Advancing Budding Projects: A Guide and Toolkit for Estimating the Economic Benefits of Sustainable Development Ideas in Southwestern Pennsylvania

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Ideas that sustain.

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ABBREVIATIONS

ACEEE	American Council for an Energy-Efficient Economy
ACEnet	Appalachian Center for Economic Networks, Inc.
AML	abandoned mine land
BEA	U.S. Bureau of Economic Analysis
BLS	U.S. Bureau of Labor Statistics
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
kW	kilowatt
kWh	kilowatt-hour
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MW	megawatt
MWh	megawatt-hour
POWER	Partnerships for Opportunity and Workforce and Economic Revitalization
PV	photovoltaic
TCWAC+	Turtle Creek Watershed and Airshed Communities Plus
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

PREFACE

The idea for this project was born out of conversations held at the Indiana County Sustainable Economic Development Taskforce Summit in October 2019. There, lead author Joey James shared his experience serving as a technical assistance provider to the Reclaiming Appalachia Coalition in Kentucky, Ohio, Virginia, and West Virginia. One key takeaway from Mr. James' talk was that while working to develop mine land reuse projects across the region, one tool that communities have found particularly useful for moving nascent ideas towards project implementation is an economic impact assessment. An economic impact assessment communicates a project's benefits using widely understood standards or metrics, which can help raise money and other support for project implementation. Additionally, economic impact assessments can be used to refine the ultimate design of a project to maximize the benefits to the community. The problem, however, is that for most resource-strapped communities, an economic impact assessment can be too costly.

This document is designed to demystify the process of projecting economic impacts for ReImagine projects. As a capacity-building tool for community organizations, it is intended to empower groups and individuals to estimate economic impacts when projects are initially conceived, paving the way for them to become a driver of economic growth in their regions.

In Chapter 2, this document starts with a guide on the value and role of economic data for sustainability initiatives. Chapter 3 then provides a step-by-step toolkit for creating rational, realistic economic impact projections without using complex economic software or modeling systems.

Based on the shared interest areas of the four ReImagine groups, Chapters 4 through 9 provide more detailed instructions for estimating economic benefits for six areas of sustainable development:

- solar energy,
- green buildings,
- green chemistry,
- sustainable agriculture,
- trails and outdoor recreation, and
- land restoration.

These topical chapters provide more nuanced information, tips, and strategies for assessing economic impacts for specific types of projects and apply this information to case studies from the four ReImagine groups. They also provide concrete examples of projects implemented in other states.

Chapter 10 discusses emerging workforce development programs and models that will help build critical workforce capacity for undertaking sustainable development projects in the region. Chapter 11 discusses project funding opportunities. The report ends with key takeaways for advancing sustainable development projects in the region.

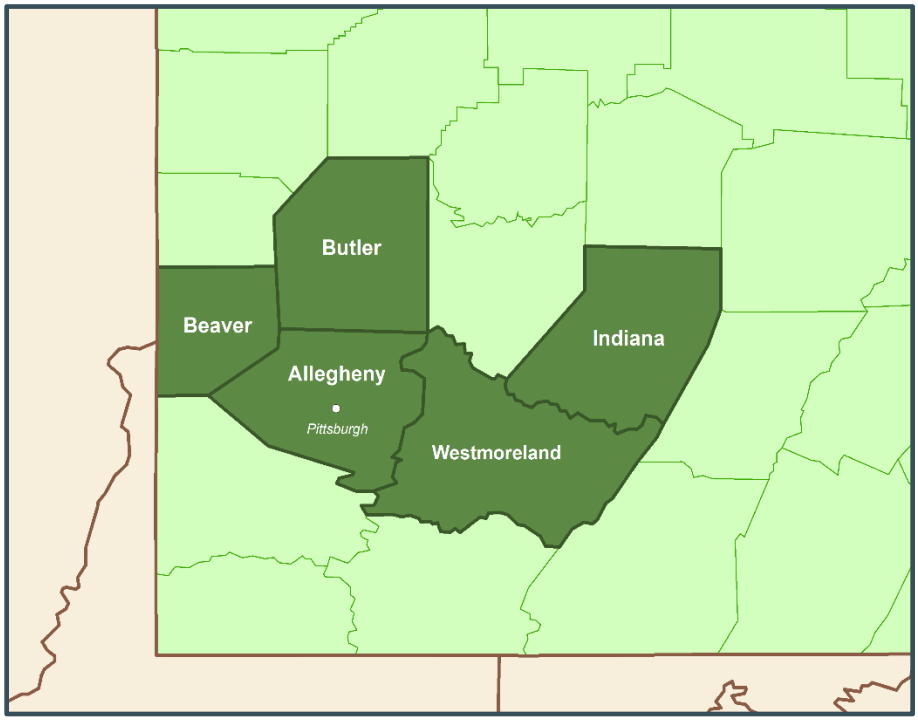
1. INTRODUCTION

Across Appalachia, the Rust Belt, and beyond, people are coming together to reimagine a future in which their communities shift away from fossil fuel–based economies in favor of more resilient, sustainable industries.

Four organizations in southwestern Pennsylvania—referred to collectively as the ReImagine groups—seek to leverage innovative, sustainable economic development for positive change in their communities:

- Indiana County Sustainable Economic Development Task Force,
- Re-Imagine Beaver County,
- Re-Imagine Butler County, and
- ReImagine Turtle Creek Watershed and Airshed Communities Plus (TCWAC+).

Figure 1: Southwestern Pennsylvania counties in which the ReImagine groups work



As these ReImagine groups develop their ideas into specific projects for implementation, they will need to be able to communicate the benefits of their projects—including environmental, social, economic, and other benefits—in order to leverage resources and support for implementation. Of these types of benefits, the economic impacts are often the most difficult to estimate and communicate.

As a co-founder of these ReImagine groups, the League of Women Voters of Pennsylvania Citizen Education Fund recognizes that a better understanding of economic impacts could greatly enhance local advocates' ability to develop and implement successful sustainability projects in the region.

To assist this effort, the League contracted Downstream Strategies to develop this guide and toolkit to outline steps that the ReImagine groups could take to estimate the economic returns of the projects that they envision.

ReImagine groups in southwestern Pennsylvania

ReImagine TCWAC+ is a community-led initiative to envision a sustainable economic development future for the southwestern Pennsylvania communities within the Turtle Creek Watershed and beyond. TCWAC+ supports five main working groups: Food and Agriculture, Land Use/Land Management, Reduction of Single-Use Plastics, Health and Wellness, and Renewable Buildings/Infrastructure. The group is based in Allegheny and Westmoreland counties.

Re-Imagine Beaver County, created in 2017, is a grassroots group guided by community visioning of climate-conscious economic development strategies. It is committed to working with local leadership to promote workforce development and job creation from innovative technologies that emphasize renewable energies and offer a balanced combination of economic, environmental, and social benefits to achieve a high quality of life and long-term prosperity for residents. Re-Imagine Beaver County envisions a greener local economy as a result of making diversified, equitable, and sustainable economic development investments. It pursues energy innovation, green chemistry and manufacturing, sustainable agriculture, and riverfront recreation and tourism as examples.

Re-Imagine Butler County is a citizens' group whose goal is to advance Butler County by providing public forums to stimulate community action to achieve a sustainable future for current and future generations. The main areas of interest include renewable energy (particularly solar energy), outdoor recreation and tourism, and sustainable agriculture.

The Indiana County Sustainable Economic Development Task Force is a citizen-based organization that was established in 2017 by the Indiana County Commissioners following a Sustainable Economy Summit. Its mission is to identify new opportunities in four main sectors: agriculture, renewable energy, building construction and materials, and environmental restoration and stewardship—with economic development, workforce development, and citizen education being key underlying principles within each sector.

The League of Women Voters of Pennsylvania

The League of Women Voters is a nationwide, nonpartisan grassroots organization of women and men who believe that through informed action, people can make profound changes in their communities.

Its dedicated members work every day to provide voter services, educate the public, and advocate for issues that matter.

Downstream Strategies

Downstream Strategies is an Appalachia-based environmental and economic development consulting firm. It is considered *the* go-to source for objective, data-based analyses, plans, and actions that strengthen economies, sustain healthy environments, and build resilient communities.

While Downstream Strategies takes on projects nationwide, it works most often in Appalachia, and its staff has in-depth knowledge and experience specific to communities negatively affected by the downturn of industries on which they historically depended.

2. A GUIDE TO UNDERSTANDING ECONOMIC IMPACT AND WHY IT IS IMPORTANT

2.1 The sustainable development equation

As communities in southwestern Pennsylvania and beyond envision a brighter future, many see sustainable development as a promising path forward. Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (International Institute for Sustainable Development, 2020)

One of the core principles behind sustainable development is the interconnection between healthy ecosystems, healthy people, and healthy economies. In fact, a growing concept in economics known as the triple bottom line maintains that a high quality of life results from balancing social, environmental, and economic needs, and that sustainability occurs where these three spheres overlap.

Figure 2: The components of sustainable development

For many, the inclusion of social and economic principles within the sustainability equation may come as a surprise. After all, isn't sustainability focused on the environment?

Maintaining a healthy environment is a guiding tenet of sustainability. However, as stewards of the planet, people must be able to meet their basic needs in order to preserve—and not deplete—the Earth's precious resources. This makes economies, which undergird viable and fulfilling livelihoods, critical for sustainable development.

In southwestern Pennsylvania, the connections between environment, economy, and society are extremely relevant. Even as industries that historically underpinned the regional economy have declined, many residents and stakeholders still link these industries with prosperity—even if they are polluting industries. Sustainable development advocates must be able to clearly link sustainability with economic development if they hope to gain community buy-in for new, innovative projects.

United Nations sustainable development goals

The United Nations recognizes 17 sustainable development goals that promote prosperity while protecting the planet (United Nations, 2020).

1. No poverty
2. Zero hunger
3. Good health and well-being
4. Quality education
5. Gender equality
6. Clean water and sanitation
7. Affordable and clean energy
8. Decent work and economic growth
9. Industry, innovation, and infrastructure
10. Reduced inequalities
11. Sustainable cities and communities
12. Responsible consumption and production
13. Climate action
14. Life below water
15. Life on land
16. Peace, justice, and strong institutions
17. Partnerships for the goals

2.2 Communicating economic impacts

Each of the four ReImagine groups seeks to develop projects that will promote sustainable development and an equitable economic system in southwestern Pennsylvania.

As with any project, launching these sustainability initiatives will hinge on building partnerships, securing support, and raising funds for implementation. To secure these critical forms of support, project leaders must be able to communicate a project's potential benefits and overall impact to different audiences. Based on the sustainability equation, economic, social, and environmental outcomes are all important aspects of sustainable development projects whose impacts can—and should—be communicated.

Economic impacts can be incredibly powerful, but they are often underutilized for sustainability initiatives for several reasons. First, economic impacts are typically measured in terms of dollars, jobs, and businesses. These metrics are easily recognizable and understood, and they hold sway with governments, businesses, and other key community stakeholders. In fact, many government agencies, departments, and private industries now require an economic impact assessment (often in the form of a cost-benefit analysis)[1] before they commit to funding or even supporting a new project.

Further, projects linked to significant economic benefits are generally more successful when applying for grants and other competitive sources of funding. When reviewing grant requests, funders often look for projects that offer the greatest return on their investments. As a result, a grant proposal that effectively communicates the project's environmental, social, and economic benefits will typically outshine its competitors.

[1] A cost-benefit analysis is a process used to analyze decisions by comparing the potential costs and benefits of a proposed project.

It is also important to note that understanding the economic benefits associated with certain project decisions can help design better, more impactful projects. During the planning process of a project, an economic impact analysis might identify a particular project task that is more impactful than another. The project's leaders might then decide to change the plan to increase the total benefits of the project. In this way, economic impact analyses are a great tool to help conceptualize and develop better projects.

In summary, developing and incorporating economic impact data into a project helps legitimize the project in the eyes of key stakeholders, increases the likelihood that a proposed project will be taken seriously by the greater community, and can even change the shape of the project to make it more impactful. When presented in concert with strong environmental, social, and other benefits, projected economic benefits can be an important tool for building support, raising funds, and securing partnerships for long-term success.

2.2.1 Communicating why you chose a site for a project

Often, part of communicating the economic impact of a project is justifying why a certain location was chosen for project activities. Sometimes, choosing the right location can result in more funding opportunities and can maximize or increase project impacts. Two areas that should be given special consideration in Pennsylvania are environmental justice areas and the Appalachian Regional Commission's distressed areas.

Environmental justice areas

In Pennsylvania, environmental justice areas are census tracts where 20 percent or more individuals live in poverty, and/or 30 percent or more of the population is minority. The concept of identifying these areas grew out of the recognition that landfills were, historically, disproportionately sited in or near Black communities. While the Pennsylvania Department of Environmental Protection recognizes these areas, there are no special regulations for development in these communities. (State Impact Pennsylvania, 2020)

The environmental justice area designation, however, can be helpful for identifying communities where sustainable economic development activities will have the most transformative impacts on the surrounding community. For example, a farmers' market may have a greater impact on a high-poverty area located within a food desert than in a middle-class suburban neighborhood with multiple grocery stores.

The environmental justice area designation should be used as a tool to identify areas where sustainable development projects can be most impactful.

Appalachian Regional Commission distressed areas

Similar to the environmental justice area designation, the Appalachian Regional Commission identifies census tracts that have substantially higher poverty or lower income levels than national averages. These areas are designated as "distressed" by the Commission and given priority for funding. (Appalachian Regional Commission, 2020) There are several distressed areas in southwestern Pennsylvania, and some overlap environmental justice areas.

2.3 Demystifying economic impact analysis

Economic data can seem intimidating and intangible to those outside of the field. Economic projections are often thought of as the territory of governments, agencies, and businesses that use

complex models. As a result, many community practitioners feel unprepared when it comes to estimating their project's economic impact.

This section presents a primer on economic impact assessments. Let's start by defining some basic terms.

Economic impacts are observed changes to the economy that result from a project's activities. Economic impacts are just one type of impact that can result from sustainability projects—along with environmental, social, and other impacts. Economic impacts, like other impacts, can be positive or negative.

What do economic impacts look like? Viewed in the context of sustainability projects, economic impacts often capture metrics such as changes in employment, income, business activity, and revenue (from sales and taxes).

A **metric** is a system or standard of measurement. In economic assessment, metrics are used to quantify potential changes in economic activity. Figure 3 lists metrics commonly used for different types of sustainability projects.

Figure 3: Common economic impact metrics for sustainability projects

Solar energy	Sustainable agriculture	Trails and outdoor recreation
• Industry jobs created and supported • Value of energy produced • Energy cost savings	• Farm sales revenue • Price per crop • Number of customers • Crop production volume • Farmer incomes • Per-acre value of farmland	• Number of visitors • Annual visitor spending • Businesses created and supported (restaurants, gear shops, stores, other businesses) • Jobs created and supported
Green chemistry	**Sustainable buildings**	**Land restoration**
• Industry jobs created and supported • Sales revenue	• Industry jobs created and supported • Energy cost savings • Total life cycle cost • Savings-to-investment ratio	• Contractor jobs created and supported • Value of land returned to productive use • Downstream economic improvement or development

Common metrics in grants

Some grant funders require grantees to report on specific outcome metrics. For economic development projects, common metrics include

- businesses created and/or retained,
- costs reduced,
- jobs created and/or retained,
- leveraged private investment, and
- revenues increased (both export and non-export sales).

Economic impacts generally fall under three general categories.

- **Direct impacts** include the income and employment generated by the project itself. For example, a rail-trail project directly supports jobs for trained contractors.
- **Indirect impacts** include the income and employment in other industries that relate to the project. For example, a rail-trail project indirectly supports jobs and spending in the paving industry, as gravel and asphalt are key materials used for the trail.
- **Induced impacts** include a project's impacts that circulate through other seemingly unrelated industries within the economy. For example, as a rail-trail project directly and indirectly supports local jobs, those workers will in turn spend more in the local economy at restaurants, stores, and other businesses. This secondary spending represents induced impacts from the rail-trail project.

An **economic impact assessment** (also sometimes called **economic impact analysis** or **economic benefits analysis**) quantifies the economic impact of a project. Economic impact assessments can be performed for projects of any scale. For large-scale assessments focused on entire industries, researchers and economists have developed advanced computer modeling systems to calculate direct, indirect, and induced impacts in order to capture an industry's total economic benefits. IMPLAN[2] and RIMS,[3] known as **input-output models**, are the best-known and most widely used models. Costs for these models can range from hundreds to thousands of dollars, and they generally require advanced knowledge and training to use.

While input-output models are powerful tools, no single model is perfect for a given scenario. Further, these models impose knowledge and cost barriers on users. Input-output modeling is generally not cost-effective, practical, or even necessary for early-stage projects like those being proposed by the four ReImagine groups.

Instead, direct and indirect economic impacts[4] can be projected in a much simpler fashion for some types of projects, as described in the next section. At the initial stages when a project is being conceptualized, simpler back-of-the-envelope estimates of economic benefits are still helpful for advancing the project. After the project concept has been refined and more details about the project and its budget are known, a more formal analysis could be performed to refine the results.

[2] Impact Analysis for Planning
[3] Regional Input-Output Modeling System
[4] Induced impacts are very difficult to quantify without input-output modeling.

2.4 The logic of economic impact analysis

The key to performing simplified economic assessments for community-scale projects is to understand how a project's activities translate into direct and, to a lesser degree, indirect impacts.

One way to do this is by using a simple three-tiered **logic model**, a visual flow diagram that illustrates how a project's activities translate into outcomes and overall impact.[5]

While logic models can be adapted for many different purposes, they are often used for mapping out desired short- and long-term impacts to address community needs. As such, they can be useful tools at the outset of developing a project concept. Appendix A includes a logic model worksheet that can be used to help translate project activities to outcomes.

As illustrated in Figure 4, logic models offer a straightforward, linear process for visualizing economic impacts.

Getting to know input-output models

Input-output models are used to estimate the impacts of projects or events on an economy and to analyze the resulting ripple effects through interdependent economic sectors within a defined geography.

IMPLAN, often considered the industry standard input-output model, was first conceptualized in 1976 to help the U.S. Forest Service better understand the impact of forest management decisions on local communities and the nation. IMPLAN evolved to be managed by an independent corporation and, in 1991, began providing databases and software for commercial use. The most recent iteration of the IMPLAN model was introduced in 2018 and is entirely web-based. IMPLAN costs vary depending on the scope of study: county, state, or national. County-level software costs $150 per county. State-level software averages about $1,500 per state.

RIMS II, dating from the 1980s, is developed and maintained by the U.S. Bureau of Economic Analysis (BEA). RIMS multipliers estimate the impact from changes in final demand on one or more regional industries in terms of output, employment, and labor earnings. RIMS is often viewed as a cheaper and less complicated alternative to IMPLAN; however, it offers fewer bells and whistles yet still requires a certain level of training to be utilized appropriately. Access to RIMS II data costs $275 per user-defined region or $75 per industry.

[5] To learn more about logic models, visit the University of Minnesota's Model for Planning for Program Evaluation: "What is a Logic Model" (https://cyfar.org/what-logic-model).

Using logic models to support grant applications

Some funders require grant applicants to submit logic models when applying for funding. Thoughtful logic models show funders that the applicant has a thorough, realistic plan for implementing project activities that are linked to desirable outcomes.

Figure 4: Basic logic model

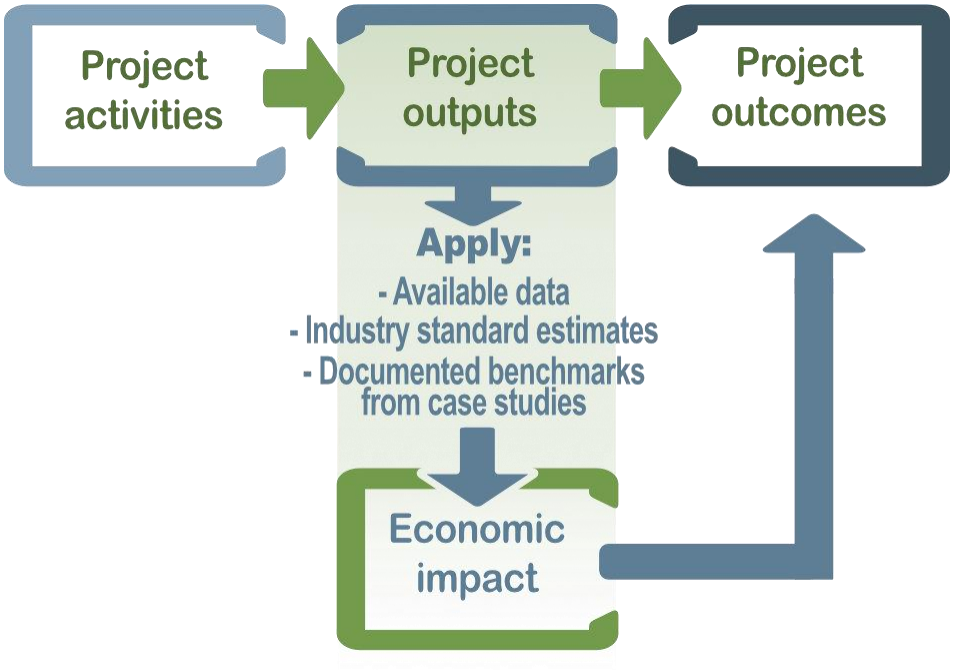
1. **Project activities** are the concrete actions that will be undertaken in a given project. These activities form the basis for economic impact projections. *Ex. Create a farmers' market. Build 15 miles of new trail.*
2. **Project outputs** are the short-term results and immediate impacts that come about as a project's activities are implemented. A sustainability project may have several different kinds of outputs based on the project activities; however, economic impact assessments are tied to outputs with direct connections with economic impacts. *Ex. A new trail will attract 1,000 visitors per year, who spend an average of $110 per day. Building energy efficiency improvements will offset 250 tons of carbon emissions per year. A solar installation will support 30 solar jobs.*
3. **Project outcomes** are the longer-term results from project activities. If project activities are the cause and project outputs are effects, project outcomes can be thought of as the overall systemic changes that will come about as the project outputs are sustained over time. *Ex. Diversify the local economy. Reduce fossil fuel dependence. Increase community resilience.*

Economic impact assessments build upon project outputs and the activities that inform them. Once specific, quantifiable outputs for a project are identified, they can be translated into estimated economic impacts by multiplying outputs by available economic metrics. These metrics vary based on the type of project and the specific output, and they come from:

- available data from current research,
- industry standard estimates, and
- benchmarks from recent case studies.

This produces basic economic impact estimates, which can be woven into a narrative to describe a project's cumulative economic impact. In turn, a project's economic impact influences its ultimate long-term outcomes (See Figure 5).

Figure 5: Basic economic impact assessment



3. PUTTING IT ALL TOGETHER: SIMPLE STEPS FOR STRAIGHTFORWARD ECONOMIC IMPACT ASSESSMENT

The following steps are designed to walk you through a straightforward economic impact assessment process using the linear logic model framework as a guide.

3.1 Make a list of the activities of your project

If developing a project concept from scratch, start by thinking about what you want your project to do or accomplish, and what steps will be necessary to reach those goals. Figure 6 presents examples of common project activities across the six Re-Imagine focus areas.

Figure 6: Example project activities

Solar energy	Sustainable agriculture
• Install solar on existing buildings. • Create a utility-scale solar farm on underutilized land.	• Start or support farmers' markets. • Conduct education and outreach to local farmers and consumers. • Establish or enhance local food hubs and aggregation systems.
Green chemistry	**Trails and outdoor recreation**
• Manufacture new or existing products. • Develop a supportive infrastructure. • Establish a resilient supply chain.	• Build or improve trails and trailside amenities. • Enhance tourism infrastructure.
Sustainable buildings	**Land restoration**
• Utilize sustainable building materials in new buildings. • Weather and retrofit existing buildings with efficient/sustainable materials.	• Restore degraded streams and land. • Remediate brownfield properties.

Try to be as specific as possible when developing your project activities. In particular, try to quantify the scale of your activities whenever possible. For example:

- Remediate a 5,000–square foot abandoned industrial facility and repurpose it as a hemp processing plant.
- Install one megawatt (MW) of solar on a five-acre parcel.
- Build 15 miles of trail for hikers and cyclists.
- Restore a 1,000-foot stretch of stream and plant 2,000 native plant seedlings along the banks.
- Develop a 2,000–square foot hydroponic growing facility.
- Retrofit 50 buildings with energy-efficient, occupant-sensitive LED lights.

Because these project activities form the foundation of your economic impact assessment, quantifying these activities (to the best of your ability) early on will greatly enhance the economic projections you can make in the next steps.

For groups with established projects, enumerating what your project has done can be a relatively simple task. For grassroots groups just getting started, it's best to set specific targets (even if the targets are a range) for the project activities you hope to accomplish.

3.2 Link project activities to specific outputs

Once you've developed your project activities, think about the obvious environmental, social, and other benefits (project outputs) that go along with those project activities. For example, say your project is to build a 10-mile trail through your community. Initial brainstorming might yield benefits like the following:

- **Health and wellness:** Residents can exercise and recreate on the trail.
- **Quality of life:** Trails contribute to making the community a more attractive place to live.
- **Environmental stewardship:** Well-used trails can foster a community's sense of place and appreciation for the natural world.
- **Environmental benefit:** When designed with connectivity in mind, trails can make it easier for people to commute by foot or bicycle, which could reduce their reliance on cars for daily transportation needs.
- **Tourism:** Trails can attract visitors from outside the area to recreate in the community.

Building upon this initial list, the next step is to flesh out these expected project outputs, quantifying them whenever possible. Some more tangible outputs will be easier to quantify than others. Still, go through the exercise of teasing out additional details for each output to fully paint the picture of what the project activities would ideally produce.

Using our same trail example, the following questions could help further develop the project outputs for each identified benefit:

- **Health and wellness:** How many residents might use the trail on a daily, weekly, monthly, or yearly basis? What kinds of activities would people undertake on the trails (hiking, cycling, walking, jogging, etc.)?
- **Quality of life:** How might trails make your community a better place to live? What local assets (homes, businesses, parks, other amenities, etc.) would be located along the trail? Would the trail increase these assets' property values or make them more desirable and/or successful?
- **Environmental stewardship:** Would the trails be accessible to school children and other youth groups? What kind of environmental education and/or enrichment opportunities might be available in connection with the proposed trail? If so, how many people might interact with such programming?
- **Environmental benefit:** Would the trail connect existing assets within the community? How many people would be able to access the trails directly, without using a car?
- **Tourism:** How many non-local visitors might use the trail on a daily, weekly, monthly, or yearly basis? What existing businesses in your community would benefit from increased visitors? What new businesses might form as a result of increased tourism?

As with project activities, the more quantifiable the project outputs, the easier it will be to estimate the economic impact.

Projecting outputs ultimately boils down to making the best educated guess possible as to the benefits your project activities will produce. If you're more comfortable estimating a range for certain outputs, this is fine; the economic benefits analysis will then provide a range of benefits.

One of the best ways to inform this process is to study examples of similar projects already undertaken in other places. Learning what other groups have successfully accomplished is a powerful way to shape your own horizons of what is possible. The verifiable outputs from successful projects, such as those featured later in this toolkit, can be used as benchmarks for estimating project outputs and economic impact.

Always include justifications and cite your sources

Economic impact assessments are often based on many estimates (or informed guesses) of what a project will accomplish. As a result, the validity of your assessment hinges on how logical and realistic your "best guesses" for project output are. *As a result, always include justifications that explain how you came to your conclusions.* This means citing any data or case studies you used to develop your assessment.

Returning to our trail scenario, after reviewing relevant case studies, researching outcomes from comparable trail projects, and making informed "best guesses," the following represent examples of refined outputs that would be ready for an economic impact assessment.

- **Health and wellness:** The trail would be available and accessible to all of the 5,000 residents in your community.
- **Quality of life:** The trail would benefit the neighborhood it passes through. As shown by many case studies around the county, it would likely increase property values for the 50 homes located adjacent to the trail route. It would also likely double the number of visitors to the city park located at the trail's terminus, based on estimates from the local parks department.
- **Environmental stewardship:** This trail would be utilized by local schools, clubs, and organizations to provide youth enrichment activities for the 1,200 children in our community under the age of 18.
- **Environmental benefit:** Based on the performance of a similar trail in a neighboring county, this trail would ideally reduce the number of vehicle trips made in the community by 5 percent.
- **Tourism:** Based on visitor counts at the similar Great Example Trail, we believe that our Project Trail could attract up to 10,000 non-local visitors per year.

3.3 Translate project outputs into economic impact

With project outputs in hand, the next step is to link as many outputs as possible to economic metrics. The result yields basic economic impacts for the project.

Some outputs lend themselves to economic quantification—particularly those that directly relate to jobs, businesses, revenue, and spending. On the other hand, other outputs can be very challenging to translate into economic terms, and that is perfectly okay. Remember, economic impacts are just one piece of a sustainability project's story and always need to be viewed in conjunction with the project's environmental, social, and other benefits.

Also, as your project moves forward from its initial conceptualization, you will learn more details about the project and may also secure some initial funding for more detailed planning. This may allow you to quantify even more outputs and economic impacts.

Many sustainability project outputs can be readily linked to relevant economic metrics. These metrics vary by industry and reflect standard, generally accepted estimates that are backed by ample research and current data.

As you'll see, some sectors have industry standards such as the number of jobs created per unit of investment. For example, 20 jobs are generated per $1 million investment in building energy efficiency improvements (ACEEE, 2020).

In other cases, economic metrics are derived from significant research and verifiable results from case studies. For example, a 2015 survey of mountain bikers across North America found that the average mountain bike tourist in North America spends $382 per trip (Barber, 2015).

These industry standards are essential tools for conducting informal economic impact assessments. In simple terms, multiplying these standard economic metrics by the relevant project outputs yield economic impacts for a project.

The next six chapters look in-depth at specific economic metrics relevant for six different categories of sustainability projects. They also highlight specific strategies and tips for calculating common types of economic impacts.

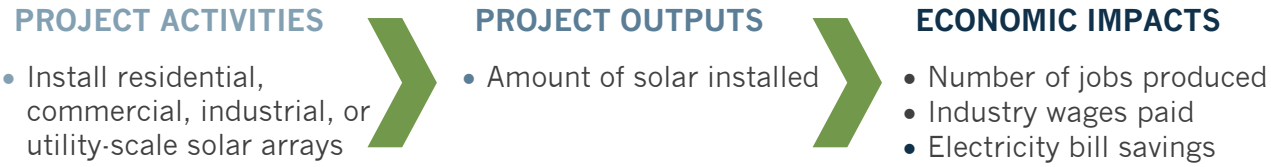
4. SOLAR ENERGY

The industrial history of southwestern Pennsylvania is intertwined with energy production. The same towns that enjoyed financial success at the height of steel production have endured economic hardship as demand for conventional energy sources declined.

However, southwestern Pennsylvania and the rest of Appalachia could be on the verge of a potential economic boom. Global investment in renewable energy is at an all-time high. Despite low wholesale electricity rates, uncertainty about policies and incentives, and low natural gas prices, growth in the U.S. renewable energy sector continues to consistently outpace projections.

Over the past decade, nearly $400 billion has been invested into renewable energy in the United States alone (Frankfurt School-UNEP Centre/BloombergNEF, 2020). Solar photovoltaic (PV) energy has had record-breaking growth year over year. The proportion of clean energy in the global energy blend has steadily increased in the past decade, from 5.9 percent in 2009 to 13.4 percent in 2019; in the United States, approximately 11 percent of total energy comes from renewable sources.

Figure 7: Solar energy activities, outputs, and impacts



Renewable energy is a powerful driver of economic growth because it generates an array and abundance of new jobs. For example, “solar PV installer” is projected to be one of the fastest-growing occupations through 2029, far outpacing even many healthcare occupations (BLS, 2020). As more locales and businesses set aggressive renewable energy goals, the demand for solar electricity will only increase.

The economic impacts of solar energy projects are most commonly discussed in terms of job creation and energy savings potential. Well-researched standard estimates and other resources are available to estimate these impacts.

4.1 Job creation

The Solar Foundation has conducted the National Solar Jobs Census every year for the past decade. Utilizing the data collected in the census, the Solar Foundation produces job creation estimates for utility, commercial, industrial, and residential solar applications. These estimates include manufacturing, project development, wholesale trade and distribution, installation, operation and maintenance, and other jobs related to the solar project.

The estimates, shown in Table 1, can be used to calculate the job creation potential of solar installations of all sizes: Simply multiply the size of the project by the Foundation’s metric to estimate the jobs created by a solar project. Project sizes for large projects are typically measured in MW, while project sizes for small projects are typically measured in kilowatts (kW). There are 1,000 kW in one MW.

Table 1: Jobs created per megawatt of installed capacity and installation type

Utility	Commercial and industrial	Residential
3.3	21.9	38.7

Note: Utility-scale installations are typically greater than two MW. Commercial- and industrial-scale installations typically range between 25 kW and two MW. Residential installations are typically less than 25 kW.

The Solar Foundation

The Solar Foundation is a nonprofit organization whose mission is to accelerate adoption of solar energy in the United States. Through its leadership, research, and capacity building, it creates transformative solutions to achieve a prosperous future in which solar and solar compatible technologies are integrated into all aspects of our lives. In 2010, The Solar Foundation conducted its inaugural National Solar Jobs Census, establishing the first comprehensive solar jobs baseline and verifying that the solar industry is having a positive impact on the U.S. economy. Using the same rigorous, peer-reviewed methodology, it has conducted an annual census in each of the past 10 years to analyze trends and track changes over time. (The Solar Foundation, 2020)

4.2 Wages

Solar projects create jobs in many different occupations (Hamilton, 2011). As illustrated in Table 2, median annual wages for these occupations average $71,989 in the greater Pittsburgh area. This number can be multiplied by the number of jobs created to estimate the wages associated with a proposed solar project. It should be noted, however, that while the solar economy supports they types of jobs shown in Table 2, it supports more jobs in some industries. For example, few scientific research jobs are supported by the solar industry compared to the number of jobs supported in installation and maintenance. That said, the average wages presented in this table provide a defensible, though generous, metric for estimating the labor wage potential of a solar project.

Table 2: Median annual wages of solar-related occupations

Occupation	National	Pittsburgh region
Scientific research	$105,220	$100,063
Engineering and manufacturing	$74,097	$70,082
Power plant development	$79,053	$70,680
System construction	$66,610	$64,503
Plant operations	$65,988	$66,244
Installation and maintenance	$55,330	$60,363
Average	$74,383	$71,989

Source: BLS (2020).

4.3 Electricity bill savings

Residential, commercial, and industrial solar arrays result in electricity bill savings.[6] To calculate these savings, you'll first need to know how much you're paying per kilowatt-hour (kWh) for electricity. This can be found on your electricity bill; however, for situations where an electricity bill is not readily available, a good source of state-specific energy cost assumptions is the U.S. Energy Information Administration (EIA), which collects, analyzes, and disseminates energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. Table 3 summarizes the average retail cost of electricity in Pennsylvania for residential, commercial, and industrial customers.

Table 3: Average retail electricity rates in Pennsylvania, May 2020 (cents/kWh)

Customer type	Average cost
Residential	13.99
Commercial	8.84
Industrial	6.15

Source: EIA (2020).

Next, you'll need to know how much electricity will be saved. PVWatts can be used to calculate the electricity generated by a solar array. For different types of buildings, Table 4 summarizes the average electricity consumption per square foot. These estimates come from EIA's Commercial Buildings Energy Consumption Survey, which provides statistical information on energy-related characteristics, consumption, and expenditures for the nation's nearly 6 million commercial buildings totaling 87 billion square feet of floor space.

Table 4: Average electricity consumption by building activity (kWh/square foot)

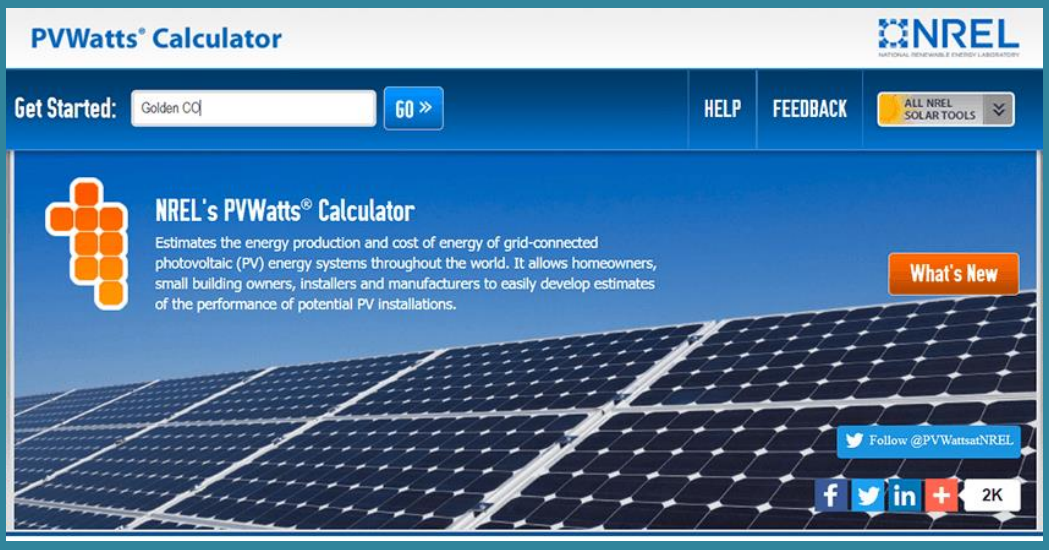
Principal building activity	Electricity consumption
Education	11.0
Grocery and convenience	48.7
Food service	44.9
Health care	25.8
Lodging	15.3
Mercantile	18.3
Office	15.9
Public assembly	14.5
Public order and safety	14.9
Religious worship	5.2
Service	8.3
Warehouse and storage	6.6
Average	19.1

Source: EIA (2016).

[6] For simplicity, we assume that the solar array is sized so that all electricity generated is consumed onsite; therefore, each kWh generated by solar reduces electricity bills by the retail cost of electricity.

Using PVWatts to calculate yearly energy production

The easiest way to size a solar PV system, based on knowledge or estimates you may have on electricity consumption, is to utilize the free PVWatts web-based tool.



PVWatts allows users to model potential solar installations in specific geographic locations, utilizing standard or user-defined system specifications. Simply enter a system size and then adjust until you've found a size that would offset the electricity consumption.

4.4 Example calculations

4.4.1 Example: Commercial solar array

An economic development project in your county will install 750 kW of solar on commercial businesses. This solar array will generate approximately 920,000 kWh of electricity per year.

Step 1. Estimate the number of jobs this project will support.

- *0.75 MW x 21.9 jobs per MW = 16.4 jobs*

Step 2. Estimate the wages paid to these workers.

- *16.4 jobs x $71,989 wage (regional average) = $1.2 million in wages*

Step 3. Estimate the electricity bill savings.

- *920,000 kWh per year x 8.84 cents per kWh (average commercial retail rate) = $81,000 per year*

A sample economic impact narrative for this project might read as follows:

> *The proposed commercial solar arrays will offset electricity that is currently purchased. It is sized at 750 kW to produce approximately 920,000 kWh of electricity per year, which corresponds to 75% of the businesses' electricity demand. Installing the solar array will create approximately 16 jobs and $1.2 million in wages. In addition, it will save the businesses approximately $81,000 per year in reduced electricity bills.*

4.4.2 Example: Utility-scale solar array

An economic development project in your county will install a 25-MW utility-scale solar array.

Step 1. Estimate the number of jobs this project will support.

- *25 MW x 3.3 jobs per MW = 82.5 jobs*

Step 2. Estimate the wages paid to these workers.

- *82.5 jobs x $71,989 wage (regional average) = $5.9 million in wages*

A sample economic impact narrative for this project might read as follows:

> *The proposed utility-scale solar array is sized at 25 MW. This project will create approximately 83 jobs and $5.9 million in wages.*

4.5 Case studies

4.5.1 Sustainable innovation hub

Indiana County Sustainable Economic Development Task Force envisions creating a sustainable innovation hub as a center for promoting entrepreneurship and sustainability in Indiana County. While the sustainable innovation hub property will feature a demonstration solar project, which will offset the energy needs of the new building and produce some positive economic impacts, the most significant impact it will have on the local economy will be through its programing. If it sets modest solar development goals, similar to those of other regional sustainable development vehicles, it could reasonably inspire or encourage the development of 5 MW of residential solar, 10 MW of commercial or industrial solar, and 100 MW of utility-scale solar within a short period of time. Then, its programming would have a hand in creating 742.5 jobs with wages of $53.5 million.

- *38.7 jobs (for residential solar) x 5 MW = 193.5 jobs*
- *21.9 jobs (for commercial and industrial solar) x 10 MW = 219 jobs*
- *3.3 jobs (for utility solar) x 100 MW = 330 jobs*
- *742. 5 jobs x $71,989 wage (regional average) = $53.5 million in wages*

4.5.2 Green business park

Re-Imagine Beaver County envisions transforming one of the county's riverfront brownfields sites into a cutting-edge "green" business park built with sustainable building materials and fueled by renewable energy. Based on national averages, a 50,000–square foot eco-industrial park would likely consume 955,000 kWh of electricity per year. To fuel the building entirely with solar, Beaver County could install 800 kW of solar onsite. This would save approximately $59,000 in electricity costs per year and would support 17.5 jobs with $1.3 million in wages.

- *19.1 kWh per square foot (average electricity consumption for commercial buildings) x 50,000 square feet = 955,000 kWh or 955 megawatt-hours (MWh)*

- *Utilizing PVWatts, we estimate it would take 800 kW of solar to displace 955 MWh of electricity consumption in Beaver County.*
- *6.15 cents per kWh (for industrial) x 955,000 kWh = $58,733 per year electricity cost savings*
- *21.9 jobs (for commercial and industrial) x 0.80 MW = 17.5 jobs*
- *17.5 jobs x $71,989 wage (regional average) = $1.3 million in wages*

4.5.3 Solar development on brownfields and degraded sites

Re-Imagine Butler County: In assessing over 1,200 brownfields and degraded sites in Butler County, the federal RE-Powering America's Land Initiative[7] identified 139 sites as viable for large-scale solar development, with a combined estimated capacity of 1,442 MW. Re-Imagine Butler could work with landowners and developers to develop a sizable portion of the viable land. If just 25 percent of viable degraded land in Butler County were redeveloped for large-scale solar, the County could host 360 MW of solar, which would result in 1,188 jobs with $85.5 million in wages. Based on research from across the region, this solar capacity could likely be sufficient to entice upstream manufacturing investment (Blumer, 2017).

- *3.3 jobs (for utility-scale) x 360 MW = 1,188 jobs*
- *1,188 jobs x $71,989 wage (regional average) = $85.5 million in potential wages*

4.5.4 Monroeville Eco-Mall

ReImagine TCWAC+ envisions transforming the 1.2 million–square foot Monroeville Mall into a one-stop shop for community sustainability initiatives. At least initially, this transformation would be focused on the estimated 120,000 square feet of vacant space at the mall. When in use, this space consumes an estimated 2,196 MWh of electricity each year, which costs approximately $194,000 per year. ReImagine TCWAC+ seeks to integrate solar across the property to displace carbon intensive electricity purchases and attract socially- and environmentally conscious businesses. It is estimated that 1.8 MW of solar would displace all electricity purchases in this 120,000–square foot space. This project would support approximately 39 jobs with wages of $2.8 million.

- *18.3 kWh per square foot (average electricity consumption for mercantile buildings) x 120,000 square feet = 2,196,000 kWh consumed by mall*
- *2,196,000 kWh consumed x 8.84 cents/kWh = $194,126 per year electricity cost savings*
- *Utilizing PVWatts, we estimate it would take 1.8 MW to displace 2,196 MWh of electricity consumption at this location.*
- *21.9 jobs (for commercial and industrial) x 1.8 MW = 39.4 jobs*
- *39.4 jobs x $71,989 (regional average solar salary) = $2.8 million*

[7] RE-Powering America's Land Initiative was established by EPA's Office of Solid Waste and Emergency Response and Center for Program Analysis and the U.S. Department of Energy National Renewable Energy Laboratory. The goal of the program is to provide tools and resources to assist private developers and communities seeking to site renewable energy projects on potentially contaminated lands, landfills, and formerly mined lands.

The Solar Workgroup of Southwest Virginia

The Solar Workgroup of Southwest Virginia is a group of nonprofit and community action agencies, colleges, state agencies, planning district commissions, and other interested citizens and businesses seeking to develop a renewable energy industry cluster in the seven coalfield counties of Southwest Virginia, an area of high-poverty and joblessness.

Soon after its founding, the Solar Workgroup of Southwest Virginia spearheaded a project that identified sites for commercial- and utility-scale solar development to supply energy to industrial centers. To help attract investment to these projects, it worked with Downstream Strategies and West Virginia University to complete an economic impact assessment of several solar development scenarios. The study showed that solar development supported by the Workgroup could support approximately 212 jobs over a 10-year period.

To date, the Solar Workgroup has used that study to attract millions of dollars in public and private investment in a solar energy industry cluster in Southwest Virginia. Notably, this has included the first deployment of large-scale solar on a former mine site in the state and possibly the region. (Solar Workgroup of Southwest Virginia, 2020)

4.6 Key resources

Frankfurt School-UNEP Centre/BloombergNEF. 2020. Global Trends in Renewable Energy Investment 2020. https://www.fs-unep-centre.org/wp-content/uploads/2020/06/GTR_2020.pdf

National Renewable Energy Laboratory. 2020. NREL's PVWatts Calculator. https://pvwatts.nrel.gov/

Solar Workgroup of Southwest Virginia. 2020. Solar Workgroup Background. https://swvasolar.org

The Solar Foundation. 2020. www.thesolarfoundation.org

U.S. Bureau of Labor Statistics (BLS). 2019a. Fastest Growing Occupations. https://www.bls.gov/ooh/fastest-growing.htm

U.S. Bureau of Labor Statistics (BLS). 2020. Careers in Solar Power. https://www.bls.gov/green/solar_power/

5. GREEN BUILDINGS

Green buildings are those designed with systems and materials that minimize environmental impact and maximize efficiency and comfort by reducing energy and water consumption, improving indoor air quality, and sourcing recyclable or renewable materials from local companies that follow environmentally friendly practices.

An efficiency opportunity

Buildings use approximately 40 percent of the nation's energy, 70 percent of its electricity, and 13 percent of its water through public and domestic supply, so there are ample opportunities to reduce these figures for both environmental and economic benefit (EIA, 2020; Livingston et al., 2014; Dieter et al. 2018).

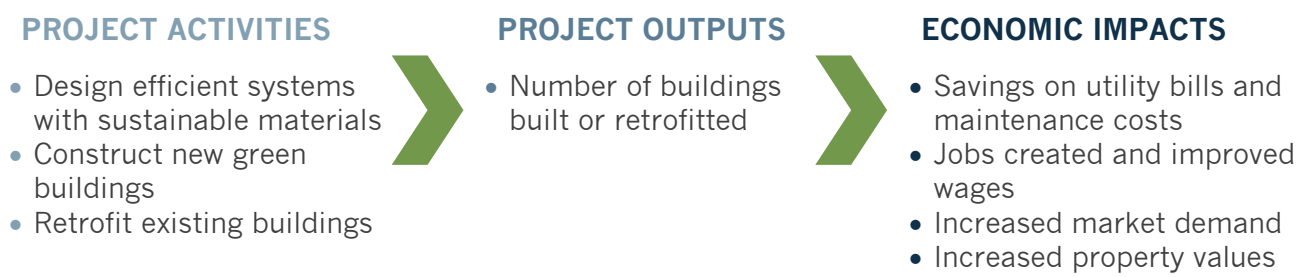
Sustainable building design and construction offer economic benefits to individuals and businesses through job creation and direct cost savings. By lowering utility bills, maintenance fees, and other operating expenses, money is freed up for other uses. Additional benefits include reduced costs from avoided air pollution, lower infrastructure costs, reduced construction waste, more recycled resources, efficient resource allocation, and improved worker productivity. (Liming, 2012)

An investment opportunity

The market demand for building efficiency represents a "$279 billion investment opportunity, returning $1 trillion in energy savings and creating a cumulative 3.3 million jobs over 10 years" (Institute for Market Transformation, 2015, p. 16).

The growing market for sustainable buildings also creates a demand for a variety of skilled occupations, including construction workers, architects, planners, engineers, auditors, researchers, manufacturers, and designers. So far, green construction is estimated to have created millions of jobs, generated $200 billion in labor earnings, and contributed over $300 billion in gross domestic product growth in the United States alone (Booz Allen Hamilton, 2015). In fact, growth in green construction currently outpaces the growth of general construction, which itself boasts a notable 10 percent projected growth rate through 2028 (BLS, 2020). In fact, the growth rates of most jobs related to construction and sustainable buildings are designated by the U.S. Bureau of Labor Statistics (BLS) as "faster than average" or "much faster than average."

Figure 8: Green buildings activities, outputs, and impacts



Economic impacts of projects in sustainable buildings are typically measured in jobs created, labor earnings, industries supported, and the long-term savings gained from investing in sustainable materials. The upfront cost of constructing or retrofitting a green building has long been shrinking thanks to better technology, strong competition, and cheaper materials, but metrics to consider include those that compare the lifetime savings accrued by green versus traditional buildings against the upfront cost to construct or renovate (Liming, 2012).

In addition to cost savings, most building professionals find that green technologies increase a property's asset value by more than 10 percent, and the proportion of owners experiencing that value increase in 2018 (30 percent) was nearly double of that from 2012 (16 percent) (Dodge Data and Analytics, 2018) Certification programs like Leadership in Energy and Environmental Design (LEED) and the U.S. Environmental Protection Agency's (EPA's) WaterSense and ENERGY STAR not only designate a property as higher-value, but also help incentivize and create demand for green buildings.

LEED certification reduces energy use and lowers costs

LEED-certified new construction typically results in 25 percent reduced energy use and 20 percent lower maintenance costs, and retrofits typically result in a 10 percent operating cost decrease in just one year (Fowler et al., 2011). A typical 20,000–square foot commercial building will cost approximately $42,000 in utilities each year (Iota Communications, 2020). If utility costs were reduced by 20 percent from efficiency measures, the company could save $8,400 per year and $42,000 over five years.

5.1 Job creation

The green building industry involves many different skill sets, from design to construction to maintenance. While BLS does not provide wage data for occupations labeled as green construction, the occupations listed in Table 5 will benefit as the green building industry expands.

Table 5: Median annual wages of green building–related occupations

Occupation	National	Pittsburgh region
Architects	$80,750	$80,450
Landscape architects	$69,360	$50,400
Civil engineers	$87,060	$85,450
Urban and regional planners	$74,350	$67,200
Construction managers	$95,260	$92,180
Construction laborers	$36,000	$43,710
Operating engineers and other construction equipment operators	$48,160	$57,430
Carpenters, electricians, HVAC mechanics and installers, plumbers, and other trades	$47,430	$58,430
Average	$67,296	$60,445

Source: BLS (2020).

The average number of jobs supported per investment will depend on the specific industries affected, such as energy, construction, and manufacturing. According to the American Council for an Energy-Efficient Economy (ACEEE), for every $1 million invested in each industry (e.g., construction or energy), approximately 17.3 jobs are supported in the general local economy, 9.9 in energy, 13.8 in manufacturing, 20.3 in construction, and 18.8 in trade services, including direct, indirect, and induced jobs. (Bell, 2012)

Energy efficiency investments stimulate the economy in two primary ways. The first wave of job creation comes from the initial expense and project activities. These jobs include workers hired to create and carry out the improvement, generally in construction, engineering, and maintenance industries; jobs created in the materials supply chain, such as in lumber yards and manufacturers; and jobs created in trade services as new employees spend their earnings throughout the economy.

Most jobs created through energy efficiency investments, however, come from the second wave of economic activity that occurs when individuals and businesses take the funds that would have gone toward higher utility bills and instead redirect them into the surrounding economy, which creates more jobs (17.3 per $1 million) than the energy sector does (9.9 per $1 million).

Table 6: Jobs per $1 million invested in energy efficiency and re-spending of savings

Industry	Jobs created
Energy efficiency improvements	20.3
Re-spending of energy savings	17.3

Source: Bell (2012).

5.2 Example calculations

5.2.1 Example: Energy efficiency retrofit[8]

A city invests $15 million in building efficiency improvements. The city typically spends $15 million per year in utilities and maintenance costs. The retrofits will save $3 million per year for 20 years.

Step 1. Determine how much money the city will save.

- *$15 million annual utilities cost x 20% saved = $3 million saved per year*

Step 2. Calculate the number of construction jobs created. The initial expenditure in retrofitting buildings will redirect $15 million into the construction industry, which supports approximately 20.3 jobs per $1 million investment.

- *20.3 jobs per $1 million invested x $15 million = 304.5 construction jobs created*

Step 3. Estimate the wages paid to these workers.

- *304.5 jobs x $43,710 (regional average) = $13.3 million in wages*

Step 4. Calculate the number of new non-construction jobs created in the local economy over 20 years. The $3 million saved will be diverted from the energy sector, which supports just 9.9 jobs per $1 million invested, and into the greater economy, which supports 17.3 jobs per $1 million invested.

- *$3 million saved per year x 20 years = $60 million invested in the local economy instead of utilities*

[8] This scenario is modified from ACEEE (Bell, 2012).

- *$60 million invested x 17.3 jobs per $1 million invested = 1,038 non-construction jobs*

A sample economic impact narrative for project might read as follows:

> *Ultimately, by investing $15 million in energy efficiency retrofits, the city will create approximately 305 temporary construction jobs with $13.3 million wages. The re-spending of the expected $3 million per year in energy savings is expected to support approximately 1,000 additional jobs over 20 years.*

Note: While the above scenario used ACEEE's job creation figures, the available literature presents a range of possible estimates.

Jobs, jobs, jobs

When the city first spends $15 million on the retrofits, three types of jobs are created:

- Direct: Construction contractors hire workers to carry out the project
- Indirect: Workers need tools and building materials that will be purchased from manufacturers, which creates jobs in supply chain industries that equip the building industry.
- Induced: Employees in the construction and supply chain industries spend earnings in the local economy, supporting additional jobs.

5.3 Case studies

5.3.1 Sustainable innovation hub

The Indiana County Sustainable Development Task Force envisions offering educational programming on sustainable building materials at its sustainable innovation hub. Training local workers in sustainable building technologies will open Indiana County to this in-demand industry, which supports average wages of $60,445 in the greater Pittsburgh area. Training 100 workers could support eventual local earnings of approximately $6 million. Incorporating green building materials into the sustainable innovation hub building itself will reduce the building's energy use 25 percent and decrease maintenance costs by another 10 percent. For a 25,000–square foot building, that would save $10,111 per year, or about $202,000 over twenty years.

- *100 new jobs x $60,445 (regional average) = $6.0 million in wages*
- *25,000 square feet x 18.3 kWh per square foot (average electricity consumption for mercantile buildings) x 8.84 cents per kWh = $40,443 annual utility costs*
- *$40,443 x 25% savings = $10,111 savings per year x 20 years = $202,215 for 20 years*

5.3.2 Eco-industrial park

At its eco-industrial park, **Re-Imagine Beaver County** envisions a LEED-certified facility built with sustainable building materials. Starting with a modest initial facility, a newly built 30,000–square foot building with green building materials would consume approximately 20 percent less energy

than a similarly sized, conventionally built structure. This equates to almost $10,000 in cost savings for the facility each year.

- *30,000 square feet x 18.3 kWh per square foot (average electricity consumption for mercantile buildings) x 8.84 cents per kWh = $48,532 annual utility costs*
- *$48,532 x 20% savings = $9,706 utilities savings per year*

5.3.3 County energy efficiency improvements

Re-Imagine Butler County proposes making energy efficiency improvements to County-owned buildings. Retrofitting 50,000 square feet of County buildings would reduce energy consumption at these buildings 10 percent per year, which would save Butler County approximately $8,000 per year—which adds up to almost $81,000 in savings over 10 years.

- *50,000 square feet x 14.5 kWh per square foot (average electricity consumption for public buildings) x 8.84 cents per kWh = $64,090 annual utility costs*
- *$64,090 x 10% savings = $6,409 utilities savings per year*

5.3.4 Monroeville Eco-Mall

In addition to the solar installation discussed above on page 22, **ReImagine TCWAC+** envisions the Monroeville Mall undergoing significant energy efficiency improvements. Without an energy audit, there is no way of knowing exactly what type of energy efficiency improvements the Mall would require and at what cost. However, it can be assumed that an investment on the magnitude of $1 million would reduce total energy costs by 10 percent, or approximately $194,000 per year. If this is the case, the project would support over 20 construction jobs while improvements were made and result in $3.9 million in energy savings over 20 years. The re-spending of these energy savings on-site would support an additional 67 jobs.

- *120,000 square feet (10% of total square footage) x 18.3 kWh per square foot (average electricity consumption for mercantile buildings) x 8.84 cents per kWh = $194,126 annual utility costs*
- *$1 million invested in energy efficiency x 20.3 jobs per $1 million invested = 20.3 jobs*
- *$194,126 in energy savings x 20 years = $3.9 million in energy savings*
- *$3.9 million x 17.3 jobs per $1 million invested = 67.2 jobs*

5.4 Key resources

Bell, C.J. 2012. How Does Energy Efficiency Create Jobs? ACEEE Fact Sheet. https://www.aceee.org/files/pdf/fact-sheet/ee-job-creation.pdf

Booz Allen Hamilton. 2015. Green Building Economic Impact Study. Prepared for the U.S. Green Building Council. http://go.usgbc.org/2015-Green-Building-Economic-Impact-Study.html

Dodge Data and Analytics. 2018. World Green building and Construction Trends. https://www.construction.com/toolkit/reports/world-green-building-trends-2018

Liming, D. 2012. Careers in Green Construction. BLS. https://www.bls.gov/green/construction/

Short, W, Packey, DJ, and Holt, T. A. 1995. Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies. NREL/TP-462-5173.

U.S. Bureau of Labor Statistics (BLS). 2020. Occupational Outlook Handbook. https://www.bls.gov/ooh/home.htm

Retrofit: Empire State Building

One of the most prominent examples of existing structures aligning with sustainability goals is the Empire State Building in New York City, which is nearly one century old. Before its 2010 green retrofit, its daily energy consumption was equal to that of 40,000 homes—but that is now reduced by 38 percent, saving an estimated $4.4 million per year. To achieve this, its 6,514 windows were replaced, building controls and heating and cooling systems were updated, and high-efficiency and adaptive LED lights were installed, among other modifications.

The "deep retrofit" cost $31.1 million, achieved payback in three years, and generated more than 250 direct jobs and many more indirect and induced jobs. While the Empire State Building may seem of incomparable scale to most projects, the retrofit was designed to be replicable for existing buildings across the country. The building now boasts a LEED Existing Buildings: Operations and Maintenance Gold Certification and a 90 out of 100 Energy Star score. (Kaplan, 2020; Al-Kodmany, 2014; Clinton Foundation, 2014)

New construction: Frick Environmental Center

Completed in 2016, the Frick Environmental Center is a greyfield-turned-green building that is now one of the premier models of sustainability in the Pittsburgh area. Prior to 2014, the building was an abandoned education center that had burned down in 2002. Pittsburgh Parks Conservancy and project planners used 12 years of feedback gained from 34 community input sessions with over 1,000 individuals from the region to construct a building that responded to the community's vision.

The new, 16,440–square foot building occupies the same footprint of the original center to minimize encroachment into natural areas and was built with sustainable design, materials, and practices. Among its many accolades, the most prestigious is the Living Building designation, which has rigorous requirements in categories such as energy, materials, and water. A comprehensive list of the intentional design choices that make this net-zero energy building noteworthy is beyond the scope of this study, but highlights include on-site solar panels and geothermal wells that reduce energy use by 40 percent compared to similar buildings; responsibly sourced and local materials; diversion of virtually 100 percent of construction waste away from landfills; water conservation through rooftop rain barrels, a 15,000-gallon underground cistern, and on-site treatment; daylighting and efficient lighting; and a 115-acre nature preserve that boasts a range of habitats supporting native species.

The Center generates an energy surplus that is sent back to the grid, and with negative net carbon emissions, it is mitigating more than it is emitting. Compared to a model energy code the building achieves 108 percent energy cost savings.

The project cost was approximately $19 million. While no demonstrated job creation statistics are available, they can be estimated by the investment-to-jobs ratio for green buildings. The immediate economic activity would support approximately 380 jobs. The savings gained can be diverted into the greater economy, creating additional jobs in the long term. (Hoffman, 2014; Risen, 2018; American Institute of Architects, 2019)

6. GREEN CHEMISTRY

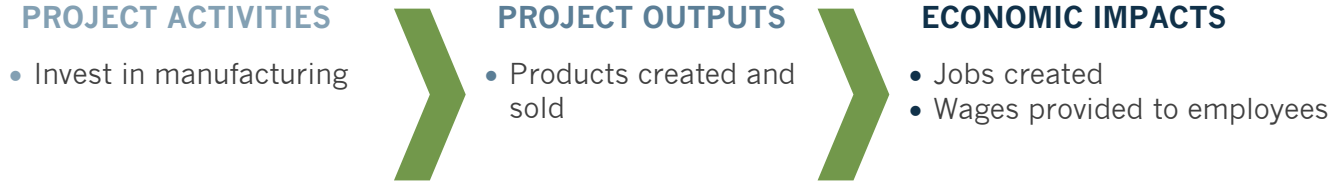
Green chemistry, a concept first developed in response to the Pollution Prevention Act of 1990, is now practiced throughout all areas of the modern chemical industry. The green chemistry approach entails the intentional reduction or elimination of hazardous materials in the design of chemical products and processes and applies to a chemical product's design, manufacture, use, and disposal.

The evolution of green chemistry standards has spurred researchers to identify safer, environmentally friendly, and more sustainable alternatives to conventional chemical inputs, products, materials, and processes which will minimize pollution, waste, and intrinsic risk. Adverse chemical use has cascading negative effects on health, the environment, and the economy. Green chemistry has the potential to promote cleaner, less toxic air, water, foods, and working conditions; avoid chemical disruptions and exposure to ecosystems and their inhabitants; reduce feedstock and increase yields of chemical reactions, reducing synthetic steps and waste; and improve products, competition, and sales. (EPA, 2020)

The foundation of green chemistry is outlined in the 12 Principles of Green Chemistry:

1. Prevent waste
2. Atom economy
3. Less hazardous synthesis
4. Design benign chemicals
5. Benign solvents and auxiliaries
6. Design for energy efficiency
7. Use of renewable feedstocks
8. Reduce derivatives
9. Catalysis (vs. stoichiometric)
10. Design for degradation
11. Real-time analysis for pollution prevention
12. Inherently benign chemistry for accident prevention (American Chemical Society, 2020)

Figure 9: Green chemistry activities, outputs, and impacts



While green chemistry is a fairly new and rapidly evolving industry, academic institutions and labor organizations have documented the potential benefits of an expanded green chemistry marketplace in the United States. A variety of new market opportunities are emerging, including bioplastics, building materials, flame retardants, healthcare, and personal care and household products. (Heintz and Polin, 2011)

One benefit is that, for the same amount of product sold, green chemistry creates more jobs than petroleum-based chemistry. These jobs are not at the chemical plant itself; instead, the additional jobs are created because biomass feedstocks create 3–4 times more jobs for every dollar than petroleum-based feedstocks. (Heintz and Polin, 2011)

A more specific example is the job creation potential of green chemistry–linked bioplastics manufacturing as compared with petroleum-based plastics manufacturing, which is particularly

relevant to Central Appalachia because of the conversations taking place now about the petro-chemical storage hub and downstream plastics manufacturing opportunities.

As illustrated in Table 7, the direct and indirect service industry jobs are estimated to be the same for bioplastics or petroleum-based plastics. But the indirect jobs related to producing feedstocks are estimated to be four times higher for bioplastics: 3.4 versus 0.85 jobs per million dollars of output.

Table 7: Jobs created per million dollars of output

Industry	Direct jobs	Indirect service industry jobs	Indirect jobs to produce feedstocks
Bioplastic	1.2	2.3	3.4
Petroleum-based plastic	1.2	2.3	0.85

Source: Heintz and Polin (2011).

6.1 Wages

BLS does not currently collect wage data on green chemistry industry jobs; however, data is collected for jobs that would inevitably be supported by the industry, Specifically, jobs for farm workers, chemical plant and system operators, and sales and related occupations could reasonably be created by the growth of the green chemistry industry.

Table 8: Median annual wages of green chemistry–related occupations

Occupation	National	Pittsburgh region
Farm workers	$27,780	$32,970
Chemical plant and system operators	$62,710	$63,730
Sales and related occupations	$43,060	$42,050
Average	$44,517	$46,250

Source: BLS (2020).

6.2 Example calculations

6.2.1 Example: New bioplastics plant

A company will build a new bioplastics plant, with annual sales expected to reach $10 million after three years of operation.

Step 1. Estimate the number of jobs this project will support.

- *$10 million output x 1.2 jobs per $1 million output = 12 direct jobs*
- *$10 million output x 2.3 jobs per $1 million output = 23 indirect service industry jobs*
- *$10 million output x 3.4 jobs per $1 million output = 34 indirect jobs to produce feedstocks*
- *Total jobs = 12 + 23 + 34 = 69 jobs*

Step 2. Estimate the wages paid to these workers.

- *12 direct jobs x $63,730 wage (regional average) = $764,760 in wages for direct jobs*
- *23 indirect service industry jobs x $42,050 wage (regional average) = $967,150 in wages for indirect service industry jobs*

- *34 indirect jobs to produce feedstocks x $32,970 wage (regional average) = $1.1 million in wages for indirect jobs to produce feedstocks*
- *Total wages = $764,760 + $967,150 + $1.1 million = $2.9 million*

A sample economic impact narrative for this project might read as follows:

After ramping up production, the proposed bioplastics plant is projected to reach $10 million in annual sales. This project will create approximately 69 jobs with $2.9 million in wages.

6.3 Case studies

6.3.1 Bioplastics manufacturer at the eco-industrial park

Re-Imagine Beaver County seeks to recruit a bioplastics manufacturer to its eco-industrial park. Assuming the facility produces $20 million in product sales per year, it will likely support 24 direct employees as well as an additional 114 indirect jobs in the local area. In total, this level of sales output would support approximately $5.7 million in local wages per year.

- *$20 million output x 1.2 jobs per $1 million output = 24 direct jobs*
- *$20 million output x 2.3 jobs per $1 million output = 46 indirect service industry jobs*
- *$20 million output x 3.4 jobs per $1 million output = 68 indirect jobs to produce feedstocks*
- *Total jobs = 24 + 46 + 68 = 138 jobs*
- *24 direct jobs x $63,730 wage (regional average) = $1.53 million in wages for direct jobs*
- *46 indirect service industry jobs x $42,050 wage (regional average) = $1.93 million in wages for indirect service industry jobs*
- *68 indirect jobs to produce feedstocks x $32,970 wage (regional average) = $2.24 million in wages for indirect jobs to produce feedstocks*
- *Total wages = $1.53 million + $1.93 million + $2.24 million = $5.7 million*

True Pigments: AMD to Paint Pigments

True Pigments is a social enterprise of Rural Action in Ohio that is committed to turning the environmental destruction of yesterday's extractive industries into a vibrant, regenerative environment and economy for the future. It, quite literally, is creating colors for a cleaner world.

The social enterprise's proprietary technology turns pollution from historic coal mines into pigments for use in paints and other products.

True Pigments recently received an Abandoned Mine Land (AML) Pilot grant to scale up production of the pigment in the Sunday Creek Watershed in rural southeastern Ohio. This expansion is expected to generate local revenue, create short- and long-term employment opportunities, and support educational and outreach programs. Economic modeling by Downstream Strategies utilizing RIMS II multipliers suggests the facility will spur $8.5 million in immediate economic activity, contribute $2.8 million in earnings to employees, support over 60 jobs across different sectors of the economy, and provide over $4.7 million in value-added benefits. (Reclaiming Appalachia Coalition, 2020)

6.4 Key resources

American Chemical Society. 2020. 12 Principles of Green Chemistry. https://www.acs.org/content/acs/en/greenchemistry/principles/12-principles-of-green-chemistry.html

Heintz, J, and R. Polin. 2011. The Economic Benefits of a Green Chemical Industry in the United States. Political Economy Research Institute. https://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/Green_Chemistry_Report_FINAL.pdf

U.S. Environmental Protection Agency (EPA). 2020. Green Chemistry. https://www.epa.gov/greenchemistry

7. SUSTAINABLE AGRICULTURE

Agriculture is essential to our daily lives, yet conventional farming practices have placed significant pressure on the environment. In recent decades, more and more the world's food supply has been grown through industrial agriculture, which damages soils, water, air, and climate through the use of chemical inputs, monoculture farming, and other harmful practices.

In addition, most food consumed in the United States is produced far from where it is consumed. Small farms, which have traditionally sold their products to nearby consumers, have struggled to compete in the global food marketplace.

As awareness of the inherent instability of industrial agriculture rises, farmers, scientists, and consumers around the globe seek to revolutionize modern agriculture by returning to a farming system that is more sustainable—environmentally, economically, and socially (Union of Concerned Scientists, 2017).

Sustainable agriculture is defined broadly as an integrated, site-specific system of plant and animal production practices that will over the long-term satisfy human food and fiber needs (National Institute of Food and Agriculture, 2020).

Recent trends in food buying alongside shifting realities of the global marketplace have contributed to a resurgence in interest in locally grown and produced food that has helped small farmers, new and old, move toward more economically sustainable small farm operations. This is most visible in the rise of farmers' markets but has been buoyed by the expansion and development of other entities such as food hubs, beginning farmer and rancher programs, and producer cooperatives.

While individual consumers may provide a myriad of reasoning and justifications for their choices, numerous studies have found that "local" has become the most important attribute for most consumers, surpassing "organic," "natural," and other descriptors (Adams and Salois, 2010; Stanton et al., 2018). Small farms and adjacent businesses, nonprofits, and local government entities are taking notice.

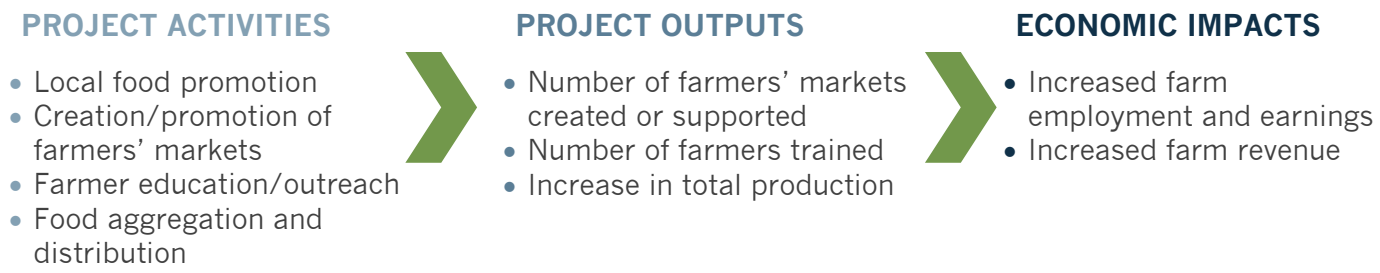
Allegheny, Beaver, Butler, and Indiana counties are home to roughly 3,200 farm operations[9] covering 320,000 acres, which contribute to more than $120 million in annual agricultural product sales (USDA, 2017). This corner of Pennsylvania largely reflects greater regional trends of declining overall acreage devoted to agriculture, likely due to expanding suburban development, with increases in sectors most closely associated with local foods (vegetable farms and layer hens) as well as steady performance from sectors that have traditionally succeeded in these counties (goat farms, most notably) (Downstream Strategies, 2019). Various entities in the region have endeavored to organize around and promote small farms and local food, such as the Greater Pittsburgh Food Bank, the Fayette County Community Action Agency, and the CRAFT Center at Chatham University.

Projects promoting sustainable food systems and local agriculture in the region fall primarily within two categories of activities:

- **Farmer-focused programs** focus on supporting new and existing farmers through training, access to resources, and technical assistance.
- **Market-focused programs** promote the overall production and sales of local foods. These include programs supporting or creating farmers' markets and food hubs as ways to expand access to local foods, as well as consumer awareness programs to build market support for local products.

[9] Of these total farm operations, less than one-third are income-producing.

Figure 10: Sustainable agriculture activities, outputs, and impacts



7.1 Farmer-focused programs

Many local foods projects focus on providing training to farmers and ranchers. This training may take a wide variety of forms, from specific growing practices such as high tunnel farming or no-till planting, to business planning, to important food safety training such as the federally required Good Agricultural Practices training and certification process.

These projects often measure their short-term success in the number of individuals or businesses trained or otherwise assisted. In the longer term, these projects contribute to new revenue streams for farmers, which will translate into increased sales revenue and, ultimately, farmer incomes.

As a result, for farmer-focused projects, economic impacts generally include any increases expected in employment (i.e., the number of farmers or vendors) and wages. Such employment is two-fold.

First, it includes jobs and wages of employees hired directly to carry out farmer training programming: instructors, training staff, and facility maintenance workers. For example, when Sprouting Farms[10] launched its West Virginia farmer apprenticeship and business incubator program in 2016, it created 6.6 full-time equivalent positions to support the program and hired eight part-time apprentices (1 full-time equivalent total), which resulted in wages of $250,000–$500,000 per year during its first three years of operation.

Second, it includes the jobs and wages created and enhanced as participants complete farmer training programs and grow their businesses over the long term. Many new farmers, including those entering the field after completing training programs, begin working for existing farms and are often paid hourly wages. As illustrated in Table 9, the median wage for farmworkers in the greater Pittsburgh area is approximately $13 per hour, which translates to roughly $27,000 per year. To estimate the earnings of future farmers, we have to rely on our best guess of how many positions will be created. The number of positions can be based on the number of people expected to complete training or receive technical assistance, and of these, the percentage of trainees who continue to pursue farming. These anticipated new jobs can then be multiplied by the approximate expected income. As illustrated in Table 9, the mean annual wage for farmers in Allegheny, Beaver, Butler, and Indiana counties is approximately $37,000 per year (BLS, 2019).

[10] www.sproutingfarms.org

A new generation of farmers

The current mode of industrial agriculture often makes it difficult for smaller farmers to make a decent living. In fact, more than half of American farms have lost money every year since 2013 (USDA, 2018). Farmers in Pennsylvania and beyond are aging rapidly, which means significant numbers are leaving the workforce to retire each year. According to the Center for Rural Pennsylvania, over 75,000 new and replacement farm positions will be needed statewide over the next decade. This makes farmer-focused programs more critical now than ever before.

Table 9: Median hourly and annual wages of agriculture-related occupations

Occupation	Pittsburgh region		National	
	Mean hourly	Mean annual	Mean hourly	Mean annual
Farming, Fishing, and Forestry Occupations	$17.82	$37,060	$15.07	$31,340
First-Line Supervisors of Farming, Fishing, and Forestry Workers	$29.44	$61,240	$25.25	$52,520
Agricultural Inspectors	$29.54	$61,430	$22.67	$47,160
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	$15.85	$32,970	$13.36	$27,780
Farmworkers, Farm, Ranch, and Aquacultural Animals	$13.04	$27,110	$14.37	$29,880
Average	$21.14	$43,962	$79.22	$37,736

Source: BLS (2019b, 2019c).

Kitchen incubators

Farming isn't the only job available in sustainable food systems. Training programs such as the Appalachian Center for Economic Networks, Inc. (ACEnet) in Athens, Ohio help aspiring entrepreneurs develop and launch food-sector businesses. ACEnet assists food businesses with business planning, marketing, regional brand access, and financial management. It also manages a shared-use kitchen, the Food Ventures Center. The 11,000–square foot facility serves 140+ clients from Ohio and West Virginia and has produced $7.8 million of wholesale food products. ACEnet's clients produce more than 30 new jobs annually.

7.1.1 Example calculations

Example: Agricultural training center

An agricultural training center will be created that employs five people at an average salary of $37,000 per year. It will train 20 beginner farmers per year.

Step 1. Estimate the wages paid to people who work at the training center.

- *5 jobs x $37,000 wage (regional average) = $185,000 in wages*

Step 2. Estimate the wages paid to graduates of the training program who continue to pursue farming.

- *20 graduates x 50% pursue farming x $27,000 wage (regional average) = $270,000 in wages*

A sample economic impact narrative for this project might read as follows:

> *The proposed agricultural training center is projected to employ five people at an average salary of $37,000 per year. It will pay a total of approximately $185,000 per year in wages. We estimate that half of the 20 people who receive training will continue to pursue farming. Assuming they begin work as farm assistants or laborers on existing farms, they will earn a total of approximately $270,000 per year in wages.*

7.2 Market-focused programs

Whereas farmer-focused programs aims to help growers and food businesses supply local foods for the marketplace, market-focused programming strives to create viable markets in which local consumers can buy local, sustainable food. While economic impacts within this sphere may include jobs, they often focus on increased sales revenue for local farms and food businesses.

Farmers' markets are one of the most common—and visible—sales outlets for local foods. The number of farmers' markets in the United States rose from 340 in 1970 to 8,140 in 2019 (Union of Concerned Scientists, 2011; National Farmers Market Managers Survey, 2020).

Jobs from local growers

The Farmers Market Coalition found that growers who sell locally create 13 full time jobs per $1 million in revenue earned; growers who do not sell locally create just three (Farmers Market Coalition, 2016).

National studies have documented the economic impact of farmers' markets in terms of jobs created and sales revenue generated. A comprehensive 2011 report determined that public funding for 100–500 otherwise-unsuccessful farmers' markets per year could create as many as 13,500 jobs over a five-year period (Union of Concerned Scientists, 2011).

Building on the findings of these studies, smaller-scale farmers' market projects can utilize national survey data of farmers' markets as benchmarks for expected economic outputs.

The following represents key data from the 2019 National Farmers' Market Managers Survey data:

- The average daily spending at farmers' markets in the United States is $14,547 per market.
- 53 percent of U.S. farmers' markets had paid managers. On average, these employees worked 19.4 hours per week and earned $18.40 per hour.
- 25.5 percent of markets employed more than one person.
- The average market features 25 different vendors on a peak market day. (National Agricultural Statistics Service, 2020)

For example, say a project is going to create a new farmers' market. Knowing that (as with any new undertaking) it can take time to build up a customer base and market following, project leaders might set sales and employment goals to achieve these national benchmarks within their first 5–10 years of operation. These performance benchmarks should be qualified based on knowledge of the local area. Once the farmers' market is operational, managers should track their actual performance against these projections in order to quantify their progress towards meeting these goals.

Consider the competition

When considering opening a new farmers' market, start by mapping out nearby markets in your area. If your area does not have any existing farmers' markets nearby, chances are that a new market will be a welcome addition to the area. However, if your area already supports existing markets, you'll want to carefully consider whether adding a new market will be a good idea. After all, undercutting the success of an existing market will not actually produce net economic gains for the area. Start by talking with the managers of the existing markets and discuss whether they think the area can support two or more farmers' markets.

7.2.1 Example calculations

Example: Farmers' market

A new farmers' market will be opened that will start with six local farmers and grow to 20 local vendors. It will operate once per week from May through October (26 weeks) each year and will employ a part-time market manager, whose hours will likely be scaled up from 10 hours per week in the first year of operation to 20 hours per week by the third year.

Step 1. Estimate the total sales by farmers' market vendors.

- *26 days of operation per year x $14,547 in sales per day = $378,222 in sales per year*

Step 2. Estimate the wages paid to the farmers' market manager.

- *In Year 1: 10 hours per week x 26 weeks x $18.40 per hour = $4,784 in wages*
- *In Year 2: 15 hours per week x 26 weeks x $18.40 per hour = $7,176 in wages*
- *In Year 3: 20 hours per week x 26 weeks x $18.40 per hour = $9,568 in wages*
- *Total over three years: $4,784 + $7,176 + $9,568 = $21,528*

A sample economic impact narrative for this project might read as follows:

> *Within five years of launching, we hope to feature more than 20 local vendors and sell on par with national averages (over $14,000 per market day, based on National Farmers' Market Managers Survey from 2019). Assuming our market operates from May through October (26 weeks) each year, that will translate into estimated total sales of approximately $378,000 for local vendors in our area per year. To make this happen, our market will employ a part-time market manager, whose hours will likely be scaled up from 10 hours per week in our first year of operation to 20 hours per week by our third year of operation. As a result, in the first three years, this market will support wages of $21,528.*

Local and regional food hub projects are also gaining momentum throughout Appalachia and beyond to help build markets by enhancing aggregation and distribution systems for local foods. Individual small farms are generally unable to deliver volumes of product sufficient to sell into wholesale markets, but through production planning and aggregation of products from multiple farms by a food hub, these market segments become available.

Food hubs

A food hub is a business or organization that actively manages the aggregation, distribution, and marketing of food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand (USDA, 2012).

Food hubs are analogous to large food distribution businesses like Sysco and US Foods; within the context of local foods and sustainable agriculture, however, they often perform numerous other functions such as marketing and production planning. Food hubs generally focus directly on small farms with the aim of helping to deliver a living wage to farmers.

Since 2013, the Center for Regional Food Systems at Michigan State University has conducted three biennial surveys of food hubs across the United States. Its reports of these findings provide the most current and comprehensive picture of food hubs to date. The following findings help frame the overall economic impact of food hubs:

- Employment: Food hubs employ an average of 16 people. Older food hubs employ more people on average. Those that have been in operation for two years or longer employ an average of 18 people.
- Sales revenue: In 2017, food hubs averaged $2.3 million in gross product sales.
- Producers: A single food hub works with an average of 78 different producers and suppliers. This means food hub sales directly support 78 other businesses in the local economy. (National Food Hub Survey, 2017)

7.3 Case studies

7.3.1 Farmer training and technical assistance programs

Partnering with local educational resources, the **Indiana County Sustainable Development Task Force** could promote the creation of farmer training and technical assistance programs for local farmers. These programs could be tailored to prepare new farmers interested in entering the profession or to enhance farmers' skills and increase the production and profitability of existing farmers in the area. A training program that employed five people at an average salary of $37,000 per year would bring approximately $185,000 per year in wages to the local area. Assuming the program resulted in filling 10 farmhand positions in the area, it would support $270,000 per year in local wages.

- *5 jobs for employees x $37,000 wage (regional average) = $185,000 in wages for employees*
- *10 jobs for farmhands x $27,000 wage (regional average) = $270,000 in wages for farmhands*

7.3.2 Farmers' market at the Monroeville Eco-Mall

TCWAC+ proposes opening a new farmers' market focused primarily on vegan offerings at the Monroeville Eco-Mall. Upon opening, this market will feature six local farmers and food vendors, who currently have limited opportunities to sell their produce locally. Within five years of launching, we hope to feature more than 20 local vendors and sell on par with national averages (over $14,000 per market day, based on National Farmers' Market Managers Survey from 2019). Assuming the market operates at least May through October (26 weeks) each year, that will translate into estimated total sales of approximately $378,000 for local vendors in the area per year.

To make this happen, the market will employ a part-time market manager, whose hours will likely be scaled up from 10 hours per week in our first year of operation to 20 hours per week by our third year of operation. As a result, in our first three years, this market will support wages of $21,528.

- *26 days of operation per year x $14,547 in sales per day = $378,222 in sales per year*
- *In Year 1: 10 hours per week x 26 weeks x $18.40 per hour = $4,784 in wages*
- *In Year 2: 15 hours per week x 26 weeks x $18.40 per hour = $7,176 in wages*
- *In Year 3: 20 hours per week x 26 weeks x $18.40 per hour = $9,568 in wages*
- *Total over three years: $4,784 + $7,176 + $9,568 = $21,528*

7.4 Key resources

Sprouting Farms. 2020. www.sproutingfarms.org

Turnrow Appalachian Farm Collective. 2020. www.turnrowfarms.org

Appalachian Center for Economic Networks (ACEnet). 2020. www.acenetworks.org

USDA. 2017. Census of Agriculture.
https://www.nass.usda.gov/Publications/AgCensus/2017/index.php

Michigan State University. 2020. National Food Hub Survey.
www.canr.msu.edu/national_food_hub_survey

Union of Concerned Scientists. 2011. Market Forces: Creating Jobs Through Public Investment in Local and Regional Foods Systems. https://www.ucsusa.org/resources/market-forces

Turnrow: food aggregation/food hub and online farmers' market

Launched in 2015, Turnrow: Appalachian Farm Collective is a food hub that helps small farmers in West Virginia and Virginia gain access to larger wholesale markets by way of aggregation.

As a food hub, Turnrow acts as the intermediary between small farmers in southwest Virginia, West Virginia, and southwestern Pennsylvania and wholesale markets in Virginia, West Virginia, Pennsylvania, Maryland, and Ohio. While wholesale prices paid to farmers are lower than retail prices (from farmers' market sales, for example), the relative labor requirements for meeting each sale is dramatically lower, and production planning based on forecasting from previous years' sales are comparably reliable. Turnrow provides sales, aggregation, and distribution services to wholesale producers. Turnrow also provides a sales platform to farmers who wish to sell to individual retail customers via a digital farmers' market platform. These sales are also aggregated and distributed by Turnrow, dramatically reducing the overhead burden for producers.

Turnrow now works with over 170 producers across three states and has an operational footprint spanning five states. Through 2019, Turnrow facilitated roughly $200,000 in sales for producers. 2020 has seen an enormous surge in sales, with producers projected to earn approximately $750,000 via sales brokered, aggregated, and distributed through Turnrow.

Turnrow was initiated with funding from the Appalachian Region Commission's POWER Initiative, with assistance from several other grant programs including the Local Foods Promotion Program and funding from private foundations. The food hub is staffed by approximately seven positions, all currently employed by other cooperating nonprofits and universities.

Turnrow utilizes two primary metrics to track progress: a count of producers they work with, and revenue to producers by sales category (wholesale and retail). Turnrow also reports operating expenses to its funders and engages in regular efforts to increase efficiency with an eye towards financial sustainability.

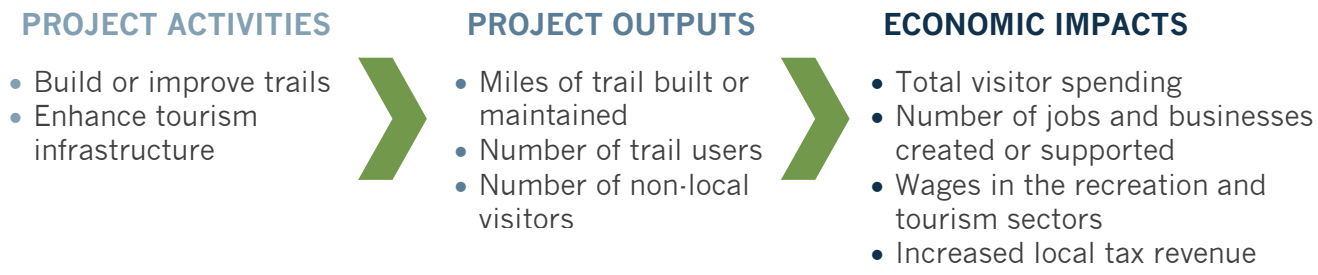
8. TRAILS AND OUTDOOR RECREATION

Outdoor recreation is one of the nation's largest and fastest-growing sectors. The outdoor economy in the United States supports 7.6 million jobs and generates $887 billion in consumer spending annually. (BEA, 2019; Outdoor Industry Association, 2017)

Outdoor recreation has long been part of the culture of southwestern Pennsylvania. Each year, 56 percent of Pennsylvanians participate in outdoor recreation activities. Outdoor recreation directly supports 251,000 jobs in Pennsylvania—which is three times as many jobs as the natural gas industry. Within the state alone, the outdoor industry annually generates $8.6 billion in wages and salaries, $29.1 billion in consumer spending, and $1.9 billion in state and local tax revenue. (Outdoor Industry Association, 2017)

Given how well outdoor recreation fits with the region's natural assets, the outdoor economy presents a significant growth opportunity for this corner of the state.

Figure 11: Trails and outdoor recreation activities, outputs, and impacts



Across the nation, trail-based tourism is one of the leading forces driving the outdoor economy. Over the last decade, countless case studies document communities that are successfully leveraging trails for economic development. Appalachia and the mid-Atlantic region are home to a growing number of these "trail towns," which have developed reputations as premiere destinations for hiking, mountain biking, long-distance cycling, skiing, off-road vehicle riding, and other outdoor activities.

The economic benefits provided to trail towns are driven predominantly by visitor spending. Successful trail systems often attract tens to hundreds of thousands of people per year, including large numbers of non-local visitors who stay overnight in the area.

While most trails see higher daily usage from locals, economic impacts are fueled largely by the non-local visitors who spend significantly more per visit. Whereas a local visitor might spend $10–20 on lunch after visiting a trail, non-local visitors often spend $100–140 per day on overnight trips on lodging, food and beverage, outdoor gear, gasoline, merchandise, and other items (Downstream Strategies, 2020). Based on surveyed spending from several trail projects in the region, overnight visitors typically spend six to seven times more per day than local visitors (The Progress Fund, 2015).

As a result, the basic building blocks for trail-related economic impact projections are:

- **visitor estimates,** including current visitor counts (if available) as well as the estimated future number of visitors once the trail is built and operating at full capacity; and
- **visitor spending** for the type of activities your trail will serve.

Unlike other industries, there are no national standard economic metrics for determining the economic impact of trail-based tourism. Fortunately, there is a wealth of information available on successful trail systems in Pennsylvania and beyond, including many well-documented studies, surveys, and other solid data sources that are publicly available through online research. As a result, trail advocates often rely on case studies and other hard data to build estimates for the economic benefits of a trail project.

To do so, start with your trail design and pinpoint the specific user groups your trail will target.

- For example, consider a hypothetical trail system in Imaginary, Pennsylvania. The Imaginary Trails will feature a 20-mile network of trails through a nature preserve linked to downtown Imaginary. While available for hiking, these trails will be designed specifically for mountain biking in the warmer months and will be maintained for cross-country skiing in the winter.

Once your targeted user groups have been identified, research the spending patterns and demographics of these users. Given the abundance of articles, case studies, and research available on the internet, a simple web search will yield a wealth of information.

The booming national interest in outdoor recreation has spurred significant research into nearly every major outdoor recreation user group. For example, significant data has been collected on the demographics and spending patterns of mountain bikers. A 2015 survey of mountain bikers across North America found that the average mountain biker takes two trips per year specifically to mountain bike and spends an average of $382 locally per trip (Barber, 2015). A recent study conducted by West Virginia University similarly found that non-local mountain bike tourists in West Virginia spend an average of $387 per trip (Eades and Arbogast, 2019).

- Because the Imaginary Trails will target mountain biking, start by searching the web for the economic impact of mountain biking and cross-country skiing to expand your knowledge of these user groups.

Finally, look for examples of other prominent and relevant trail projects. Survey your local community of trail enthusiasts on their favorite trails in other areas and then simply start searching the internet for the nation's best trails for any given outdoor activity. In particular, look for trails that are similar to your trail project, such as those that are comparable in mileage or designed specifically for the same user groups as your proposed trail project, as well as those that have tracked quantifiable outcomes. The more hard data you can gather on other comparable trail systems, the stronger you can make the case for your local trail project.

In addition, look for information from trail advocacy organizations in that area. Many of these groups post metrics of their success on their websites, and a basic internet search of a trail system will often point to articles or blog posts that speak to the miles of trail built, the number of annual visitors, and the overall economic impact of the trail system. Don't be afraid to contact local trail groups, as many are happy to talk with trail enthusiasts seeking to learn from their success.

Basic research for trail systems similar to the Imaginary Trails might point to:

- **The Allegrippis Trail System** at Raystown Lake in central Pennsylvania. This is a 30-mile trail network built specifically for mountain bikers in 2002. While no recent visitor counts are readily available, visitor studies from 2012 estimated that the Allegrippis Trails attract at minimum 26,000 visits annually. According to the Huntingdon County Visitors Bureau, "Assuming that the trailhead visitation mirrors the normal visitor trends at Raystown Lake, it can be safely estimated that about 9,000 of these visitors travelled more than 50 miles to reach the trailhead along Baker's Hollow Road, and combined spent more than $1.3 Million while in Huntingdon County" (Price, 2012).

- **The Trails at Jakes Rock** in the Allegheny National Forest near Warren, Pennsylvania. The Warren County Chamber of Business and Industry and the U.S. Forest Service have built 30 miles of a planned 45-mile trail network specifically for mountain biking. In less than five years of operation, early data is showing annual visitation of more than 10,000 people per year. Local restaurants have reported up to 30 percent increases in sales and are hiring new positions, fueled directly by the increase in trail tourism. (Ferry, 2019)

Armed with case studies and targeted user group data, you can then make informed judgements about what kind of visitation and total economic impact a proposed trail project might see upon completion.

8.1 Example calculations

8.1.1 Example: Mountain bike trail network

The Imaginary Trails will be a 20-mile trail network designed as a destination for mountain bikers across the region, including people in the nearby Pittsburgh and Cleveland metropolitan areas.

Step 1. Estimate the number of visitors for the trail system. Identify comparable trail systems in the region to estimate potential visitation statistics. In this case, similar trails in Pennsylvania include the Allegrippis Trails and the Trails at Jakes Rocks.

- *According to the available data for these trails, approximately 30,000 annual visitors can be expected for the Imaginary Trails.*

Step 2. Estimate the proportion of non-local or out-of-state visitors. Again, use available statistics from similar trail systems to estimate the percentage of non-local annual visitors. The Allegrippis Trails and the Trails at Jakes Rocks attract an average of one-third of their visitors from outside the region.

- *30,000 annual visitors x 33.3% from outside the area = 10,000 non-local visitors*

Step 3. Estimate the increased tourism revenue from non-local visitors. National survey data indicate that an average mountain biker spends an average of $382 over a three-day trip. Multiply a conservative estimate of $100 spent per day with the number of non-local visitors.

- *10,000 non-local visitors x $100 spent per day = $1 million in increased tourism revenue*

A sample economic impact narrative for this project might read as follows:

> *The Imaginary Trails will be a 20-mile trail network designed as a destination for mountain bikers across the region. Market data and surveyed user spending show that mountain bikers are a powerful market segment fueling trail-based tourism in communities across Pennsylvania and beyond. National survey data shows that mountain bikers are a young, affluent user group and that the average mountain biker takes two mountain biking trips per year, spending an average of $382 per three-day trip. Located within easy driving distance from both Pittsburgh and Cleveland, the Imaginary Trails are within convenient trip distance to major urban areas with more than 4.4 million people.*
>
> *Based on results from comparable trail systems in Pennsylvania (the Allegrippis Trails and the Trails at Jakes Rocks), the Imaginary Trails will likely attract up to 30,000 people per year, of which approximately one-third will be from outside the area. If 10,000 non-local users spend $100 per day, the trails will generate about $1 million in tourism revenue for the county each year. Based on the experience of the Allegrippis Trails, the Imaginary Trails could likely reach this level of use and overall visitor spending within 10 years of opening.*

In the short term, the Imaginary Trails will support local restaurants, shops, and overnight lodging venues in Imaginary and spur downtown revitalization. This is supported by documented outcomes from similar trail systems in the state. For example, within the first several years of opening, local restaurants near the Trails at Jakes Rocks reported 30% sales increases driven by increased tourism. As a result, the Imaginary Trails hold strong potential to transform the local economy.

8.2 Case studies

8.2.1 Ohio River Greenway Trail

Re-Imagine Beaver County envisions the Ohio River Greenway Trail as a riverfront rail-trail connecting the towns of Midland, Monaca, Aliquippa, and more. Located at the epicenter of a regional trail system, the Greenway would connect to the Montour Trail in Coraopolis, which in turn links to Pittsburgh and the Great Allegheny Passage (GAP), the region's preeminent 150-mile rail-trail. As a result, this trail would directly connect Beaver County to a market of over 1 million existing trail users in nearby Pennsylvania, Maryland, and beyond, thus opening the door to developing a robust local tourism economy fueled by trails and outdoor recreation. Each year the GAP generates $50 million in total economic impact, driven largely by non-local visitors who spend an average of $124 per day in communities along the trail. This type of spending would have a significant and lasting impact on communities in Beaver County. Following in the example of the GAP's Trail Towns Program, Beaver County can provide focused programming to the businesses, entrepreneurs, and communities located along the trail to maximize the economic opportunity presented by trail tourism.

8.3 Key resources

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The Progress Fund. 2015. Trail User Survey and Business Survey Report: Great Allegheny Passage. March 2015. https://www.railstotrails.org/resourcehandler.ashx?name=trail-user-survey-andbusiness-survey-report-great-allegheny-passage&id=7313&fileName=2015-GAP-Report.pdf

The Great Allegheny Passage

The GAP is a 150-mile rail-trail that extends from southwestern Pennsylvania to western Maryland and also connects to the C&O Canal Towpath, which links to Washington, D.C. The trail links 12 towns, many of which were negatively impacted by the steady declines in the coal and steel industries. It has been transformational for the economies of these small towns.

Now regarded as one of the nation's premier long-distance trail corridors, the GAP sees nearly 1 million users every year. Through hands-on assistance provided by The Progress Fund and other partners, the GAP has a strong suite of economic performance data that has chronicled its success over time. Six studies and surveys completed between 1998 and 2015 documented the creation of 270 jobs and 65 businesses as a result of the GAP within its first ten years of operation. These studies have also quantified a total economic impact of $50 million annually, an average visitor spending of $124 per day for overnight, non-local visitors, and an average visitor spending of $18 per day for day visitors (The Progress Fund, 2016). The GAP also partners with academic researchers who perform annual visitor use studies to document the number of trail users per year.

Kingdom Trails

Kingdom Trails in northeastern Vermont is a picture of success in grassroots-based outdoor recreation endeavors. In the 1990s, the local logging industry was in decline and the local ski mountain resort went bankrupt, leaving many residents without the means or the access to employment or recreation. In response, local mountain bikers went door-to-door asking neighbors for permission to build trails on their private properties.

While they are open for other uses such as hiking and horseback riding, mountain biking has put Kingdom Trails on the map. Today, it is considered one of the preeminent mountain biking destinations in the country, with 100 miles of trail entirely on private land.

Because Kingdom Trails charges user fees, it has access to solid data that can be plugged into economic impact projections. For example, 138,000 trail passes and memberships are sold per year and 85 percent of those visitors come from outside the state. Local visitor use surveys have found that the average out-of-state Kingdom Trails visitor spends $115 each day in the area and stays an average of 2.75 days per trip. According to Kingdom Trails Association's estimates, the trails generate $10 million for the local economy every year.

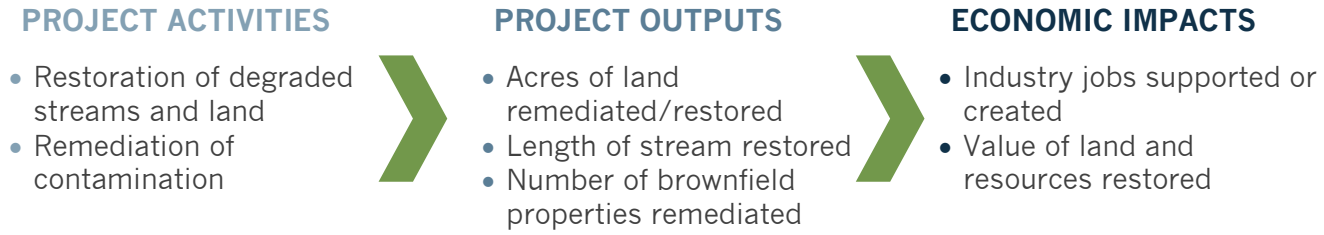
The growing success of the trails over the last decade has transformed the economies of the four surrounding towns, whose combined population is under 4,000 people. The trails are directly connected to the communities they traverse, with in-town trailheads and centers, making it easy for mountain bikers to grab a meal and visit local shops. (Kingdom Trails, 2020; Long, 2020)

9. LAND RESTORATION

While southwestern Pennsylvania boasts verdant vistas and natural charm, extractive and other land-impacting industries have left scars upon the landscape. In some places, land use practices such as mining and timbering have caused hillsides and streambanks to erode, which causes sediment to flow into nearby waterways and destroy habitat for fish and other aquatic organisms. In other places, land previously used for industrial or commercial purposes has been contaminated by pollution and hazardous substances. Such properties are known as **brownfields**.

Degraded lands and contaminated properties pose serious risks to the environment and the people, plants, and animals living nearby. They also are economically unproductive: Throughout the nation, properties once used for industry now sit vacant, unable to be reused until their contamination is addressed. Restoring these lands and properties can return them to productive use as healthy environments and homes for sustainable social and economic enterprises.

Figure 12: Land restoration activities, outputs, and impacts



Facilitating many uses

Both ecological restoration and brownfields remediation work have economic benefits. However, these fields differ somewhat from the other subject areas examined in this toolkit because they focus on improving conditions so that other uses (economic, social, environmental, or other) may occur.

Ecological restoration is broadly defined as the process of assisting the recovery of a damaged ecosystem, thereby helping to return it to its original state (BenDor et al., 2015). In Pennsylvania and the surrounding region, restoration projects frequently address degraded streams, wetlands, and mine-impacted lands.

Restored habitats and ecosystem services provide clear ecological benefits. However, restoration projects do generate economic benefits as well. A 2015 study found that ecological restoration is a $9.5 billion industry that employs about 126,000 people directly. In addition, the restoration economy indirectly generates $15 billion and 95,000 jobs, bringing restoration's total economic output value to nearly $25 billion (BenDor et al., 2015). In terms of direct employment, that ranks ecological restoration behind the oil and gas sector (200,000 jobs) and automaking (175,000), but ahead of coal mining (79,000), logging (54,000), and steel production (91,000) (Barrett, 2015).

In the context of the ReImagine groups, there are two key avenues for considering economic impacts from restoration projects. First, ReImagine groups can extrapolate large-scale economic impacts based on industry-level statistics from reputable studies. For example, a 2016 study found that every $1 million invested in ecosystem restoration results in:

- the creation of 13–32 job-years (meaning the total of full- and part-time jobs accumulated over the course of the restoration project), and
- $2.2–3.4 million in total economic output for the U.S. economy (USGS, 2016).

For more immediate and finely tuned impacts, ReImagine groups can look to the specific project budgets for proposed restoration work to examine short-term, project-based economic impacts.

Completing a restoration project involves a wide range of activities from different sectors of the economy, ranging from project planning, engineering, and legal services to intermediate suppliers of inputs, to on-the-ground earthmoving, forestry, and landscaping firms that contribute to the ecological restoration process (BenDor et al., 2015). When these projects use local firms to complete these tasks and project funding comes from outside the region, like a federal grant, those dollars represent an inflow of cash spent in the local economy.

Based on a review of ecological restoration projects throughout the mid-Atlantic region, an estimated 70 percent or more of a typical restoration project budget is spent on construction alone. This means that most restoration project funds go into the local construction economy, similar to a road or infrastructure project.

ReImagine groups can use this statistic to help frame the potential economic impact of restoration work by multiplying the total projected cost of restoration[11] by 70 percent.

9.1 Example calculations

9.1.1 Example: Stream restoration

An estimated $1 million stream restoration project in Example Creek will include planting 10,000 saplings along the stream bank and building in-stream structures to recreate natural flow conditions. It will reduce sedimentation, reduce stream temperatures, and improve fish habitat for brook trout.

Step 1. Estimate local construction spending.

- *$1 million total cost x 70% = $700,000 in local construction spending*

Step 2. Estimate the number of jobs created from the investment.

- *Because studies show ecosystem restoration typically creates 13–32 job years per $1 million invested, a conservative estimate of 13 jobs can be expected from the investment in Example Creek.*

Step 3. Estimate the total economic output. According to available data, approximately $2.2–3.4 million of economic output is generated for every $1 million invested in restoration. Again, a conservative estimate for the investment is $2.2 million. Additionally, $700,000 is invested directly into the local construction industry.

- *$2.2 million economic output + $700,000 local spending = $2.9 million in total economic output*

[11] ReImagine groups should consult a company specializing in restoration to develop an estimated project cost.

A sample economic impact narrative for this project might read as follows:

We seek to restore Example Creek at an estimated cost of $1 million. By planting 10,000 saplings along the stream bank and building in-stream structures to recreate natural flow conditions, this project will reduce sedimentation, reduce stream temperatures, and improve fish habitat for the Pennsylvania brook trout. The project will also contribute over $700,000 directly to the local construction economy, which will support more than 13 jobs and over $2.2 million in total economic output, based on estimates from the U.S. Geological Survey (USGS).

EPA Brownfields Program

Brownfields remediation in the United States is routed largely through the EPA Brownfields Program, which provides grants and technical assistance to communities, states, tribes and others to assess, safely clean up, and sustainably reuse contaminated properties. According to EPA estimates, every dollar spent as a brownfields grant leverages $17.45 additional dollars in investment, and nine jobs are created per $100,000 in brownfields grant funding (EPA, 2019).

9.2 Case studies

9.2.1 Reclaiming the degraded land at eco-industrial parks on vacant brownfields

Re-Imagine Beaver County envisions developing eco-industrial parks on vacant brownfields properties throughout the county. In addition to the economic development expected from the eco-industrial parks, the act of reclaiming the degraded land will also generate positive economic benefits for Beaver County. For example, a $2 million ecosystem restoration project in Beaver County would create as many as 64 jobs (both full and part-time) and result in a total of up to $6.8 million in total economic output.

Should the County pursue EPA Brownfields Program funding to remediation properties for redevelopment, it should expect further gains: A typical $500,000 brownfields grant would likely leverage $8.7 million in additional investment for the property and result in around 45 jobs created in Beaver County.

- *2 x 32 job-years (high end estimate per $1 million investment) = 64 full- and part-time jobs*
- *2 x $3.4 million (high end estimate per $1 million investment) in total economic output = $6.8 million total economic output*
- *$500,000 x 17.45 = $8.7 million additional dollars leveraged*
- *$500,000 x 9 jobs / $100,000 brownfields grant = 45 jobs created*

9.3 Key resources

U.S. EPA Brownfields Program: Environmental and Economic Benefits
https://www.epa.gov/brownfields/brownfields-program-environmental-and-economic-benefits

U.S. Geological Survey (USGS). 2016. Estimating the Economic Impacts of Ecosystem Restoration: Methods and Case Studies. https://pubs.er.usgs.gov/publication/ofr20161016

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opportunities-economic-growth#:~:text=Research%20shows%20that%20every%20%241,carbon%20sequestration%2C%20and%20water%20quality.

Beaver Creek Fishery Enhancement

Funded by an AML Pilot grant, the Canaan Valley Institute and partners including Downstream Strategies, the West Virginia Division of Natural Resources, and the West Virginia Division of Highways are currently restoring five miles of Beaver Creek in Tucker County, West Virginia. The project includes improvements to instream and pool habitats and planting riparian vegetation to provide a long-term buffer for the creek. In addition to improving water quality, this project will develop Beaver Creek into a viable fishery for stocked trout, thus enhancing recreational opportunities for fishing and users of the adjacent rail-trail. When reclamation is completed, the creek is estimated to attract 5,000 anglers annually with an annual economic impact of $500,000. Of the nearly $300,000 reclamation budget, over $210,000 is expected to go to local construction firms, which will contribute significantly to the local economy.

The Reclaiming Appalachia Coalition

The Reclaiming Appalachia Coalition is made up of leading organizations in the Just Transition movement: Appalachian Voices, Coalfield Development Corporation, Rural Action, and Downstream Strategies. It has a long track record of partnering with coal-impacted communities and engaging state and regional development agencies to identify and implement mine reclamation projects that drive economic and social impacts in historically disadvantaged areas. It envisions a robust movement around innovative mine reclamation that supports the growth of a mature restoration economy in Central Appalachia and beyond. Each year, it works with community partners to secure and leverage funding to implement innovative projects while growing the movement around land restoration.

To date, the Coalition has fetched nearly $30 million in AML Pilot and leveraged funds for innovative land restoration and reuse projects across our region, which has resulted in short-term construction and permanent jobs at each project.

10. EMPOWERING A WORKFORCE

In order to capture the full local economic potential of the development areas discussed in Chapters 4 through 9, it may be necessary to empower a local workforce with the skills and tools needed to carry out the work. Historically, workforce development activities have taken place primarily at community and technical colleges. However, several relevant alternative models have arisen in the region, including Coalfield Development Corporation's 33-6-3 Model, the Trail Towns Program Model, and the Earth Conservancy's Environmental Workforce Training Program.

Coalfield Development Corporation's 33-6-3 Model

Based in the coalfields of West Virginia, Coalfield Development Corporation trains unemployed or underemployed people in modern workforce skills. Coalfield is working to promote a diversified economy in coal country by offering on-the-job learning opportunities in industries like real estate development, solar energy, sustainable construction, mine-land reclamation, wood working, agriculture, and artisan trades.

It employs a 33-6-3 training model. Each week, crew members complete 33 hours of paid work at the Coalfield family of social enterprises, six credit hours of higher education at local community colleges, and three hours of personal development and mentorship at Coalfield headquarters. At the end of their 2.5-year contract, trainees earn an associate's degree and enter the workforce with years of on-the-job experience under their belt and the life skills needed to be successful. Coalfield works within a network of employers to ensure its training is relevant to the needs of growing industries and that jobs are available for trainees on graduation.

To date, Coalfield has trained over 1,200 people in new economic sectors and created more than 250 jobs. Additionally, it estimates that it has supported or grown 50 new businesses, attracted over $20 million in new investment to the region, and directly redeveloped more than 200,000 square feet of formerly abandoned property.

For more information about Coalfield Development Corporation, its workforce development model, and its commitment to sustainability, contact Coalfield Development Corporation's Conservation Coordinator, Jacob Hannah at jhannah@coalfield-development.org.

Trail Towns Program Model

Workforce development for trails and recreation can take many different forms. Many communities are launching capacity-building efforts modeled off of those undertaken for the GAP through The Progress Fund's Trail Towns Program. The Trail Towns model helps communities tailor tourism- and trail-focused assistance to help local businesses tap into a growing trail economy.

Partners developing the Baileys Trail System in southeastern Ohio are launching their own iteration in the soon-to-be trailhead communities of Chauncey, Buchtel, and Doanville, Ohio. Project partner Rural Action has provided training sessions for local residents near the Baileys Trail System on how to run successful short-term rentals using Airbnb and other platforms. ACEnet plans to provide "pop-up offices" in trail towns where they will host workshops and provide assistance to residents developing business plans. Leaders are also working with the Appalachian Conservation Corps to create temporary jobs connected to trail-building where people can learn skills and gain certifications (such as in chainsaw use, for example). They have secured funding to support Athens High School in placing 12 paid high school interns per year in different organizations and companies throughout the region for work experience. Their goal is to expose young people to viable job options and career paths in the area.

For more information about the Trail Towns Program Model and how it has been applied in Ohio, contact Rural Action's Resilient Communities Coach, Dan Vorisek at dan@ruralaction.org.

The Environmental Workforce Training Program

With support from the Appalachian Regional Commission and Penn State-Wilkes Barre's Office of Continuing Education, the Earth Conservancy of Ashley, Pennsylvania offers a free 233-hour, three-month program designed to train unemployed, underemployed, or dislocated workers for careers in the environmental sector. The program focuses primarily on surveying, construction safety, hazardous material cleanup, and environmental technologies.

Specific courses include:

- Introduction to Brownfields,
- Surveying Field Assistant,
- Basic Land Surveying Techniques,
- AutoCAD,
- GIS for Resource Conservation,
- Environmental Sampling,
- OSHA 40-Hour HAZWOPER,
- OSHA 10-Hour Safety,
- First Aid/CPR, and
- Technical Writing.

For more information about the Environmental Workforce Training Program and its success in northeastern Pennsylvania, contact the Earth Conservancy's Director of Communications, Dr. Elizabeth Hughes at e.hughes@earthconservancy.org.

11. PROJECT FUNDING OPPORTUNITIES

As your project moves forward, grant funding may be available for planning and/or construction. There are many different funding streams that ReImagine groups or their partners could apply for, and it is recommended that each group develop a funding strategy as close to the beginning of each fiscal year as possible to maximize the chances of getting funded.

There are several recurring federal programs that should be on each group's radar:

1. **AML Pilot Program.** Economic development projects near abandoned coal mines may qualify for federal AML Pilot Program grants, which are administered locally by the Pennsylvania Department of Environmental Protection. In 2020, the Wolf administration released $25 million for projects through this program. Another $25 million is expected in 2021.
2. **POWER Grants.** The Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative targets federal resources to help communities and regions that have been affected by job losses in coal mining, coal power plant operations, and coal-related supply chain industries due to the changing economics of America's energy production. In 2020, the Appalachian Regional Commission announced $43.3 million of funding for 51 projects to support economic diversification in Appalachia's coal-impacted communities. Additional funding for POWER is expected to be allocated in 2021.
3. **USDA Rural Development Grants.** Dozens of USDA grant and loan programs are relevant to the various ReImagine initiatives, including the Rural Energy for America Program, which covers up to 25 percent of the cost of energy efficiency and/or renewable energy projects at small businesses and farms within qualified, non-urban areas.
4. **Economic Development Administration CARES Grants.** The Economic Development Administration published an Addendum to its Fiscal Year 2020 Public Works and Economic Adjustment Assistance Notice of Funding Opportunity, making an additional $1.467 billion in CARES Act funding available to eligible grantees in communities impacted by the coronavirus pandemic. One of its goals is to fund projects that increase economic resilience and a community's ability to weather economic shock. The Economic Development Administration is accepting proposals on a rolling basis. While the future of this program is somewhat uncertain, it is likely that it will continue in some form in 2021.
5. **Community Development Block Grants.** Public-private partnerships present additional opportunities for putting together funding solutions for innovative economic development projects. Public entities have access to recurring federal funding streams, like Community Development Block Grants, which have priorities and goals that are complementary to the projects promoted by the various ReImagine initiatives. These funding streams can and should be used as leverage or match.

12. FINAL THOUGHTS AND KEY TAKEAWAYS

This report provides simple tools that the ReImagine groups can use to estimate the economic benefits of projects—especially at an early stage of project development, before all of the details are known and before significant resources have been garnered. As described in Chapters 4 through 9, these tools will allow you to estimate the number of jobs created and wages paid to build a solar array or to install energy efficiency improvements, or to build a bioplastics plant or start a farmers' market. For certain sectors, tools are provided to calculate other local economic benefits beyond jobs and wages.

The data presented in this report are current as of the time this document was prepared; however, all data will eventually become outdated. While the example calculations and case studies are helpful starting places for initial back-of-the-envelope estimates, it is strongly suggested that the ReImagine groups make use of the references provided for each type of data and use the most up-to-date figures available.

Also, it is suggested that the ReImagine groups track and gather their own data whenever possible. While it is possible to make a first-cut approximation of the impact of a rail-trail based on usage measured at other rail-trails, there is no substitute for collecting your own data by conducting trail user surveys or via other methods.

As a project progresses from its initial conceptualization, more information will likely become available that will allow your initial economic benefits estimates to be refined. You may also garner the resources needed to hire an economist to perform a more formal economic analysis. Should you desire to engage an economist, the source of your funding may dictate the type of procurement process that is required. No matter which process is required, it is certainly a best practice to request qualifications and quotations from multiple consultants and to evaluate the proposals based not only on who can do the work most cheaply, but also on who has a track record of completing similar projects for satisfied clients.

In closing, this report provides straightforward tools that the ReImagine groups can use to estimate the economic benefits of projects, which will attract attention to your efforts and help turn nascent ideas into fundable concepts with clearer pathways to project implementation. Equally as important as the tools and data presented in this report are the case studies presented from groups throughout the region. Use these groups' experiences to help advance projects undertaken by the various ReImagine Initiatives. There is no need to reinvent the wheel. Most of the regional projects mentioned in this report are in economically distressed communities with historically underserved populations, and the community development organizations mentioned in this report have extensive experience designing and implementing impactful projects.

It is important to remember, however, that the economy is only one part of the sustainable development equation and that equal focus must be placed on the social and environmental impacts of projects. Similar time and energy should be spent developing complementary resources to this report that explore the social and environmental impacts of these different development areas.

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APPENDIX A: LOGIC MODEL WORKSHEET

LOGIC MODEL WORKSHEET

Use this worksheet to help develop or refine your project ideas.

Step 1: Project activities	Step 2: Project outputs	Step 3: Project outcomes
What specific activities or actions will your project undertake?	**List the short-term results and immediate impacts that will come about once you implement your project activities.**	**What's the long-term significance of your project? What ultimate changes will this work bring about?**
These activities form the basis for economic impact projections.	Use the tips, strategies, and standard industry estimates presented in Chapters 4–9 to translate these outputs into economic benefits.	
Project activities examples: • *Create a farmers' market.* • *Build 15 miles of new trail.*	**Project outputs examples:** • *A new trail will attract 1,000 visitors per year, who spend an average of $110 per day.* • *Building energy efficiency improvements will offset 250 tons of carbon emissions per year.* • *A solar installation will support 30 solar industry jobs.*	**Project outcomes examples:** • *Diversify the local economy.* • *Reduce fossil fuel dependence.* • *Increase community resilience.*