THOUGHT LEADERSHIP Manufacturing Momentum PART 2 OF 3 Scaling for Success in Key Markets **NEWMARK**

Foreword

This report is the second of a three-part Newmark Industrial Research series exploring advanced manufacturing growth in North America since 2020.

In the first installment of this series, we quantified approximately 300 major manufacturing announcements made in the U.S. since 2020, driven almost entirely by four main advanced manufacturing sectors (see below), and the macro factors driving this growth.

In this installment, we delve deeper into unique trends catalyzing growth, site selection considerations, and which markets are poised to benefit the most.

Four Main Advanced Manufacturing Sectors:



Think: Pharmaceuticals

Advanced Talent Among Myriad Factors Underpinning Manufacturing Location Strategy

Rapid expansion in North America's advanced manufacturing sector promises to deliver significant economic impact to newly selected sites and their surrounding regions through added jobs, infrastructure improvements and substantial capital investments. New clusters are forming and existing clusters further maturing as a record number of new industrial projects are set to begin in over 160 metro and micropolitan areas in the next decade, as captured in Newmark Research's survey.

Successful advanced manufacturing operations require a combination of critical factors, with the cost and access to labor, utilities (especially power), real estate and ease of doing business taking precedence over most other considerations. Proximity to colleges, universities and trade schools, incentives and a strong supply chain are also of importance. The specific type of operation and company stage will impact the site selection process as well.

Although surveyed announcements fall in a wide variety of places, the regions poised to benefit most from advanced manufacturing investments are predominantly secondary and tertiary metros near major markets with higher-than-average levels of preexisting advanced manufacturing talent, relatively lower-cost energy and abundant, affordable land.

Top Growth Markets | By Metro Size and Key Market Indicators

BY LARGEST PROJECTED JOB GAINS FROM SURVEYED MANUFACTURING ANNOUNCEMENTS SINCE 2020





Manufacturing Jobs Announced 15,466

Facility Announcements

14

Advanced Mfg. Labor Pool, 2023

74,316

Percent of Industrial Inventory Under Construction, 3Q23

11.8%

Average Industrial Energy Cost, 2023

7.67 Cents / kWh

ATLANTA, GA Large Metro

Manufacturing Jobs Announced 12,713

Facility Announcements

Advanced Mfg. Labor Pool, 2023

41,325 Percent of Industrial Inventory Under Construction, 3Q23

Average Industrial Energy Cost, 2023

7.01 Cents / kWh

AUSTIN, TX Large Metro

Manufacturing Jobs Announced 11,465

Facility Announcements

6

Advanced Mfg. Labor Pool, 2023 43,209

Percent of Industrial Inventory Under Construction, 3Q23

13.5%

Average Industrial Energy Cost, 2023 6.74 Cents / kWh

RALEIGH, NC Large Metro

Manufacturing Jobs Announced 8,580

Facility Announcements

3

Advanced Mfg. Labor Pool, 2023 16,205

Percent of Industrial Inventory Under Construction, 3Q23

Average Industrial Energy Cost, 2023

6.88 Cents / kWh



DETROIT, MI Large Metro

Manufacturing Jobs Announced 6,462

Facility Announcements

6

Advanced Mfg. Labor Pool, 2023 131,427

Percent of Industrial Inventory Under Construction, 3Q23 1.2%

Average Industrial Energy Cost, 2023

GREENSBORO, NC

Mid-Sized Metro

Manufacturing Jobs Announced

Advanced Mfg. Labor Pool, 2023

Percent of Industrial Inventory

Under Construction, 3Q23

6.88 Cents / kWh

Facility Announcements

 $8.29 \; \text{Cents/kWh}$

2.520

9,912

1.9%

4



CHARLESTON, SC

2.075

Facility Announcements

Percent of Industrial Inventory

10.8%

Average Industrial Energy Cost, 2023

6.79 Cents / kWh



COLUMBIA, SC

Manufacturing Jobs Announced

Facility Announcements

SYRACUSE, NY

Mid-Sized Metro

9,000

Advanced Mfg. Labor Pool, 2023 11,020

Percent of Industrial Inventory Under Construction, 3Q23

0.0%

Average Industrial Energy Cost, 2023

6.65~Cents/kWh



Mid-Sized Metro

Manufacturing Jobs Announced

3

Advanced Mfg. Labor Pool, 2023

17,801

Under Construction, 3Q23



Mid-Sized Metro

Manufacturing Jobs Announced 4,300

Facility Announcements

2

Advanced Mfg. Labor Pool, 2023

8,286

Percent of Industrial Inventory Under Construction, 3Q23 3.1%

Average Industrial Energy Cost, 2023

6.79 Cents / kWh

SAVANNAH, GA Small Metro/Micro

Manufacturing Jobs Announced 8.840

Facility Announcements

2

Advanced Mfg. Labor Pool, 2023

10,761 Percent of Industrial Inventory

Under Construction, 3Q23 13.9%

Average Industrial Energy Cost, 2023

7.01 Cents / kWh



ALBANY, NY Mid-Sized Metro

Manufacturing Jobs Announced 2,633

Facility Announcements

2

Advanced Mfg. Labor Pool, 2023 12,317

Percent of Industrial Inventory Under Construction, 3Q23

0.8%

Average Industrial Energy Cost, 2023 6.65 Cents / kWh

BROWNSVILLE, TN Small Metro/Micro

Manufacturing Jobs Announced 7.490

Facility Announcements

3

158

Advanced Mfg. Labor Pool, 2023

Percent of Industrial Inventory Under Construction, 3Q23

0.0%

Average Industrial Energy Cost, 2023

6.41~Cents/kWh



RENO, NV Small Metro/Micro

Average Industrial Energy Cost, 2023

Manufacturing Jobs Announced 5,600

Facility Announcements 3

Advanced Manufacturing Labor Pool, 2023

Percent of Industrial Inventory Under Construction, 3023

5.6%

14,874

Average Industrial Energy Cost, 2023

11.82 Cents / kWh



Small Metro/Micro

ELIZABETHTOWN, KY

Manufacturing Jobs Announced 5,120

Facility Announcements

2 Advanced Manufacturing Labor Pool, 2023

3,007

Percent of Industrial Inventory Under Construction, 3023

9.9%

Average Industrial Energy Cost, 2023

6.36 Cents / kWh



SHERMAN, TX Small Metro/Micro

Manufacturing Jobs Announced 4,500

Facility Announcements

Advanced Manufacturing Labor Pool, 2023 2,042

Percent of Industrial Inventory Under Construction, 3023 61.1%

Average Industrial Energy Cost, 2023

6.74 Cents / kWh

Sources: JobsEQ, Moody's Analytics, U.S. Energy Information Administration, Newmark Research Average energy costs on a statewide basis

Smaller Metros Stand to be Disproportionately Impacted by Manufacturing Growth

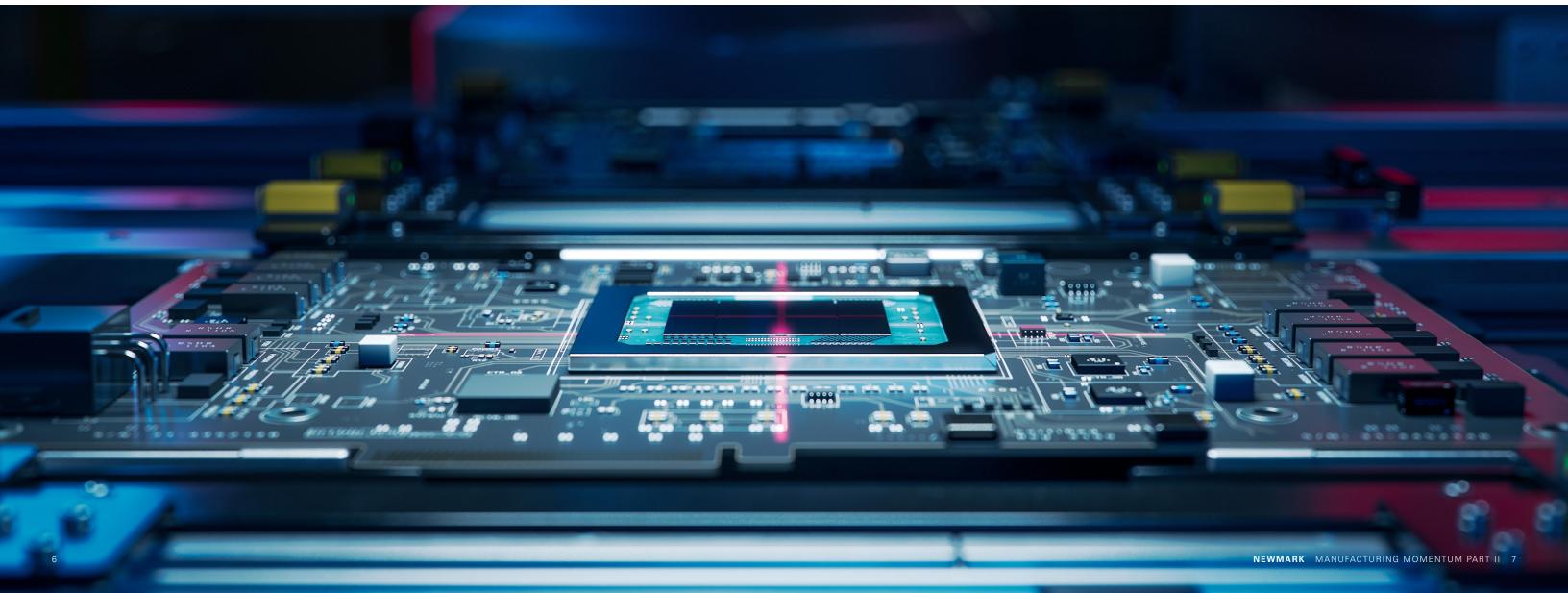
The top five markets in each size group of Large, Mid-Sized and Small Metros represent nearly 50.0% of the additional advanced manufacturing jobs announced in recent years. Large, relatively low-cost metros such as Atlanta, Raleigh and Detroit are ranked among the top markets for projected job growth, garnering 16 major

facilities announcements combined since 2020 with a potential for close to 28,000 new jobs. Despite having slightly higher business costs, users have also been targeting Phoenix and Austin for new sites. As the tenth-largest metropolitan area in the U.S., Phoenix has attracted 14 major project announcements—the most of any single market examined—that are expected to generate close to 15,500 additional advanced manufacturing jobs for the metropolitan area.

Mid-sized markets such as Syracuse and Albany in New York, Greensboro in North Carolina and Columbia in South Carolina offer greater cost savings for manufacturing operators while still maintaining the skilled workforce needed. Twelve new manufacturing sites focused mainly in the Automotive/Transportation and High Tech/Digitalization sectors have been proposed within the top five mid-sized markets with potential to create up to 21,000 additional jobs. Micron's proposed semiconductor complex is slated to bring up to 9,000 new jobs to the Syracuse region alone, with tens of thousands of ancillary jobs anticipated from firms that would locate near the proposed facility.

Based on recent announcements across sectors, the smallest markets, including Brownsville in Tennessee, Elizabethtown-Fort Knox in Kentucky and Sherman-Denison in Texas are all slated for new facilities with thousands of job openings in the coming years. Individually, each of these five markets' projected employment gains will surpass all but

one of the top mid-sized markets—indicating new advanced manufacturing facilities have the potential to disproportionately impact smaller economies. However, it's worth noting that the existing advanced manufacturing labor pool in Brownsville and Sherman-Denison are relatively limited, which places greater demands on state, local, and company resources for new job training, upskilling, and employee attraction to these small communities. Users may experience significant wage pressure and/or need to draw employees from further away. Alternatively Savannah and Reno, while geographically small, are wellestablished U.S. logistics hubs with extensive industrial infrastructure, real estate and supply chains. New manufacturing users would benefit from comparatively deeper talent pools in these two markets as well.



Stages of Operations Have Different Locational Strategies and Labor Needs

While the top growth markets demonstrate the forecasted impact of mega investments, the advanced manufacturing narrative is not all about the gigafactories. The average square footage of the mega investments proposed is 1.45 million SF, but the average domestic manufacturing leasing deal done in the past three years is approximately 45,000 SF, representing a panorama of space, labor and locational requirements within the manufacturing sector.

In general, advanced manufacturing users operate within three distinct types of facilities:

RESEARCH AND DEVELOPMENT (R&D)

Think: Small startups & University Spinouts

PILOT PLANT

Think: Proximity to initial R&D site & Proof of Concept

MASS PRODUCTION

Think: Commercial production facilities, mid-sized to mega sites

Highly innovative young companies with growing talent from universities and small-scale manufacturing needs navigate toward "Research and Development (R&D)" sites with small footprints. R&D site users tend to concentrate in high-barrier-to-entry markets



that may carry higher costs due to their proximity to specific talent, educational institutions and overall innovative economies. Initial capital investments are usually less substantial than the mega facilities being proposed. Boston, the Bay Area and Raleigh (Research Triangle Park) are examples of markets benefiting from a growing number of R&D operations for startups.

As startups mature, many will move on to a "Pilot Plant" facility, which maintains proximity to an initial R&D site. These properties are typically roughly 150,000 or below, providing advanced manufacturers with the space needed to execute a proof of concept on a smaller scale. The location strategy for companies entering the Pilot Plant phase is likely very similar to companies in earlier stages of growth. The Commerce Department recently announced plans to funnel CHIPS Act funding to smaller semiconductor-related projects, with capital investments below \$300 million—building on commitments to the mega projects and the whole of the ecosystem.

Once manufacturers reach commoditization, their operations shift focus to mass production. At this point, the need for significant cost savings while maintaining access to abundant power and a deep labor pool becomes critical for users and locations with affordable land, lower construction costs, favorable tax structures and generous incentives become notable choices. Accordingly, areas that can provide project attributes immediately or can provide 'scalability' have attracted a significant amount of proposed capital investment in the advanced manufacturing sector.

The Labor Landscape

Access to a skilled workforce is one of the most critical factors for manufacturing users. In the U.S., there are currently almost 13.0 million manufacturing workers, with the four key advanced manufacturing sectors identified in this series accounting for over 30% of all jobs in this industry. Structural shifts in domestic production over the last 50+ years led to stagnant growth in overall manufacturing employment, and recent employment gains have been concentrated in the Automotive/Transportation and Biomanufacturing industries – both sectors that were seeing burgeoning

manufacturing growth even prior to the passage of recent federal spending programs. The desire of firms to bring operations closer to consumption, especially in the wake of the pandemic, has been a clear driving force behind considerable sector-specific labor market gains since early 2020. Following a nearly 12.0% decline—equating to roughly 450,000 jobs—during the pandemic, advanced manufacturing payrolls have increased by more than 600,000 jobs since bottoming, outpacing overall manufacturing job growth.

EMPLOYMENT GROWTH

April 2020 to July 2023

Automotive / Transportation

36.0%

Biomanufacturing

16.5%

High Tech / Digitalization

4.9%

Energy

4.2%

Advanced Manufacturing

18.2%

Overall Manufacturing

13.7%

Given the watershed level of investments announced since 2020, all advanced manufacturing sectors should expect stronger labor growth patterns in the coming years as proposed projects become reality and commence production. The 215,000+ additional jobs pledged by manufacturers since 2020 represents 1.7% of total manufacturing and 5.4% of keysector advanced manufacturing employment in the U.S. Nearly 80% of estimated job projections are Automotive/Transportation or High Tech/Digitalization-related, which makes the need for more skilled labor most acute in those sectors.



Where is the Existing Manufacturing Workforce

Concentrated?

Newmark's survey of major manufacturing announcements over the past three years illustrates the breadth of manufacturing momentum, with 165 metro and micropolitan areas across the U.S. set to receive at least one new facility. The following analysis is based solely on those markets identified in the aforementioned survey.

A discernible pattern has emerged regarding existing advanced manufacturing employment levels among markets of all sizes. Larger metropolitan areas generally have nominally larger workforces and more diverse economies. while smaller metropolitan and micropolitan areas exhibit greater comparative labor concentrations, as evidenced by the lower total employment pool combined with above-average location quotients (LQ)*. More than half of the markets slated for future operations already possess high concentrations of the necessary labor force, with 90 metropolitan and micropolitan areas having key-sector location quotients above 1.0.

Greater Kokomo, Indiana (LQ of 7.7) and the Sidney, Ohio micropolitan area (LQ of 7.2) are home to some

of the highest concentrations of manufacturing jobs within the markets examined, largely due to the existing clustering of several major automotive/transportation, food, raw material and plastics manufacturing operations. Based on recent announcements in Kokomo and Sidney, three electric vehicle battery manufacturers are expected to bring up to 1,000 new jobs to each market in the coming years. Among the largest markets, San Jose, which boasts one of the most innovative economies in the world, and Detroit, bastion of automotive production, each rank as key employment hubs based on their LQs. In the Motor City, electrical vehicle battery production is set to expand by several thousand jobs from companies such as Ford, General Motors and Lear.

Historical Employment by Advanced Manufacturing Super Sector



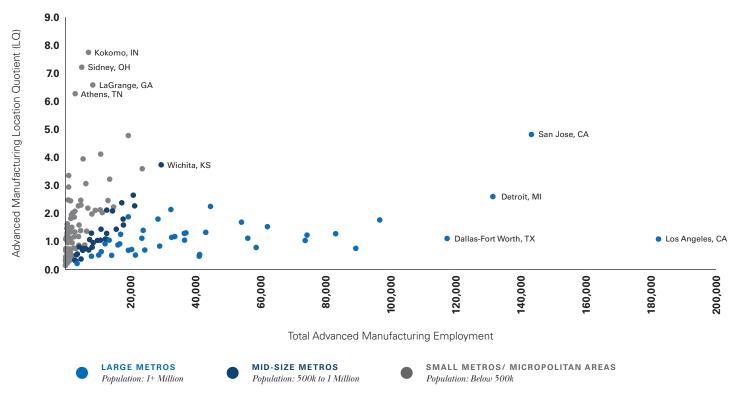
Sources: Newmark Research, Moody's Analytics

*Location Quotient (LQ) is defined as an analytical statistic that measures a region's industrial specialization relative to a larger geographic area (usually the nation). A LQ is computed as an industry's share of a regional total for some economic statistic (i.e., employment) divided by the industry's share of the national total for the same statistic. For example, an LQ of 1.0 in mining means that the region and the nation are equally specialized in mining; while an LQ of 1.8 means that the region has a higher concentration in mining than the nation.

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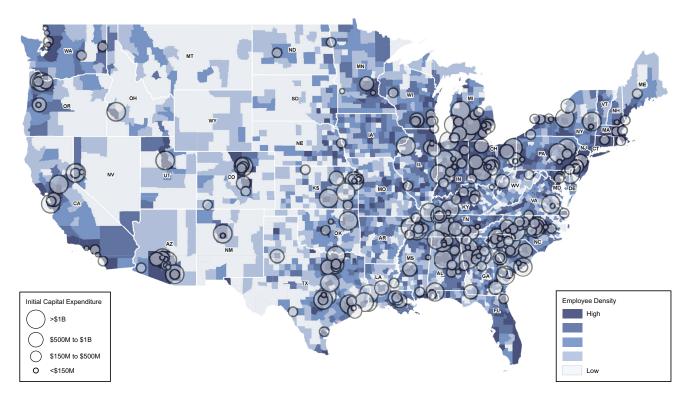
Current Key-Sector Advanced Manufacturing Employment and Location Quotient

BY MARKET SIZE



Sources: Newmark Research, JobsEQ

Heat Map of Key-Sector Advanced Manufacturing Employment (2023) and U.S. Major Advanced Manufacturing Announcements (2020 to 3Q 2023)



Sources: Newmark Research, JobsEQ

"We're seeing a notable uptick in advanced manufacturers exploring and investing in multiple facility locations across the United States. This distribution of risk allows companies to tap into diverse talent pools, suppliers, customers, and geographies, and navigate a host of local policy environments."

ADAM PETRILLO
EXECUTIVE MANAGING DIRECTOR, NEWMARK

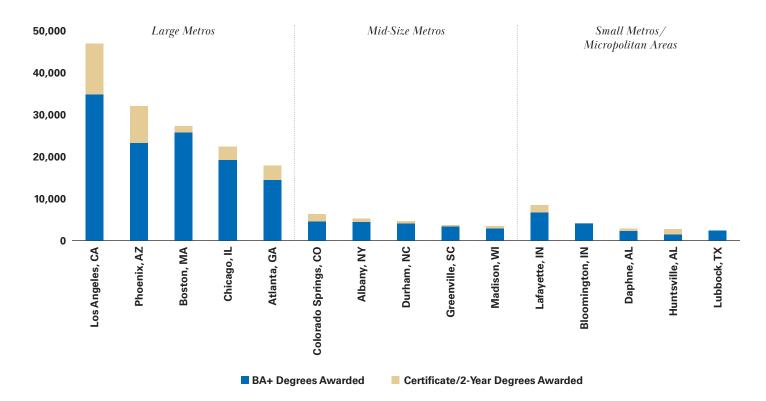
Challenges (and Solutions) to Meeting Manufacturing Labor Needs

While the recent surge in momentum has demonstrated that many manufacturers are locating where there are strong concentrations of skilled labor within an existing manufacturing ecosystem, there will be challenges to actually filling every job projected. Labor availability is a critical issue impacting not just the availability of skilled workers to operate these facilities when up and running, but also to build the sites in the first place. Growth will be hampered without more public/private sector partnerships working on training new cohorts of workers and strategically improving access to global talent. The public/private collaboration is necessary to attract labor with specialty skillsets- immigrants account for about 40% of highly skilled workers in America's semiconductor industry today, for example.

Markets with robust higher education systems can provide a strong pipeline to labor, as visible in the below graph charting degrees awarded within metros that have seen recent major manufacturing announcements. While many of the top occupations associated with key-sector advanced manufacturing require an advanced degree, certificates and training programs are becoming increasingly common to help fill the skills gap.

Secondary Degrees Awarded in Top Advanced Manufacturing Occupations

AS OF 2021



Sources: Newmark Research, JobsEQ

- 2. Architectural and Engineering Managers
- 4. Network and Computer Systems Administrators
- 6. Computer Occupations, All Other
- 7. Electrical Engineers

- 10. Industrial Engineering Technologists and Technicians
- 11. First-Line Supervisors of Production and Operating Workers

Industries, governments and educational institutions will need to collaborate further to develop workforce training programs that cater to the evolving skill requirements of advanced manufacturing. Initiatives like apprenticeships, vocational training and educational grants can play pivotal roles in bridging the skills gap, but will need to scale in order to meet skilled workforce needs over the short and long term. Increasing adoption of automation technologies will also help manufacturers amplify productivity amidst talent scarcity.

"There's a growing trend of co-locating **R&D** facilities with manufacturing plants to ensure a seamless transfer of technology and skills. This creates an ecosystem where skilled labor can be more readily shared and developed, further mitigating the challenges posed by labor shortages."

ADAM FAULK VICE CHAIRMAN, NEWMARK



^{*}Top occupations in key-sector advanced manufacturing include the following occupations.

Super Sector Spotlights



Automotive / Transportation

The production of EVs and related components such as batteries, charging infrastructure, fuel cells, etc.

2023 Employment

1.8 Million

New Jobs Announced Since 2020

116,000+

Avg. Annual Wages, 2023

\$87,984

The Automotive/Transportation Sector is driven by the EV Supply Chain, which has rapidly evolved over the past two decades, from the success of early hybrid models like the Toyota Prius to Tesla's entrance into the all-electric market. Propelled by improving battery technology, falling prices, high gas prices and environmental concerns, EVs are gaining consumer interest, capturing 8.9% of auto sales in 3Q 2023, up from 6.2% last year. As the industry continues to develop, it's being driven forward by the influence of both federal and state regulations and the attractive financial incentives to build now. The federal government aims to have 50% of all new vehicle sales be zero-emission by 2030. Furthermore, California's Advanced Clean Cars II rule is demanding even more, requiring all new cars and light trucks sold in the state to be 100% zero-emission vehicles by 2035. It is uncertain, however, if consumer demand will continue to rise quickly enough to meet ambitious production growth plans aimed at capturing lucrative EV incentives before they start phasing down in 2030. There will likely be a divergence among consumer EV adoption rates across the U.S., with states more aggressively offering incentives and building infrastructure to support EVs forecasting much higher projections, like California forecasting 94% EV sales share by 2035, but Michigan, just 41%, according to JD Power.

Key Occupations

First-Line Supervisors of Production and Operating Workers, Computer and Information Systems Managers, Industrial Engineers

Top Manufacturers by Jobs Announced

Tesla, Ford Motors, Hyundai



Biomanufacturing

The production of pharmaceuticals, food ingredients, fuel enzymes, cosmeceuticals, etc.

2023 Employment

360,200

New Jobs Announced Since 2020

16,000+

Avg. Annual Wages, 2023

\$136,700

Driven by the production of pharmaceuticals and medicine, a spotlight was shone on the Biomanufacturing Sector following the start of the COVID-19 outbreak. In September of 2022, the federal government announced the National Biotechnology and Biomanufacturing Initiative to improve and expand U.S. biomanufacturing capacity and processes as well as foster investment and innovation within the sector. This legislation will also bolster a skilled workforce and clarify and streamline regulations. According to the St. Louis Federal Reserve, the industrial production or real output of pharmaceutical and medicine manufacturers reached a 13-year high in September of 2023 as growth within the sector continues to accelerate—having increased nearly 27% from its 2018 trough.

Long-term demand drivers are rooted in the nation's rapidly aging population, a greater emphasis on treating and curing illnesses and a desire to maintain more control over production processes and supply chains. Key life science markets such as Boston and Raleigh's Research Triangle Park will likely continue to garner a large portion of biomanufacturing growth, though more emerging markets such as Dallas and Columbus will capture their share of the reshoring efforts within the sector.

Key Occupations

Management Analysts, Computer and Information Systems Managers, Industrial Engineers

Top Manufacturers by Jobs Announced

Meissner Corporation, Thermo Fisher, Eli Lilly



Super Sector Spotlights



High-Tech / Digitalization

The production of chips, semi-conductors, sensors and devices, satellites, etc.

2023 Employment

1.1 Million

New Jobs Announced Since 2020

46,000+

Avg. Annual Wages, 2023

\$148,719

High Tech/Digitalization is all about the chips, a booming industry undergoing a seismic shift. Over the past few decades, the U.S. has shifted from being a hub of semiconductor production to a global leader in R&D, with much manufacturing offshored. With TSMC and Samsung, producing nearly all advanced chips, mostly in Taiwan, raising supply chain security concerns and therefore, driving U.S. efforts to reshore production and build secure supply chains with allied countries. Technological advances have also further expanded the sector in two main ways: (1) Amid Internet of Things (IoT), more goods than ever need chips, and (2) Artificial Intelligence (AI) is driving a proliferation of proprietary advanced chip designs.

According to the World Intellectual Property Organization, approximately 70,000 global semiconductor patents were filed in 2022, up 59% from five years ago. The growth in announcements for new U.S. facilities reflects this expanding, evolving market. Challenges to sector growth like labor shortages and unpredictable tech advancements remain, but the drive to re-shore semiconductor manufacturing has strong momentum with government support, rising security concerns and rapid innovation necessitating production agility.

Key Occupations

Database and Network Administrators and Architects, Computer and Information Systems Managers, Electrical and Electronics Engineers

Top Manufacturers by Jobs Announced

Micron, Intel, TSMC



Energy

The production of clean energy, batteries, solar panels, wind turbines, fuel, nuclear reactors, etc.

2023 Employment

685,400

New Jobs Announced Since 2020

15,000+

Avg. Annual Wages, 2023

\$118,097

Energy availability, sustainability, security, scalability and cost are interrelated, critical issues animating the need for energy-related manufacturing projects across the country. Recent geopolitical events have injected greater volatility into global energy markets, further driving public-sector and private-industry initiatives and investment. Under the provisions of the IRA and IIJA, a host of incentives for manufacturing clean energy technology in the U.S. are available to companies through 2032, subsidizing the current proliferation of projects. The U.S. Energy Information Administration has forecasted energy consumption to steadily rise over the coming decades, with growth increasingly supported by renewable fuel sources.

Threats to momentum include materials availability, federal and local permitting processes, production bottlenecks and land availability. With technological progress potentially escalating timelines of obsolescence in some energy modalities, the risk of wasted time and investment is also apparent. But, the need for greater energy underpins the entirety of the manufacturing growth story.

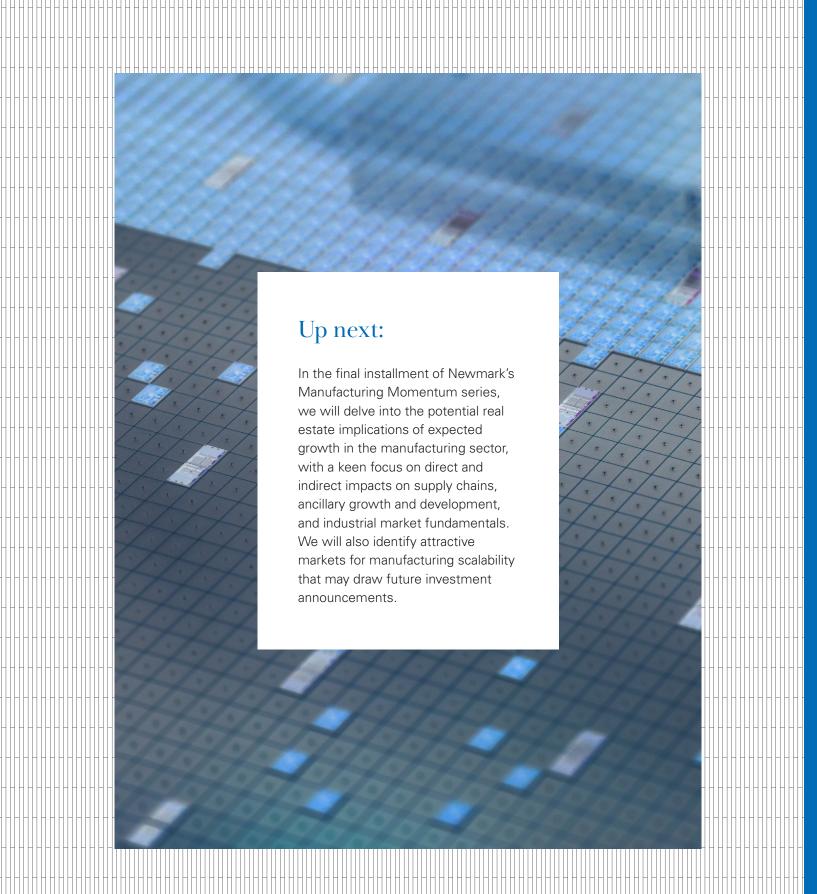
Key Occupations

Software and Web Developers, Programmers and Testers, First-Line Supervisors of Production and Operating Workers, Computer and Information Systems Managers

Top Manufacturers by Jobs Announced

Ocells, Plug Power, Canadian Solar





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