ELECTRIFYING ILLINOIS: ECONOMIC POTENTIAL OF GROWING ELECTRIC TRANSPORTATION

COMPANIES, JOBS, GROWTH RATES, AND OPPORTUNITIES AS ELECTRIFICATION ACCELERATES

Prepared by BW Research Partnership

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The Power of Now

ADVANCED ENERGY ECONOMY

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This report was prepared for Advanced Energy Economy by BW Research Partnership. BW Research is a full-service consulting and research firm specializing in workforce and economic development for public entities, including workforce investment boards, economic development agencies, cities, counties, and educational institutions.

BW Research has substantial experience developing customized research projects and a deep understanding of the clean energy sector and its employers, workforce, and supply chain dynamics. BW Research has designed and conducted more than 500 studies for public, private, and not-for-profit organizations globally, and our projects have directly impacted federal, state, and local initiatives. Our research, employer engagement, ideation services, and facilitation have produced tangible results across the world.

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About Advanced Energy Economy

Advanced Energy Economy (AEE) is a national association of businesses that are making the energy we use secure, clean, and affordable. AEE is the only industry association in the U.S. that represents the full range of advanced energy technologies and services, both grid-scale and distributed. Advanced energy includes energy efficiency, demand response, energy storage, wind, solar, hydro, nuclear, electric vehicles, and more. AEE's mission is to transform public policy to enable rapid growth of advanced energy businesses. Engaged at the federal level and in more than a dozen states around the country,

AEE represents more than 100 companies in the $240 billion U.S. advanced energy industry, which employs 3.6 million U.S. workers. Learn more at www.aee.net and follow the latest industry news @AEEnet.

EXECUTIVE SUMMARY

Advanced Energy Economy engaged BW Research Partnership to examine the economic and job potential related to the development of the Electric Transportation (ET) industry in Illinois, focusing on opportunities for businesses and workers to become involved in the automotive supply chain as the industry goes electric. A historical manufacturing powerhouse with a highly skilled workforce — Illinois already employs over 5,000 workers in the ET industry, and this number is expected to grow. In fact, there are declining employment sectors not currently involved in the ET industry, but rather in adjacent industries, that could easily transition to the ET industry. These industries also face an aging workforce, which presents an opportunity for young people entering the workforce, provided Illinois has the necessary training programs and policy incentives in place. This report looks at these opportunities and discusses the current state of the ET economy in Illinois, highlighting several strengths, challenges, and opportunities.

This study begins with an overview of the current ET supply chain, including the current number of jobs and businesses involved in ET, historical growth rates, and projections of near-term growth. The research then discusses "Adjacent Industries and Occupations," which are firms and workers that are generally not currently involved with ET goods or services but have characteristics similar to those that are. This analysis is useful in highlighting some industries that may benefit from increased demand for their products driven by the rise in ET.

For the purposes of this study, the ET sector is defined as any firms involved in the manufacturing, wholesale distribution, retail sale, installation, research and development, maintenance and repair of electric vehicles (EVs) and equipment (including automobiles, light and heavy-duty trucks, buses, industrial equipment, agricultural equipment, rail, recreational vehicles, and other ET), component parts (including battery, motor controller, electric engine, regenerative braking, and drive system components), and the infrastructure necessary for ET (including charging stations and associated storage and their component parts).

BW Research developed a database of 11,200 Illinois businesses potentially involved in the ET supply chain. BW Research then closely examined 2,080 companies within the database to determine if they were involved in ET-related activity. Manufacturing operations were prioritized, as manufacturing is often much more labor-intensive per measure of output, possesses greater overall economic impact than most other sectors, and has the greatest potential to create net new jobs by giving existing manufacturers of inputs and components an opportunity to expand their product lines.

Key Findings

In 2019 there were an estimated 5,200 ET-related workers at 560 Illinois businesses. This number is projected to increase by 83% by 2024, when an estimated 9,500 workers will be involved in ET activity around the state.

ET-related employment can be found across Illinois. Ninety-seven of the 102 counties in Illinois have at least one worker involved in ET-related activity, and nearly 1,000 ET jobs can be found outside the 10 Illinois counties with the greatest number of ET jobs. This suggests that, while ET jobs are currently somewhat concentrated in Chicago, there are numerous ET opportunities throughout the state.

ET activity contributed $850 million to Gross State Product, about twice the contribution of Industrial Building Construction.

With the right policy priorities, Illinois is well positioned to be a leader in developing the domestic ET supply chain. The state has significant strength across a range of industries that support ET development and supply chain growth. These range from research and development bolstered by the strong universities in the state, as well as diverse precision manufacturing facilities and workers that attract national ET manufacturers, such as Rivian, to locate in the state.

ET growth offers opportunities for manufacturing and related industries in Illinois. Two-thirds of ET-related jobs, accounting for 3,400 jobs across the state, are in manufacturing, which will continue to play a significant role in ET growth in the state. Another 70,000 workers in Adjacent and Support Industries have skillsets that would allow them and the companies they work for to transition to ET-related work with relatively little training or upskilling required. ET-related jobs could offer a lifeline in particular to workers in Support Industries, which shed 15,900 jobs across the state between 2014 and 2019.

While Illinois has only three ET-specific training programs, the state has a robust set of manufacturing education and training options. While these education and training opportunities are not ET-specific, they do prepare students to enter many of the ET-related jobs in the state.

In order to spur the EV market and fully capitalize on ET employment opportunities, Illinois must take regulatory and legislative action now. This includes setting goals for EV adoption, establishing a tax credit for ET supply chain companies that relocate to Illinois, leveraging the nearly $160 million remaining in VW Mitigation Settlement and 2020 Capital Plan funds to build out a robust network of public charging stations, initiating a regulatory proceeding that requires utilities to submit Transportation Electrification Plans (TEPs) and expanding training opportunities for ET workers.

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INTRODUCTION

Advanced Energy Economy commissioned BW Research Partnership to examine the scale of the Electric Transportation (ET) supply chain in Illinois. This research seeks to quantify existing companies involved in ET and the workforce that support them. This report also includes a forward-looking section focused on adjacent industries that could benefit from increased ET activity in the state. For the purposes of this study, the ET sector is defined as any firms involved in the manufacturing, wholesale distribution, retail sale, installation, research and development, maintenance and repair of electric vehicles (EVs) and equipment (including automobiles, light and heavy-duty trucks, buses, industrial equipment, agricultural equipment, rail, recreational vehicles, and other ET), component parts (including battery, motor controller, electric engine, regenerative braking, and drive system components), and the infrastructure necessary for ET (including charging stations and associated storage and their component parts).

To develop the data for this report, BW Research developed a comprehensive database of 11,200 firms potentially involved in ET work. BW Research closely examined 2,080 companies within this dataset, prioritizing manufacturing operations. BW Research confirmed 66 firms with 71 unique locations with current involvement in the ET sector. Based on this sample, BW Research estimates that there are 560 businesses involved in some form of ET-related activity across the state.

Sample of ET Companies in Illinois

- Aisin Light Metals LLC
- AllCell Technologies
- American NTN Bearing
- Buck Bros Inc.
- E-T-A Circuit Breakers
- Hubbell Wiegmann
- Kaiser Electrical Contractors
- Lizzy Lift
- Magna International
- Navitas Systems LLC
- Piston Automotive Belvidere
- Powerstop
- Rivian
- Wiese Planning & Engineering Inc.

It is important to note that ET-related growth creates net new jobs in some segments of the economy while minimally impacting others. Manufacturing makes up the majority of the ET-related workforce. Its dominance in the production of EVs and component parts means Illinois is in an advantageous position to benefit from the increased demand for ET. Among occupations in sales, service, and other downstream jobs, new ET activity is more likely to replace work currently focused on non-ET activates rather than creating new jobs. This results in fewer net new jobs created in downstream roles than in manufacturing.

The ET sector is rapidly evolving in Illinois. The dynamic and dispersed nature of the ET sector emphasizes the importance of understanding the current scale, workforce, and opportunities for continued growth and development. To capture some of this potential for growth, this report identifies the industries, companies, and workers that could readily transition to and benefit from an expanding ET market. Throughout this report,

these areas of opportunity are referred to as "Adjacent" Industries and Occupations. Adjacent Industries provide similar goods or services and have workers who, along with Adjacent Occupations, often have overlapping knowledge, skills, and abilities to those currently involved in ET.

Company Snapshot

Rivian

McLean County

Rivian is an independent U.S. manufacturer of all-electric trucks, SUVs and delivery vans, with centers of gravity in Michigan and California and a manufacturing facility in central Illinois. In 2021, the company will offer the R1T mid-size pickup and R1S seven-seater SUV. Both vehicles will eventually offer 400 miles of range. The company currently has nearly 4,000 employees across the country, including over one thousand in Normal, Illinois. Rivian also has a contract with Amazon to produce 100,000 electric delivery vans starting in the year 2021—the world's largest commercial EV fleet purchase in history. These delivery trucks, along with the R1T and R1S, will be produced at the plant in Normal, a previously-shuttered plant formerly owned and operated by Mitsubishi. By the end of the ramp-up period in early 2022, Rivian expects to have 2,700 manufacturing employees working at the plant in Normal. After securing over $2.6 billion in its most recent funding round, bringing the total funding to over $8 billion, Rivian is a startup that is poised to be a be a key EV industry player and a leading provider of ET jobs in Illinois.

As the ET sector in Illinois continues to develop, much of the growth is expected to primarily transition, rather than expand, the demand for transportation workers, goods, and services. For example, among service centers, dealerships, and some parts wholesalers and distributors, non-ET employment is expected to transition to ET-related employment rather than generate new and additional roles. However, the opportunity for new jobs and business creation exists among the design and manufacturing of ET products. Illinois' substantial Motor Vehicle Manufacturing industries mean there is substantial talent and infrastructure already in place across the state. This existing expertise should allow Illinois to easily expand production of ET components and finished goods as the demand for these products grows. Illinois also has a substantial pool of talent that may be able to transition to ET-related activities with relative ease. Many of these workers can be found in Adjacent Industries.

There are three types of Adjacent Industries identified in this report:

Immediate Adjacent Manufacturing Industries include companies that are very similar to those identified as ET companies. They are so similar that they share a federal industry classification code (six-digit NAICS). Transition to ET-related work would be most rapid for companies in Immediate Adjacent Manufacturing Industries. Examples of Immediate Adjacent Manufacturing include General Automobile Manufacturing[1], Motor and Generator Manufacturing, and Other Electronic Component Manufacturing.

Secondary Adjacent Manufacturing Industries include companies that are similar to existing ET companies, but less so than Immediate Adjacent Manufacturing Industries. These companies engage in the same general family of activities, but their transition to ET work would take more investment and time than for the Immediate Adjacent Manufacturing Industries. Examples of Secondary Adjacent Manufacturing Industries include Relay and Industrial Control Manufacturing; Semiconductor and Related Device Manufacturing; and Power, Distribution, and Specialty Transformer Manufacturing.

Support Industries include companies that are upstream suppliers to companies in Adjacent Industries.[2] These include manufacturers as well as distributors and wholesalers. Growth in the ET market might require changes in operations, but as these firms tend to focus on raw materials and upstream components, those changes are likely to be minimal. These Support Industries are expected to strongly benefit from the growth of the Illinois ET supply chain. Examples include Plate Work Manufacturing, Iron and Steel Mills and Ferroalloy Manufacturing, and Machine Shops.

[1] Throughout this report, industries and occupations that are capitalized refer to specific titles in the North American Industry Classification System (NAICS) and Standard Occupational Classification (SOC), respectively. For definitions of these industries and occupations, please see the Glossary in Appendix D.

[2] Support industries do provide some raw materials to existing ET firms, but the small size of the current market has minimal relative impact.

POLICY RECOMMENDATIONS

In order to spur the EV market and fully capitalize on ET employment opportunities, Illinois must take regulatory and legislative action now. EVs are still an emerging technology and continue to face some barriers to adoption, such as higher upfront cost, a lack of supportive charging infrastructure, accessibility issues, and a general lack of consumer awareness.

Supportive policies can address these barriers head-on and provide the sector the support it needs for Illinois to fully recognize the breadth of benefits that these vehicles provide. In addition to the employment opportunities provided by the supply chain, EVs provide broad-based cost savings for all electric ratepayers, regardless of whether they own an EV. They also provide operational cost savings for the drivers and increased security as they speed the transition from fossil fuels to clean electricity generation, much of which will come from in-state resources.

These benefits create a clear need for thoughtful policy that cuts across multiple areas of concern, including electric utility regulation, transportation policy, and workforce development. To that end, Illinois should consider the following policies to support its burgeoning ET supply chain:

- Increase the adoption of EVs in the state to 1.2 million by 2030. Illinois must set intrepid goals for the growth of EVs given the sizeable supply chain already present in the state. Electrifying the state's transportation sector can also be a key economic development driver for Illinois, putting people back to work to overcome the COVID-19 pandemic and offering a lifeline to companies that have seen job declines over the past decade. Putting more than a million new and used EVs on the roads by 2030 is also one of the most effective methods for reducing emissions from the Illinois' transportation sector. Increased adoption of EVs will improve public health and air quality for Illinois residents, while simultaneously putting downward pressure on electricity costs paid by ratepayers.
- Establish a tax credit for EV supply chain companies that relocate to Illinois or are located downstate or in a disproportionately impacted area. Illinois can further encourage EV manufacturing by creating a friendlier business environment for supply chain companies that are already growing quickly to meet global EV demand. Often the EV supply chain includes diversified manufacturing companies that serve more than one sector, so creating tax incentives that can be scaled based on location would be a critical tool for attracting significant new private investment to the state.
- Leverage the nearly $160 million in residual VW Mitigation Settlement and 2020 Capital Plan funding to build out a robust network of public charging stations across Illinois. With roughly $90 million in available VW funds, and another $70 million in Capital funding still unspent, Illinois has an opportunity to build out charging infrastructure to support consumer-based, light-duty vehicle charging, with an emphasis on DC Fast-Charging, as well as the electrification of government-owned fleets.
- Initiate a process that requires utilities to submit Transportation Electrification Plans (TEPs) to the Illinois Commerce Commission (ICC) every three years, with an emphasis on building out "make-ready" infrastructure. Creating an ICC process for TEP evaluation would demonstrate a strong signal for

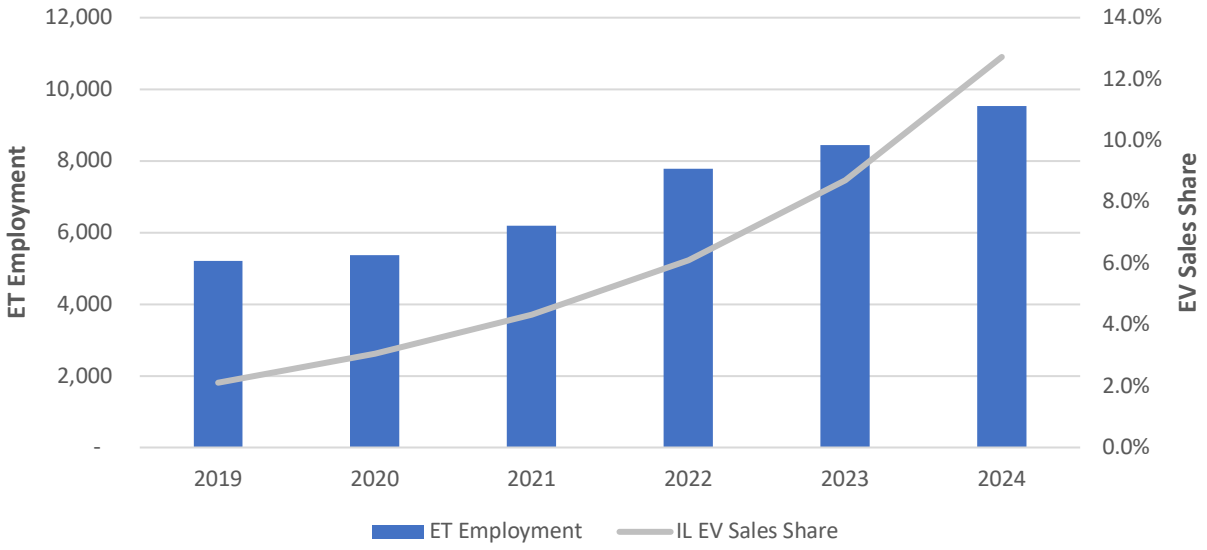
encouraging private investment in EVs and would facilitate more thoughtful EV rate design to mitigate traditional demand charges that can disincentivize EV adoption. This process would also create clear milestones for building out charging infrastructure in dense urban areas like Chicago where multi-unit dwellings are more common and more difficult to retrofit with EV charging. Focusing on "make-ready" infrastructure would also facilitate expedited electrification of public transit, as well as fleet electrification of both government-owned and privately-owned medium- and heavy-duty EVs.

- Expand the availability of the Electric Vehicle Infrastructure Training Program (EVITP) curricula across Illinois, with an emphasis on broad geographic reach. The EVITP curricula is an important training tool that helps expedite the development of skills needed to work on construction and maintenance related to EV charging infrastructure. There are few examples already in place in Illinois, but by partnering with junior colleges, trade schools, and labor organizations such as the International Brotherhood of Electrical Workers (IBEW), the state can create a steady pipeline to develop its EV workforce.

THE ILLINOIS ELECTRIC TRANSPORTATION WORKFORCE

ET-related employment in Illinois is projected to grow 83% between 2019 and 2024.[3] ET-related employment in Illinois is estimated to increase by nearly 1,000 jobs between 2019 and 2021, bolstered by an increase in Rivian employees working at the production plant in Normal, Illinois. EV sales within Illinois are projected to reach nearly 13% of annual vehicle sales by 2024, supporting a continued increase in ET-related employment in the state (Figure 1).

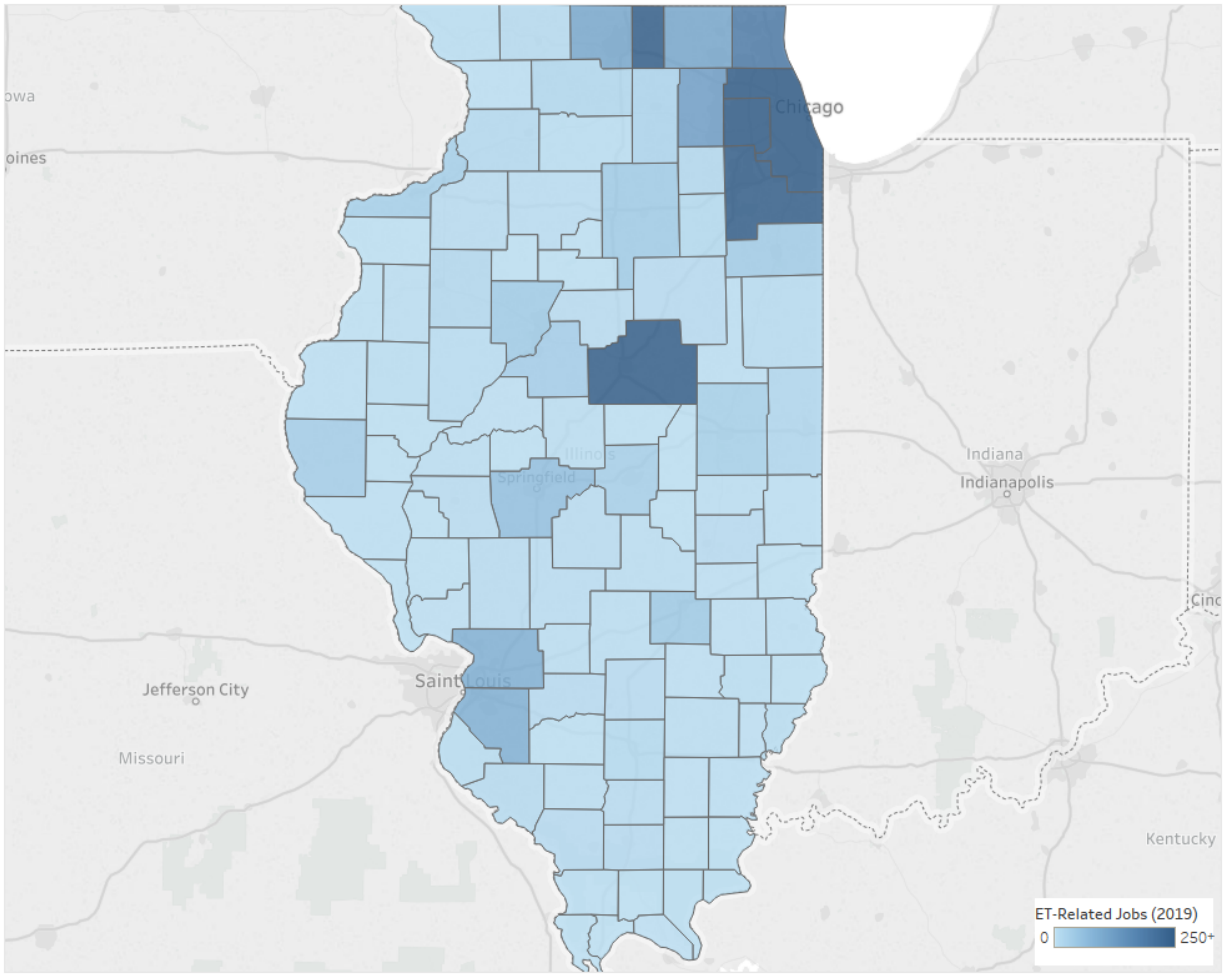
Figure 1: Projected ET Employment and Share of Electric Vehicles (EVs) Sales[4] [5]



[3] This definition is based on a worker spending any time on electric transportation goods or services.
[4] This definition includes Battery-Electric Vehicles (BEVs) and Plug-in-Hybrid Electric Vehicles (PHEVs).
[5] Project share of EV sales in IL is from "Charging Ahead: Deriving Value from Electric Vehicles for All Electricity Customers." Citizens Utility Board. https://www.citizensutilityboard.org/wp-content/uploads/2019/03/Charging-Ahead-Deriving-Value-from-Electric-Vehicles-for-All-Electricity-Customers-v6-031419.pdf

ET-related jobs are in 97 of the 102 counties in Illinois. Cook, McLean, DuPage, Boone, and Will Counties are the five counties with the greatest number of ET-related workers. One thousand five hundred (1,500) ET-related workers can be found in the other 92 counties across Illinois with ET-related employment (Figure 2).

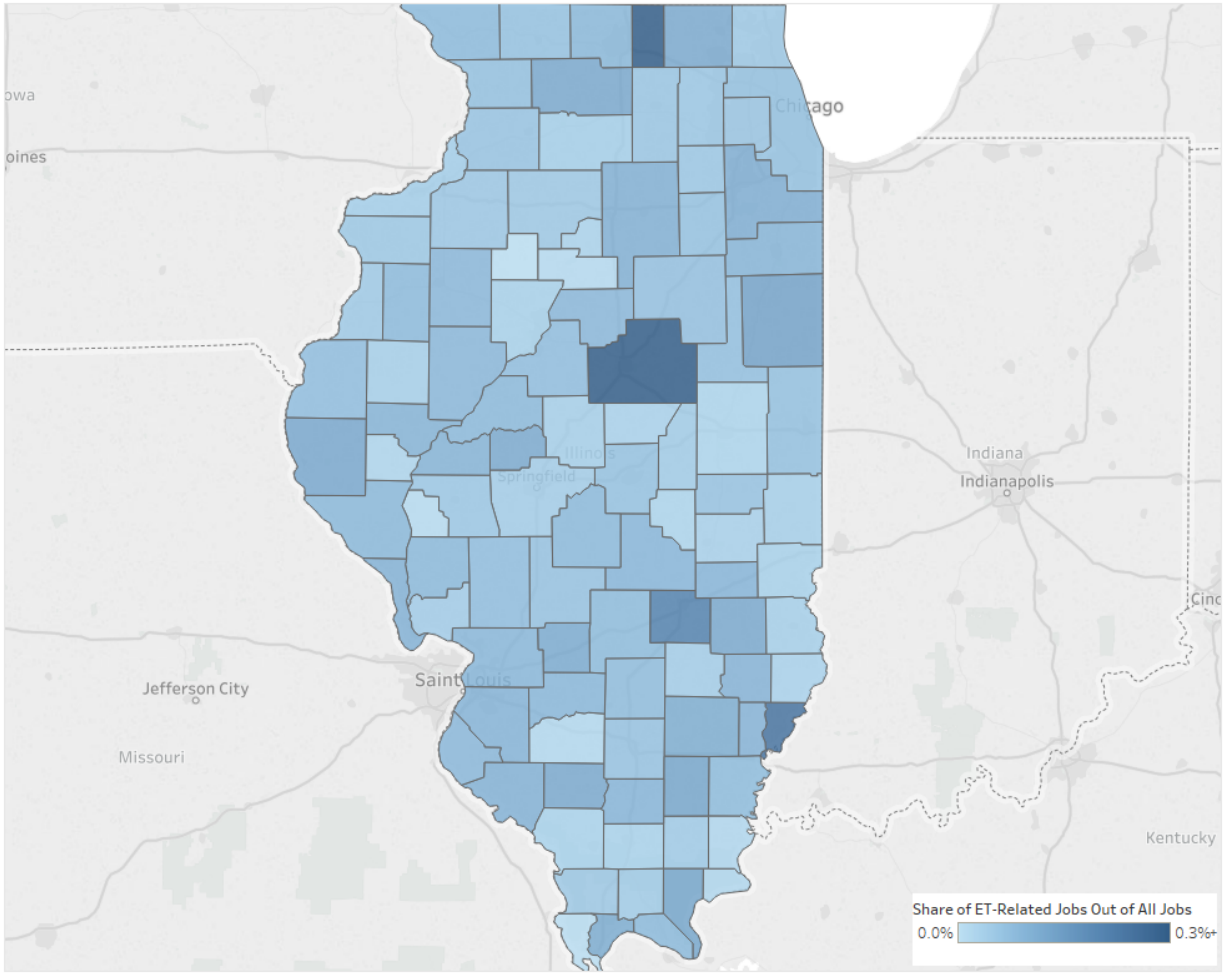
Figure 2: ET-Related Employment, 2019



ET-related jobs account for a significant portion of the workforce in many counties throughout the state. Boone and McLean Counties have the greatest proportion of ET-workers relative to the number of overall workers in the county; in each of these counties, ET workers account for at least 1% of the total workforce.

Wabash and Effingham counties in the South-Eastern portion of the state also have relatively high proportions of ET-related workers relative to the overall jobs in the region (Figure 3).

Figure 3. Share of ET-Related Employment Out of All Jobs



Illinois ET-related activity is estimated to have generated $850 million in Gross State Product (GSP) in 2019. This is about equivalent to the GSP contribution of Veterinary Services and about twice the GSP contribution of Industrial Building Construction.

Nearly two-thirds (65%) of workers involved in ET are involved in Manufacturing. Wholesale Trade, Distribution, & Transportation accounts for about one-in-ten ET-related jobs (11%) of ET-related employment, or about 600 jobs (Table 1).

Table 1: ET-Related Employment by Value Chain

	Employment	Share of Employment
Manufacturing	3,400	65%
Wholesale Trade, Distribution, & Transport	600	11%
Repair & Maintenance	500	9%
Retail Trade	400	7%

Company Snapshot

AllCell Technologies

Cook County

AllCell Technologies designs and manufacturers lithium-ion battery packs for portable, stationary, and transportation applications. This includes batteries that power recreational and lightweight electric vehicles, robots, watercraft, scooters, and commercial drones. AllCell's keystone product is a passive thermal management technology that surrounds each lithium-ion cell and absorbs and conducts heat away from the cell. This significantly improves the life of batteries, and the technology has been proven to stop "thermal runaway propogation," a process where one compromised cell sets off a chain reaction that spreads to the other cells of a battery leading to failure.

AllCell grew out of a research project at the Illinois Institute of Technology. The company was founded in 2001 but has seen significant growth in recent years. In 2020 the company moved its offices from Chicago to Broadview, Illinois. The company now has 45 employees, 20 of whom are skilled laborers who manufacture custom battery packs. The AllCell Team also includes about 12 research and development engineering staff. As demand for AllCell products and services continues to grow, so does the AllCell Team. The company is planning onboarding additional staff to meet rising demand.

Installation	300	5%
Professional and Business Services	200	3%

Assemblers and Fabricators make up a large portion of key ET occupations in Illinois. Team Assemblers and All Other Assemblers and Fabricators make up more than a third (36%) of the ET-related jobs in the state. These positions also offer attractive wages with median hourly wages of $22.69 and $24.04, respectively (Table 2). Both of these rates are greater than the overall state median hourly wage of $19.74.[6]

Table 2: Key ET Occupations

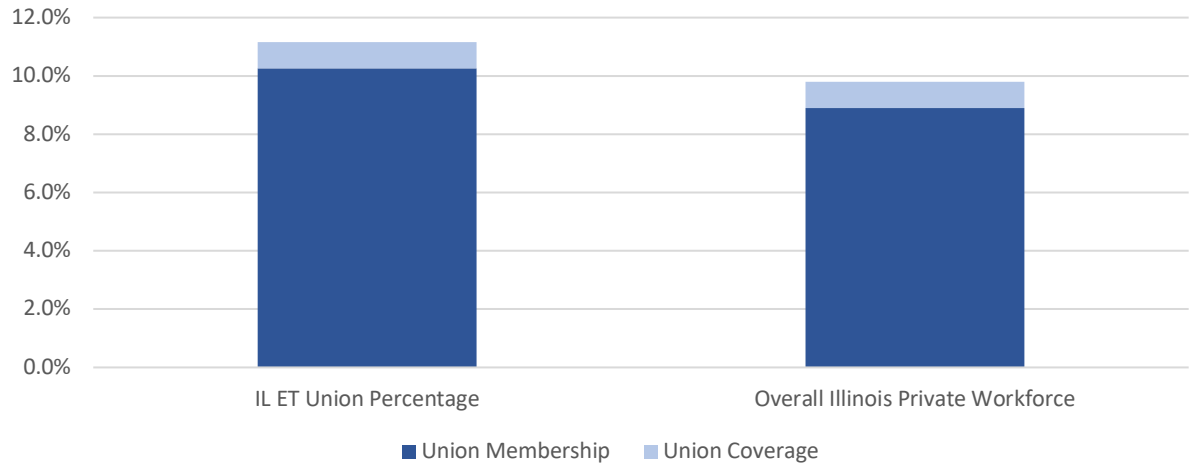
Key Occupations[7]	*2019 ET Jobs*	*Projected 2024 ET Jobs*[8]	*Median Hourly Wage*
Team Assemblers	1,668	3,027	$22.69
Assemblers and Fabricators, All Other	227	408	$24.04
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	221	400	$30.29
Automotive Service Technicians and Mechanics	144	259	$20.96
Light Truck Drivers	132	242	$16.88
Laborers and Freight, Stock, and Material Movers, Hand	124	227	$16.06
Parts Salespersons	46	83	$16.06
First-Line Supervisors of Mechanics, Installers, and Repairers	27	50	$29.71

ET-related jobs in Illinois have slightly higher rates of union coverage and membership than the broader statewide workforce. One in ten (10%) ET-related workers are union members and a slightly greater

[6] Occupational Employment Statistics. U.S. Bureau of Labor Statistics. May 2019 State Occupational Employment and Wage Estimates Illinois
[7] Key occupations were identified based on total current employment within ET.
[8] Projected jobs are extrapolated from BLS OES occupational projections through 2024 and ET industry projections developed using data from the 2019 United States Energy and Employment Report, BLS QCEW, and EVAdoption.

proportion receive union coverage (Figure 4). Union membership includes workers who pay union fees, while coverage includes workers in jobs negotiated through unions but do not pay union dues. Thus, union coverage tends to be slightly higher than union membership rates.

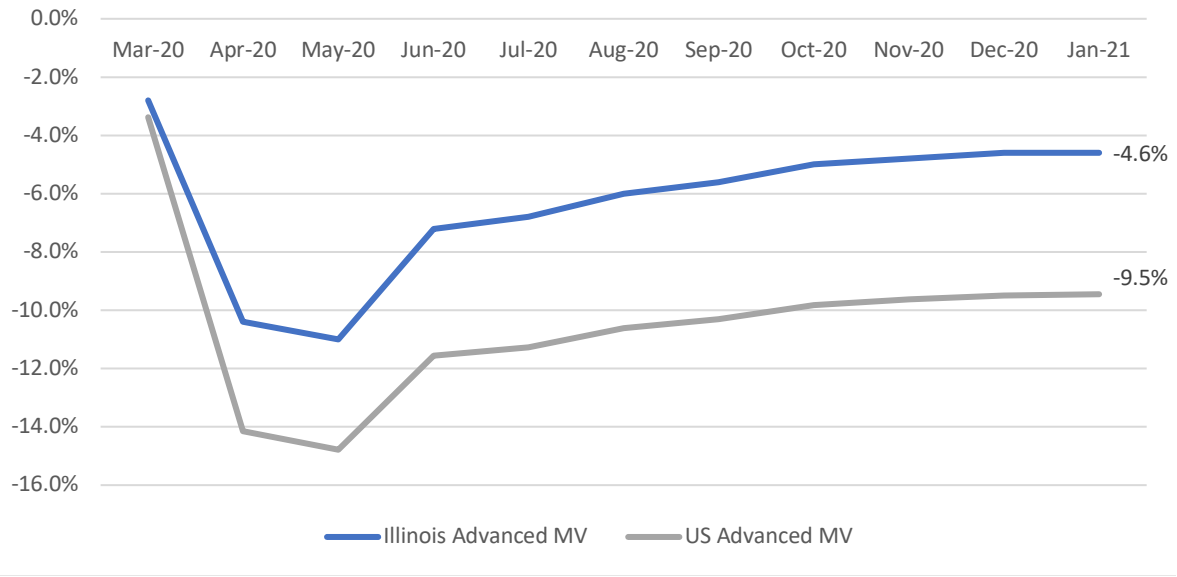
Figure 4. Union Membership and Coverage



IMPACTS OF COVID-19

Advanced Vehicle[9] employment in Illinois has declined by less than 5% between the start of the COVID-19 pandemic and January 2021. Since the early days of the pandemic, BW Research has been tracking the changes in advanced energy employment across the United States.[10] The models developed by BW Research[11] suggest that Illinois employment in advanced motor vehicles,[12] which includes EVs, declined by less than 5% while advanced motor vehicle employment nationally declined at nearly twice the rate, reaching levels 9.5% lower in January 2021 than pre-pandemic levels (Figure 5).

Figure 5. COVID-19-Related Employment Losses in Advanced Motor Vehicles[13]



[9] This definition includes hybrid electric vehicles, plug-in hybrid vehicles, electric vehicles, natural gas vehicles, hydrogen vehicles, and fuel cell vehicles. This is broader than the ET definition used throughout this report

[10] https://www.bwresearch.com/covid/docs/BWResearch_CleanEnergyJobsCOVID-19Memo_Dec2020.pdf

[11] https://www.bwresearch.com/covid/docs/BWResearch_CleanEnergyJobsCOVID-19Memo_Dec2020.pdf

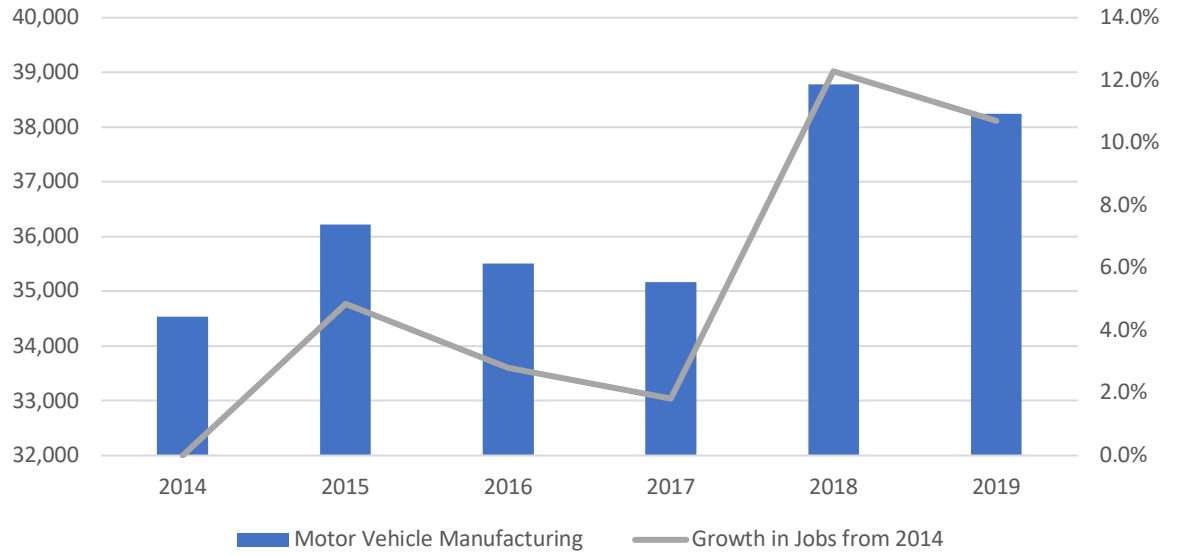
[12] This definition includes hybrid electric vehicles, plug-in hybrid vehicles, electric vehicles, natural gas vehicles, hydrogen vehicles, and fuel cell vehicles.

[13] https://www.bwresearch.com/covid/docs/BWResearch_CleanEnergyJobsCOVID-19Memo_Dec2020.pdf

KEY TRENDS IN ILLINOIS

Motor Vehicle Manufacturing[14] employment in Illinois grew by 11% between 2014 and 2019, adding 3,700 more jobs (Figure 6). Most of this growth was seen among Automobile Manufacturing and Other Motor Vehicle Parts Manufacturing – the two largest industry-specific sources of employment among Motor Vehicle Manufacturing (Figure 7). Some other specific industries, such as Motor Vehicle Brake System Manufacturing and Motor Vehicle Metal Stamping, saw employment declines during this period. An increase in ET production may provide some of these displaced workers with an opportunity to return to work.

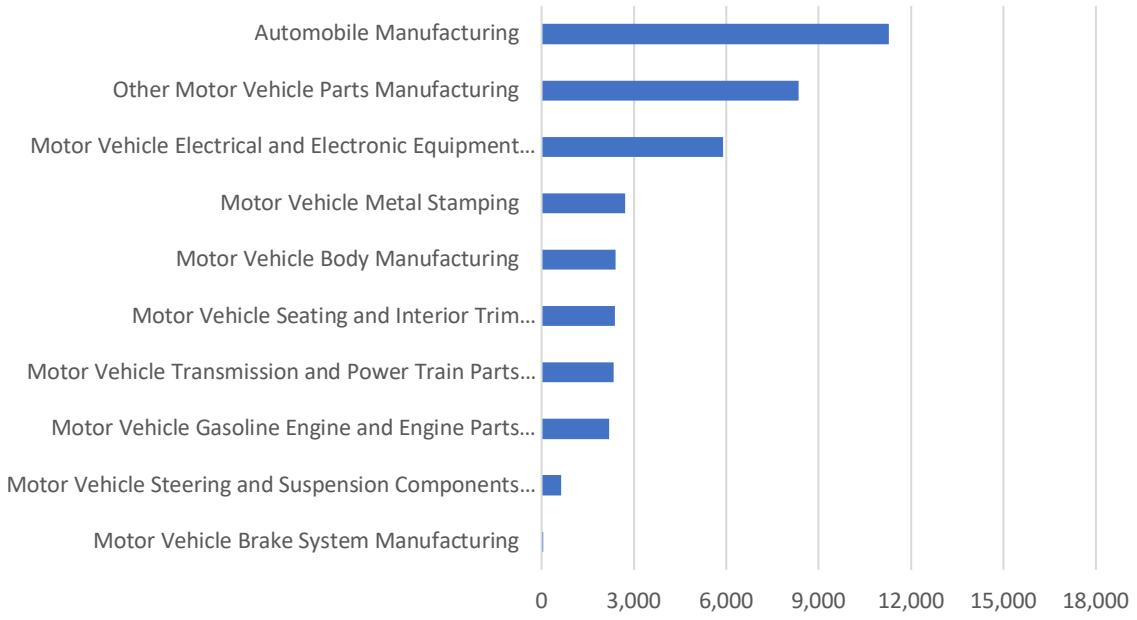
Figure 6. Motor Vehicle Manufacturing Employment in Illinois[15]



[14] This includes 10 NAICS centered around traditional automobile manufacturing. These NAICS codes are: 336111, 336211, 336310, 336320, 336330, 336340, 336350, 336360, 336370, and 336390.

[15] Ibid.

Figure 7. Motor Vehicle Manufacturing Jobs by Specific Industry, 2019[16]

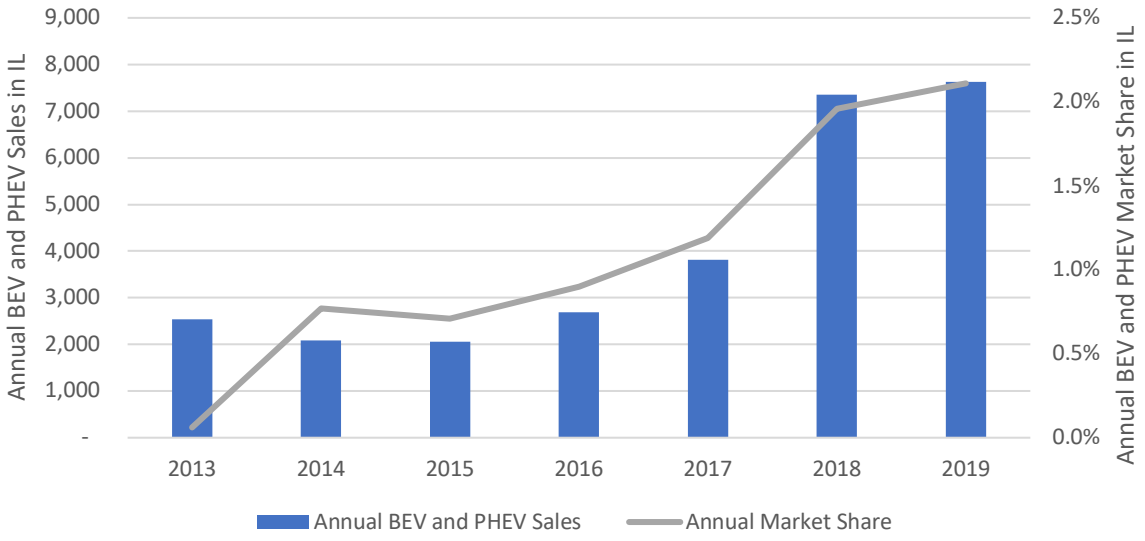


The market share of BEVs and PHEVs in Illinois nearly doubled between 2017 and 2019. EVs[17] accounted for more than 2% of all car sales in Illinois in 2019, compared to only 1.2% in 2017. In 2019, 7,600 EVs were sold in the state (Figure 8). This trend is likely to continue as ET activity and related infrastructure become more common around the state and EV prices continue to fall.

[16] Sub-industry by six-digit NAICS code. Emsi 2020.4

[17] Including Battery-Electric Vehicles (BEVs) and Plug-in-Hybrid Electric Vehicles (PHEVs).

Figure 8. Annual Sales and Annual Market Share of EVs in Illinois[18]



[18] Includes BEV (Battery electric vehicles, which run exclusively on electric fuel) and PHEV (Plug-in hybrid electric vehicles, which run on either or both gasoline and electric fuel). Data from: Alliance of Automobile Manufacturers (2019). Advanced Technology Vehicle Sales Dashboard. Data compiled by the Alliance of Automobile Manufacturers using information provided by HIS Markit (2011-0218) and Hedges & Co. (2019). Data last updated 8/20/2019. Data retrieved February 22, 2020 from https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/

ADJACENT INDUSTRY ANALYSIS

ET activity can be found across a wide range of industries in Illinois. To best understand the scope and scale of some of the greatest opportunities in ET as the sector continues to grow, the research team identified "Adjacent Industries" that have similar workforce competencies, supply chains, and activities to current ET firms. Adjacent Industry and Occupational analyses help identify talent with similar or complementary skillsets that could easily transition to ET work from non-ET industries.

The Adjacent Industries identified in this report currently have little to no involvement in ET activities. Their importance lies in the workers, who have skill sets that would allow them to move into the ET supply chain with relatively little training and transition with relative ease. Identifying these industries and their workers highlights a potential workforce that could easily support and grow with increased ET demand.

Adjacent Industries include three distinct categories: Immediate Adjacent Manufacturing Industries; Secondary Adjacent Manufacturing Industries; and Support Industries. For more information on these industry categories, see Appendix C.

- Immediate Adjacent Manufacturing Industries. This category includes the industries that share a federal industry classification code (six-digit NAICS) with ET manufacturing companies. Transition to ET-related work would be most rapid for companies in this category. Examples include Automobile Manufacturing, Motor and Generator Manufacturing, and Other Electronic Component Manufacturing.

- Secondary Adjacent Manufacturing Industries. This category includes industries in the same general industry classifications (four-digit NAICS codes) but differs at the more granular level (six-digit NAICS codes). These industries conduct the same family of activities as ET manufacturing firms, but their transition to ET work would take more investment and time than Immediate Adjacent Manufacturing Industries. Examples include: Semiconductor and Related Device Manufacturing, Other Aircraft Parts and Auxiliary Equipment Manufacturing, and Guided Missile and Space Vehicle Manufacturing.

- Support Industries. This category includes industries that are upstream of Immediate Adjacent Manufacturing Industries. They are typically industries that involve raw materials extraction and manufacturing. Growth in the ET market might require changes in operations, but since these companies tend to focus on raw materials and upstream components, those changes are likely to be minimal. Examples include: Plate Work Manufacturing, Iron and Steel Mills and Ferroalloy Manufacturing, and Bolt and Machine Shops.

An Adjacent Occupational analysis is somewhat different from an Adjacent Industry analysis in that the occupational analysis is conducted through a workforce lens. Adjacent Occupational analyses highlight types of workers that are most common among Adjacent Industries and examine their frequency throughout the entire statewide economy. Such an analysis identifies occupations with similar knowledge, skills, abilities, tasks, and other work activities, regardless of the industry in which the workers are currently

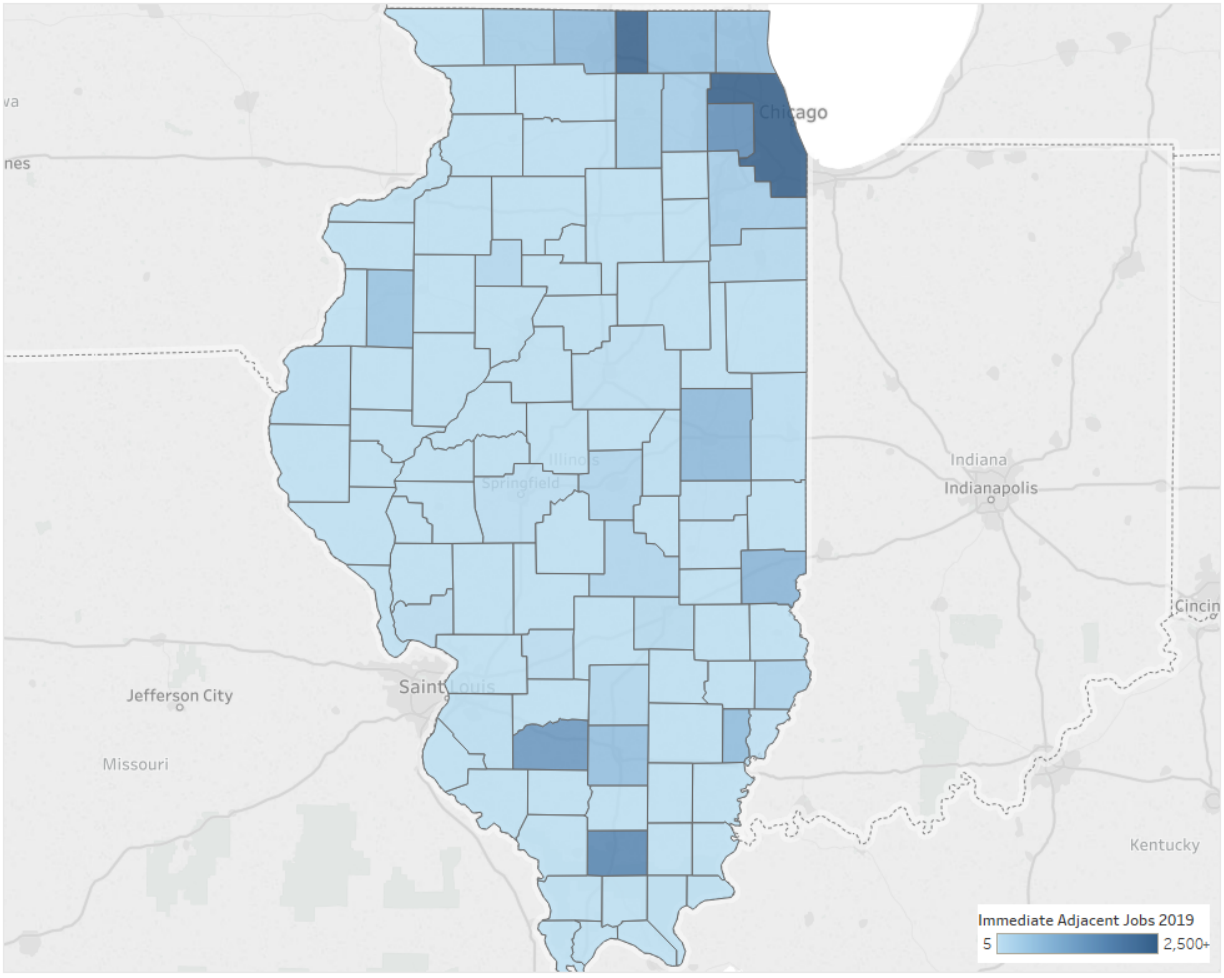
in. The result is a list of occupations that share enough similarities such that the required workforce or on-the-job training to transition to an ET job would be minimal. Ultimately, an Adjacent Occupational analysis provides an occupation-oriented perspective of the potential talent pool for ET work.

Immediate Adjacent Manufacturing Industries

Industry Analysis

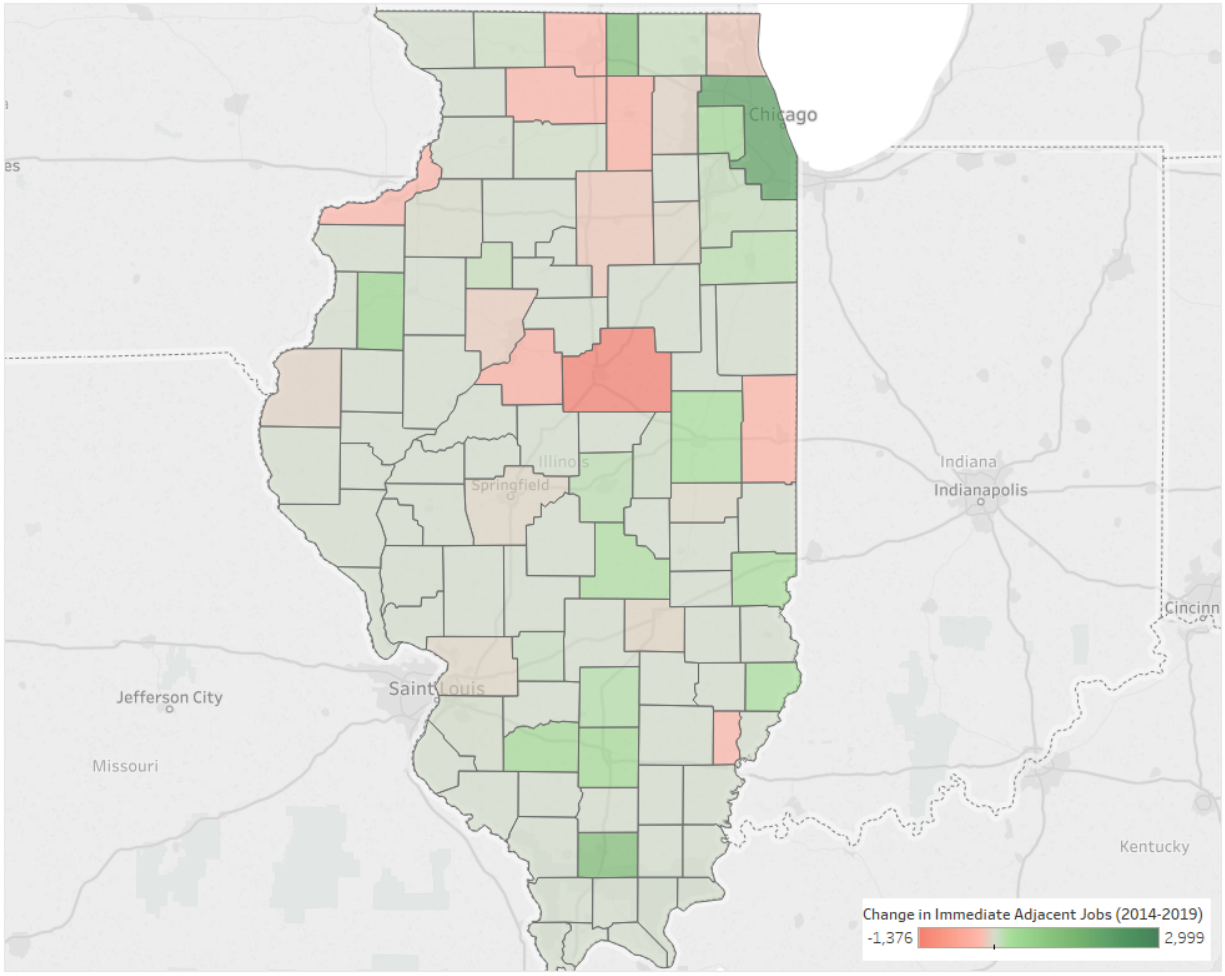
Illinois has 30,500 workers across the state who work in Immediate Adjacent Manufacturing Industries (IAMI). Cook and Boone Counties have the greatest share of IAMI workers, with 8,900 and 4,500 workers, respectively. IAMI employment is not limited to the Northeast corner of the state; three other counties (Williamson, DuPage, and Washington) each have more than 1,400 IAMI workers (Figure 9).

Figure 9: Immediate Adjacent Manufacturing Industry Employment, 2019



While IAMI jobs across the state saw a net increase of about 3,000 jobs between 2014-2019, 23 counties saw declines in IAMI employment. Counties that have seen the largest declines in IAMI employment include McLean County (-1,400 jobs), Tazewell (-400 jobs) and DeKalb (-400 jobs) (Figure 10). ET activity has the opportunity to bring manufacturing jobs back to these counties, as exemplified by Rivian's new production plant in McLean County which will help offset some of the 1,400 IAMI jobs lost.

Figure 10: Change in Immediate Adjacent Manufacturing Industry Employment, 2014-2019



Occupation Analysis

The ten most-common occupations found among Immediate Adjacent Industries account for 400,000 jobs across all industries in Illinois. While these jobs can be found across the entire economy, the knowledge, skills, and abilities of these workers mean that these workers could likely easily transition to ET-related work. Because of this, these occupations are likely to be in the greatest demand as ET activity increases in the state. Most of these occupations have a typical entry-level education requirement of a high school diploma or equivalent, meaning these roles are accessible to a very broad range of residents (Table 3). Given the substantial number of workers in these occupations, the Illinois' workforce is well prepared for an expanding ET economy.

Table 3. Key Immediate Adjacent Manufacturing Occupations

Key Occupations	2014 Jobs	2019 Jobs	Projected 2024 Jobs[19]	Typical Entry-Level Education	Median Annual Earnings[20]
Industrial Engineers	10,611	11,179	11,766	Bachelor's degree	$87,464
Mechanical Engineers	14,752	14,273	14,376	Bachelor's degree	$90,979
First-Line Supervisors of Production and Operating Workers	25,152	26,669	26,864	High school diploma or equivalent	$60,507
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	9,275	13,042	12,947	High school diploma or equivalent	$32,843
Miscellaneous Assemblers and Fabricators	67,609	68,685	65,242	High school diploma or equivalent	$31,637
Machinists	33,184	29,425	29,011	High school diploma or equivalent	$40,435
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	6,893	13,462	13,272	High school diploma or equivalent	$37,544

[19] These projections are from EMSI 2020.4 and based on occupation-specific growth across the state. They are not based on ET growth estimates.
[20] Earnings include wages as well as benefits, such as healthcare or dental insurance.

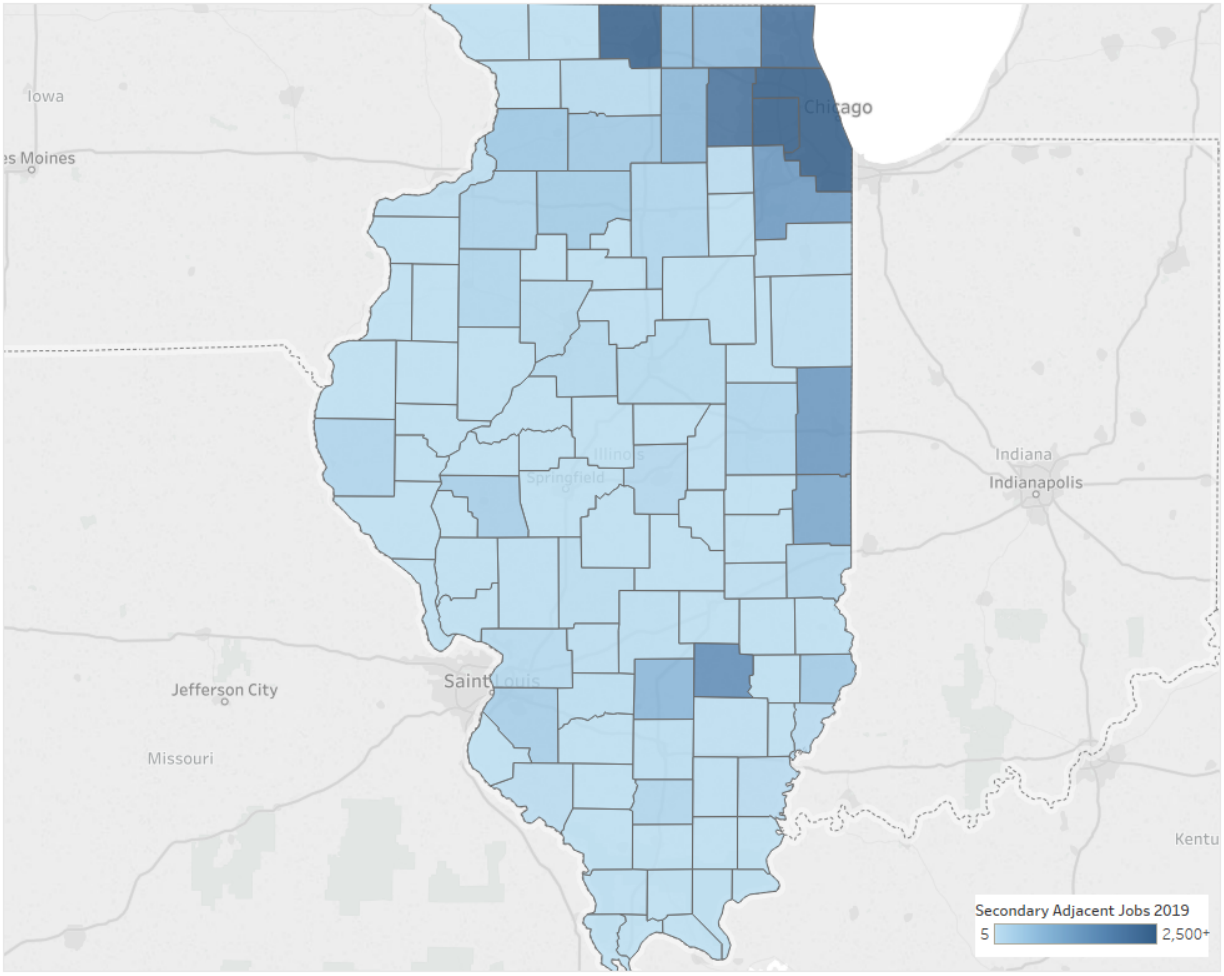
Welders, Cutters, Solderers, and Brazers	13,776	13,350	13,937	High school diploma or equivalent	$40,914
Inspectors, Testers, Sorters, Samplers, and Weighers	22,648	29,558	27,256	High school diploma or equivalent	$37,794
Laborers and Freight, Stock, and Material Movers, Hand	144,921	180,293	188,069	No formal educational credential	$28,600

Secondary Adjacent Manufacturing Industries

Industry Analysis

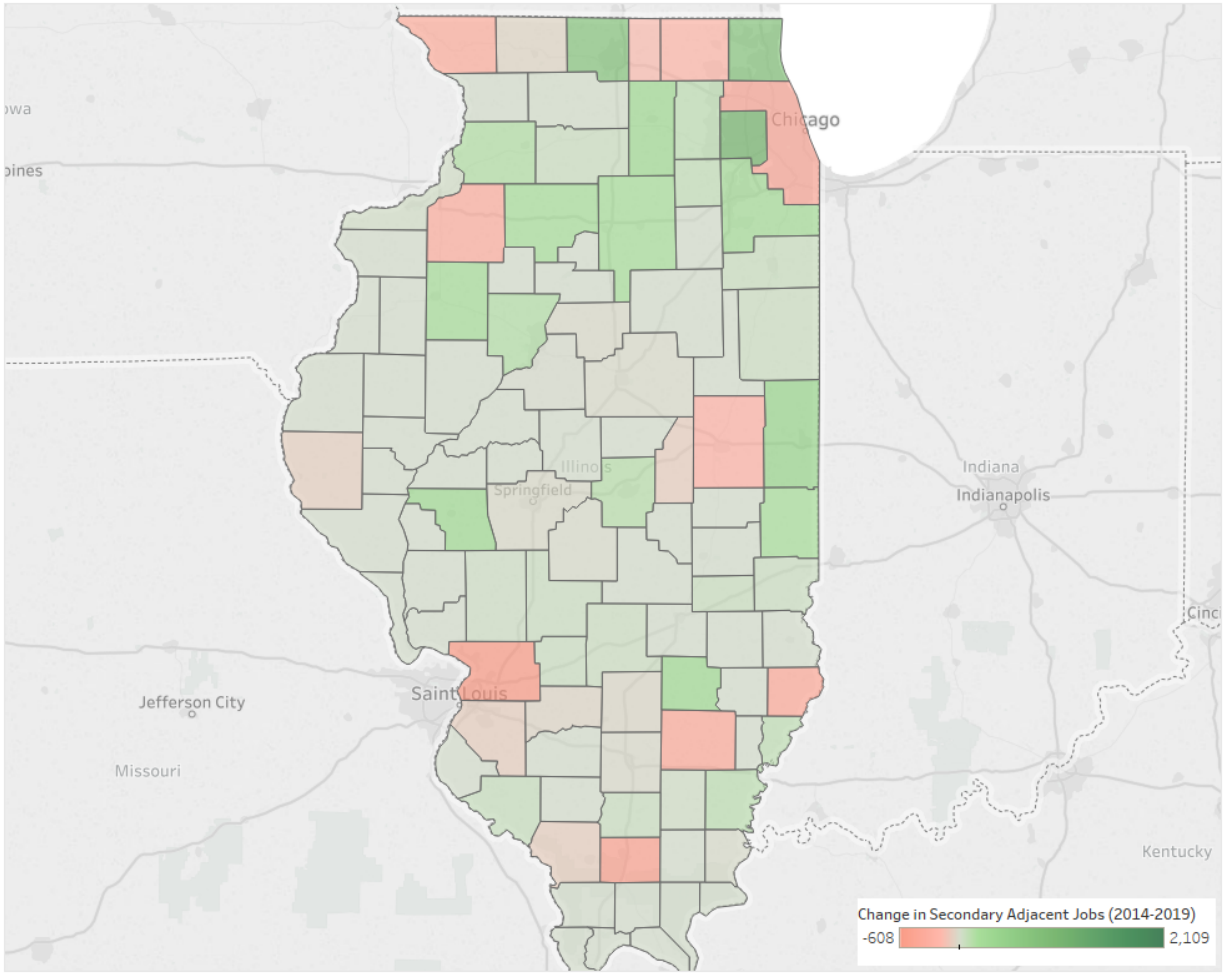
There were 40,700 workers in Secondary Adjacent Manufacturing Industries (SAMI) in Illinois in 2019. While Cook County accounts for a large share of the SAMI workforce (12,200 workers) there are 13 other counties across the state that have 500 or more SAMI employees, including DuPage, Winnebago, Lake, Kane, and Clay Counties (Figure 11).

Figure 11: Secondary Adjacent Manufacturing Industry Employment, 2019



The number of jobs in Secondary Adjacent Manufacturing Industries increased by 2,000 across the state between 2014 and 2019. Twenty-nine of the 103 counties in Illinois saw a decrease in SAMI employment during this time. Madison, Williamson, Lawrence, Cook, and Jo Daviess Counties each lost 400 or more SAMI jobs during this time (Figure 12). Growth in ET-related work presents strong opportunity to return jobs with similar skillsets to these counties. While workers in SAMI industries may require some additional training or upskilling to participate in ET-activity, the strong similarities between SAMI industries and ET-related activity make these transition opportunities feasible for displaced workers.

Figure 12: Change in Secondary Adjacent Manufacturing Industry Employment, 2014-2019



Occupational Analysis

The ten-most common Secondary Adjacent Occupations account for nearly 400,000 jobs across all industries in the state. This means there is already a substantial workforce across the entire Illinois economy with skills that could easily transition into ET-related work. Most of these Secondary Adjacent Occupations typically require a high school diploma or equivalent for entry-level roles, meaning that these jobs are accessible to a wide range of workers (Table 4).

Table 4: Key Secondary Adjacent Occupations

Key Occupations	2014 Jobs	2019 Jobs	Projected 2024 Jobs[21]	Typical Entry-Level Education	Median Annual Earnings[22]
Industrial Engineers	10,611	11,179	11,766	Bachelor's degree	$87,464
Mechanical Engineers	14,752	14,273	14,376	Bachelor's degree	$90,979
First-Line Supervisors of Production and Operating Workers	25,152	26,669	26,864	High school diploma or equivalent	$60,507
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	9,275	13,042	12,947	High school diploma or equivalent	$32,843
Miscellaneous Assemblers and Fabricators	67,609	68,685	65,242	High school diploma or equivalent	$31,637
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	10,433	9,864	9,513	High school diploma or equivalent	$35,318
Machinists	33,184	29,425	29,011	High school diploma or equivalent	$40,435
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	6,893	13,462	13,272	High school diploma or equivalent	$37,544
Inspectors, Testers, Sorters, Samplers, and Weighers	22,648	29,558	27,256	High school diploma or equivalent	$37,794
Laborers and Freight, Stock, and Material Movers, Hand	144,921	180,293	188,069	No formal educational credential	$28,600

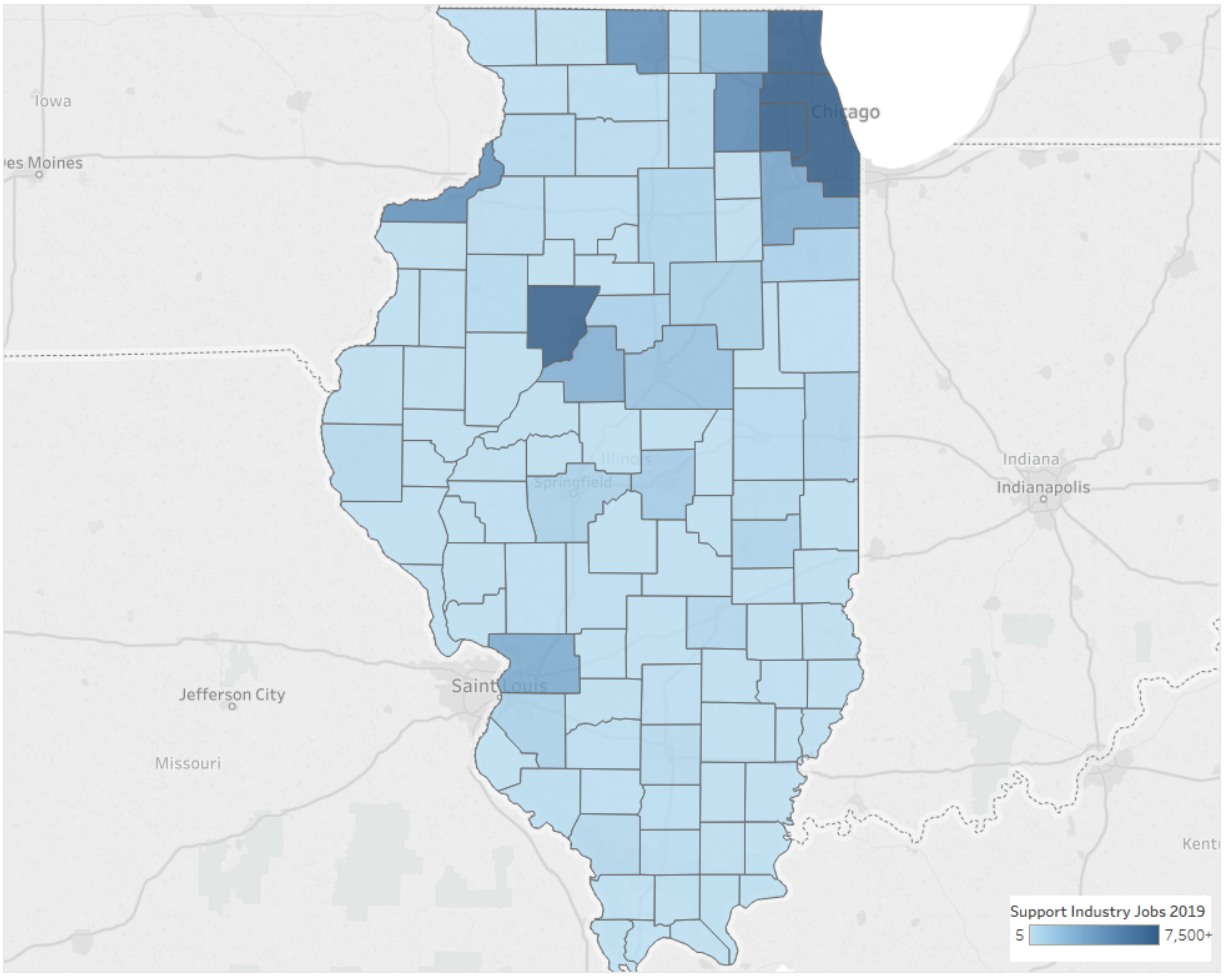
[21] These projections are from EMSI 2020.4 and based on occupation-specific growth across the state. They are not based on ET growth estimates.
[22] Earnings include wages as well as benefits, such as healthcare or dental insurance.

Support Industries

Industry Analysis

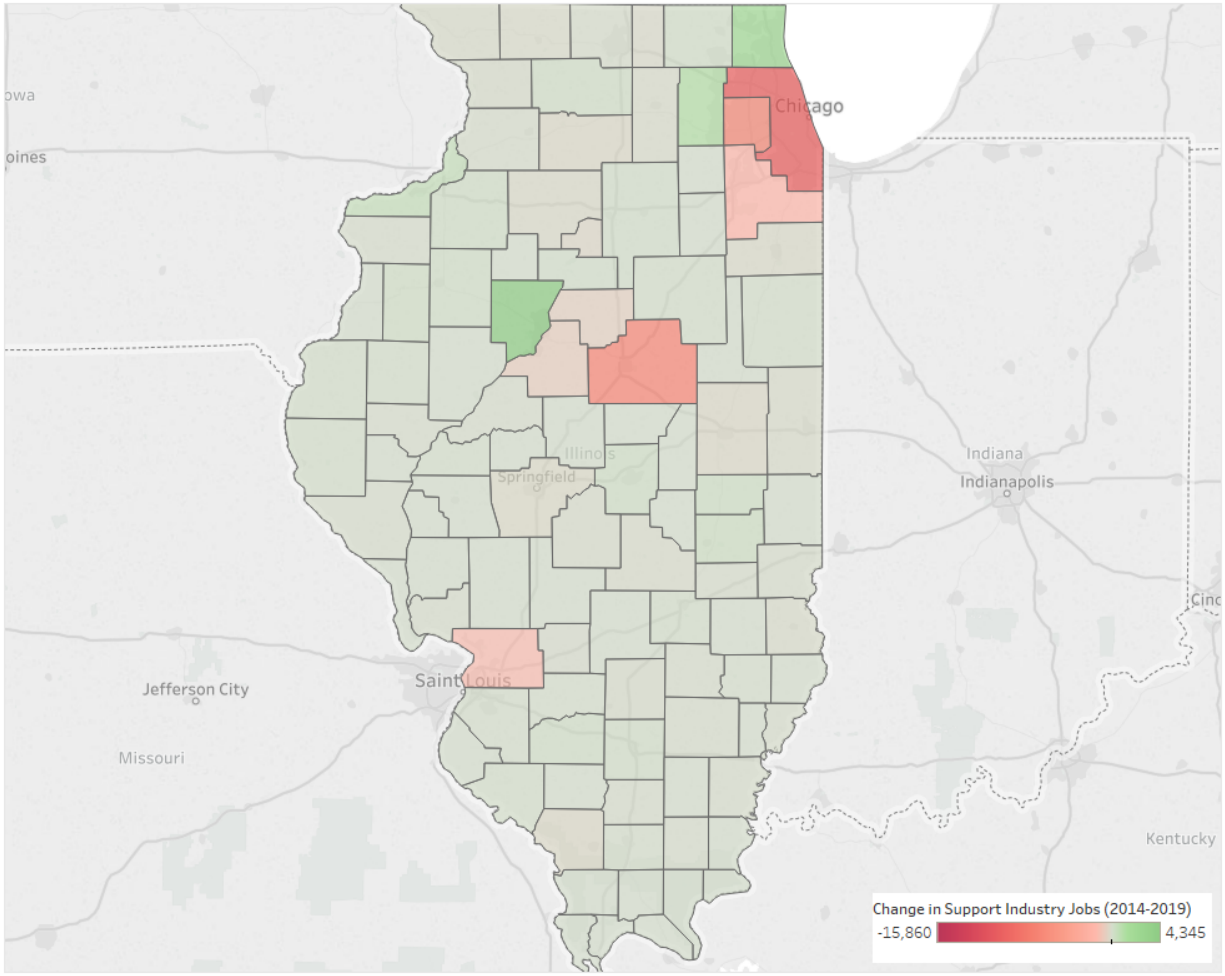
The Support Industries (SI) employ 150,600 Illinois residents. Cook (52,200 jobs), DuPage (28,500), and Lake (13,700) Counties account for 63% of SI jobs found across the state. Although many SI jobs are concentrated among the three counties mentioned above, 22 other counties across Illinois have 500 or more SI jobs (Figure 14).

Figure 13. Support Industry Employment, 2019



Across Illinois, jobs in Support Industries declined by 10% between 2014 and 2019, shedding 15,900 jobs. While the heaviest losses were sustained in Cook County (-9,700 jobs), McLean, DuPage, Will, and Madison Counties each lost 1,000 or more jobs during this time (Figure 14). Growth in ET activity across Illinois will help bolster demand for the goods and services provided by Support Industries, potentially mitigating some of these losses.

Figure 14: Change in Support Industries Employment, 2014-2019



Occupational Analysis

The ten-most common occupations found within Support Industries account for 913,600 jobs across the entire Illinois economy. These occupations span a range of skill sets and educational requirements, with some roles requiring Bachelor's degrees and others requiring a high school diploma or equivalent (Table 5). This suggests that growing employment in Support Industries propelled by ET activity could draw from an established talent pool of nearly one million workers across the economy.

Table 5: Key Support Industry Occupations

Key Occupation	2014 Jobs	2019 Jobs	Projected 2024 Jobs[23]	Typical Entry-Level Education	Median Annual Earnings[24]
General and Operations Managers	107,827	129,608	131,744	Bachelor's degree	$100,381
Financial Managers	31,572	42,300	44,757	Bachelor's degree	$129,834
Project Management Specialists and Business Operations Specialists, All Other	52,739	52,807	54,000	Bachelor's degree	$76,565
Accountants and Auditors	52,609	53,255	55,078	Bachelor's degree	$70,491
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	71,412	67,690	67,822	High school diploma or equivalent	$58,635
Bookkeeping, Accounting, and Auditing Clerks	57,315	59,615	58,314	Some college, no degree	$41,954
Customer Service Representatives	114,593	122,821	120,914	High school diploma or equivalent	$36,213
Office Clerks, General	163,184	175,792	170,921	High school diploma or equivalent	$35,235
Machinists	33,184	29,425	29,011	High school diploma or equivalent	$40,435

[23] These projections are from EMSI 2020.4 and based on occupation-specific growth across the state. They are not based on ET growth estimates.
[24] Earnings include wages as well as benefits, such as healthcare or dental insurance.

Laborers and Freight, Stock, and Material Movers, Hand	144,921	180,293	188,069	No formal educational credential	$28,600

WORKFORCE DEMOGRAPHICS

The workers in Adjacent and Support industries are similar in their demographics to the overall Illinois workforce, though women tend to be relatively underrepresented and Adjacent and Support workers tend to be older than the overall workforce. Black or African-American worker representation are generally in line with statewide workforce averages and slightly higher among Primary Adjacent Industries. This strong representation is likely reflective of the broader U.S. automotive manufacturing industry, which has historically employed a high rate of Black or African-American workers. In 2020, 18.2% of automotive manufacturing workers were Black or African American, a rate 50% greater than the share of working age Black or African Americans.[25]

Tracking the demographics of workers is one important way to ensure that the significant economic benefits from the growth of the EV sector are accessible and distributed equitably. Lessons learned from the traditional automobile sector, as well as expanding outreach, awareness, and education and training opportunities to underrepresented communities can ensure that meaningful career opportunities are accessible to all. Expanding outreach and awareness will also grow increasingly important as these industries experience an aging workforce that is likely have to a substantial number of workers looking to retire in the next 5-10 years.

Immediate Adjacent Industry Workforce Demographics

The Immediate Adjacent workforce has a relatively high proportion of workers that are non-White, while women are underrepresented relative to the overall workforce (Figure 15). The IAMI workforce also tends to skew older, with nearly half of the workforce (46%) between the ages of 45 and 64. (Figure 16). An older workforce paired with a relatively small proportion of younger workers could suggest that qualified workers may become more scare as older workers look to retire.

[25] 2020 Employed persons by detailed industry, sex, race, and Hispanic or Latino ethnicity. Labor Force Statistics from the Current Population Survey. U.S. Bureau of Labor Statistics.

Figure 15. Immediate Adjacent Workforce Demographics

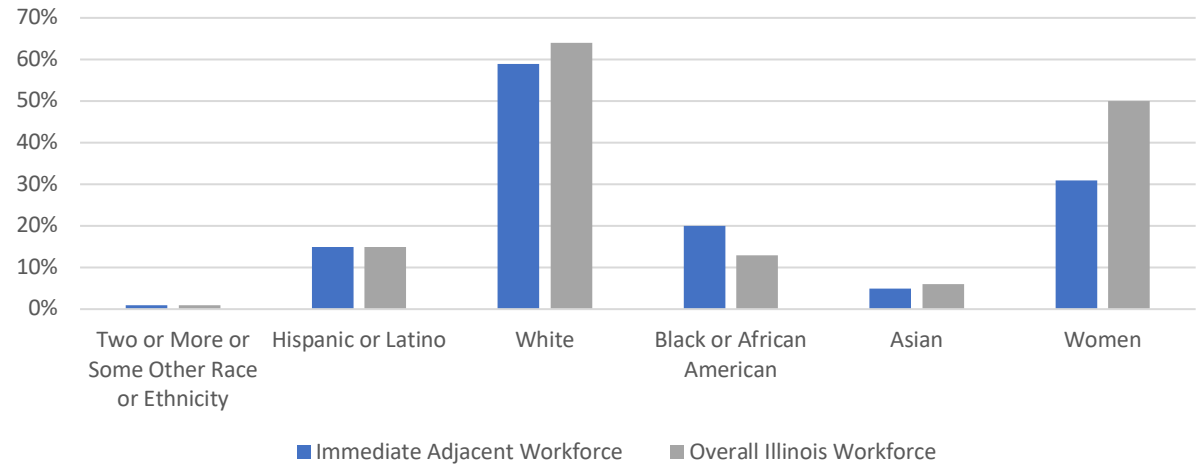
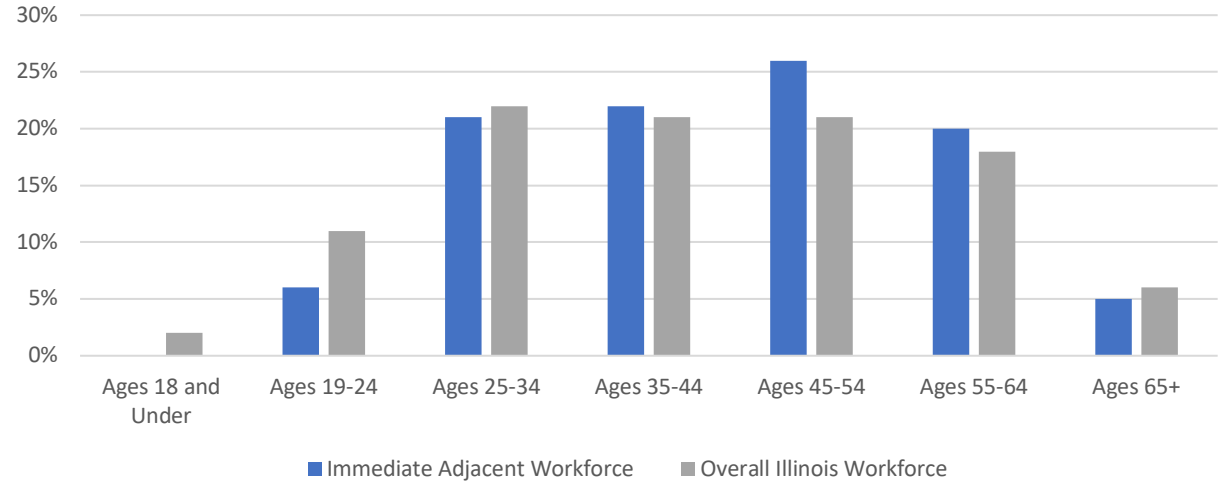


Figure 16. Age Distribution of Immediate Adjacent Workforce



Secondary Adjacent Workforce Demographics

The Secondary Adjacent Industry workforce has a slightly greater proportion of workers who are Hispanic or Latino than the overall workforce. The Secondary Adjacent workforce also has a slightly higher proportion of Asian workers, and women are represented at a much lower rate (31%) than in the overall workforce (50%) (Figure 17). The SAMI workforce is also relatively older than the overall workforce in Illinois. Fifty percent of SAMI workers are between the ages of 45 and 64 (Figure 18). This suggests that SAMI employers face challenges similar to IAMI employers and may struggle to find qualified talent in 5-10 years as their workers look to retire.

Figure 17. Secondary Adjacent Workforce Demographics

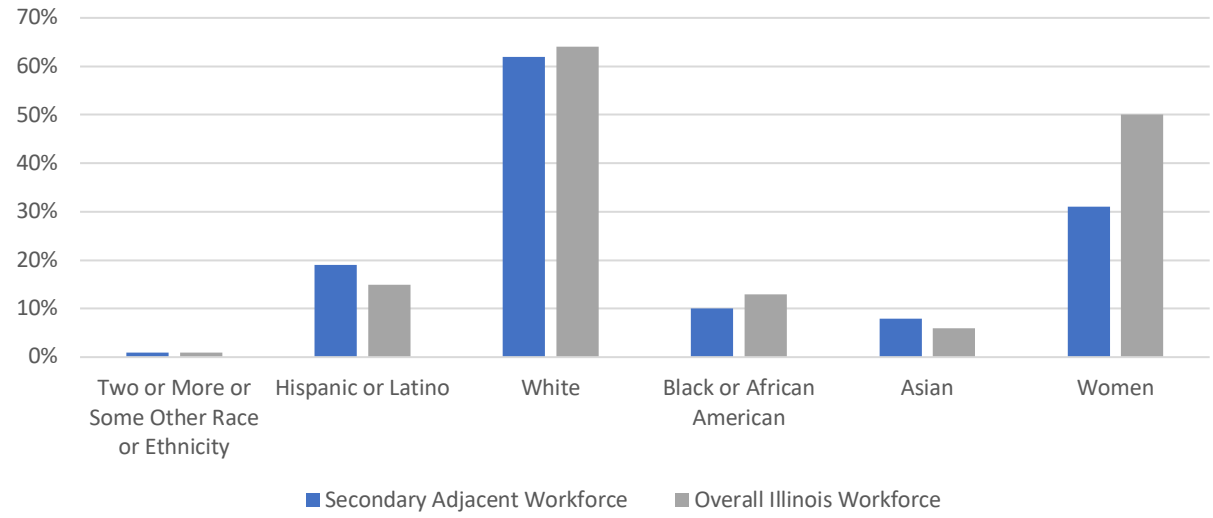
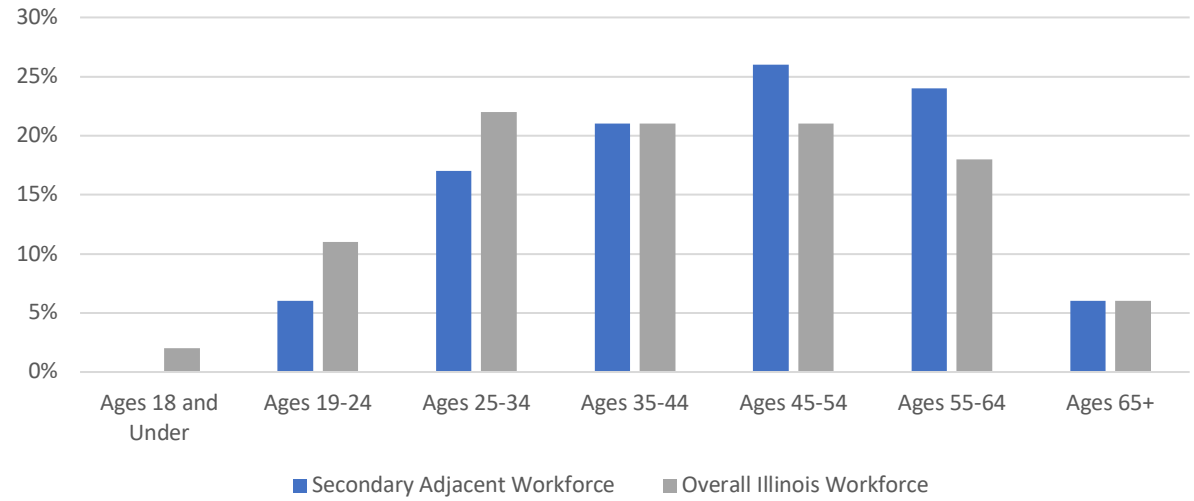


Figure 18. Age Distribution of Secondary Adjacent Workforce



Support Industry Workforce Demographics

The Support Industry workforce tends to have a greater share of workers that are White and Men relative to the overall workforce in the state (Figure 19). The Support Industry workforce also tends to be older than the overall Illinois workforce (Figure 20). There are also relatively fewer workers between the ages of 19-34, suggesting that there may be a shortage of younger and experienced talent prepared to serve as team or crew leaders in the medium- to long-term.

Figure 19. Support Industry Workforce Demographics

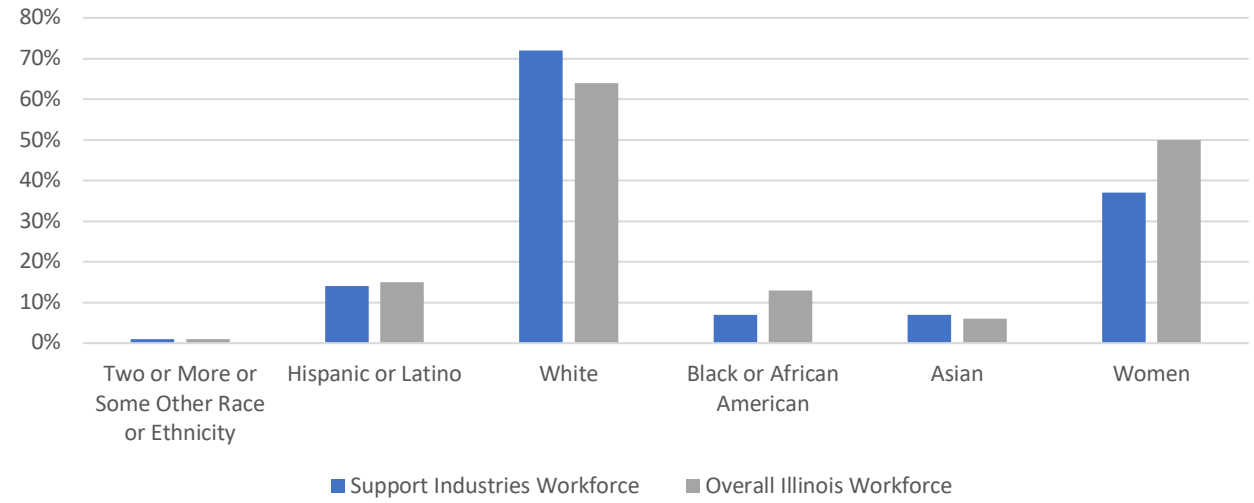
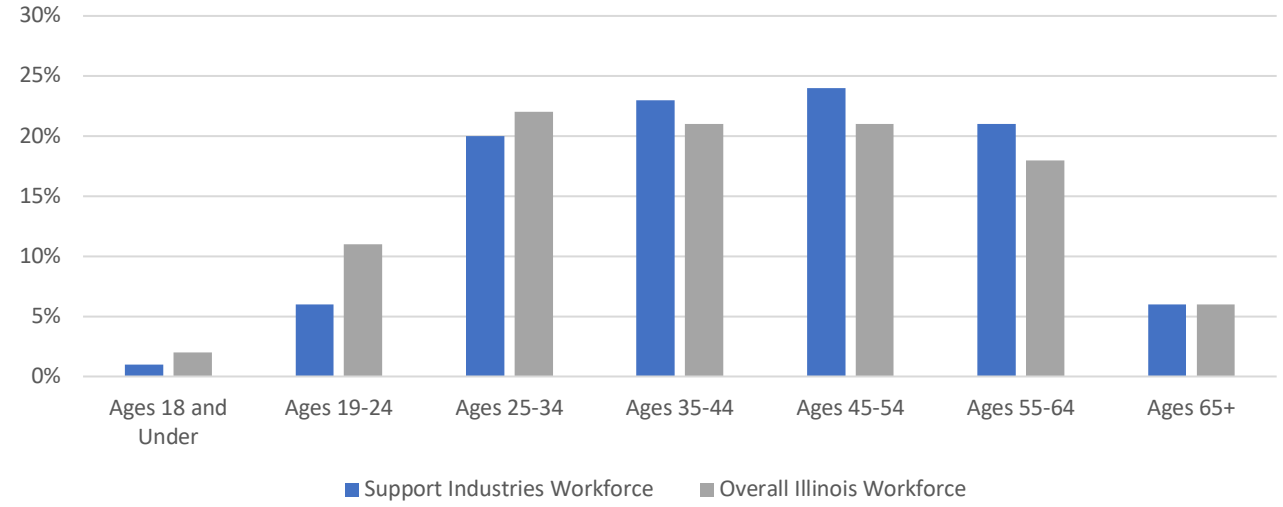


Figure 20. Age Distribution of Support Industry Workforce



TRAINING INVENTORY

The research team examined the training and education opportunities available to Illinois residents interested in joining the ET workforce. Because there are so many potential training opportunities that can lead to ET careers, only programs that are specifically geared towards ET activity are included in this inventory, while programs that include some ET-related curricula, but are not wholly ET-focused, were left out. To see a list of the trainings identified, please see Appendix B.

Thirty-eight community colleges and vocational schools across Illinois currently offer vehicle maintenance and repair programs. While these programs increasingly contain modules on hybrid and electric vehicles (at least four currently do), this material often makes up a small portion of the overall curriculum. For this reason, automotive technician and maintenance programs are not included in this inventory.

Manufacturing roles, such as Machinists and Assemblers, are also a crucial component of the ET economy in Illinois. Training for these roles is rarely ET-specific, and workers are typically developed through Illinois' Community College system or union-related work experience. Forty-four community colleges and vocational schools currently offer precision manufacturing programs in the state, as do other private and non-profit training providers. In 2020, Illinois announced a $15 million investment into two new Manufacturing Trainings Academies to help job seekers gain experience and qualifications as CNC Machine Operators, Technicians, Machinery Mechanics, and other Machinist roles.[26] While these programs are not included in this training inventory due to their lack of distinct ET-related programming, Figure 22 showcases the numerous Precision Manufacturing training opportunities and program completions around the state.

Across Illinois, only three training programs were found to be geared specifically towards ET-related activities. All three training opportunities focused on charging station installation, two of which host Electric Vehicle Infrastructure Training Program (EVITP) curricula. The EVITP is a national program developed by a broad coalition of EV stakeholders and has certified more than 4,000 electricians across the United States and Canada. The nationally developed program is hosted locally, often through local education providers, unions, or industry associations. One such EVITP program in Illinois is a webinar that was developed in partnership between the Electrical Contractors' Association of City of Chicago and the International Brotherhood of Electrical Workers (IBEW). The webinar highlights the importance of an EVITP certification and the requirements to become certified. Figure 21 highlights the geographic distribution of the three ET-specific training programs. Although they are offered online, these programs are often only advertised through their local sponsors meaning that geography remains a factor in accessibility to these trainings.

[26] https://www2.illinois.gov/dceo/Media/PressReleases/Pages/PR102720-2.aspx

Figure 21. ET-Specific Training Programs in Illinois

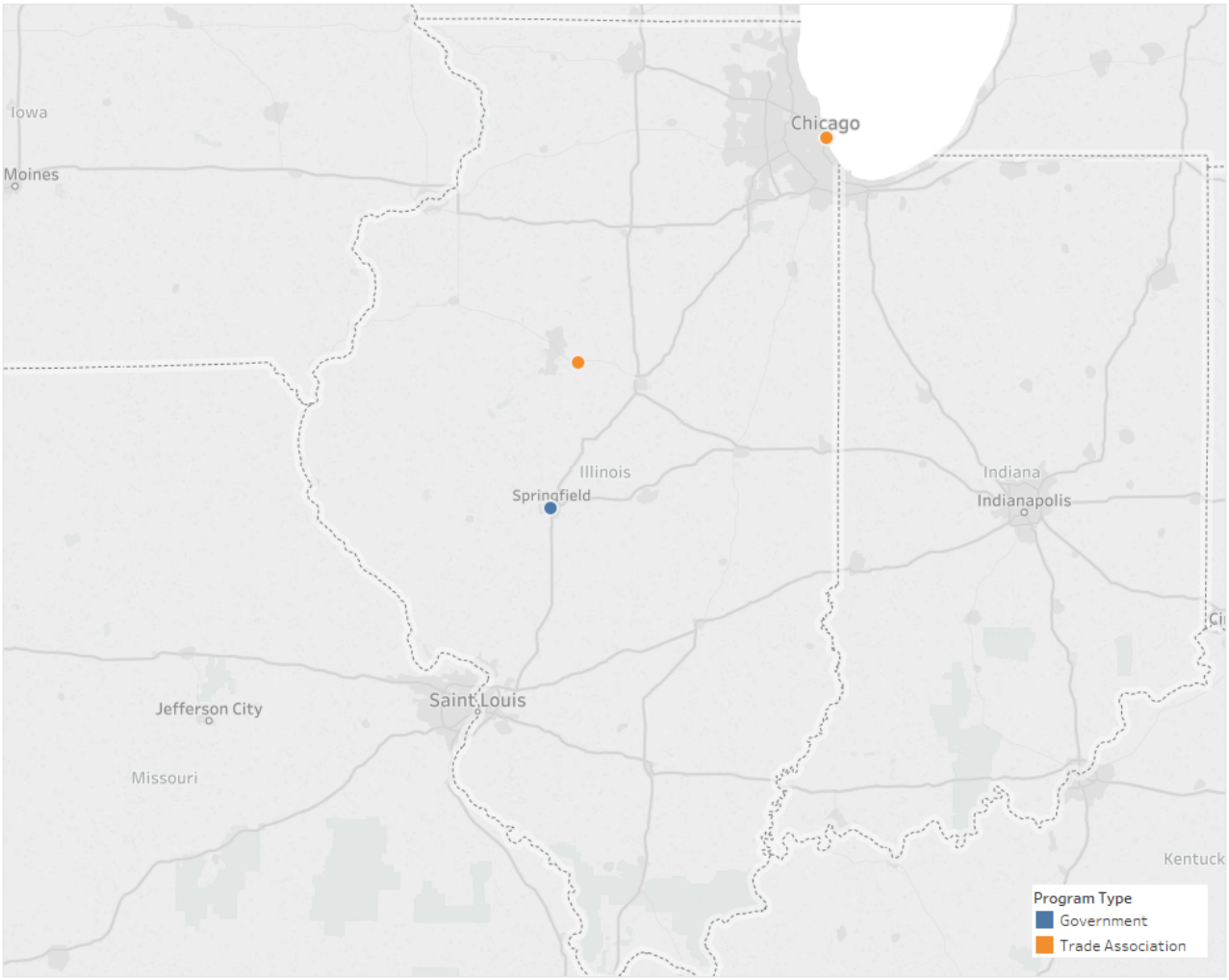
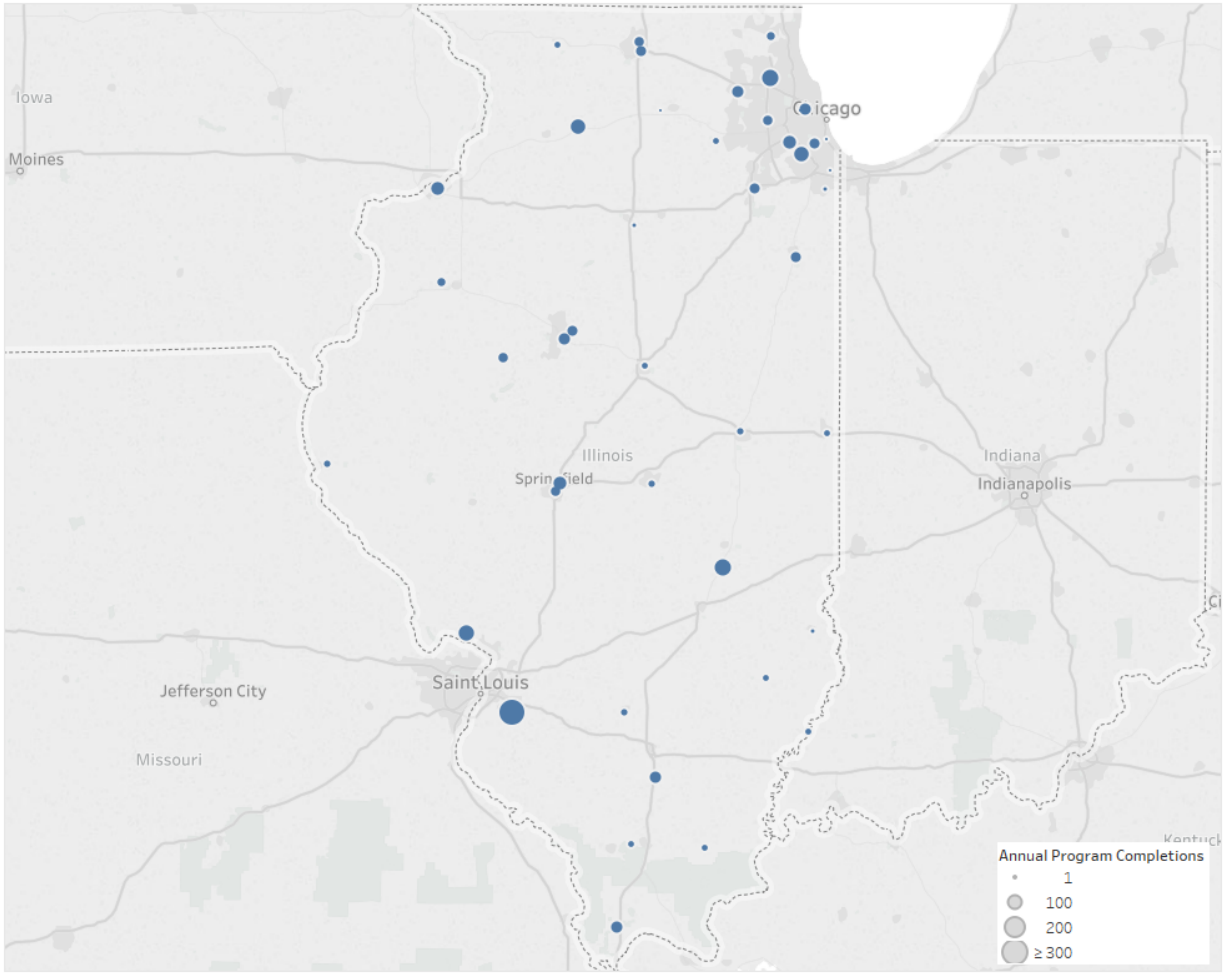


Figure 22. Precision Manufacturing Program Completions in Illinois[27]



[27] 2018-2019 Completions. JobsEQ

CONCLUSION

The ET sector in Illinois accounted for 5,200 jobs across 560 businesses in 97 counties in 2019. Over the subsequent five years (2019-2024), ET employment is expected to grow 83%, resulting in a total of 9,500 ET jobs across the state by 2024. While some of this employment growth is attributable to the rollout of the Rivian manufacturing plant in Normal, Illinois, a substantial portion of this employment growth is attributable to growing demand for component parts going into increasingly popular EVs.

Illinois' strong manufacturing roots and well-skilled workforce demonstrate the significant potential for the ET industry in the state. Two-thirds of ET workers in Illinois are involved in manufacturing, and the projected demand for ET manufacturing in Illinois has the potential to help offset some of the historical manufacturing employment losses seen in various counties across the state. As demand for ET goods and services continues to grow state- and nationwide, the demand for trained manufacturing workers will increase as well. Illinois' strong manufacturing training pipeline appears ready to help the state meet any future needs.

The growth of ET also presents a substantial opportunity to create jobs throughout the ET supply chain, which could further offset some of the recent historical employment losses seen in Adjacent and Support Industries. Many counties across Illinois saw employment losses in Adjacent Industries between 2014-2019, and Support Industries statewide saw 15,900 jobs disappear. The growing ET sector has an opportunity to bolster demand for some of these support services, and also serve as a career transition opportunity for those working in Adjacent industries facing economic headwinds.

The current ET workforce in Illinois provides an early glimpse of what's expected for the state's future ET workforce. Illinois' strong history of automotive and automotive component parts manufacturing, coupled with a growing workforce in this sector, means that the state is well positioned to grow with the rising demand for ET goods and services.

APPENDIX A: METHODOLOGY

Employment and GSP

Employment and GSP extrapolations were performed using data collected for this report, as well as data from the 2019 United States Energy Employment Report (USEER) and EMSI. The methodology used for the 2019 USEER meets the highest statistical and methodological standards and has been reviewed by the Bureau of Labor Statistics (BLS) and the Department of Energy (DOE). More details about the methodology can be found here: usenergyjobs.org.

Data Collection

The research team utilized desktop research, phone calls, email, and other forms of outreach to generate a database of companies known to be active in ET. Firms from the potential database (this database was comprised of companies from industries which were believed to be involved in ET) were first examined through desktop research to determine if they were related to ET activity. Any firms that were confirmed or identified as potentially involved in ET were called via telephone up to two times. Once phone contact was established, BW staff would confirm involvement in ET, and ask supplementary questions confirming employment counts and asking about in-state suppliers and customers. If phone contact could not be established, voicemails were left and, when possible, emails sent.

BW Research employed a number of strategies to maximize the data collection effort given the considerable size of the potential database. These approaches are outlined below:

- Prioritization of manufacturing NAICS codes. Manufacturing roles present the greatest opportunity for job creation, as manufacturing is generally more labor intensive and has substantial downstream supply chains and workforces that support them.
- "Snowball" methodology. Once a firm confirmed that they were involved in ET in some capacity, researchers followed up by asking about any relevant in-state suppliers and customers. This allowed the research team to develop a more complete picture of the supply chain.
- Among industries which the research team did not exhaust via phone interviews, staff conducted desktop research to identify relevant firms that advertised ET-related products or services.

Of the 11,240 firms in the assembled potential database, 2,080 firms were examined closely by the research team. Of these, 542 were contacted via telephone at least once. Of the 9,160 firms that remain unexamined, 91% fall under five industry codes: 23% percent are electrical contracting firms, 22% are industrial machinery and equipment wholesalers, 21% are urban transit systems, 13% are other electronic parts and equipment merchant wholesalers, and 12% are miscellaneous rental and leasing facilities.

Some of the industry definitions of electric transportation used in this report are not included and reported in the USEER motor vehicles section. These industries include:

- Automobile Retail (NAICS 4411)
- Rail Transportation (NAICS 4281)
- Farm and Garden Machinery and Equipment Merchant Wholesalers (NAICS 42382)
- Agricultural Implement Manufacturing (NAICS 33311)
- Railroad Rolling Stock Manufacturing (NAICS 33651)
- Industrial Machinery and Equipment Merchant Wholesalers (NAICS 42383)
- Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers (NAICS 42361)
- Engineering Services (NAICS 54133)
- Electrical Contractors and Other Wireless Installation Contractors (NAICS 23821)
- Power and Communication Line and Related Structures (NAICS 33451)
- Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (NAICS 33451)
- Electrical Equipment Manufacturing (NAICS 33531)
- Plate Work and Fabricated Structural Product Manufacturing (NAICS 33231)

Having confidently determined the involvement of 2,080 firms out of the BLS estimated 17,620 firms in industries that were identified as potentially involved in ET, the margin of error is among these industries is approximately 2.49% for incidence.

APPENDIX B: ET TRAINING INVENTORY

Provider	Program	Program Type	Occupational Focus	City	Zip Code	Duration
The State Group	Electric Vehicle Infrastructure Training Program (EVITP)	Trade Association	Installation (electrical)	Mayfair	61550	24-30 Hours
Illinois Commerce Commission	EV Charging Station Installer Certification	Government	Installation (electrical)	Springfield	62704	1 year
IN-TECH	Electric Vehicle Infrastructure Training Program (EVITP)	Trade Association	Installation (electrical)	Chicago	60616	24-30 Hours

APPENDIX C: INDUSTRY GROUP DEFINITIONS

Below are the NAICS code definitions for the immediate Adjacent, secondary Adjacent, and Support Industries described in this report.

Table 6: Immediate Adjacent Manufacturing Industries

NAICS Code	Description
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
334419	Other Electronic Component Manufacturing
335312	Motor and Generator Manufacturing
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing
336111	Automobile Manufacturing
336120	Heavy Duty Truck Manufacturing
336390	Other Motor Vehicle Parts Manufacturing
336510	Railroad Rolling Stock Manufacturing
336991	Motorcycle, Bicycle, and Parts Manufacturing
336999	All Other Transportation Equipment Manufacturing

Table 7: Secondary Adjacent Industries

NAICS Code	Description
333921	Elevator and Moving Stairway Manufacturing
333922	Conveyor and Conveying Equipment Manufacturing
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing
334310	Audio and Video Equipment Manufacturing
334412	Bare Printed Circuit Board Manufacturing
334413	Semiconductor and Related Device Manufacturing
334416	Capacitor, Resistor, Coil, Transformer, and Other Inductor Manufacturing
334417	Electronic Connector Manufacturing
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing
335313	Switchgear and Switchboard Apparatus Manufacturing
335314	Relay and Industrial Control Manufacturing
335991	Carbon and Graphite Product Manufacturing
336112	Light Truck and Utility Vehicle Manufacturing
336212	Truck Trailer Manufacturing

336213	Motor Home Manufacturing
336214	Travel Trailer and Camper Manufacturing
336310	Motor Vehicle Gasoline Engine and Engine Parts Manufacturing
336320	Motor Vehicle Electrical and Electronic Equipment Manufacturing
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing
336370	Motor Vehicle Metal Stamping
336412	Aircraft Engine and Engine Parts Manufacturing
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing
336414	Guided Missile and Space Vehicle Manufacturing
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
336611	Ship Building and Repairing
336612	Boat Building
336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing

Table 8: Support Industries

NAICS Code	Description
331110	Iron and Steel Mills and Ferroalloy Manufacturing
331511	Iron Foundries
332312	Fabricated Structural Metal Manufacturing
332313	Plate Work Manufacturing
332710	Machine Shops
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing
333613	Mechanical Power Transmission Equipment Manufacturing
333618	Other Engine Equipment Manufacturing
423110	Automobile and Other Motor Vehicle Merchant Wholesalers
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers
423830	Industrial Machinery and Equipment Merchant Wholesalers
551114	Corporate, Subsidiary, and Regional Managing Offices

APPENDIX D: GLOSSARY OF TERMS

Below is a glossary of terms used throughout this report. Additional information on some key occupations can be found in Appendix A.

Aircraft Parts and Auxiliary Equipment Manufacturing: This U.S. industry comprises establishment primarily engaged in (1) manufacturing aircraft parts or auxiliary equipment (except engines and aircraft fluid power subassemblies) and/or (2) developing and making prototypes of aircraft parts and auxiliary equipment. Auxiliary equipment includes such items as crop dusting apparatus, armament racks, inflight refueling equipment, and external fuel tanks.

Assemblers and Fabricators (All Other, Including Team Assemblers): Work as part of a team having responsibility for assembling an entire product or component of a product. Team assemblers can perform all tasks conducted by the team in the assembly process and rotate through all or most of them rather than being assigned to a specific task on a permanent basis. May participate in making management decisions affecting the work. Includes team leaders who work as part of the team.

Automobile Merchant Wholesalers: This industry comprises establishments primarily engaged in the merchant wholesale distribution of new and used passenger automobiles, trucks, trailers, and other motor vehicles, such as motorcycles, motor homes, and snowmobiles.

Automotive Service Technicians and Mechanics: Diagnose, adjust, repair, or overhaul automotive vehicles.

Boat Building Manufacturing: Establishments primarily engaged in building boats. Boats are defined as watercraft not built in shipyards and typically of the type suitable or intended for personal use. Included in this industry are establishments that manufacture heavy-duty inflatable rubber or inflatable plastic boats (RIBs).

Computer-Controlled Machine Tool Operators, Metal and Plastic: Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.

Cutting, Punching, and Press Machine Setters, Operators, and Tenders: Set up, operate, or tend machines to saw, cut, shear, slit, punch, crimp, notch, bend, or straighten metal or plastic material.

Electrical, Electronic, and Electromechanical Assemblers (Except Coil Winders, Tapers, and Finishers): Assemble or modify electromechanical equipment or devices, such as servomechanisms, gyros, dynamometers, magnetic drums, tape drives, brakes, control linkage, actuators, and appliances.

Electrical and Electronic Goods Merchant Wholesalers: This industry comprises establishments primarily engaged in the merchant wholesale distribution of electrical construction materials; wiring supplies; electric light fixtures; light bulbs; and/or electrical power equipment for the generation, transmission, distribution, or control of electric energy.

Fabricated Structural Metal Manufacturing: This industry comprises establishments primarily engaged in fabricating structural metal products, such as assemblies of concrete reinforcing bars and fabricated bar joists.

First-Line Supervisors of Production and Operating Workers: Directly supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators.

Heavy Duty Truck Manufacturing: industry comprises establishments primarily engaged in (1) manufacturing heavy duty truck chassis and assembling complete heavy duty trucks, buses, heavy duty motor homes, and other special purpose heavy duty motor vehicles for highway use or (2) manufacturing heavy duty truck chassis only.

Industrial Machinery and Equipment Merchant Wholesalers: This industry comprises establishments primarily engaged in the merchant wholesale distribution of specialized machinery, equipment, and related parts generally used in manufacturing, oil well, and warehousing activities.

Inspectors, Testers, Sorters, Samplers, and Weighers: Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment.

Iron and Steel Mills and Ferroalloy Manufacturing: This industry comprises establishments primarily engaged in one or more of the following: (1) direct reduction of iron ore; (2) manufacturing pig iron in molten or solid form; (3) converting pig iron into steel; (4) making steel; (5) making steel and manufacturing shapes (e.g., bar, plate, rod, sheet, strip, wire); (6) making steel and forming pipe and tube; and (7) manufacturing electrometallurgical ferroalloys. Ferroalloys add critical elements, such as silicon and manganese for carbon steel and chromium, vanadium, tungsten, titanium, and molybdenum for low- and high-alloy metals. Ferroalloys include iron-rich alloys and more pure forms of elements added during the steel manufacturing process that alter or improve the characteristics of the metal.

Laborers and Freight, Stock, and Material Movers (Hand): Manually move freight, stock, or other materials or perform other general labor. Includes all manual laborers not elsewhere classified.

Machine Shops: Machine shops primarily engaged in machining metal and plastic parts and parts of other composite materials on a job or order basis. Generally machine shop jobs are low volume using machine tools, such as lathes (including computer numerically controlled); automatic screw machines; and machines for boring, grinding, milling, and additive manufacturing.

Machinists: Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

Mechanical Engineers: Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of equipment such as centralized heat, gas, water, and steam systems.

Motor and Generator Manufacturing: This U.S. industry comprises establishments primarily engaged in manufacturing electric motors (except internal combustion engine starting motors), power generators (except battery charging alternators for internal combustion engines), and motor generator sets (except turbine generator set units).

Motor Home Manufacturing: Type of self-propelled recreational vehicle (RV) which offers living accommodation combined with a vehicle engine.

Motor Vehicle Manufacturing: The motor vehicles manufactured in this industry include automobiles, sport-utility vehicles (SUVs), vans and pickup trucks, heavy duty trucks, buses, truck trailers, and motor homes. It also includes the manufacturing of the parts that go into these vehicles, such as the engine, seats, brakes, and electrical systems.

Multiple Machine Tool Setters, Operators, and Tenders (Metal and Plastic): Set up, operate, or tend more than one type of cutting or forming machine tool or robot.

Non-Ferrous Metal Foundries: Establishments primarily engaged in manufacturing nonferrous metal castings (including alloys), except all die-castings and other castings of aluminum or copper.

Other Electronic Component Manufacturing: Manufacturing electronic components (except bare printed circuit boards; semiconductors and related devices; electronic capacitors; electronic resistors; coils, transformers and other inductors; connectors; and loaded printed circuit boards).

Other Motor Vehicle Parts Manufacturing: Primarily engaged in manufacturing and/or rebuilding motor vehicle parts and accessories (except motor vehicle gasoline engines and engine parts, motor vehicle electrical and electronic equipment, motor vehicle steering and suspension components, motor vehicle brake systems, motor vehicle transmissions and power train parts, motor vehicle seating and interior trim, and motor vehicle stampings).

Plate Work Manufacturing: Industry comprises establishments primarily engaged in manufacturing fabricated metal plate work by cutting, punching, bending, shaping, and welding purchased metal plate.

Power, Distribution, and Specialty Transformer Manufacturing: Engaged in manufacturing power, distribution, and specialty transformers (except electronic components). Industrial-type and consumer-type transformers in this industry vary (e.g., step up or step down) voltage but do not convert alternating to direct or direct to alternating current.

Railroad Rolling Stock Manufacturing: This industry comprises establishments primarily engaged in one or more of the following: (1) manufacturing and/or rebuilding locomotives, locomotive frames and parts; (2) manufacturing railroad, street, and rapid transit cars and car equipment for operation on rails for freight and passenger service; and (3) manufacturing rail layers, ballast distributors, rail tamping equipment and other railway track maintenance equipment.

Relay and Industrial Control Manufacturing: Establishments primarily engaged in manufacturing relays, motor starters and controllers, and other industrial controls and control accessories.

Sales Representatives, Wholesale and Manufacturing (except Technical and Scientific Products): Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment.

Semiconductor Manufacturing: A semiconductor chip is an electric circuit with many components such as transistors and wiring formed on a semiconductor wafer. An electronic device comprising numerous these components is called "integrated circuit (IC)". The layout of the components is patterned on a photomask (reticle) by computer and projected onto a semiconductor wafer in the manufacturing processes

Switchgear and Switch Board Apparatus Manufacturing: The switchgear and switchboard apparatus manufacturing industry comprise establishments manufacturing switchgear and switchboard apparatus. Switchgear is the combination of electrical disconnect switches and circuit breakers used in electricity transmission to interrupt or reestablish the flow of electricity.

Truck Trailer Manufacturing: This U.S. industry comprises establishments primarily engaged in manufacturing truck trailers, truck trailer chassis, cargo container chassis, detachable trailer bodies, and detachable trailer chassis for sale separately.

Welders, Cutters, Solderers, and Brazers: Use hand-welding, flame-cutting, hand soldering, or brazing equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products.

Wholesale and Manufacturing Sales Representatives: Sell goods for wholesalers or manufacturers to businesses or groups of individuals. Work requires substantial knowledge of items sold.

APPENDIX E: ET-EMPLOYMENT BY CONGRESSIONAL DISTRICT

The table below provides estimates for ET-related employment by congressional districts in Illinois.

Congressional District	2019 ET Employment
1	306
2	313
3	362
4	290
5	322
6	387
7	266
8	341
9	242
10	296
11	383
12	39
13	190
14	168
15	45
16	130
17	45
18	1,080

APPENDIX F: AUTOMOTIVE MANUFACTURING TRAINING PROGRAMS

Education & Training Provider	2019 Completions
Universal Technical Institute of Illinois Inc	345
College of Lake County	258
Joliet Junior College	220
Elgin Community College	151
Lake Land College	151
Moraine Valley Community College	136
Waubonsee Community College	131
Lincoln College of Technology-Melrose Park	106
Lincoln Land Community College	94
McHenry County College	78
Rend Lake College	69
Rock Valley College	66
City Colleges of Chicago-Harry S Truman College	55
College of DuPage	53
Parkland College	52
Triton College	42
Lewis and Clark Community College	33
Olney Central College	27
Kankakee Community College	26
Prairie State College	24
Richland Community College	24
Illinois Central College	21
Illinois Valley Community College	21
Kishwaukee College	18
Kaskaskia College	15
Oakton Community College	14
Highland Community College	13
Morton College	11
Carl Sandburg College	10
John A Logan College	9
Southeastern Illinois College	8
City Colleges of Chicago-Kennedy-King College	4
City Colleges of Chicago-Olive-Harvey College	4
Frontier Community College	4

Shawnee Community College	3
Black Hawk College	1
Danville Area Community College	1