REINDUSTRIALIZATION REVISITED: POLICY IMPACTS AND LOAD GROWTH

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Technology Innovation

According to the U.S. Census Bureau, spending on construction of domestic manufacturing facilities has more than tripled in the past 3 years. A 2023 EPRI white paper explored early evidence of a revitalized U.S. manufacturing sector and estimated the potential for load growth attributable to new and expanded production facilities within the context of larger demographic, digitization, and decarbonization trends. This brief presents preliminary results from an updated 2024 analysis providing further insights regarding the characteristics of the reindustrialization that is occurring, with important implications at national and regional levels and for electricity providers.

STUDY APPROACH

EPRI's bottom-up analyses of reindustrialization and load growth are based on media reports and public announcements regarding new and expanded manufacturing facilities across the U.S. since January 1, 2021. While many early announcements were spurred by supply chain disruptions, the 2021-22 laws enacted to improve economic security, create jobs, and accelerate economy-wide decarbonization represent the primary current driver.

For EPRI's 2023 study, which covered announcements prior to March 1, 2023, annual electricity consumption in gigawatt-hours (GWh) for the 131 facilities with announced production capacities was estimated based on previously published, process-specific electricity inputs per unit of production. Continuous per-facility demand in megawatts (MW) was calculated by averaging the annual consumption estimates.

EPRI's updated analysis, based on announcements prior to May 1, 2024, focuses on sectors addressed by the "Creating Helpful Incentives to Produce Semiconductors and Science Act" (CHIPS), "Infrastructure Investment and Jobs Act" (IIJA), and "Inflation Reduction Act" (IRA). Facilities are categorized by sector and aggregated into four major areas of industry—Semiconductors and Electronics, Transportation and Mobility, Clean Energy, and Heavy Industry—plus a miscellaneous category representing the 1.8% of unaligned facilities.

The 2024 analysis includes 252 production-based estimates. For an additional 277 facilities with no announced production capacities, estimated annual load is calculated based on average-facility electricity consumption for relevant North American Industry Classification System (NAICS) categories. For the five largest new loads, annual use is based on published estimates.

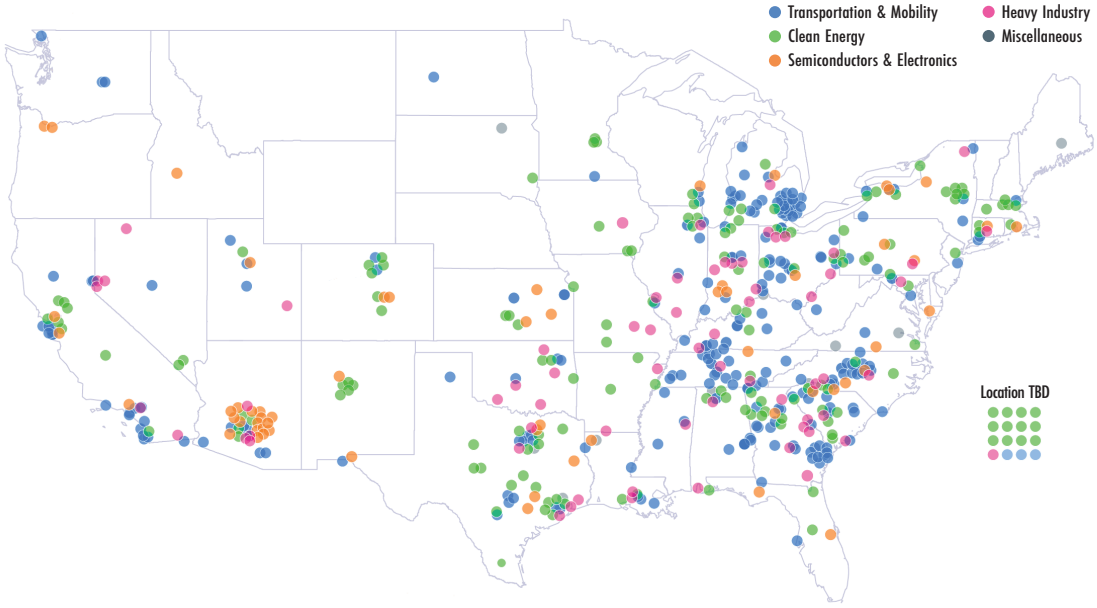
RESEARCH QUESTION

How will the reindustrialization of the U.S. economy impact near- and long-term demand growth and resource planning?

REINDUSTRIALIZATION BY THE NUMBERS

	2023 Study	2024 Update
Announced facilities	150	534 (+256%)
Total load, TWh/yr	13	31 (+138%)
Point loads >10 MW	38	61 (+61%)

Reindustrialization by Facility Location and Industry (as of 5/1/24)



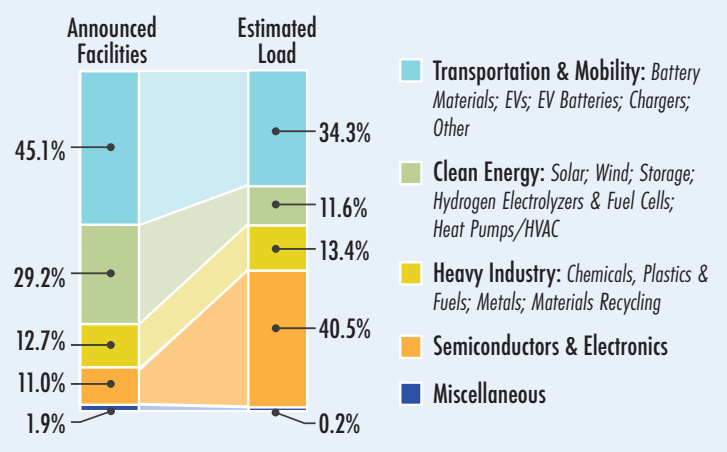
HIGH-LEVEL FINDINGS AND INSIGHTS

The scale of reindustrialization has increased as CHIPS, IIJA, and IRA have been implemented: 534 new or expanded manufacturing facilities have been announced, initiated construction, or begun operation since January 1, 2021.

Coincident with manufacturing expansion, U.S. industrial electricity consumption is growing after 2 decades of stagnation. According to the August 2024 U.S. Energy Information Administration's *Short-Term Energy Outlook* (STEO), since a pandemic-driven dip in 2020, retail sales of electricity to industrial customers have increased at a cumulative annual growth rate of 2.2% and will reach an all-time high in 2025. This would represent the longest run of year-over-year growth since the 1990s.

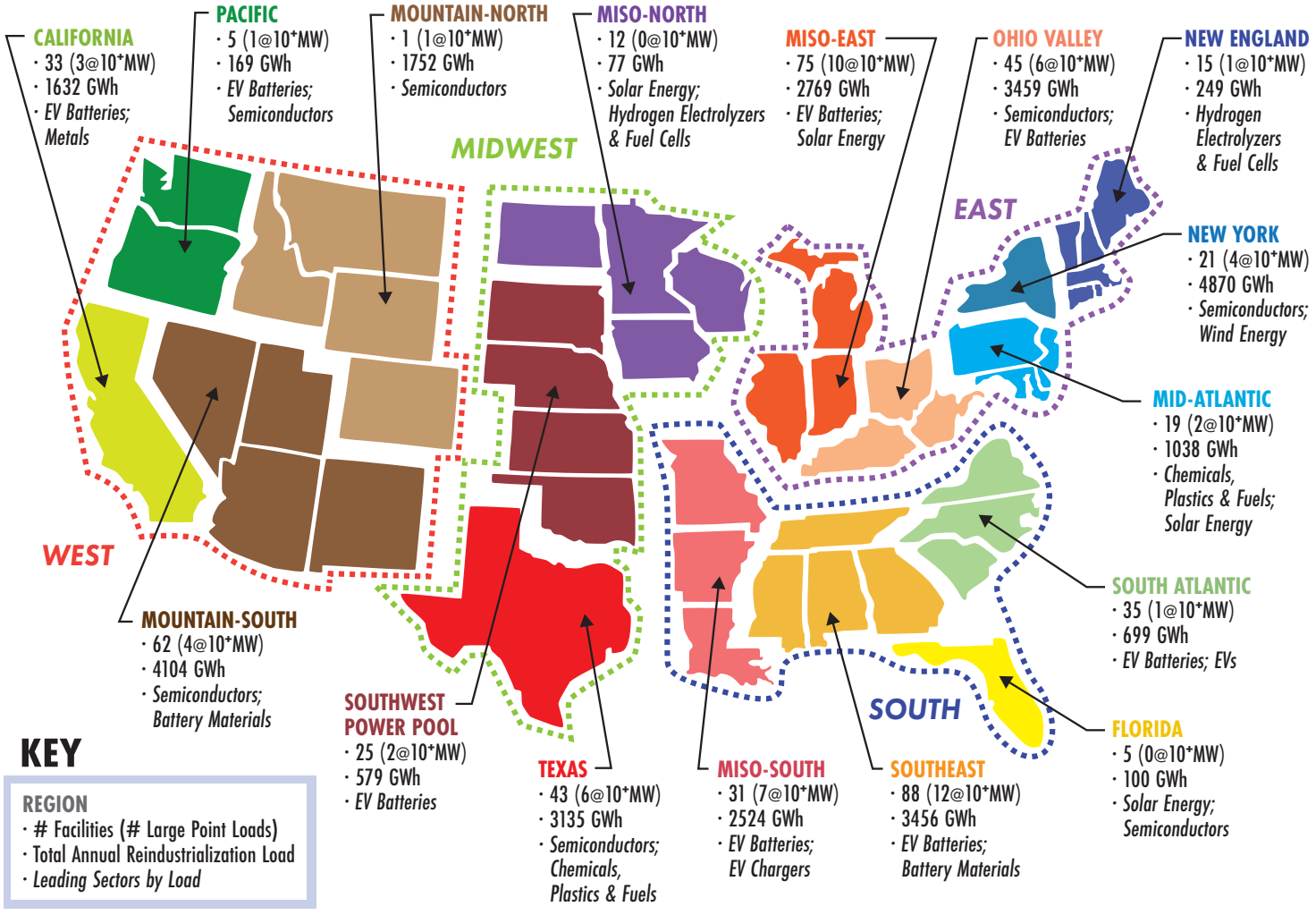
The observed increase largely involves a rebound from the pandemic and the onset of conflict in Europe. EPRI's study indicates that facilities planned to be operating in 2025 could, by themselves, increase U.S. industrial load by 2.3% relative to 2022. While the extent to which the STEO reflects these announcements is not clear, industrial sales for 2024-25 and beyond could exceed current expectations, all else being equal. If all announced facilities become operational, the total estimated new load is 31.4 terawatt-hours/year (TWh/yr).

Reindustrialization by Major Industry



Projected load growth varies by grid planning and control region and by state, with New York, Arizona, and Texas the top three states in added load, followed by Ohio, California, Idaho, Michigan, and South Carolina. Reindustrialization activity and estimated load also vary significantly by sector—with the top three sources of demand growth being the semiconductor, EV battery, and solar energy industries.

Reindustrialization by Region: Facility Announcements, Load Impacts and Leading Sectors



POINT LOAD FINDINGS AND INSIGHTS

Large, electricity-intense manufacturing facilities are already creating interconnection challenges for electricity providers—just like data centers, fleet charging depots, and hydrogen electrolyzers—as significant new loads requiring grid service at discrete locations. More than 80% of the total estimated reindustrialization load is attributable to 61 point loads (just over 11% of facilities identified) having estimated electricity consumption equivalent to at least 10 MW of continuous demand. Two-thirds of these facilities are projected to have loads exceeding 20 MW. Six semiconductor facilities lead the way with demand ranging from 120 to 480 MW each. More than 160 facilities have estimated demand of between 1 to 10 MW, creating the potential need for distribution system reinforcement. The remaining 300+ facilities are expected to contribute to incremental regional load growth. Geographic clusters emerging within some industries could have noticeable impacts within specific control areas.

Industries and Sectors	Number of Facilities	Total Estimated Load, GWh/yr
Semiconductors and Electronics	59	12,693
Semiconductors	42	12,639
Other Electronics	17	54
Transportation and Mobility	241	10,760
Battery Materials	53	1,288
EVs	68	956
EV Batteries	87	7,752
EV Chargers	25	686
Other Transportation	8	78
Clean Energy	156	3,643
Solar Energy	86	2,191
Wind Energy	24	538
Energy Storage	11	365
Hydrogen Electrolyzers and Fuel Cells	16	519
Heat Pumps/Heating, Ventilation and Cooling	19	30
Heavy Industry	68	4,219
Chemicals, Plastics and Fuels	21	2,041
Metals	15	1,691
Materials Recycling	32	487
Miscellaneous	10	55
Totals	534	31,371

SCALE OF POINT LOADS

MANUFACTURING SECTORS BY: TOTAL ANNUAL LOAD (rank)	NUMBER OF FACILITIES	AVERAGE DEMAND OF 3 LARGEST ANNOUNCED FACILITIES	POINT LOAD EQUIVALENT IN U.S. HOMES (= 10,000 HOMES (12.3 MW))
1 Semiconductors	42	293 MW	
2 EV Batteries	87	55 MW	
3 Solar Energy	86	23 MW	
4 Chemicals, Plastics & Fuels	21	51 MW	
5 Metals	15	48 MW	
6 Battery Materials	53	18 MW	
8 EVs	68	16 MW	
9 Wind Energy	24	18 MW	
10 Hydrogen Electrolyzers & Fuel Cells	16	10 MW	

IMPLICATIONS AND NEXT STEPS

Reindustrialization is an emerging load growth driver, joining digitization and decarbonization. The pace of facility announcements, the size of large point loads, and the likelihood of accelerated development timelines and specialized service requirements together suggest potential for disruptive impacts on load forecasting and grid planning and investment. Higher-resolution modeling and analysis and greater coordination among electricity providers, manufacturers, and other stakeholders are essential to ensure that growth can be met in efficient and timely fashion. EPRI's **Load Forecasting Initiative** is addressing several key considerations, largely driven by the **proliferation of data centers**. Regional, state-level, and sector-specific findings from recent reindustrialization work will be published in Fall 2024. Potential future topics include impacts of industrial electrification, automated manufacturing, and customer- and facility-specific requirements (e.g., 24/7 carbon-free energy procurement), as well as case studies in reindustrialization and interconnection by sector.

About EPRI

Founded in 1972, EPRI is the world's preeminent independent, non-profit energy research and development organization, with offices around the world. EPRI's trusted experts collaborate with more than 450 companies in 45 countries, driving innovation to ensure the public has clean, safe, reliable, affordable, and equitable access to electricity across the globe. Together, we are shaping the future of energy.

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