

Region 1 Emerging Industry Cluster Analysis

Key Findings & Summary

December 2023

PREPARED FOR:

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Deliverable Description

This document serves as an executive summary and overview of our work on the Region 1 Emerging Industry Cluster Analysis. It provides context for the study; outlines the state of the economy, innovation, workforce, and real estate in the region; and lays out high-level key findings for each of the emerging clusters.

EXECUTIVE SUMMARY

The Comprehensive Economic Development Strategy (CEDS) for Northern Illinois calls for the completion of a targeted industry cluster analysis aimed at creating a roadmap towards a more robust and economically resilient Tri-County Region. The CEDS identified four emerging industry clusters for further study: Electric Vehicles, Renewable Energy, Innovative Agriculture, and IT Innovation.

This Emerging Industry Cluster Analysis is a joint effort between the Region 1 Planning Council (R1PC) and its partners to develop strategies and an implementation plan for advancing efforts to expand and attract these emerging industry clusters to the Tri-County Region.

The study is funded through a Research in Illinois to Spur Economy Recovery (RISE) program grant from the Illinois Department of Commerce and Economic Development.

This report consists of the following components:

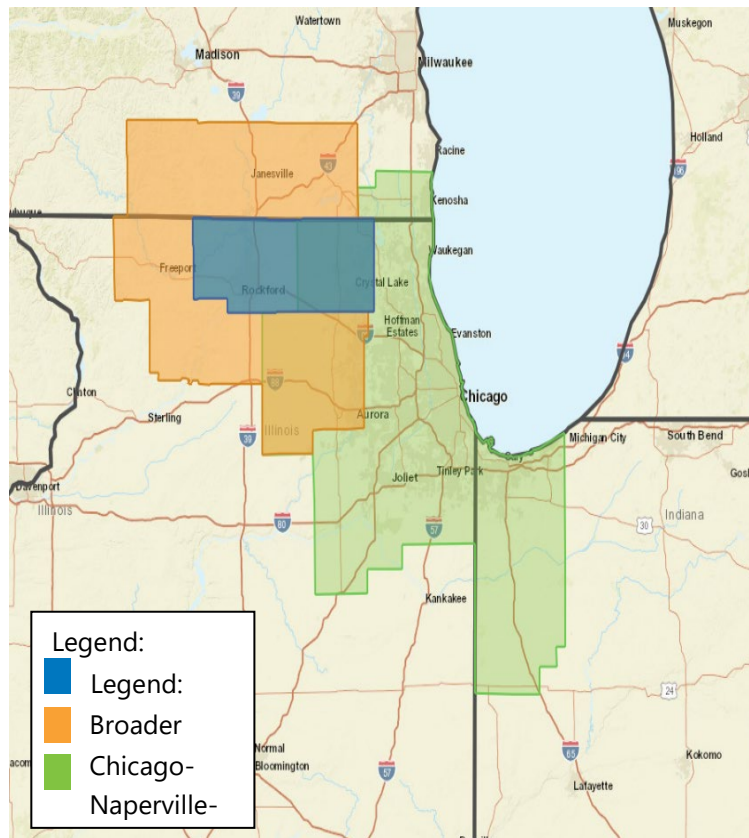
1. **Overview:** Summary of opportunities and trends related to the emerging industry clusters.
2. **Strategy Framework:** Discussion of strategies and actions, followed by an implementation matrix.
3. **Region and Economic Overview:** Tri-County Region demographic trends, economic composition, innovation ecosystem, real estate inventory and infrastructure availability, and a summary of other assets.
4. **Emerging Industry Cluster Profiles:** For each emerging industry cluster, a discussion of emerging trends, opportunities, and challenges; national outlook; regional performance; and workforce analysis.
5. **Aspirational Region Profiles:** Overview of four regions in the Midwest that have shown success in cultivating investment in the emerging industry clusters (one region is profiled for each cluster).
6. **Additional Resources (attachments):** Detailed CEDS summary as related to the emerging industry clusters; information on educational assets, grants and funding sources, labor unions, relevant policies (including Federal agricultural policies); NAICS-based sector definitions; data sources; and an accompanying workbook with an inventory of relevant Tri-County Region businesses.

A review of the Comprehensive Economic Development Strategy (CEDS) for the Northern Illinois Region shows that an overlap exists between the target clusters identified in the Northern Region's CEDS report and the emerging clusters identified in our analysis. The CEDS identified Advanced Manufacturing as a target cluster with subclusters including Automotive and Aerospace and Defense Production. Both subclusters are related to the emerging Electric Vehicle Cluster in terms of input requirements and skill overlap. Production Technology and Heavy Machinery was identified in the CEDS as another target subcluster. This subcluster is related to Renewable Energy and Innovative Agriculture through machinery and equipment technology requirements. Plastic



Products and Chemical Products were also highlighted as target subclusters. Development of these subclusters would support electric vehicle production. Increasing Plastic and Chemical production, however, may be contradictory to environmentally conscious efforts in the Innovative Agriculture and Renewable Energy clusters. The CEDS report recognized Agriculture and Food processing as another target cluster which is in line with the Innovative Agriculture Cluster identified in this analysis. Unlike the CEDS, our analysis does not specifically focus on Transportation or Logistics as emerging clusters. We do, however, account for their importance in the region’s industry trade and supply chain stability and the cross-section with the emerging targeted sectors. Additionally, transportation-related assets were included in the educational program analysis (Attachment B).

Throughout the report, the analysis compares the Tri-County Region to a Broader Region (which includes Tri-County Region), as well as the Chicago-Naperville-Elgin, IL-IN-WI MSA (Chicago MSA). Each of these regions is composed of a group of counties as follows:

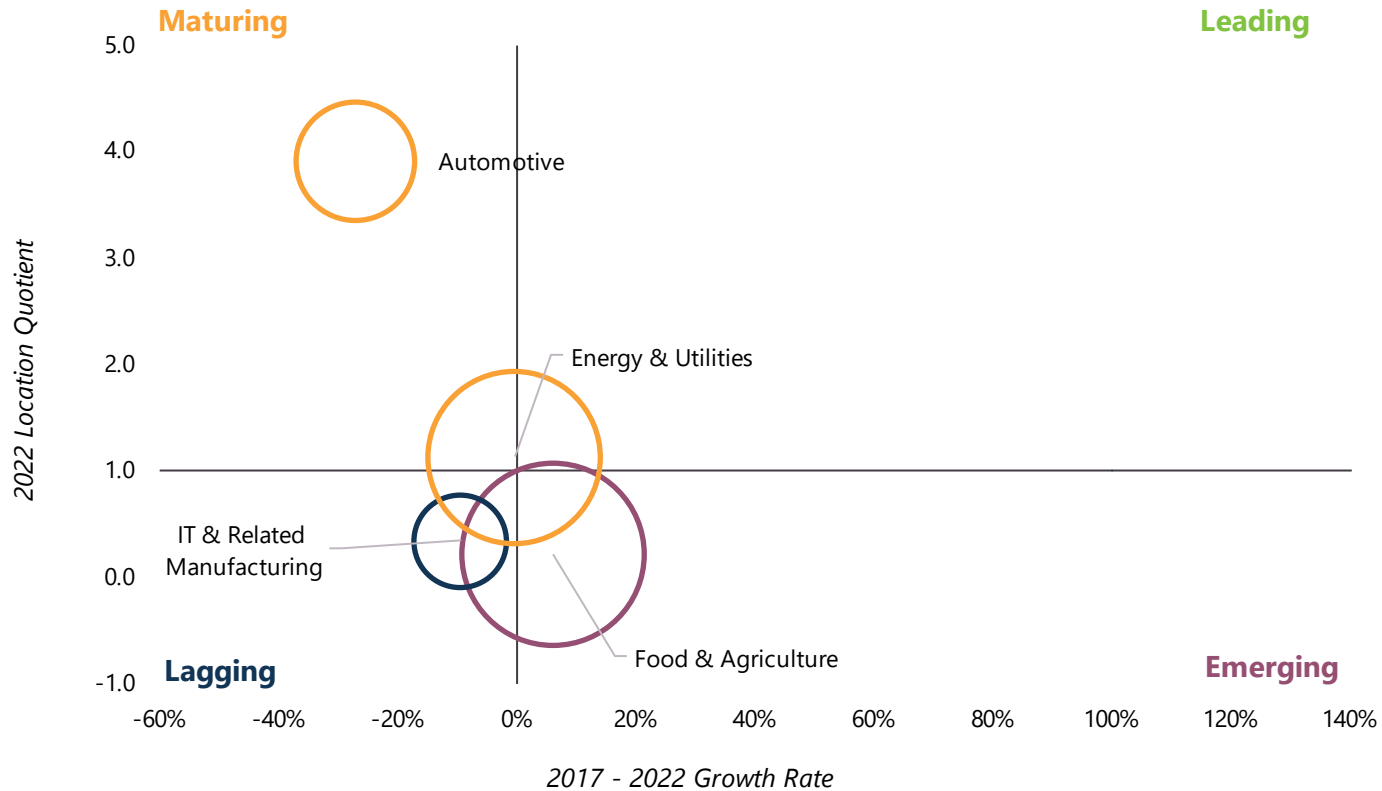


Note: When referring to Region 1 Planning Council as an organization, it is abbreviated as “R1PC”



Key Metrics by Cluster, Tri-County Region

Bubble size indicates 2022 job count



In the Tri-County Region, none of the broad sectors relating to the emerging industry clusters are categorized as “leading,” which is defined as having a high location quotient (concentration) and employment growth. Food & Agriculture is “emerging” in the Tri-County Region, with a low location quotient but positive growth. The Automotive and Energy & Utilities clusters are “maturing” in the Tri-County Region, with a high location quotient but negative or low growth. IT & Related Manufacturing is “lagging” in the Tri-County Region, meaning it has a low employment concentration and has seen declining jobs in the last five years.



Key Industry Indicators

	Automotive	Energy & Utilities	Food & Agriculture	IT & Related Manufacturing	Tri-County Region	US
Total Jobs (2022)	4,432	9,035	10,134	2,670	256,759	168,791,091
% of Tri-County Region's Total Jobs	1.7%	3.5%	3.9%	1.0%	N/A	N/A
LQ	3.9	1.2	0.76	0.34	N/A	N/A
Historic Job Growth 2017-2022	-1,657	-42	567	-284	-8,512	6,108,534
Historic Growth Rate 2017-2022	-27.2%	-0.5%	5.9%	-9.6%	-2.8%	3.8%
Projected Job Growth 2022-2027	-359	138	356	303	8,036	11,903,543
Projected Growth Rate 2022-2027	-8.1%	1.5%	3.5%	11.4%	3.1%	6.6%
Average Earnings	\$93,851	\$108,983	\$65,533	\$98,366	\$64,889	\$80,830
GRP per Job	\$270,194	\$215,340	\$129,211	\$174,336	\$112,502	\$136,035

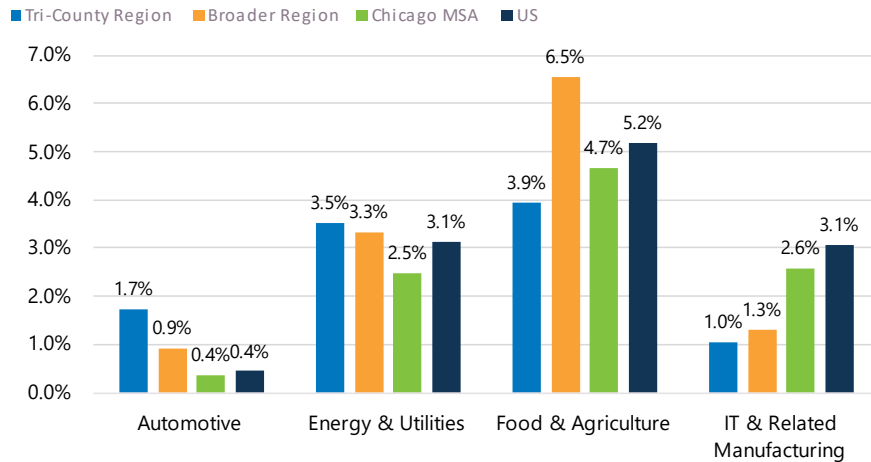
Source: Lightcast

While the Tri-County Region specializes in the Automotive sector with a location quotient of 3.9 and the highest GRP per job (\$270,194), there are more jobs in the Tri-County Region in Food & Agriculture (10,134) and Energy & Utilities (9,035). These two industries each make up almost 4% of the region's total jobs. Of these four key clusters, the only one that did not experience a decline in jobs was Food & Agriculture, which saw a 5.9% growth. By 2027, however, all industries except Automotive are expected to grow. The automotive industry is expected to see an 8.1% decline in jobs. This forecast is driven by the closure of Stellantis and if re-opened and even expanded as recent news suggests with the end of the UAW stricken, increases are more likely than declines.



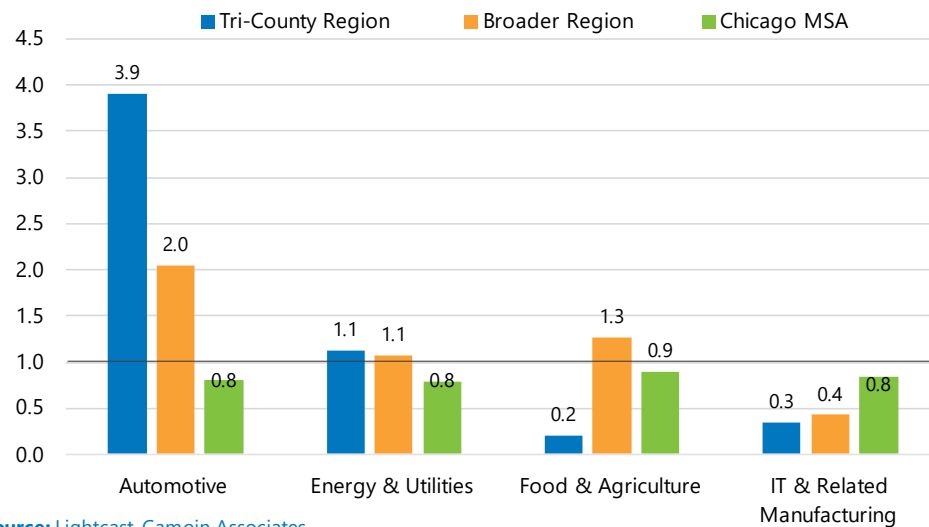
CLUSTER ANALYSIS SUMMARY

Cluster Share of Total Employment, 2022



Source: Lightcast, Camoin Associates

Location Quotients in Emerging Clusters, 2022



Source: Lightcast, Camoin Associates

Broad sectors corresponding to each emerging industry cluster were defined to assess the presence and performance of each sector in the Tri-County Region.

- The **Electric Vehicles** industry cluster falls within the broad **Automotive** sector.
- The **Renewable Energy** industry cluster falls within the broad **Energy & Utilities** sector.
- The **Innovative Agriculture** industry cluster falls within the broad **Food & Agriculture** sector.
- The **IT Innovation** industry cluster falls within the broad **IT & Related Manufacturing** sector.

Of the four broad sectors, Food & Agriculture and Energy & Utilities make up the largest shares of the Tri-County Region's overall economy, accounting for 3.9% and 3.5% of total jobs, respectively.

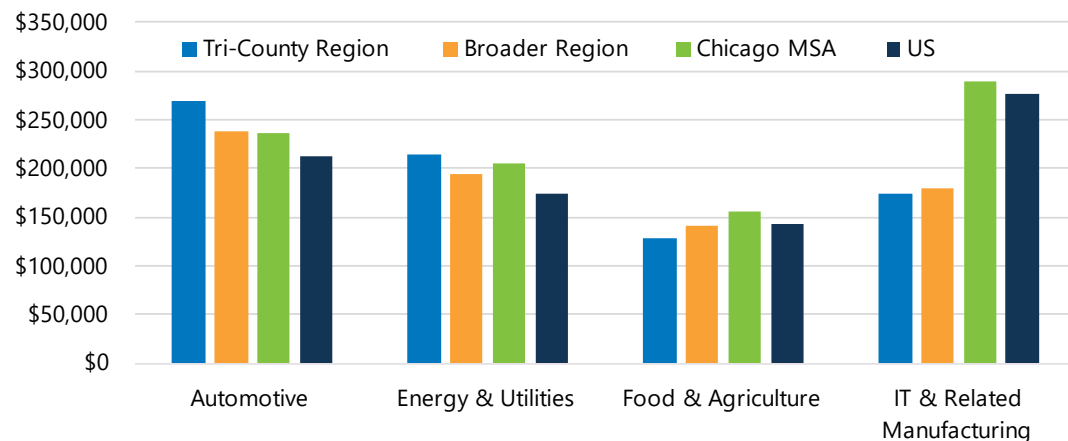
The Tri-County Region has the largest concentration of Automotive employment, at 1.7% of total jobs compared to 0.9% in the Broader Region* and 0.4% of jobs in the Chicago MSA and the US.

**See Emerging Industry Cluster Profiles for definitions of geographic study areas.*

Location quotient (LQ) is a measure of industry concentration within a region. An LQ of 1.0 means that an industry is as concentrated within the region as it is on a national level. An LQ greater than 1.0 indicates that an industry is more concentrated in a region than at the national level.



GRP Per Job in Emerging Clusters, 2022



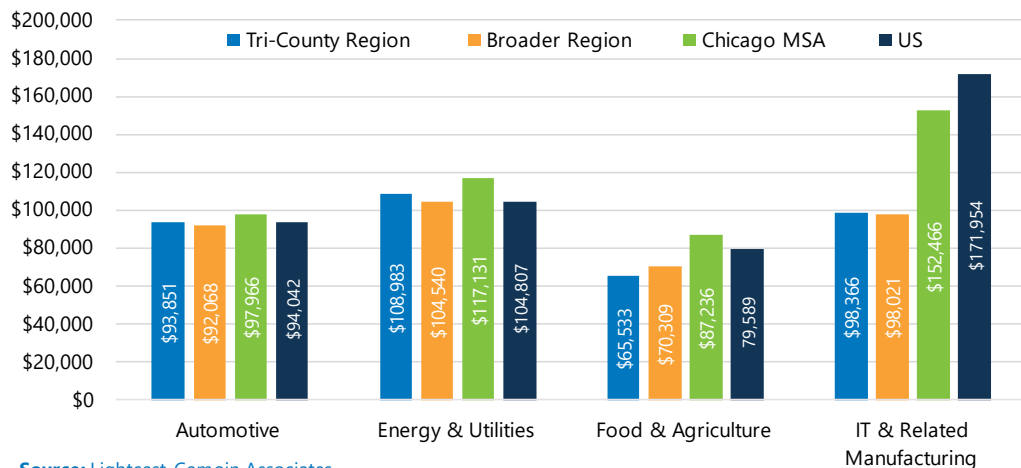
Source: Lightcast, Camoin Associates

The Tri-County Region has a significantly higher concentration of employment in the Automotive sector compared to all other study regions and is almost four times as concentrated as the national average.

Energy & Utilities is the only other sector in the Tri-County Region with a location quotient above 1.0, and its employment approximately equally as concentrated as the US average.

Both Food & Agriculture and IT & Related Manufacturing have location quotients well below 1.0, meaning that employment in these clusters is significantly less concentrated in the region than in the US on average.

Average Earnings Per Job in Emerging Clusters, 2022



Source: Lightcast, Camoin Associates

IT makes up the smallest share of employment, at 1.0% in the Tri-County Region. This is just one-third of the employment concentration of the US.

Energy & Utilities has the highest average earnings per job in the Tri-County Region, at \$108,983 per year in 2022.

In the Tri-County Region, the Automotive sector has the highest productivity, generating \$270,194 of Gross Regional Product per job in 2022. Food & Agriculture has the lowest productivity, with \$129,211 of GRP per job.

The Tri-County Region is more productive than the other study regions in the Automotive and Energy & Utilities sector, and less productive than all other study regions in the Food & Agriculture and IT & Related Manufacturing sectors.



KEY FINDINGS

Overall Economic Context

Highlighted in the 2016 CEDS report, the three counties that make up the Tri-County Region, Boone, McHenry, and Winnebago, are connected by economic overlap, environmental issues, land use concerns, industrial composition, and access to expansive rail, road, and air networks. These connections make collaboration between the three counties mutually beneficial.

Between 2022 and 2027, population growth in the Tri-County Region is projected to outpace growth in the Broader Region and the Chicago MSA. However, population growth in the region and the individual counties lagged US population growth from 2017-2022 and is projected to lag US rates through 2027. The region's median age is older when compared to the US. In 2023, the Tri-County Region's median age was 40.3 years while the median in the broader region was 39.0, Chicago's median was 38.1 and the median age in the US was 29.1. A key indicator of an aging workforce, regions with older populations often struggle to meet labor demand needs and maintain a healthy economy. In line with the older median age, when comparing the study areas, we observe that large shares of the Tri-County Region's population fall into older age cohorts, particularly the 50-74 years old cohort. In contrast, the Tri-County Region also has a comparatively strong share of children between the ages of 5 and 14.

In 2022, the Tri-County Region's three largest industries were Manufacturing (39,425 jobs), Health Care and Social Assistance (36,340 jobs), and Retail Trade (29,605 jobs). Together, these three industries account for 39% of the Tri-County Region's jobs. Manufacturing and Retail are classified as maturing industries, with strong employment concentration but a five-year decline in the number of related jobs. Between 2017 and 2022, none of the major sectors were identified as emerging (low concentration but job growth) in the Tri-County Region.¹ The region has five Leading industries, which are defined by high employment concentration and strong job growth.

Leading Industries

1. Arts, Entertainment, and Recreation
2. Health Care & Social Assistance
3. Wholesale Trade
4. Construction

¹ The major sectors are Agriculture, Forestry, Fishing and Hunting; Mining, Quarrying, and Oil and Gas Extraction; Utilities; Construction; Manufacturing; Wholesale Trade; Retail Trade; Transportation and Warehousing; Information; Finance and Insurance; Real Estate and Rental and Leasing; Professional, Scientific, and Technical Services; Management of Companies and Enterprises; Administrative and Support and Waste Management and Remediation Services; Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; Accommodation and Food Services; Other Services (except Public Administration); and Public Administration.



5. Transportation & Warehousing

While the Tri-County Region and all the comparison geographies are projected to experience job growth between 2022-2027, the Tri-County Region is projected to have the slowest growth rate. Job growth in the Broader Region and the Chicago MSA is projected to lag the US's growth rate.

Innovation

A comprehensive workforce-training pipeline, continued investments in research and development and high levels of patent activity indicate that a specific region is likely a hub for innovation and growth.

The Tri-County Region produced 559 patents between 2016 and 2020. The majority of this patent activity was directly related to as well as potentially related to the emerging clusters. For example, the Tri-County Region produced patents for Electrical Machinery Apparatuses; Transport; Food Chemistry; Environmental Technology; IT Methods for Management; Handling; and Machine Tools. 238 of the patents produced in the Tri-County Region, however, were not related to the emerging clusters. This accounts for 45% of the Broader Region's total patents and indicates that the Tri-County Region's strengths in patents may fall outside of the emerging clusters.

Both the Tri-County Region and the Broader Region scored high on the Patent Technology Diffusion Index and the University-Based Knowledge Spillover Index. These high scores can be attributed to the presence of educational institutions with substantial research expenditures in science and engineering. As the state's land-grant institution, The University of Illinois at Urbana-Champaign plays a pivotal role in driving innovation in agriculture technologies, which complements R1PC's focus on the emerging Innovative Agriculture cluster. Northern Illinois University (NIU) has secured several awards and grants from the National Science Foundation (NSF). Specifically, NIU has been awarded over \$3 million for projects that focus on Renewable Energy, IT, and Electric Vehicles. These projects may directly support and contribute to the emerging clusters in the Tri-County Region.

Although both regions fall slightly below the national baseline in terms of Venture Capital and STEM Degree Creation, the investment attractiveness of the Tri-County Region, indicated by the FDI Attractiveness Index, is currently outpacing the Broader Region. Several SBIR/STTR awards in the Tri-County Region are closely aligned with the area's key industries, particularly the aerospace, defense, and energy sectors which are relevant to the emerging clusters identified in this report.

Educational attainment in the Tri-County Region is similar to the Broader Region but lower than the Chicago MSA. Overall, 39% of the Tri-County Region's adult population has a college degree (Associate's, Bachelor's, or Graduate Degree), compared to 40% in the Broader Region and 47% in the Chicago MSA. The Tri-County Region currently offers approximately 91 workforce training programs related to the emerging clusters. Among the Tri-County Region's educational institutions, McHenry County College, and Rock Valley College offer 70 of the identified training programs.

Workforce

The workforce in the Tri-County Region is a complex interplay of economic conditions, pandemic impacts, and future projections. Here, we delve into the key aspects that define the region's labor force. The Tri-County Region has shown a slightly higher unemployment rate compared to the Broader Region



and the Chicago Metropolitan Statistical Area (MSA). During the pandemic, the region's unemployment rate reached an average of 9.8% in 2020, on par with the Chicago MSA's 9.7%. However, the Tri-County Region's path to recovery has been more gradual compared to its neighboring regions.

From 2017 to 2022, all three comparison regions experienced a decline in the total number of jobs. The Tri-County Region saw the steepest drop at -3.2%, whereas the Broader Region and the Chicago MSA experienced milder decreases at -1.6% and -1.2%, respectively. Looking ahead, through 2027, the Tri-County Region is projected to experience job growth of 3.1%, outpacing the Chicago MSA but slightly lagging behind the Broader Region's growth rate of 4.3%.

Historically, the Tri-County Region's labor force participation rate was in alignment with the Broader Region and even slightly higher than the Chicago MSA. However, the COVID-19 pandemic took a toll on labor force participation, particularly in the Tri-County Region and the MSA. While it has rebounded in the Chicago MSA, the Tri-County Region has seen further declines, with a rate of 62.8% in May 2023, compared to 64.5% in the Broader Region and 64.4% in the Chicago MSA.

Within the context of the four emerging clusters in the Tri-County Region, specific occupations play a crucial role in staffing support. Miscellaneous Assemblers and Fabricators, for instance, make up 10.5% of all employment within these clusters, with 41.4% of them working in the emerging clusters. Other key occupations like Farmers/Ranchers, Plumbers, Electricians, and HVAC Mechanics see a substantial proportion (ranging from over 70% to nearly 100%) of their workers employed in one of the emerging cluster industries.

Over the next five years, Software Developers are projected to experience the most growth, adding 90 net jobs, which equates to a 21% increase. Notably, the fastest-growing occupations within the emerging clusters span a wide earnings spectrum, encompassing lower-wage occupations like Bakers and Laborers and Freight/Stock/Material Movers to high-earning roles such as Electrical Power-Line Installers.

Laborers and Freight, Stock, and Material Movers are expected to be in high demand over the next five years, with an average annual gap exceeding 1,300 workers. While this occupation constitutes a relatively large share of the cluster's workforce, it represents a small portion of the occupation's workforce demand across the broader economy. Many of the occupations with the largest projected workforce gaps do not necessitate formal education beyond

Real Estate

Most facility needs related to the four emerging industry clusters will require office, flex, or industrial space. Real estate available in the Tri-County Region is mainly small office space, with 58% of spaces measuring less than 5,000 SF. There are 67 industrial spaces available and only 15 flex spaces available, ranging from under 5,000 SF up to 100,000 SF. Smaller spaces are easier to come by in the Tri-County Region, with about 61% of spaces under 50,000 SF. There are 3 properties over 1 million SF in the region. The Tri-County Region has 169 available sites currently being marketed, with 57% under 5 acres and another 34% between 5 and 50 acres. There are 14 sites over 100 acres, the largest of which is 636 acres.



Office space in the Tri-County Region leases for an average of about \$19 per square foot, nearly 40% lower than rates in the Tri-County Region and the 33% lower than the national average. Industrial space in the Tri-County Region goes for about \$6 per square foot, more than 25% lower than the Chicago MSA average and 45% lower than the national average.



TARGETED INDUSTRY FINDINGS

Electric Vehicles

The automotive industry is undergoing a significant transformation with the rapid rise of electric vehicles (EVs) and related markets. This transformation presents a multitude of opportunities for regional economic development in the Tri-County Region. The Tri-County Region, with its specialization in the automotive sector, is well-positioned to benefit from this industry shift. What follows are the key components of the EV value chain, market complexities, driving factors, emerging opportunities, challenges, and current conditions of the EV space in the region.

Key Components of the Electric Vehicle Industry Value Chain:

- **Research and Development (R&D):** Research and development play a crucial role in making EVs better, cheaper, and safer. Innovations in materials, energy, and information technology are vital for the industry's advancement.
- **Production and Assembly:** This phase encompasses the manufacturing of EVs and their component parts, including batteries, electrical systems, and vehicle frames. The Tri-County Region has the potential to become a hub for EV manufacturing and assembly.
- **Charging and Storage:** The EV industry relies on charging stations, battery production, and recycling. Establishing a robust charging infrastructure is vital for widespread EV adoption.
- **Logistics:** Efficient logistics are required to source materials and transport finished EVs to the market. The Tri-County Region's strategic location can serve as a logistics hub for the EV industry.
- **Servicing and Maintenance:** Post-sale services, such as maintenance and repairs, are essential to ensure customer satisfaction and the long-term viability of EVs.

Market Complexities to Understand:

- **Electrification of Transportation:** The shift towards electric vehicles is not limited to cars; it extends to buses, trucks, marine vehicles, farm equipment, aircraft, and recreational vehicles. Each of these segments has unique market dynamics.
- **Transition and Hybrid Options:** The adoption of EVs occurs alongside hybrid options, which still rely on traditional fuels. Understanding the coexistence of these technologies is crucial.
- **Charging Methods and Infrastructure:** The development of charging methods and infrastructure is a vital component of the EV ecosystem. R1PC can play a significant role in establishing charging networks.
- **Digital Technology:** EVs are embedded with digital technology, including hardware, microchips, and software. This technology offers opportunities for software development, cybersecurity, and more.



Driving Factors for Market Trends:

- **Technological Advancement:** Progress in energy, materials, information technology, and more are catalysts for innovation and growth in the EV industry.
- **Changing Consumer and Industry Demand:** Increasing acceptance of electrified vehicles, driven by environmental consciousness and the comfort of EVs, is spurring demand.
- **State and Federal Policy Support:** Environmental goals, incentives for consumers and producers, and U.S. production sourcing policies are shaping the industry's landscape.

Emerging Opportunities for Economic Development in the Tri-County Region:

- **Technology:** Software development for operations, battery management systems, autonomous driving features, and cybersecurity are potential areas for investment and job creation.
- **Chemical Opportunities:** Chemical companies can provide valuable materials solutions for EV components, reducing costs and improving reliability.
- **Battery Manufacturing:** With the increasing adoption of EVs, battery production is a critical sector with opportunities for growth and investment.
- **Battery Recycling:** As EVs become more prevalent, the demand for battery recycling processes and facilities will increase.
- **Charging Infrastructure:** The need for charging stations creates opportunities for companies involved in installation and maintenance.
- **Renewable Energy:** The transition to EVs boosts the demand for renewable energy sources, such as solar and wind power.

Challenges in Growing the EV Industry:

- **Market Unpredictability:** The pace of adoption, technology costs, and timing of industry demand for sites and infrastructure are uncertain, creating investment risks.
- **Community Support:** Gaining support and incentives from local communities is essential for successful development.
- **Workforce Availability:** The need for skilled workers poses a challenge, and competition for talent is fierce.
- **Competition:** Competition, both globally and domestically, for new investments and development can be intense.
- **Utility Constraints:** EV-related projects require significant electricity, leading to utility challenges.
- **Supply Chains:** Global and regional supply chains are susceptible to disruptions due to various factors, including climate change and geopolitical conflicts.

Current Economic Conditions in the Tri-County Region EV Space

In 2022, the Tri-County Region emerged as a distinctive hub for the automotive sector. With a Location Quotient (LQ) of 3.9, it displayed a specialization in the automotive industry that significantly surpassed both the broader region (LQ of 2.0) and the Chicago Metropolitan Statistical Area (MSA) (LQ of 0.8).



This specialization was further underlined by the Tri-County Region's impressive concentration in Auto and Auto Parts Manufacturing, boasting an LQ of 4.4 compared to the national average. However, the region lagged behind the rest of the nation in Electric Motor and Battery Manufacturing specialization.

The Tri-County Region specializes in the automotive sector, with 70% of all automotive employment in the Broader Region located there. However, the region faced a 27% decline in automotive employment due to the closure of the Stellantis plant. Recent developments indicate the reopening of the Belvidere plant, improving growth projections.

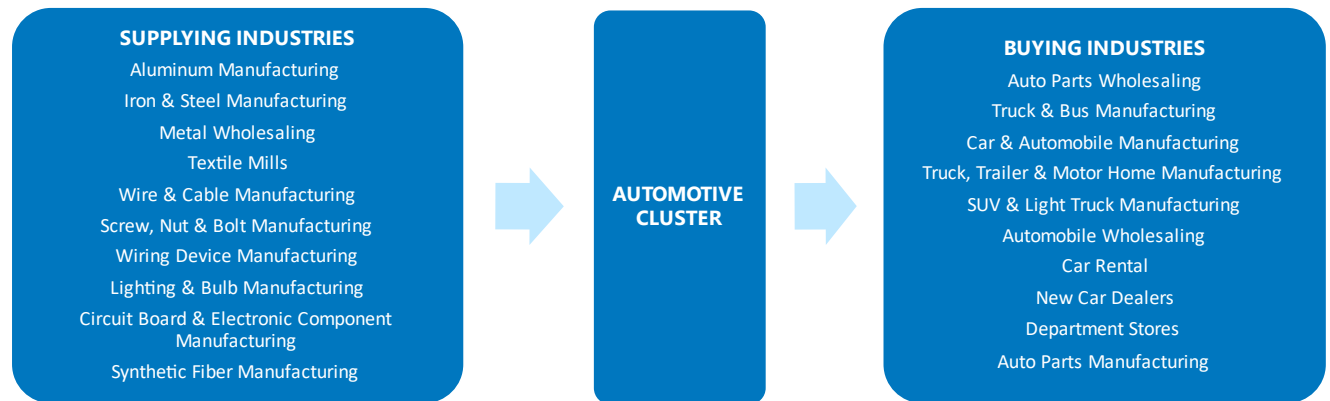
In terms of earnings, the Tri-County Region excelled with average earnings per job in both Electric Motor & Battery Manufacturing and Auto & Auto Parts Manufacturing subclusters surpassing \$35,000 above the living wage in the Tri-County Region and similar regions. This indicates a thriving workforce within the automotive industry in the region.

Despite the Tri-County Region's high concentration in Auto and Auto Parts Manufacturing, there has been a slowing growth trend in this subcluster, signaling that it may be reaching a mature phase. Conversely, Electric Motor and Battery Manufacturing showed a low LQ and a negative growth rate, indicating a challenging environment for this subcluster in the Tri-County Region.

Looking at the broader region, Electric Motor and Battery Manufacturing is closer to emerging, boasting a LQ close to one, but still grappling with a negative growth rate. While Auto and Auto Parts Manufacturing remains concentrated, it witnessed a decline in growth between 2017 and 2022.

When it comes to international trade, the Tri-County Region largely depends on imports to meet the demand for Electric Motor and Battery Manufacturing (98%). However, it compensates by exporting 85% of the goods from this subcluster. In contrast, 59% of the demand for Auto and Auto Parts Manufacturing in the Tri-County Region is met by imports, but the region excels in exporting these goods, with 87% being shipped to external markets.

The Tri-County Region's Automotive Cluster currently provides employment for 4,432 jobs, spread across 135 different occupations. Notably, Production Occupations dominate the workforce, accounting for over 75% of employment in the Automotive Cluster. Other occupation groups include Architecture & Engineering Occupations (6.0%) and Management Occupations (4.9%). Interestingly, the top three occupations in this cluster are predominantly employed in other sectors, with Miscellaneous Assemblers and Fabricators making up 52% of total employment.



However, it is not all positive news for these occupations. Miscellaneous Assemblers and Fabricators are projected to lose 210 jobs between 2022 and 2027, while Inspectors, Testers, Sorters, Samplers, and Weighers are expected to lose 12 jobs.

The Tri-County Region’s workforce demographics show an almost even split between males and females. However, males overwhelmingly dominate the top 30 Automotive occupations, making up 77% of the workforce. In specific occupations like Electricians and Tool and Die Makers, female representation is notably low, at 3% and 2%, respectively.

Looking ahead, Laborers and Freight, Stock, and Material Movers are anticipated to be in high demand over the next five years, with an average annual gap of over

1,300 workers. Interestingly, the O*Net Job Zones system indicates that most of the jobs in the Automotive Cluster have relatively low barriers to entry, with 81% of the jobs falling into Job Zone level 2, meaning that they need some preparation. This includes the occupations with the largest gaps, such as Laborers and Freight, Stock, and Material Movers and Miscellaneous Assemblers and Fabricators.

Notably, all foreign investment in the Automotive sector took place outside the region, although Mercedes-Benz invested \$22.3 million in renovating a Parts Distribution Center in DuPage County within the broader region.

In terms of revenue, the total revenue for the automotive cluster in 2022 amounted to approximately \$557 billion. There was a significant drop in revenue in 2020, with more than half of this drop attributed to the decline in Automobile & Light Duty Vehicle Manufacturing. Despite the revenue not fully recovering since then, projections indicate gradual growth through 2027, although it may not regain its previous peak over the next five years.

The Tri-County Region has established itself as a specialized hub for the automotive industry, particularly in Auto and Auto Parts Manufacturing. However, the region faces challenges in the Electric Motor and Battery Manufacturing sector. The workforce is concentrated in production occupations, but certain

In-Demand Skills for Critical Occupations, Automotives Cluster, Tri-County Region (2022)

SOC	Description	Estimated Annual Workforce Surplus /	Job Zone	In-Demand Skills		
				Necessary (1)	Defining (2)	Distinguishing (3)
51-4041	Machinists	(325)	Three: Medium Preparation Needed	Machinery	Machining	Speeds and Feeds
				Blueprint Reading	Lathes	Tapping
				Grinding Machine	Tooling	Fanuc Controllers
				Drilling	CNC	Indicators (Measuring Device)
				Machine Operation	Mills	Mastercam (CAD/CAM Software)
47-2111	Electricians	(40)	Three: Medium Preparation Needed	Machinery	Electrical Wiring	Motor Controllers
				Electric Components	Electrical Systems	Voltmeter
				Test Equipment	Blueprinting	Relays
				Wiring Diagram	Hand Tools	Electrical Theory
				Programmable Logic Control	Transformers (Electrical)	Lighting Systems
11-3051	Industrial Production Managers	(38)	Four: Considerable Preparation Needed	Continuous Improvement Proc	Auditing	Supplier Quality Management
				Good Manufacturing Processes	Quality Management	
				Lean Manufacturing	Production Management	
				Product Quality	ISO 9000 Series	
				Project Management	Corrective and Preventive Action	
17-2112	Industrial and Mechanical Engineers	(818)	Four: Considerable Preparation Needed	New Product Development	Manufacturing Processes	Process Failure Mode and Effects Analysis
				Process Improvement	Lean Manufacturing	Production Part Approval Process
				Auditing	Continuous Improvement Process	Supplier Quality Management
				Tooling	Quality Management	Eight Disciplines Problem Solving
				Root Cause Analysis	Six Sigma Methodology	Aerospace Basic Quality Systems Standards

Source: Lightcast, O*Net

Note: Bolded skills indicate that they are correlated with an increase in pay.

(1) The specialized skills required for that job and relevant across other similar jobs. An employee needs these skills as building blocks to perform the more complex Defining Skills.

(2) The day-to-day tasks and responsibilities of the job. An employee needs these skills to qualify for and perform successfully in this occupation.

(3) The advanced skills that are called for occasionally. An employee with these skills is likely more specialized and able to differentiate themselves from others in the same role.



jobs within the industry are projected to decline. The region is also poised to experience growth in the coming years, with positive indicators for revenue and exports.

Renewable Energy

A 2022 report from the International Energy Agency predicts that renewables will soon surpass coal as the primary source of global electricity, accounting for over 90% of global electricity expansion by early 2025². Over the past five years, the renewable energy sector in the United States has experienced steady expansion. Deloitte's 2023 Renewable Energy Industry Outlook anticipates accelerated growth in 2023, fueled by surging demand and an array of incentives presented by the Inflation Reduction Act (IRA)³. The renewable energy sector in the Tri-County Region demonstrates remarkable growth and promising opportunities and is set to play a pivotal role in both local and national economic development. What follows are the driving forces for growth in the Renewable Energy sector in the Tri-County Region, local support policies, opportunities, challenges, and an overview of the current economic conditions of the Renewable Energy space in the Tri-County Region.

Driving Forces for Growth:

- **Falling Costs:** Advances in technology and economies of scale have significantly reduced the costs of wind and solar energy, making them increasingly competitive with traditional fossil fuels.
- **Increasing Consumer Demand:** Environmental consciousness, social responsibility, and potential cost savings have spurred greater consumer demand. This includes a rising interest in community solar projects and sustained interest in personal solar installations.
- **Supportive Policies:** Federal, state, and local governments have been instrumental in advancing renewable energy through incentives and mandates.
- **Private Investment:** Private investment exceeded \$10 billion in 2022 and is expected to continue growing, driven by incentives provided by the IRA.
- **Utility Decarbonization:** Major US investor-owned utilities have committed to reducing carbon emissions, with a substantial focus on increasing renewable energy sources.
- **Corporate Renewable Procurement:** Over 400 global businesses have pledged to transition to 100% clean electricity by 2040 as part of the RE100 initiative.

Robust Policy Support in Illinois:

- The "Sitting Bill," which prevents local regulations from exceeding state standards.
- "Illinois Shine," an incentive program supporting solar energy development.

² <https://www.iea.org/news/renewable-power-s-growth-is-being-turbocharged-as-countries-seek-to-strengthen-energy-security>

³ <https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/renewable-energy-outlook>.



- The "Illinois Clean Jobs Workforce Network Program," which fosters the training and development of renewable energy workers.

Federal support reached new heights with the signing of the IRA in 2022. This comprehensive act aims to bolster the renewable energy sector through measures such as:

- **Increased Deployment:** The IRA extends and broadens tax credits for clean electricity technologies, including the investment tax credit (ITC) and production tax credit (PTC), reducing the costs of developing and maintaining renewable energy projects. It also introduces new tax credits for energy storage, green hydrogen, and carbon capture and sequestration.
- **Enhanced Grid Integration:** The IRA allocates funds for modernizing the electric grid, supporting the expansion of transmission lines, microgrids, smart meters, and demand response programs to enhance grid reliability and resilience.
- **Boosted Domestic Manufacturing:** The IRA provides incentives for domestic manufacturing of clean energy components and materials, including solar panels, wind turbines, batteries, and critical minerals. It also supports research and development, innovation, and workforce training in the clean energy sector.

Emerging Opportunities for Economic Development:

- **Clean Tech Accelerators:** Forming a vital part of cleantech innovation ecosystems, they nurture early-stage startups, facilitating the market entry of their solutions through mentorship, resources, and networking opportunities.
- **Chain Reaction Innovations:** Based in Chicago at Argonne National Laboratory, this program supports entrepreneurs developing technologies to address energy and sustainability challenges.
- **Advanced Photovoltaics (PV):** Advancements in high-efficiency solar cells and modules, such as perovskite solar cells, tandem solar cells, and bifacial solar modules, are propelling the sector's growth.
- **AI and Big Data:** Leveraging artificial intelligence and big data analytics to optimize renewable energy system operation and management, thereby enhancing grid stability and fault detection.
- **Green Hydrogen:** Production of hydrogen from renewable sources, such as water electrolysis powered by wind or solar energy, offers a clean fuel alternative for various industries and power generation.
- **Advanced Robotics:** Automation is transforming the installation, inspection, and maintenance of renewable energy assets, reducing labor costs, enhancing safety, and boosting productivity.

Challenges Facing Renewable Energy:

- **Supply Chain Disruption:** Global and regional supply chains for critical inputs are evolving due to factors like climate change, pandemics, and geopolitical conflicts. This disruption has implications for the renewable energy sector, influencing transportation and assembly costs.
- **Trade Policy Uncertainty:** Unstable trade policies can deter investors and hinder renewable energy projects. Uncertainty surrounding tariffs, subsidies, and other trade-related measures may have a dampening effect.



- Inflation and Increasing Interest Rates: Rising costs for consumers and producers may affect the viability of renewable energy projects and developments.
- Interconnection Delays: Rapid growth in renewable energy projects may strain existing grid infrastructure, necessitating updates or enhancements to accommodate additional capacity.

Current Economic Conditions in the Tri-County Region Renewable Energy Space

The broader region witnessed over \$55.3 million in venture capital investment related to renewable energy from 2017 to 2023, constituting 10% of all VC investments in Illinois during this period. Foreign investment in renewable energy in Illinois has totaled nearly \$2.7 billion between 2017 and 2023 YTD. Notably, wind electric power comprises a significant share of these investments. Portuguese and Italian companies have been the most prominent investors in Illinois' renewable energy cluster. In the Tri-County Region, a substantial \$143.5 million capital investment from the French company Air Liquide within the Biomass subsector in Rockford generated 53 jobs.

The Tri-County Region boasts concentrated employment in the Energy & Utilities cluster, standing at 1.12 times the national average. Within this cluster, Equipment and Manufacturing for Renewables enjoys the highest concentration relative to the US. The Tri-County Region's employment is 1.12 times as concentrated in the Energy & Utilities cluster as the national average.

Within Energy & Utilities, Equipment Manufacturing for Renewable Products is the most concentrated relative to the US, with a location quotient 2.48 times higher than the national average. In contrast, Professional & Technical Services lag behind, with a location quotient of only 46% as concentrated. Subclusters with high location quotients and employment growth in the Tri-County Region include HVAC Wholesalers and Contractor-Related jobs, while Utilities and Equipment Manufacturing for Renewable Products are maturing. Professional and Technical Services in the Tri-County Region exhibit a low location quotient and declining jobs, signifying a need for growth in this area.

In 2022, the Energy & Utilities cluster in the Tri-County Region comprised 9,035 jobs spanning 797 occupations. A significant portion of the workforce (24.8%) falls within Construction and Extraction occupations. Other prominent occupational groups include Installation, Maintenance, and Repair (14.1%) and Production (14.0%). The top 30 occupations account for about 62% of the cluster's jobs in the Tri-County Region. Many of the occupations within this cluster are unique to the industry, making it a competitive environment for talent. Plumbers, Pipefitters, and Steamfitters, along with Heating, Air Conditioning, and Refrigeration Mechanics and Installers, are anticipated to experience the most significant growth between 2022 and 2027, with 38 new jobs expected for each occupation. These projections align with growth expectations in the broader region, Chicago MSA, and the US.

While the Tri-County Region maintains a relatively even split between male and female workers, males dominate the top Energy & Utilities occupations, with most of the top 30 occupations being male-dominated. Heating, Air Conditioning, and Refrigeration Mechanics and Installers have the highest share of male workers (99%).

Laborers and Freight, Stock, and Material Movers (Hand) and Miscellaneous Assemblers and Fabricators are expected to face high demand in the next five years, with average annual gaps of over 1,300 and 775 workers, respectively. These jobs generally are considered within job zone 3, meaning that they require medium preparation.



In summary, the renewable energy sector in the Tri-County Region is experiencing robust growth and economic potential driven by global and local factors. It is creating a dynamic environment with diverse opportunities for investment, business development, and job creation, while contributing to the broader transition to clean energy sources and the realization of a sustainable future.

Innovative Agriculture

The agriculture sector in the Tri-County Region is undergoing a transformative shift, harnessing innovation and technology to meet the evolving challenges of our time. The integration of technology and novel approaches in agriculture is driven by an array of objectives, which are aligned with boosting productivity, enhancing sustainability, and adapting to changing market dynamics. What follows is a review of the Innovative Agriculture space in the Tri-County Region, including driving forces, a description of the existing categories, challenges, investments, and economic conditions.

Forcing Driving Innovative Agriculture:

- **Increasing Productivity:** A primary goal is to enhance productivity, measured in terms of yield relative to costs, fixed assets, land, and capital, and to reduce labor costs.
- **Supply Chain Efficiency:** Innovations aim to streamline supply chain operations, cut costs, and increase resilience to various disruptions.
- **Enhancing Safety:** Advancements in agriculture technology enhance safety for workers and consumers alike.
- **Market Responsiveness:** Agriculture must be agile to respond to changing market demands, including safety and evolving consumer preferences.
- **Market Expansion:** Innovations are expanding agricultural markets, reaching new consumers and clients.
- **Environmental Considerations:** Sustainability is a top priority, with a focus on decreasing water, fertilizer, and pesticide usage, improving energy efficiency, and incorporating renewable energy sources.
- **Ecosystem Preservation:** The industry seeks to reduce its impact on natural ecosystems and minimize chemical runoff into rivers and groundwater.
- **Worker Safety:** Technology and innovation are improving working conditions and worker safety in agriculture.

Categories of Innovation and Technology:

- **Precision Agriculture:** This involves the use of digital and GPS technologies embedded within machinery and equipment to precisely plant, cultivate, and harvest crops.
- **Robotics, Automation, and Drones:** From autonomous vehicles and equipment to drones, these technologies are automating tasks and complementing human labor.
- **Sensors:** Ground, aerial, and machine-based sensors are employed for tracking plant and soil metrics, monitoring animals, weather forecasting, and more.
- **Indoor and Vertical Farming:** These practices provide controlled environments for enhanced production scalability and improved product quality.



- Energy, Environment, and Climate Resilience: Integration of renewable energy sources, electrification, energy storage, water conservation, and energy efficiency is a focal point.
- Biomaterials and Bio-pharmaceuticals: The extraction and processing of agricultural products for non-food purposes, including medicines, fuels, bio-plastics, and packaging materials.
- Data, Analytics, and AI: Utilization of data-driven insights and artificial intelligence for farm management, supply chain optimization, and market analytics.
- Agriculture Biotech: Advancements in genetics, microbiome research, breeding, animal health, and pest and disease resistance and treatment.

Challenges Facing Innovative Agriculture in the Tri-County Region:

- Technology Adoption: Encouraging existing farms and farmers to adopt new methods and technologies while ensuring profitable operations with current practices and equipment.
- Workforce: Acquiring and retaining a skilled workforce in low-density areas where out-migration is a concern.
- Land Market Competition: Balancing the growing demand for non-agricultural land development.
- Rural Infrastructure: Addressing the need for improved broadband connectivity to support technological advancements in rural areas.

Local Investment:

- According to Ag Funder's 2022 Annual Report, investors have backed 50 rounds of funding for Illinois-based startups in food and agriculture⁴.
- S2G Ventures, actively investing in Innovative Agriculture in Illinois, plays a vital role in this landscape⁵.
- Foreign entities have significantly invested in the broader region's food and agriculture sector since 2017, totaling over \$168 million.
- Kane, DeKalb, and Stephenson counties account for nearly 10% of Illinois' foreign investment in the sector.
- Italian and German companies have made the most substantial investments in Illinois' Agribusiness and Food cluster since 2017.

Current Economic Conditions in the Tri-County Region Innovative Agriculture Space

The Food and Agriculture cluster in the Tri-County Region has experienced substantial growth, with revenues rising significantly over the past five years. While the compound annual growth rate for key indicators was higher from 2017-2022 than projected for 2022-2027, some challenges remain. The Tri-County Region shows negative competitive effects, indicating that although jobs in the cluster are increasing, job growth underperforms expectations based on national economy and industry trends.

⁴ <https://agfunder.com/>

⁵ www.s2gventures.com/



The industries most productive in the Tri-County Region include Food and Agricultural Product Wholesaling, Fertilizer, Chemical, and Equipment Manufacturing, and Food and Beverage Products and Processing. These sectors generate over \$150,000 of GRP per job, with Food and Beverage Products and Processing contributing the most to the Tri-County Region's GRP.

Region 1 demonstrates the highest concentration in Fertilizer, Agricultural Chemical, and Equipment Manufacturing, while Professional & Scientific Services for Innovative Agriculture are less concentrated.

In 2022, the Food and Agriculture Cluster in the Tri-County Region comprised 10,134 jobs across 269 occupations. Transportation and Material Moving Occupations make up a substantial portion of the workforce, followed by Production Occupations and Management Occupations. Occupational growth in the coming years is expected in areas such as Laborers and Freight, Stock, and Material Movers (Hand), Industrial Truck and Tractor Operators, and Stockers and Order Fillers. The occupations within the Food & Agriculture Cluster have relatively low barriers to entry, with 68% of jobs falling within Job Zone levels 1 or 2, meaning that only a small amount of preparation, if any, is needed.

In conclusion, innovative agriculture in the Tri-County Region, represents an opportunity for economic growth and sustainability. With the integration of technology and forward-thinking practices, the region is poised to address current and future agricultural challenges while contributing to the global movement for sustainable and productive food production.

IT Innovation

The Tri-County Region stands at the forefront of IT innovation and technology, driving economic growth and technological advancements in multiple sectors. The IT sector in this region encompasses various technological domains, and its trajectory offers profound insights into the evolution of the digital landscape. What follows is a comprehensive overview of IT Innovation in the Tri-County Region including investment, job creation, innovation, imports and exports, top products and growth trends, and an overview of the workforce.

Investment, Job Creation, and Innovation

Venture capital investment in IT-related activities in Illinois over the past five years has been instrumental in fostering innovation across various technologies and sectors. These include AI and analytics in life sciences, digital technologies for healthcare, AI and digital technologies for logistics, and software and applications for finance, management, and marketing. Illinois has attracted substantial foreign investment in the IT sector since 2017, totaling over \$1.9 billion. Japanese and German companies have been the leading contributors to this influx of foreign investment, leading to the creation of an estimated 6,221 jobs in the state. Notably, approximately 44% of these jobs are in the Custom Computer Programming Services subsector.

Imports and Exports

The IT cluster in the Tri-County Region engages in substantial imports, significantly outweighing exports. In 2022, imports exceeded exports by approximately \$375 billion. While the trade balance is projected to be most significant in 2023, it is expected to level off slightly through 2027. No industries in the IT cluster experienced a trade surplus in 2022. The industries with the largest trade deficits include Communications Equipment



Manufacturing and Computer Manufacturing. This indicates that there is significant room for the region to grow in the IT sector in order to fill the demand of the region.

Top Products and Growth Trends

The top products and services in the IT cluster include application software publishing, custom services, system software publishing, and other services. Value added has consistently risen over the last five years, and this trend is projected to continue through 2027. Overall, value added for the cluster is expected to grow from \$820 billion in 2017 to \$1.29 trillion in 2027. Furthermore, total revenue for the cluster is approximately \$2 trillion in 2022, with a consistent upward trajectory over the last five years. Key drivers of revenue growth include Software Publishing, Data Processing & Hosting, Search Engines, and Graphic Designers, all of which are expected to continue driving growth through 2027.

Workforce Overview

The Tri-County Region's employment concentration in the IT cluster is approximately a third as concentrated as the national average. The region lags behind the Chicago MSA and the US by over \$100,000 per job when it comes to GRP per job. The region's employment concentration in IT-related manufacturing subclusters is low, with only Semiconductor & Other Electronic Component Manufacturing classified as emerging due to strong growth in recent years.

The composition of IT-related occupations in the Tri-County Region, Illinois, is notable. IT occupations account for 1.7% of total employment in the region, compared to 2.7% in the Broader Region, 4.9% in the Chicago MSA, and 4.7% in the US. The projected growth of IT-related occupations is being driven by Software Developers, Computer and Information Systems Managers, and Computer User Support Specialists. These occupations are expected to grow across the Broader Region, Chicago MSA, and the US, underlining the critical demand for these positions in the broader economy.

Gender-wise, IT occupations in the Tri-County Region are more male-dominated, with only 30% of these jobs held by women compared to 49% in the overall economy. In terms of racial diversity, the Tri-County Region's IT workers are 69% White, 16% Hispanic or Latino, and 9% Black or African American. Skill requirements vary across IT-related occupations, with some, such as Information Security Analysts and Data Scientists, demanding extensive training and education.

Most IT-related occupations are projected to meet workforce demand in the next five years based on current completion rates at regional educational institutions. However, Software Developers and Computer User Support Specialists are expected to have the largest workforce gaps, requiring 43 and 34 workers per year, respectively. The majority of IT-related occupations have relatively high barriers to entry, with the vast majority (86%) of jobs in these fields at a Job Zone level 4, meaning that workers need considerable preparation.

In conclusion, there is significant room for the Tri-County Region to expand in the IT Innovation space, supported by foreign investment. Innovation in IT leads to innovation in all key emerging clusters, as IT can make most processes more efficient and/or more secure.



