NORTHERN ILLINOIS UNIVERSITY
Center for
Governmental Studies
Outreach, Engagement, and Regional Development

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GRUNDY COUNTY AND LABORSHED REGIONAL CLUSTER ANALYSIS:

Interstate 80/Brisbin Road Interchange Development Opportunities

IN PARTNERSHIP WITH

Channahon "Where the Waters Meet" Illinois

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Grundy County Economic Development

EDA U.S. Economic Development Administration

Grundy County and Laborshed Regional Cluster Analysis:

Interstate 80/Brisbin Road Interchange Development Opportunities

Written by Brian Harger and Melissa Henriksen

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Grundy County and Laborshed Regional Cluster Analysis

EXECUTIVE SUMMARY

In October 2013, the Villages of Channahon and Minooka (The Villages) were awarded a Department of Commerce, U.S. Economic Development Administration (EDA) Short-Term Planning and Assistance Grant to conduct a cluster analysis for the Grundy County region. The Villages contracted with the Center for Governmental Studies (CGS) at Northern Illinois University (NIU) to prepare a cluster analysis of the development area surrounding the Interstate 80/Brisbin Road Interchange.

The objective of the cluster analysis was to evaluate demographic and business trends and characteristics of Grundy County and the surrounding region, and ultimately identify concentrations of competing, complementary, and/or interdependent firms and industries which may have supply-chain relationships with each other and/or have common needs for talent, technology, and infrastructure. When analyzing clusters and potential economic development, it is important to recognize that the laborshed and industry supply chains extend well beyond the borders of any one county. Therefore, in addition to the Grundy County analysis, the Laborshed Region cited in this report consists of seven other counties in north central and northeastern Illinois (Cook, DuPage, Kankakee, Kendall, LaSalle, Livingston, and Will Counties).

The CGS analysis of the Grundy County Interstate 80/Brisbin Road Interchange development area and the Laborshed Region identified six clusters to pursue. These clusters are compatible with the existing or proposed land use, zoning, and infrastructure capacity of the development area. The six clusters identified and analyzed were:

1. Advanced Materials
2. Chemicals and Chemical Based Products
3. Energy (Conventional and Renewable)
4. Glass and Ceramics
5. Machinery Manufacturing
6. Transportation and Logistics

Several demographic trends affect the suggested clusters and are reshaping the workforce in ways that will have major impacts on Grundy County and the Laborshed Region's economic competitiveness, including the aging of the Baby Boomer generation. To maintain and increase Grundy County's economic competitiveness, strategies to prevent and minimize the 'knowledge gap' will require cooperation and creativity by local officials, local traning and education facilities, and businesses.

The following analysis and recommendations can be used to develop strategies and marketing for the Interstate 80/Brisbin Road development area, as well as to benefit existing, expanding, and new industries in the larger Laborshed Region. This information can also be used to enhance the skill level of the workforce, maintain the existing workforce and attract new labor in the region.

SECTION 1: PROJECT OVERVIEW

Methodology

The cluster analysis included a comprehensive evaluation of factors ranging from regional demographics to commuting patterns of the workforce, business trends, existing industry assessment, and site selection criteria. Data were derived from a variety of sources including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics (BLS), the Illinois Department of Employment Security (IDES), and several private vendors.

Specific target clusters were identified, which required both quantitative and qualitative research. The quantitative approach examined local, regional, and national trends in population, employment and earnings. Industry staffing patterns and related occupational employment demands were also researched. Grundy County is a part of the greater Chicago laborshed meaning worker mobility is a critical factor in business retention and attraction; therefore analyzing regional commuting patterns was essential. In addition, education, business vitality, and site selection rankings were also considered.

Data were derived from a variety of sources including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics (BLS), the Illinois Department of Employment Security (IDES), and several private vendors. A steering committee consisting of local economic and community development leaders

Clusters are geographic concentrations of competing, complementary, or inter-dependent firms and industries which conduct business with each other and/or have common needs for talent, technology, and infrastructure.

- ✓ Clusters are centered on firms which sell outside the local, state, or even national market.
- ✓ Exporting firms are driving forces in a regional or state economy because they bring money into the area and support many local industries.
- ✓ A cluster does not represent an industry or a business; it represents the potential of linking industries and businesses that share common elements.

from the Villages of Channahon and Minooka, as well as the Grundy Economic Development Council (GEDC) was established to help guide the project and avoid duplication of on-going efforts and research already being conducted in the region.

Qualitative research included the review of recent information and documents relating to infrastructure, planning, zoning, and business climate issues in the Interstate 80/Brisbin Road Interchange development area, Grundy County, and the greater Chicago metropolitan area. This review included:

- The ***Brisbin Road Corridor Access Study*** completed in August 2012 by Kenig, Lindgren, O'Hara, Aboona, Inc. This study determined the street improvements needed to support new commercial and industrial development in the vicinity of the Interstate 80/Brisbin Road Inter-change development area.
- The ***Brisbin Road Value Capture Finance Analysis*** completed in 2013, compiled by RS&H Commercial Realty, Inc. This study evaluated various development scenarios based on current market research, as well as interviews with public and private sector stakeholders.

Analyzing clusters helps development practitioners and policymakers identify the networks of businesses which create wealth in a local or regional economy.

Clusters…

- ✓ **Describe** how industries in a region compare to each other;
- ✓ **Identify** growth trends;
- ✓ **Reveal** emerging industries;
- ✓ **Rethink** business expansion strategies;
- ✓ **Reveal** groups of industries which have similar workforce needs;
- ✓ **Prioritize** groups of firms which have growth potential; and
- ✓ **Create** regional identities which improve marketing effectiveness.

- The ***2012 Business Retention and Outreach Program Report*** issued by the Grundy Economic Development Council (GEDC). This study examined perceptions of the local business climate based on interviews with key employers in Grundy County.
- The ***Grundy County 2011-2016 Comprehensive Economic Development Strategy*** *(CEDS)*. The CEDS, completed by the GEDC, identified regional strengths and outlined the goals and objectives necessary to address economic development challenges in the region.

The *Grundy County 2011-2016 CEDS* and the *GEDC 2012 Business Retention and Outreach Program Report* identified four clusters in the Grundy County region:

1. Energy and Energy Related Industries
2. Industrial Manufacturing
3. Transportation and Logistics
4. Health Care and Life Sciences

Geographic Scope

The focal point of this analysis is the development area surrounding the Interstate 80/Brisbin Road Interchange, a 12,000 acre site designated for commercial, industrial, and distribution activities located in northwest Grundy County. The Villages of Channahon and Minooka share corporate jurisdiction of the development area and are in the process of determining infrastructure needs and capacity based on a range of prospective tenants.

When analyzing clusters and potential economic development, it is important to recognize that the laborshed, or the area from which an employment center draws its commuting workers from, and industry supply chains extend well beyond the borders of any one county. Therefore, this cluster analysis identifies potential development opportunities by examining commuting patterns and linking businesses in the region to the dominant clusters in nearby counties and the larger metropolitan area.

In addition to the Interstate 80/Brisbin Road Interchange development area and Grundy County analysis, the Laborshed Region cited in this report consists of seven other counties in north central and northeastern Illinois: Cook, DuPage, Kankakee, Kendall, LaSalle, Livingston, and Will Counties (Figure 1, refer to the red star for the location of the Interchange). The Laborshed Region represents an opportunity for the Grundy County area to strengthen existing economic interactions with the dominant or emerging industries in this eight-county region (as well as create new ones).

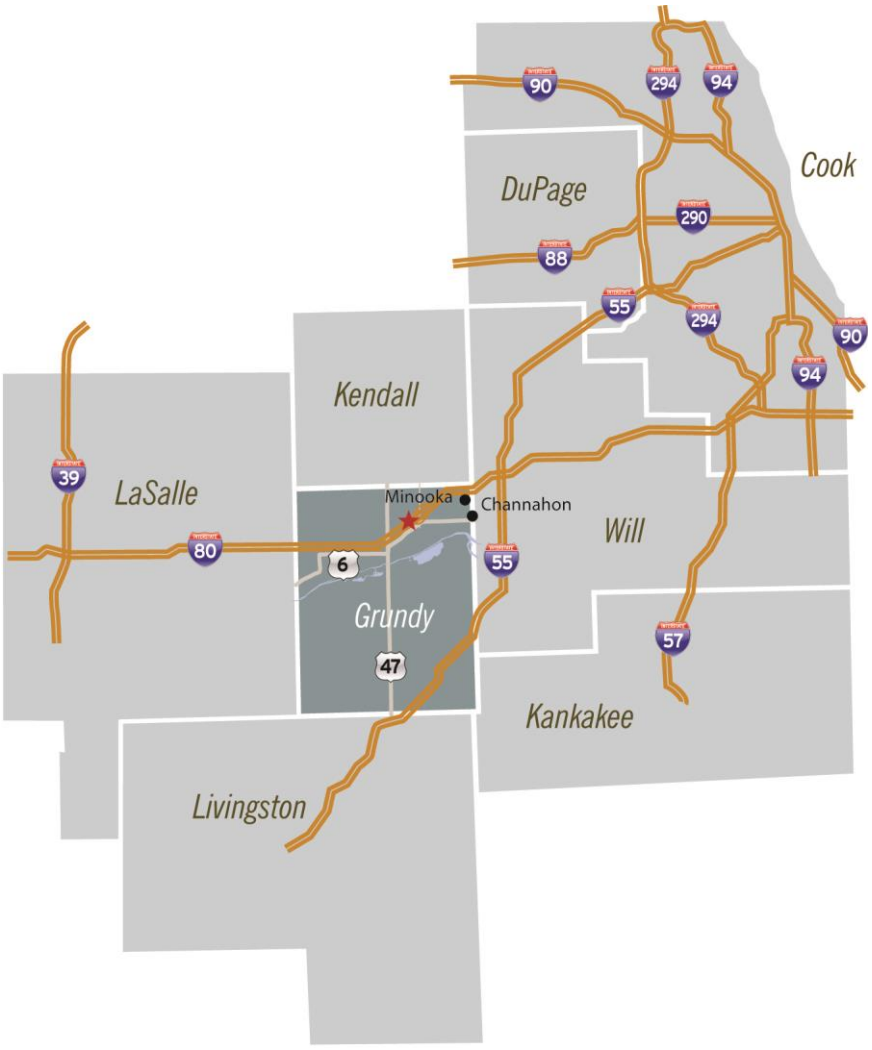
As a business site, a critical factor in the attractiveness of the Interstate 80/Brisbin Road Interchange development area is its access to an adequate supply of skilled workers. As the population continues to change both locally and regionally, with the aging and retiring of the Baby Boomer[1] generation, thousands of younger workers will be required to replace the retiring workers.

Grundy County is in a unique position, located at the outer edge of the greater Chicago metropolitan area. The county's population growth over the past two decades has far exceeded employment growth resulting in increasing numbers of residents commuting to jobs in other parts of the metro area.

The Laborshed Region for this analysis was defined based on worker commuting data. The commuters are a potential labor force for companies locating or expanding in the Interstate 80/Brisbin Road Interchange development area and the entirety of Grundy County.

[1] A baby boomer is a person born during the demographic post-World War II period between 1946 and 1964, according to the U.S. Census Bureau.

Figure 1: Grundy County (Primary Study Area) and the Laborshed Region (Secondary Study Area)



Highlights of Significant Findings

The CGS analysis focused on the Grundy County Interstate 80/Brisbin Road Interchange development area and the Laborshed Region and identified six clusters to pursue:

1. Advanced Materials
2. Chemicals and Chemical Based Products
3. Energy (Conventional and Renewable)
4. Glass and Ceramics
5. Machinery Manufacturing
6. Transportation and Logistics

These clusters are compatible with the existing or proposed land use, zoning, and infrastructure capacity of the development area and align with three of the four industries targeted in the Grundy County CEDS and the GEDC Strategic Plan

The analyses also identified significant findings related to the six clusters:

- Several of the clusters identified are made up of industries that serve or have the potential to serve more than one cluster. These industries represent an opportunity to enhance economic development efforts to achieve greater results.
- Aligning public infrastructure investments with industry development strategies will be critical to maintaining and enhancing the Laborshed Region's competitive advantage in the identified clusters, especially Transportation and Logistics.
- Although expected job growth will vary by industry, the replacement demands for retiring workers will greatest source of job openings in the next decade. Since all industries will experience the same challenges, competition for skilled workers will be aggressive given the relatively limited number of younger workers.
- The Illinois Department of Commerce and Economic Opportunity (DCEO) completed the Illinois Economic Development Plan[2] in July 2014, identifying several targeted key clusters for Illinois to pursue. These included: Advanced Materials, Energy, Machinery Manufacturing, and Transportation and Logistics. Over the next five years, business development efforts will focus on these clusters based on their potential for creating and sustaining high paid and high value-added jobs. This may give local officials in the Grundy County region additional resources to assist new and existing companies in this cluster.

[2] Illinois Department of Commerce and Economic Opportunity. (2014, July). *The Illinois Economic Development Plan.* Retrieved from: http://www.illinois.gov/dceo/Documents/DCEOEconPlan_FULLPDF_vJuly1_2014.pdf.

SECTION 2: DEMOGRAPHIC TRENDS AND CHARACTERISTICS

The future of Grundy County and the Laborshed Region will be determined by their abilities to successfully evolve while navigating several demographic and economic transitions. One of the most significant is the aging of the population and a growing demand for younger workers to replace older ones as they retire. In short, competition for a well-trained, highly skilled work force will be substantial.

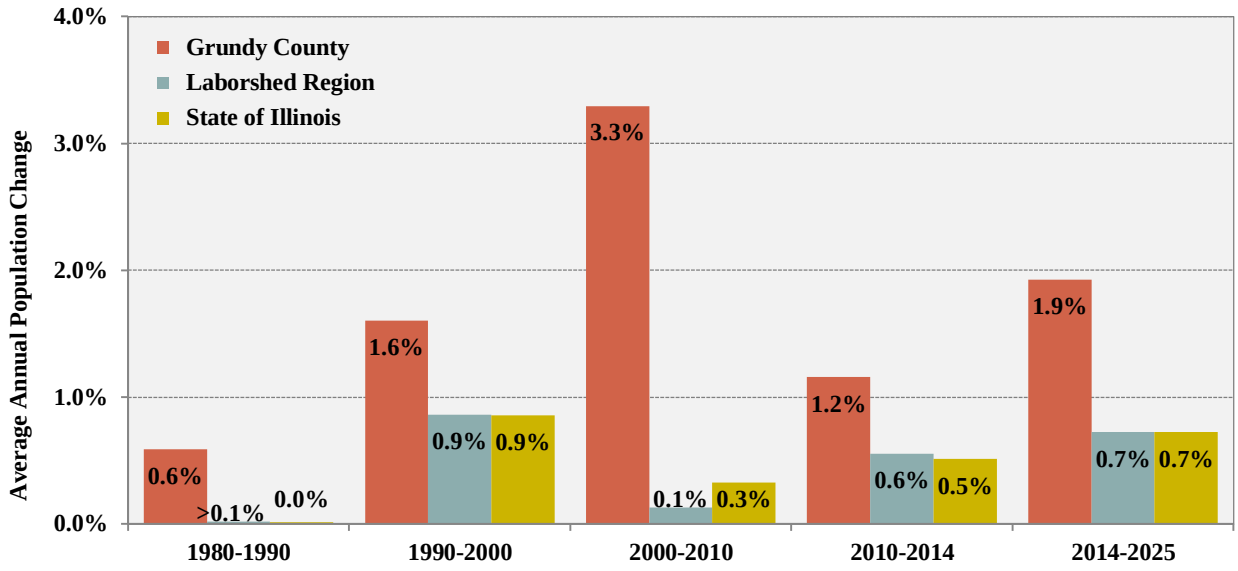
Many demographic trends will have significant impacts on the Chicago metropolitan area in general and Grundy County in particular. To set the stage for more complete analyses of potential industrial and commercial uses of the Interstate 80/Brisbin Road Interchange development area, as well as identify marketing strategies for Grundy County economic development leaders, a discussion of major demographic and economic trends follows. The section includes population trends, employment trends, occupation employment characteristics, educational characteristics, and business vitality.

Population Trends

In addition to accounting for approximately two-thirds of the population of Illinois, the Chicago metropolitan area has been the primary driver in population growth over the past decade. Between 2000 and 2010, Grundy County's population grew by 32.9%, or an average of about 3.3% per year, accounting for one of the highest increases in Illinois and contributing to overall population growth of the metropolitan area and Laborshed Region. Although population growth in Grundy County has slowed considerably in the current decade, growth between 2014 and 2025 is projected to increase by 1.9% per year (Figure 2)[3].

[3] Future population trends are based partly on economic activity; due to a prolonged period of sluggish economic growth following the last recession, it is difficult to predict employment. However, it is useful in gaining insights into how population changes may impact Grundy County and the Laborshed Region's competitiveness.

Figure 2. Population Trends, Average Annual Change, 1980-2025



Source: Woods and Poole Economics, Inc. database. (2014).

Both the state of Illinois and the Laborshed Region are expected to increase their population by 0.7% per year to reach 6.5% growth through 2025. This growth is not unexpected due to the global connectivity of Chicago, as well as the related business activity and opportunities of major metropolitan areas based on the innovation and application of technology.

Other demographic trends are also reshaping the workforce in ways that will have major impacts on Grundy County and the Laborshed Region's economic competitiveness. The aging of the Baby Boomer generation will be a major economic and community development challenge in the next several decades. Although the prospects for overall population between 2014 and 2025 are very good, the number of workers between 18 and 35 is projected to be well below those ages 65 and older. A substantial number of younger workers will be required over the next 15 to 20 years to fill new jobs that will be created, as well as to replace the Baby Boomer generation as they enter retirement (Figure 3).

Moreover, succeeding generations of workers replacing the Boomers will often lack the skills and

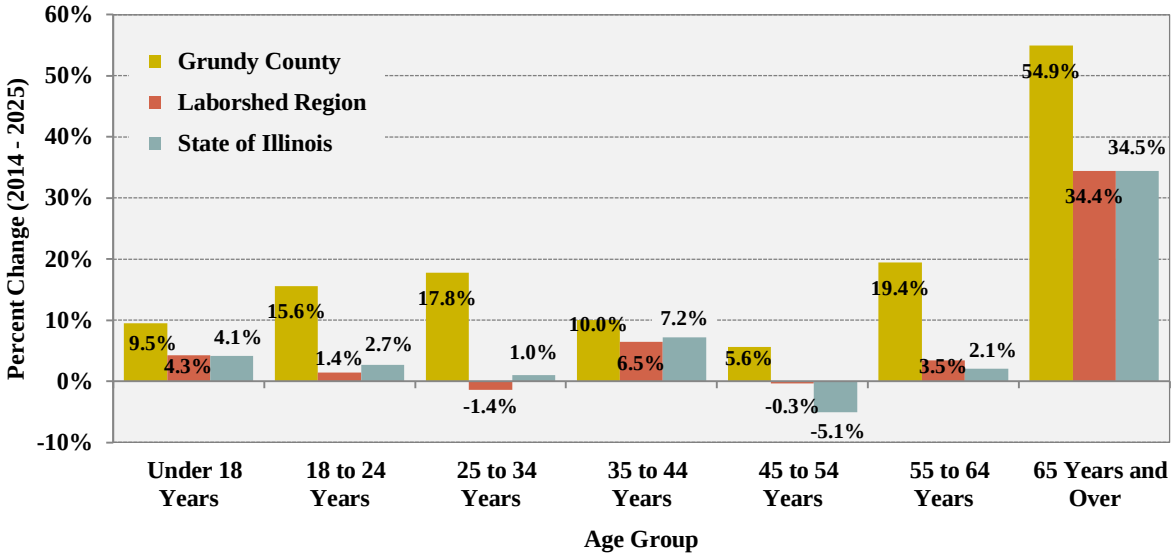
To maintain and increase Grundy County's economic competitiveness, strategies to prevent and minimize the 'knowledge gap' will require cooperation and creativity by local officials and businesses to maximize the capabilities as well as the productivity of the current and future workforces.

knowledge of those they are replacing. While this transition will be especially acute for Grundy County in the rural areas to its south and west, the county is unique because of its rapid population growth over the past 20 years and the potential to attract workers from the adjacent metropolitan counties, as well as retain more of its commuting workforce. To maintain and increase Grundy County's economic competitiveness, strategies to prevent and minimize the 'knowledge gap' will require cooperation and creativity by local officials and businesses to maximize the capabilities and productivity of the current and future workforces.

Educational Characteristics

Educational attainment often reflects the investment that a state or region has made in developing and attracting workers, businesses, and their associated economic impacts. This indicator provides a broad assessment of a region's workforce preparedness and economic potential which are increasingly recognized as key to the ability of an area to attract and retain industry.

Figure 3. Population Trends by Age Group, Percent Change, 2014-2025



Source: Woods and Poole Economics, Inc. database. (2014).

Grundy County compares favorably with the Laborshed Region, Illinois, and the U.S. in terms of the proportion of residents who have a high school diploma or higher (non-degree) credentials (Figure 4). However, one area of concern is the relatively small proportion of those with baccalaureate or higher degrees. Although this situation may not have much effect on the recruitment for production and similar jobs, it could impact the county's competiveness as far as supplying the professional, technical, and managerial workers needed for the industries identified in this report.

Figure 4: Education Attainment, as a Percent of the Population 25 Years of Age and Older

ATTAINMENT LEVEL BY YEAR	YEAR	% GRUNDY COUNTY	% LABORSHED REGION	% ILLINOIS	% US
High School Graduate or Higher	2010	91.8	85.9	86.9	85.6
	2013	93.0	86.8	87.7	86.3
	2018	94.9	88.4	89.1	87.3
Some College (no degree)	2010	28.3	20.1	21.2	21.2
	2013	28.3	20.6	21.9	22.0
	2018	27.8	21.7	23.1	23.4
Associate's Degree	2010	8.3	6.1	7.3	7.6
	2013	7.1	6.3	7.3	7.8
	2018	5.2	5.9	7.3	8.0
Bachelor's Degree	2010	12.9	21.3	19.3	17.9
	2013	13.4	22.0	19.8	18.2
	2018	14.0	23.2	20.6	18.6
Master's Degree or Higher	2010	5.1	13.4	11.7	10.6
	2013	4.3	13.7	12.0	10.8
	2018	3.3	14.2	12.5	11.3

Source: EASI Analytics, Inc. (2013).

In addition, Grundy County currently has a high percentage of residents with 'some college but no degree' at 28.3%. The same category of residents for the Laborshed Region is 20.6%, Illinois is 21.9% and the U.S. is 22.0%. This trend is projected to continue through 2018. While this group may have the necessary skills for some front-line production or supervisory jobs, a systematic assessment of the skill and potential of these individuals would be necessary to determine the educationor training that is needed in order to help them fulfill their job market potential.

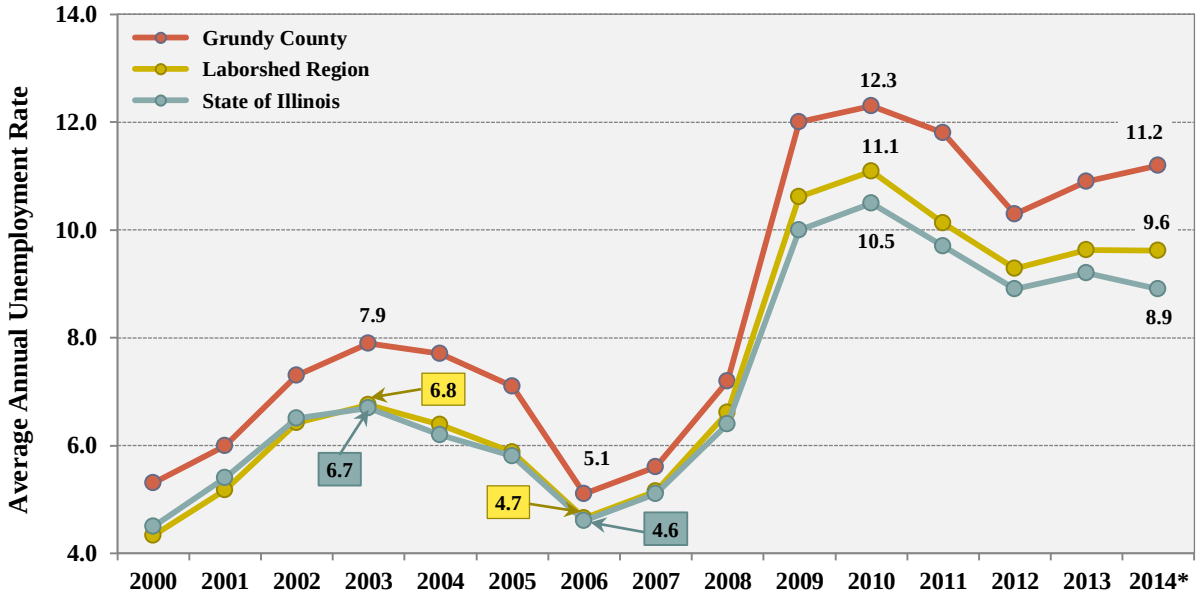
Grundy County currently has a high percentage of residents with 'some college but no degree' at 28.3%. The same category of residents for the Laborshed Region is 20.6%.

SECTION 3: EMPLOYMENT AND BUSINESS TRENDS AND CHARACTERISTICS

Employment Trends

While Grundy County and other Collar counties[4] have experienced significant job growth since the end of the last recession, Grundy County and the Laborshed Region continue to struggle in terms of unemployment, with 11.2% and 9.6% in 2014 respectively (Figure 5).

Figure 5. Unemployment Trends, Average Annual Rate, 2000-2014*



Source: Woods and Poole Economics, Inc. database. (2014).
*Figures for 2014 are based on the average of the months of January through March.

These unemployment figures remain well above the average of 8.9% for Illinois. In the case of Grundy County and several Collar counties, this may be due to a relatively high proportion of residents commuting to jobs in other parts of the region, especially to Chicago. When these workers lose their jobs they are counted as unemployed in their place of residence. The City of Chicago, for example, lost over 75,000 jobs in the past recession and is still experiencing net job losses, indirectly precipitating higher unemployment across the region[5]. In addition, in the past two decades, the population in Grundy and the

[4] Illinois Collar counties (surrounding Cook County) include DuPage, Kane, Kendall, Lake, McHenry, and Will Counties.
[5] Calculations based on data from the Illinois Department of Employment Security and the U.S. Bureau of Labor Statistics for December 2007 through June 2013.

Collar counties has increased far more rapidly than employment. This results in fewer opportunities for displaced workers to find jobs in their immediate area.

According to the Illinois Department of Employment Securities, Grundy County experienced a lower rate of job loss (-1.3%) in the recent recession (December 2007-April 2009) than the Laborshed Region (-5.9%) or Illinois (-6.1%); however, the county has continued to struggle five years after the end of the last recession with unemployment rates that are significantly higher than the Laborshed Region and Illinois[6]. Yet, post-recession employment growth in Grundy County has been robust at 6.2%[7], whereas the Laborshed Region increased by only 1.7%.

This paradox of high unemployment combined with high employment growth reflects several factors, including the dependence of the Collar counties on Chicago as the primary employment center, declining labor force participation, and an uneven recovery in several key business sectors.

Industry Employment Characteristics

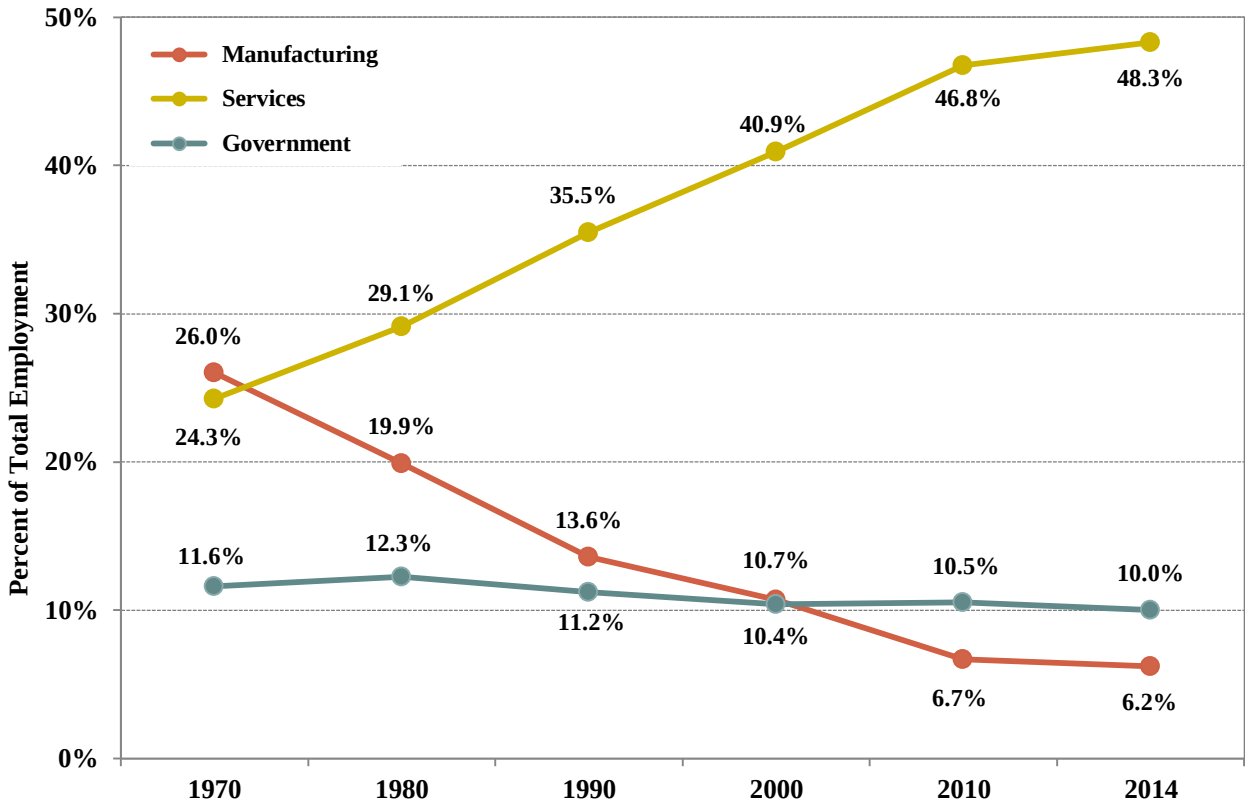
Apart from the industry sectors consisting of Education, Health Care, and Social Assistance, most of the employment in Grundy County and the Laborshed Region is dominated by Finance, Insurance, Real Estate, Government, and a variety of Business Services. Many of these sectors experienced employment growth over the past several decades as the Chicago metropolitan area has developed into a major financial and business services center. Although most of these sectors were severely impacted by the last recession, the long-term growth trend is projected to continue. In fact, the Education, Health Care, and Social Assistance sector added employees through the recession and have continued experienced job growth since then (Figure 6)[8].

[6] The duration of business cycles is determined by the Business Cycle Dating Committee of the National Bureau of Economic Research. The duration of the recent recession was December 2007 through June 2009.

[7] Illinois Department of Employment Security, non-farm employment change between June 2009 and April 2014.

[8] Based on analysis of industry employment data for the Chicago-Naperville-Michigan City, IL-IN-WI Combined Statistical Area (CSA) from the U.S. Bureau of Employment Statistics, (2013).

Figure 6. Employment by Major Industry Sector, Laborshed Region



Source: Woods & Poole Economics, Inc. database. (2014).
Note: Services sector includes: Professional and Technical Services, Management of Companies and Enterprises, Administrative and Waste Services, Educational Services, Health Care and Social Assistance , Arts, Entertainment, and Recreation, Accommodation and Food Services, and Other Services (excluding Public Administration).

Manufacturing employment declined significantly between 2000 and 2014, continuing a long-term trend. However, it remains an important sector in Grundy County, the Laborshed Region, and Illinois. Although manufacturing employment accounts for only 7.6% of total Illinois employment, it generates 12.3% of the Gross Domestic Product (GDP) in Illinois[9]. Despite decades of job losses, Illinois still ranks 4th in the U.S. in terms of the number of manufacturing jobs[10]. This reflects the impact of competitive pressures and

Technological advancements in many industries, especially manufacturing, demand a higher level of education and/or training to fill the jobs which will become available.

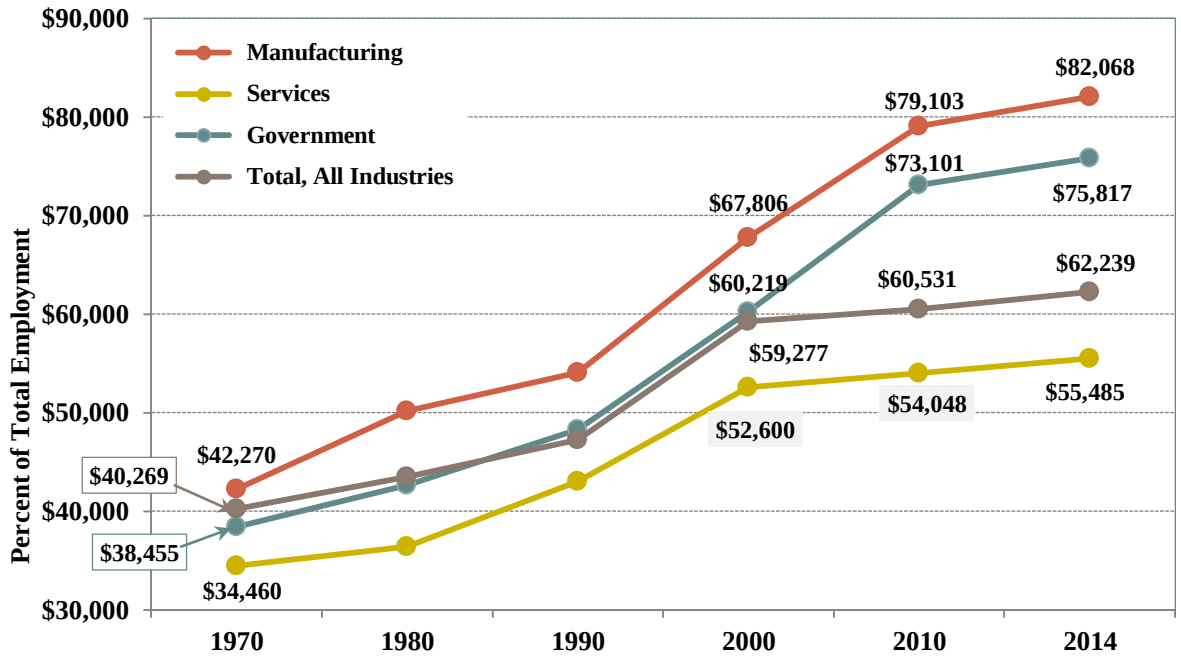
[9] Based on an analysis of data estimates derived from the Woods and Poole Economic, Inc. database (employment), (2014); and IMPLAN GDP, (2012).
[10] Based on data from the U.S. Bureau of Labor Statistics, (2013).

productivity improvements that have allowed companies to meet or exceed past production levels with fewer employees.

Technological advancements in many industries, especially manufacturing, demand a higher level of education and/or training to fill the jobs which will become available. A desired outcome of any county or regional economic development effort is that employers and educational institutions in the area can work together to deliver a set of training programs based on the needs of industries being recruited into a county or region. Regional strategies are needed to maintain and improve this employment sector because jobs in the manufacturing sector typically pay more than many other sectors.

In 2014, the average earnings per employee in the Laborshed Region for manufacturing were $82,068, nearly one-third higher than the average for all industries in the Laborshed Region ($62,239). In addition, manufacturing earnings increased 16.7% between 2000 and 2010 and are projected to increase 3.7% from 2010 to 2014 (Figure 7). Grundy County's manufacturing sector, though relatively small, compares favorably in relation to the Laborshed Region, other industry sectors, and recent growth trends.

Figure 7. Earnings per Employee by Major Industry Sector, Laborshed Region



Source: Woods & Poole Economics, Inc. database. (2014).
Note: Services sector includes: Professional & Technical Services, Management of Companies & Enterprises, Administrative & Waste Services, Educ. Services, Health Care & Social Assistance, Arts, Entertainment, Recreation, Accommodation & Food Services, and Other Services (exclg. Public Admin.

Occupational Employment Characteristics

Occupational employment characteristics both influence, and are influenced by, the industrial make-up of the regional economy, population trends, and educational attainment. The skills, aptitudes, and competence of the workforce govern to a large extent the type of industry which can be developed or attracted to a region. Grundy County and the Laborshed Region maintain a long standing specialization in manufacturing which is reflected in the composition of the workforce. Installation, Maintenance, & Repair; Transportation & Material Moving; and Production occupations accounted for 17.3% of total occupational employment, or nearly 650,000 jobs, in 2010 (Figure 8).

Grundy County and the Laborshed Region maintain a long standing specialization in manufacturing, which is reflected in the composition of the workforce.

Figure 8. Occupation Employment Projections, Laborshed Region, 2010–2020

	2010		2020		CHANGE 2010-2020	
OCCUPATION CLASSIFICATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Total, All Occupations	3,749,676	100.0%	4,097,346	100.0%	347,670	9.3%
Management	241,463	6.4%	251,925	6.1%	10,462	4.3%
Business & Financial Operations	216,780	5.8%	243,185	5.9%	26,405	12.2%
Computer & Mathematical	95,764	2.6%	115,601	2.8%	19,837	20.7%
Architecture & Engineering	52,753	1.4%	57,008	1.4%	4,255	8.1%
Sales & Related	398,313	10.6%	421,991	10.3%	23,678	5.9%
Office & Administrative Support	589,205	15.7%	616,351	15.0%	27,146	4.6%
Construction & Extraction	133,845	3.6%	146,191	3.6%	12,346	9.2%
Installation, Maintenance & Repair	120,959	3.2%	129,116	3.2%	8,157	6.7%
Production	246,517	6.6%	240,038	5.9%	-6,479	-2.6%
Transportation & Material Moving	281,909	7.5%	303,734	7.4%	21,825	7.7%

Source: Illinois Department of Employment Security, Labor Market Information Unit. (2014).
Note: The Laborshed Region cited in this table consists of Workforce Investment Areas #6 (DuPage County), #7 (Cook County), #10 (Will County), and #11 (Grundy, Kankakee and Livingston Counties).

Although the categories of Installation, Maintenance, and Repair; Transportation and Material Moving; and Production occupations are expected to fall to 16.5% by 2020, these occupations will continue to play a critically important role in the economic development of the Laborshed Region. The Manufacturing and Transportation sectors rely heavily on these occupational skills and, despite anticipated declines in the aggregate number of jobs in these sectors over the next decade, the demand for replacement workers will more than offset those declines.

The three largest occupational sectors for manufacturing (Installation, Maintenance, and Repair; Transportation and Material Moving; and Production) are projected to have 18,756 job openings, with nearly 79.4% resulting from replacement demands (Figure 9). This situation will create an increase in competition for employers as the number of younger skilled workers will be limited. Grundy County may be at a competitive disadvantage in attaining additional manufacturing workers since the Laborshed Region offers a greater number and variety of employment opportunities, as well as competitive compensation within a reasonable commuting distance. While the current work-force continues to receive high praise from local employers, there is a growing concern about finding and retaining skilled workers for the future[11]. To properly address this situation, it is essential that employers, educators, and local officials work together to address the worker skill gaps.

While the current workforce continues to receive high praise from local employers, there is a growing concern about finding and retaining skilled workers for the future.

Figure 9. Occupational Employment Average Annual Openings
Laborshed Region, 2010-2020

OCCUPATIONAL CLASSIFICATION	AVERAGE ANNUAL JOB OPENINGS DUE TO:			ANNUAL AVERAGE GROWTH
	GROWTH	REPLACEMENT	TOTAL	
Total, All Occupations	38,463	88,131	126,594	0.9%
Management	1,228	5,302	6,530	0.4%
Business & Financial Operations	2,828	4,384	7,212	1.2%
Computer & Mathematical	1,986	1,781	3,767	2.1%
Architecture & Engineering	458	1,182	1,640	0.8%
Sales & Related	2,523	12,138	14,661	0.6%
Office & Administrative Support	3,947	12,900	16,847	0.5%
Construction & Extraction	1,273	2,727	4,000	0.9%
Installation, Maintenance & Repair	898	2,657	3,555	0.7%
Production	603	4,960	5,563	-0.3%
Transportation & Material Moving	2,352	7,286	9,638	0.8%

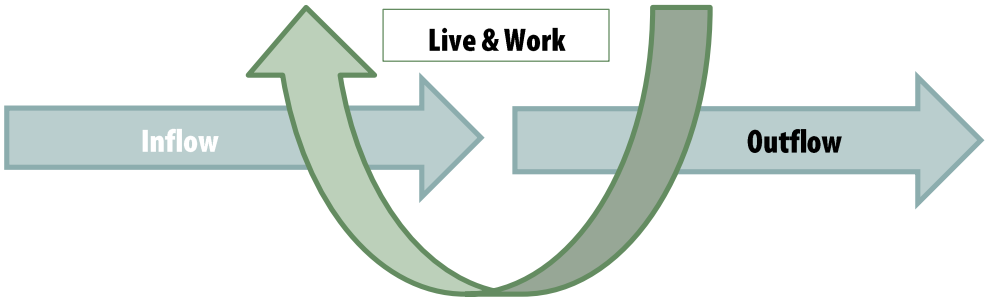
Source: Illinois Department of Employment Security, Labor Market Information Unit. (2014).
Note: The Laborshed Region cited in this table consists of Workforce Investment Areas #6 (DuPage County), #7 (Cook County), #10 (Will County), and #11 (Grundy, Kankakee and Livingston Counties).

[11] Business and Expansion Outreach Program, Grundy Economic Development Council. (2012). *Grundy County Retention and Expansion Report.*

Workforce Commuter Trends

Worker commuting patterns are one indicator of the actual size and scope of the regional labor market. Commuting patterns are best described in terms of worker inflow (workers living in other areas but employed in Grundy County), worker outflow (employed residents in Grundy County who work outside the area) and. The regional labor force consists of those who:

1. Are employed in the county, but live outside the county (inflow);
2. Live in the county, but are employed outside the county (outflow); and
3. Both live and work in the county.



Although Grundy County experienced a rapid rate of population and employment growth over the past two decades, the number of residents far exceeds the number of jobs. New development and job growth depend in part on the supply and mobility of workers. Commuting workers represent a labor market for existing and potential employers in the Interstate 80/Brisbin Road Interchange development area and Grundy County.

Current out-bound commuters (worker outflow) may be attracted to employment opportunities closer to home provided there is a positive trade-off between compensation and the cost of commuting, while workers in the surrounding communities may be attracted as the number and quality of job offerings increase in the area (worker inflow).

Current out-bound commuters (worker outflow) may be attracted to employment opportunities closer to home provided there is a positive trade-off between compensation and the cost of commuting.

Labor market data for Grundy County indicates a substantial and growing number of workers commute to jobs outside of the county. In 2011, 25,007 workers lived in Grundy County, while only 15,811 were employed in county resulting in *a net outflow* of 9,196 workers commuting to jobs in the surrounding areas (Figure 10).

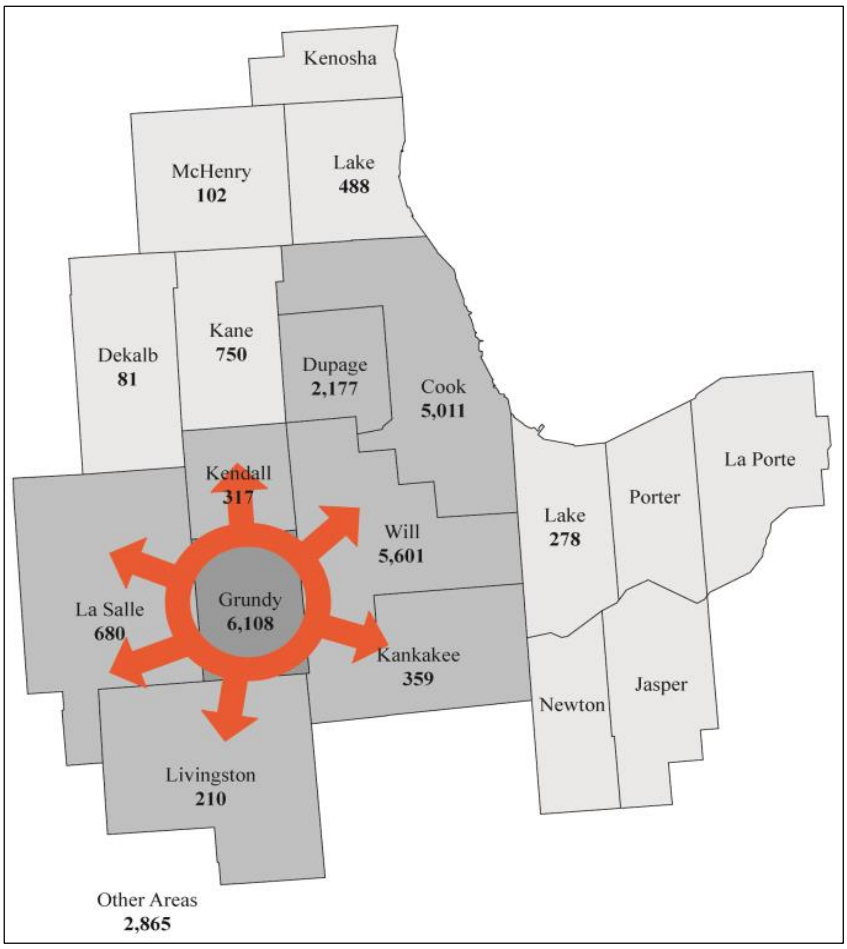
Figure 10: Inflow and Outflow of Workforce, Grundy County, Illinois, 2011

GRUNDY COUNTY	2011	2008	2005	2002
Workers *Employed* in Grundy County	15,811	15,677	15,233	14,771
Workers *Living* in Grundy County	25,007	22,903	21,231	18,435
Net Job Inflow (+) or Outflow (-)	-9,196	-7,226	-5,998	-3,664

Source: U.S. Census Bureau. (2014). *Local Employment Dynamics.*

The most popular destinations for those commuting to jobs outside of Grundy County were Will, DuPage, and Cook Counties. These three counties account for over two-thirds of the out-bound commuting of Grundy County residents (Figure 11).

Figure 11. Workplace of Grundy County Residents, Worker Outflow by County of Employment, 2011

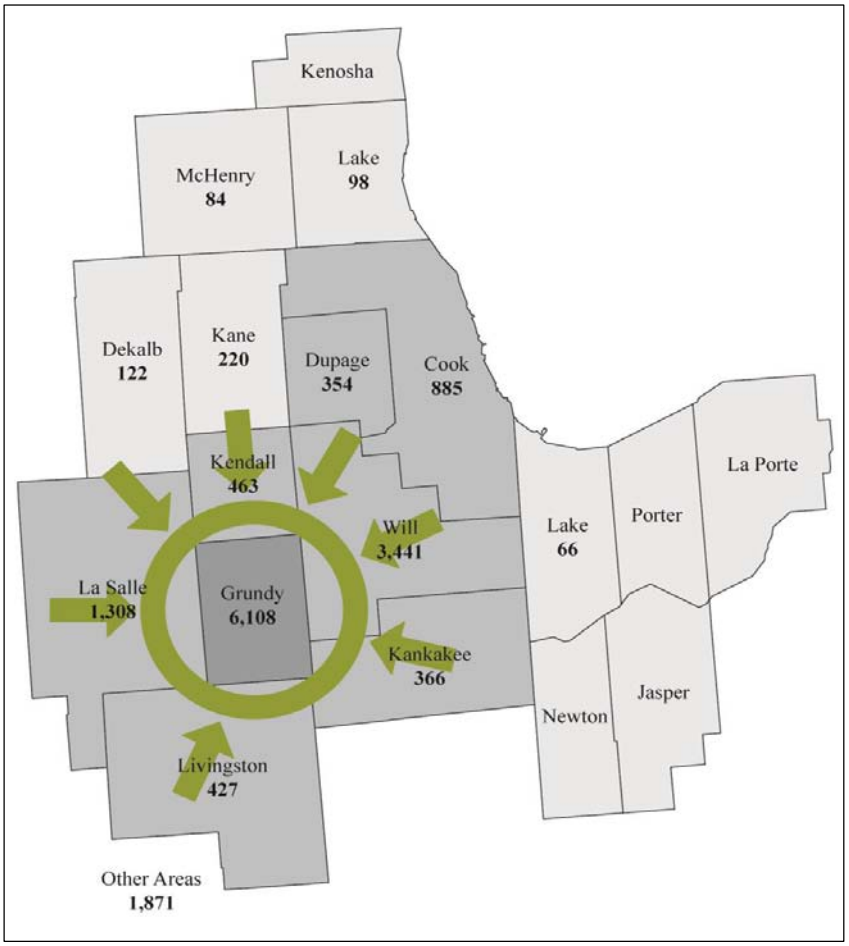


Source: U.S. Census Bureau. (2014). OnTheMap Application and LEHD Origin-Destination Employment Statistics.

Because of its smaller business and employment base, Grundy County tends to draw most of its commuting workers from adjacent areas, especially Will and LaSalle Counties. These counties account for

nearly one-half of in-bound commuters (Figure 12). This inflow of workers is characteristic of the outer belt of Collar counties in the Chicago metropolitan area. It is driven primarily by the metropolitan area's extensive transportation network coupled with relatively lower housing and other living costs that attract workers to suburban and exurban areas. Businesses and employment often follow population migration, albeit at a much slower pace.

Figure 12. Residence of Grundy County Workers, Worker Inflow by County of Employment, 2011



Source: U.S. Census Bureau. (2014). OnTheMap Application and LEHD Origin-Destination Employment Statistics.

Business Vitality Trends

Economic analyses are often centered on changes in the number of establishments and employment, which are caused by many factors. This section examines the factors which create some of these changes in business and employment trends by researching businesses according to size (based on number of employees). It also considers business starts, closures, and migration and how these factors impact the economic growth of the Laborshed Region.

The key elements of business vitality are new business start-up, existing business growth, and the migration of businesses into the Laborshed Region. Business start-ups are essential to a vibrant economy regardless of the size, even though most small businesses never become large employers[12]. The expansion of existing firms is often cited as the single greatest source of job growth in a community or region[13]. Business migration, while playing a significant role in job creation and loss, is more of an indicator of industry vitality than the quality of the local business climate over time[14].

The growth in small businesses may also suggest that resident firms, especially the smaller businesses, are more resilient in terms of job creation or retention, which underscores the importance of including them in local development strategies.

Between 2009 and 2012, employment in the Laborshed Region increased by 6.6% (Figure 13)[15]. This represents a net gain of 271,712 jobs. The trend represents growing business vitality and is consistent with the gradual economic recovery occurring nationwide during this period. Job creation stemmed predominantly from small businesses – referred to as 'Stage 1' which employ 2 to 9 workers. Stage 1 businesses represent 40.0% of net job growth. It should be noted, however, that some of the job growth in smaller firms is possibly due to downsizing by larger firms, outsourcing of work to self-employed contractors, or expansions by smaller firms.

The growth of small businesses, especially those classified as either 'Self-Employed' or Stage 1, is a positive sign because it suggests that entrepreneurs and small businesses have confidence in the local economy and are willing to hire. The growth in small businesses may also suggest that resident firms, especially the smaller businesses, are more resilient in terms of job creation or retention, which underscores the importance of including them in local development strategies.

[12] Walzer, N. and Harger, B. (2012). *The Rural Midwest: How Is It Faring?* Macomb, Illinois. Rural Research Report 23 (1). Illinois Institute for Rural Affairs. Retrieved from http://www.iira.org/pubs/publications/IIRA_RRR_740.pdf.

[13] Birch, D., Gunderson, J., Haggerty A., and Parsons, W. (1993). *Who's Creating Jobs?* Mimeo, Cognetics, Inc., Cambridge, MA.

[14] Kolko, J. and Newmark, D. (2007). *Business Location Decisions and Employment Dynamics in California.* Public Policy Institute of California, San Francisco, CA. Retrieved from http://www.ppic.org/content/pubs/report/R_1107JKR.pdf.

[15] The National Establishment Time Series (NETS) data includes business establishments and employment. The NETS data are reported by business location or place of employment rather than residence as in the case of the U.S. Census Bureau data.

Figure 13: Employment Changes by Size and Ownership Class, Laborshed Region, 2009-2012

LABORSHED REGION	2009	2012	NUMERIC CHANGE	PERCENT CHANGE
Total	4,113,323	4,385,035	271,712	6.6%
Self-Employed (1)	115,121	119,182	4,061	3.5%
Stage 1 (2-9)	761,475	870,219	108,744	14.3%
Stage 2 (10-99)	1,450,809	1,479,076	28,267	1.9%
Stage 3 (100-499)	1,003,081	1,091,967	88,886	8.9%
Stage 4 (500+)	782,837	824,591	41,754	5.3%

Source: National Establishments Time-Series (NETS) database. (2014).

In addition to Self-Employed and Stage 1 companies, there are three other categories based on business size, 'Stage 2' businesses employ 10 to 99 workers, 'Stage 3' employ 100 to 499 workers, 'Stage 3' companies employ 100 to 499 workers, and 'Stage 4' businesses employ 500 or more workers. Stage 3 companies were another major source of job growth in the Laborshed Region, representing 32.7% of net job growth with more than 88,800 net new jobs. While small businesses drive the majority of job creation in the Laborshed Region, retention of existing large companies should be equally important in its economic development strategy.

In terms of business activity, the Laborshed Region gained 51,948 *establishments*[16] (12.5% increase) between 2009 and 2012 (Figure 14). As with employment, the primary source of establishment growth was Stage 1 companies. The Laborshed Region gained businesses in all size categories except those with more than 500 employees (Stage 4).

Small businesses represent the majority of new business activity in the Laborshed Region, but many of the jobs created also come from a smaller number of expanding Stage 3 business. Establishments with less than 10 employees (self-employed and Stage 1) represented 98.7% of net establishment growth between 2009 and 2012. The source of establishment growth in this group were start-up companies and expansion of existing firms, while much of the growth in Stage 3 and 4 businesses came as a result of 'spin-offs' from existing firms.

[16] An 'establishment' is defined as a single physical location where business is conducted or where services or industrial operations are performed.

Figure 14: Establishment Changes by Size Class, Laborshed Region, 2009-2012

LABORSHED REGION	2009	2012	NUMERIC CHANGE	PERCENT CHANGE
Total	416,142	468,090	51,948	12.5%
Self-employed (1)	115,121	119,182	4,061	3.5%
Stage 1 (2-9)	239,109	286,302	47,193	19.7%
Stage 2 (10-99)	55,638	55,863	225	0.4%
Stage 3 (100-499)	5,613	6,085	472	8.4%
Stage 4 (500+)	661	658	-3	-0.5%

Source: National Establishments Time-Series (NETS) database. (2014).

Business Churn and Employment Trends

Employment growth is the result of a dynamic process sometimes referred to as business 'churn', in which job creation is driven by business start-ups, spin-offs, expansions, and move-ins, and job elimination is driven by closures, contractions and move-outs. Although the factors contributing to the overall gain or loss of businesses and employment may change based on the location being studied or over time, it is important for local officials to understand the different factors and adjust their economic development efforts accordingly.

Sources of Job Growth:

- ✓ **Start-ups** are new establishments that have no prior affiliation with any existing business.
- ✓ **Spin-offs** are new establishments that were created from an existing business.
- ✓ **Expansions** refer to existing businesses that added jobs.
- ✓ **Move-Ins** refer to a subset of businesses that relocated to the subject area.

Sources of Job Loss:

- ✓ **Closures** include all establishments that went out of business.
- ✓ **Contractions** refer to existing companies that reduced employment.
- ✓ **Move-Outs** refer to a subset of businesses that relocated out of the subject area.

Between 2009 and 2012, new companies and spin-offs of existing companies accounted for about two-thirds of jobs and business growth (Figure 15). Especially important to job creation were spin-off companies. Although fewer in number than new start-ups (2,880 spin-offs compared to 42,970 start-ups), spin-off firms collectively added nearly as many jobs as start-up companies (103,834 spin-off jobs compared to 106,356 start-up jobs).

Figure 15: Effects of Business 'Churn' on Employment Changes, 2009-2012

Source: National Establishment Time Series (NETS) database. (2014). Retrieved from **http://**www.YourEconomy.org.

This suggests that Grundy County, as well as the Laborshed Region, could benefit from focusing on economic development policies that foster entrepreneurship, as well as the retention and expansion of existing firms.

The overall impact of business expansions in the Laborshed Region was positive, offsetting job losses from businesses that reduced employment by a considerable margin. The number of establishments expanding (19,529 firms) was over three times greater than those contracting (5,648 firms). Jobs created by the expansion of existing firms exceeded the number of jobs lost in businesses that contracted, by a margin of nearly 2 to 1.

Although business migration (i.e. Move In/Move Out) accounts for a relatively small share of business churn, and the number of businesses moving in (2,254) to the Laborshed Region was about the same as those moving out (2,438), the result was a *net loss* of 8,805 jobs. Stage 4 firms were by far the largest source of job loss due to net migration. While Stage 4 firms moving into the Laborshed Region created 5,314 jobs, Stage 4 firms moving out were responsible for the loss of 13,348 jobs, resulting in a net loss of 8,034 jobs. The only segment to have a gain in employment was Stage 2 companies where business migration resulted in a net gain of 358 jobs.

A closer examination of business starts (both start-ups and spin-offs) illustrates their contribution to the economies of Grundy County, the Laborshed Region, Illinois, and the U.S. (Figure 16). Grundy County benefits greatly from its location in the Chicago metropolitan area, a major driver of the Illinois economy representing more than 75.0% of the state's Gross Regional Product (GRP) according to the Bureau of Economic Analysis. Recent studies of new business starts have indicated a much lower level of business formation both during and after the recent recession[17]. While Grundy County has had a lower rate of business formation than the Laborshed Region, this may be explained to some degree by its relatively smaller population base and business density.

Figure 16: Business Start-Ups, 2009-2012

AREA NAME	BUSINESS START-UPS PERCENT OF TOTAL FIRMS		NET BUSINESS START-UPS PER 10,000 POPULATION	
	2009	2012	2009	2012
Grundy County	9.6%	8.8%	56.1	55.4
Laborshed Region	10.9%	9.9%	63.0	63.5
Illinois	9.9%	9.0%	59.3	58.4
U.S.	10.8%	9.5%	79.8	76.1

Source: National Establishment Time Series (NETS) database. (2014). Retrieved from http://www.YourEconomy.org.

Although the data do not offer further insight into the issue of business turnover, conducting further research would be worthwhile in order to determine the reasons that local companies open, close, expand, or migrate in and out of the Laborshed Region, and also whether the local economic development climate and/or environment has any influence on these events. In order for Grundy County and the Laborshed Region to maintain and/or improve their advantages relative to other regions across the country, the local policies, incentives, and support services for start-ups and expansion must be suitable for local needs.

[17] Kane, T. (2012, September). *The Collapse of Startups in Job Creation*. Hudson Institute. Retrieved from http://www.hudson.org/files/publications/Kane--TheCollapseofStartupsinJobCreation0912web.pdf

Site Location Trends

Industrial location preferences change as new industries start-up and/or move from using and producing heavy products to focusing more on information technology, services, distribution logistics, or other outputs. As the Interstate 80/Brisbin Road Interchange development area continues in its build-out phase it is important to monitor site location trends, especially in the targeted industries and to adjust development and marketing plans accordingly.

In performing a site location analysis, the source was the Annual Survey of Corporate Executives conducted by *Area Development Magazine*[18]. The latest results reported in 2014 are for surveys conducted in 2012 and 2013, and of the 240 respondents 39.0% were affiliated with manufacturing companies, 19.0% represented the financial services, insurance and real estate sectors. Distribution, logistics and warehousing firms accounted for another 10.0%. Nearly half of the respondents (47.0%) reported that their companies employ fewer than 100 people, but nearly a third (31.0%) employed 500 or more workers, which is similar to much of the Laborshed Region.

As the Interstate 80/Brisbin Road Interchange development area continues in its build-out phase it is important to monitor site location trends, especially in the targeted industries and to adjust development and marketing plans accordingly.

Many of the factors considered 'very important or important' site selection criteria play to the strengths of Grundy County and the Laborshed Region. In 2013, *highway accessibility* (93.5%) and *labor costs* (90.8%) factors were outranked by the *availability of skilled labor* (95.1%) which ranked as the most important factor by site selectors in location decisions, up from third last year (Figure 17). To help produce a bigger pool of skilled labor, work experiences which make graduates more career ready should continue and increase. Current collaboration efforts with the Grundy County Workforce Services, Joliet Junior College, and other area training programs help contribute to this outcome. If businesses also participate in these programs that improve the availability of skilled labor, then Grundy County and the Laborshed Region could be in a solid position to market to prospective businesses.

[18] Halcyon Business Publications. (2014). *28th Annual Survey of Corporate Executives Results*. Retrieved from http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2014/28th-Corporate-Executive-RE-survey-results-6574981.shtml?Page=2

Figure 17: 2012 and 2013 Ranking of Site Location Factors

COMBINED RATINGS CORPORATE SURVEY 2013*

	SITE SELECTION FACTORS		
	RANK	**2013**	**2012**
1.	**Availability of skilled labor**	95.1	89.4 (3)**
2.	**Highway accessibility**	93.5	90.1 (2)
3.	**Labor costs**	90.8	90.8 (1)
4.	**Occupancy or construction costs**	87.4	82.8 (5)
5.	**Availability of advanced ICT services**	84.6	85.1 (4)
6.	**Available buildings**	83.3	78.4 (8)
7.	**Corporate tax rate**	82.4	79.3 (7)
8.	**State and local incentives**	81.9	71.1 (13T)
9.	**Low union profile**	81.4	73.5 (10)
10.	**Energy availability and costs**	80.8	81.3 (6)
11T.	**Tax exemptions**	80.6	75.4 (9)
11T.	**Right-to-work state**	80.6	72.6 (11)
13.	**Available land**	80.3	59.0 (18)
14.	**Expedited or 'fast-track' permitting**	76.3	67.2 (15)
15.	**Proximity to major markets**	75.6	72.2 (12)
16.	**Availability of long-term financing**	74.8	63.1 (17)
17.	**Environmental regulations**	71.7	71.1 (13T)
18.	**Inbound/outbound shipping costs**	70.9	63.7 (16)
19.	**Proximity to suppliers**	67.7	54.9 (19)
20.	**Raw materials availability**	60.5	49.7 (23)
	QUALITY-OF-LIFE FACTORS		
	RANK	**2013**	**2012**
1.	**Low crime rate**	80.9	79.3 (1)**
2.	**Healthcare facilities**	79.7	69.8 (2T)
3.	**Housing costs**	75.3	66.9 (4)
4.	**Ratings of public schools**	73.0	63.3 (5)
5.	**Housing availability**	71.5	69.8 (2T)
6.	**Recreational opportunities**	66.4	52.9 (8)
7T.	**Colleges and universities in area**	59.5	61.6 (6)
7T.	**Climate**	59.5	55.0 (7)
9.	**Cultural opportunities**	54.8	48.9 (9)

Source: Area Development Corporate Survey. (2014). *Area Development Magazine.*
*All figures are percentages and are the total of 'very important' and 'important' ratings. **(2012 ranking)
Note: 'T' means there was a tie for that particilar ranking.

The importance of *skilled labor availability*, however, also emphasizes the impact that population trends will have on the region as the Baby Boomer generation retires. Strong efforts are needed to encourage young adults to remain in the region and /or return after they complete higher education. An effective program of entrepreneurship training or support agencies and/or internships could increase this age group's attraction to the Laborshed Region.

Highway accessibility ranked second with 93.5% of the respondents rating it as 'very important or important' in location decisions. The importance of highway access indicates that access to major markets is also a high priority and plays to the strength of the Interstate 80/Brisbin Road Interchange development area.

Occupancy and construction costs ranked fourth among site location factors with 87.4% of survey respondents reporting that this factor was 'very important or important.' Conducting a comparative cost analysis of the Laborshed Region occupancy and construction costs could be helpful to determine the competitiveness the Region has with other areas in terms of this important site selection factor.

The list of important location considerations also included availability of *information and communication technology (ICT), taxes, incentives, and other factors*. These area characteristics can be affected by local policies or actions and GEDC is currently exploring options for the Interstate 80/ Brisbin Road Interchange development area. GEDC offers a unique incentive for industrial clients that are locating or expanding in the county through the Economic Development Project Area (EDPA) tax abatement program. The EDPA program provides a mechanism for significant tax relief for new industrial investors and existing businesses looking to reinvest in current facilities by rebating a portion of their property taxes to cover expenses such as: property acquisition and related assembly costs, site preparation and related costs, construction costs of public works, project related infrastructure improvements, annual project interest costs (up to 30.0%), relocation costs, and/ or job training.

It will continue to be important for governments and economic development leaders to examine their competitiveness with regard to incentives, tax rates, and other factors affecting the business operating environment. Local public officials working with business leaders should continue to explore opportunities to design or modify programs to improve the business climate.

It will continue to be important for governments and economic development leaders to examine their competitiveness with regard to incentives, tax rates, and other factors affecting the business operating environment.

SECTION 4: DETAILED CLUSTER ANALYSIS

The cluster analysis began by reviewing cluster data from the EDA sponsored work by the Purdue Center for Regional Development[19] and similar research carried out by Professor Michael E. Porter with the Institute for Strategy and Competitiveness[20]. The selected clusters have a significant presence in Grundy County, as well as the Laborshed Region.

This presence was determined based on several factors including a review of:

- Demographics,
- Economic and industry trends, including location quotients,
- Physical attributes of the development area,
- Current and projected business climate,
- Existing sites and businesses,
- Community assets, and
- Supporting institutions.

[19] Purdue Center for Regional Development, Purdue University, et. al. (2009, October). *A Practitioner's Guide to Economic Development Tools for Regional Competitiveness in a Knowledge-Based Economy*.
[20] U.S. Cluster Mapping Project led by Professor Michael E. Porter. (2012-2014). Institute for Strategy and Competitiveness, Harvard Business School. Retrieved from http://clustermapping.us/

In addition, consideration was given to the proposed purpose and uses of the Interstate 80/Brisbin Road Interchange development area, supply-chain relationships, the industry targets identified in the Grundy County CEDS, as well as the current business development plans of the Grundy County Economic Development Council (GEDC) and the affected municipalities.

Specifically CGS analyzed the concentration of establishments, employment, and/or wages as measured by location quotients (LQ) which are used to evaluate local development opportunities. Location Quotients (LQ) are used to evaluate local development opportunities and find businesses which are especially suited for the region.

Figures 18 and 19 show the general employment and wage characteristics of the six clusters chosen for this project:

1. Advanced Materials
2. Chemicals and Chemical Based Products
3. Energy (Conventional and Renewable)
4. Glass and Ceramics
5. Machinery Manufacturing
6. Transportation and Logistics

LOCATION QUOTIENT (LQ)

- ✓ **The ratio of the employment percentage represented by a given industry** in the county to the percentage which industry represents in the state or a representative area of interest.
- ✓ A **ratio greater than 1.0** indicates a higher local concentration and a likelihood of exports from the county.
- ✓ A **ratio less than 1.0** may suggest that goods or services are imported into the region.

Figure 18: Cluster Employment Characteristics

DESCRIPTION	LABORSHED REGION			GRUNDY COUNTY		
	EMPLOYMENT (2012)	EMPLOYMENT LQ (2012)	PCT. CHANGE (2009-2012)	EMPLOYMENT (2012)	EMPLOYMENT LQ (2012)	PCT. CHANGE (2009-2012)
Advanced Materials	111,322	1.0	-15.6%	995	1.9	10.1%
Chemicals & Chemical Based Products	46,131	1.0	-8.4%	815	3.4	-1.2%
Energy (Conventional & Renewable)	88,961	0.6	-9.3%	1,707	2.3	7.3%
Glass & Ceramics	7,141	1.3	-3.3%	84	2.9	740.0%
Machinery Mfg.	20,996	1.0	-30.7%	120	1.1	66.7%
Transportation & Logistics	144,219	1.4	8.1%	855	1.7	13.5%

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2014).

Figure 19: Cluster Wage Characteristics

DESCRIPTION	LABORSHED REGION			GRUNDY COUNTY		
	ANNUAL AVG. WAGE (2012)	WAGE LQ (2012)	PCT. CHANGE (2009-2012)	ANNUAL AVG. WAGE (2012)	WAGE LQ (2012)	PCT. CHANGE (2009-2012)
Advanced Materials	$68,942	0.8	9.1%	$85,690	2.0	6.8%
Chemicals & Chemical Based Products	$66,543	0.9	10.7%	$86,623	4.3	5.0%
Energy (Conventional & Renewable)	$83,244	0.6	6.3%	$70,197	1.9	-3.9%
Glass & Ceramics	$48,563	1.1	9.1%	$79,388	4.5	71.5%
Machinery Mfg.	$72,721	1.0	18.4%	$103,619	1.7	35.7%
Transportation & Logistics	$54,989	1.4	10.2%	$46,571	1.5	-7.6%

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2014).

As the economy continues its slow recovery after the last recession, the long-term prospects for employment and wages seem promising as the demand for replacement workers increases over the next decade. A broader discussion of attributes is included in the cluster profile section

Description of Targeted Clusters

One of the purposes of this study is to provide data-driven guidance to economic and community leaders in Grundy County. In order to develop a strategic direction for the Interstate 80/Brisbin Road Interchange development area within the larger context of regional cluster analyses, it is important to address the industry analyses from the perspectives of regional assets and potential. Based on the research and discussion with the steering committee and community leaders, a specific set of clusters and subsectors within those clusters were selected.

- *Advanced Materials* - Development and manufacturing of unique composites of plastic, glass fibers, carbon fibers, ceramics, metals and nano-materials. Any of these materials could be used simultaneously to create end products that are stronger, thinner, lighter, or have higher conductivity or insulation values than conventional alternatives. These innovative industrial technologies not only enable commercialization, but also provide the means to produce new products effectively and efficiently. The Digital Manufacturing and Design Innovation (DMDI) Institute in Chicago will provide regional manufacturers with access to a combination of advanced materials, high performance computing resources, modeling and simulation tools, and additive manufacturing practices allowing companies to design and build complex shapes and systems while significantly reducing manufacturing costs and cycle times. DMDI also holds the potential to dramatically boost the region's competitive advantage in attracting and retaining advanced manufacturing of all types.

- *Chemicals and Chemical Based Products* - Manufacturing basic, intermediate and specialty chemicals. Minerals, natural gas, petroleum, and plants are common materials for industrial chemical companies. Companies also use industrial chemicals as their raw materials. The cluster also includes industries whose products that manufactured from chemical substances such as plastics and rubber products, pharmaceutical preparations, ceramic and cement products, and paint, industrial coatings, adhesives and cleaning products. Major companies in Laborshed Region include Abbott Laboratories, Alberto-Culver, BP Amoco, BASF, Dow Chemical and Lyondell Chemical.

- *Energy* - This cluster encompasses all aspects of energy production, transmission and distribution. It includes conventional sources of electricity and fuel such as petroleum, coal, nuclear, and hydro, as well as a range of emerging alternative energy sources and technologies (solar, wind, hydrogen, biomass, and biofuels). It also includes resource extraction and refining, the transmission or transportation systems and the manufacturing of the mechanisms or equipment

used by the industry). The Chicago area is a major hub for energy production, transmission and distribution, as well as the development and deployment of alternative energy technologies.

- *Glass and Ceramics* – Involves the manufacture of glass and ceramic products from raw mineral. The glass and glass products component of this cluster includes manufacturers of glass containers, flat glass, fiberglass, and specialty glass products. The ceramics component of the cluster is made up of producers of earthenware and pottery products used as plumbing and electrical fixtures and accessories, kitchen and table articles, clay building materials and cement. It also includes companies that make clay refractory products, such as furnace linings. Abundant supplies of raw materials for the glass and ceramics cluster, such as clay, sand and aggregates are readily available across northern and central Illinois, making the Region an attractive location for production and distribution. Major companies include Enamelers & Japanners, Inc., LaFarge North America, Inc., Owens-Illinois, and Saint-Gobain Containers.
- *Machinery Manufacturing* - Comprised of a broad and diverse range of machinery or components which are used in agriculture, mining, construction, or manufacturing. Major products of companies in the Laborshed Region include farm and construction machinery, metalworking and other manufacturing machinery, HVAC and commercial refrigeration equipment, and general-use machinery such as engines and pumps. Products have a high engineering content, and product design usually involves CAD systems, which are integrated directly into a computer-aided manufacturing (CAM) process. While some products, such as tractors or heaters, are finished products, others like motors are components used in further production, and some are custom-designed for a specific manufacturing process. Manufacturing involves producing and assembling components. Companies either make or buy components and various types of mechanical, hydraulic, and electrical control systems. Manufacturing often involves forging, machining, and welding activities which require skilled labor.
- *Transportation and Logistics* - Road, rail, and air freight transportation companies, as well as warehousing, parcel couriers, and related logistics services. This cluster has a relatively small, but growing presence in the Grundy County, which is driven by transportation access and proximity to the Chicago area and other regional markets. It not only benefits from excellent highway and rail access, but also has close proximity large commercial airports, foreign trade zones, a major parcel air hubs, inland port facilities and rail-truck intermodal facilities.

It is important to note that due to the overlap of supply-chain, research and development, customers, and infrastructure needs, several of the selected clusters consist of the same industry sectors. The Advanced Materials cluster, for example, is based primarily on the application of new or innovative materials across a number of industries. This is also true for the Chemicals and Chemical-Based Products cluster since many new composite materials are being developed from organic or inorganic chemical substances. The synergies between the selected clusters are a great opportunity for local economic development officials to impact growth by focusing efforts on industries and companies that can serve or support several clusters.

The next section discusses individual profiles for each cluster followed by an overview of many of the industry trends and marketing opportunities for the six clusters within the Laborshed Region (see Appendix A for a list that identifies industry sectors found in multiple selected clusters).

Cluster Profiles

A cluster is comprised of a group of related industries which are connected by supply chains and/or common labor pools within the same region. The following cluster profiles include general characteristics and components of each of the six industry clusters. They also identify business opportunities for the Interstate 80/Brisbin Road Interchange development area, Grundy County, and the Laborshed Region based on gaps in the industry's regional supply chain.

In addition, the profiles provide a snapshot of the workforce requirements and occupational trends for each cluster as well as a take-away summary section. More detailed descriptions of the industries included in each cluster can be found in Appendix B.

The cluster profiles may be used by the communities and by economic developers to advise their clients and constituents on the importance as well as on the competitive advantages of these industries in the regional economy. The information can also be used in economic development retention and recruiting efforts, highlighting the competitive advantages of the Interstate 80/Brisbin Road Interchange development area and Grundy County in general.

Supply Chain

An essential component for a cluster is the local *supply chain*. While not all goods or services (inputs) that a cluster needs can be produced in the local economy, it is desirable to meet as many of the cluster's needs locally as possible.

This analysis reveals:

- Source and amount of purchases among the *unique niches* within an industry.
- Total economic outputs and areas where goods and services are purchased outside the regional economy
- *Areas where supply chains are strongest,* as well as those which present the best *opportunities for growth* within the Laborshed Region.

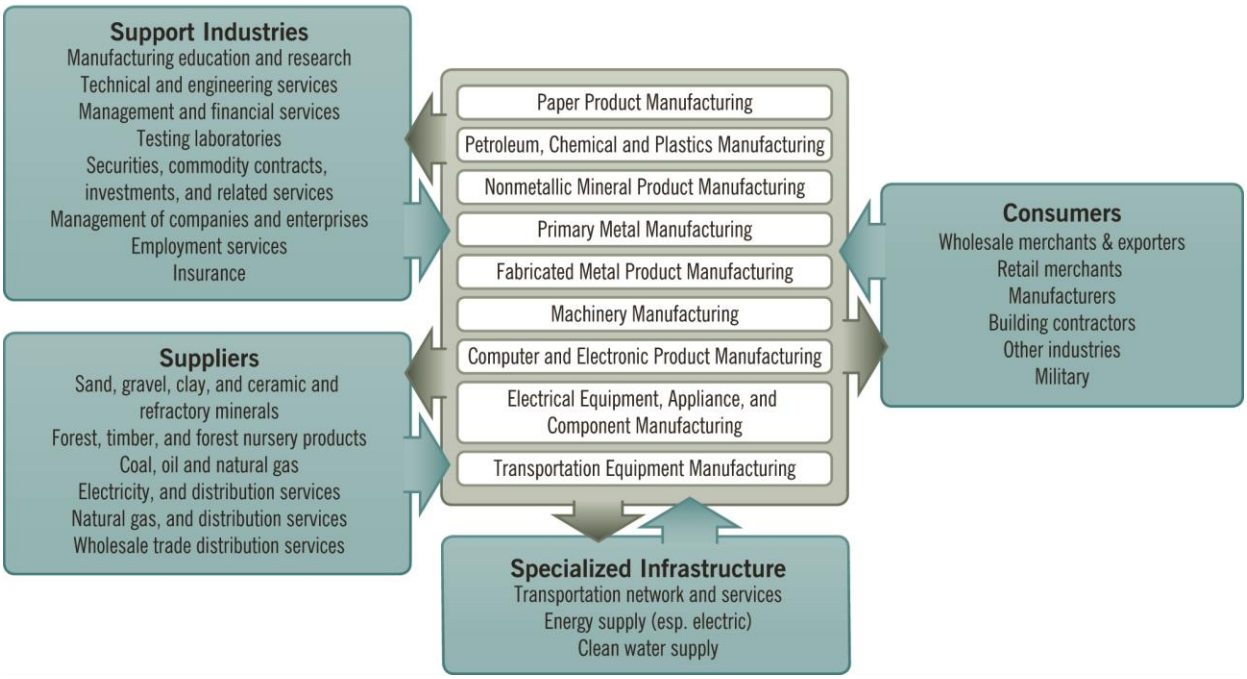
Cluster Profile: Advanced Materials

Cluster Summary

The *Advanced Materials* cluster is unique because it encompasses a wide variety of manufacturing industries. This cluster of industries is distinguished by the development and use of composites of plastic, glass fibers, carbon fibers, ceramics, metals and nano-materials in their products. Any of these materials are used to create manufactured products that are stronger, thinner, and lighter or have higher conductivity or insulation values than conventional alternatives. These innovative industrial technologies not only enable commercialization, but also provide the means to produce new or established products more effectively and efficiently.

The core strength of the Advanced Materials cluster comes from companies across the manufacturing sector that incorporate innovative composite materials in their products. These industries rely heavily on research and development, technology commercialization, and industrial process services within the region to support and sustain them. (Figure 20).

Figure 20: Advanced Materials, Cluster Components



Source: The Purdue Center for Regional Development (cluster definitions). (2014).

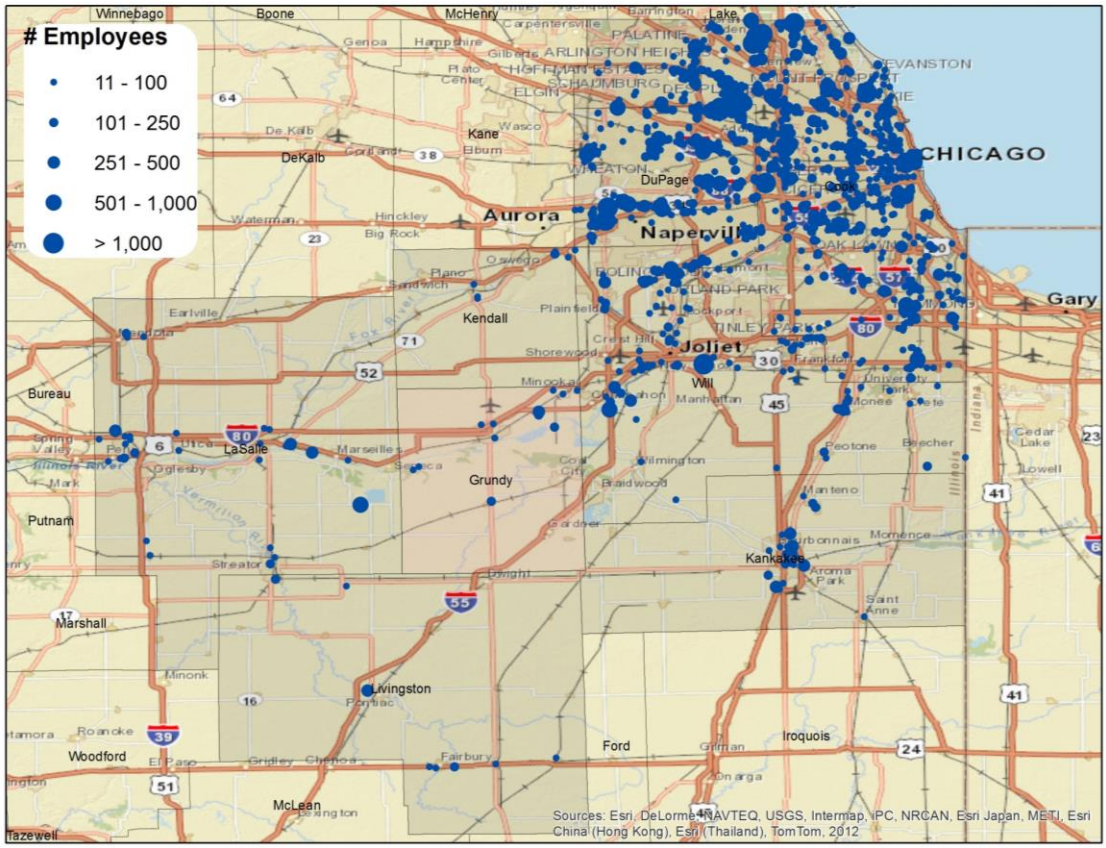
The creation of the Chicago-based Digital Manufacturing and Design Innovation (DMDI) Institute will provide regional manufacturers with access to a combination of advanced materials, high performance computing resources, and modeling and simulation tools. Additive manufacturing practices is allowing companies to design and build otherwise impossibly complex shapes and systems while significantly

reducing manufacturing costs and cycle times. DMDI also holds the potential to dramatically boost the region's competitive advantage in attracting and retaining advanced manufacturing of all types.

Regional Overview

Most of the companies and employment in the Advanced Materials cluster are concentrated in Cook, DuPage and Will counties with minor concentrations in Kankakee County and along the Interstate 80 corridor in Grundy and LaSalle counties (Figure 21). A majority of businesses (66.7%) in the cluster have fewer than 10 employees, but 6.3% of all jobs. Companies with 500 employees make up only 16.6% of all establishments, but account for 29.1% of total employment in the Advanced Materials cluster.

Figure 21: Advanced Materials Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

Although the cluster has only a modest presence in the Laborshed Region overall, there are many individual industries that have a strong presence in terms of concentration of employment (Figure 22). In addition, the broad array of industries that make up this cluster have a significant impact on most of the other targeted industry clusters in this study.

Figure 22: Advanced Materials Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Printing ink manufacturing	**3.9**
Wiring device manufacturing	3.7
Gasket, packing, and sealing device manufacturing	3.5
Crown and closure manufacturing and metal stamping	2.9
Vending, commercial, industrial, and office machinery manufacturing	2.8
Paint and coating manufacturing	2.7
Other fabricated metal manufacturing	2.7
Petroleum lubricating oil and grease manufacturing	2.6
All other forging, stamping, and sintering	2.5
Steel product manufacturing from purchased steel	2.4
Automatic environmental control manufacturing	2.4
Abrasive product manufacturing	2.3
Bare printed circuit board manufacturing	2.3
Toilet preparation manufacturing	2.1
Spring and wire product manufacturing	2.1

Source: IMPLAN. (2012).

In 2012, the region had 3,713 establishments and employed 111,322 people in direct Advanced Material cluster jobs. This cluster has a higher than average concentration of economic activity in the Laborshed Region when compared to the nation's economic activity in this cluster (Figure 23).

Figure 23: Advanced Materials Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	26	3,713
Percent Change in Number of Firms (2009-2012)	8.3%	-7.1%
Firm Location Quotient (LQ)	1.5	1.2
EMPLOYMENT (2012)	995	111,322
Percent Change in Employment (2009-2012)	10.1%	-15.6%
Employment Location Quotient (LQ)	1.9	1.0
AVERAGE ANNUAL WAGE (2012)	$85,690	$68,942
Percent Change in Average Annual Wage (2009-2012)	6.8%	9.1%
Wage Location Quotient (LQ)	2.0	0.8

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development. (2014).

Fifteen firms have 1,000 or more employees and reflecting the diversity of this cluster, leading companies in the region are involved in a wide range of research, development manufacturing and industrial services. Argonne LLC, Underwriters Laboratories along with the region's many universities and related institutions form the basis for the cluster's dynamism (Figure 24).

Figure 24. Advanced Materials Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
Enamelers & Japanners Inc.	10,000	Metal coating, engraving and allied services	Franklin Park
Schneider Electric, Inc.	4,620	Automatic environmental control manufacturing for residential, commercial, and appliance use	Palatine
Argonne LLC	3,200	Scientific research and development services	Lemont
Andrew International Services Corp.	2,600	Radio and television broadcasting and wireless communications equipment manufacturing	Joliet, Westchester
Molex U.S., Inc.	2,200	Electronic connector manufacturing	Lisle
Underwriters Laboratories, Inc.	1,840	Testing laboratories	Northbrook
Bowe Bell & Howell Co.	1,710	Commercial and service industry machinery manufacturing	Wheeling
Federal-Mogul Corp.	1,500	Gasket, packing, and sealing device manufacturing	Skokie
Nalco Company	1,150	Chemical machinery and equipment	Naperville
Chrysler Group LLC	1,130	Motor vehicle parts manufacturing	Naperville
Manan Tool & Manufacturing	1,110	Machine tool manufacturing	Wheeling
Alberto-Culver Co.	1,100	Toilet preparation manufacturing	Melrose Park
Boeing Irving Co.	1,000	Radio and television broadcasting and wireless communications equipment manufacturing	Chicago
Abbott Laboratories	1,000	Pharmaceutical preparation manufacturing	Des Plaines
Graham Packaging Co.	1,000	Packaging, plastics (e.g., blister, bubble), manufacturing	West Chicago

Source: Dun & Bradstreet, Inc. (2012).
*North American Industry Classification System.

Supply Chain

The supply chain analysis provides insight into the value of supply chain inputs, the amount of inputs produced in a region for the industry segments studied (an absorption rate), and the stages along the supply chain which stand out as areas of competitive advantage. Within the Advanced Materials industry, areas of high absorption are comprised of segments in the transportation equipment manufacturing supply chain which allow the region to capture the most value from a specific stage in the production or delivery of products and services within the supply chain. This supports an economic development strategy by indicating where an investment will have the highest impact on the regional economy and may also indicate opportunities for business retention or expansion.

Gross Inputs

The total dollar amount of inputs used by the industry within each sector.

Regional Inputs

The dollar value of Gross Inputs that are produced within the region.

Regional Supply Gap

The difference between Gross Inputs and Regional Inputs. A large difference indicates that a large amount of inputs are imported into the Laborshed Region, rather than produced within the region.

Conversely, stages along the supply chain which are underperforming also offer opportunities for business attraction and/or entrepreneurship. When reviewing data relating to industry inputs, comparing both the absorption rate and the total value of inputs is important because certain services or components which maintain a high absorption rate may be of low value to the regional economy. Similarly, certain inputs, regardless of value or absorption, may be of high strategic importance to the region in efforts to build a stronger cluster.

Key sectors which may be appropriate targets for expansion appear as imports (gaps) from outside the Region, but still within the industry. These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed within a supply chain model to determine the stages of the supply chain with the weakest and strongest regional presence. In order to fully develop Advanced Materials cluster, the Laborshed Region can make the most progress by focusing on those sectors without a strong regional presence currently, but which have significant development potential (Figure 25).

Figure 25: Advanced Materials Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Petrochemicals	-$587,468,490	$8,244,622	$161,744,639	94.9%
Other basic organic chemicals	-$153,500,017	$4,143,889	$109,275,903	96.2%
Plastics materials and resins	-$105,132,014	$7,514,814	$82,272,508	90.9%
Management of companies and enterprises	-$74,757,694	$5,562,578	$36,733,862	84.9%
Refined petroleum products	-$31,171,284	$43,586,062	$62,346,633	30.1%
Wholesale trade distribution services	-$18,760,571	$12,437,917	$30,060,680	58.6%

Source: IMPLAN, 2012.

For example, the regional Advanced Materials cluster requires nearly $161.7 million in products or services which are required to create a finished product (inputs) from the 'petrochemicals' industry. However, due to a supply chain gap, only $8.2 million of the required inputs from this industry are produced within the region, with the balance purchased elsewhere.

Petrochemicals (NAICS Sector 325110)

Subsectors include the following:

- ✓ Acyclic hydrocarbons (e.g., butene, ethylene, and propene) made from refined petroleum or liquid hydrocarbons.
- ✓ Cyclic aromatic hydrocarbons such as benzene, toluene, styrene, xylene, ethyl benzene, and cumene made from refined petroleum or liquid hydrocarbons.

This finding indicates opportunities for an existing firm or new business to satisfy the regional demand for these products. Two other industries also present opportunities for existing business development - 'other basic organic chemicals' and 'plastics, materials and resins'.

In addition to targeting supply-chain opportunities within the Advanced Materials cluster, there are also opportunities to develop or expand industries that serve more than one targeted cluster. The Chemicals and Chemical-Based Products, Energy and Glass and Ceramics, and Machinery Manufacturing clusters share 23 industries in their supply chains with the Chemicals and Chemical-Based Products cluster (Figure 26). Focusing economic development efforts on these industries could help to strengthen all of them.

Figure 26. Advanced Materials, Cluster Supply Chain Synergies, Laborshed Region

INDUSTRY SECTOR	CLUSTER	LABORSHED EMPLOYMENT	EMPLOYMENT LQ
Wiring device manufacturing	Advanced Materials, Energy	3,977	3.7
Vending, commercial, industrial, and office machinery manufacturing	Advanced Materials, Machinery Manufacturing	923	2.8
Adhesive manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,626	2.7
Abrasive product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	603	2.3
Printing ink manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,712	2.1
Cutting tool and machine tool accessory manufacturing	Advanced Materials, Machinery Manufacturing	1,145	1.8
Toilet preparation manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,135	1.7
Coating, engraving, heat treating and allied activities	Advanced Materials, Glass and Ceramics	5,959	1.7
Metal cutting and forming machine tool manufacturing	Advanced Materials, Machinery Manufacturing	1,560	1.6
Soap and cleaning compound manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	730	1.5
All other chemical product and preparation manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,785	1.5
Rolling mill and other metalworking machinery manufacturing	Advanced Materials, Machinery Manufacturing	498	1.5
Polystyrene foam product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	899	1.4
Other plastics product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	8,847	1.3
Watch, clock, and other measuring and controlling device manufacturing	Advanced Materials, Energy	1,066	1.3
Relay and industrial control manufacturing	Advanced Materials, Energy	1,508	1.3
Unlaminated plastics profile shape manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	692	1.2
Ground or treated mineral and earth manufacturing	Advanced Materials, Energy, Chemicals and Chemical-Based Products	233	1.2
Industrial mold manufacturing	Advanced Materials, Machinery Manufacturing	1,065	1.2
Synthetic dye and pigment manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	355	1.1
All other basic inorganic chemical manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	840	1.1
Paint and coating manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	724	1.1
Urethane and other foam product (except polystyrene) manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	814	1.1

Source: IMPLAN. (2012).

Workforce Requirement, Supply and Demand

Even as manufacturing employment has experienced net declines over the past decades (a trend projected to continue), there will be a strong demand for younger workers to replace those that retire. Shortages of qualified workers could become acute because the succeeding generation is relatively small and there is a propensity of younger workers to pursue careers outside of manufacturing. In the Advanced Materials cluster, over 55% of workers in 2012 were 45 year of age or older (Figure 27). This is similar to the age profiles of the Chemicals and Chemical-Based Products and the Machinery Manufacturing clusters.

Figure 27: Advanced Materials Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	4.9%	$28,899
25-44 Years	39.1%	$54,735
45-64 Years	50.2%	$73,632
65 Years & Older	5.7%	$65,500

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW).*

Although 42.1% of employment and 28.3% of the wages in the Advanced Materials cluster are concentrated in Production occupations, Professional, Technical and Scientific positions[21] also account for a significant share of employment (20.5%) and wages (29.1%) in its staffing profile (Figure 28).

Figure 28: Advanced Materials Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Production	42.1%	28.3%	$34,694
Architecture and Engineering	13.2%	18.3%	$71,445
Office and Administrative Support	11.0%	7.9%	$36,970
Management	6.8%	16.0%	$121,006
Transportation and Material Moving	5.5%	3.2%	$30,053
Life, Physical, and Social Science	4.0%	5.4%	$69,094
Business and Financial Operations	4.0%	5.2%	$67,486
Installation, Maintenance, and Repair	3.8%	3.4%	$46,142
Computer and Mathematical	3.3%	5.4%	$83,533
Sales and Related	2.6%	3.5%	$68,658
Construction and Extraction	1.4%	1.3%	$46,560

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

[21] This includes Architecture and Engineering, Life, Physical, and Social Science, and Computer and Mathematical occupations.

Key Trends for the Advanced Materials Cluster

- *Development and Application of Technologies and Innovative Processes.* The Advanced Materials cluster is made up of a diverse group of industries that are defined by the development and application of technologies and innovative processes to produce new products, or improve existing ones, rather than by the products or services they offer. Given this situation, local officials should consider pursuing new or expanding niche manufacturers, especially those that are part of more than one targeted cluster.
- *Digital Manufacturing and Design Innovation (DMDI) Institute.* The DMDI Institute located in Chicago has the potential to dramatically boost the region's competitive advantage in attracting and retaining advanced manufacturing of all types.
- *New Powder Metal Applications.* Powder metal parts are often cheaper to produce, and in some cases are lighter or have better performance characteristics, than traditional metal parts. The light weight of powder metal parts is particularly attractive in automotive applications: on average, vehicles now contain about 40 pounds of powder metal parts.
- *New Manufacturing Materials.* New metal alloys with desirable physical properties allow manufacturers to upgrade existing products and introduce new ones. Such alloys have been especially useful for products that must operate in extreme conditions, such as inside engines and in cooling applications. Prior to the use of these new materials, a large investment is required for engineering and testing.
- *Additive Manufacturing.* Better known as 3D printing, additive manufacturing produces solid, three-dimensional objects by successively layering materials according to a digital design. Unlike subtractive manufacturing, which uses cutting tools to create shapes by removing material, the additive process has relatively little waste. Additive manufacturing is already being applied in industries including automotive, defense products, and various consumer goods. Chiefly used for rapid prototyping, the technology may eventually advance into producing finished products. Advantages over traditional manufacturing methods include decreased capital spending on tooling and machinery, along with reduced waste since only the amount of material needed to make the product is used.
- *High-Value Specialty Steel.* More U.S. companies have moved into manufacturing and processing higher-grade metal products, such as stainless and high-strength steel. The move toward high-value specialty steel responds to a growing range of uses for metals and to a steady growth in the global capacity for basic low-grade metal production. Specialty steels include high-technology, high-value stainless, and other specialty alloy products. Demand for lightweight, high-strength specialty steels is likely to increase as U.S. automobile manufacturers need to reduce vehicle weight amid more stringent fuel economy standards.

- *Growing Demand for Complex Paper Products.* While demand for basic paper products like corrugated boxes has grown slowly, markets for specialty paper products have expanded more rapidly. These specialty products include coated papers, labels, and papers laminated with other materials like metal foils, glues, and plastics. Producing these materials requires more advanced engineering expertise and production equipment than is typically found at small paper companies. Entry into the specialty paper market can be difficult, however, as the machinery required for the more complex process can often require large initial investments.

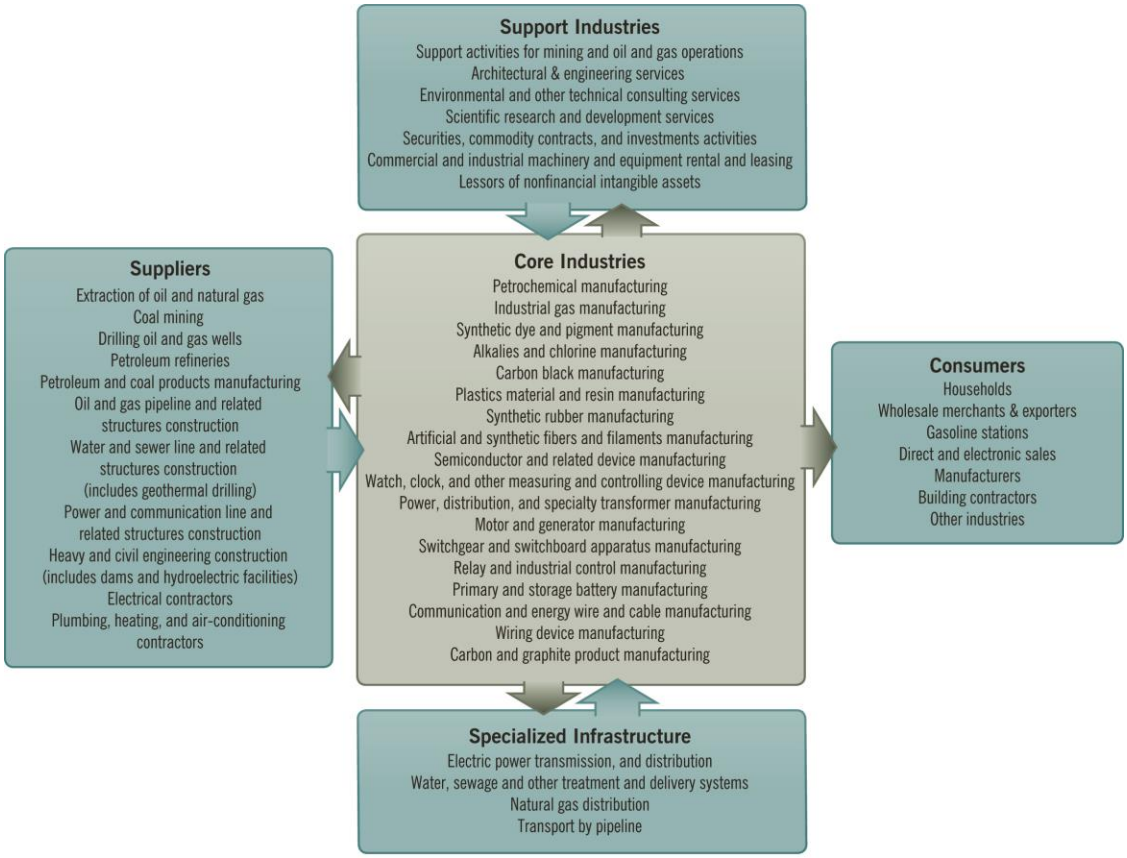
Cluster Profile: Chemicals and Chemical-Based Products

Cluster Summary

The *Chemical and Chemical-Based Products* cluster is composed of the manufacturers of basic, intermediate and specialty chemicals. Common materials for industrial chemicals include minerals, natural gas, petroleum, and plants. Companies also use industrial chemicals as their raw materials. This cluster includes a wide range of industries whose products are manufactured from chemical substances such as plastics and rubber products, pharmaceutical preparations, ceramic and cement products, paint, industrial coatings, adhesives, and cleaning products.

The core strength of the chemical and chemical-based products cluster comes from the manufacturing of organic and inorganic substances that are distributed as finished products or incorporated are into other manufactured goods. These core industries drive employment and inputs in other industries which supply them (e.g., mining, construction, energy production/distribution), as well as those which support the core industries by providing research and development, finance and business and technical services (Figure 29).

Figure 29: Chemicals and Chemical-Based Products, Cluster Components

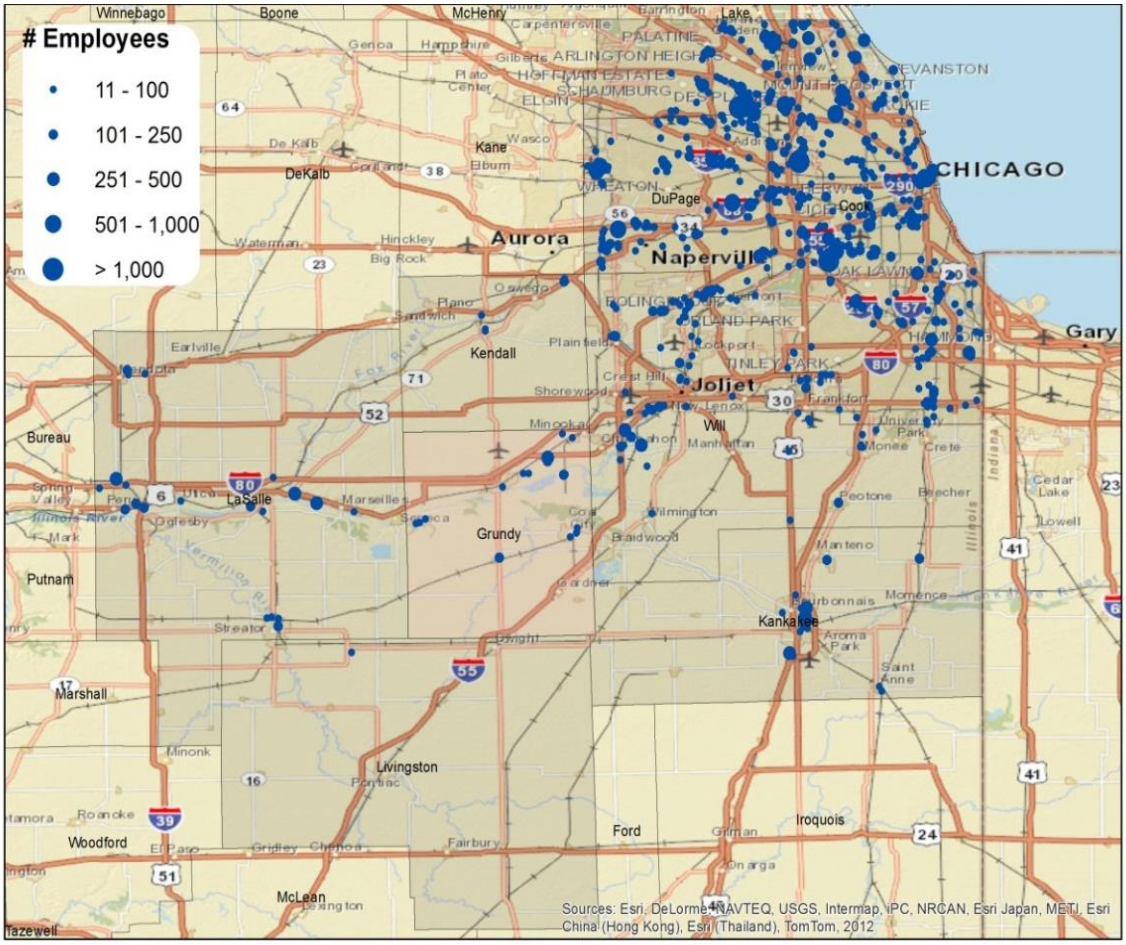


Source: The Purdue Center for Regional Development (cluster definitions). (2014).

Regional Overview

Companies and employment in the Chemicals and Chemical Based Products cluster are concentrated in Cook, DuPage and Will counties with minor concentration along the Interstate 57 and Interstate 80 corridors in Grundy, LaSalle and Kankakee counties. (Figure 30). The majority of firms are small in employment (66.8% of firms have fewer than 10 employees) with the largest companies (those with 500 or more employees) representing about 16.3% of total employment.

Figure 30: Chemicals and Chemical-Based Products Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

The cluster is rather weak in the Laborshed Region with an employment location quotient (LQ) of 1.0 in 2012. The six subsectors that have the strongest presence in the Laborshed Region based on the concentration of employment are listed in Figure 31.

Figure 31: Chemical and Chemical-Based Products Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Printing ink manufacturing	3.9
Paint and coating manufacturing	2.7
Toilet preparation manufacturing	2.1
Plastics bottle manufacturing	1.7
Soap and cleaning compound manufacturing	1.7
Glass container manufacturing	1.6

Source: IMPLAN. (2012).

The Chemical and Chemical-Based Products cluster in the Laborshed Region is comprised of 1,646 firms that employ 46,131 people. The average annual wage in this cluster was $66,543. The employment concentration (LQ) in the Laborshed Region was 3.4 compared to the national average of 1.0 (Figure 32).

The cluster has a much greater presence in Grundy County with an employment concentration that is 3.4 times above the national average. Grundy County annual wages are well above the regional and national averages with significant growth in recent years.

Figure 32: Chemicals and Chemical-Based Products Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	16	1,646
Percent Change in Number of Firms (2009-2012)	-15.8%	-6.3%
Firm Location Quotient (LQ)(2012)	1.8	1.1
EMPLOYMENT (2012)	815	46,131
Percent Change in Employment (2009-2012)	-1.2%	-8.4%
Employment Location Quotient (LQ)	3.4	1.0
AVERAGE ANNUAL WAGE (2012)	$86,623	$66,543
Percent Change in Average Annual Wage (2009-2012)	5.0%	10.7%
Wage Location Quotient (2012)	4.3	0.9

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW)* Purdue Center for Regional Development. (2014).

There are many large employers in the cluster within the Laborshed Region, including major national and global companies such as Abbott Laboratories, Alberto-Culver, VCNA and Graham Packaging (Figure 33).

Figure 33: Chemicals and Chemical-Based Products Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
Graham Packaging Co., Europe LLC	2,200	Plastics containers	West Chicago
VCNA Prairie, Inc.	2,000	Ready-mix concrete manufacturing	Bridgeview
Abbott Laboratories	1,900	Pharmaceutical preparation manufacturing	Chicago, Des Plaines
Tigerflex Corporation	1,120	Rubber and plastics hoses and belting manufacturing	Elk Grove Village
Alberto-Culver Company	1,150	Toilet preparation manufacturing	Melrose Park
Univar USA, Inc.	970	Chemical and allied products merchant wholesalers	Bedford Park
Nalco Holdings LLC	800	Corrosion preventive lubricant	Naperville
Lawter, Inc.	680	Chemical product and preparation manufacturing	Chicago
Chicago Manifold Products Co.	625	Rubber rolls and roll coverings	Wheeling
Sanford LP	600	Adhesive manufacturing	Oak Brook

Source: Dun & Bradstreet, Inc. (2014).
*North American Industry Classification System.

Supply Chain

The supply chain information provided shows the flows of trade which support Chemicals and Chemical-Based Products industries both within and outside of the Laborshed Region. The key sectors that may be appropriate targets for expansion appear as imports (gaps) from outside the region, but still within the industry (Figure 34). These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed into a supply chain framework to determine the stages of the supply chain which possess the strongest regional presence. In order to fully develop the Chemicals and Chemical-Based Products cluster, the Laborshed Region can best achieve progress by focusing on those sectors without a strong regional presence, but which have significant development potential for the region.

Figure 34: Chemicals and Chemical-Based Products Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL SUPPLY GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Petrochemicals	$153,494,820	$8,244,343	$161,739,162	94.9%
Other basic organic chemicals	$105,272,105	$4,149,411	$109,421,516	96.2%
Plastics materials and resins	$73,430,770	$7,381,428	$80,812,198	90.9%
Management of companies and enterprises	$31,199,851	$5,567,676	$36,767,527	84.9%
Refined petroleum products	$18,898,858	$43,907,341	$62,806,199	30.1%

Source: IMPLAN. (2012).

For example, the regional Chemicals and Chemical-Based Products cluster requires $161.7 million in products or services which are required to create a finished product (inputs) from 'petrochemicals' production. However, only $8.2 million of this material is produced in the region with the balance being purchased elsewhere. This suggests an opportunity for an existing firm or new business to satisfy the regional demand for this product. Another closely related opportunity is the 'basic organic chemicals' sector, which processes products such as ethanol and butane.

Basic Organic Chemicals (NAICS Sector 325190)

This industry comprises establishments primarily engaged in manufacturing basic organic chemicals (except petrochemicals, industrial gases, and synthetic dyes and pigments).

Subsectors include the following:

- ✓ Gum and Wood Chemical Manufacturing
- ✓ Cyclic Crude and Intermediate Manufacturing
- ✓ Ethyl Alcohol Manufacturing

In addition to targeting supply-chain opportunities within the Chemicals and Chemical-Based Products cluster, there are also opportunities to develop or expand industries that serve more than one targeted cluster. Three clusters - Advanced Materials, Energy, and Glass and Ceramics - share 18 industries in their supply chains with the Chemicals and Chemical-Based Products cluster (Figure 35). Focusing economic development efforts on these industries could help to strengthen all of them.

Figure 35: Chemicals and Chemical-Based Products, Cluster Supply Chain Synergies, Laborshed Region

INDUSTRY SECTOR	CLUSTER	LABORSHED EMPLOYMENT	EMPLOYMENT LQ
Printing ink manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	883	3.9
Paint and coating manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,626	2.7
Abrasive product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	603	2.3
Toilet preparation manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,712	2.1
Soap and cleaning compound manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,135	1.7
Glass container manufacturing	Chemicals and Chemical-Based Products, Glass and Ceramics	642	1.6
Adhesive manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	730	1.5
All other chemical product and preparation manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,785	1.5
Polystyrene foam product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	899	1.4
Other plastics product manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	8,847	1.3
Wholesale trade businesses	Energy, Chemicals and Chemical-Based Products	188,809	1.3
Unlaminated plastics profile shape manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	692	1.2
Ground or treated mineral and earth manufacturing	Advanced Materials, Energy, Chemicals and Chemical-Based Products	233	1.2
Synthetic dye and pigment manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	355	1.1
All other basic inorganic chemical manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	840	1.1
Biological product (except diagnostic) manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	724	1.1
Urethane and other foam product (except polystyrene) manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	814	1.1
Plastics packaging materials and unlaminated film/ sheet manufacturing	Advanced Materials, Chemicals and Chemical-Based Products	2,060	1.0

Source: IMPLAN. (2012).

Workforce Requirement, Supply and Demand

Even as employment in the Chemicals and Chemical-Based Products cluster has declined in the past decade, the supply of potential new workers is comparatively low because of demographic trends and the propensity of younger workers to pursue careers outside of manufacturing and related sectors. The cluster

has a low proportion of younger as well as older workers (4.7% are under age 25; 4.4% are 65 or older) (Figure 36). Wages also vary between the age groups, but in an expected pattern with older workers earning more than younger workers based on the level of skills, tenure, and experience. Industry wages are significantly higher than average, especially for younger workers. The higher wage levels should be a particular inducement to younger people as they formulate how they choose careers.

Figure 36: Chemicals and Chemical-Based Products Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	4.7%	$34,334
25-44 Years	38.3%	$58,231
45-64 Years	52.6%	$79,081
65 Years & Older	4.4%	$66,502

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages.*

Over 58.0% of the employment and over 43.0% of the wages in the cluster are in production or transportation and material-moving occupations (Figure 37). Production and related employment classifications account for the largest share of the jobs in the Laborshed Region in this cluster. Ensuring that appropriately skilled production workers are available at competitive compensation rates will be critical to maintaining the manufacturing sector in the region.

Figure 37: Chemicals and Chemical-Based Products Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Production	44.3%	33.8%	$33,894
Transportation and Material Moving	14.1%	10.1%	$31,755
Office and Administrative Support	11.8%	9.6%	$36,084
Management	5.8%	14.9%	$114,888
Installation, Maintenance, and Repair	5.7%	5.8%	$45,424
Sales and Related	5.6%	8.4%	$66,543
Life, Physical, and Social Science	3.5%	5.0%	$63,350
Architecture and Engineering	2.9%	4.6%	$72,234
Business and Financial Operations	2.8%	4.0%	$63,407

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

Key Trends for the Chemicals and Chemical-Based Products Cluster

- *Grundy County's Strong Presence of Chemicals and Chemical Based Products Clusters.* In contrast to the Laborshed Region, the Chemicals and Chemical-Based Products cluster has a strong presence in Grundy County, with an employment location quotient 3.4 times above the national average. The average annual wage for the cluster in the county is 4.3 times above the national average. In addition, there is a significant concentration of firms and employment in the Interstate 80/Brisbin Road Interchange development area.
- *Increasing Demand for Rubber and Plastics Components.* The demand for rubber and plastics to replace metal parts in autos and aircraft continues, as manufacturers prefer low-weight components. High-temperature, high-performance plastics are replacing aluminum, brass, steel, and other metals historically used in manufacturing. The use of plastics in residential and commercial construction is also expected to increase.
- *Bioplastics Development and Use.* Most large chemical companies are exploring the development of, and uses for bioplastics, which are derived from biomass such as vegetable oil or corn starch instead of petroleum. Plastic companies anticipate that bioplastics will eventually outpace traditional petro polymers, as bioplastics are competitive in terms of cost and performance.
- *Green Product Initiative.* Given the State of Illinois and the Chicago region's initiatives to support the development and manufacturing of 'green products'[22], there may be an opportunity for local officials to collaborate with state and regional agencies and organizations to recruit, retain and expand businesses in the cluster.

[22] Metropolitan Strategies. (2012, January). *The Chicago Region's "Green" Economic Opportunities: An Examination of Chicago's Cluster-Based Economic Growth Opportunities Arising from Changing Market Demand for Energy Efficient Products and Services.*

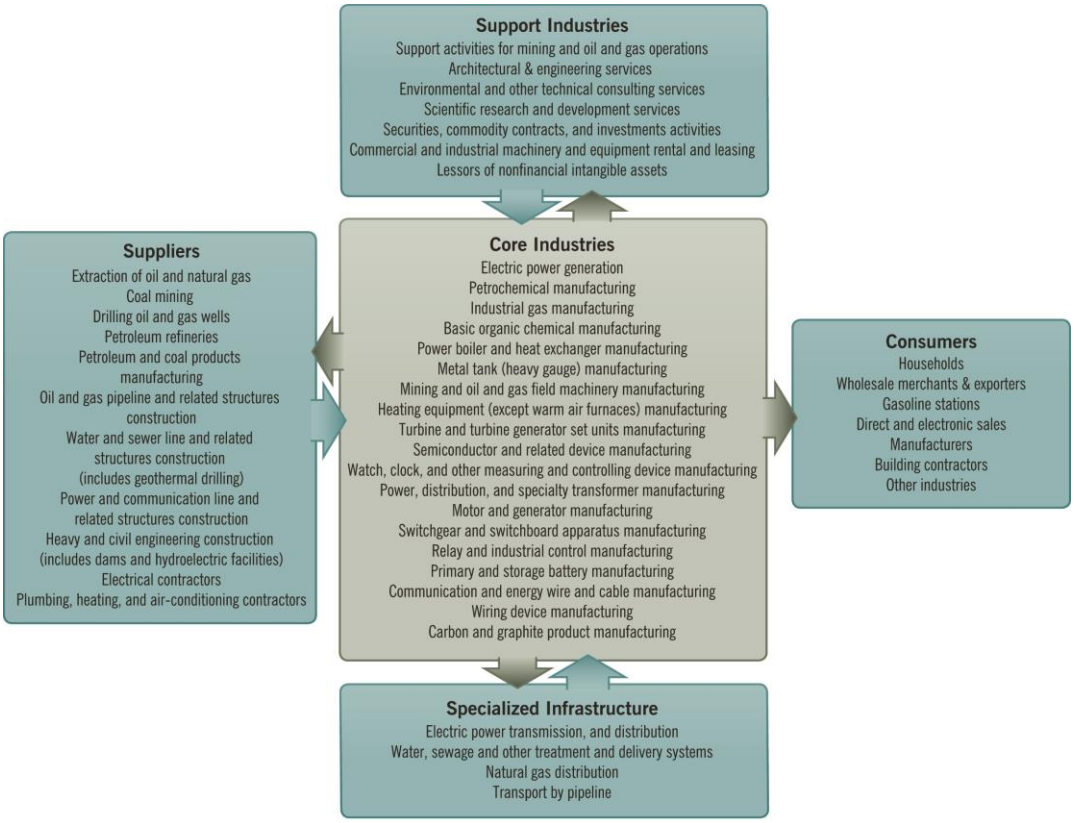
Cluster Profile: Energy (Conventional and Renewable)

Cluster Summary

The *Energy* cluster encompasses all aspects of production, transmission and distribution of energy. It includes conventional sources of electricity and fuel such as petroleum, coal, nuclear, and hydro, as well as a range of alternative energy sources and technologies (solar, wind, hydrogen, biomass, and biofuels). It also includes resource extraction and refining, the transmission or transportation modes and the manufacturing of the machinery and equipment used by the industry. The Chicago area is a major hub for energy production, transmission and distribution, as well as the development and deployment of alternative energy technologies.

The core strength of the cluster is the production of fuel and electricity from a variety of sources. These core industries drive employment and inputs in other industries which supply them (e.g., mining, oil and gas extraction, refineries, transportation and pipeline companies, construction and maintenance contractors), as well as those which support the core industries by providing engineering, research and development and financial services (Figure 38).

Figure 38: Energy (Conventional and Renewable), Cluster Components

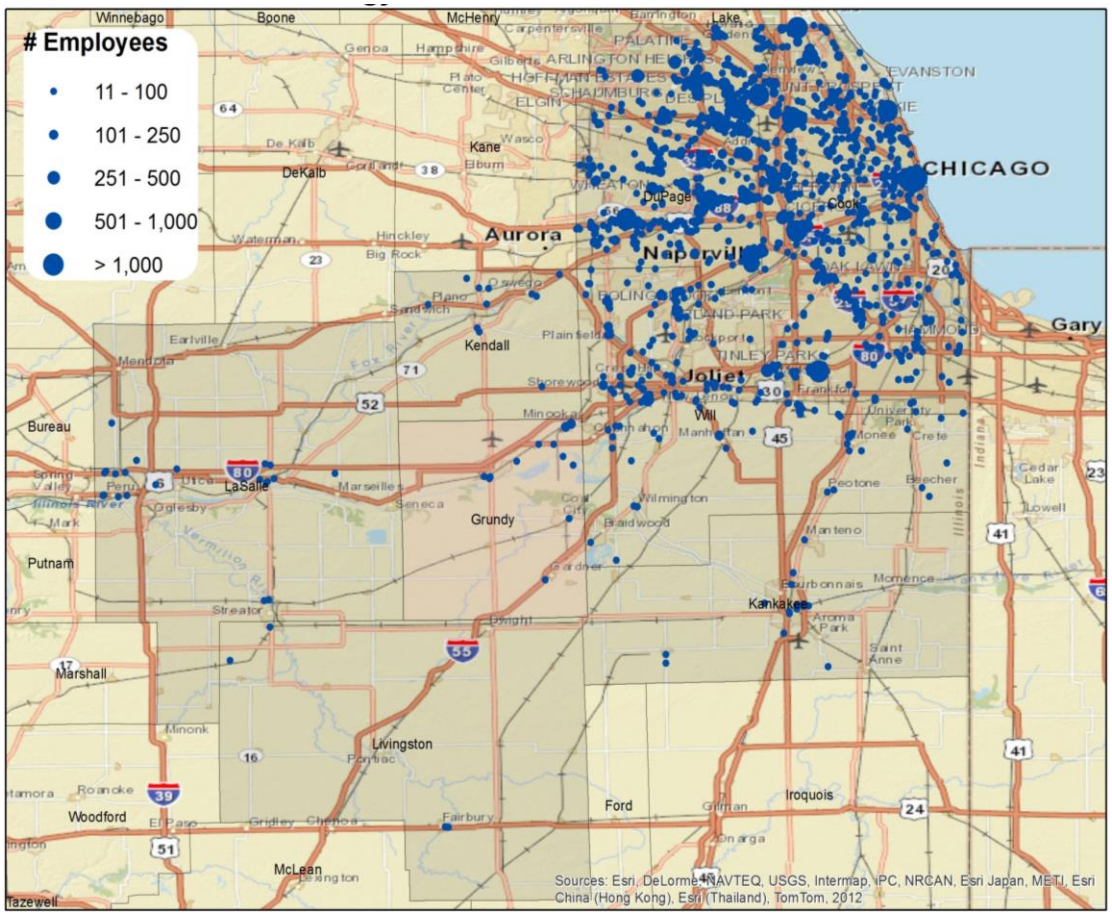


Source: The Purdue Center for Regional Development (cluster definitions). (2014).

Regional Overview

The majority of businesses in the Energy cluster are small in terms of employment (87.6% of firms have fewer than 10 employees) with the ten largest companies in the region accounting for 11.5% of total employment in the cluster. Most employers are concentrated in Cook, DuPage and Will counties. There are also smaller concentrations of firms in Northern Grundy, LaSalle and Kankakee counties (Figure 39).

Figure 39: Energy (Conventional and Renewable) Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

The cluster has a relative low concentration of economic activity in the Laborshed Region, but has a strong presence in Grundy County. In 2012, the energy cluster had an employment location quotient (LQ) of 2.3 and an average wage that was 1.9 times the national average. There are eleven industry subsectors in the cluster which have a strong presence in the region based on concentration of employment (Figure 40).

Figure 40: Energy (Conventional and Renewable) Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Wiring device manufacturing	3.7
Switchgear and switchboard apparatus manufacturing	2.8
Watch, clock, and other measuring and controlling device manufacturing	1.3
Power, distribution, and specialty transformer manufacturing	1.3
Relay and industrial control manufacturing	1.3
Wholesale trade businesses	1.3
Motor and generator manufacturing	1.2
All other petroleum and coal products manufacturing	1.2
Commercial and industrial machinery and equipment rental and leasing	1.1
Communication and energy wire and cable manufacturing	1.1
Natural gas distribution	1.1

Source: IMPLAN. (2014).

In the Laborshed Region the cluster includes 6,332 establishments and 88,961 employed people in direct cluster jobs in 2012. This cluster has a higher than average concentration of economic activity in Grundy County when compared to the nation's economic activity in this cluster overall (Figure 41).

Figure 41: Energy (Conventional and Renewable) Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	79	6,332
Percent Change in Number of Firms (2009-2012)	11.3%	3.3%
Firm Location Quotient (LQ) (2012)	1.4	0.7
EMPLOYMENT (2012)	1,707	88,961
Percent Change in Employment (2009-2012)	7.3%	-9.3%
Employment Location Quotient (LQ) (2012)	2.3	0.6
ANNUAL AVERAGE WAGE (2012)	$70,197	$83,244
Percent Change in Annual Average Wage (2009-2012)	-3.9%	6.3%
Wage Location Quotient (LQ) (2012)	1.9	0.6

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2014).

The Laborshed Region hosts a number of major national and global companies. The nine largest employers (those with 500 or more employees) account for over 15,000 jobs in the cluster. The companies in this cluster are involved in various facets of energy production, transmission, or distribution, as well as manufacturing machinery, equipment and related industrial services (Figure 42).

Figure 42: Energy (Conventional and Renewable) Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
BP America, Inc.	2,000	Petroleum refineries	Warrenville
O-Z Gedney Company LLC	2,000	All other miscellaneous electrical equipment and component Manufacturing	Rosemont
U O P Equitec Services, Inc.	2,000	Oil and gas field machinery and equipment manufacturing	Des Plaines
S & C Electric Company	1,900	Switchgear and switchboard apparatus manufacturing	Chicago
Electro-Motive Diesel, Inc.	1,850	Motor and generator manufacturing	Mc Cook
Underwriters Laboratories, Inc.	1,840	Testing laboratories	Northbrook
Sargent & Lundy LLC	1,600	Engineering services	Chicago
Peoples Gas Light and Coke Co.	1,115	Natural gas distribution	Chicago
Panduit Corp.	1,100	All other miscellaneous electrical equipment and component manufacturing	Tinley Park

Source: Dun & Bradstreet, Inc. (2014).
*North American Industry Classification System.

Supply Chain

The supply chain information provided indicates the flows of trade which support Energy-related industries both within and outside of the Laborshed Region. The key sectors which may be appropriate targets for expansion are imports (gaps) from outside the region, but still within the industry. These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed into a supply chain model in order to determine the stages of the supply chain with the strongest regional presence. To fully develop the Energy cluster, the Laborshed Region can make the most progress by focusing on sectors which do not yet have a strong regional presence, but have significant development potential (Figure 43).

Figure 43: Energy (Conventional and Renewable) Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Rail transportation services	-$25,681,229	$3,945,131	$29,626,360	86.7%
Pipeline transportation services	-$20,963,325	$3,043,573	$24,006,898	87.3%
Refined petroleum products	-$13,801,308	$32,064,306	$45,865,614	30.1%
Turbines and turbine generator set units	-$8,393,253	$20,651	$8,413,903	99.8%
Architectural, engineering, and related services	-$7,304,234	$4,629,364	$11,933,599	61.2%

Source: IMPLAN. (2012).

For example, the regional Energy cluster requires $24.0 million in products or services which are required to create a finished product (inputs) from the 'pipeline transportation services' industry. However, only $3.0 million of the required inputs from this industry is produced within the Laborshed Region, with the balance being purchased from outside. This indicates that there may be an opportunity for an existing firm or new business to satisfy the regional demand for these products.

Pipeline Transportation Services (NAICS Sector 4860)

Subsectors include the following:

- ✓ Pipeline transportation of crude oil
- ✓ Pipeline transportation of natural gas
- ✓ Pipeline transportation of refined petroleum products
- ✓ Booster pumping station (except natural gas, petroleum)
- ✓ Coal pipeline transportation
- ✓ Slurry pipeline transportation

The supply chain gap for 'refined petroleum products' and 'turbines and turbine generator set units' industries also present opportunities for new or existing business development.

In addition to targeting supply-chain opportunities within the Energy cluster, there are also opportunities to develop or expand industries that serve more than one targeted cluster. The Advanced Materials and the Chemicals and Chemical-Based Products clusters share a total of six industry sectors in their supply chains with the Energy cluster.

Focusing economic development efforts on these industries could help to strengthen all of them. Figure 44 gives an overview of these industries and their potential for development.

Figure 44: Energy (Conventional and Renewable), Cluster Supply Chain Synergies, Laborshed Region

INDUSTRY SECTOR	CLUSTER	LABORSHED EMPLOYMENT	EMPLOYMENT LQ
Wiring device manufacturing	Advanced Materials, Energy	3,977	3.7
Watch, clock, and other measuring and controlling device manufacturing	Advanced Materials, Energy	1,066	1.3
Relay and industrial control manufacturing	Advanced Materials, Energy	1,508	1.3
Wholesale trade businesses	Energy, Chemicals and Chemical-Based Products	188,809	1.3
Ground or treated mineral and earth manufacturing	Advanced Materials, Energy, Chemicals and Chemical-Based Products	233	1.2
Industrial gas manufacturing	Advanced Materials, Energy, Chemicals and Chemical-Based Products	355	1.1

Source: IMPLAN. (2012).

Workforce Requirement, Supply and Demand

Just over one-half of workers employed in the Energy industry in 2012 were under 45 year of age, with 6.2% under the age of 25. The age profile for the industry is somewhat younger than the other targeted industry clusters, except Transportation and Logistics. Even so, it faces the same challenge of replacing a substantial number of its current workforce (Figure 45).

Figure 45: Energy (Conventional and Renewable) Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	6.2%	$28,638
25 to 44 Years	47.2%	$61,874
45 to 64 Years	42.6%	$78,964
65 Years & Older	4.0%	$61,138

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages.*

Unlike the other clusters, the professional, technical and managerial positions account for 29.0% of the jobs and 44.1% of the wages in the Energy cluster[23]. Although the share of employment and wages for

[23] This includes the Architecture and Engineering, Business and Financial Operations and Management occupation categories.

production and installation, maintenance, and repair occupations are smaller, the average wages are higher than for comparable positions in other clusters (Figure 46).

Grundy County is in a relatively good position as employment has increased over the last four years. However, the average annual wage is lower in the County than in the Laborshed Region ($70,197 versus $83,244), so being aware competitive wage issues will be essential to recruiting highly qualified workers to the area.

Figure 46: Energy (Conventional and Renewable) Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Office and Administrative Support	16.0%	10.0%	$37,275
Construction and Extraction	11.8%	9.4%	$47,738
Architecture and Engineering	11.1%	13.6%	$72,934
Business and Financial Operations	10.6%	14.7%	$83,079
Production	10.1%	6.4%	$37,683
Sales and Related	9.0%	7.7%	$50,931
Management	7.3%	15.8%	$128,446
Installation, Maintenance, and Repair	6.8%	5.4%	$46,804
Life, Physical, and Social Science	4.7%	5.4%	$69,155

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

Key Trends for the Energy (Conventional and Renewable) Cluster

- *High Concentration of Energy Firms and Employment in Grundy County*. Although the Energy cluster does not have a strong presence in the Laborshed Region, it does have a significant concentration of establishment and employment and relatively high wages in Grundy County. The cluster has an employment concentration 2.3 times above the national average and has continued to grow despite the impact of the recent recession.
- *Renewable Energy Growth Trend.* The federal and state governments are working to increase the market for renewable energy. For example, new state legislation requires the Illinois Power Agency (IPA) to buy up to $30 million in electricity from clean energy sources, primarily solar. The demand for more renewable energy supplies will also stimulate demand for the manufactured components used in wind, solar and geothermal power generation.

- *Smart Grid Development.* Spurred by the federal and state support, 'smart grid' development projects are becoming more popular as ways to test the application of new electrical grid technologies[24]. The Illinois Smart Grid Cluster supports innovation, investment, expansion and development of smart grid technology by offering technical and business support to smart grid start-ups and small businesses. This could a useful tool for local officials to attract related manufacturers to the area.
- *Energy Efficient Lighting Development.* A recent study completed for World Business Chicago identified the energy efficient lighting sector as having high potential for development. The Chicago region has a large concentration of lighting firms that cover a broad range of technologies, products, services and markets. The market for lighting design, controls and energy management will grow substantially, with much of it driven by regional players. While most commodity manufacturing will be done overseas, the economics of domestic production are favorable for niche products with smaller lot sizes and shorter lead times[25].
- *Workforce Training and Skills Development.* As new opportunities in the Energy industry emerge, workforce training and skills will be critical to increasing Grundy County's and the Laborshed Region's competitive advantage. The State of Illinois recently announced the allocation $5 million to build the Advanced Technology Education Center, a 21,000 square-foot addition at Kankakee Community College (KCC) that will enhance learning opportunities in green energy and other emerging technologies.

[24] 'Smart grid' is a term that encompasses multiple technologies, including smart meters that monitor in-home demand and feed information back to the electricity grid, and transmission infrastructure that can adjust to local power demands in real-time.

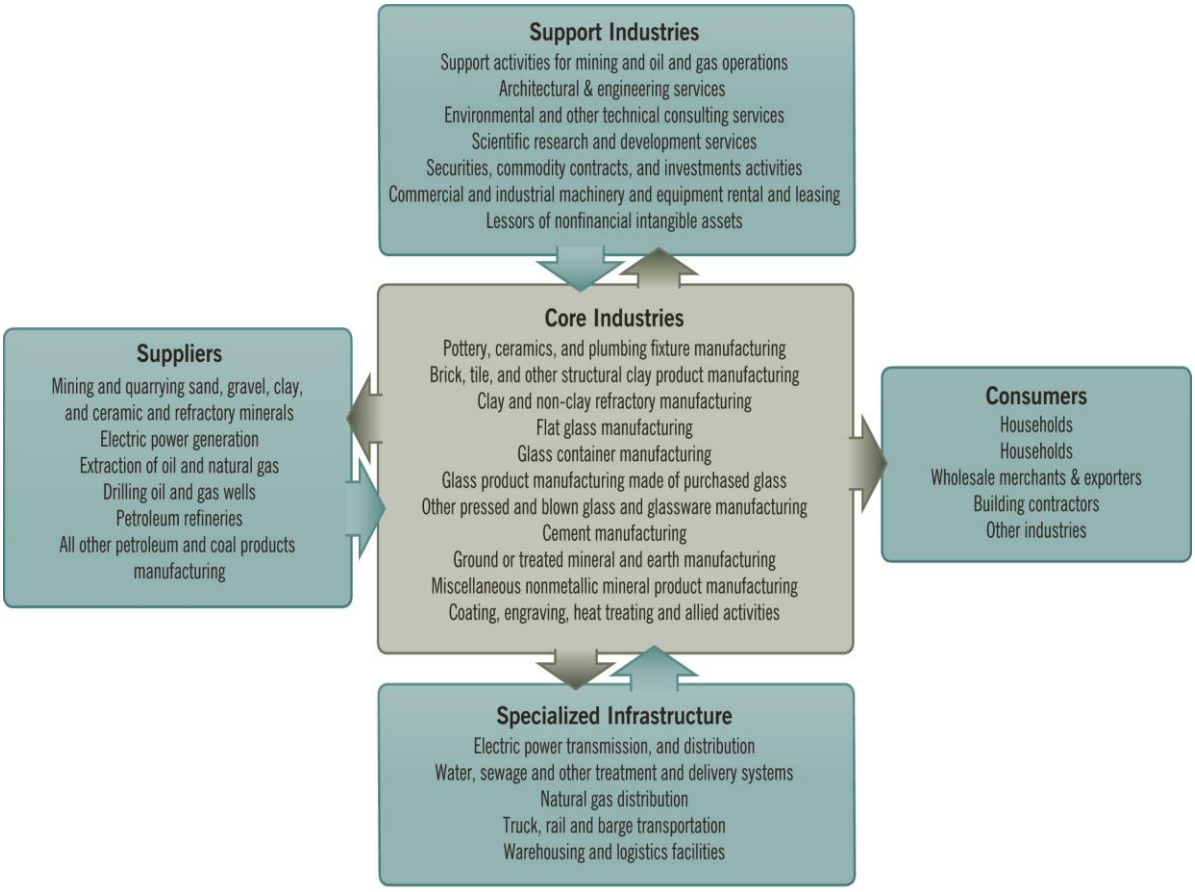
[25] Metropolitan Strategies. (2012, January). *The Chicago Region's "Green" Economic Opportunities: An Examination of Chicago's Cluster-Based Economic Growth Opportunities Arising from Changing Market Demand for Energy Efficient Products and Services.*

Cluster Profile: Glass and Ceramics

Cluster Summary

The *Glass and Ceramics* cluster is comprised of companies which manufacturer glass and ceramic products from their raw mineral components. The glass and glass products component of this cluster includes manufacturers of glass containers, flat glass, fiberglass, and specialty glass products. The ceramics component of the cluster is made up of producers of earthenware and pottery products used as plumbing and electrical fixtures and accessories, kitchen and table articles, clay building materials and cement. It also includes companies that make clay refractory products, such as furnace linings. Abundant supplies of raw materials for the Glass and Ceramics cluster, such as clay, sand and aggregates are readily available across northern and central Illinois, making the region an attractive location for production and distribution (Figure 47).

Figure 47: Glass and Ceramics, Cluster Components

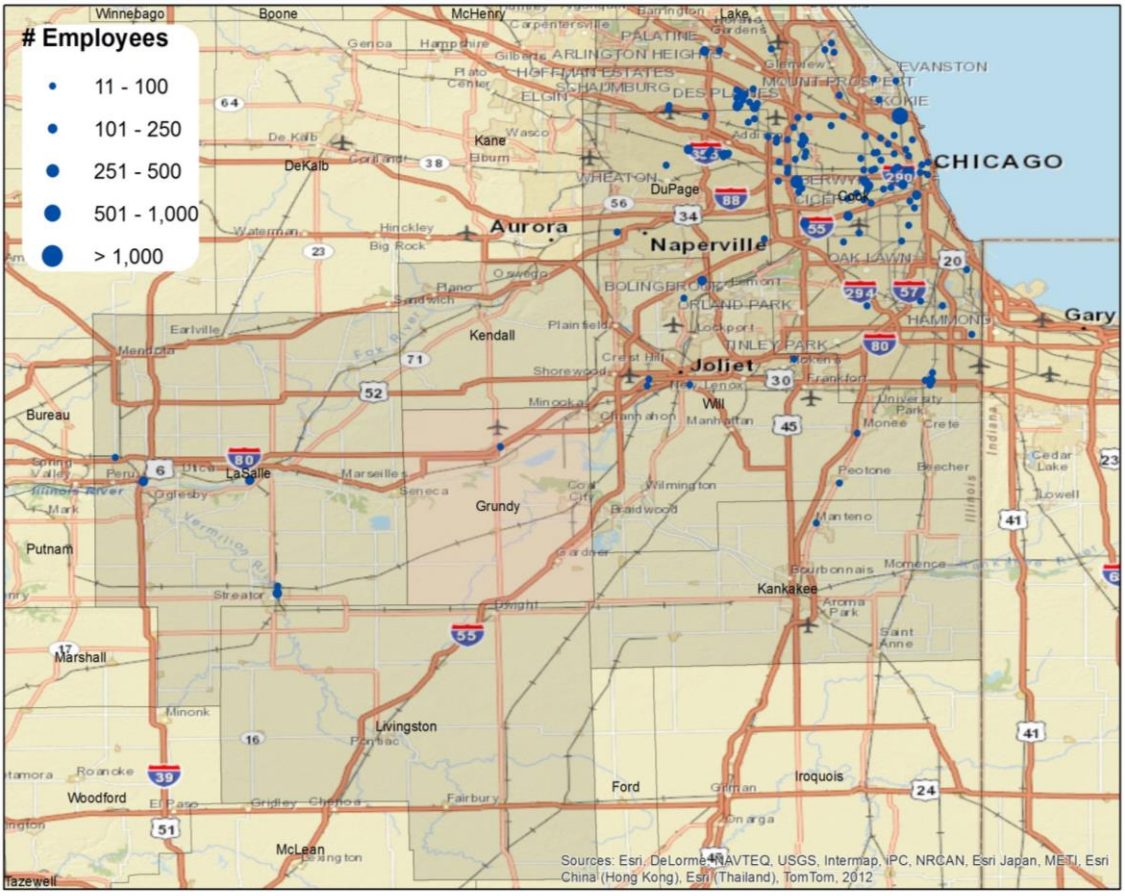


Source: The Purdue Center for Regional Development (cluster definitions). (2012).

Regional Overview

The majority of businesses in the Glass and Ceramics cluster were small in terms of employment (61.7% of firms have fewer than 10 employees). There were only two firms with more than 500 employees, accounting for 55.0% of total employment in the cluster. Most companies are concentrated in Chicago, western Cook County and DuPage counties (Figure 48).

Figure 48: Glass and Ceramics Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

The Glass and Ceramics cluster also has a consistently high concentration of employment in the Laborshed Region with a location quotient (LQ) of 1.1 in 2009, and 1.3 in 2012. Most industry subsectors in this cluster were represented in the Laborshed Region. Three subsectors have a strong presence in the region based on the concentration of employment (Figure 49).

Figure 49: Glass and Ceramics Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Cement manufacturing	1.7
Glass container manufacturing	1.6
Glass product manufacturing made of purchased glass	1.2

Source: IMPLAN. (2012).

In 2012, the Laborshed Region had 372 establishments and employed 7,141 people in direct Glass and Ceramics cluster jobs. This cluster has a higher than average concentration of economic activity in the Laborshed Region when compared to the nation's economic activity in this cluster overall. Although the number of companies and jobs in Grundy County is small, the employment growth trend is positive. In addition, the average wage in the county is well above the average for many other industries (Figure 50).

Figure 50: Glass and Ceramics Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	3	372
Percent Change in Number of Firms (2009-2012)	0.0%	-12.1%
Firm Location Quotient (LQ)	2.5	1.9
EMPLOYMENT (2012)	84	7,141
Percent Change in Employment (2009-2012)	740.0%	-3.3%
Employment Location Quotient (LQ)	2.9	1.3
ANNUAL AVERAGE WAGES (2012)	$79,388	$48,563
Percent Change in Average Annual Wages (2009-2012)	71.5%	9.1%
Wage Location Quotient (LQ)	4.5	1.1

Sources: U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages (QCEW)* and the Purdue Center for Regional Development (cluster definitions). (2014).

Although there are relatively few large employers in the Glass and Ceramics cluster within the Laborshed Region (only two firms have more than 500 employees), there are a number of major national or global companies. The leading companies in the Laborshed Region manufacture flat glass, glass containers, as well as provide coating, engraving, plating and anodizing services using products or materials derived from glass, ceramic or related composite (Figure 51).

Figure 51: Glass and Ceramics Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
Enamelers & Japanners, Inc.	10,090	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers	Franklin Park
Pilkington North America, Inc.	461	Flat glass manufacturing	Glendale Heights, Ottawa
Downey Investments, Inc.	260	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers	Broadview
Chicago Finished Metals, Inc.	250	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers	Chicago
MSC Pre Finish Metals Engraving, Inc.	230	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers	Elk Grove Village
Owens-Brockway Glass Containers, Inc.	210	Glass container manufacturing	Streator
Gerresheimer Glass, Inc.	200	Glass container manufacturing	Chicago Heights

Source: Dun & Bradstreet, Inc. (2014).
*North American Industry Classification System.

Supply Chain

The supply chain information provided here indicates the flows of trade which support Glass and Ceramics industries both within and outside the Laborshed Region. The key sectors which may be appropriate targets for expansion are imports (gaps) from outside the region, but still within the industry. These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed into a supply chain model in order to determine the stages of the supply chain with the strongest regional presence. To fully develop a cluster, the region can make the most progress by focusing on sectors which do not yet have a strong regional presence, but which have significant development potential (Figure 52).

Figure 52: Glass and Ceramics Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Other pressed and blown glass and glassware	-$25,594,045	$2,970,305	$28,564,350	89.6%
Flat glass	-$16,927,643	$592,120	$17,519,762	96.6%
Semiconductor and related devices	-$10,223,119	$112,864	$10,335,983	98.9%
Alkalies and chlorine	-$10,159,642	$3,303,897	$13,463,540	75.5%
Special tools, dies, jigs, and fixtures	-$8,864,121	$856,248	$9,720,370	91.2%
Paperboard containers	-$8,386,988	$16,927,703	$25,314,691	33.1%
Clay and nonclay refractory products	-$8,188,026	$4,050,149	$12,238,175	66.9%
Ground or treated mineral and earth products	-$5,369,246	$1,867,986	$7,237,232	74.2%
Plastics packaging materials and unlaminated films and sheets	-$4,821,297	$1,593,022	$6,414,319	75.2%

Source: IMPLAN. (2012).

For example, the regional Glass and Ceramics cluster requires $28.56 million in products or services which are required to create a finished product (inputs) from the 'other pressed and blown glass and glassware' industry. However, only $2.97 million of the required inputs from this industry is produced within the region with the balance being purchased from outside the Laborshed Region. This indicates an opportunity for an existing firm or new business to satisfy the regional demand for these products.

In addition to targeting supply-chain opportunities within the Glass and Ceramics cluster, there are also opportunities to develop or expand

Other pressed and blown glass and glassware

(NAICS Sector 327212)

This U.S. industry comprises establishments primarily engaged in manufacturing glass by melting silica sand or cullet and making pressed, blown, or shaped glass or glassware (except glass packaging containers).

Subsectors include the following:

- ✓ Glass blanks for electric light bulbs
- ✓ Glass blanks for ophthalmic lens and optical glass
- ✓ Glass blocks and bricks
- ✓ Glass cookware and cooking utensils
- ✓ Glassware for industrial, scientific, and technical use

industries that serve more than one targeted cluster. The Advanced Materials and Chemicals and Chemical-Based Products clusters share four industry sectors in their supply chains with the Glass and Ceramics cluster (Figure 53). Focusing economic development efforts on these industries could help to strengthen all of them.

Figure 53: Glass and Ceramics, Cluster Supply Chain Synergies, Laborshed Region

INDUSTRY SECTOR	CLUSTER	LABORSHED EMPLOYMENT	EMPLOYMENT LQ
Coating, engraving, heat treating and allied activities	Advanced Materials, Glass and Ceramics	5,959	1.7
Glass container manufacturing	Chemicals & Chemical-Based Products, Glass and Ceramics	642	1.6
Glass product manufacturing made of purchased glass	Chemicals & Chemical-Based Products, Glass and Ceramics	914	0.9
Miscellaneous nonmetallic mineral product manufacturing	Chemicals & Chemical-Based Products, Glass and Ceramics	203	0.7

Source: IMPLAN. (2012).

Workforce Requirement, Supply and Demand

Even as employment in the industry has declined during the past decades (a trend that is projected to continue) the supply of potential new workers is comparatively low because of demographic trends and the propensity of younger workers to pursue careers outside of manufacturing. The workforce in the Glass and Ceramics cluster is significantly younger that workers in other targeted clusters. Workers 25 years old and younger account for 11.4% total employment in 2012. Together with those 25 to 44 years old, they comprise more than one-half of the workers in the cluster (Figure 54).

Figure 54: Glass and Ceramics Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	11.4%	$23,991
25-44 Years	44.4%	$49,808
45-64 Years	39.7%	$62,549
65 Years & Older	4.6%	$55,285

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages.*

Over 75% of the employment, as well as over 60% of the wages, in the Glass and Ceramics industry are concentrated in production; installation, maintenance, and repair; or transportation and material moving

occupations (Figure 55). Production and the related employment classifications account for the largest single share of the jobs in the Laborshed Region. Ensuring that appropriately skilled production workers are available at competitive rates of compensation will be critical to maintaining the region's manufacturing sector[26].

Estimated average annual wages for production-related workers in the Glass and Ceramics cluster is below the other targeted clusters. While this may be, in part, a reflection of a higher percentage of younger workers it presents a challenge in recruiting new workers into the industry. In addition, Grundy County will need to be competitive with the surrounding metropolitan area given the greater number of employers and job opportunities within a reasonable commuting distance. Given the expected intense competition for skilled workers, companies will have to monitor compensation trends in order to recruit and to retain qualified employees.

Figure 55: Glass and Ceramics Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Production	51.2%	43.1%	$31,807
Transportation and Material Moving	19.0%	16.0%	$31,746
Office and Administrative Support	9.5%	8.6%	$34,522
Installation, Maintenance, and Repair	5.1%	5.7%	$42,387
Management	4.6%	12.7%	$104,114
Construction and Extraction	3.6%	3.5%	$37,419
Sales and Related	2.5%	3.9%	$58,473
Business and Financial Operations	1.6%	2.4%	$58,482
Architecture and Engineering	1.5%	2.5%	$61,651

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

Key Trends for the Glass and Ceramics Cluster

- *High Concentration of Glass and Ceramics Firms and Employment in the Laborshed Region.* The Glass and Ceramics cluster has a concentration of firms which is 1.9 times above the national average, and an employment concentration which is 1.3 times above the national average in the Laborshed Region. Although the number of companies and number of jobs in Grundy County is small, growth prospects appear to be good.

[26] In 2010, Production; Installation, Maintenance, and Repair; and Transportation and Material Moving occupations accounted for 17.3% of all occupational employment in the Laborshed Region.

- *Growth Opportunities for Related Companies and Customers.* The Glass and Ceramics cluster is diverse, but there appear to a number opportunities to develop or grow industries key suppliers or customers of the cluster, including glassware manufacturers, mineral products manufacturing, and coating, engraving, heat treating and related industrial services
- *New Supply Chain Companies.* Opportunities may also exist for companies to develop new supply chain relationships with companies in the Laborshed Region or outside the industries that they already serve, but more research is needed to identify and develop those opportunities.
- *Growth Opportunities for Niche Companies.* Small niche manufacturers or industrial services providers can be supported as part of a strategy to support small businesses and entrepreneurship in the Region.
- *Supporting Services Appeal.* The research and development capabilities, technology transfer, and other support services available from the Laborshed Region's college, universities, and other training facilities could be an additional selling point to attract, retain and expand businesses in this cluster.
- *Abundant Supplies of Raw Materials.* Raw materials needed for the Glass and Ceramics cluster are readily available across northern and central Illinois, making the region an attractive location for production and distribution.
- *Competitive Compensation for Glass and Ceramics Employees.* Grundy County will need to be competitive with wages compared with the surrounding metropolitan area, given the greater number of job opportunities within commuting distance. With competition for skilled workers, companies will have to monitor compensation trends in order to recruit and to retain qualified employees.

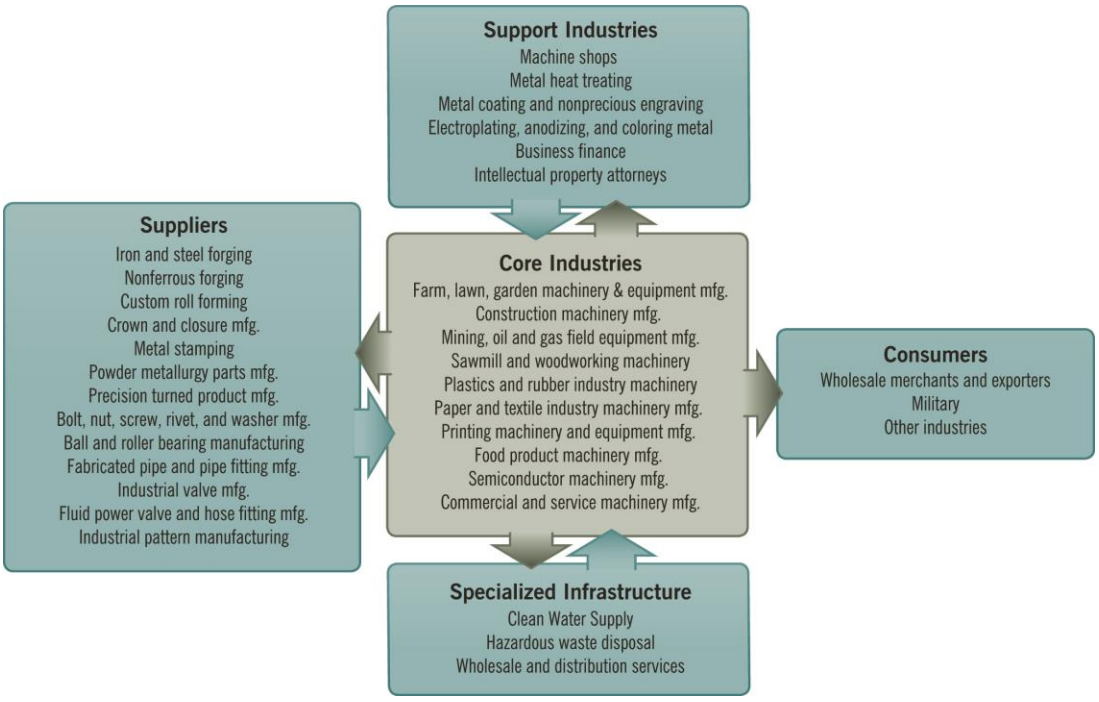
Cluster Profile: Machinery Manufacturing

Cluster Summary

The *Machinery Manufacturing* cluster is comprised of a broad and diverse range of machinery or components used in agriculture, mining, construction, or manufacturing. Major products of these cluster companies in the Laborshed Region include farm and construction machinery; metalworking and other manufacturing machinery; HVAC and commercial refrigeration equipment; and general-use machinery such as engines and pumps. While some products, such as tractors or heaters, are finished products, others like motors are components used in further production, and others are custom-designed for a specific manufacturing process. Manufacturing involves the production and assembly of components and this requires skilled labor for activities such as forging, machining and welding. Products have a high engineering content, and product design usually involves CAD systems, which are integrated directly into a computer-aided manufacturing (CAM) process.

The core strength of the Machinery Manufacturing cluster comes from the production of tools, structural components, and parts which are either sold as finished products or incorporated into other manufactured goods. These core industries drive employment and inputs in other industries which supply them (e.g., agricultural, construction, and food processing machinery), as well as those which support the core industries by providing business finance and various industrial services and component manufacturers (Figure 56).

Figure 56: Machinery Manufacturing, Cluster Components

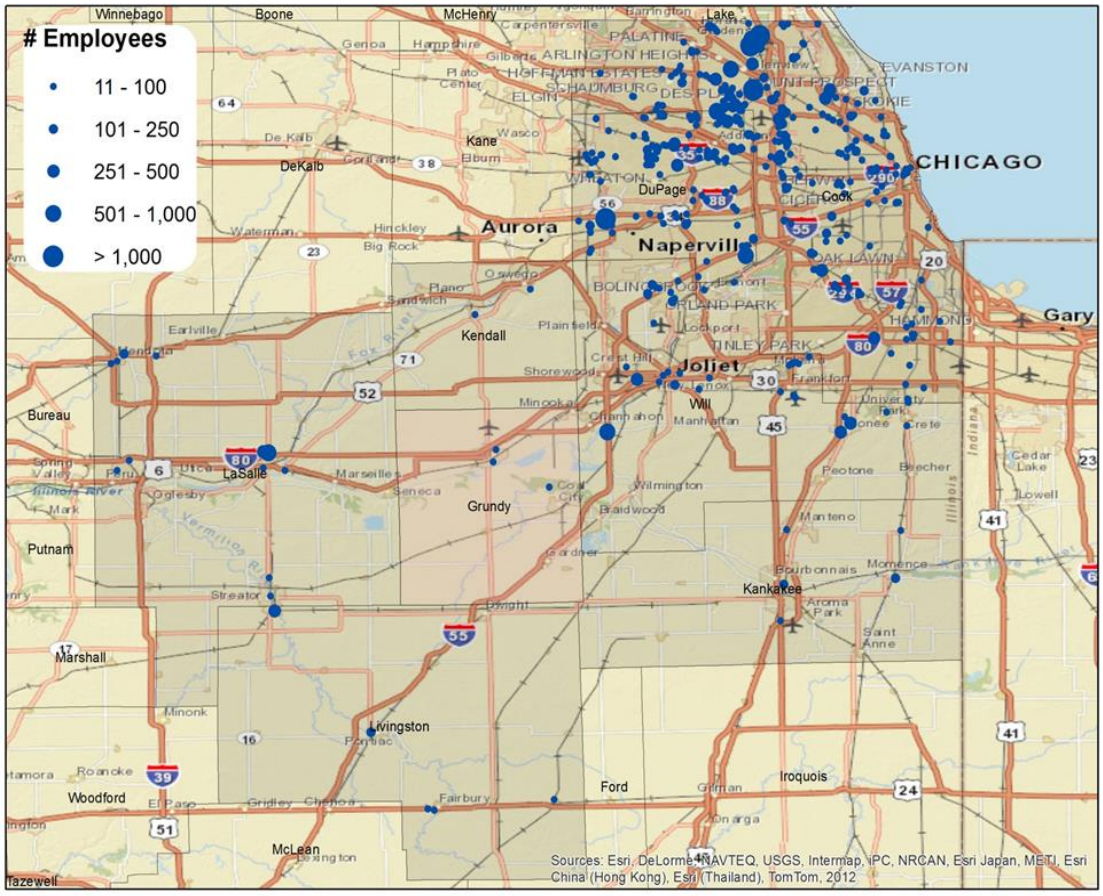


Source: The Purdue Center for Regional Development (cluster definitions). (2012).

Regional Overview

The greatest concentration firms and employment in the Machinery Manufacturing cluster were in the suburban areas in western Cook, DuPage and Will counties (Figure 57). The majority of businesses in this cluster were small in terms of employment (64.2% of firms have fewer than 10 employees), and accounted for only 7.5% of total employment. Larger firms (those with 500 or more employees) made up less than 1.0% of all establishments, yet accounted for 23.7% of the jobs in the cluster.

Figure 57: Machinery Manufacturing Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

The Machinery Manufacturing cluster also has a significant concentration of firms and employment in the Laborshed Region, but this has diminished in the past few years. Between 2009 and 2012, its employment location quotients (LQs) have fallen from 1.2 to 1.0. However, the cluster remains viable and a number of subsectors have a strong presence in the Laborshed Region based on the concentration of employment (Figure 58). In addition, the Machinery Manufacturing cluster shares significant supply-chain relationships with several other targeted clusters (Advanced Materials and Energy).

Figure 58: Machinery Manufacturing Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Pump and pumping equipment manufacturing	3.4
Speed changer, industrial high-speed drive, and gear manufacturing	3.4
Packaging machinery manufacturing	3.0
Vending, commercial, industrial, and office machinery manufacturing	2.8
Special tool, die, jig, and fixture manufacturing	1.9
Cutting tool and machine tool accessory manufacturing	1.8
Air purification and ventilation equipment manufacturing	1.7
Metal cutting and forming machine tool manufacturing	1.6
Rolling mill and other metalworking machinery manufacturing	1.5
Other industrial machinery manufacturing	1.5

Source: IMPLAN. (2012).

In 2012, the Laborshed Region had 757 establishments and employed 20,996 people in jobs related directly to the Machine Manufacturing cluster. This cluster has an employment location quotient (LQ) of 1.0 in the Laborshed Region, making it comparable to the national average but it has a stronger presence in Grundy County especially in terms of wages (Figure 59). The average annual wage is 1.7 times above the national average and has increased by 35.7% between 2009 and 2012, nearly twice the Laborshed Region's average.

Figure 59: Machinery Manufacturing Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	3	757
Percent Change in Number of Firms (2009-2012)	0.0%	-39.4%
Firm Location Quotient (LQ)	1.1	1.6
EMPLOYMENT (2012)	120	20,996
Percent Change in Employment (2009-2012)	66.7%	-30.7%
Employment Location Quotient (LQ)	1.1	1.0
AVERAGE ANNUAL WAGE (2012)	$103,619	$72,721
Percent Change in Average Annual Wage (2009-2012)	35.7%	18.4%
Wage Location Quotient (LQ)	1.7	1.0

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2014).

The Laborshed Region is host to a number of major national and global companies in this cluster. Although large employers (firms with 500 or more employees) represent a small fraction of the businesses in this cluster (0.6%), they account for 23.7% of cluster employment (Figure 60). Machinery Manufacturing companies in the Laborshed Region manufacture machinery, parts and components for the oil, gas, chemical, and transportation equipment industries as well as finished products.

Figure 60: Machinery Manufacturing Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
U O P Equitec Services, Inc.	2,000	Oil and gas field machinery and equipment manufacturing	Des Plaines
Bowe Bell & Howell Co.	1,710	Commercial and service industry machinery manufacturing	Wheeling
Nalco Co.	1,150	Chemical machinery and equipment	Naperville
Manan Tool & Manufacturing	1,110	Machine tool manufacturing	Wheeling
Tuthill Corp.	870	Turbine and turbine generator set units manufacturing	Burr Ridge
Clover Technologies Group LLC	760	Photographic and photocopying equipment manufacturing	Ottawa
Videojet Technologies, Inc.	650	Addressing machines, plates and plate embossers	Wood Dale
Robert Bosch Tool Corp.	600	Power-driven hand tool manufacturing	Mt. Prospect
Exxonmobil Oil Corp.	550	Refinery, chemical processing, and similar machinery	Channahon
Fluid Handling LLC	500	Pump and pumping equipment manufacturing	Morton Grove
Cornelius IMI, Inc.	500	Air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment manufacturing	Glendale Heights

Source: Dun & Bradstreet, Inc. (2014).
*North American Industry Classification System.

Supply Chain

The supply chain information provided here indicates the flows of trade which support Machinery Manufacturing industries both within and outside of the Laborshed Region. The key sectors which may be

appropriate targets for expansion are imports (gaps) from outside the Laborshed Region, but still within the industry. These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed into a supply chain model in order to determine the stages of the supply chain with the strongest regional presence. To fully develop a Machinery Manufacturing cluster, Grundy County and the Laborshed Region can make the most progress by focusing on sectors which do not yet have a strong regional presence, but which have significant development potential (Figure 61).

Figure 61: Machinery Manufacturing Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Other engine equipment	-$14,720,767	$8,908	$14,729,675	99.9%
Iron and steel and ferroalloy products	-$8,785,227	$5,500	$8,790,727	99.9%
Motor vehicle parts	-$7,739,132	$5,180	$7,744,312	99.9%
Valves and fittings other than plumbing	-$6,524,177	$410,319	$6,934,496	94.1%
Wholesale trade distribution services	-$5,433,535	$3,834,918	$9,268,453	58.6%
Construction machinery	-$4,963,824	$74,620	$5,038,444	98.5%
Management of companies and enterprises	-$4,605,379	$821,839	$5,427,218	84.9%
Fluid power process machinery	-$3,984,294	$0	$3,984,294	100.0%
Tires	-$3,650,563	$0	$3,650,563	100.0%
Ferrous metals	-$3,499,670	$0	$3,499,670	100.0%

Source: IMPLAN. (2012).

Other Engine Equipment (NAICS Sector 33631)

Firms in this industry manufacture internal combustion engines (except automotive gasoline and aircraft).

Subsectors include the following:

- ✓ Diesel and semi-diesel engines
- ✓ Gasoline engines (except aircraft, automotive, truck)
- ✓ Natural gas engines

For example, the regional Machinery Manufacturing cluster requires $14.7 million in the products or services which are required to create a finished product (inputs) from the 'other engine equipment' industry. However, only $8,900 of the required inputs from this industry are produced within the region with the balance being purchased from outside.

This indicates an opportunity for an existing firm or new business to satisfy the regional demand for these products. In addition to targeting supply-chain opportunities within the Machinery Manufacturing cluster, there are also opportunities to develop or expand industries that serve more than one targeted cluster.

The Machinery Manufacturing cluster shares six industry sectors in its supply chain with the Advanced Materials cluster. Focusing economic development efforts on these industries could help to strengthen all of them. Figure 62 gives an overview of these industries and their potential for development.

Figure 62. Machinery Manufacturing, Cluster Supply Chain Synergies, Laborshed Region

INDUSTRY SECTOR	CLUSTER	LABORSHED EMPLOYMENT	EMPLOYMENT LQ
Vending, commercial, industrial, and office machinery manufacturing	Advanced Materials, Machinery Manufacturing	923	2.8
Cutting tool and machine tool accessory manufacturing	Advanced Materials, Machinery Manufacturing	1,145	1.8
Metal cutting and forming machine tool manufacturing	Advanced Materials, Machinery Manufacturing	1,560	1.6
Other industrial machinery manufacturing	Advanced Materials, Machinery Manufacturing	2,846	1.5
Rolling mill and other metalworking machinery manufacturing	Advanced Materials, Machinery Manufacturing	498	1.5
Industrial mold manufacturing	Advanced Materials, Machinery Manufacturing	1,065	1.2

Source: IMPLAN. (2012).

Workforce Requirement, Supply and Demand

Even as employment in the Machinery Manufacturing industry has declined during the past decades (a trend that is projected to continue) the potential supply of replacement workers is relatively tight due to demographic trends and the propensity of younger workers to pursue careers outside of manufacturing. More than one-half of the workers employed in the industry in 2012 were 45 years old or older, with only 5.6% under the age of 25 (Figure 63).

Figure 63: Machinery Manufacturing Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	5.6%	$29,318
25-44 Years	37.5%	$58,947
45-64 Years	50.6%	$75,459
65 Years & Older	6.3%	$60,338

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages.*

Over 60.0% of the employment and almost 50.0% of the wages in the Machinery Manufacturing cluster are concentrated in Production; Installation, Maintenance, and Repair; or Transportation and Material Moving occupations (Figure 64). Production and related occupations account for the largest single shareof the jobs in the Laborshed Region. Ensuring that appropriately skilled production workers are

available at competitive rates of compensation will be critical to maintaining the Laborshed Region's manufacturing sector[27].

Compensation levels are a concern for local businesses because of competition for workers with specific skills or experience the Laborshed Region[28]. In the case of Grundy County, the surrounding metropolitan area has the advantage of a greater number of employers and more job opportunities from which to choose within a reasonable commuting distance. Given the expected intense competition for skilled workers, companies will have to monitor compensation trends in order to recruit and to retain qualified employees.

Figure 64: Machinery Manufacturing Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Production	54.1%	42.2%	$36,618
Office and Administrative Support	11.3%	8.7%	$36,212
Architecture and Engineering	9.3%	12.8%	$64,719
Management	6.4%	15.2%	$111,983
Installation, Maintenance, and Repair	4.2%	4.0%	$45,000
Sales and Related	3.6%	5.3%	$69,040
Business and Financial Operations	3.5%	4.5%	$60,276
Transportation and Material Moving	3.3%	2.1%	$30,331
Computer and Mathematical	1.9%	2.8%	$70,110

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

Key Trends for the Machinery Manufacturing Cluster

- *Greater Presence in Grundy County.* The Machinery Manufacturing industry in the Laborshed Region has a concentration of firms and employment that is near the national average, but it is much stronger in Grundy County.
- *Take Advantage of the Overlap of the Machinery Manufacturing Cluster and the Advanced Materials Cluster.* Since several industries in this cluster are also part of the Advanced Materials cluster, local officials may be able to leverage their efforts by focusing on companies in industries that serve and enhance the growth of both clusters.

[27] In 2010, Production; Installation, Maintenance, and Repair; and Transportation and Material moving occupations accounted for 17.3% of all occupational employment in the Laborshed Region.
[28] Business and Expansion Outreach Program, Grundy Economic Development Council. (2012). *Grundy County Retention and Expansion Report.*

- *New Supply Chain Companies.* Opportunities likely exist for companies to develop new supply chain relationships with companies outside the industries that they already serve, but more research is needed to further define those opportunities.
- *Take Advantage of Additional Resources.* The recently issued economic development plan has identified Machinery Manufacturing and related industries as a focus of it business development efforts over the next five years based on its potential for creating and sustaining high paid and high value-added jobs. This will give local officials additional resources to assist new and existing companies in this cluster.[29]
- *Competitive Compensation for Machinery Manufacturing Employees.* Production and related employment account for a majority of jobs in this cluster. Ensuring that appropriately skilled production workers are available at competitive compensation rates will be critical to maintaining the Laborshed Region's Machinery Manufacturing cluster. Companies will have to monitor compensation trends in order to recruit and to retain qualified employees.

[29]Illinois Department of Commerce and Economic Opportunity. (2014, July). *The Illinois Economic Development Plan.*

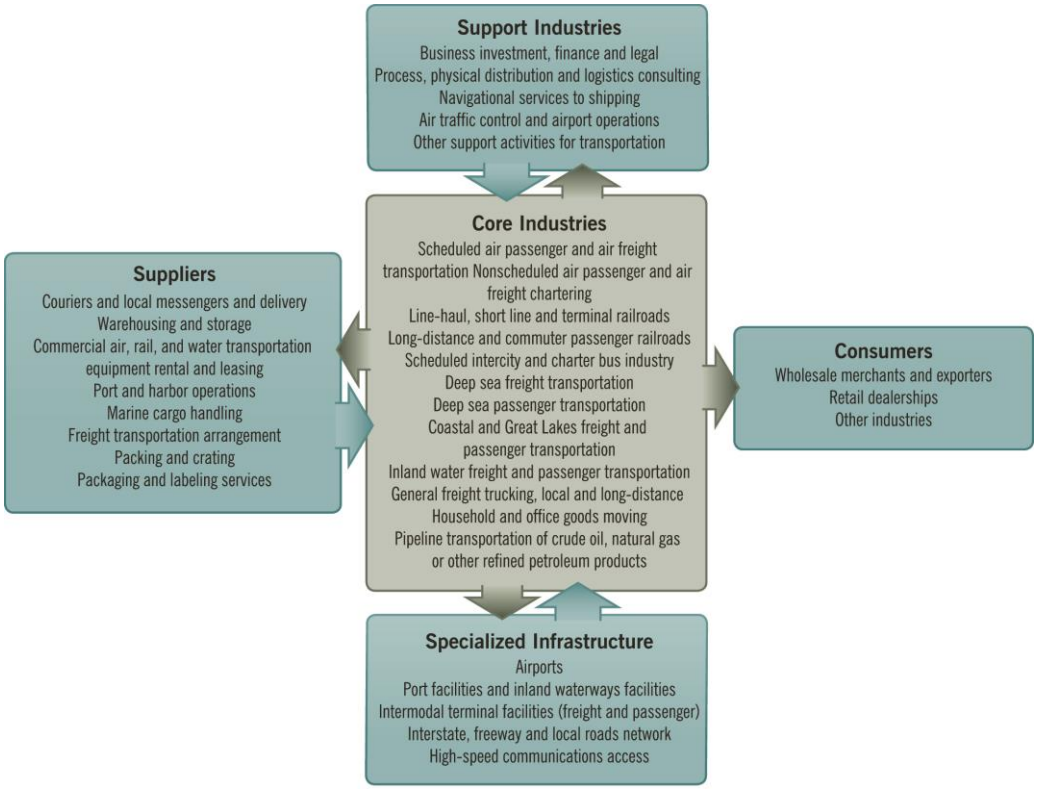
Cluster Profile: Transportation and Logistics

Cluster Summary

The *Transportation and Logistics* cluster encompasses the transportation of passengers and freight, related support services (e.g., freight forwarding and supply chain management), warehousing, and the management of transportation infrastructure (e.g., ports and terminal facilities). Providers of air, water, road, and rail transportation and related services are also included in this cluster. The cluster has a relatively small, but growing presence in the Laborshed Region driven by access to national and international markets.

The Transportation and Logistics cluster in this report is considered to be a grouping of physical and strategic assets which should be developed and maintained to support other targeted industries. The Laborshed Region not only benefits from excellent highway and rail access, but also benefits from several large commercial airports, foreign trade zones, inland ports and intermodal facilities. The core strength of the Transportation and Logistics cluster comes from the transportation of people or goods by air, road, rail, or water. These core industries drive employment and inputs in the other industries which supply them, as well as those which support the core industries by providing business finance and other various business services (Figure 65).

Figure 65: Transportation and Logistics, Cluster Components

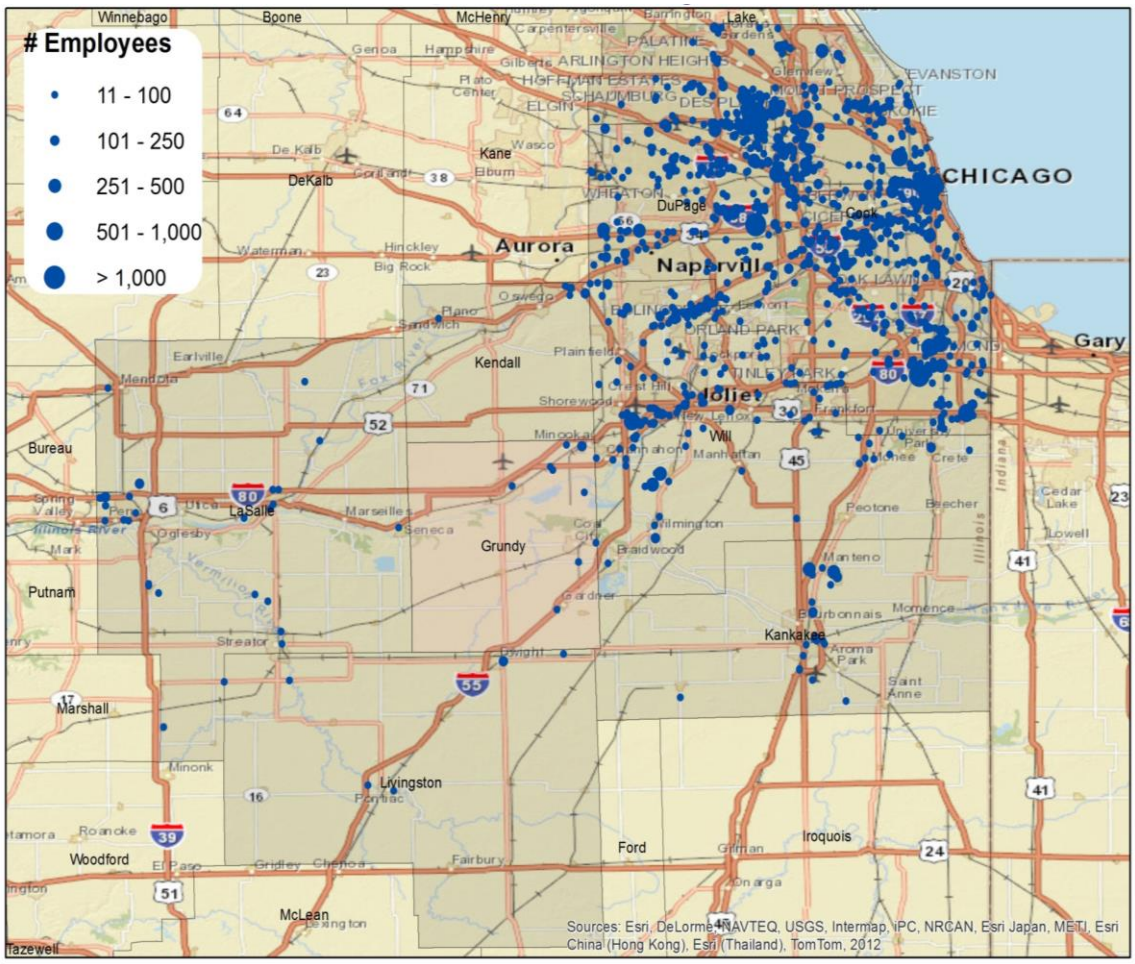


Source: The Purdue Center for Regional Development (cluster definitions). (2012).

Regional Overview

Within the Transportation and Logistics cluster, the passenger and freight transportation component (trucking, railroads, airlines, and barge or other shipping operations) represents 6.2% of the total business establishments and 52.2% of the total employment. Transportation support activities including facilities operations and transportation brokerage services represent 5.8% of total business establishments and 32.9% of total cluster employment. The warehousing and storage services component accounts for 88.0% of the firms operating in the Laborshed Region and 14.9% of total employment. Principal employment centers are located along major transportation arteries and at break-in-bulk points where goods are transferred from one mode of transport to another, such intermodal terminals or ports (Figure 66).

Figure 66. Transportation and Logistics Cluster, Firms by Employment Size Category



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Source: DecisionData.net, 2014

The Transportation and Logistics cluster has had a strong concentration of employment in the Laborshed Region with LQs of 1.4 in 2009 and 2012. Seven subsectors have a strong presence in the region as measured by employment concentration (Figure 67).

Figure 67: Transportation and Logistics Cluster, Principal Subsectors by Employment Concentration, Laborshed Region

INDICATOR	LOCATION QUOTIENT
Transport by air	2.7
Management, scientific, and technical consulting services	2.0
Transit and ground passenger transportation	1.6
Transport by rail	1.6
Warehousing and storage	1.5
Transport by truck	1.2
Commercial and industrial machinery and equipment rental and leasing	1.1

Source: IMPLAN. (2012).

In the Laborshed Region, the Transportation and Logistics cluster includes 8,629 establishments which employed 144,219 people in direct cluster jobs in 2012. The average annual wage for direct cluster jobs is $54,989. This cluster has a higher than average concentration of economic activity in the Laborshed Region when compared to the nation's economic activity in this cluster (Figure 68). The cluster has experienced significant growth since the end of the recession with the number of firms increasing by 21.3%, employment expanding by 8.1% and annual wages increasing by 10.2%.

Grundy County, though it has proportionally fewer Transportation and Logistics businesses and jobs than the Laborshed Region, has a stronger concentration of economic activity in this cluster (in terms of LQs) and has experienced a higher rate of employment growth. Annual wages are lower than the standard for the region, but still compare favorably nationally with a wage location quotient that was 1.5 times above the U.S. average.

Figure 68: Transportation and Logistics Cluster, Summary Characteristics

INDICATOR	GRUNDY COUNTY	LABORSHED REGION
NUMBER OF FIRMS (2012)	74	8,629
Percent Change in Number of Firms (2009-2012)	-1.3%	21.3%
Firm Location Quotient (LQ)	2.5	1.7
EMPLOYMENT (2012)	855	144,219
Percent Change in Employment (2009-2012)	13.5%	8.1%
Employment Location Quotient (LQ)	1.7	1.4
AVERAGE ANNUAL WAGE (2012)	$46,571	$54,989
Percent Change in Average Annual Wage (2009-2012)	-7.6%	10.2%
Wage Location Quotient (LQ)	1.5	1.4

Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2014).

The largest employers in the Laborshed Region are primarily engaged in in air and rail transportation and mail and parcels shipping and delivery activities (Figure 69). Smaller firms are involved in trucking and related activities.

Figure 69: Transportation and Logistics Cluster, Largest Employers, Laborshed Region

COMPANY NAME	NO. OF EMPLOYEES	NAICS INDUSTRY DESCRIPTION*	CITY
U.S. Postal Service	10,000	Postal service	Chicago
Canadian National Railway	5,400	Rail freight transportation	Chicago
United Airlines	4,300	Air passenger transportation	Chicago
HGDS Acquisition LLC (Footprint Retail Services)	3,200	Freight transportation arrangement	Lisle
United Parcel Service	2,700	Parcel shipping and delivery	Chicago
National Rail Passenger Corp. (AMTRAK)	2,000	Passenger rail transportation	Chicago
Union Pacific	1,900	Rail freight transportation	Chicago

Source: Dun & Bradstreet, Inc. (2014).
*North American Industry Classification System.

Supply Chain

The supply chain information provided presents the flows of trade which support Transportation and Logistics industries both within and outside the Laborshed Region. The key sectors which may be appropriate targets for expansion appear as imports (gaps) from outside the region, but still within the industry (Figure 70). These gaps are then analyzed in terms of regional strengths and potential areas for targeting and support and are placed into a supply chain analysis to identify stages of the supply chain with the strongest regional presence. In order to fully develop the Transportation and Logistics cluster, the Laborshed Region can make the best progress by focusing on those sectors which do not currently have a strong regional presence, but have significant potential to develop in the Region.

Figure 70: Transportation and Logistics Cluster, Largest Supply Chain Gaps, Laborshed Region

INDUSTRY	REGIONAL GAP	REGIONAL INPUTS	GROSS INPUTS	PURCHASED OUTSIDE THE REGION
Refined petroleum products	-$3,312,005	$7,694,716	$11,006,721	30.1%
Insurance	-$2,566,644	$9,039	$2,575,683	99.6%
Employment services	-$1,892,329	$718,193	$2,610,522	72.5%
Scenic and sightseeing transportation services and support activities	-$1,668,934	$322,142	$1,991,076	83.8%
Motor vehicle parts	-$1,608,054	$1,076	$1,609,131	99.9%
Real estate buying and selling, leasing, managing, and related services	-$1,385,644	$1,091,170	$2,476,813	55.9%
Management of companies and enterprises	-$1,255,748	$224,091	$1,479,839	84.9%
Wholesale trade distribution services	-$1,141,441	$805,614	$1,947,055	58.6%

Source: IMPLAN. (2012).

For example, the regional Transportation and Logistics cluster requires $11.0 million in products or services which are required to create a finished product (inputs) from the 'refined petroleum products' industry. However, only $28.9 million is produced in the region, with the balance purchased from outside the region. This suggests an opportunity for an existing firm or new business to satisfy the regional demand.

The supply chain gaps in these industries are significant and the Chicago area is a global transportation and logistics hub. Development of these opportunities is possible if they can be pursued in a cooperative manner within the Laborshed Region.

Workforce Requirement, Supply and Demand

The available workforce for the Transportation and Logistics cluster has been an ongoing issue, just as it has for manufacturing in general. The lack of qualified workers stems from the wave of retirement of the older generation of skilled laborers. Although industry employment has remained mostly stable during the past decade, the next generation of potential workers is relatively small. This is due in part to general demographic trends and the propensity of many younger workers to pursue white collar careers.

Refined Petroleum Products (NAICS Sector 324110)

This industry comprises establishments primarily engaged in the manufacturing and/or rebuilding motor vehicle parts and accessories.

Subsectors include the following:

- ✓ Asphalt paving, roofing, and saturated materials manufacturing
- ✓ Petroleum lubricating oil and grease manufacturing
- ✓ Fuel briquettes or boulets
- ✓ Oil-based additives made from refined petroleum
- ✓ Petroleum jelly and waxes made from refined petroleum

Transportation and Logistics has a somewhat younger age profile (7.5% are under age 25 and 47.7% are age 25 to 44 years), than the other clusters (Figure 71). Wages are also lower than for comparable age groups in the manufacturing clusters. This pattern could be due to several reasons: a younger, less experienced workforce; a higher number of part-time and seasonal workers employed; and many of these jobs require less training and experience than jobs in other industries.

Figure 71: Transportation and Logistics Cluster, Industry Employment by Age Group, Laborshed Region

AGE GROUP	EMPLOYMENT PERCENT OF TOTAL	AVERAGE ANNUAL WAGE
Under 25 Years	7.5%	$22,503
25-44 Years	47.7%	$49,675
45-64 Years	41.4%	$59,246
65 Years & Older	3.4%	$47,835

Source: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages.*

In total, about 50% of the employment and 50% of the wages in the cluster are concentrated in transportation and material moving occupations (Figure 72). Along with production and related

employment, this occupational sector represents the largest single share of the jobs in the Laborshed Region. Ensuring that appropriately skilled production workers are available at competitive rates of compensation will be critical to maintaining the manufacturing sector in the region[30].

The estimated average annual wage for workers in this cluster in Grundy County is $46,571, below the average for the Laborshed Region ($54,989)[31]. Average wages are higher than the national average for the industry, but they declined by 7.6% in the county from 2009 to 2012 as wages increased in the Laborshed Region. Higher wages can help attract workers to a particular area or industry, but it can also discourage companies from locating or expanding. Given the intense competition for skilled workers, companies will have to monitor compensation trends to recruit and retain qualified employees.

Figure 72: Transportation and Logistics Cluster, Industry Staffing Patterns, Laborshed Region

OCCUPATIONAL CLASSIFICATION	SHARE OF EMPLOYMENT	SHARE OF WAGES	AVERAGE ANNUAL WAGE
Transportation and Material Moving	50.5%	49.3%	$42,058
Office and Administrative Support	26.1%	21.5%	$35,356
Installation, Maintenance, and Repair	6.1%	6.7%	$47,498
Personal Care and Service	5.8%	5.5%	$40,354
Management	3.1%	7.3%	$99,631
Business and Financial Operations	2.3%	3.1%	$58,513
Sales and Related	2.0%	2.7%	$56,148
Production	1.3%	1.1%	$35,203

Sources: U.S. Bureau of Labor Statistics. (2012). *Quarterly Census of Employment and Wages (QCEW);* Purdue Center for Regional Development. (2014).

Key Trends for the Transportation and Logistics Cluster

- *High Number of Firms and Employment.* The Transportation and Logistics cluster in the Laborshed Region has a concentration of firms which is 1.7 times above the national average and an employment concentration which is 1.4 times above the national average. Although wages in the Transportation and Logistics cluster are generally lower than those in manufacturing, jobs on the Laborshed Region pay well above the national average.

[30] In 2010, production, installation, maintenance, repair or transportation and material moving occupations accounted for 17.3% of all occupational employment in the Laborshed Region.
[31] Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and the Purdue Center for Regional Development (cluster definitions). (2012).

- *Take Advantage of Additional Resources.* The Transportation and Logistics cluster has also been cited in DCEO's *Illinois Economic Development Plan* as one of seven clusters with high growth potential in the State[32]. This means that local officials may be eligible to get additional support to recruit, retain and expand businesses in this cluster.
- *Consider the Regional Infrastructure Along With Industry Development.* Aligning public infrastructure investments with industry development strategies will be critical to maintaining the region's competitive advantage in the Transportation and Logistics cluster. This is especially critical for the Interstate 80/Brisbin Road development area if it is to be successful.
- *Take Advantage of Growth Opportunities.* The growth of the Transportation and Logistics cluster in terms of companies and operations can be leveraged to retain and attract businesses and jobs in the other targeted clusters as well.
- *Competitive Compensation for Transportation and Logistics Employees.* Although expected job growth in the cluster will be significant, the demands for retiring workers will create most of the demand for new workers. Since other industries will experience the same challenges, competition for skilled workers will be aggressive given the relatively limited number of younger workers. Companies will have to monitor compensation trends in order to recruit and to retain qualified employees.
- *Take Advantage of the Strategic Location.* The Laborshed Region's strategic location in terms of proximity to major markets (e.g., Chicago), transportation assets (particularly in roads and rail lines), along with competitive tax and site acquisition costs make it attractive for warehouse and distribution operations.

[32] Illinois Department of Commerce and Economic Opportunity. (2014, July). *The Illinois Economic Development Plan.*

Industry Trends Affecting Clusters in the Laborshed Region[33]

An understanding of national and global industry and marketing trends is essential to making informed investment decisions about the Interstate 80/Brisbin Road development area. It will also help local officials promote the area to businesses in the targeted clusters. This section highlights important trends that should be taken into consideration when developing local strategies to recruit and retain businesses.

- *Reshoring:* As wages rise in countries such as China and India, a number of manufacturers are *reshoring* as a result of rethinking offshoring practices. Recent studies show higher productivity rates among American workers (3.2 to 3.4 times higher than Chinese workers according to Boston Consulting Group) and higher instances of using cost-effective robotics in manufacturing. A recent survey of 106 manufacturing companies with $1 billion or more in annual sales conducted by Boston Consulting Group found that 37.0% are planning or considering reshoring. Almost 50.0% of companies with more than $10 billion in revenue are actively planning or considering it. The consulting firm further forecasted that reshoring could generate between 2 million and 3 million manufacturing jobs in the U.S. by 2020. Of those jobs, 1 million are expected to come from factory work while the remaining jobs would come from support services including construction, transportation and retail.
- *Energy Costs:* Another factor fueling reshoring is energy costs, which analysts predict will continue to be lower in the U.S. than in other countries, especially China. Powering factories costs less at home in America than in a number of countries abroad. The current boom in oil and natural gas production (especially the huge finds in shale gas) is leading to lower energy costs for many America-based manufacturers. Natural gas costs dramatically less in the U.S. than in most of the rest of the world and it has become increasingly expensive to ship goods manufactured offshore back to home markets due to high fuel prices abroad. PricewaterhouseCoopers estimates that lower U.S. energy prices could result in 1 million additional manufacturing jobs. This is good news for millions of unemployed factory workers in the U.S., however they may need to be trained in the necessary skills to handle the reshored work.
- *Robotics:* The continuing drive for efficiency and quality, both at the factory and in the supply chain, is making automation technologies more vital. Robotics and automation assist manufacturing in a wide variety of ways, far beyond final assembly. Robots can also control the warehouse, delivering parts to the factory floor on an as-needed basis. Savings in energy costs are being augmented by increased manufacturing efficiency, due to the growing adoption of robotics.

[33] Source: Hoovers, Inc. (2014). Retrieved from http://www.hoovers.com.

- *Computer Controls:* Industrial applications are the largest consumers of computer chips. New versions of standard machinery feature advanced electronic applications. The greater use of computer components requires manufacturers to develop new engineering skills.
- *New Factory Designs Require Versatile Machinery:* To respond to changing customer demand, more manufacturers prefer machinery which can easily be reconfigured in production work. With metalworking machinery, for example, manufacturers prefer machinery which can easily switch between different types of cutting heads.
- *Environmentalism*: Growing awareness of climate change and other environmental issues has encouraged companies to develop products and processes that reduce their environmental impact. Efforts include the reduction of greenhouse gas emissions associated with production. Waste management remains a challenge for companies, who must limit soil and groundwater contamination resulting from the use of landfills.
- *Globalization:* U.S. manufacturers face greater competition in export markets both from makers of sophisticated machinery (Japan and Germany) and from producers of low-cost, low-technology machinery (China and Mexico).

Market Opportunities for Clusters in the Laborshed Region[34]

- *Eco-friendly Technologies*: The global trend toward environmentalism and the subsequent creation of more energy-efficient products is providing manufacturers with new opportunities. Examples include lightweight plastics used in fuel-efficient cars and packaging, and films used in solar cells. Businesses can also take advantage of renewable energy sources such as biomass, geothermal, or solar technology in their own facilities.
- *Plastics and Composites:* High-temperature, high-performance plastics are replacing aluminum, brass, steel, and other metals which historically have been used in manufacturing. Demand is also increasing in the packaging and container market, as plastic is preferred over glass and metal for containers. The following six industries are increasing their use of plastics.
- *Aircraft Manufacturing:* Demand for rubber and plastics to replace metal parts in aircraft continues as manufacturers prefer low-weight components.
- *Auto Parts Market:* The use of plastics in automobiles has grown from primarily interior and trim components to include body panels, bumpers, and other parts. Plastics offer several advantages in automobile design: lighter and less expensive than steel, plastics make automobiles cheaper to

[34] Source: Hoovers, Inc. (2014). Retrieved from http://www.hoovers.com.

build, and increased fuel economy. Automobile designers and engineers are also using post-consumer recycled plastic, which offers environmental benefits.

- *Chemical Companies and Bioplastics:* Another eco-friendly technology is the growth of bioplastics. Most large chemical companies are exploring the development of and uses for bioplastics, which are derived from biomass such as vegetable oil or corn starch instead of petroleum which has been used traditionally. Plastic companies anticipate that bioplastics will eventually outpace traditional petro polymers, as bioplastics are competitive in terms of cost and performance.
- *Construction:* The use of plastics in residential and commercial construction is expected to increase. PVC piping is used extensively in construction, and plastics continue to be developed for insulation, roofing, windows, and structural materials. Building materials such as recycled plastic lumber are also used in eco-friendly 'green building' applications.
- *Electronics Market:* Research has opened up new ways to incorporate plastics into electronics. Plastic-based transistors and organic light emitting displays are being used in new ways including in electronic billboards, HDTV screens, and flexible laptop computers. Because transistors made of plastic are cheaper and easier to manufacture than those made of the traditional silicon, research into other plastics applications in electronics will continue.
- *Medical Supplies:* Plastic is increasingly being used for tubing, containers, and instruments in the medical supply industry.
- *Alliances*: Partnerships allow companies to share resources in the pursuit of new products and markets. Often taking the form of joint ventures, such alliances can provide entry into foreign markets where a local partner has established access to materials, labor, and sales channels. Businesses can also form alliances with universities and other research facilities for R&D projects.
- *Domestic Oil and Gas Production*: Ample supplies of oil and gas in the U.S. should help manufacturers regulate energy and feedstock costs. Advances in horizontal drilling and hydraulic fracturing (or fracking) technologies have enabled domestic producers to tap deposits that were previously inaccessible, dramatically increasing U.S. production of oil and gas in recent years. The U.S. could become nearly energy-independent by 2030, according to a forecast by BP.
- *Design Processes:* New machinery design and manufacturing technologies have greatly improved machinery effectiveness and lowered costs. New CAD simulation software can provide a virtual prototype of the product or machine before a physical model is built and reduce costly product design and physical testing. Rapid prototyping, a new type of manufacturing process, is used to make small machinery parts.
- *Information Technology:* Large truckers are among the most sophisticated users of transportation technology resulting in increased productivity. Many in-cab systems include basic management

and dispatching software. New systems incorporate bar code readers, signature capture, and radio frequency identification (RFID) tagging, allowing drivers to quickly manage the transfer of goods. Experience with computer systems has led some truckers to expand into courier and logistics services for large shippers.

- *Larger Warehouses, Electronically Equipped:* To provide sophisticated distribution functions for customers, new warehouses are bigger - 1 million square feet is now a common size. With computer systems now controlling the identification and throughput of individual items, special wiring and outlets are installed in warehouses. In some warehouses, a grid of wires in the floor allows computer-guided forklifts to find stored items.
- *Logistics Services:* From being a passive provider of storage space, the warehousing industry has evolved to providing logistics services which enable customers to identify, track, and expedite individual items through the supply chain. Many warehouse facilities are considered high throughput distribution (HTD) facilities rather than long-term storage buildings.
- *Outsourcing Logistics:* Recognizing the importance of efficient storage and distribution functions, more companies are outsourcing warehouse/distribution functions to logistics specialists, known as third-party logistics providers, or 3PLs. In addition to higher efficiency, companies can lower their capital investment as well as the risk of owning with poorly sited facilities. Outside logistics firms are more likely to use public warehousing to meet local distribution needs.
- *Electronic Record Storage:* Some record storage firms are expanding their capabilities from only paper document storage to include electronic record storage by building computer server farms in secure locations. By providing secure, online storage offsite for customers' critical computer applications, storage companies are gradually transforming their business from paper to electronic storage.
- *Alternative Transportation:* Rising costs have caused a decline in air cargo as many U.S. shippers to migrate from air shipping to other modes of transportation. Fewer flights and the high fuel costs associated with air transport have made ship, rail, and truck transport more competitive options. Joint ventures between ship and truck carriers have succeeded in improving shipment reliability and shortening delivery times. Advances in information systems and innovations in intermodal transport have caused resurgence in the use of railroads. Railroads are also one of the most cost-effective, environmentally friendly forms of freight transportation.

APPENDIX A: INDUSTRY SECTORS IN MULTIPLE SELECTED CLUSTERS, LABORSHED REGION

Industry Sector	Advanced Materials	Energy	Chemicals & Chemical Based Products	Glass and Ceramics	Machinery Mfg.	Transport. & Logistics
Petrochemical manufacturing	X	X	X			
Industrial gas manufacturing	X	X	X			
Synthetic dye and pigment manufacturing	X		X			
Alkalies and chlorine manufacturing	X		X			
Carbon black manufacturing	X		X			
All other basic inorganic chemical manufacturing	X		X			
Other basic organic chemical manufacturing	X	X	X			
Plastics material and resin manufacturing	X		X			
Synthetic rubber manufacturing	X		X			
Artificial and synthetic fibers and filaments manufacturing	X		X			
Pesticide and other agricultural chemical manufacturing	X		X	X		X
Pharmaceutical preparation manufacturing	X		X	X		X
In-vitro diagnostic substance manufacturing	X		X	X		X
Biological product (except diagnostic) manufacturing	X		X	X		X
Paint and coating manufacturing	X		X	X		X
Adhesive manufacturing	X		X	X		X
Soap and cleaning compound manufacturing	X		X	X		X
Toilet preparation manufacturing	X		X		X	

Industry Sector	Advanced Materials	Energy	Chemicals & Chemical Based Products	Glass and Ceramics	Machinery Mfg.	Transport. & Logistics
Printing ink manufacturing	X		X		X	
All other chemical product and preparation manufacturing	X		X		X	
Plastics packaging materials and unlaminated film and sheet mfg.	X		X		X	
Unlaminated plastics profile shape manufacturing	X		X		X	
Polystyrene foam product manufacturing	X		X		X	
Urethane and other foam product (except polystyrene) manufacturing	X		X		X	
Other plastics product manufacturing	X		X		X	
Other rubber product manufacturing	X		X		X	
Pottery, ceramics, and plumbing fixture manufacturing	X	X	X		X	
Brick, tile, and other structural clay product manufacturing			X	X		
Clay and non-clay refractory manufacturing	X	X	X		X	
Flat glass manufacturing			X	X		
Other pressed and blown glass and glassware manufacturing			X	X		
Glass container manufacturing						
Glass product manufacturing made of purchased glass			X	X		
Cement manufacturing			X	X		
Lime and gypsum product manufacturing			X	X		
Abrasive product manufacturing	X		X			
Ground or treated mineral and earth manufacturing	X		X			

Industry Sector	Advanced Materials	Energy	Chemicals & Chemical Based Products	Glass and Ceramics	Machinery Mfg.	Transport. & Logistics
Mineral wool manufacturing	X	X	X			
Miscellaneous nonmetallic mineral product manufacturing	X		X			
Coating, engraving, heat treating & allied activities			X	X		
Mining and oil and gas field machinery manufacturing	X			X		
Other industrial machinery manufacturing		X			X	
Vending, commercial, industrial, and office machinery manufacturing	X				X	
Heating equipment (except warm air furnaces) mfg.	X				X	
Industrial mold manufacturing		X			X	
Metal cutting and forming machine tool mfg.	X				X	
Cutting tool and machine tool accessory mfg.	X				X	
Rolling mill & other metal-working machinery mfg.	X				X	
Turbine and turbine generator set units mfg.		X			X	
Air and gas compressor manufacturing	X				X	
Semiconductor and related device manufacturing	X	X				
Watch, clock, and other measuring and controlling device manufacturing	X	X				
Relay and industrial control manufacturing	X	X				
Wiring device manufacturing	X	X				
Wholesale trade businesses		X	X			
Transport by pipeline		X				X
Architectural, engineering, and related services	X	X				
Scientific research and development services	X	X				

Source: IMPLAN, 2012.

APPENDIX B: CLUSTER DEFINITIONS BY NAICS CODE

ADVANCED MATERIALS

NAICS Code	NAICS DESCRIPTION
212325	Clay and ceramic and refractory minerals mining
316211	Rubber and plastics footwear manufacturing
322221	Coated and laminated packaging paper and plastics film manufacturing
322299	All other converted paper product manufacturing
324191	Petroleum lubricating oil and grease manufacturing
325110	Petrochemical manufacturing
325120	Industrial gas manufacturing
325131	Inorganic dye and pigment manufacturing
325132	Synthetic organic dye and pigment manufacturing
325181	Alkalies and chlorine manufacturing
325182	Carbon black manufacturing
325188	All other basic inorganic chemical manufacturing
325191	Gum and wood chemical manufacturing
325192	Cyclic crude and intermediate manufacturing
325193	Ethyl alcohol manufacturing
325199	All other basic organic chemical manufacturing
325211	Plastics material and resin manufacturing
325212	Synthetic rubber manufacturing
325221	Cellulosic organic fiber manufacturing
325222	Non-cellulosic organic fiber manufacturing
325320	Pesticide and other ag. chemical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
325510	Paint and coating manufacturing
325520	Adhesive manufacturing
325611	Soap and other detergent manufacturing
325612	Polish and other sanitation good manufacturing
325613	Surface active agent manufacturing
325620	Toilet preparation manufacturing
325910	Printing ink manufacturing
325920	Explosives manufacturing
325991	Custom compounding of purchased resins
325992	Photographic film and chemical manufacturing
325998	Other miscellaneous chemical product manufacturing
326112	Plastics packaging film and sheet (including laminated) manufacturing
326113	Unlaminated plastics film and sheet (except packaging) manufacturing
326121	Unlaminated plastics profile shape manufacturing
326140	Polystyrene foam product manufacturing
326150	Urethane and other foam product (except polystyrene) manufacturing

ADVANCED MATERIALS

NAICS Code	NAICS DESCRIPTION
326199	All other plastics product manufacturing
326291	Rubber product manufacturing for mechanical use
326299	All other rubber product manufacturing
327112	Vitreous china, fine earthenware, and other pottery product manufacturing
327113	Porcelain electrical supply manufacturing
327124	Clay refractory manufacturing
327125	Non-clay refractory manufacturing
327420	Gypsum product manufacturing
327910	Abrasive product manufacturing
327992	Ground or treated mineral and earth manufacturing
327993	Mineral wool manufacturing
331111	Iron and steel mills
331210	Iron and steel pipe and tube manufacturing from purchased steel
331221	Rolled steel shape manufacturing
331222	Steel wire drawing
331311	Alumina refining
331314	Secondary smelting and alloying of aluminum
331315	Aluminum sheet, plate, and foil manufacturing
331316	Aluminum extruded product manufacturing
331319	Other aluminum rolling and drawing
331411	Primary smelting and refining of copper
331419	Primary nonferrous metal, except Copper and Aluminum
331421	Copper rolling, drawing, and extruding
331422	Copper wire, except mechanical, drawing
331423	Secondary processing of copper
331491	Nonferrous metal, except Copper and Aluminum, shaping
331492	Secondary processing of other nonferrous
331511	Iron foundries
331512	Steel investment foundries
331513	Steel foundries, except investment
331521	Aluminum die-casting foundries
331522	Nonferrous, except AL, die-casting foundries
331524	Aluminum foundries, except die-casting
331525	Copper foundries, except die-casting
331528	Other nonferrous foundries, exc. die-casting
332111	Iron and steel forging
332116	Metal stamping
332117	Powder metallurgy part manufacturing
332313	Plate work manufacturing
332322	Sheet metal work manufacturing
332618	Other fabricated wire product manufacturing
332710	Machine shops
332812	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers
332813	Electroplating, plating, polishing, anodizing, and coloring

ADVANCED MATERIALS

NAICS Code	NAICS DESCRIPTION
332911	Industrial valve manufacturing
332991	Ball and roller bearing manufacturing
332995	Other ordnance and accessories manufacturing
332997	Industrial pattern manufacturing
332999	All other miscellaneous fabricated metal product manufacturing
333298	All other industrial machinery manufacturing
333313	Office machinery manufacturing
333319	Other commercial and service industry machinery manufacturing
333511	Industrial mold manufacturing
333513	Machine tool (metal forming types) manufacturing
333514	Special die and tool, die set, jig, and fixture manufacturing
333515	Cutting tool and machine tool accessory manufacturing
333518	Other metalworking machinery manufacturing
333912	Air and gas compressor manufacturing
334119	Other computer peripheral equipment manufacturing
334220	Radio and television broadcasting and wireless communications equipment manufacturing
334290	Other communications equipment manufacturing
334411	Electron tube manufacturing
334412	Bare printed circuit board manufacturing
334413	Semiconductors and related device manufacturing
334414	Electronic capacitor manufacturing
334415	Electronic resistor manufacturing
334416	Electronic coils, transformers, and inductors
334417	Electronic connector manufacturing
334418	Printed circuit assembly manufacturing
334419	Other electronic component manufacturing
334510	Electro-medical and electrotherapeutic apparatus manufacturing
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing
334512	Automatic environmental control manufacturing for residential, commercial, and appliance use
334513	Instruments and related products manufacturing for measuring, displaying, & controlling industrial process variables
334514	Totalizing fluid meter and counting device manufacturing
334515	Instrument manufacturing for measuring and testing electricity and electrical signals
334517	Irradiation apparatus manufacturing
334519	Other measuring and controlling device manufacturing
335110	Electric lamp bulb and part manufacturing
335314	Relay and industrial control manufacturing
335921	Fiber optic cable manufacturing
335931	Current-carrying wiring device manufacturing
336322	Other motor vehicle electrical and electronic equipment manufacturing
336399	All other motor vehicle parts manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
339111	Laboratory apparatus and furniture manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing

ADVANCED MATERIALS

NAICS Code	NAICS DESCRIPTION
339991	Gasket, packing, and sealing device manufacturing
541380	Testing laboratories
541710	Research and development in the physical, engineering, and life sciences
541720	Research and development in the social sciences and humanities

CHEMICALS & CHEMICAL BASED PRODUCTS

NAIC CODE	NAICS DESCRIPTION
325110	Industrial gas manufacturing
325120	Inorganic dye and pigment manufacturing
325131	Synthetic organic dye and pigment manufacturing
325132	Alkalies and chlorine manufacturing
325181	Carbon black manufacturing
325182	Carbon black manufacturing
325188	All other basic inorganic chemical manufacturing
325191	Gum and wood chemical manufacturing
325192	Cyclic crude and intermediate manufacturing
325193	Ethyl alcohol manufacturing
325199	All other basic organic chemical manufacturing
325211	Plastics material and resin manufacturing
325212	Synthetic rubber manufacturing
325221	Cellulosic organic fiber manufacturing
325222	Non-cellulosic organic fiber manufacturing
325311	Nitrogenous fertilizer manufacturing
325312	Phosphatic fertilizer manufacturing
325314	Fertilizer, mixing only, manufacturing
325320	Pesticide and other ag. chemical manufacturing
325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological product manufacturing
325510	Paint and coating manufacturing
325520	Adhesive manufacturing
325611	Soap and other detergent manufacturing
325612	Polish and other sanitation good manufacturing
325613	Surface active agent manufacturing
325620	Toilet preparation manufacturing
325910	Printing ink manufacturing
325920	Explosives manufacturing
325991	Custom compounding of purchased resins
325992	Photographic film and chemical manufacturing
325998	Other miscellaneous chemical product manufacturing
326111	Plastics bag manufacturing
326112	Plastics packaging film and sheet manufacturing

CHEMICALS & CHEMICAL BASED PRODUCTS

NAIC CODE	NAICS DESCRIPTION
326113	Nonpackaging plastics film and sheet manufacturing
326121	Unlaminated plastics profile shape manufacturing
326122	Plastics pipe and pipe fitting manufacturing
326130	Laminated plastics plate, sheet, and shapes
326140	Polystyrene foam product manufacturing
326150	Urethane and other foam product manufacturing
326160	Plastics bottle manufacturing
326191	Plastics plumbing fixture manufacturing
326192	Resilient floor covering manufacturing
326199	All other plastics product manufacturing
326211	Tire manufacturing, except retreading
326212	Tire retreading
326220	Rubber and plastics hose and belting manufacturing
326291	Rubber product manufacturing for mechanical use
326299	All other rubber product manufacturing
327111	Vitreous china plumbing fixture manufacturing
327112	Vitreous china and earthenware articles manufacturing
327113	Porcelain electrical supply manufacturing
327121	Brick and structural clay tile manufacturing
327122	Ceramic wall and floor tile manufacturing
327123	Other structural clay product manufacturing
327124	Clay refractory manufacturing
327125	Non-clay refractory manufacturing
327211	Flat glass manufacturing
327212	Other pressed and blown glass and glassware
327213	Glass container manufacturing
327215	Glass product manufacturing made of purchased glass
327310	Cement manufacturing
327320	Ready-mix concrete manufacturing
327331	Concrete block and brick manufacturing
327332	Concrete pipe manufacturing
327390	Other concrete product manufacturing
327410	Lime manufacturing
327420	Gypsum product manufacturing
327910	Abrasive product manufacturing
327991	Cut stone and stone product manufacturing
327992	Ground or treated minerals and earths manufacturing
327993	Mineral wool manufacturing
327999	Miscellaneous nonmetallic mineral products
424610	Plastics materials merchant wholesalers
424690	Other chemicals merchant wholesalers
424710	Petroleum bulk stations and terminals
424720	Other petroleum merchant wholesalers

ENERGY (CONVENTIONAL AND RENEWABLE)

NAIC CODE	NAICS DESCRIPTION
211111	Crude petroleum and natural gas extraction
211112	Natural gas liquid extraction
212111	Bituminous coal and lignite surface mining
212112	Bituminous coal underground mining
212113	Anthracite mining
212291	Uranium-Radium-Vanadium ore mining
213111	Drilling oil and gas wells
213112	Support activities for oil and gas operations
213113	Support activities for coal mining
213114	Support activities for metal mining
221111	Hydroelectric power generation
221112	Fossil fuel electric power generation
221113	Nuclear electric power generation
221119	Other electric power generation
221121	Electric bulk power transmission and control
221122	Electric power distribution
221210	Natural gas distribution
221330	Steam and air-conditioning supply
237110	Water and sewer line and related structures construction (includes geothermal drilling)
237120	Oil and gas pipeline and related structures construction
237130	Power and communication line and related structures construction
237990	Other heavy and civil engineering construction (includes dams and hydroelectric facilities)
238210	Electrical contractors
238220	Plumbing, heating, and air-conditioning contractors
324110	Petroleum refineries
324199	All other petroleum and coal products manufacturing
325110	Petrochemical manufacturing
325120	Industrial gas manufacturing
325191	Gum and wood chemical manufacturing (include coke and charcoal)
325193	Ethyl alcohol manufacturing (includes ethanol manufacturing)
332410	Power boiler and heat exchanger manufacturing
332420	Metal tank (heavy gauge) manufacturing
333131	Mining machinery and equipment manufacturing
333132	Oil and gas field machinery and equipment manufacturing
333414	Heating equipment (except warm air furnaces) manufacturing (includes solar and hydronic heating equipment mfg.)
333611	Turbine and turbine generator set units manufacturing
334413	Semiconductor and related device manufacturing
334519	Other measuring and controlling device manufacturing
335311	Power, distribution, and specialty transformer manufacturing
335312	Motor and generator manufacturing
335313	Switchgear and switchboard apparatus manufacturing
335314	Relay and industrial control manufacturing
335911	Storage battery manufacturing
335912	Primary battery manufacturing
335929	Other communication and energy wire manufacturing
335931	Current-carrying wiring device manufacturing

ENERGY (CONVENTIONAL AND RENEWABLE)

NAIC CODE	NAICS DESCRIPTION
335991	Carbon and graphite product manufacturing
335999	All other miscellaneous electrical equipment and component manufacturing
423520	Coal and other mineral and ore merchant wholesalers
423610	Electrical apparatus and equipment, wiring supplies, and related equipment merchant wholesalers
423690	Other electronic parts and equipment merchant wholesalers
423720	Plumbing and heating equipment and supplies (hydronics) merchant wholesalers
424710	Petroleum bulk stations and terminals
424720	Petroleum and petroleum products merchant wholesalers (except bulk stations and terminals)
447110	Gasoline stations with convenience stores
447190	Other gasoline stations
454311	Heating oil dealers
454312	Liquefied petroleum gas (bottled gas) dealers
454319	Other fuel dealers
486110	Pipeline transportation of crude oil
486210	Pipeline transportation of natural gas
486910	Pipeline transportation of refined petroleum products
486990	All other pipeline transportation
523910	Miscellaneous intermediation (includes mineral and oil royalties dealing)
523999	Miscellaneous financial investment activities (includes oil and gas lease brokers)
532412	Construction, mining, and forestry machinery and equipment rental and leasing
533110	Lessors of nonfinancial intangible assets (except copyrighted works) (includes oil royalty companies and leasing)
541330	Engineering services
541360	Geophysical surveying and mapping services
541380	Testing laboratories
541620	Environmental consulting services
541690	Other scientific and technical consulting services
541710	Research and development in the physical, engineering, and life sciences
926130	Regulation and administration of communications, electric, gas, and other utilities

GLASS AND CERAMICS

NAIC CODE	NAICS DESCRIPTION
327111	Vitreous china plumbing fixture manufacturing
327112	Vitreous china and earthenware articles manufacturing
327113	Porcelain electrical supply manufacturing
327121	Brick and structural clay tile manufacturing
327122	Ceramic wall and floor tile manufacturing
327123	Other structural clay product manufacturing
327124	Clay refractory manufacturing
327125	Non-clay refractory manufacturing
327211	Flat glass manufacturing
327212	Other pressed and blown glass and glassware
327213	Glass container manufacturing
327215	Glass product manufacturing made of purchased glass

GLASS AND CERAMICS

NAIC CODE	NAICS DESCRIPTION
327310	Cement manufacturing
327992	Ground or treated minerals and earths manufacturing
327999	Miscellaneous nonmetallic mineral products
332812	Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers
332813	Electroplating, plating, polishing, anodizing, and coloring

MACHINERY MANUFACTURING

NAIC CODE	NAICS DESCRIPTION
333111	Farm machinery and equipment manufacturing
333112	Lawn and garden equipment manufacturing
333120	Construction machinery manufacturing
333131	Mining machinery and equipment manufacturing
333132	Oil and gas field machinery and equipment
333210	Sawmill and woodworking machinery
333220	Plastics and rubber industry machinery
333291	Paper industry machinery manufacturing
333292	Textile machinery manufacturing
333293	Printing machinery and equipment manufacturing
333294	Food product machinery manufacturing
333295	Semiconductor machinery manufacturing
333298	All other industrial machinery manufacturing
333311	Automatic vending machine manufacturing
333312	Commercial laundry and drycleaning machinery
333313	Office machinery manufacturing
333314	Optical instrument and lens manufacturing
333315	Photographic and photocopying equipment manufacturing
333319	Other commercial and service machinery manufacturing
333411	Air purification equipment manufacturing
333412	Industrial and commercial fan and blower manufacturing
333414	Heating equipment, except warm air furnaces
333415	Air Conditioning, refrigeration, and forced air heating
333511	Industrial mold manufacturing
333512	Metal cutting machine tool manufacturing
333513	Metal forming machine tool manufacturing
333514	Special tool, die, jig, and fixture manufacturing
333515	Cutting tool and machine tool accessory manufacturing
333516	Rolling mill machinery and equipment manufacturing
333518	Other metalworking machinery manufacturing
333611	Turbine and turbine generator set units manufacturing
333612	Speed changer, drive, and gear manufacturing
333613	Mechanical power transmission equipment manufacturing
333618	Other engine equipment manufacturing
333911	Pump and pumping equipment manufacturing

MACHINERY MANUFACTURING

NAIC CODE	NAICS DESCRIPTION
333912	Air and gas compressor manufacturing
333913	Measuring and dispensing pump manufacturing
333921	Elevator and moving stairway manufacturing
333922	Conveyor and conveying equipment manufacturing
333923	Overhead cranes, hoists, and monorail systems
333924	Industrial truck, trailer, and stacker manufacturing
333991	Power-driven handtool manufacturing
333992	Welding and soldering equipment manufacturing
333993	Packaging machinery manufacturing
333994	Industrial process furnace and oven manufacturing
333995	Fluid power cylinder and actuator manufacturing
333996	Fluid power pump and motor manufacturing
333997	Scale and balance, except laboratory, manufacturing
333999	Miscellaneous general purpose machinery manufacturing

TRANSPORTATION AND LOGISTICS

NAIC CODE	NAICS DESCRIPTION
481111	Scheduled passenger air transportation
481112	Scheduled freight air transportation
481211	Nonscheduled air passenger chartering
481212	Nonscheduled air freight chartering
481219	Other nonscheduled air transportation
482111	Line-haul railroads
482112	Short line railroads
483111	Deep sea freight transportation
483112	Deep sea passenger transportation
483113	Coastal and Great Lakes freight transportation
483114	Coastal and Great Lakes passenger transportation
483211	Inland water freight transportation
483212	Inland water passenger transportation
484110	General freight trucking, local
484121	General freight trucking, long-distance TL
484122	General freight trucking, long-distance LTL
484210	Used household and office goods moving
484220	Other specialized trucking, local
484230	Other specialized trucking, long-distance
485112	Commuter rail systems
485510	Charter bus industry
485999	All other ground passenger transportation
486110	Pipeline transportation of crude oil
486210	Pipeline transportation of natural gas
486910	Refined petroleum product pipeline transportation
486990	All other pipeline transportation

TRANSPORTATION AND LOGISTICS

NAIC CODE	NAICS DESCRIPTION
488111	Air traffic control
488119	Other airport operations
488190	Other support activities for air transportation
488210	Support activities for rail transportation
488310	Port and harbor operations
488320	Marine cargo handling
488330	Navigational services to shipping
488390	Other support activities for water transportation
488410	Motor vehicle towing
488490	Other support activities for road transportation
488510	Freight transportation arrangement
488991	Packing and crating
488999	All other support activities for transportation
492110	Couriers
492210	Local messengers and local delivery
493110	General warehousing and storage
493120	Refrigerated warehousing and storage
493130	Farm product warehousing and storage
493190	Other warehousing and storage
532411	Commercial air, rail, and water transportation equipment rental and leasing
541614	Process, physical distribution and logistics consulting services
561910	Packaging and labeling services

AUGUST 2014

GRUNDY COUNTY AND LABORSHED REGIONAL CLUSTER ANALYSIS:

Interstate 80/Brisbin Road Interchange Development Opportunities

NORTHERN ILLINOIS UNIVERSITY
Center for Governmental Studies
Outreach, Engagement, and Regional Development

IN PARTNERSHIP WITH

Channahon "Where the Waters Meet" Illinois

The Village of Minooka Established 1869

Grundy County Economic Development

EDA U.S. Economic Development Administration