



# Final Report: Building Sustainable Communities in Ohio's Shale Region

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## Introduction

Rural communities throughout the eastern and southern regions of Ohio are experiencing sudden impacts as a result of the shale gas boom. The focus of the evaluation is to build capacity and long-term sustainability in these regions. The evaluation will measure **economic, social and environmental changes** that have occurred as a result of shale development to measure and understand the degree to which changes have affected communities and what opportunities, if any, are emerging as a result.

Economically, the impacts include the increasing demand for public and private goods and services as well as growth in tax revenues and large lease and royalty payments accruing to individual landowners. Socially, shale development impacts rural communities' social structures through the influx of new, often temporary workers, challenging existing community dynamics and the ability of existing institutions such as schools and social services to meet increased needs. Environmentally, shale development impacts land use, agricultural soils, water, and air quality.

This project, "Building Sustainable Communities in Ohio's Shale Region", addresses impacts from a perspective of sustainability. Specifically, the program responds to the need for a proactive approach that identifies changes and develops strategies to position the region for sustainable growth.

## Stakeholders and Team Management Plan

Three broad stakeholder groups are included in this program as described below:

1. Sustainable Strategic Planning Team: The Sustainable Strategic Planning Team consists of a multi-disciplinary group of Extension Educators and Specialists with expertise in community economics, energy development, sustainable community planning, community foundations and interpersonal relationships.
2. OSU Extension Shale Working Group: Draws on Extension personnel and faculty from various departments across the university and the Ohio Department of Natural Resource to develop accurate research-based information on shale energy exploration and drilling in Ohio.
3. Regional Economic Development Districts (EDD): Eastgate Regional Council of Governments (ERCG), Northeast Ohio Four County Regional Planning and Development Organization (NEFCO), Ohio Mid-Eastern Governments Association (OMEGA), and the Buckeye Hills-Hocking Valley Regional Development District (BH-HVRDD).

## Team Management Plan

**Table 1. Staffing Matrix**

<b>Extension Staff</b>	<b>Title</b>	<b>Key Specialization Related to Project</b>	<b>Activity Component(s)</b>	<b>% Time</b>
<b>Bowen, N.</b>	Associate Professor and Field Specialist Comm. Economics	Economic Impact Analysis	1,2,3,4,5, 6	15%
<b>Romich, E.</b>	Assistant Professor and Field Specialist Energy Development	Energy Development	2,3,4,5,6	11%
<b>Moss, M.</b>	Associate Professor, Extension Educator	Sustainable Community Development	2,3,4,5,6	11%
<b>Bond, C.</b>	Assistant Professor, Extension Educator	Community Planning	2,3,4,5,6	11%
<b>Civittolo, D.</b>	Associate Professor and Field Specialist Comm. Economics	Economic Development	2,3,4	7%
<b>Lloyd, M.</b>	Assistant Professor, Extension Educator	Oil and Gas /Economic Development	2,3,4	7%
<b>Bates, J.</b>	Assistant Professor and Field Specialist, Family Wellness	Community and Family Wellness	2,3,4	7%
<b>Loy, P.</b>	Extension Educator, Family & Consumer Sciences	Rural Community and Family Wellness	2,3,4	7%
<b>Bonnell, J.</b>	Program Director, Watershed Mgmt.	Environmental Planning	2,3,4	7%
<b>Economic Development Districts</b>	EDD Staff provided general project support as co-applicants and project partners	EDD personnel provided expertise in database development, GIS mapping, and helped to facilitate meetings	6	N/A

## Description of Personnel Activities

The project comprised of six key activity components

### 1. Project Management Component

- Monitor/oversee project activities
- Direct liaison with EDA representatives
- Grant fiscal management
- External evaluation of the project performance
- Coordinate OSU Extension Team
- Oversee collaborative relationships with EDDs
- Coordination with OSU Office of Sponsored Projects on project funds

### 2. Planning and Technical Assistance Component

- Create plan of work for program in coordination with regions
- Identify key stakeholders and coordinate project launch meetings
- Review data analysis results, asset mapping, and regional economic and demographic profiles and incorporate results into sustainable strategic planning process
- Coordinate and facilitate sustainable strategic planning sessions in each region
- Coordinate linkages between public and private partners in all four regions
- Host final celebratory meeting with regional stakeholders

### 3. Advanced Cluster Analysis, Industry Capacity Assessment and Asset Mapping Component:

- Gather relevant data to measure regional economic change
- Identify high growth industry clusters and employers
- Measure subsector strengths
- Map linkages between direct shale development activities and indirect activities that benefited from shale development
- Use GIS mapping to create visual depiction of change and potential change
- Report to team on evaluation of the qualitative status of the project
- Provide consultation and assistance to regions for the development of written documentation, priorities and development of projects
- Prepare targeted report for each region that compiles data analysis results

#### **4. Collaboration and Communications Component:**

- Establish communications for sustained outreach region-wide by hosting and facilitating web-based regional meetings on progress and best practices
- Develop new connections to gain support and ensure sustainability
- Develop database of regional partners, stakeholders and clientele
- Develop collaborative strategies to utilize resources
- Facilitate multi-regional discussions on implementation strategies
- Identify and address communications and information barriers
- Identify and research new economic drivers and regional linkages that will help to grow the collaboration and increase opportunities for shale value added development in the region
- Present final planning reports for each individual region and for the combined regions

#### **5. Evaluation and Implementation Strategies Component**

- Develop a variety of evaluation techniques to monitor the effectiveness of the project as it progresses
- Provide progress reports to OSU Extension team on evaluation of qualitative indicators of the project
- Provide consultation and assistance to regions for the development of written documentation, priorities and development of projects
- Complete final report and evaluation; share with EDDs, stakeholders, EDA

#### **6. Project Support as Needed**

- Subject matter expertise and project support was provided, as needed, by members of the OSU Extension Shale Working Group, County Extension Educators and Specialists, were called upon from time-to-time during the project for project support and subject matter expertise as needed. The EDD's provided general support for the project as well as specific expertise in GIS mapping and in the compilation of a database of supply-chain manufacturing businesses within the shale development cluster. Manufacturers were identified as a result of the advanced cluster analysis and industry capacity assessment conducted by the OSU Extension. EDD's will assisted by identifying project participants and by hosting and helping to facilitate regional project-related meetings.

The two primary team goals included conducting economic trend analysis and developing a sustainable community development planning process to guide long-range decision-making by educating community leaders, residents, planners, and elected officials on the characteristics and potential challenges of a natural resource shale energy economy.

## Reporting Plan

In addition to required biannual reports to EDA, the OSU Sustainable Strategic Planning Team provided both formal reports and oral presentations for to stakeholders in the 25-county region. Presentations were conducted to share the results of the analyses. This three-year program also included the following planning reporting activities listed in Table 2 below:

**Table 2. Reporting Activity Chart**

	<b>Reporting Activity</b>	<b>Frequency</b>
1	Cluster Development Trend Results: Technical reports, oral presentations and press releases, and blog postings	Quarterly or biannually
2	Industry Capacity Assessment Survey Results: Technical reports, oral presentations and press releases, in addition to blog postings.	Quarterly or biannually
3	Sustainability Planning Process: Planning process developed to address social, environmental and economic considerations of a sustainable shale development strategy.	One-time training and sharing of modules
4	Implementation and Final Report: Develop and deliver final report to regions and to the Economic Development Administration. Press release and press conference in addition to blog posting.	One-time

## Timeline

This three-year project, which began in January 2014, resulted in the development of an analysis and sustainable planning process to identify manufacturing opportunities within a shale-impacted region. This process can easily be replicated in other shale play regions of the U.S. The three-year timeline and activities are described in Table 2.

**Table 3. Timeline Chart**

	<b>Activity</b>	<b>Time Period</b>
1	Economic Trend Analysis: Access formal datasets and conduct an advanced cluster analysis and report results to the EDD regions	Jan-Oct 2014
2	Business and Industry Survey: Conduct an industry capacity assessment/Business Retention and Expansion (BR&E) initiative and report results to the EDD regions	Oct 2014-April 2015
3	Sustainable Planning: Deliver a sustainable planning process in partnership with the regions to address the social, environmental and economic considerations of a shale development	March 2015-Oct 2015
4	Implementation: Develop implementation strategies with EDD regions sessions during working sessions with regions (conducted 10/15, 2/16 and 5/16)	Oct 2015-Aug 2016
5	Report and Replicate: Develop and deliver final report to regions and to the EDA. Introduce program to other shale-impacted regions.	May 2016-Aug 2016

# Development Trends, Project Justification, and Literature Review

## Background

Across the country, there is promising evidence of new investment, new companies, and new jobs being created through higher education's efforts (Shaffer & Wright, 2010).

Since growth is desirable for most communities, complacency often sets in when community leaders expect a boom to continue forever. According to Kelsey, Partridge and White (2016), some U.S. communities have expressed this optimism in the past, particularly during the energy booms of the 1970s and 1980s.

“Extension educators should engage communities in renewable energy education to build the capacity of local officials, preparing them to successfully assess the impacts of renewable energy projects,” (Romich & Bowen-Ellzey, 2013). The same approach would apply to non-renewable energy resources with the goal of helping communities prepare for future growth opportunities.

Fortson predicted this critical contribution in her 2006 article, "Extension agents [Educators] across the country are in the best possible position to both introduce this new [energy-related] industry to America's farmers and ranchers and support them through the tides of change. In doing so, we'll help create a crop of entirely new possibilities". Extension professionals have a growing responsibility to provide research-based data to our customers about these emerging opportunities (Fortson, 2006).

Christopherson and Rightor (2011) asked, “What costs do communities face in conjunction with shale gas drilling? What are likely to be the cumulative effects of shale gas drilling and production, not only from the drilling process itself, but also from the industrial infrastructure required to transport and store the gas and to service the wells. How will these costs be affected by the pace and scale of drilling?”

Kelsey, Partridge and White (2015), recommend, “Restricting development patterns can help constrain oil and gas mining operations to address infrastructure solutions. Land use controls can be very controversial but necessary to avoid becoming “unwilling sacrifice zones”.

Some scholar’s look beyond the economic impact of natural resource based energy development to examine how communities and regions are coping and planning for the future. They argue the need for increased research to measure change and identify best practices that can be replicated in other regions affected by natural resources.

## Measuring Economic, Social, and Environmental Impact of Shale Development

Evidence-based analysis provides stakeholders with the information they need to make informed decisions. Literature supports the need for careful analysis of existing and original data to help stakeholders understand the potential impacts of shale development on their communities.

As economic development professionals, Extension professionals and their clientele go about their work in creating healthy, vibrant communities, they may wish to gain a better insight as to how their local economies operate. An input-output (IO) model such as IMPLAN provides a relatively straightforward description of an economy (Blaine, Bowen-Ellzey, Davis, 2011).

In addition to employing IMPLAN to track economic change, another private data source is enterprise-level data from the Ohio Longitudinal Data Archive<sup>1</sup> at OSU, and public data sources cited for this evaluation include Ohio Development Services Agency Office of Research and U.S. Bureau of Economic Analysis.

Black, Mckinnish, and Sanders (2005) examined how counties in West Virginia, Kentucky, Ohio, and Pennsylvania fared during the coal boom of the 1970s and subsequent bust in the 1980s. In terms of employment effects, they found that the bust had a stronger negative effect than the boom's positive effect.

In fact, according to Tsvetkova and Partridge (2015), energy sector booms are negligible to negative in metropolitan areas, mostly due to metro areas being large and energy being a relatively small sector in terms of employment. Even though there are positive net spillovers for several sectors in rural areas, the longer-term positive effects are on non-traded goods employment (e.g. public service, construction, tourism), not on the manufacturing sector.

A literature review authored by Kinnaman (2011) described three studies that attempted to measure the economic impact of shale gas extraction and found disputed evidence that there is significant economic impact related to shale development. In reviewing one report, Kinnaman summarized, 'the authors of this report unfortunately draw the wrong conclusions by describing changes in economic variables in shale areas as "tremendous" and those in non-shale areas as "negligible". The review report concluded that these reports should be discounted and accurate estimates of shale extraction should be developed.

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<sup>1</sup> The Ohio Longitudinal Data Archive is a project of the Ohio Education Research Center ([oerc.osu.edu](http://oerc.osu.edu)), and provides researchers with centralized access to administrative data. The OLDA is managed by The Ohio State University's Center for Human Resource Research ([chrr.osu.edu](http://chrr.osu.edu)) in collaboration with Ohio's state workforce and education agencies ([ohioanalytics.gov](http://ohioanalytics.gov)), with those agencies providing oversight and funding.

## Sustainable Planning

Literature supports the need for proactive, sustainable planning to prepare for the potential “bust” that can occur in natural resource-based economies.

Two planning strategies identified by Kelsey, Partridge and White (2015) are: 1) planning for diversification and, 2) planning for development of permanent funds. To effectively implement these two forms of planning, communities can capture revenues generated by ongoing energy activities through severance, property, sales (sales taxes come to counties directly and are the primary increasing income stream from energy development in Ohio - possibly other states too) or corporate income taxes, and/or impact fees to fund targeted activities.

As part of his dissertation research, Joe Campbell conducted a case study to examine how one county in Ohio was adjusting to the shale boom. He found that Jefferson County’s resiliency to the changes taking place was based in large part on a framework of collaborative management that had been built among leading elected officials, public administrators and private-sector leaders during the 1990s and 2000s (Campbell, 2013).

In her article *Unconventional Oil and Gas Development’s Impact on State and Local Economies*, Weinstein (2014) stated “oil and gas development has undoubtedly increased the employment and earnings in communities impacted by shale resources. However, sustained, stable economic growth should be the goal of these communities or any community.”

“Communities may be able to actually lessen the impact of a bust by using their newfound fortunes to prepare for the long run—by diversifying their economies, raising the skill level of their workforce, maintaining or improving their local services, and mitigating social or environment effects.”

The above literature review supports a thoughtful, collaborative approach to energy development and sustainable planning by rural communities. It also supports the need for an evaluation of intervention programs that are focused on the potential “boom/bust” that can occur in regions rich in natural resources.

This project reflects this need for Extension to play a role in engaging community stakeholders to plan for a sustainable future based on leveraging benefits or energy development to support long term manufacturing employment opportunities. Therefore, an evaluation is necessary to determine the impact that proactive planning conducted by Extension researchers in collaboration with local stakeholders can have on the future sustainability of a region affected by shale development.

## Description of Project and Methodology

### Context

Many are calling shale gas and oil development a “game changer.” According to a 2012 International Energy Agency (IEA) report, as a result of shale energy development the United States will overtake Saudi Arabia as the world's largest oil producer by around 2020. Rural communities throughout the eastern and southern Ohio regions have been affected by the wave of shale energy development and are vulnerable to long-term economic fluctuations experienced by natural resource dependent economies.

It is essential that the influences on a community’s social structure from shale energy development are understood and managed through strategic planning. For example, the influx of new, often temporary workers, can challenge existing community dynamics and stress the ability of existing institutions such as schools and social services to meet increased needs.

While the social impacts must be considered and effectively managed, the economic implications to landowners and communities are unprecedented for the region. Economically, the impacts of shale energy development include the growing demand for public and private goods and services as well as increasing tax revenues and large sums of money for individual landowners.

For example, during a CNBC Nightly News interview with Brian Williams, it was noted that shale energy development in eastern Ohio has resulted in 88 new millionaires in Harrison County. In addition, the report noted that local high schools were offering welding training programs to establish a workforce for anticipated oil and gas jobs in the region.

This three-year grant funded project brings together 25 counties within four Economic Development Districts (EDD’s) in eastern Ohio, and an Ohio State University Extension team (OSU team), to support the development and growth of manufacturing employment opportunities as well as a “shale industry” cluster through sustainable planning. The targeted audience is EDD board members and staff, community leaders, residents, elected officials and other stakeholders involved in the future community economic development of the four regions.

The program includes original research, outreach programming, and sustainable community planning including the development of implementation strategies to be adopted as part of the regions’ Community Economic Development Strategy (CEDS) plans.

## **Logic Model**

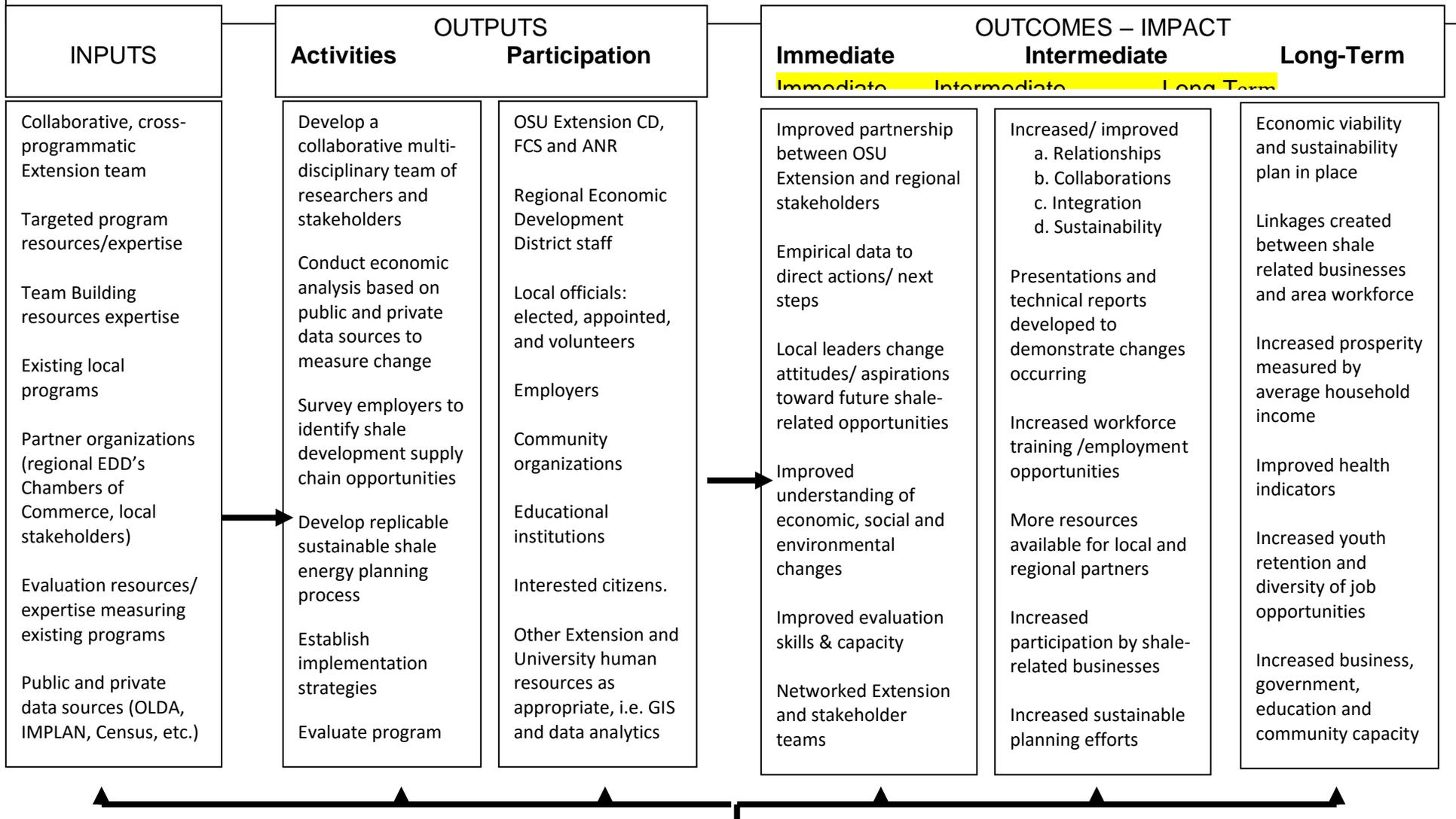
A logic model was developed to organize and manage project flow, including expected inputs, outputs and anticipated outcomes for the project. Logic models are tools frequently used in Extension work to assist in program management and to assure objectives are met. Below is a list of ten outputs, or activities and the participants involved in project development and completion. See Table 4 for a detailed logic model developed for the project.

## **Expected Outputs**

1. Partnerships with four regional Economic Development Districts and local and regional stakeholders.
2. Integrated/interdisciplinary program planning team.
3. Ohio Department of Job and Family Services approval for access to raw enterprise and workforce data used for analysis through the Center for Human Resource Research.
4. Cluster analysis presentations and reports for four regions.
5. Industry capacity assessment and business retention and expansion presentations and/or reports.
6. Survey instrument for industry capacity assessment to include questions on supply chain linkages and workforce development.
7. Sustainable strategic planning process including program materials and resources.
8. Revised comprehensive economic development strategy documents for four regions that include implementation strategies.
9. Program evaluation plan.
10. Formal reports to the four EDD regions and to EDA the funder.

**Table 4: Building Sustainable Communities Logic Model**

**ASSUMPTION:** Recognizing the need to be strategic about the current oil and gas boom, an OSU Extension planning team is conducting economic trend analysis, developing a curriculum, and collaborating with stakeholders to develop an implementation plan to support long-term economic viability and community sustainability in the shale-impacted region of Ohio.



**EXTERNAL FACTORS:** Smaller, rural communities have fewer opportunities/systems create collaboration between business and the workforce. There exists a need to develop and encourage sustainable planning efforts that build capacity and improve communication between regional partners and businesses.

## Focus of the Project

### Goals

This grant funded program, *Building Sustainable Communities in Ohio's Shale Region: Leveraging Manufacturing Clusters and Local Assets with Strategic Planning*, recognizes the need to be strategic about the current oil and gas boom in Ohio. An OSU Extension team conducted trend analysis and collaboration events with stakeholders to develop a plan to support long-term economic viability and community sustainability.

To achieve these goals, the program objectives were to: 1) form a collaborative team of researchers and community stakeholders, 2) analyze economic trends based on private and public data sources to measure change, 3) build capacity and sustainability through education and strategic planning.

In sum, the primary focus of this project is to build community capacity, promote long-term sustainability and economic diversity. This can be accomplished by countering the permanent reduction of non-renewable natural resource (extraction) by proactively developing a sustainable plan to increase human, environmental, and built capital.

### Approach

The underlying evaluation approach for this study is a participant-oriented approach allowing for some flexibility in activities and methods, with the primary purpose to inform decisions. Stakeholders in the 25-county region will ultimately decide which strategies that will be implemented to sustain their regional economies.

The approach for this project also included a program-oriented component. In writing a grant through the Economic Development Administration to conduct the program, the OSU team was challenged to explain the theory behind the program, and why we think the program will be successful. Development of the theory behind the program involved numerous stakeholders, including funders, who continue to drive the process.

The program-oriented approach also involves stakeholders to identify key research questions and methods to be used. Research questions were developed for both the process and the results aspects of the project and are listed below. Questions are accompanied by criteria and standards that help to validate the project results and assure accountability.

## Research Questions

### Process Questions:

1. *Has a collaborative been formed combining a multi-disciplinary team of researchers and regional stakeholders to develop the plan?*  
**Criteria:** Diversity and number of team members  
**Standard:** Representatives from at least three OSU units or departments and 15 stakeholders from each of the four geographic regions.
2. *Are sufficient resources available to conduct research that will result in informed implementation strategies?*  
**Criteria:** Citation and description of data resources and research methodology  
**Standard:** At least 2 private and 2 public data sources and valid investigative methods used to measure at least 3 indicators for economic, social and environmental change within all four regions.
3. *Are program results being reported and tracked to evaluate outcomes?*  
**Criteria:** Reporting requirements included in the scope of work agreed upon by the funder, OSU Extension and the regions.  
**Standard:** Implementation strategies developed and results tracked for each of four regions. Outcomes to be measured and evaluated annually.

### Results Questions:

4. *Is the regional economy changing due to shale development and based upon economic, social and environmental indicators?*  
**Criteria:** Indicators measuring economic, social and environmental changes in each of the four regions in eastern Ohio.  
**Standard:** Measurable changes of at least 10% for half of the change indicators within the 3-year project window for each of the four region.
5. *Do regional assets, growth opportunities and/or industry linkages exist that can be further developed to bring about sustainable growth?*  
**Criteria:** Increased understanding of growth opportunities, assets and linkages that can lead to long-term sustainable growth.  
**Standard:** Stakeholders reach consensus on at least 3 implementation strategies to leverage shale development opportunities and mitigate social or environmental concerns for inclusion in regional sustainable plans.
6. *Will changes and opportunities inform the creation of a long-term sustainable plan that increases capacity in the shale-impacted region of Ohio?*  
**Criteria:** Implementation of a long-term sustainable plan.  
**Standard:** Increased diversification index, net new jobs, higher wages and mitigated or addressed environmental and social concerns. At least one new public/private sector network or formal collaboration developed.

# Methodology, Research Procedures and Results

## Data Sources

The OSU Extension research team accessed two private sources of data, IMPLAN (IMPact Analysis for PLANning) and OLDA (Ohio Longitudinal Data Archive). Public data sources that were accessed include StatsAmerica, a public on-line data source, in addition to the Bureau of Labor Statistics and the National Association of Industry Classification Codes. A survey of manufacturers in the 25-county eastern Ohio shale-impacted region also provided original data for analysis.

## Data Collection Methods

- Records and original data. Researchers identified criteria (geography, year, NAICS code, etc.) for data needed. For instance, the OLDA data is at the aggregate, employer enterprise level. We are reducing the size and organizing the OLDA data set and aggregating the OLDA data for the top 20 industries by change in employment and wages to simplify and reduce analytical steps.
- Survey. Data collected was both quantitative and qualitative through responses to a survey. A database was developed containing about 1,500 manufacturers within the 25-county region. A link to the survey, created in Qualtrics, was e-mailed to the database and input collected and organized for analysis.
- Regional stakeholder focus groups and meetings. Regional meetings were conducted to engage stakeholders in the process of identifying and formulating strategies. OSU researchers used multiple methods, one-on-one interviews and focus group meetings, to engage them in the process.

## Data Collection Arrangements

- The OLDA database was accessed via restricted access. The CHRR staff sends the authorized team members a link to the updated data and the team is then able to download the data into SPSS, excel or a comma-separated format. The database is private and no unauthorized access is permitted.
- The OSU Extension Community Development team received permission from the Ohio Department of Job and Family Services in 2014 to access the OLDA data from CHRR on a quarterly basis.
- IMPLAN data is purchased annually as part of a license agreement. The data set is available for download through the IMPLAN website on an

annual basis. Once it is available for download, an e-mail link is sent to licensed users. Other demographic data was accessed on the public websites, including census data sets that are updated quarterly.

- Three researchers on the team were responsible for the dissemination and collection of the data using a survey instrument. This data was collected one month after dissemination of the survey, organized and initial reports developed using the Qualtrics survey software.
- Once the initial research was completed, findings were shared with stakeholders within six months in a format results report and also presentations. Researchers then facilitated focus group meetings to begin developing implementation strategies. Data was collected during stakeholder meetings and aggregated with other findings into a report.

### Economic Analysis Procedures

This program included original research, outreach, and sustainable community planning including development of implementation strategies to be adopted as part of the regions' Community Economic Development Strategy (CEDS) plans. Table 4 summarizes the research questions, analysis, interpretation and reporting procedures for each of the following questions.

**Table 5. Summary of Research Questions, Procedures and Reporting**

Evaluation Questions or Objectives	Analysis Procedures	Interpretation Procedures and Criteria	Reporting of Information		
			To Whom	How	When
<b><i>How is the eastern Ohio regional economy changing due to shale development?</i></b>	Quantitative methods including cluster and shift share analysis	Longitudinal tracking of economic changes by sector, employment and wages	Regional EDD's, stakeholders and the project funder: EDA	Technical reports, blogs, meetings, and press releases	Quarterly or as needed
<b><i>What regional economic growth opportunities are emerging that can be developed to bring about sustainability?</i></b>	Quantitative statistical methods to including frequency distributions, correlations and probability	Associating strengths and linkages using correlation and coefficients for strategy decision-making	Regional EDD's, stakeholders and the project funder: EDA	Technical reports, blogs, meetings and press releases	Quarterly or as needed
<b><i>How will economic</i></b>	Qualitative describing	SMART (specific,	Regional EDD's,	Formal plan,	At the end of the

<b>changes and opportunities inform the creation of a long-term sustainable plan that increases capacity in the region?</b>	and assessing the need and determining sustainability strategies	measurable, attainable, responsible person, time specific) implementation strategies developed	stakeholders and the project funder: EDA, media and university partners	press release, and presentations. Final report to funder	3-year project
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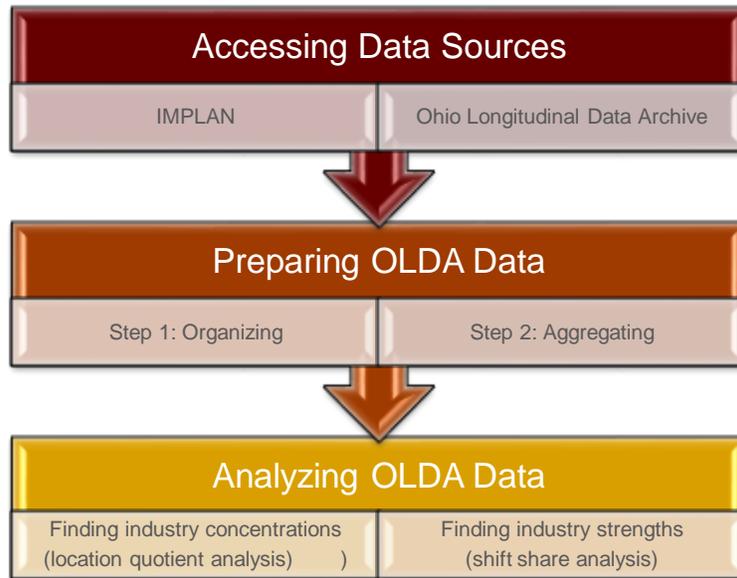
An initial analysis included researching demographic trends for the 25-county region. Retrieved October 25, 2015, demographics included population, ([https://development.ohio.gov/reports/reports\\_pop\\_proj\\_map.htm](https://development.ohio.gov/reports/reports_pop_proj_map.htm)), per capita income, poverty rate, and unemployment rate. Trends are summarized below:

- In 2014, the 25 County Region total population of 2,575,298 was about 22.2% of the State of Ohio’s total population (11,507,808).
- The NEFCO Region had the largest population at 1,195,098, followed by OMEGA (585,181) and Eastgate (537,554). The Buckeye Region had the least population at 257,465, which made up only 10% of the total population in the 25 county region in 2014.
- While the State of Ohio’s population increased slightly between 2010 and 2014, the 25-County Region showed a slight decrease in terms of total population. Of the 4 Regions, only the NEFCO Region showed a slight increase in population. In terms of actual population numbers, the Eastgate Region lost the most population (from 550,627 in 2010 to 537,554 in 2014).
- While the per capita income in Ohio was \$41,049 in 2014, the 25 County Region had a per capita income of \$38,193, which was almost \$3,000 less than the State of Ohio’s. Of the four regions, the NEFCO was the only region above the State of Ohio’s per capita income. In 2014, the NEFCO Region had a per capita income of \$41,685, almost \$700 above the State of Ohio’s per capita income. The Buckeye Region had the lowest per capita income in 2014 at \$32,198, almost \$9,000 less than the State of Ohio’s.
- While the State of Ohio had a labor force of 5,765,704 in 2014, the 25 County Region had 1,124,012, which made up almost 20% of the total labor force in Ohio. While the labor force in Ohio actually increased between 2009 and 2014, the 25 County Region saw a decrease. For example, in the Eastgate Region, the labor force shrank by over 16,000 people between 2009 and 2014.

- The Unemployment Rate in the State of Ohio in 2014 was 7.4%. The 25 County Region had an unemployment rate of 5.4% during the same time frame. In fact, all 4 Regions were below that State of Ohio's unemployment rate with the lowest found in the NEFCO region (5.0%), followed closely by OMEGA (5.5%) and Eastgate (5.9%).

The economic analysis was conducted using two procedures described below: 1) advanced industry cluster analysis, including LQ and shift share analyses and, 2) industry capacity assessment. Figure 1 outlines the steps used for the advanced industry cluster analysis.

**Figure 1. Data Analysis Procedures**



### Advanced Industry Cluster Analysis

The OSU research team measured and examined economic changes as a result of shale development for the 25-county region and for each of the four EDD's between 2010-2014. The primary objective of this research was to better understand to what degree the community and regional economy changes as a result of shale development.

The data analysis process included accessing two sources of data for the Advanced Cluster Analysis stage of the data analysis process, IMPLAN and OLDA. IMPLAN will provide an overview of industry contributions by region. The OLDA will give us specific industry concentrations and industry strengths (cluster concentrations and sector drill down).

Once team members reduced the size and organized the OLDA dataset, the OLDA data was then be aggregated for the top 20 industries by change in

employment and wages for each region. The team then conducted Location Quotient (LQ) and Shift Share analyses of the top manufacturing sectors to measure the relative concentration and strength of the sectors. This helped to determine which clusters are strong due to regional or national market confluences.

### **Industry Capacity Assessment**

Another aspect of this project was to provide an assessment of industry capacity related to shale development. The assessment surveyed over 1,500 manufacturers within five broad industry sectors that may be primed for growth or have potential for growth in the future. This assessment mapped the strengths and assets related to the shale industry to determine the strength of the industry clusters and how they are linked. Industry sectors were also measured for potential economic impact and regional cluster sustainability within the shale development industry.

### **Summary of Economic Analysis Results**

As a result of the advanced cluster analysis and industry capacity assessment, five industrial sectors emerged that were identified as being most relevant to the expansion of oil and gas manufacturing activities in the 25-County region:

- **Energy**
- **Chemicals & Chemical Based Products**
- **Metals Manufacturing**
- **Forest and Wood Products**
- **Machinery Manufacturing**

Further analysis of the growth or contraction of the five industrial sectors was tracked over a four year period between 2010-2014 and the results demonstrated that the LQ's for each of the five industry sectors increased. LQ's for the five industry sectors in the 25-County region are listed in Table 6, which was excerpted from the 25-County Region Economic Report (see Appendix 1 for full report). Appendix 2 includes maps depicting LQ's for each of the five industry clusters within the four regions.

Location quotients show the strength and concentration of industry sectors relative to the U.S. economy based on employment. While all five clusters showed a strong LQ of over one, the Machinery Manufacturing cluster had the highest percent change in the 25 county region of 53%. Even though the Chemicals and Chemical Based Products and Energy clusters showed a negative change, these clusters in the 25 county region were extremely strong relative to the U.S. with LQ's much greater than one.

**Table 6. 25 County Region Manufacturing Clusters by LQ**

Cluster Description	2010 LQ	2014 LQ	% Change
Metals Manufacturing	3.33	3.43	3%
Chemicals & Chemical Based Products	2.56	2.38	-7%
Machinery Manufacturing	1.25	1.92	53%
Energy	1.71	1.61	6%
Forest and Wood Products	1.42	1.48	4%

Source: Quarterly Census of Employment and Wages, accessed from the Ohio Longitudinal Data Archive

Table 7 shows the results of the shift share analysis for the 25-county region. Significant job growth took place in all five clusters, clusters that account for the majority of manufacturing jobs in the region between 2010-2014. The cluster with the largest increase in jobs during this period was the Machinery Manufacturing cluster. This cluster is comprised of NAICS category 333, a broad group that includes agriculture, construction, mining, and commercial and industrial machinery. The group also includes HVAC machinery and engine, turbine and power equipment machinery manufacturing. With the regions strong concentration in manufacturing jobs, this cluster is comprised of processes used in manufacturing, such as welding and assembling parts, representing skills that support a growing manufacturing base.

**Table 7. 25 County Region Manufacturing Clusters by Shift Share Analysis**

Cluster Description	National Share	Industry Mix	Regional Shift	Total Change (2010 - 2014)
Machinery Manufacturing	1,544	308	26,562	28,413
Chemicals & Chemical Based Products	823	-77	14,220	15,043
Energy	1,051	-343	6,832	7,540
Metals Manufacturing	2,404	-39	21,978	24,343
Forest and Wood Products	31	27	5,782	5,840

Source: Quarterly Census of Employment and Wages, accessed from the Ohio Longitudinal Data Archive

With over 90% of the job creation in the five clusters occurring as a result of regional factors, researchers conclude that much of the positive changes, although potentially short term, took place due to some unique competitive advantage. The advantage could be attributed to a skilled workforce, beneficial business clustering, favorable environments for development activities, or other similar assets. This competitive advantage is allowing these sectors to grow faster and to a greater extent than in other parts of the country. While the regional effect was positive for all five clusters within the 25-county region, national factors - effects present in the larger national economy that may be pushing these developments forward, was only a small factor in one sector, energy.

This analysis defines and demonstrates growing clusters and emerging manufacturing linkages that can be related to shale development. These linkages and potential new development activities appear to be more pronounced in the Machinery and Metals Manufacturing clusters. These two clusters together accounted for over 52,000 net new jobs within the 25-county region between 2010-2014. These two clusters were #1 and #2 in total employment change during this period, representing almost half of the total job growth.

Researchers recommend further development or attraction of new or expansion of existing businesses that help to grow regional cluster strengths. Strategies developed by the EDD's, largely based on this research, are listed and included in a later section of this report. A full report of the economic research findings is included in Appendix 1.

## **Sustainable Strategic Planning**

Another key objective of the project was to develop and deliver a sustainable strategic planning process in partnership with the regions to promote long-term community sustainability and economic diversity. This was accomplished by identifying key social, environmental and economic indicators that measure changes in human, ecological, and built capital in support of the advancement of manufacturing as identified through the economic analysis. This holistic approach to planning aims to help the regions, and their communities, develop implementation strategies that support community sustainability, the advancement of manufacturing cluster advancement, and overall regional economic diversity.

To better understand the conditions affecting the 25-county region being studied, economic, social and environmental indicators and the factors and influences affecting the regions were researched and are discussed in the following sections.

## **Social Factors and Influences**

### ***Introduction***

Shale oil and gas industries have a significant impact on rural communities because of their relatively low population density and little economic and social diversification (Lendel, 2014). These communities cannot easily absorb change, and as shale development has been associated with challenges related to social and family services, emergency response services, and law enforcement. Increased communication capacity, enhanced equipment and training, and additional individuals are needed to provide these services.

The rapid and short-term influx of out-of-state workers may change a rural community's culture. The in-migration of temporary labor can be documented by the increase of beds filled in hotel/motels, construction of new temporary housing facilities, and increases in local bed taxes. This in-migration places a strain on the availability and affordability of rental property and other local resources. In addition, small community infrastructures are ill equipped to handle shale development-related emergencies and issues of public safety related to the rapid and sudden influx of temporary workers. Many small communities have limited or shared volunteer law enforcement and/or volunteer emergency and fire response teams. The size and duration of this influx of temporary workers is difficult to predict. However, by reviewing trends, the magnitude of shale development and the economic pace can help to predict the depth of impact.

This section considers the trends of four social factors that may be impacted by shale development. They are housing, crime, philanthropy, and public primary and secondary school education. Shale development significantly affects predominantly rural communities with relatively low population density and little economic and social diversification (Lendel, 2014). These communities cannot easily absorb change, and shale development has been associated with many challenges related to social and family services, emergency response abilities, and law enforcement. Increased communication capacity, enhanced equipment and training, and additional trained individuals are needed to provide these services.

### ***Housing***

There is an in-migration of temporary labor as documented by the increased occupancy rate of hotel/motel beds and strains on local housing resources. (I took the rest of this out because it is a repeat of the introduction.)

Shale development in the United States and influx of temporary workers has generated two major types of housing impacts. First, housing costs have risen as a result of the demand for housing by non-local shale workers. Second rural

communities have seen an increase in the development of new hotels, also due to shale worker demand. Some of these rural communities had no or few hotels prior to rapid shale development.

Some research initiatives have characterized and categorized the impacts of unconventional drilling. Communities acknowledge an impact on housing. A housing needs survey (BBC Research 2013 – is there a better reference for this?) of key leaders and stakeholders indicated the key impacts in unconventional drilling areas were:

- ✓ extremely low vacancy,
- ✓ escalating housing costs,
- ✓ low income families forced to move (result of increase in housing costs),
- ✓ shortage of temporary housing and,
- ✓ crew or man camps

The four regions and twenty-five counties in this mirror the BBC Research results caused by an influx of temporary workers and an increase in bed tax (hotel occupancy) followed by a decrease in beds filled as shale activity decreases and temporary workers left.

### **Crime**

A recent study (Raimi, 2012) used a statistical analysis to determine whether there were significant relationships between drilling and crime rates. The results showed that in Colorado and Wyoming, increased shale development was significantly correlated with high rates of violent crime, particularly aggravated assault. In North Dakota, Oklahoma, and Pennsylvania, no relationship was found between shale development and crime rates. In Texas, the data showed a significant relationship between increased shale development and lower non-violent crime rates. The mixed results indicate that a broad generalization between shale development and crime rates cannot be made.

The media sensationalized perception of shale impacted communities has resulted in the fear of increased crime in unconventional drilling areas. Public opinion survey research indicates that residents perceive that crime in their community will likely worsen as shale development increases (Theodori, 2009). At the same time, residents also believe that local police protection will likely increase as a result. This sentiment suggests an implicit trust placed in community leaders to address crime and public safety with the hiring of additional police officers (Wynveen, 2011). However, as noted above, many small rural communities in Ohio may not have funds available to expand services. Regardless of whether crime rates actually change, the anticipated or perceived impacts can be a source of social disruption within a community (Wynveen, 2011).

The four regions in Ohio reported data on:

- ✓ misdemeanor summons,

- ✓ OVI arrests
- ✓ crashes and, number of crashes

## ***Philanthropy***

Studies have projected employment growth, wealth creation, and an increase in the gross state product resulting from shale development. There are many acres of land under drilling leases. Property owners are paid lease bonuses for granting drilling right to oil and gas producing companies and receive royalty payments as a percentage of production value if there is a producing well.

Increased wealth in some of the communities of these property owners has introduced challenges such as personal financial management and family wealth. In addition, there are examples of charitable and philanthropic development in these shale rich communities.

Tracking and statistically analyzing philanthropic growth is challenging. Some of the challenges include the report system and categorization of philanthropic giving. Nonprofit, private foundation, community foundation, and corporate foundation are just a few of the types of philanthropic giving.

The number of foundations and assets varies substantially by county. Other factors to consider include population, poverty rate, educational attainment and annual family income. Historically these factors have correlated with philanthropic giving. Lastly, foundations may be administered to a specific county or community but has a physical address and is reported in a different county, region or even state.

For the purposes of this research a statistical picture of private foundations was developed, acknowledging that other types of philanthropic efforts also exist in the region.

## ***Methodology***

According to the National Center for Charitable Statistics in 2014 there were 1,057,231 tax exempt organizations in the United States. Tax-exempt organizations include public charities, nonprofit organizations, and private foundations. Reported here are the number of private foundations and their assets. Foundations are a key indicator of philanthropic giving for long-term sustainability of a community. The number of foundations by county and their assets are reported on IRS Form 990.

Foundations are reported to the IRS according to their physical address within the county or state in which they are located. While a county may not report having many (or any) foundations within the county boundaries, they may receive funds by a foundation outside the county or even outside the state.

**Table 8: Private Foundation Assets**

<i>Private Foundations Assets</i>				
	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>
<i>Eastgate</i>				
<i>*Ashtabula</i>	<b>35,270,475</b>	35,607,402	37,327,801	<b>113,409,783</b>
<i>*Trumbull</i>	97,825,241	91,054,589	88,361,753	97,227,656
<i>*Mahoning</i>	<b>168,554,925</b>	174,538,084	180,199,264	<b>198,457,092</b>
<i>NEFCO</i>				
<i>Portage</i>	5,026,554	5,080,300	5,878,124	5,350,119
<i>Stark</i>	257,862,048	263,249,367	246,785,632	248,569,113
<i>*Summit</i>	<b>674,589,665</b>	685,457,589	579,151,834	<b>803,606,367</b>
<i>Wayne</i>	54,603,982	52,699,547	56,222,425	57,943,694
<i>Ohio Mid- Eastern</i>				
<i>Belmont</i>	2,846,695	2,851,423	2,864,596	1,709,065
<i>Carroll</i>	<b>803,674</b>	801,561	1,236,497	<b>1,316,532</b>
<i>Columbiana</i>	13,479,800	16,021,191	15,139,214	12,821,508
<i>Coshocton</i>	26,095,143	26,670,376	21,972,120	22,920,609
<i>Guernsey</i>	2,838,933	2,508,417	2,555,870	2,576,799
<i>*Harrison</i>	<b>0</b>	0	0	<b>27,813</b>
<i>*Holmes</i>	<b>12,468</b>	72,429	85,998	<b>155,306</b>
<i>*Jefferson</i>	<b>22,122,374</b>	36,738,123	36,152,903	<b>39,469,588</b>
<i>*Muskingum</i>	<b>23,384,146</b>	40,446,775	41,225,182	<b>46,179,760</b>
<i>Tuscarawas</i>	90,128,837	89,218,870	90,228,164	88,923,049
<i>Buckeye Hills</i>				
<i>Athens</i>	2,342,589	2,965,596	1,804,846	1,952,117
<i>Hocking</i>	7,955,761	7,723,303	8,658,052	8,747,630
<i>Meigs</i>	1,312,963	1,335,869	1,408,221	2,025,295
<i>Monroe</i>	0	0	0	0
<i>Morgan</i>	4,565,153	4,502,168	4,383,008	4,308,263
<i>Noble</i>	8,173,796	8,411,797	8,338,808	8,299,345
<i>Perry</i>	1,434,632	1,411,173	1,418,335	590,746
<i>Washington</i>	6,117,875	6,226,909	6,356,699	6,473,472

\*Increased number of private foundations

Source: National Center for Charitable Statistics

The ten-county region of 82 private foundations compares to 4,661 private foundations for the State of Ohio. Four of the ten counties in the OMEGA region increased the number of private foundations from 2012 to 2015. Total private foundation assets for the region in 2012 were \$181,712,170 and \$176,630,441 in 2015. Three of the ten counties showed a significant decrease in assets while the other seven counties indicated an increase in assets.

## ***Implications***

The number of foundations located in this 10-county region varies substantially by county. In addition, there is a wide range in how much is given to those foundations. There are a number of possible reasons why these differences exist, including, (1) higher rates of the poverty, lower paying jobs (income), and limited educational attainment correlated with a lower percentage of philanthropic giving, (2) foundations that serve the county may be located outside the county and are thus not reported as being physically located in that county, and (3) population, in that more populated counties typically have higher levels of giving.

## ***Education***

Public education is fundamental to community development. A review of the research literature has shown industrial booms impact education. (need a reference?) A robust statistical analysis reviewing indicators for school revenues, test scores, student teacher ratios could provide further insight to a cause effect of education and shale development.

For the purposes of this study, one of the theories explored was that the influx of temporary workers will change demographic makeup of shale impacted communities. This study reviewed ethnicity changes. Subtle changes in individual schools and districts were noted by region, although when analyzed at the school district-level, changes were more obvious.

## ***School Enrollment***

Analysis of District Profile Reports (Cupp Reports) provided by the Ohio Department of Education reveal information regarding changes in school ethnicity; students in poverty; students with limited English proficiency; and students with disabilities in each of four regional economic development regions. The analysis uses 2010 as a baseline year compared with 2013 data.

Overall, throughout all four regions, the most significant trend is the increase in the number of Hispanic students. Also noteworthy is that the number of students with limited English skills either decreased or increased insignificantly in three of the four economic development regions. In the OMEGA region, the number of students identifying themselves as Hispanic increased 112% compared to only 1% statewide. Simultaneously (and curiously), the number of students with limited English proficiency decreased 21% compared to the statewide increase of <1%.

## Environmental Factors and Influences

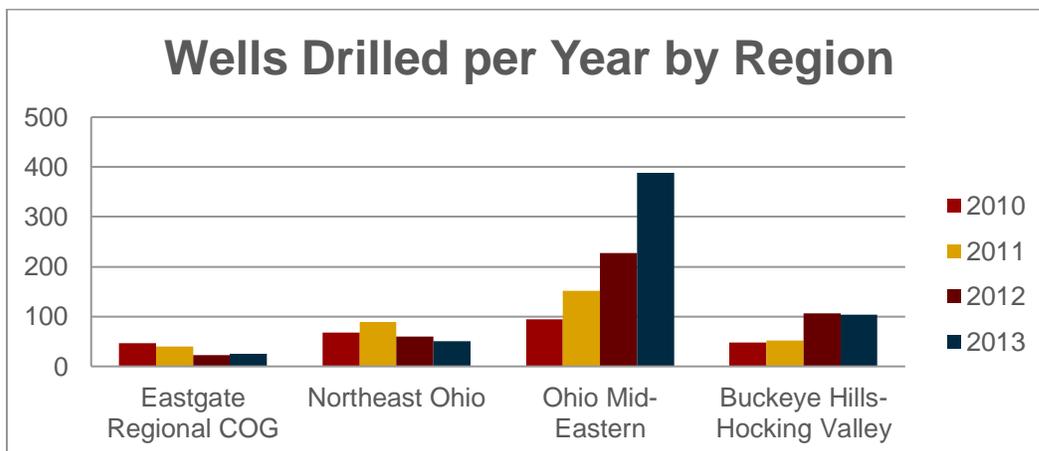
### Introduction

The shale oil and natural gas boom in the Utica and Marcellus shale plays has the potential to positively impact the economies of communities in the Appalachian region of Ohio. However, as with any industry based on resource extraction, there will also be associated environmental impacts. The development of the shale energy industry involves land use changes for drilling, pipelines, and processing facilities; water use for hydraulic fracturing and processing facilities; air emissions from heavy vehicles, diesel power plants, flares, and leaking transmission lines; and waste management issues, including the disposal of drilling mud, naturally occurring radioactive materials, and flowback water from hydraulic fracturing. These activities have the potential to negatively impact water quality, air quality, and habitat. While it is difficult if not impossible to accurately assess the full range of environmental impacts directly attributable to oil and gas extraction, transport, and processing activities in the region, we have attempted to identify several indicators that can provide some measure of environmental impact over time.

### Wells drilled

Extraction of oil, natural gas, and natural gas liquids requires drilling thousands of feet down to the Marcellus and Utica shale layers and then horizontally for up to a mile through those layers. While drilling technologies and techniques have advanced greatly in the past few decades, drilling operations still have an impact on and around the drilling site. One indicator of the *potential* for impacts from drilling operations is the number of wells drilled in a county or region. Below is a table showing the number of wells drilled in the four EDA regions between 2010 and 2013.

**Figure 2. Number of wells drilled in each of four regions from 2010-2013.**



The following Table 1a provides an update of permitting, drilling and production activity in the four EDA Regions. The greatest amount of activity is occurring in the OMEGA Region, while the least activity is in the NEO 4-County Region. The number of wells permitted is a general indication, as of the date of this chart, of future activity in the region.

**Table 9: Utica/Point Pleasant Oil & Gas Wells – as of 5/2016**

EDA Region	Permitted	Drilled	Producing
Eastgate	46	25	20
NEO 4-County	29	17	5
OMEGA	1,621	1,312	990
BH-HVRDD	445	346	237
Total	2,141	1,700	1,252

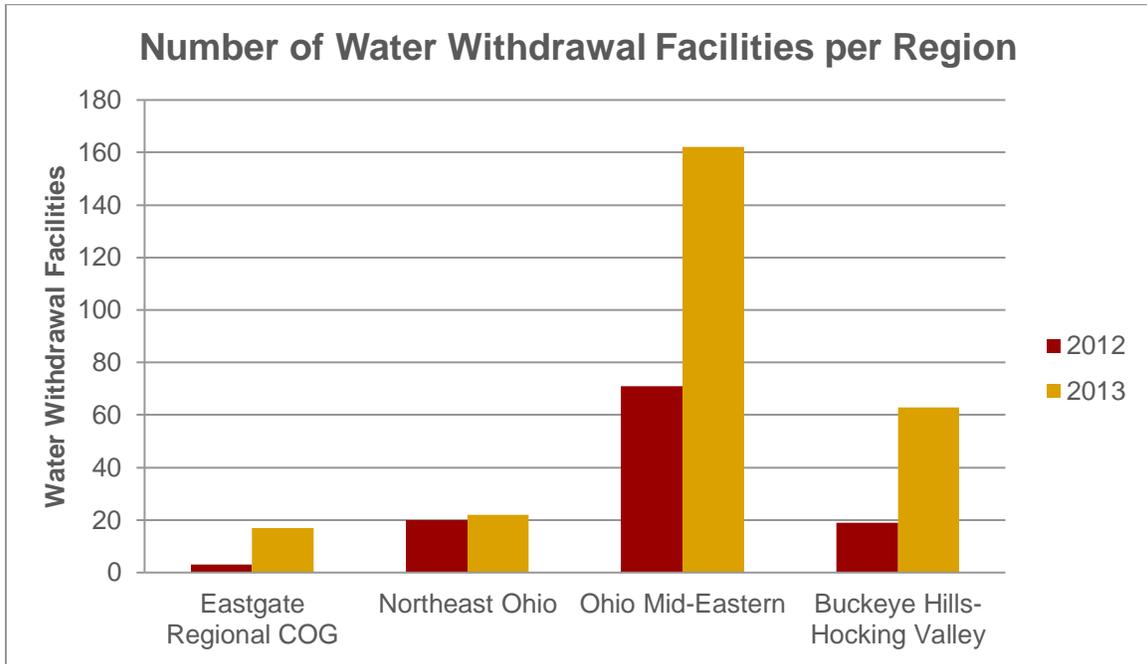
Source: Ohio Department of Natural Resources, 2015, Horizontal Utica-Point Pleasant Well Activity in Ohio: Columbus, 5/9/2016

Clearly, there has been a significant increase in the number of oil and gas wells drilled in the region since 2010. However, we emphasize that the existence of well drilling operations in the region is merely an indicator of the *potential* for associated environmental impacts and that *actual* environmental impacts, including air emissions, spills, and noise may vary significantly from one drilling operation to the next. Note also that drilling operations for a single well may only last a few weeks, though drilling operations may last much longer at any given site if multiple wells are drilled on a single pad.

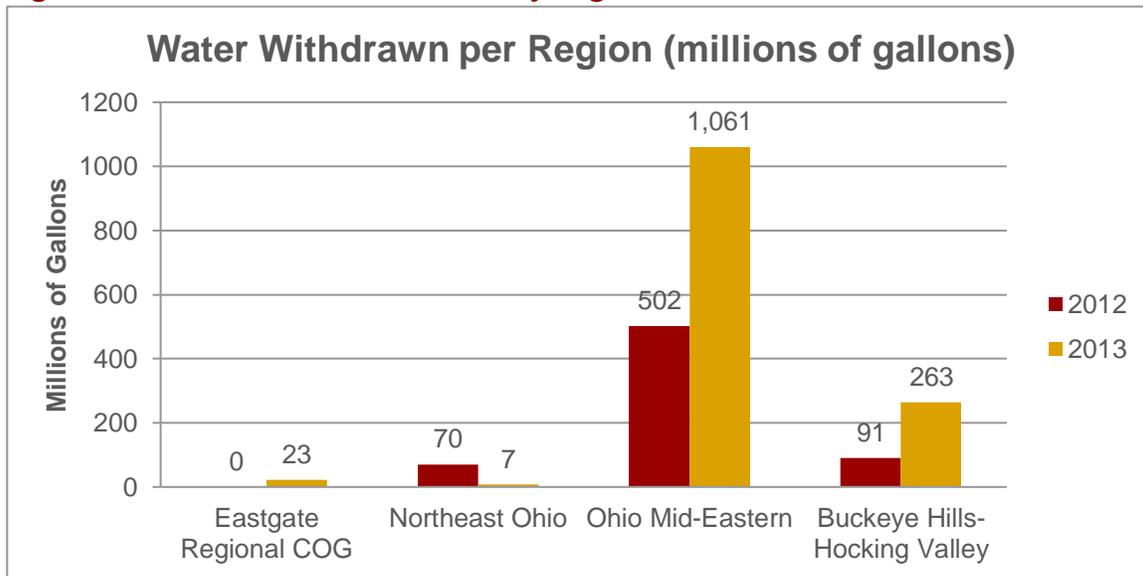
### **Water withdrawals**

Hydraulic fracturing involves pumping water, sand, and chemical additives (primarily lubricants and biocides) into the shale formation under very high pressures in order to facilitate extraction of oil and gas. Hydraulic fracturing of horizontal wells in the Utica and Marcellus shale formations generally requires several million gallons of water. This water is generally obtained from surface waters (reservoirs, rivers, or streams) via temporary pumping facilities established specifically for this purpose. While the amount of water being extracted from a particular source may be very small in relation to the total volume in the source water body, there is a potential for localized impacts from water withdrawals, particularly when taken from small streams, if the amount and rate of withdrawal is significant relative to the natural flow rate. The following tables show changes in the number of registered water withdrawal facilities (Table 3) and reported water withdrawals for hydraulic fracturing (Table 4) by region from 2012 to 2013.

**Figure 3. Number of water withdrawal facilities registered by region for 2012 and 2013.**



**Figure 4. Total water withdrawals by region for 2012 and 2013.**



### **Class II Injection Wells**

During and after the process of hydraulic fracturing, some percentage of the hydraulic fracturing fluids and contaminated water from the shale formations flows to the surface through the well bore. These fluids, typically referred to as brine because of their high salt content, must be disposed of as a waste product. In Ohio, brine waste from drilling operations is disposed of by pumping it under

high pressure into deep geologic formations many thousands of feet below the surface. These deep injection wells are referred to as “Class II” injection wells and are regulated by the Ohio Department of Natural Resources. In rare instances, deep injection wells have been associated with seismic activity (tremors), but in terms of environmental impacts, the existence of Class II injection wells are probably more important as a waste management facility where there is likely to be higher levels of traffic of heavy trucks carrying brine and wastewater from hydraulic fracturing with the associated risks of accidents or spills during the transport and transmission of fluids into the well. Table 5, below, shows the number of Class II Injection Wells by region in 2014.

**Figure 5. Total number of active Class II injection wells operating in 2014 by region.**

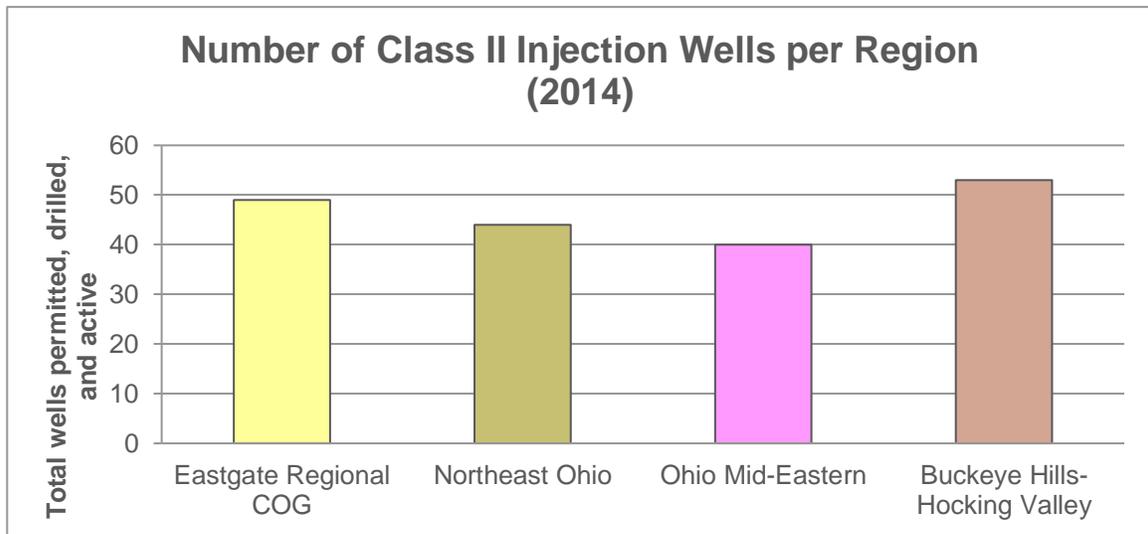


Table 5a provides an updated overview of Class II Brine Injection wells in the EDA Region as of May 2016. Injection wells are used to dispose of production fluid (flowback) generated during drilling and hydraulic fracturing of horizontal oil and gas wells. The greatest amount of activity has occurred in the Buckeye Hills-Hocking Valley Regional Development District. The least activity is in the Eastgate Region.

**Table 10: Class II Brine Injection Wells by EDA Region, as of 5/2016**

EDA Region	Active Wells	Drilling/drilled	Permitted
Eastgate	26	7	0
NEO 4-County	36	0	1
OMEGA	37	3	2

BH-HVRDD	60	1	1
Total	159	11	4

Source: Ohio Department of Natural Resources, Division of Gas and Oil Resource Management, 2015

### Summary

The extraction, transport, and processing of shale oil and gas in the four EDA regions will have some impact on the environment. In most cases, the data needed to quantify direct impacts on soil, air, water quality, and habitat are not collected systematically, making a conclusive, comprehensive assessment of environmental impacts of the oil and gas industry on the region challenging. What we can conclude from the data provided in this report is that drilling activity has greatly increased in the region between 2011 and 2016 with a corresponding increase in the potential for associated impacts from drilling activities, as reflected in an increase in the number and types of drill permit violations reported by ODNR. Water withdrawals from streams and reservoirs have also increased markedly during this time, which has the potential to impact aquatic life, particularly in smaller streams. Wastes are generated as a result of drilling and hydraulic fracturing. There are currently 159 active Class II injection wells in the four regions available for the disposal of brine and hydraulic fracturing fluids that return to the surface during and after the hydraulic fracturing process.

## Implementation Strategies

A strength of this program is the seamless integration of economic trend analysis, and sustainable strategic planning into regional economic development district CEDS reports to support the creation of well-paying manufacturing jobs in region allowing the area to recover and sustain their economy over time. Implementation strategies were developed by the EDD's to maximize the economic opportunity from shale energy development research, to position manufacturers to thrive once shale boom is gone, and diversify the regional economy beyond the shale industry to grow other economic sectors while being cognizant of, and responsive to, social and environmental confluences. The strategies are listed below, as presented, by each EDD region.

### Buckeye Hills – Hocking Valley Regional Development District

#### 1. Provide ongoing statistical analysis and tracking of the industry clusters identified by Ohio State.

A key part of the research conducted by the Ohio State University was the establishment of the five industry clusters that serve as indicators for oil and gas activity in the eastern Ohio region. BH-HVRDD will continue to track these clusters and use recognized data points including shift share, location

quotients, employment levels, and related levels of change in those factors as an indicator of continuing activity in the region. These data points will serve as items for consideration when discussing impacts and activities related to shale in the Buckeye Hills region.

This activity addresses one goal identified in the most recently revised Buckeye Hills CEDS document:

*'Work collaboratively to continue diversifying the regional economy to lessen the impact of any external threats to the traditional economic base.'*

Recognizing and understanding trends in employment and identifying which sectors are affected by those trends is a key part of providing meaningful assistance to local governments and communities who may be experiencing those changes.

## **2. Provide continued tracking and visualization of horizontal well permits in eastern and southeastern Ohio.**

An important part of understanding which communities and economies may be impacted by shale exploration and development activities can be understood by utilizing mapping products. BH-HVRDD will continue to utilize publically available horizontal gas well permit data provided by ODNR to produce a monthly series of maps showing all permitted wells, the permit holder, current well status, and general point location. These maps are utilized as an informational item provided to BH-HVRDD members and the public at large to help spread the understanding of exactly where these developments are taking place in the region and beyond.

Map products and other relevant information will continue to be housed on the BH-HVRDD website, accessible at the following address:

<http://buckeyehills.org/development/marcellus-and-utica-shale/>

This activity addresses one goal identified in the most recently revised BH-HVRDD CEDS document:

*'Serve as a resource and a facilitator to local communities addressing quality of life challenges for residents.'*

A key service provided by BH-HVRDD is the provision of information to local communities and interested parties that can help shape action or policy for decision makers. This permit information is an important item that helps keep local officials informed of the events taking place in their communities and those around them.

### **3. Provide continued support to post-secondary educational institutions working to develop training and curriculum for the future oil and gas workforce.**

Workforce training has been expressed repeatedly in this effort and others as a key need for all the respective regions participating in this study. Groups like BH-HVRDD can provide important insight and perspective to educational partners as they work to gauge the needs of the businesses in their service area. BH-HVRDD will continue to support the efforts of staff members as they participate on curriculum boards, advisory committees, and other similar groups focused on understanding the existing training needs of industry partners, and forecasting what needs may be present in the future.

Staff has historically participated with Washington State Community College as a member of the Oil and Gas Advisory Committee, this work will continue, and additional similar opportunities to provide benefit will be sought.

This activity addresses one goal identified in the most recently revised BH-HVRDD CEDS document:

*‘Support opportunities for residents to capitalize on meaningful career opportunities within the BH-HVRDD region.’*

BH-HVRDD and its partners are acutely aware of the workforce needs that face the region. Addressing these issues through cooperation with local partners such as community colleges, technical colleges, career centers, and local universities is a key component to overcoming these challenges. BH-HVRDD staff will continue to act as a resource to these entities as they work to develop training and curriculum offerings that can help local communities maximize the employment opportunities currently available, and to prepare for future opportunities.

## **Eastgate Regional Council of Governments**

### **Strategy #1: Workforce/Training & Education**

- Implement the Greater Oh-Penn Manufacturing Apprenticeship Network and identify other successful apprenticeship programs available in the state.
- Analyze the number of workers needed within mid and downstream production and the number of workers expected to retire within these skill sets. And/or Adjust educational institutions to align programs with occupations that are in highest demand for the local oil and gas

development, processing and potentially downstream manufacturing over the next twenty to seventy years.

- Create exposure for pathways in downstream production and expand outreach beyond the state to fill positions. And/or Discuss pathway and curriculum development for engineering, transportation, and logistics programs in addition to other needs such as soft-skills.
- Study existing training capacity at regional educational institutions and available training programs in occupations relevant to upstream, midstream, and downstream industries. Assist educational institutions and training programs form close connections to industry.
- Support the creation of an Advanced Manufacturing Training Center.
- Prepare a common safety system for training across industries.

### **Strategy #2: Innovation & Entrepreneurship**

- Promote the Valley Alliance for Science and Technology (VAST) to appropriate stakeholders.
- Discuss with transportation equipment manufacturers, suppliers, and General Motors the ability to research and develop ethane-fueled vehicles.
- Capitalize on opportunities for downstream development.
- Recognize synergies in waste management services and energy.

### **Strategy #3: Access to Capital**

- Identify ways to leverage land lease money for long-term philanthropic development.

### **Strategy #4: Infrastructure & Site Development**

- Utilize estimates for when cracker facilities will go online to address needed modernization of infrastructure.
- Maintain good rating of pavement condition for freight and movement of goods.
- Study processing facilities locations in relation to needed infrastructure, capacity, and potential site development.
- Identify Class A Office and other needed commercial space for regional offices.

### **Strategy #5: Industry & Business Climate**

- Create a manufacturing engagement plan for small and medium-sized businesses to assess their business model and technology needs.
- Build up relationship with Akron's polymer industry. Create partnerships around polymers such as the University of Akron and the Polymer Alliance Zone of West Virginia.
- Recognize additional growth in the distribution, compounding, and converting of polyethylene into manufactured products.

- Determine if and what raw products and/or materials used for additive manufacturing can be produced in the region.
- Determine how to support local metal fabricators as energy prices fall.
- Analyze unmet demand and our capacity for aluminum processing and extruders.
- Support JobsOhio, the Greater Cleveland Growth Association, and others on developing petrochemical cluster of companies in partnership with Pennsylvania and West Virginia.
- Determine how transportation equipment manufacturing’s strong location quotient and employment growth can be leveraged.
- Promote a Phase II marketing strategy beyond Oil & Gas to include mid and downstream industries.
- Develop analysis of relevant oil and gas downstream segments including basic chemicals manufacturing; resin, synthetic rubber and artificial fibers manufacturing; plastic products and other chemical products manufacturing; and pesticide, fertilizer, and other agricultural products manufacturing.

## Ohio Mid-Eastern Governments Association

**Table 11. Table Summary of OMEGA Implementation Strategies**

Strategy	Who	Timeline
<b>1</b> Focus on workforce readiness by partnering with local school districts, career centers, technical colleges, community colleges, and four-year educational institutions.	OMEGA, EDD’s OSU Ext., University Centers, Ohio Means Jobs, Workforce Initiative Boards, Appalachian P-20 Council	2016-2010
<b>2</b> Continue to develop basic infrastructure (water, sewer, roads) and technology-based infrastructure (broadband) to support development of a diverse and sustainable economy.	OMEGA, EDD’s Elected Officials, ED Professionals, JobsOhio/APEG, Port Authorities, CIC’s, Planning Commissions	2016-2020
<b>3</b> Identify the most appropriate partners based on focus of each project – making sure the right people are at the table from idea to implementation (may change throughout the project).	OMEGA and extensive list of stakeholders on a project-by-project basis	2016-2020

<p><b>4</b> Continue to expand Grant Writing and GIS TA services offered by OMEGA according to regional and community needs. Partner with agencies offering related services to enhance value of service.</p>	<p>OMEGA, EDDs, OSU Ext., EDA University Centers, state and local agencies, Small Business Development Centers, etc.</p>	<p>2016-2020</p>
<p><b>5</b> Continue to work in cooperation (facilitate marketing &amp; communication) with the Department of Commerce, Ohio Development Services Agency, JobsOhio/APEG, and SBDC's.</p>	<p>Department of Commerce, Ohio Development Services Agency, JobsOhio/APEG, and Small Business Development Centers</p>	<p>2016-2020</p>

## Northeast Ohio Four County Regional Planning

### ENVIRONMENTAL

#### Concerns:

- The negative effects of horizontal hydraulic fracturing and injection wells
- Possible abandonment of properties and environmental problems following a decline in exploration/production
- Proximity to pipelines and public safety concerns

#### 1. Goal: Facilitate environmentally-responsible development of shale oil and gas

##### *Educational activities*

- Inform NEFCO's regional partners of studies on waste byproducts
- Gain an understanding of the spatial implications and effects of the horizontal hydraulic fracturing process and injection wells
- Provide current information to local governments to assist them with addressing environmental concerns associated with this industry

##### *Springboard activities*

- Support projects and activities that propose the development of renewable forms of energy
- Interview development groups to learn of new environmental technologies and trends
- Research new energy technologies/clusters
- Offer opportunities for members and the general public to learn about conditions and trends by featuring speakers at NEFCO's Environmental Resources Technical Advisory Committee and General Policy Board meetings

## **ECONOMIC**

### Concerns:

- Declining local government revenues restrict funding of new or defer maintenance of infrastructure
- Lack of large parcels of land in cities for expansion, which results in greenfield development or business relocations
- Lack of skilled manufacturing labor
- Perceived or actual Brain Drain

**2. Goal: Provide the conditions for the shale oil and gas industry to grow, to become regionally sustainable, and to support the local economy.**

**3. Goal: Help communities to benefit from this industry and to retain the wealth generated by the oil and gas industry within the communities or greater region.**

### ***Educational activities***

- Understand economic conditions and trends surrounding the shale oil and gas industry
- Network with EDA's University Centers to obtain current data to monitor the growth and/or decline of this industry
- Develop effective ways to communicate information about this industry and its trends to the region. Newsletter articles or e-mail blasts on the status of shale oil/gas industry in NEFCO region are two examples.
- Evaluate the effectiveness of NEFCO's communication to the region.

### ***Springboard Value-added activities***

- Support initiatives in NEFCO's CEDS that will responsibly expand the industry and which will have a lasting impact on northeast Ohio, especially in the Metals Manufacturing, Machinery Manufacturing, and Chemicals and Chemical-based Products, Energy, and Forest and Wood Products
- Coordinate services with Ohio's statewide network of resources, working with northeast Ohio's regional economic development agencies to eliminate duplication.
- Seek opportunities to participate in regional economic development groups, especially those involved in activities that will grow the shale oil and gas industry and complementary industries
- Prioritize projects that align with the Ohio Third Frontier sectors and encourage start-ups, especially in Advanced Materials, Additive Manufacturing, and the Hybrid Healthcare innovative technology.
- Prioritize projects that will create high-skilled, livable wage jobs, and that improve or connect to current infrastructure
- Pursue and support land assembly efforts through providing updated land inventories and through partnering with appropriate entities to redevelop brownfields

- Expand NEFCO’s brownfield expertise through grant applications and new brownfield partnerships
- Explore partnerships with appropriate workforce or economic development groups to support training and retention activities
- Inventory non-profit and charitable groups that support community functions

## **SOCIAL**

Conditions in the region:

- Need for housing options to attract/retain young adults
- Aging population
- Possible abandonment of properties following a bust cycle
- Unknown impacts on communities (schools, services, etc.) by a transient population and the industry’s boom-bust cycle

**3. Goal: Support projects and initiatives that strengthen the region’s communities by maintaining and growing the population, supporting transportation alternatives, and increasing the arts.**

### ***Springboard Value-added activities***

- Compile appropriate metrics that are reliable indicators of social trends
- Update statistics such as StatsAmerica’s Industry cluster analysis
- Compile updated land inventories and partner with appropriate entities to redevelop brownfields and investigate abandoned and vacant properties

## **Conclusions**

Through this project, we have identified key stakeholders who are critical to the creation and facilitation of economic development initiatives and sustainable strategic planning practices within each of the four EDD regions. Collaboration and partnership linkages between public and private partners in all four regions will provide a lasting benefit to all project partners well beyond the closure of the grant funding. The OSU Extension team will continue to track relevant economic data to measure regional economic changes and identify high growth industry clusters and employers in the eastern Ohio region influenced by oil and gas development. We will offer future outreach and education meetings to the EDDs to disseminate updates on the economic trends. Ongoing collaboration and current information will allow the regional EDDs to update their strategies to reflect the continuous changes occurring in the region. The OSU Extension team will catalog future reports and make resources available at [www.go.osu.edu/energyecon](http://www.go.osu.edu/energyecon).

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## **Appendix #1: Link to 2015 Eastern Ohio 25-County Regional Report**

<http://energizeohio.osu.edu/sites/energizeohio/files/imce/EDA%20Final%20Economic%20Report%203-27-16.pdf>

## **Appendix #2: Link to Location Quotient Maps**

<http://buckeyehills.org/development/marcellus-and-utica-shale/>

## Appendix #3: Evaluation Plan Chart

Evaluation Questions or Objectives	Information Required	Information Source	Method for Collecting Information	Information Collection Arrangements			Analysis Procedures	Interpretation Procedures and Criteria	Reporting of Information		
				By Whom	Conditions	When			To Whom	How	When
<i>How is the eastern Ohio regional economy changing due to shale development?</i>	Private enterprise data by NAICS, demographic data	Ohio Longitudinal Data Archive, IMPLAN and Census	Records and original data	OSU Extension CD researcher team	IRB, formal agreement, CITI training	Quarterly during two years of program and annually thereafter	Quantitative methods including cluster and shift share analysis	Longitudinal tracking of economic changes by sector, employment and wages	Regional EDD's, stakeholders and the project funder: EDA	Technical reports, blogs, meetings, and press releases	Quarterly or as needed
<i>What regional economic growth opportunities are emerging that can be further developed to bring about sustainability?</i>	Industry capacity indicators including growth, trade and market parameters	Industry trend reports and survey results	Survey and records	OSU Extension CD researcher team	Manufacture businesses	Half-way into the 3 year project	Quantitative statistical methods to including frequency distributions, correlations and probability	Associating strengths and linkages using correlation and coefficients for strategy decision-making	Regional EDD's, stakeholders and the project funder: EDA	Technical reports, blogs, meetings and press releases	Quarterly or as needed
<i>How will economic changes and opportunities inform the creation of a long-term sustainable plan that increases capacity in the region?</i>	Stakeholder input based on results of previous two stages: cluster analysis and capacity assessment	Results of previous two steps and stakeholders	Focus groups, interviews and one-on-one meetings with stakeholders	OSU Extension CD researcher team	Adequate number and diversity of stakeholder representatives	Process is ongoing but with primary collection from reps during last half of project	Qualitative describing and assessing the need and determining sustainability strategies	SMART (specific, measurable, attainable, responsible person, time specific) implementation strategies developed	Regional EDD's, stakeholders and the project funder: EDA, media and university partners	Formal plan, press release, and presentations. Final report to funder	At the end of the 3-year project

