

# The next industrial renaissance



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The latest industrial transformation appears to be here and is accelerating due to the pace of innovation and the need to build resiliency in the system. The COVID-19 pandemic, trade war and geopolitical instability each highlighted the dangers of overly concentrated supply chains and long lead times. Manufacturers experienced the pressures of supply-chain risk as unfilled orders, delayed shipments and surging prices wreaked short-term havoc on their business models. Companies are now accelerating the evaluation of reshoring or nearshoring manufacturing capabilities to build better flexibility into their operations. The factory of the future is going to go beyond simply adopting new technologies and digitalization: We believe concepts such as resiliency and sustainability will be a cornerstone of their design. From a technology perspective, this transformation will encompass automation, robotics, smart systems, virtualization, Internet of Things (IoT), big data analysis, machine learning and artificial intelligence (AI).

### Industrial digitalization

Where does US industrial digitalization progress stand? According to McKinsey, only 24% of industrial businesses have a digital transformation strategy in place. While many industrials are pursuing the implementation of digital and analytics solutions, only 20% report high levels of success. Management teams cite fragmented data landscapes, outdated legacy systems, suboptimal technology solutions and lack of talent as some of the challenges for both informational and operational technology systems.<sup>1</sup>

Yet, we believe the benefits of digitalization are real and robust.

Factory automation is just the beginning of the next industrial transformation. The benefits include lower costs and increased productivity through advances like predictive maintenance, robotics and data analytics. Predictive maintenance uses computer AI and sensors to alert companies about potential maintenance issues or failures; the clear benefit is less downtime. Similarly, automating order processing allows a business to track orders, modifications and price calculations in real time, allowing for more efficient working capital management. One smart factory in Lexington, KY, combined IoT connectivity and predictive analytics to lower energy use by 26%, CO<sub>2</sub> emissions by 30% and water use by 20%.<sup>2</sup>

Digital transformation goes beyond automation and includes connected machines (IoT), advanced analytics and AI/ML, which together lead to novel processes, services and products (Exhibit 1). Connected machines integrate physical operations with smart technologies such as IoT devices and AI to drive smarter and more agile decisions. One exciting area of innovation is digital twin technology. A digital twin is a virtual replica of a system's behavior in its operating environment, which can lead to a reduction in cost, waste and energy consumption. It can also increase a company's speed to market, enable product personalization and improve quality and customer satisfaction. McKinsey expects the digital-twin market to grow at a 35%–40% average growth rate through 2030.<sup>3</sup>

Digital manufacturing allows manufacturers to increase efficiency through optimized processes, continuously improve workflows as smart devices identify and resolve issues, improve product quality, enhance customer satisfaction, innovate faster and reduce costs. According to multiple studies, digital strategies can reduce manufacturing costs by more than 25%, labor costs by over 30% and energy use by roughly 24% while increasing productivity by over 25%.<sup>4</sup> This efficiency leads to better earnings and return on invested capital (ROIC).

Exhibit 1: Key Elements of Industrial Digitalization



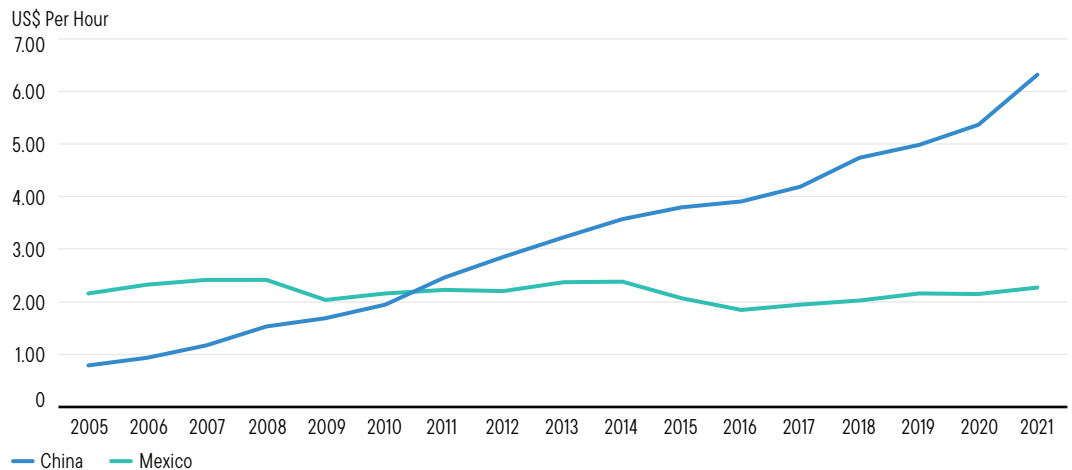
Source: Fierce Electronics, IIoT And Industry 4.0: The Basics You Need to Know.

## Sustainability and resiliency

Today, management teams are facing new challenges of skilled-labor shortages, soaring prices and supply-chain disruptions. Both trade frictions with China and the COVID-19 pandemic exposed the fragility and risk of supply-chain concentration while elongating lead times. According to a McKinsey study, 86% of executives cited inflation as their top concern, 81% cited labor supply and skill mismatch challenges, and 50% said building a more resilient supply chain is a strategic priority.<sup>5</sup> This priority has highlighted the need and opportunity for automation to include resiliency, flexibility and sustainability. Momentum is building to nearshore and reshore supply chains to make them nimbler while improving customer service and market responsiveness, as well as to enable greener methods of production. A UBS C-Suite survey found 87% of US executives said they are planning to move out of China.<sup>6</sup> A rising-cost profile including tariffs and labor costs in China combined with technology innovation is reducing the costs of North American production (Exhibit 2).<sup>7</sup>

### Exhibit 2: Cost of Labor in an Increasingly Challenged Environment

**Wages Per Hour in the Manufacturing Sector**  
2005–2021



Source: Quartz. Data: BofA Research.

Estimates of the investment required to meet the reshoring manufacturing needs across many industries, including battery, electric vehicles (EVs), semiconductors, biomanufacturing and clean energy, range between US\$300 billion and over US\$600 billion.<sup>8</sup>

Some anticipate reshoring to add 1.5% to US manufacturing employment in 2022. “For the first time since the 1970s, US industrial production, manufacturing employment, and capex [capital expenditure] spending have all exceeded prior peak levels.”<sup>9</sup> Construction spending and hiring has started (Exhibit 3 on the next page). Reshoring growth is leading to record labor demands and shortfalls. This trend is highlighting the need for industrial companies to promote learning and development to reskill the labor force and improve engagement through empowerment, collaboration and recognition.<sup>10</sup>

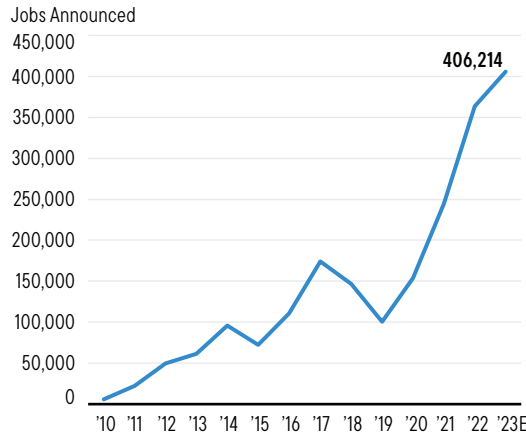
## Massive capital investments

How will these significant capital expenditures be funded? We believe a combination of government and corporate spending will provide the necessary investments to drive progress. In our view, US corporations are in a healthy position to invest. Balance sheets are strong, capex-to-sales ratios have been below historical levels and, in our conversations with management teams across an array of industries, we sense a high degree of motivation to address the factors which have created headwinds in recent quarters, including inflation.<sup>11</sup>

### Exhibit 3: Reshoring and Nearshoring Labor Drives Jobs and Construction Spend

**Left: Manufacturing Job Announcements Per Year, Reshoring and Foreign Direct Investment (FDI) 2010–2023E**

**Right: US Construction Expenditures (\$US Billions) January 2008–July 2023**



Source: Citi Research, Reshoring Initiative.

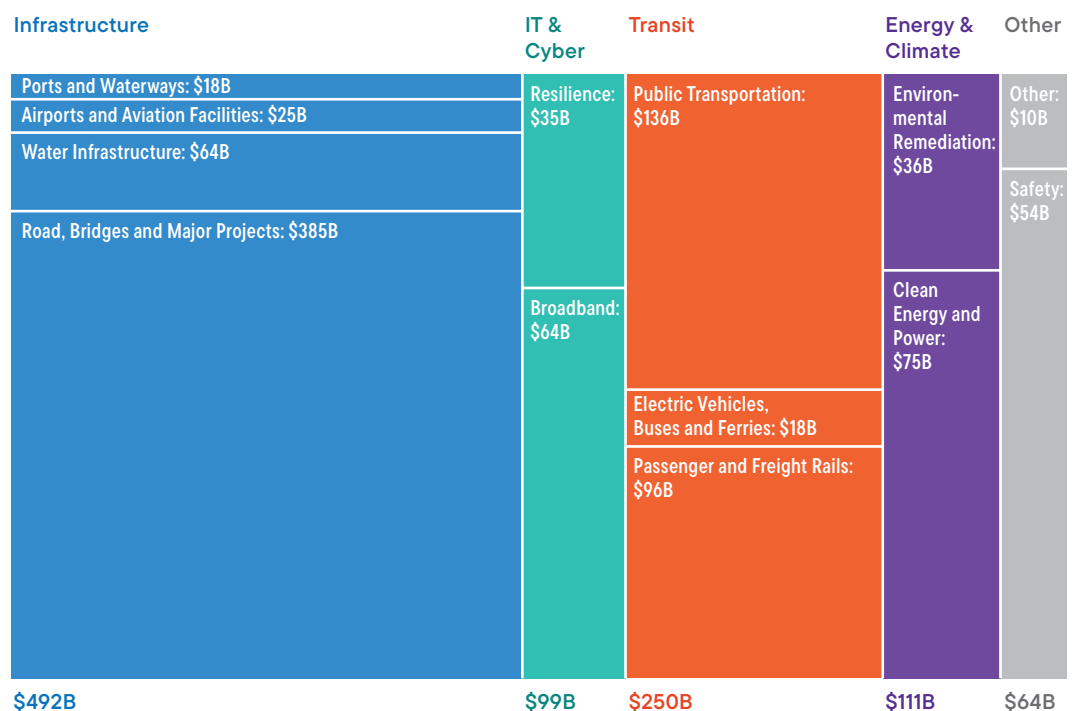
E=estimate. There is no assurance that any estimate, forecast or projection will be realized.

Sources: Citi Research, DataStream.

The Inflation Reduction Act, the Infrastructure Investment and Jobs Act and the Chips Act are complete game-changers for infrastructure investment, in our view (Exhibit 4). In aggregate, they provide more than US\$2 trillion of funding.<sup>12</sup> The legislation includes spending on roads, bridges, water infrastructure, resilience infrastructure, clean energy, manufacturing, EVs and semiconductors, to name a few. In addition, Europe established the EU Green Deal, a plan to invest €1 trillion in sustainable investments over the next 10 years, while Canada plans to invest CDN\$80 billion in clean energy and sustainable infrastructure.<sup>13,14</sup> In order to support the growth of many of these initiatives, we believe the energy market will require a massive transformation to meet new power requirements. Investment will be needed for not only renewable energy (wind, solar, hydrogen), in our view, but also for battery storage, transmission and distribution against the backdrop of an aging electrical grid.

### Exhibit 4: Government Investment in Infrastructure and Clean Energy

**Investment Summary of Bipartisan Infrastructure Deal (US\$ Billions)**



Source: "A Guidebook to the Bipartisan Infrastructure Law." US White House.

## Conclusion

We believe industrial executives are concluding that transforming digitally needs to be a number one priority to build resiliency and sustainability and to stay relevant. Corporations are feeling the impact of supply-chain disruptions, global instability and forthcoming policy tailwinds. The US industrial complex, in our view, is at the forefront of combining technological advancements through digitalization, automation and data analytics which is coinciding with the need to build resiliency and sustainability in the system to limit the risk of systemic shocks leading to the perfect tailwind of adoption growth for years to come. We believe they must invest to stay competitive and relevant. At the same time, they recognize the challenges and that this renaissance will not happen overnight. The transformation of the US manufacturing landscape will likely take decades and hundreds of billions of dollars of investment.

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## Endnotes

1. Source: "Connected machines: A game changer in industrial manufacturing?" Kpmg.com. 2022.
2. Source: "What are Industry 4.0, the Fourth Industrial Revolution, and 4IR?" McKinsey.com. August 17, 2022.
3. Source: "Is industrial automation headed for a tipping point?" McKinsey.com. June 16, 2023.
4. Source: "Digital machinations: payback time." Bank of America Institute. February 23, 2023.
5. Source: "Is industrial automation headed for a tipping point?" McKinsey.com. June 16, 2023.
6. Source: "Multi-Industry: Profiling Private Industrial Tech Disrupters, Round 2." UBS Evidence Lab. 14 September 2023.
7. Source: "As China's wages rise, Mexico beckons manufacturers." Qz.com. November 2, 2022.
8. Source: "US Smid-Cap Industrials Reshoring Deep-Dive; Perfect Storm for \$500B/yr opportunity." UBS. September 15, 2020.
9. Source: "Digital machinations: payback time." Bank of America Institute. February 23, 2023, pg. 3.
10. Source: "Supply Chain Technology: Improving Efficiency, Resilience, and Transparency." Citi.com. October 2023, pg. 11.
11. "Executing on the \$2 trillion investment to boost American competitiveness." Deloitte.com. March 16, 2023.
12. "Executing on the \$2 trillion investment to boost American competitiveness." Deloitte.com. March 16, 2023.
13. "The European Green Deal Investment Plan and Just Transition Mechanism explained." Europa.eu. January 14, 2020.
14. "Canada's Inflation Reduction Act response: An \$80bn clean energy plan." Energymonitor.ai. April 7, 2023.

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