially technical skills.

Market research is expensive, but it's critical to understanding new business opportunities. Companies that serve the coal industry need assistance in assessing other business opportunities in order to diversify. Since SBDC's are affiliated with universities, stakeholders believe there is a potential role for university students in helping with market research.

More effective methods are needed to connect miners to manufacturing opportunities. Manufacturers like coal workers because of their established work ethic and skills. However, once laid off from coal jobs, coal miners can go "off-grid" and be hard to find when manufacturing job opportunities arise. Organizations need to hone in on a system or database where these off-the-grid miners can be contacted for potential opportunities. Former miners require assistance in translating skill sets to other industries.

EXPLORING COMMONWEALTH GOVERNMENT PROGRAMS

Create re-mining and reclamation incentives. Investigate establishing a program that would encourage re-

mining and reclamation in areas that would create a net positive environmental benefit. Communities might encourage remining on abandoned and un-reclaimed coal lands, where such activity would result in the land being reclaimed and released for agricultural or development uses.

Fund research for alternative uses for anthracite coal.

By diversifying anthracite coal markets beyond iron, steel, and home heating, more stable demand can be created. The high rare earth element and carbon content of anthracite coal can be a valuable industrial input, beyond use as combustible fuel.

Support community-level strategic planning. Provide funding and technical assistance for strategic assessments, marketing, and rebranding of communities to identify competitive strengths and help attract new businesses and people to the areas.

Foster public-private infrastructure partnerships.

Establish and promote the legal authorities, technical assistance, and administrative support needed to leverage public-private partnerships for new infrastructure and other investments.

Reinstate the ‘self-employment assistance’ program.¹⁸

This former program provides for unemployment benefits as individuals explore efforts to develop self-employment (i.e. entrepreneurial) opportunities.

Provide better transition assistance needs. Stakeholders mentioned that even if training or retraining opportunities are provided at no charge, miners interested in these opportunities still have financial obligations that may prevent them from exploring these resources. A stakeholder asked, “who will pay the mortgage while I am training for a new career?”

RESPECTING LOCAL COMMUNITY CULTURE AND LEGACY WHILE MOVING FORWARD

Understand and respect miner culture. Miner characteristics include being independent, hard-working, and resilient. These workers have become accustomed to coal boom-bust cycles, where overtime

work and high pay is robust in boom times, followed by periods of unemployment during bust times.

Address psychological impacts. Provide resources to help combat the psychological impacts on coal communities from coal downturn. These psychological impacts can manifest in a variety of ways, including but not limited to, depression, substance abuse, or anti-social behavior.

Set reasonable expectations. Most stakeholders do not envision a resurgence of coal demand and high-levels of production that existed prior to 2007. However, many believe that coal will still be a part of Pennsylvania’s future. Communities, businesses, and individuals have to be better informed about reasonable expectations on the new normal for coal production in their communities.

Sacrifice for diversification. A business-owning stakeholder asserted that it took significant sacrifice to diversify his coal-dependent supply chain business into other market segments. Devotion of time, money, and opportunity costs were incurred, but in the end, the business has become healthier, stronger, and more resilient.

¹⁸ Self-Employment Assistance offers dislocated workers the opportunity for early re-employment. The program is designed to encourage and enable unemployed workers to create their own jobs by starting their own small businesses. Under these programs, states can pay a SEA allowance, instead of regular unemployment insurance benefits, to help unemployed workers while they are establishing businesses and becoming self-employed.



Insights: Pennsylvania's Drug Epidemic

According to a 2016 report from the U.S. Drug Enforcement Agency (DEA) and the University of Pittsburgh, Pennsylvania saw a 37% increase in drug overdoses from 2015 to 2016 (U.S. Drug Enforcement Agency and the University of Pittsburgh 2017). In 2016, approximately 13 people in Pennsylvania died per day of drug overdoses, equating to 4,642 drug-related deaths that year. Of these deaths in 2016, opioids were present in approximately 85% of the cases. Men represented 70% of these deaths, and 77% of these deaths were racially identified as white, and the age group where the majority (30%) of drug related deaths occurred was between 25 and 34 years of age (even though this age group makes up only 15% of Pennsylvania's population).

The percent increase in drug-related deaths between 2015 and 2016 was larger in rural Pennsylvania counties compared to urban counties. Yet overall in 2016, drug-related deaths were more common in urban areas (3,568) compared to rural areas (1,074). This makes

sense because there are larger populations in urban areas. For this reason, population-adjusted rates were calculated to enable more granular geographic comparison. In 2016, Pennsylvania's average rate of drug overdoses was 36.5 for every 100,000, while the national average rate of drug overdoses was 16.3 people for every 100,000. While not suggesting a causal relationship, counties home to distressed coal communities had some of the highest drug-related death rates in the state, including: Cambria (65.4 people per 100,000), Armstrong (59.5), Washington (51), Indiana (50.6), Greene (49.1), Westmoreland (47.6), Fayette (43.9), Luzerne (43.6), and Schuylkill (39.8).

In addition to drug-related deaths, prevalent drug use results in failed drug tests, preventing many individuals from qualifying for employment.

More information about Pennsylvania drug overdose deaths can be found in the DEA's 2017 report located at <https://www.overdosefreepa.pitt.edu/wp-content/uploads/2017/07/DEA-Analysis-of-Overdose-Deaths-in-Pennsylvania-2016.pdf>



SECTION IV

CONCLUSIONS AND NEXT STEPS

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The downturn of the coal industry has resulted in significant and widespread impacts on local communities and businesses throughout the Appalachian region, including Pennsylvania. This report identifies many—not all—strategies, projects, and programs being employed in Pennsylvania (and other states) to help assist coal communities. Many of these initiatives have recently been implemented or are still being developed, and as such, the ultimate effectiveness of the efforts cannot yet be measured.

The changing coal economy in Pennsylvania comes with losses, but also the potential for regrowth and restoration in new areas. However, these new opportunities will take time to cultivate before regrowth and restoration can be achieved. The strategies identified in this report can help identify potential pathways towards economic revitalization for some of the hardest hit coal communities and related businesses and workers. ***Of course, financial resources are always limited, which is a challenge that cuts across all identified solutions.***

This report identifies options for communities to explore. However, these pathways are dynamic, and as such require initial strategies to be developed, implemented, monitored, and adjusted as circumstances evolve. Below are key principles communities should keep in mind as they assess the appropriateness of the options identified in this report.

Key Principles for Identifying Strategies. Choosing the right strategy or portfolio of strategies will require reliance on at least four key principles:

1. **Community-Specific Approach.** Understanding the strengths, weaknesses, opportunities, and threats embodied in the community is a critical baseline to establish.
2. **Stakeholder Collaboration and Cooperation.** Stakeholders—including local and regional, public and private, individuals, and organizations—need to be identified and engaged, early and often. This is in fact the “market” for which to test ideas to determine if the revitalization strategy (the “product”) has a strong or weak chance of success.
3. **Leveraging Financial Resources.** There are not enough resources to meet the needs of all communities and businesses. A constant challenge will be securing financial resources and making the impact of each dollar look, feel, and behave like a five-dollar investment.
4. **Establishing Connections and Connectors.** Ensuring every potential opportunity is fully and efficiently exploited will take robust, consistent, and effective communications among stakeholders within the community, and beyond. Emerging opportunities must be recognized, communicated, and promoted as options to all of the right audiences. Securing early buy-in from these audiences will help to effectively cultivate and support initiatives, providing the best opportunity for successful realization, if implemented. Clearly and transparently identifying connectors—such as specific organizations, community leaders, and public officials—can create the required institutional conduits needed to maximize connections. Making these designations should occur productively so as not to exclude interested stakeholders or foster an environment of competition at the expense of collaboration.



Promoting Local Government and Economic Development Organization Leadership. These organizations are invaluable to leading communities and businesses through the complex and confusing economic transition that is occurring in Pennsylvania's coal country. This leadership could include assisting individuals, businesses, and communities in reviewing and assessing strategies, options, and opportunities. The following activities are just some of the ways local governments and economic development organizations can help lead this transition. Consistent with the four principles identified above, these entities can:

1. **Complement regional planning with community-specific planning.** Challenges and opportunities may be unique for each county or town. As an example, the ARC funded a feasibility study for the county of Somerset titled, *The Somerset Diversification*. The study used consultants to conduct a field report on what economic areas the county could conceivably pivot toward after the downturn of the coal industry. The results of the study recommended five growth opportunities including tourism, small-business development, agriculture and local foods, health care and related activities, and manufacturing (EntreWorks Consulting 2016). This community-specific resource would be a helpful complement to the regional comprehensive economic development strategies—or CEDS—currently developed by economic development districts.
2. **Promote a culture of collaboration.** Too often stakeholders lament economic development organizations must compete against one another for funding, leading to a counterproductive competition. Collaboration across counties, municipalities, industries, sectors, businesses, etc. is necessary for any monumental change to happen. Although one particular strategy or organization might address an issue, there is power in numbers, as well as diversification.
3. **Partner to identify and help secure resources to expand economic development.** Providing resources is a vital step in helping any community affected by the downturn. Whether those resources are provided on a micro-level or macro-level, all resources are beneficial. Economic development organization can lead by bringing together multiple partners to secure and leverage financial resources in order to maximum benefits.
4. **Act as a matchmaker.** Government and economic development entities have the standing required to serve as connectors within, among, and beyond communities. They have the on-the-ground knowledge to identify local leaders, involve the right stakeholders, and they can empower surrogates to spread messages.

This report brings together information—connecting coal market trends, coal country demographics, stakeholder-based input, and research on current and proposed initiatives to improve distressed coal community economics—in order to identify a menu of diverse strategies to revitalize Pennsylvania's struggling coal communities. These data can inform future efforts by local governments, economic development organizations, and policy makers as they contemplate approaches to assist individuals, businesses, and communities in these economically struggling areas of the commonwealth.



APPENDIX

OVERVIEW OF PENNSYLVANIA COAL COMMUNITY DEMOGRAPHICS

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The coal downturn has greatly impacted Pennsylvania, but these impacts have been experienced quite differently across the commonwealth. Key demographic factors that are important indicators and drivers of employment, business development and growth include: population, employment, infrastructure, skilled technical labor, educational attainment levels and industry diversification.

The majority of the coal mining and associated activity takes place in four main regions in Pennsylvania.

Northeastern Region. Carbon, Lackawanna, Luzerne, Monroe, Pike, Schuylkill and Wayne counties.

Southern Region. Cambria, Somerset, Blair, Bedford, Huntingdon, and Fulton counties.

Southwestern Region. Allegheny, Beaver, Fayette, Indiana, Pittsburgh, Westmoreland, Armstrong, Butler, Greene, Lawrence, and Washington counties.

Northwestern Region. Clarion, Crawford, Erie, Forest, Lawrence, Mercer, Venango, and Warren counties.

Sources of information about the downturn's impacts include Pennsylvania Center for Workforce Information Analysis and regional U.S. Department of Commerce Economic Development Administration Comprehensive Economic Development Strategies (CEDS). The relevant CEDS for this study include:

- *2013-2018 Comprehensive Economic Development Strategy Five-Year Plan for Northeastern Pennsylvania* (Northeastern Pennsylvania Alliance (NEPA) 2013)
- *2012-2016 Update, Comprehensive Economic Development Strategy, Southern Alleghenies Region* (Southern Alleghenies Planning & Development Commission n.d.)

- *Mapping the Future: Comprehensive Economic Development Strategy for Southwestern Pennsylvania, Southwestern Pennsylvania Commission, 2016* (Southwestern Pennsylvania Commission 2017)
- *Northwestern PA Comprehensive Economic Development Strategy, Fall 2016* (Northwest Pennsylvania Regional Planning and Development Commission 2016).

POPULATION

Northeastern Region

In Northeastern Pennsylvania, from April 1, 2010 to July 1, 2013, the population declined by 7,899 people or 0.8%. All of the counties, along with the region, the state, and the nation, had decreases in the number of people under 18 years of age, and 25 to 44 years of age. The 45 to 64 years of age group increased in all areas, with the exception of the Northeastern Pennsylvania region and Lackawanna, Luzerne, and Wayne counties. Therefore, as a result of the out-migration that is occurring at the age of 25 to 44, there is a draining of youth affecting Northeastern Pennsylvania.

Southern Alleghenies Region

The region has experienced a net loss among its younger population, most likely due to low household formation and net out-migration of young workers for better jobs. Between 2000 and 2010, the region lost roughly 9% of its population aged 15 to 34 years; what is generally considered the younger sector of the labor force. The most significant losses came in the age



group of 35 years to 44 years, where there has been a decline of approximately 14,000 persons or 19% of this age group. The region has lost a staggering 13% of its working population aged 15 to 44, over the recent decade. Significant gains in populations among age groups 55-64 and 85 and older indicate that the region as a whole is aging. This aging of the population also reflects an aging labor force, which will have consequences for the competitiveness of the region to attract jobs in the future.

Southwestern Region

At the time of the last decennial count, the region had a population of 2,574,959, making it the largest metropolitan area in the 13-state Appalachian Region. In terms of population, the Southwest Region would be the 36th largest state in the country. In terms of area, the region is larger than the states of Connecticut, Delaware, and Rhode Island. Year 2014 estimates from the Census Bureau, however, continue to show some population decline at the regional level for Southwestern Pennsylvania and closest regional neighbors such as Youngstown, Johnstown, Steubenville and Wheeling. The lingering effect of the massive population decline related to regional steel industry reductions remains a factor in current population statistics. The distribution of population varies around the region with the bulk of population decline in the older urbanized industrial centers, corresponding to economic shifts in the last several decades.

Northwestern Region

Northwest Pennsylvania experienced a loss of population between 2000 and 2015. The Northwest Region's percentage in population of persons over 65 years of age is higher than the state and the nation. According to the 2014 U.S. Census, 19.2 percent of the region's combined population was 65 years of age and over; this compares to the state's overall 16.7 percent and to the nation's overall 14.5 percent. This trend is projected to increase over the next 20 years. The aging population of the region is a major concern for the sustainability of the region's employers in all sectors of the economy. For example, as workers age and retire, it is unclear if there will be a sufficient supply of new, skilled workers in the area.

EMPLOYMENT

Northeastern Region

The number of firms and employment within the region from 2007 to 2012 experienced a decline. The Scranton–Wilkes-Barre–Hazleton Metropolitan Statistical Area (MSA), which consists of Wyoming County and the Northeastern Pennsylvania counties of Lackawanna and Luzerne, has experienced the highest unemployment rate among all of the MSA's within Pennsylvania from at least September 2011 to October 2014.

County Profile: Lackawanna County. Lackawanna County has a labor force of 105,900 people. Of those, 100,300 are employed, leaving an unemployed population of 5,700—or 5.3% unemployment rate. There are many sectors that contribute to the unemployment population. From April 2016 to March 2017, “Trade, Transportation & Utilities” sector accounts for 21% of the unemployment population, followed by “Professional & Business Services” which accounts for 17.5%. “Education & Health Services” accounts for 16% of unemployment, with “Construction” and “Manufacturing” each accounting for another 14% (Pennsylvania Center for Workforce Information and Analysis 2017).

Although there were layoffs in the “Education & Health Services” industries, “Health Care and Social Services” employs the largest percentage of the working population, employing 19.9% or 19,277 people. “Retail Trade” employs the next largest percentage of the workforce, employing 12.6% of the working population. Some of the largest employers by employment in Q3 of 2016 included: Allied Services Foundation; Pennsylvania State Government; Community Medical Center; Scranton School District; The University of Scranton; TMG Health; Wal-Mart Associates, Inc.; Scranton Quincy Hospital; and Lackawanna County (Pennsylvania Center for Workforce Information and Analysis 2017).

Southern Alleghenies Region

A significant proportion of this region's census tracts maintained unemployment rates below the state and national averages (approximately 56%). Roughly 12% of the region's census tracts maintained unemployment rates that fell between the state and national averages,



and another 32% of tracts experienced unemployment rates greater than these averages. This indicates that while the majority of the Southern Alleghenies Region maintains a fairly stable economy, retaining the current population and attracting future residents could potentially be a struggle for several of the region's counties and individual municipalities.

County Profile: Somerset County. Coal has been a major anchor of the Somerset economy, along with agriculture, tourism, and manufacturing. The coal industry has suffered a slow downturn since the 1990s. From 1990 to 2000, coal employment declined by 32% (Somerset County). Since then, the industry has been unstable, with a steady fluctuation of employment. There is an overall pattern of long-term decline in employment in Somerset, especially in the coal and mining sectors. 14.5% of the people who received unemployment compensation between February 2016 and January 2017 were “exhaustees”¹⁹ formerly employed in the “Natural Resources & Mining” sectors. The “Construction” sector along with “Trade, Transportation, and Utility” sector each added another 17% of the unemployment population, with the “Industrial” sector contributing 13%. (Pennsylvania Center for Workforce Information & Analysis 2017).

The “Mining, Quarrying, Gas, and Oil” sector still provides 673 jobs to the Somerset community, accounting for 2.8% of the total employment. “Manufacturing” and “Wholesale” sectors each provide 10.9% of the workforce labor, while “Health Care and Social Assistance”, and “Accommodations and Food Services” accounts for 29.6% of the labor force. (Pennsylvania Center for Workforce Information & Analysis 2017)

Southwestern Region

While population continued to decrease slightly in the region, employment levels continued to improve. At the 2007 adoption of the 2035 Transportation and Development Plan,²⁰ the region had seen unemployment rates at their lowest in three decades. With the economic downturn in 2008 that changed. However, unemployment rates from the Pennsylvania Department of Labor and Industry show that through the recession Pennsylvania continued to fare better than the nation, and the Pittsburgh Metro Area continued to fare better than Pennsylvania.

County Profile: Greene County. Of the 450 people who filed for unemployment compensation in Greene County from April 2016 to March 2017, 31% of those people came from the “Natural Resources and Mining” industries. Another 25% came from the “Construction” industry (Pennsylvania Center for Workforce Information & Analysis 2017). Despite being a lead cause for unemployment compensation in Greene County, “Mining, Quarrying, and Oil & Gas” employs the largest number of residents, employing 24% of the workforce, compensating employees on average \$91,101 per year (Pennsylvania Center for Workforce Information & Analysis 2017).

Northwestern Region

Between 2000 and 2007, employment in the region as a whole had been fairly steady. Between 2007 and 2010, unemployment rose from 5% to 9.3% as the result of the national recession. Between 2010 and 2015, there was a slight decrease in unemployment rates throughout the region. As of March 2016, the 24-month average unemployment rate for the region was 5.63%, 0.135% higher than the national average.

County Profile: Venango County. From 2007 to about 2010, Venango had a consistent growth in unemployment rates, peaking out at 9.3%. Since 2010, Venango has seen a constant decrease in unemployment rates. From February 2016 to January 2017, 260 people received unemployment compensation from the “Manufacturing” industry, accounting for 40.5% of total county unemployment. In March 2016, Joy Global Manufacturing Plant, one of Venango's economic anchors announced its closing. It projected a 382-employee layoff due to hard financial times (Pennsylvania Center for Workforce Information & Analysis 2017).

In financial statement released in March 2016, Joy reported that the underground mining division's sales dropped 29% to \$274 million in the quarter ending January 29, 2016. The underground mining division lost \$38.5 million in the quarter, contributing to Joy's overall operating loss of \$45.1 million and its net loss of \$40.2 million, which translated into a 41 cents per share impact. Underground mining machinery orders dropped 31% in the quarter compared to a year ago (Gough 2016). Joy had continued to see an increase in job loss since the early 2000s. Since 2003, Joy

¹⁹ An unemployment compensation exhaustee is an individual that has used all available unemployment benefits prior to finding work.

²⁰ A copy of the Southwestern Pennsylvania Commission's 2035 Transportation and Development Plan for Southwestern Pennsylvania, adopted in June 2007, is available at http://spcregion.org/pdf/lrp/2035Plan_Cover.pdf



had about 700 job cuts. In the 1980s, Joy employed about 2,000 Venango residents (Jackson 2016). “Trade, Transportation, and Utility” unemployment also accounts for another 17% of Venango unemployment rate.

Although there are many unemployed residents in the “Manufacturing” sector, the sector itself still employs the highest percentage of residents, 21.2%, providing an average compensation of \$49,942. “Health Care and Social Assistance” is the industry that employs the second largest amount of Venango workforce, employing 21.1% (Pennsylvania Center for Workforce Information & Analysis 2017).

INFRASTRUCTURE

A 2014 report by the American Society of Civil Engineers rated the condition of Pennsylvania’s overall infrastructure at a C-, meaning these systems are in mediocre to poor condition (American Society of Civil Engineers 2014). The report stated that Pennsylvania has the country’s highest percentage of “structurally deficient” bridges, with one in four of the state’s 22,000 bridges being considered structurally deficient. However, Pennsylvania’s bridge stock scored a D+, whereas Pennsylvania’s wastewater and road infrastructure scored the lowest in the state, each with a D- grade meaning poor to deteriorating.

Northeastern Region

According to the Pennsylvania Department of Transportation (PennDOT), in 2014, there were 738 structurally deficient bridges that are either state- or locally-owned in the seven-county Northeastern Pennsylvania region. Based on this information, 45.0% of the bridges in the region that are at least 8 feet in length are closed, posted, or structurally deficient. These bridges need to be upgraded or replaced in order for goods to be transported, and for markets to remain open and functional.

Northeastern Pennsylvania’s major arterial highways, such as Interstates 80 and 81, continue to have improvements. The availability of broadband also continues to improve in the region.

Many outlying areas of the Northeastern Pennsylvania region have private well water and septic systems. Depending on how close an industrial site is from public water and wastewater systems, development could occur in some of these outlying areas. Another factor would be whether the industrial site is served by

adequate roads and/or railroads. The housing stock in the seven-county Northeastern Pennsylvania region is one of the oldest in the state.

Southern Alleghenies Region

A number of low-functioning infrastructure assets need to be updated in this region. Lack of public transportation (e.g. including highway system, international airports, Amtrak service, etc.) is an obstacle to entering the labor force, for some residents that do not own a personal vehicle.

Basic infrastructure must be in place to retain and expand development. Lack of public water and/or sewer systems in various parts of the region has restricted new residential and commercial development. Cell phone coverage is weak in portions of the region and this is also a deterrent to development, as individuals are more reluctant to invest in businesses or relocate companies to areas without coverage. A study commissioned by the state of Pennsylvania found that in the Southern Alleghenies Region, 50% of the businesses surveyed with Internet access had broadband service and another 40% had dial-up Internet service. Fourteen percent of residents did not have Internet access. Of those with access, only 30% had broadband access.

Southwestern Region

PennDOT owns and maintains over 120,000 linear miles of roadway, carrying vehicles more than 300,000,000 miles per day. In FY 2012, public transit providers in the region provided over 67 million rides on fixed-route buses and rail vehicles, moving people to jobs and other life activities. Other types of alternative mobility providers—county sponsored shared ride programs, human services transportation programs, the region’s volunteer ridesharing vanpools and carpools (CommuteInfo)—provided an estimated 4 to 6 million additional rides.

Southwestern Pennsylvania is served by all three major eastern railroad systems—Norfolk Southern Railway (NS), CSX Transportation (CSXT), and Canadian National Railway (CN). Short line and regional railroads connect with the Class I railroads, and they are one of the most important elements of the region’s transportation system. An estimated 200 miles of commercially navigable water along the Ohio, Monongahela, and Allegheny rivers provide a valuable inland navigation system for raw materials, as well as bulk and manufactured goods into and through the



region. With more than 200 river terminal operators in the region, the Port of Pittsburgh is one of the busiest inland ports, and one of the 20 busiest ports of any kind in the nation, according to Port of Pittsburgh Commission records.

Corporate flight operations, recreational flights, and student training occur at more than two dozen general aviation airports in the ten-county region. Most of these airports are publicly owned, and are operated by a local or county government or airport authority. A few airports are privately owned, but are open for use by the general public. There are also several private airports in the region at which use is limited to the airport owner and guests. Southwestern Pennsylvania has an extensive network of pedestrian and bicycle facilities, including sidewalks, crosswalks, rail trails, and designated on-road bike routes.

Northwestern Region

The region's highway network provides businesses, residents, and travelers with the ability to directly access six of the region's eight counties. Most significantly, these limited access interstates link the Northwestern Region to larger markets including: Boston, New York, Chicago, Pittsburgh and Charleston. In addition to highway travel, freight rail service links the Northwestern Region's businesses to other regional markets. The region is served by three Class 1 railroads: Canadian National Railway (through its subsidiary, the Bessemer and Lake Erie Railroad), CSX Transportation, and Norfolk Southern, and several class two railroads.

Air cargo shipments can be made by transporting products to major international airports in Pittsburgh and Cleveland. In addition to the existing transportation network, the region is working on other planning strategies in order to further strengthen and optimize transportation efforts for businesses and residents of the Northwestern Region. An important consideration for the region's infrastructure is the ongoing development of the shale gas industry, particularly in the Marcellus and Utica shale formations.

EDUCATIONAL ATTAINMENT LEVELS

Northeastern Region

In Northeastern Pennsylvania, the percentage of people (42.5%) who are age 18 to 24 and enrolled either in college or graduate school was lower than the nation

(43.1%) and the state (45.7%). In the percent of the population who were age 25 years and over and were at least a high school graduate group, the region (88.7%) had a percentage that was higher than the nation (86.3%) and lower than the state (88.9%). There were no counties in Northeastern Pennsylvania that had a percentage in population who were age 25 years and over with at least a Bachelor's Degree that exceeded the state (27.9%) and national (29.1%) percentages.

Southern Alleghenies Region

The region exceeds the state in residents with a high school-level education, especially those who actually earned a diploma (or the equivalent). However, it is quite clear that the state has a significantly higher proportion of their population aged 25 and older who has earned collegiate degrees—especially bachelor's and graduate or professional degrees—compared to this region. This suggests that the region will need to focus on developing initiatives that will provide additional opportunities for continuing education so that the labor force may enhance and diversify their skills, thus increasing the region's greater economic competitiveness.

In 2011, approximately 50% of the population 25 and older had received high school diplomas, compared to roughly 40% for the overall state of Pennsylvania. However, less than 15% of residents 25 and older went on to attain some college education, and only 10% earned bachelor's degrees. This compares to roughly 17% for the overall state. The lower level of educational attainment in the region places it at a distinct competitive disadvantage in attracting industries involved in research and development, as many of these jobs require advanced degrees.

Southwestern Region

Regionally, educational attainment is above the state average with 91.5% of residents having graduated from high school and 29.1% having completed a bachelor's degree or higher. Similar figures for Pennsylvania are 88.7% for high school graduates and 27.5% for graduates with bachelor's degrees. Today, the region has nearly three dozen colleges and universities within its borders, and as recently as 2011, an enrollment of about 172,000 students. The region's economy benefits from its wealth of colleges and universities, which also support employment growth in high-skilled and high-tech occupations.



Northwestern Region

According to the U.S. Census Bureau, 88.2% of the region's residents over 25 years of age are high school graduates or higher. Approximately 19.9% of all residents have college degrees. The Northwestern Pennsylvania region has a high school graduation rate and college graduation rate slightly lower than national and statewide averages.

SKILLED TECHNICAL LABOR

Northeastern Region

There is a shortage of skilled technical labor in the Northeastern Pennsylvania region. This shortage is being addressed by providing educational programs that train the local workforce in using the latest technology possible. Bachelor's degree programs in technology-related fields are being offered by four-year colleges and universities. As technology continues to evolve, there will be a continual need for this type of training.

Southern Alleghenies Region

The labor force skill levels have evolved as one of the major problems facing the region for increased economic development and economic diversity, particularly in attracting new companies. More skilled technical training is needed.

Southwestern Region

The Southwestern Pennsylvania region is home to four Workforce Investment Boards or WIBs, which serve as one-stop shops to provide workforce development assistance through employment, education, and training programs. CareerLink also provides job-seeking services and training to individuals, as well as employee-seeking services to employers. On-the-job training is also offered through the WIBs for designated "High-Growth Industry" jobs to assist with instructional costs, supplies, contracted services.

Northwestern Region

Recent job losses leave the region with the chance to increase the skilled labor-force through regional training and educational programs. Workforce development aims to build, attract, and retain a skilled workforce to meet the economic needs of Northwestern Pennsylvania in order to minimize skill shortages and maximize the region's ability to respond

to new opportunities. The region will work with industry, the community, government, and education to build a workforce which is productive, inclusive and efficient. The region aims to enable businesses and workers to compete in the worldwide, knowledge-based economy by becoming a trained and skilled labor force.

INDUSTRY DIVERSIFICATION

Northeastern Region

In Northeastern Pennsylvania, the fields of manufacturing, education, health care, transportation, and warehousing are exporting industries—meaning that people are coming to the region to obtain the goods and services that are provided by these industries. For education, people are coming to the state and region to obtain their education and then taking it to another location where it can be applied. The hospitality industry cluster, although not a targeted industry cluster for Pennsylvania, has significance for the Northeastern Pennsylvania economy because of the tourism activity in the region. This is especially true for recreational activities in the Pocono Mountains and the Scranton-Wilkes-Barre area—because of the Mohegan Sun and Pocono Downs Casino, Racetrack, and Hotel.

Southern Alleghenies Region

The economy of the Southern Alleghenies Region is now somewhat diversified, with no reliance on any one sector. The loss of manufacturing jobs and the concurrent growth of other sectors have made the regional economy more diversified than it was in 2001. However, nearly two-thirds of the jobs in the region are concentrated in five sectors (health care, retail trade, manufacturing, public administration, accommodation, and food services) and no other sector contains more than 6% of the employment. Sectors like information and professional and technical services—which are growing rapidly in many parts of the nation—represent very minor parts of the Southern Alleghenies regional economy. Economic development specialists still emphasize the need for a more diversified economy. However, when local officials discuss economic diversity, they often refer to converting the more traditional/manufacturing/goods producing job base to a more "high tech" base. This problem, while still existing, is slowly being addressed by local companies who are employing a variety of state-of-the-art technologies.



Southwestern Region

While manufacturing is an important sector, major growth has occurred in the services sector, including education and health care services. Financial services, education, government enterprise, retail trade, and transportation/warehousing are also important industries. Business ownership among minorities has been on the rise in recent years. Between 2002 and 2007, minority-owned businesses increased 46%, while nonminority-owned businesses grew 10% during that same period, according to Minority Business Development Agency. In 2016, key sectors in the region were identified by the Pittsburgh Regional Alliance as advanced manufacturing; energy; financial and business services; health care and life sciences; and information technology.

Northwestern Region

The various components of the services sector have the most business establishments and employ the most persons in Northwest Pennsylvania, health care and social assistance being the largest service employer group. Manufacturing, retail, and government are also significant employers in the region. Although manufacturing has been decreasing in the region, it is still a significant source of employment. Approximately 18% of the region's employment is in the manufacturing sector.



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