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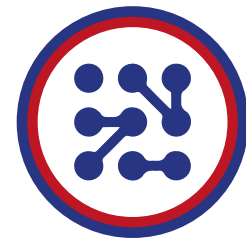
NORTH AMERICAN COMPETITIVENESS WORKING GROUP

**U.S. INDUSTRIAL POLICY:
IMPACTS ON THE GEOGRAPHY OF
EV/SEMICONDUCTOR RESHORING
AND ITS INFLUENCE ON SUB-NATIONAL
INVESTMENT & JOB GROWTH**

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ABSTRACT

Influenced by changing geopolitics, national security interests and climate change, the Biden Administration's passage of the IRA and CHIPS Act has fundamentally re-defined the direction of US global leadership beyond the promotion of a neoliberal philosophy based on expanded free trade, open-markets and a rules-based international trading system towards a new industrial policy aimed at bolstering U.S. economic competitiveness in emerging and disruptive sectors such as clean energy, electric vehicles (EVs) and semi-conductors, all requiring critical minerals. The new U.S. industrial policy and federal subsidies through the IRA and CHIPS Act have catalyzed increased reshoring/nearshoring manufacturing-related investment from China to the United States and to a lesser degree Mexico and Canada. Such policies have also fueled an increased volume of sub-nationally focused corporate subsidies, offered by state and local governments with additional public funding, as a means of maximizing future clean-tech reshoring and nearshoring to their communities. This paper examines the geographical (including cross-border) impacts of industrial policy-driven reshoring in the United States, specifically focused on EVs, batteries, and semiconductors and their resulting consequences on sub-nationally funded corporate subsidies. It questions the long-term benefit of these publicly-funded investments in terms of economic impact and job creation in light of the fast-changing nature of technological innovation and global competition.



I. INTRODUCTION

In an effort to respond to post-COVID-19 related supply chain shocks, changing geo-politics and growing trade tensions with China, the United States is pursuing a new industrial policy agenda, after an era in which the country led the way with a policy agenda focused on globalization, free trade and a rules-based order.

The new U.S. industrial policy is largely driven by two targeted legislative actions recently signed into law, the [2022 Inflation Reduction Act \(IRA\)](#) and [CHIPS & Science Act \(CHIPS Act\)](#). Together, these legislative initiatives were designed to bolster U.S. economic competitiveness in critical and disruptive technologies related to renewable energy¹, batteries, electric vehicles (EVs), and semi-conductors in order to protect U.S. economic and national security interests. Collectively, the IRA and CHIPS Act are providing over \$421 billion in federal funding to catalyze expanded investment and manufacturing capacity in the referenced clean-tech priority areas.

The IRA also offers important consumer incentives, including a [clean vehicle tax credit](#) of up to \$7,500 for the purchase of each new EV. The tax credit has two key elements: The first is a \$3,750 tax credit applicable to the value of critical minerals contained in the battery, which must be either extracted or processed in the United States or a country with which the U.S. has a free trade agreement, starting with an minimum requirement of **40%** in 2023 and increasing to **80%** by 2027. The second element of the tax credit is tied to battery components, which must be manufactured or assembled in North America beginning with a content requirement of **50%** in 2023 and increasing to 100% by 2029.²

While the subsidies offered under the IRA to qualifying companies are market distorting and counter the original spirit of NAFTA, their resulting investments in clean energy, electric vehicles and climate action, in general, will help the United States—the second largest CO2 emitter in the world behind China – to meet its international decarbonization commitments under the Paris Agreement and reduce greenhouse gas (GHG) emissions by **50-52%** by 2030. Here, a fair case can be made that, if not for the IRA, investments in clean energy and EVs would simply not be taking place at the speed and scale we are seeing today.

The IRA's financial incentives to both businesses and consumers have also been influenced by changes in U.S. environmental policy under the Biden Administration focused on more ambitious national air emissions standards and corresponding **Corporate Average Fuel Economy (CAF)** standards for vehicles manufactured in the United States, which are aimed at incentivizing a shift away from the internal combustion engine (ICE) to battery electric vehicles (BEVs) in order to reduce GHG emissions over time.

¹While the IRA includes significant federal funding intended to incentivize reshoring of clean energy technology manufacturing to the United States for everything from solar panels to wind turbine towers, this paper excluded analysis of these renewable energy supply chains to focus greater attention on EVs, batteries and semiconductors.

²Press Release: [Treasury Releases Guidance on New Clean Vehicle Credit to Lower Costs for Consumers, Build U.S. Industrial Base, Strengthen Supply Chains](#), U.S. Treasury Department, March 31, 2023.



The referenced federal incentives available under the IRA and CHIPS Act have been further buttressed by additional subnational incentives offered by U.S. state and local governments that include tax credits, tax abatements and/or exemptions, grants and low interest loans, infrastructure financing, commitments for municipal road improvements as well as breaks on real estate, power and water.³

Given the size of the overall investments for EV, battery and semiconductor manufacturing plants, inter-regional rivalries and bidding wars between U.S. states have intensified since the passage of the IRA and CHIPS Acts. According to John Boyd of the Florida-based firm, Boyd Company, **“we are in the second war of the states. That is how competitive economic development is between the states in 2023.”** Boyd further observed, **“It’s wild money and every state seems to be in on it.”⁴** Publicly available data of major manufacturing plant mega deals from the period 2019 to the end of Q2-2023 support this contention.

Based on data obtained from **Good Jobs First**, the nonprofit watchdog group, a total of \$5.6 billion in corporate incentives or subsidies had been provided for EV, battery and semiconductor plant megadeals during the two-year period before the passage of the IRA and CHIPS Act (2019-2021), yielding just over \$48 billion in new investment. Yet, during the 18-month period between January 1, 2022 and June 30, 2023, total corporate subsidies for EV, battery and semiconductor plant megadeals jumped to over \$23 billion, catalyzing nearly \$160.5 billion in new investments. This represents over a 4X increase in corporate incentives for the period following the enactment of both the IRA and CHIPS Act.

While corporate subsidies have increased sizably since the passage of the IRA and CHIPS Act, there is a growing body of evidence that calls into question the long-term economic benefit of state and local financed corporate subsidies, which remain a popular economic development tool for a growing number of subnational jurisdictions across the United States. Also, there is evidence to suggest that corporate subsidies tend to be more pervasive just prior to an election for obvious reasons⁵.

Though inter-regional rivalries have fueled a bidding war of sorts between state and regional governments for clean tech jobs, a fair question to ask is just how much each new job created is costing tax payers? Here, **Good Jobs First** observed in a recent [study](#), that five battery factory manufacturing plants, announced since the passage of the IRA, received corporate subsidies ranging from \$2 million to \$7 million per job. As a case in point, Ford Motor’s new \$3.5 billion battery plant in Marshall, Michigan will be eligible for up to \$6.7 billion in federal tax credits which will be complimented by an additional \$1.7 billion in state and local government subsidies. Given that the average wage at the plant will be about \$45,000 a year, this translates to a corporate subsidy of \$3.4 million per job created⁶.

³Marc Levy and the Associated Press, [‘A Wild West moment’: Competition to host microchip, battery and electric factories heats up among states](#), Fortune, April 1, 2023

⁴“A Wild West moment”

⁵Sobel, Russell S. and Wagner, Gary A. and Calcagno, Peter, *The Political Economy of State Economic Development Incentives: A Case of Rent Extraction* (December 23, 2021) Available at SSRN: <https://ssrn.com/abstract=3992116> or <http://dx.doi.org/10.2139/ssrn.3992116>

⁶Jacob Whiton and Greg LeRoy, *Power Outrage: Will Heavily Subsidized Battery Factories Generate Substandard Jobs?*, Good Jobs First.org, July 2023, page 2

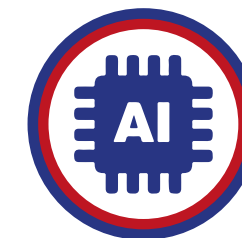


Beyond the question of cost per new job created, consideration should be given to the exceptionally large amounts of public funding required to lure a new EV, battery or semiconductor facility to U.S. communities working to promote expanded economic opportunities and job creation in their respective regions. Some high-profile deals have required a sizable investment of public resources. As a case in point, the recently announced siting of the [Scout Motors](#) EV manufacturing plant slated to be located in Blythewood, South Carolina required corporate incentives (federal, state and local) of over \$1.3 billion for a plant costing \$2 billion. This represents a public subsidy of **65%** of the project’s total investment. Also, for its new South Carolina plant, Scout Motors committed to creating **4,000 jobs**, yet at a cost of \$325,000 per job in public subsidies. [VinFast](#) (a Vietnamese-founded, Singapore-based EV manufacturer) was another company that received a sizable corporate subsidy (federal, state, local) totaling over US\$1.25 billion and representing **63%** of the expected \$2 billion facility cost. Details of major U.S. megadeals for EV, battery and semiconductor facilities across the United States between 2019 and Q2-2023, including total planned investments, publicly-funded corporate subsidies, and expected job creation for each plant can be found in Appendix A-C.

To some degree, subnational corporate subsidies, offered by state and local governments and complimented by other federal incentives, have played a role in reshoring/near shoring-related siting decisions by EV, battery and semiconductor manufacturing plants – but so too have other important workforce and technologically-related factors, especially advanced manufacturing robotics and AI that are transforming the economic and geographical contours of the U.S. automobile sector.

Because subnational corporate subsidies have been largely justified on their job-creation benefits, there is a need to better understand and quantify the true long-term economic impacts and job gains from recent U.S. reshoring investments in the EV, battery and semiconductor sectors. Technologies are ever changing and there is the risk that some fabrication methods will quickly become obsolete.

Also, advanced manufacturing robotics and AI are radically re-shaping the workforce needs of EV, battery and semiconductor manufacturing plants, requiring fewer but more skilled human capital. There is also a need to better appreciate the resulting cross-border impacts on neighboring provinces and states in Canada and Mexico resulting from market-distorting corporate subsidies in the United States. Both issues are examined in this issue paper.





II. SECTOR-SPECIFIC RESHORING CONSIDERATIONS

A) Battery Electric Vehicles (BEVs) and Battery Manufacturing:

While today electric vehicles (EVs) account for a small share of total motor vehicle sales in the United States (only 5.7% nationally in 2022⁷), EV market adoption is expected to grow rapidly in the coming years as more automakers shift production lines from internal combustion engine (ICE) vehicles to EVs. As U.S. consumers make this shift from ICE vehicles to EVs, important structural changes are also occurring within the U.S. auto industry specific to the value chain and suppliers to the sector.

While the Great Lakes region has traditionally been the center of the U.S. automobile industry – at least during the ICE era – an emerging new geography for battery electric vehicles (BEV) is taking shape across North America.

Decades of experience with ICEs have given way to batteries, power inverters and traction motors⁸. Though electric vehicles may have fewer parts than their ICE equivalents and complex transmission systems have been replaced by a simpler gearbox, EV are heavier (due to their batteries) and this has important cost and facility siting implications. BEV manufacturing plants rely more heavily on disruptive technologies such as advanced manufacturing robotics (including collaborative robots called cobots⁹), 3D printing as well as the use of artificial intelligence (AI) for, among other things, quality control,¹⁰ something once done by line workers in ICE vehicle production.

As BEV factories are less labor intensive and better optimize technology in their production lines, there is also less incentive to produce EVs in lower wage areas across the globe.¹¹

For BEV manufacturers, there is also a preference to be as close to the EV buying market as possible given the added cost of shipping the heavier BEVs relative to ICE vehicles. Here, EV manufacturers are increasingly employing a “build where you sell” strategy¹².

Auto manufacturers with EV production lines, such as Ford and GM, have continued to make investments in the Great Lakes region (including in Michigan, Ohio and Indiana) due not only to the pre-existing auto-related ecosystem of suppliers and the talent pool located there, but also for another important reason: Michigan is the only state in the United States with mining operations currently producing nickel concentrate and cobalt, two critical minerals used for EV batteries.¹³

Lithium is another critical mineral for EV battery manufacturing and two states with a ready supply are Arkansas and North Carolina¹⁴. As such, many of the new EV-only market entrants have shifted operations to the Southeast where these states are located. It’s worth noting the Southeast lacks a strong union tradition and this has been a factor in some recent relocation decisions.¹⁵

In the case of Tesla, its decision to site its manufacturing facility in Fremont, California was, in part, based on its desire to be in close proximity to lithium deposits in Nevada where the company now operates an EV battery making “Gigafactory.” Another key driver in Tesla’s site location decision-making was its desire to be in close proximity to the California EV consumer market, as the state currently accounts for over 40% of the national market for zero emission vehicles (ZEVs) with over 1,523,966 cumulative sales through Q1-2023¹⁷.

While proximity to critical minerals and the EV-buying public are key factors in the siting of BEV manufacturing facilities, as noted above, corporate subsidies have also played an important role in certain siting decisions. Here, states like Georgia and Tennessee have been among the most pro-active states to offer economic incentives to prospective companies. Both have also taken pro-active steps to create a supportive ecosystem for manufacturers, suppliers, and businesses across the entire electric vehicle value chain in their respective states.



⁷<https://cleantechnica.com/2023/02/25/us-electric-car-sales-increased-65-in-2022/>

⁸Patrick Mathews, [Robots Assemble Electric Vehicles](#), Assembly, December 21, 2022

⁹Emily Newton, [How are Cobots Disrupting Automobile Manufacturing?](#), Robotics Tomorrow, January 14, 2022

¹⁰Acerta, [Preventing Quality Spills in Automotive With Machine Learning and AI](#), Automobile Alley, March 13, 2023

¹¹Thomas H. Klier and James M. Rubenstein, Economic Perspective: North America’s rapidly growing electric vehicle market: Implications for the geography of automobile production, Federal Reserve Bank of Chicago, May 2022, pg. 12. <https://doi.org/10.21033/ep-2022-5>

¹²Ibid

¹³[Critical Minerals in Electric Batteries](#), Congressional Research Service, August 29, 2022, pages 12 and 16

¹⁴[Lithium Deposits in the United States](#), U.S. Geological Survey, June 1, 2020

¹⁵Dwayne Yancey, A ‘Battery belt’ is rising in the Southeast. How can Virginia become part of it?, [Cardinal News](#), March 29, 2023

¹⁶<https://www.gov.ca.gov/2022/02/25/california-leads-the-nations-zev-market-surpassing-1-million-electric-vehicles-sold/>

¹⁷<https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales>



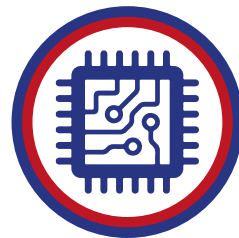
B) Semiconductors Manufacturing:

Semiconductors (also known as integrated circuits, microelectronic chips or computer chips) are essential for virtually all electronic devices that our modern economy depends upon, including both ICE and electric vehicles. During the COVID-19 pandemic, supply chain shutdowns from China and Taiwan led to shortages of semiconductors that directly impacted North American automaker's supply lines.¹⁸ Semiconductors are also vital to protect U.S. national security interests as they are the building blocks for a number of emerging technologies including AI, autonomous systems, 5G communications and quantum computing.¹⁹

While the United States accounts for the largest share of global semiconductor sales (totaling over 42% or USD\$232 billion in 2021), in 2020 only 13% of semiconductor manufacturing capability was physically located in the United States, with the majority now located in Taiwan (35%) and China (23%).²⁰ Once the global leader in semiconductor manufacturing, over time chip assembly, packaging and testing was offshored principally to Southeast Asia and China.

The U.S. Department of Commerce has identified eight key risks to semiconductor supply chains that the United States depends upon: **1) fragile supply chains; 2) malicious supply chain disruptions; 3) use of obsolete and generations-old semiconductors and related challenges for continued profitability of companies in the supply chain; 4) customer concentration and geopolitical factors; 5) electronics production network effects; 6) human capital gaps; 7) IP theft; and 8) challenges in capturing the benefits of innovation, aligning private and public interests.**²¹ Given the current geo-political realities with China vis-à-vis Taiwan and the other aforementioned risks, the U.S. has vital national security reasons for federally subsidizing expanded reshoring of semiconductors manufacturing operations domestically, prompting the passage of the CHIPS Act.

In response to changing geopolitics and other supply chain risks, U.S. private investment in semiconductor chip manufacturing has experienced a noticeable jump over the past few years. Between 2020 and 2022, well over \$200 billion in private investment has been committed to expand U.S. domestic manufacturing capacities for semiconductor fabrication. Here, the largest investments have been for logic and memory chips fabrication facilities in Arizona, Texas, Idaho, Ohio and New York.²² See Appendix C for details on recent semiconductor investment megadeals.



¹⁸Jack Ewing and Don Clark, A Shortage of Chips Puts Automakers in a Bind, New York Times, January 14, 2021, B1

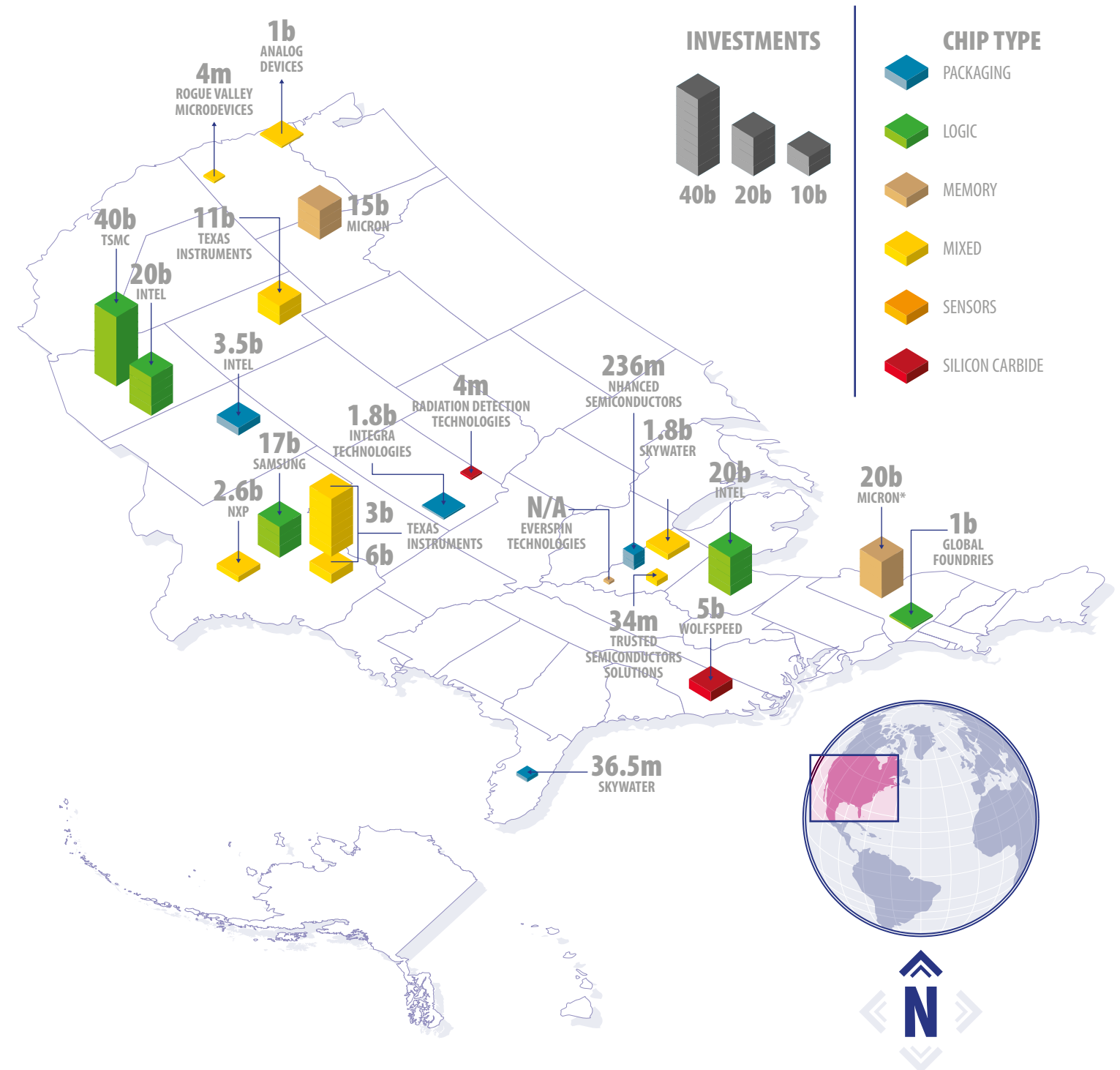
¹⁹Semiconductors and the Semiconductor Industry, Congressional Research Service (CRS), April 19, 2023, page 1

²⁰SEMI, World Fab Forecast, November 2020.

²¹Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth: 100-Day Reviews under Executive Order 14017, the White House, June 2021, page 54

²²Semiconductors and Semiconductors Industry, CRS, page 22

FIGURE 3. MAP OF ANNOUNCED PLANS TO EXPAND DOMESTIC SEMICONDUCTOR MANUFACTURING



Source: CRS, using publicly available information.

Notes: The announced plans shown on this map are intended to be illustrative and not comprehensive. Not all planned investments may be made and result in actual fab construction/expansion.

* = Micron has announced \$100 billion in investments into New York manufacturing facilities over the next 20-plus years; only the investment specified through this decade to 2030 is shown here.



III. SUBNATIONAL RESHORING REGIONAL TRENDS

A) Southeast Region

The Southeastern United States, with states like Georgia and Tennessee at the forefront, has rapidly emerged as a powerhouse in the BEV industry, attracting substantial investments and manufacturing capacity from foreign and domestic auto giants. Leveraging inherent advantages from shovel-ready mega-sites for targeted incentives, the region has secured over \$60 billion in EV investments since 2020 along with commitments for more than 75,000 high-quality manufacturing jobs. Major automakers and suppliers are flocking to the Southeast, drawn by affordable energy prices, proximity to technical schools, lithium deposits, and state-level efforts to aggressively court and help subsidize high profile EV projects. Georgia and Tennessee now rank number one and two respectively for EV jobs per capita and are spearheading the transition to electric transportation.

Indeed, over the last couple of years, key Southeastern states have secured over \$33 billion in announced EV investments along with commitments for more than **40,000 anticipated jobs**.²³ For example, the U.S. Department of Energy approved up to \$9.2 billion in loan guarantees to BlueOval SK to construct three battery plants in Tennessee and Kentucky. This project is expected to create **5,000 construction jobs and 7,500²⁴ full-time gigs**. Major project wins by Rivian, Hyundai and others represent some of the largest economic development deals ever in Georgia and Tennessee. With automakers rapidly ramping up electric transitions, the Southeast seems poised to capture over one-third of the nation's upcoming EV manufacturing employment.

In Georgia, several electric vehicle EV automakers are flocking to the state thanks to its proximity to lithium resources (in Arkansas), skilled workforce, lower state taxes, and other incentives aimed at attracting EV investments. As a result, Georgia has emerged as a clear leader in EV manufacturing in the Southeast. The state ranks number one for EV manufacturing employment per capita in the region, with over **24,174 jobs added in 2022**, representing a **20%** increase.²⁵ Georgia has also seen the second highest influx of EV investments per capita in the Southeast, with \$19.9 billion in commitments representing a **161%** surge since 2021.²⁶ The state is attracting the largest number of EV job announcements, cementing its position as a regional hub for the electric transportation industry.

²³<https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-2022-Report.pdf>

²⁴<https://www.energy.gov/lpo/articles/lpo-announces-conditional-commitment-loan-blueoval-sk-further-expand-us-ev-battery>

²⁵<https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia-2022.pdf>

²⁶<https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia-2022.pdf>

Major EV companies like Hyundai and Rivian have committed billions to build new EV and battery plants in Georgia. Hyundai signed a \$6.54 billion agreement to construct an EV and battery facility projected to create around 8,100²⁷ jobs. The U.S. electric vehicle manufacturer Rivian also announced a \$5 billion investment in an Atlanta-area EV plant expected to generate approximately 7,500 positions.²⁸ Furthermore, Georgia's pursuit of investments across the entire electric vehicle supply chain is paying dividends. For example, SK Battery America's Georgia plants have exceeded initial hiring goals by two years, adding **2,600 employees already and aiming for 400²⁹ more this year**. According to Georgia's Department of Economic Development³⁰, since 2020 over \$22.7 billion has been committed for EV projects in Georgia, resulting in more than **28,400 associated jobs**. With these figures in mind, along with supportive policies, suitable infrastructure, and coordinated efforts to attract investments, Georgia has cultivated an advantageous environment for EV manufacturers. The state plays a pivotal role in the Southeast region and is poised for significant growth as an emerging national leader in electric transportation.

Much like Georgia, Tennessee has emerged as a prime destination for electric vehicle manufacturers in the United States. The state ranks number one in the Southeast for EV investments per capita, with over 900 auto suppliers³¹ and one of the lowest tax burdens nationwide, attracting over \$16.9 billion in commitments during 2022, representing a **31%** annual increase.³² Furthermore, Tennessee places second in EV manufacturing employment per capita in the region. Data gathered from the Southern Alliance for Clean Energy shows that in 2022 the state's electric vehicle sector supported **13,031 jobs, a 26% jump from the prior year**. Major announcements in late 2022 by LG, General Motors and Microvast promised nearly **2,000 additional EV jobs** and over \$4 billion³³ in new investments.

Moreover, data from the Tennessee's Department of Economic and Community Development indicates that the state currently produces more than **31,000 EVs³⁴** annually. This production capacity is expanding rapidly. Ford Motor Company also announced a joint venture with SK that includes investing \$5.6 billion to build their BlueOval City factory in Haywood County, projected to employ **2,500 people³⁵** initially. Similarly, Ford's separate Tennessee Electric Vehicle Center will add **3,300 jobs and build up to 500,000 electric trucks** annually at full production. Magna will become the first supplier for BlueOval City with a \$790 million investment in manufacturing battery enclosures, producing **1,300 new jobs**.³⁶



²⁷<https://www.edf.org/article/made-usa-bright-future-electric-vehicle-jobs>

²⁸<https://electrek.co/2022/09/19/ev-market-share-doubled-in-the-southeast-this-year/>

²⁹<https://www.edf.org/article/made-usa-bright-future-electric-vehicle-jobs>

³⁰<https://www.georgia.org/press-release/kia-invest-over-200-million-ev9-production-expansion>

³¹<https://tnecd.com/industries/automotive/>

³²<https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Tennessee-2022.pdf>

³³<https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Tennessee-2022.pdf>

³⁴<https://tnecd.com/industries/automotive/>

³⁵<https://www.commercialappeal.com/story/money/business/2023/07/20/magna-tennessee-ford-blueoval-city-new-jobs/70436375007/>

³⁶



B) Great Lakes Region

The Great Lakes region, historically the epicenter of the U.S. auto sector, is also witnessing a transformative wave of advancements in EVs as well as semiconductor manufacturing, leading to significant investments and job growth.

Indiana

Within the Great Lakes region, Indiana has solidified its position as a key player, has been attracting substantial investments and partnerships in the electric vehicle and semiconductor domains. With a strong embrace of innovation and commitment to sustainable transportation solutions, the state promises a prosperous and vibrant future for its economy and workforce. The state has a rich history of auto manufacturing, securing its place as the third highest³⁷ auto production state in the nation. In recent developments, the state is witnessing a significant surge in investments related to electric vehicle technology and semiconductor manufacturing, promising substantial economic growth and job opportunities.

Among the investments made in the state has been the StarPlusEnergy joint venture between Stellantis and Samsung SDI to construct an electric battery manufacturing facility in Kokomo, Indiana. This ambitious project involves an investment of over \$2.5 billion and aims to create around 1,400 new jobs by the year 2027.³⁸ The facility will be dedicated to producing lithium-ion batteries, powering vehicles manufactured by Stellantis. Furthermore, Soulbrain MI, an electric vehicle supplier, has announced its own \$75 million investment³⁹ in a factory also located in Kokomo, which will play a crucial role in supporting Stellantis and Samsung SDI's gigafactory.

General Motors (GM) is another major player making significant strides in Indiana's EV and battery sector. In collaboration with Samsung SDI, GM plans to establish a more than \$3 billion⁴⁰ electric vehicle battery cell plant in New Carlisle. The project's fruition is expected to create around 1,700 manufacturing jobs, contributing to the state's employment growth. GM's commitment to the EV market does not stop there; the company has a clear vision to transition entirely to electric vehicles by 2035. With five plants already established in Indiana and employing over **5,700 workers**,⁴¹ GM's ambitious goal will undoubtedly play a pivotal role in shaping the future of the automotive industry in the state.

Adding to the state's momentum in the semiconductor industry, SkyWater Technology is planning an impressive \$1.8 billion research and development (R&D) and manufacturing facility in West Lafayette.⁴² This ambitious endeavor is set to further bolster Indiana's position as a thriving hub for cutting-edge semiconductor technology.

³⁷<https://www.investmentmonitor.ai/sponsored/competition-in-midwest-to-attract-ev-manufacturers-heats-up/>

³⁸<https://original.newsbreak.com/@building-indiana-business-1590614/3099680004443-charge-it-up-building-battery-factories-in-indiana>

³⁹<https://original.newsbreak.com/@building-indiana-business-1590614/3099680004443-charge-it-up-building-battery-factories-in-indiana>

⁴⁰<https://www.cbsnews.com/chicago/news/gm-samsung-electric-vehicle-battery-plant-indiana/>

⁴¹<https://www.cbsnews.com/chicago/news/gm-samsung-electric-vehicle-battery-plant-indiana/>

⁴²<https://original.newsbreak.com/@building-indiana-business-1590614/3099680004443-charge-it-up-building-battery-factories-in-indiana>

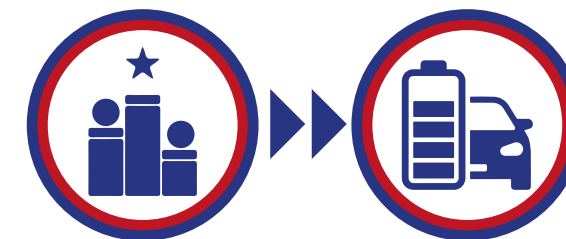


Michigan:

In Michigan, a historical stronghold in the automotive and semiconductor industries, the state is proactively capitalizing on the opportunities arising from the EV and battery manufacturing sectors. Through substantial investments and collaborative efforts, Michigan is emerging as a top destination for semiconductor talent solutions, fostering continued growth and innovation in this dynamic industry. The state has also firmly established itself as a global innovation hub for the semiconductor industry, currently boasting nearly one-fifth of U.S. auto production⁴³ and the highest concentration of Original Equipment Manufacturers (OEMs) in the country. With its semiconductor workforce ranking among the top ten in the nation, the state is projected to experience significant job growth, expected to rise by at least **11%** over the next five years. The burgeoning semiconductor industry in Michigan contributes an impressive \$4.6 billion to the total gross regional product for the state.⁴⁴

To help boost job creation in the semiconductor industry, Michigan has also implemented the Semiconductor Talent Action Team (TAT)⁴⁵ to ensure sustained growth and meet the demand for skilled talent. This public/private partnership aims to promote careers, attract talent, and entice new businesses to invest in Michigan's semiconductor industry. By onshoring critical supply chains of semiconductors back to the state, the TAT seeks to create job opportunities and mitigate delays and shortages. To further strengthen the talent pipeline, the pilot TAT Semiconductors Higher Education Grant Initiative⁴⁶ has been introduced. This program aims to provide funding to higher education partners, such as community colleges, 4-year colleges, and universities, to implement strategic solutions that nurture and grow the semiconductor talent pool in Michigan.

In a similar fashion, Michigan's prominence in the electric vehicle sector has also boomed, ranking 5th in the nation for employment in the battery-making industry. Approximately **2,000 workers** are currently employed at various Michigan electric vehicle battery manufacturing and OEM locations.⁴⁷ As the landscape evolves, the demand for electric vehicles and battery manufacturers is surging, leading to necessary adaptations in the sector. To address these changes and leverage Michigan's existing ecosystem of suppliers and skilled labor, investments have been pouring in to cater to the emerging needs of EV and battery manufacturers. Michigan has been among the states in the Great Lakes Region that have seen more post-IRA investments, totaling over \$8.1 billion.⁴⁸ For example, General Motors has committed \$4 billion to build full-size EV pickup trucks⁴⁹, and Ford has established a significant battery manufacturing facility in Marshall, Michigan.



⁴³<https://www.michiganbusiness.org/industries/semiconductor/>

⁴⁴<https://www.michiganbusiness.org/industries/semiconductor/>

⁴⁵<https://www.michiganbusiness.org/tat-semiconductor/grant/>

⁴⁶<https://www.michiganbusiness.org/tat-semiconductor/grant/>

⁴⁷<https://www.michiganbusiness.org/industries/semiconductor/>

⁴⁸<https://www.wsj.com/articles/shift-to-evs-triggers-biggest-auto-factory-building-boom-in-decades-11672503095?st=mwzeoian24e0g7n&reflink=article-email-share>

⁴⁹<https://www.areadevelopment.com/gold-shovel-econdev-awards/q2-2023/ev-battery-semiconductor-projects-dominate.shtml>



C) Southwest Region

The Southwest region has undergone a revolutionary surge in EV and semiconductor manufacturing, resulting in substantial investments and job opportunities. Phoenix and its surrounding suburbs have collectively become a thriving hub for semiconductor manufacturing, optical cable production, as well as critical mineral processing and battery manufacturing, presenting ample opportunities for equitable pathways to high-quality jobs and cementing Arizona's position as a frontrunner in cutting-edge technologies. The state's unwavering commitment to fostering innovation and attracting substantial investments also underscores its dedication to building a prosperous and sustainable economic future for the region. Similarly, Nevada is solidifying its position as a key player in EV and battery manufacturing, capitalizing on its advantageous proximity to vital raw materials and attracting significant investments. Nevada's embrace of EV technology is shaping the future of sustainable transportation while contributing to the region's economic growth and fostering a culture of innovation.

Nevada:

Nevada, a key player in the Southwest region, has been witnessing a surge in electric vehicle battery manufacturing, making it a hub for EV battery production. The prominence of EVs and their batteries, while revolutionary, comes with the challenge of their considerable weight, resulting in added shipping costs for vehicles and batteries over long distances. However, Nevada's strategic advantage lies in its proximity to key raw materials, particularly lithium, essential for battery production. This, along with the state's low taxes and its position adjacent to the world's largest EV market, California, prompted Tesla to establish its Gigafactory in Sparks, Nevada.

Furthermore, Nevada is making strides in critical mineral processing and battery recycling, with the American Battery Technology Company receiving a substantial \$57.7 million grant from the U.S. Department of Energy to build and operate a commercial-scale facility for manufacturing lithium hydroxide used in battery cathodes. This project alone is expected to create around **150 new jobs**⁵⁰, contributing to the state's job growth. Additionally, DOE-selected Lilac Solutions is in negotiations for a \$50 million grant⁵¹ to develop a lithium manufacturing plant in Fernley, Nevada. The aim of this project is to extract lithium from salt solutions or brine. Lastly, Nevada has received a \$700 million investment⁵² from the DOE to support the development of Ioneer's Rhyolite Ridge lithium and boron mining and processing facility plant.

With its strong focus on lithium manufacturing, Nevada serves as a crucial component in the supply chain for batteries used in electric vehicles. The state's utilization of "lithium-bearing claystone" contributes to cost efficiencies and a lower environmental and carbon footprint. This emphasis on lithium production has led to a significant boost in the state's lithium output, supporting the increasing demand for electric vehicle batteries.

⁵⁰<https://www.rgi.com/story/news/2022/10/20/nevada-gets-108-m-boost-2-8-b-ev-battery-grant-program/10545003002/>

⁵¹<https://sierranevadaally.org/2023/06/21/how-nevada-is-positioning-itself-to-close-the-lithium-loop/>

⁵²<https://sierranevadaally.org/2023/06/21/how-nevada-is-positioning-itself-to-close-the-lithium-loop/>



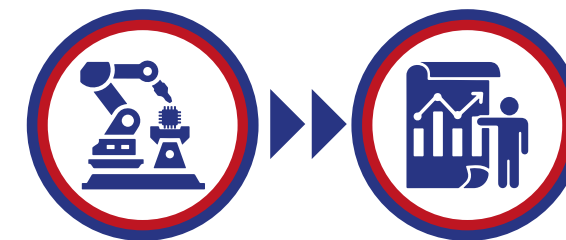
Arizona:

Arizona has also emerged as a top destination for international investment, with several key players committing to significant projects in the state. The Taiwan Semiconductor Manufacturing Company (TSMC) is set to make substantial investments, totaling \$28 billion⁵³, to build two new factories in Phoenix. Similarly, Intel has pledged a staggering \$20 billion investment in two chip factories to be located in Chandler.⁵⁴ According to the Biden-Harris Administration's **Investing in America Agenda: Delivering for Arizona**⁵⁵, the American Battery Factory is investing \$1.2 billion in Tucson to construct their first US battery cell manufacturing Gigafactory. This move not only supports the shift towards a cleaner energy economy but also anticipates the creation of around 1,000 new jobs in the state. In addition to these private investments, Arizona itself has committed \$100 million in American Rescue Plan funds to bolster its semiconductor industry. This investment will be channeled into developing a public-private partnership aimed at enhancing Arizona's infrastructure, workforce, and research and development ecosystem for semiconductors.

Equally as important, in the electric vehicle sector, LG Energy Solution is making strides with a substantial \$5.5 billion investment in the community of Queen Creek to manufacture EV batteries, marking a four-fold increase from their initial planned investment of \$1.4 billion⁵⁶ in Arizona. This venture stands as the largest single project ever for an independent battery manufacturing facility in North America.

D) New York:

New York has emerged as a prominent leader in the semiconductor industry, solidifying its position as a crucial hub for cutting-edge technology. The state boasts a well-established semiconductor sector, with a remarkable presence of 76 companies operating within its borders, generating around 34,000 direct jobs.⁵⁷ To further enhance its status in the sector, New York has revamped its local government incentives, including the Excelsior Jobs Tax Credit program, strategically designed to attract more chip manufacturers.



⁵³<https://cronkitenews.azpbs.org/2023/03/31/arizonas-58-billion-in-manufacturing-investments-among-most-in-nation/#:~:text=chip%20factories%20in%20Chandler%20in,by%20federal%20and%20state%20officials>

⁵⁴<https://cronkitenews.azpbs.org/2023/03/31/arizonas-58-billion-in-manufacturing-investments-among-most-in-nation/#:~:text=chip%20factories%20in%20Chandler%20in,by%20federal%20and%20state%20officials>

⁵⁵<https://www.whitehouse.gov/wp-content/uploads/2023/03/AZ-Investing-in-America-fact-sheet.pdf>

⁵⁶<https://www.azcommerce.com/news-events/news/2023/3/new-arizona-1-in-the-nation-for-international-investment/>

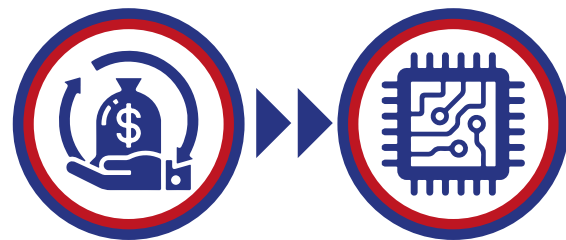
⁵⁷<https://www.ny.gov/programs/americas-microchip-resurgence#:~:text=With%20up%20to%20%2410%20billion,industry%20the%20nation's%20most%20compelling>



New York's prowess in micro-electronic R&D is exemplary, featuring industry giants like IBM, a company that announced its ambitious plans in 2022 to invest a staggering \$20 billion⁵⁸ across the region. This significant investment aims to bolster semiconductor production and foster the development of advanced technologies, such as artificial intelligence and quantum computing. Among the top 10 megadeals in the electric vehicle, semiconductor, and battery-making industry, Micron Technology Inc. leads the pack with a massive investment project in Syracuse, New York.

Micron Technology Inc. is set to invest a staggering \$100 billion over the next 20 years to establish semiconductor manufacturing facilities, known as fabs, in New York. The company's initial phase will involve an investment of \$20 billion. This ambitious project is expected to create approximately 9,000 jobs⁵⁹, contributing significantly to the state's economic growth and employment opportunities. Recognizing the immense impact of this venture, New York is providing Micron with an extensive package of tax credits amounting to \$5.5 billion⁶⁰ over the project's duration, contingent on the company meeting specific employment rates. This incentive package stands as the largest in the history of the state, underscoring New York's commitment to being a key player in the semiconductor industry.

As New York continues to make substantial investments and provide generous incentives to attract and retain semiconductor manufacturers, the state solidifies its position as a driving force in advancing technology and innovation. With its robust semiconductor industry, groundbreaking research and development, and strategic partnerships with industry leaders, New York stands as a state to watch closely in the ever-evolving landscape of cutting-edge technologies.



⁵⁸<https://www.nytimes.com/2022/10/06/us/politics/biden-ibm-semiconductors.html>

⁵⁹<https://www.nytimes.com/2022/10/06/us/politics/biden-ibm-semiconductors.html>

⁶⁰<https://www.washingtonpost.com/technology/2022/10/04/micron-chip-factory-new-york/>



IV. CROSS-BORDER IMPACTS

While both Mexico and Canada are working to compete for their share of the EV and semiconductor manufacturing pie, corporate subsidies offered through the IRA, CHIPS Act as well as state and local government agencies, are making it difficult for regions in their countries to compete. As mentioned above, certain provisions in the IRA do provide some opportunities for EVs batteries and battery component to benefit from North American content provisions. That said, the other corporate subsidies offered by U.S. state and local government agencies make it difficult for Mexican and Canadian communities to effectively compete on a dollar-for-dollar basis.⁶¹

In the case of Volkswagen, the Canadian province of Ontario proved successful in beating out the State of Oklahoma for a new Gigafactory but only after offering over CDN \$16 billion (USD\$12.07 billion) in combined Canadian federal and provincial incentives. Given Canada's more limited budgetary limitations, its provinces are unable to compete head-to-head with U.S. states over the long term for new EV, battery and semiconductor mega deals. They will compete where they can but there will be limits. Mexico will face similar challenges.

As for Mexico, Tesla announced a high-profile investment of around \$5 billion for a new EV plant just outside of Monterrey, Nuevo Leon⁶². Based on publicly available information, no publicly funded incentives appear to have been offered. Instead, other factors were at play. For Tesla, Mexico's close proximity to the U.S. market coupled with its lower labor costs – **50% lower than the company's existing US operations** – were key factors. By lowering its labor costs for EV production, Tesla is now in a better position to offer new models at a \$25,000 price point in the future.⁶³ For similar reasons, other auto makers are expected to follow Tesla's lead into Mexico. Still, other factors including water scarcity issues, limits to the access of clean energy, and security concerns could limit future EV investment into the country.

Another critical EV-specific cross-border concern relates to critical minerals. As U.S. demand for EVs grows, there will be a pressing need by U.S. EV battery manufacturers to accelerate alternative sourcing options for critical minerals such as cobalt, nickel and graphite from more reliable and friendly trading partners that might also qualify for IRA-related tax incentives. Canada is one such source, with some of the largest reserves of critical minerals in the Western Hemisphere. Mexico also has some potential for future lithium mining in Sonora.

Both Mexico and Canada aim to maximize investment in their own EV supply chains as opposed to having critical minerals simply exported to the United States for further processing and integration into battery manufacturing plants on the other side of the border. Here, it is important to emphasize that the automobile industry remains one of the most important employment sectors for all three USMCA partner countries. Canada and Mexico remain strategic trading partners for the U.S. so it is important for Americans to be mindful of the potential market distorting ripple effects that federal U.S. industrial policy can have on its neighbors when combined with state and local corporate subsidies.

⁶¹Brain Platt, Endra Curran and Gabriela Coppola, [Subsidy Wars Heat Up with US Allies Forced to Pay Up or Lose Out](https://www.bloomberg.com/news/articles/2023-03-01/tesla-s-mexico-plant-to-require-5-billion-investment-official?in-source=embedded-checkout-banner), Bloomberg.com, July 25, 2023

⁶²<https://www.bloomberg.com/news/articles/2023-03-01/tesla-s-mexico-plant-to-require-5-billion-investment-official?in-source=embedded-checkout-banner>

⁶³Nora Naughton, [Why Tesla's plan for a factory in Mexico is a genius move for making a \\$25,000 car](https://www.businessinsider.com/tesla-plans-factory-in-mexico), Business Insider, June 14, 2023



V. CONCLUSION

The IRA and CHIPS Act are important legislative achievements for the Biden Administration that are positioning the United States to enhance its economic competitiveness, address national security concerns, and support an effective decarbonization strategy aligned with its commitments under the Paris Agreement. That said, the new industrial policy established through the IRA and CHIPS Act has resulted in market distortions, furthered by the inter-state competition that this historic legislation has generated across the country as state and local governments seek to lure EV, battery and semiconductor manufacturing facilities to their communities. In some cases, federal, state and local governments have collectively offered corporate subsidies in excess of 65% of total project costs with lingering questions about whether the long-term economic impacts and job creation benefits promised will ever be realized.

It is important to remember that while the IRA and CHIPS Act have given U.S. companies a boost, technologies are ever changing and global competition is fierce. As a case in point, Toyota is now on the cusp of new [fast-charging solid state](#) EV battery technology that will revolutionize electric vehicles as we know them today, allowing for a smaller battery with a more extended range of up to **632 miles per charge**. A Chinese EV automaker, Nio, is much further along having successfully commercialized a new **150kW** solid state battery for its cars that allows them to travel up to 578 miles on a single charge.⁶⁴ So, a fair question to ask is whether existing makers of lithium-ion battery makers will be able to pivot and re-tool, adopting the new solid-state technology and at what cost? Also, will some EV automakers saddled with legacy technology be able to stay in business? If an EV battery manufacturing plant closes, what will be the fate of the facility in question or workers who are laid off?

The case of Volkswagen's (VW) first U.S. auto plant offers an important cautionary tale for promoters of state and local corporate subsidies. In 1976, the state of Pennsylvania actively enticed VW to establish its first U.S. automobile manufacturing operation in New Stanton (just outside Pittsburgh), with the expectation that **5,000 direct and 13,000 indirect jobs** would be created for the local economy. To seal the deal, Pennsylvania's then-Governor Milton Shapp offered VW financial incentives totaling nearly **\$100 million in loans and grants**, with the German automaker providing \$55 million in equity of the plant's estimated \$250 million cost. VW's objective was to produce more fuel efficient smaller cars given its bet that the Middle East [oil embargo](#) of 1973-74 would lead to Americans transitioning away from their larger cars.⁶⁵ VW's gamble seemed logical to some at the time given that U.S. gasoline prices had risen by **36%** in less than a year from \$0.39 to \$0.53. In time, however, geo-political conditions and oil prices stabilized and VW's big bet that it would be a U.S. market change-marker collapsed.

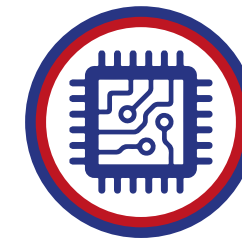
⁶⁴Noah Staats, [Nio Becomes the First EV maker to Bring Solid-state Batteries to the Mass Market](#), Top Speed, July 12, 2023.

⁶⁵In 2023 dollars, the corporate subsidies provided by the State of Pennsylvania would translate to USD\$536.2 million, on par with other incentives now being offered by other U.S. and Canadian states/provinces to lure clean tech investments to their region.

VW's facility (which came to be known as the Westmoreland Assembly plant) was in operation for less than ten years, closing in 1987. While the plant's employment was originally projected to be as high as **20,000**, in reality the facility reached its highest staffing levels in mid-1980 at **6,000**, and by 1984 it has dropped to just **1,500**. Though VW's Westmoreland's plant had a good run, producing over 1.15 million vehicles during its decade in operation, the project did not deliver on its promised benefits of long-term job creation and economic opportunity for the taxpayers of Pennsylvania.

Given the sizable sub-national investments made by state and local governments across the country, particularly since the passage of the IRA and CHIPS Act, greater public scrutiny appears warranted to better assess the true public benefit of corporate subsidies offered using public funding. As the case of the former VW plant in Pennsylvania highlights, there is also a need for greater corporate accountability related to the jobs and economic benefits promised to communities, especially if public resources are deployed to attract new investment to a given region. In fact, some U.S. state and local governmental agencies, including those in Arizona and Colorado, have begun to negotiate **"claw back provisions"**⁶⁶ that would require a company to reimburse public funds if, for whatever reason, they are forced to downsize or shutdown.

While state and local economic development officials have offered corporate subsidies with the best of intentions, there is no guarantee that the EV and battery companies they have attracted to their regions will be able to deliver on their promises of expanded and sustained job creation, especially given the rapid pace of technological innovation and the competitive factors at play in the fast evolving EV market.



⁶⁶<https://www.goodjobsfirst.org/wp-content/uploads/docs/pdf/clawbacks-chart.pdf>

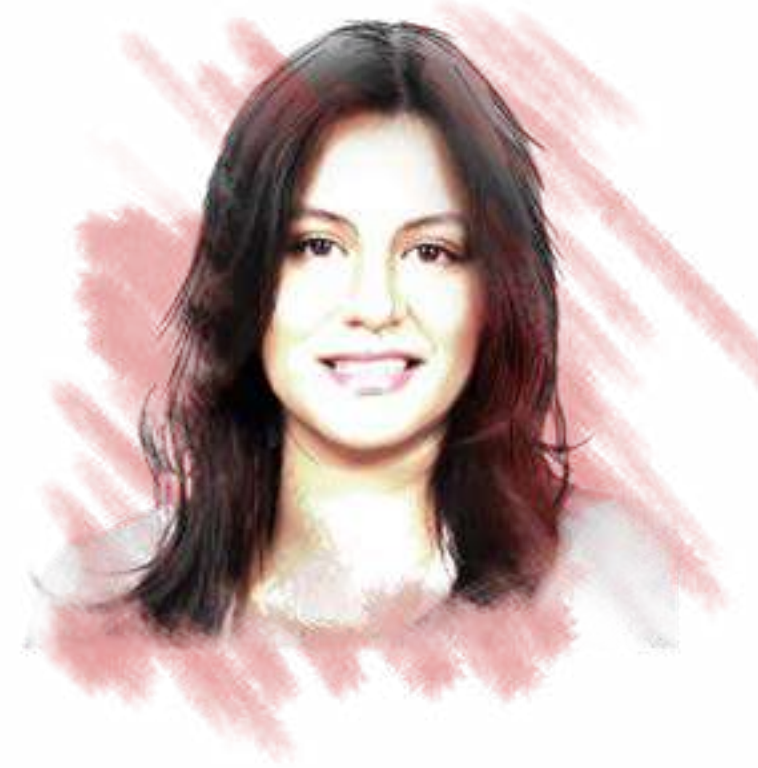


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APPENDIX A:

**EV MANUFACTURING PLANTS MEGA DEALS:
TOTAL INVESTMENT, SUBSIDIES & JOBS CREATED**

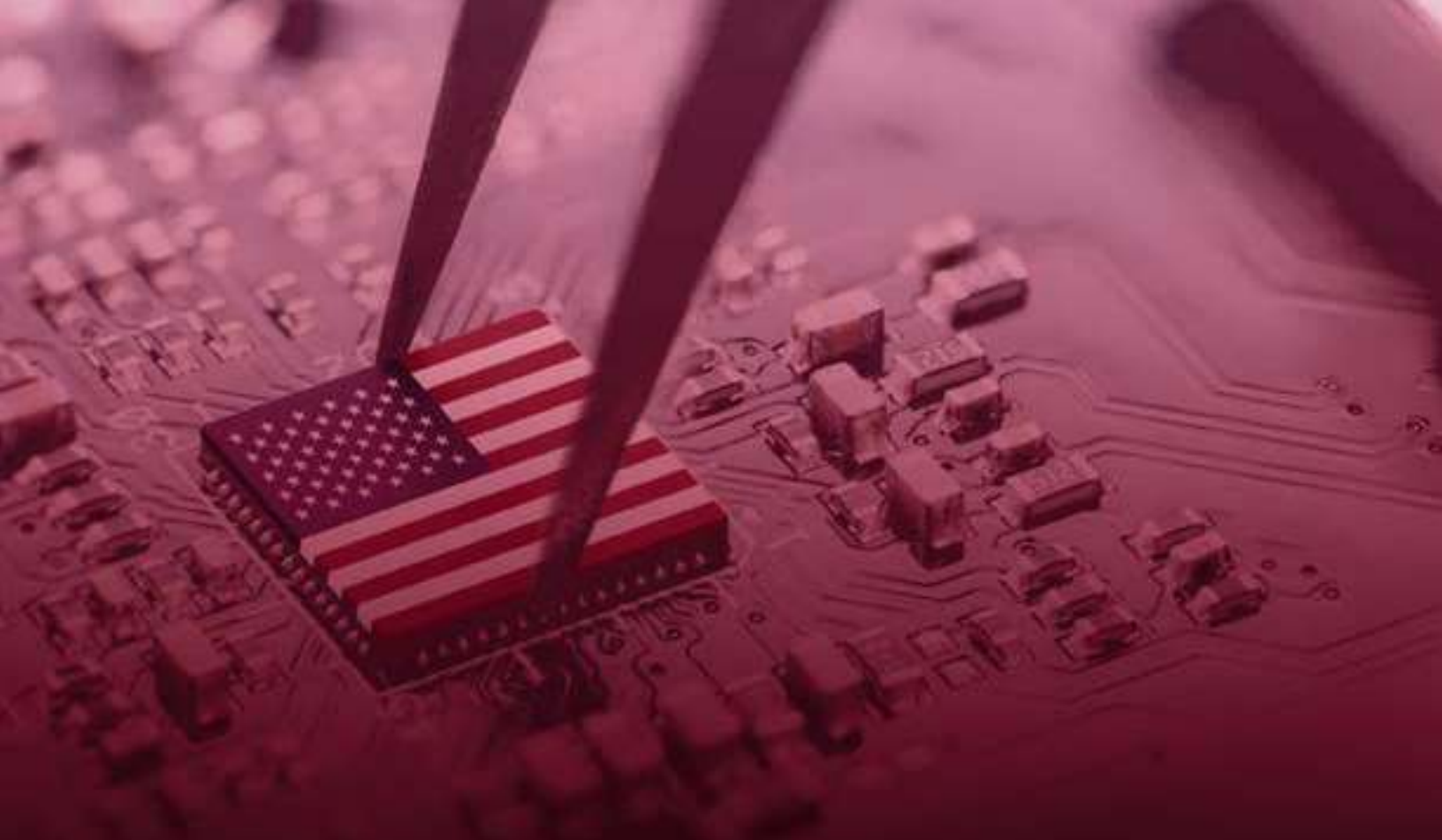
COMPANY	CITY/COUNTRY	LOCATION	PROJECT DESCRIPTION	YEAR	SUBSIDY VALUE	INVESTMENT	SUBSIDY PER INVESTMENT (USD)	NUMBER OF JOBS OR TRAINING SLOTS	TOTAL SUBSIDIES PER JOB CREATION
Hyundai Motor Group	Bryan County	Georgia	EV manufacturing plant	2022	\$1,800,000,000	\$5,500,000,000	33%	8,100	\$222,222
General Motors		Michigan	EV manufacturing and battery manufacturing plant	2022	\$1,761,000,000	\$7,000,000,000	25%	4,000	\$440,250
Rivian	Stanton Springs	Georgia	EV manufacturing plant	2022	\$1,476,899,999	\$5,000,000,000	30%	7,500	\$ 196,920
Scout Motors	Blythewood	South Carolina	EV manufacturing plant	2023	\$1,300,000,000	\$2,000,000,000	65%	4,000	\$325,000
VinFast	Chatham County	North Carolina	EV manufacturing plant	2022	\$1,254,000,000	\$2,000,000,000	63%	7,500	\$167,200
Ford Motor Co.	Stanton	Tennessee	EV and battery manufacturing plant	2021	\$884,000,000	\$5,600,000,000	16%	5,800	\$152,414
Tesla Motors	Storey County	Nevada	EV and battery manufacturing plants	2023	\$330,250,366	\$3,600,000,000	9%	3,000	\$110,083
Canoo, Inc.	Pryor Creek	Oklahoma	EV manufacturing plant	2021	\$300,000,000	\$560,000,000	54%	2,000	\$150,000
Ford Motor	Avon Lake	Ohio	Traditional and EV car manufacturing expansion	2022	\$205,000,000	\$1,500,000,000	14%	1,800	\$113,889
Ford Motor		Michigan	Traditional and EV car manufacturing expansion	2022	\$150,000,000	\$2,000,000,000	8%	2,000	\$75,000

Source: Good Jobs First, 2023

**APPENDIX B:****EV BATTERY MANUFACTURING PLANT MEGA DEALS:
TOTAL INVESTMENT, SUBSIDIES AND JOBS CREATED**

COMPANY 	CITY/COUNTRY 	STATE 	PROJECT DESCRIPTION 	YEAR 	SUBSIDY VALUE 	INVESTMENT 	% SUBSIDY OF TOTAL INVESTMENT 	NUMBER OF JOBS OR TRAINING SLOTS 	TOTAL SUBSIDIES PER JOB CREATION 
General Motors		MI	EV manufacturing and battery manufacturing plant	2022	\$1,761,000,000	\$7,000,000,000	25%	4,000	\$440,250.00
Ford Motor	Marshall	MI	EV battery manufacturing	2023	\$1,700,000,000	\$3,500,000,000	49%	2,500	\$680,000.00
Panasonic	De Soto	KS	EV battery manufacturing	2022	\$1,274,600,000	\$4,000,000,000	32%	4,000	\$318,650.00
Ford Motor Co.	Stanton	TN	EV and battery manufacturing plant	2021	\$884,000,000	\$5,600,000,000	16%	5,800	\$152,413.79
Toyota	Greensboro	NC	EV battery manufacturing plant	2021	\$859,800,000	\$3,800,000,000	23%	2,100	\$409,428.57
Gotion, Inc	Big Rapids	MI	Battery components manufacturing plant	2022	\$715,000,000	\$2,364,000,000	30%	2,350	\$304,255.32
SK Battery America, Inc.	Bartlow	GA	EV battery manufacturing plant	2023	\$641,000,000	\$5,000,000,000	13%	3,750	\$170,933.33
Toyota Battery	Randolph	NC	EV battery manufacturing plant	2021	\$439,000,000	\$5,900,000,000	7%	2,100	\$209,047.62
Manufacturing, North Carolina	Glendale	KY	EV battery manufacturing plants	2021	\$410,000,000	\$5,800,000,000	7%	5,000	\$82,000.00
Ford Motor Co. Honda	Jefferson	OH	EV battery manufacturing plant	2022	\$393,300,000	\$3,500,000,000	11%	2,527	\$155,639.10

Source: Good Jobs First, 2023



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