



Status and Investment Implications of Infrastructure, Clean Energy, and Semiconductor Spending Acts

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INVESTMENT IMPACT OF RECENT MAJOR GOVERNMENT SPENDING INITIATIVES



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The bipartisan Infrastructure Investment and Jobs Act of 2021 (IIJA), the Inflation Reduction Act of 2022 (IRA), and the bipartisan Chips and Science Act of 2022 (CHIPS Act) are all major government spending initiatives that are having a significant impact on the U.S. economy and will for years to come.

MASSIVE INVESTMENT TIED TO THE LEGISLATION

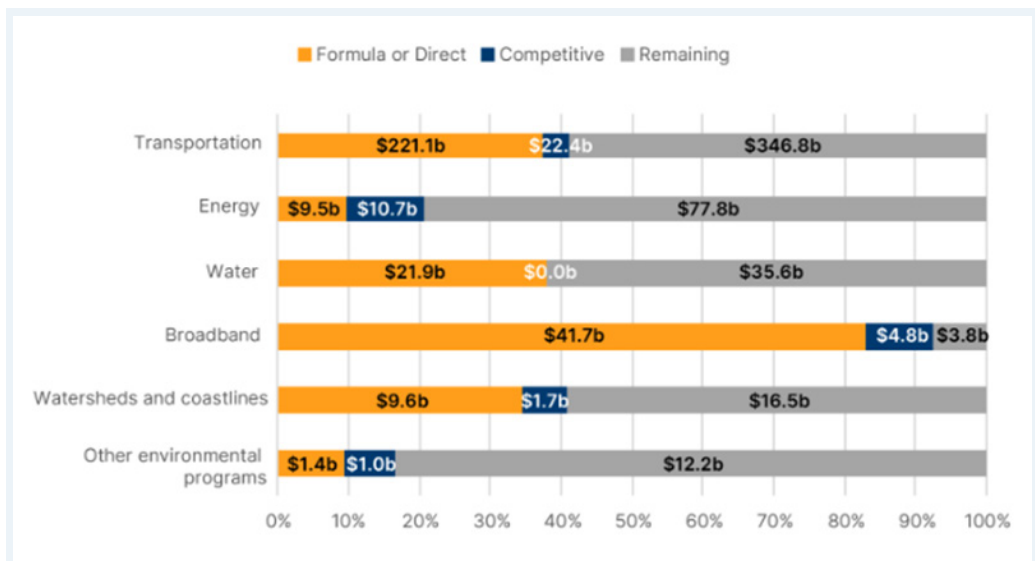
The IIJA provides an additional \$550 billion in new spending for a total of \$1.2 trillion in infrastructure spending over the rest of the decade. The IRA has already resulted in over \$242 billion in new investment announcements, with estimates suggesting as much as \$1.2 trillion in clean energy spending through 2031, far above the law’s initial \$400 billion estimate. As a result of the CHIPS Act, companies in the semiconductor ecosystem have announced dozens of new projects across America—totaling nearly \$450 billion in private investments—since the CHIPS Act was introduced.

These multi-trillion dollars of spending are not only having a major impact on the obvious industries, including semiconductors, construction, and utilities, but will ultimately have a significant influence across all industries in the economy.

THE INFRASTRUCTURE INVESTMENT AND JOBS ACT OF 2021 (IIJA)

The infrastructure law authorized \$1.2 trillion for transportation and infrastructure spending, with \$550 billion in new federal spending on top of previously approved funds. The bill is an ambitious plan to upgrade and modernize the nation’s

Chart 1: Progress of IIJA-awarded Funding, by Infrastructure Sector and Funding Type



Source: Brookings Institution
Note: Awards Data as of November 15, 2023

roads, bridges, water systems, broadband access, and electric grid. The work started in 2022 and will last through the rest of the decade.

The law calls for investing \$110 billion for roads and bridges, \$66 billion for rail, \$65 billion for power grid infrastructure, \$65 billion for broadband, \$63 billion for water and wastewater infrastructure, \$47 billion for cyber and climate resilience, \$39 billion for public transit, \$25 billion for airports, \$24 billion for environmental remediation, \$19 billion for ports and waterways, \$16 billion for electric vehicle infrastructure and electric mass transit, and \$11 billion for road safety.

Now, in year three of spending, the law has allocated over \$300 billion to state funding and direct investment projects, with about 80% of all competitive funding still left to be awarded.

This traditional infrastructure investment is beneficial for industrial and materials companies. Utilities benefit from increased investment in water and energy infrastructure. Many communication services and technology firms are beneficiaries of increased investment in broadband.

THE INFLATION REDUCTION ACT OF 2022 (IRA)

This law features \$369 billion in spending and tax incentives on energy and climate change provisions. Most of these energy security and climate-related provisions take the form of tax credits that, among other things, encourage reduced reliance on fossil fuels or increased conservation. There are some programs that are direct federal spending or grants and loans.

Ultimately, analysts expect U.S. government direct spending and tax credits under the law will far exceed the initial \$400 billion estimate, with some estimates projecting up to \$1.2 trillion of spending through 2031.

Two years after its passage, companies have announced more than \$242 billion in new investments to build the clean energy economy, according to Rhodium Group and MIT's Clean Investment Monitor (CIM). This includes investments in industries like electric vehicles, batteries and energy storage, clean energy manufacturing, clean power generation, carbon management, and many others.

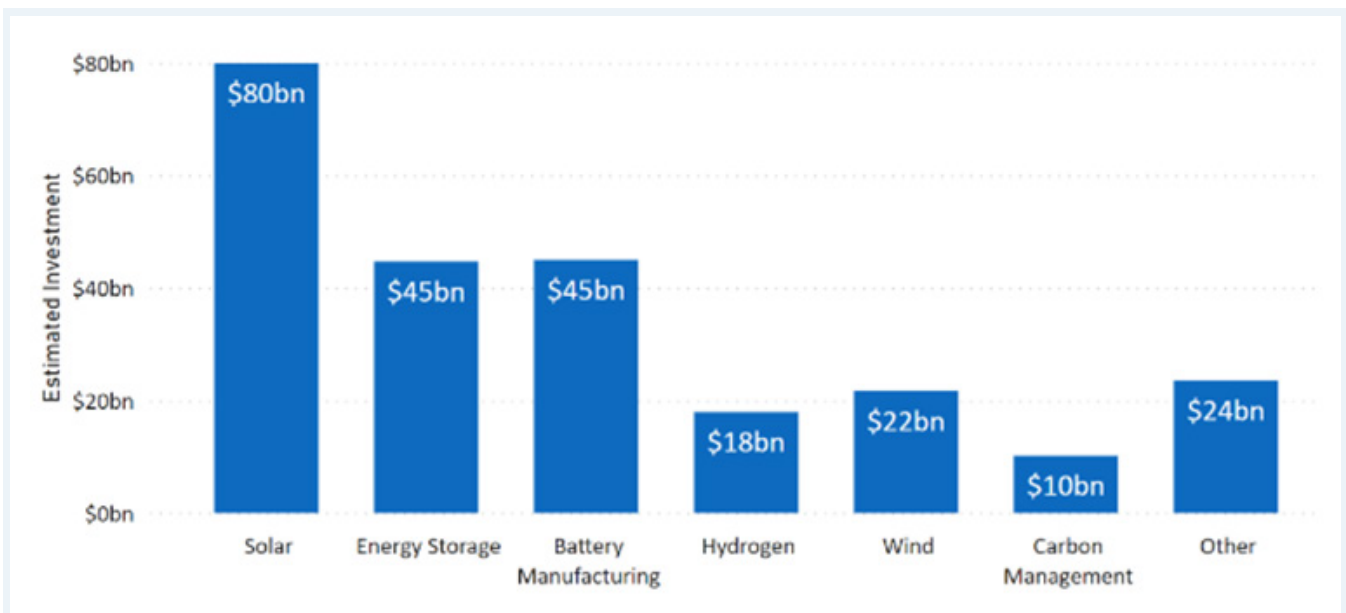
Electrical utilities, battery manufacturing, and traditional clean energies like wind and solar are major beneficiaries of the IRA. There are other, less obvious, industries that are also major beneficiaries.

Recent World Bank and IEA studies point to significant demand for base metals and other materials needed for the transition to clean energy. A typical electric car requires six times the mineral inputs of a conventional car, and an onshore wind plant requires nine times more mineral resources than a gas-fired power plant.

Many industrial firms are involved in commodity extraction, transportation, and improving energy efficiency. They are directly involved in and impacted by the movement toward clean energy, and many are well positioned for the transition.

From providing software and semiconductors necessary for advanced transportation and power grids to powering their server farms with clean energy, many tech firms are well positioned to transition to clean energy. Semiconductors are at the heart of solar power, with many solar stocks classified as Technology stocks.

Chart 2: Announced IRA Investments by Technology: Over \$242 Billion are being Invested in a Range of Technologies



Source: Rhodium Group/Clean Investment Monitor (CIM)

CHIPS AND SCIENCE ACT OF 2022 (CHIPS ACT)

The importance of advancing semiconductor technology and capacity was highlighted by the bipartisan passage of the \$280 billion CHIPS and Science Act of 2022 (CHIPS Act), which centers on more than \$52 billion for U.S. companies producing computer chips, as well as billions more in tax credits to encourage investment in chip manufacturing. It also provides tens of billions of dollars to fund scientific research and development and spur other U.S. technologies' innovation and development.

While American companies still dominate the global semiconductor industry, accounting for nearly half of all revenues, the share of global production in the U.S. has dropped from 37% in 1990 to just 12% today. The United States also lacks the capabilities to produce the most advanced chips at volume. Consequently, this is a national and economic security threat.

Many foreign competitors, including China, are investing heavily to dominate the industry. Semiconductor production is increasingly concentrated overseas, with 75% of global production occurring in East Asia. Foreign government subsidies drive as much as 70% of the cost difference for producing semiconductors overseas. Combined with other factors, the result is a 25% to 40% cost advantage for overseas semiconductor production compared to the United States.

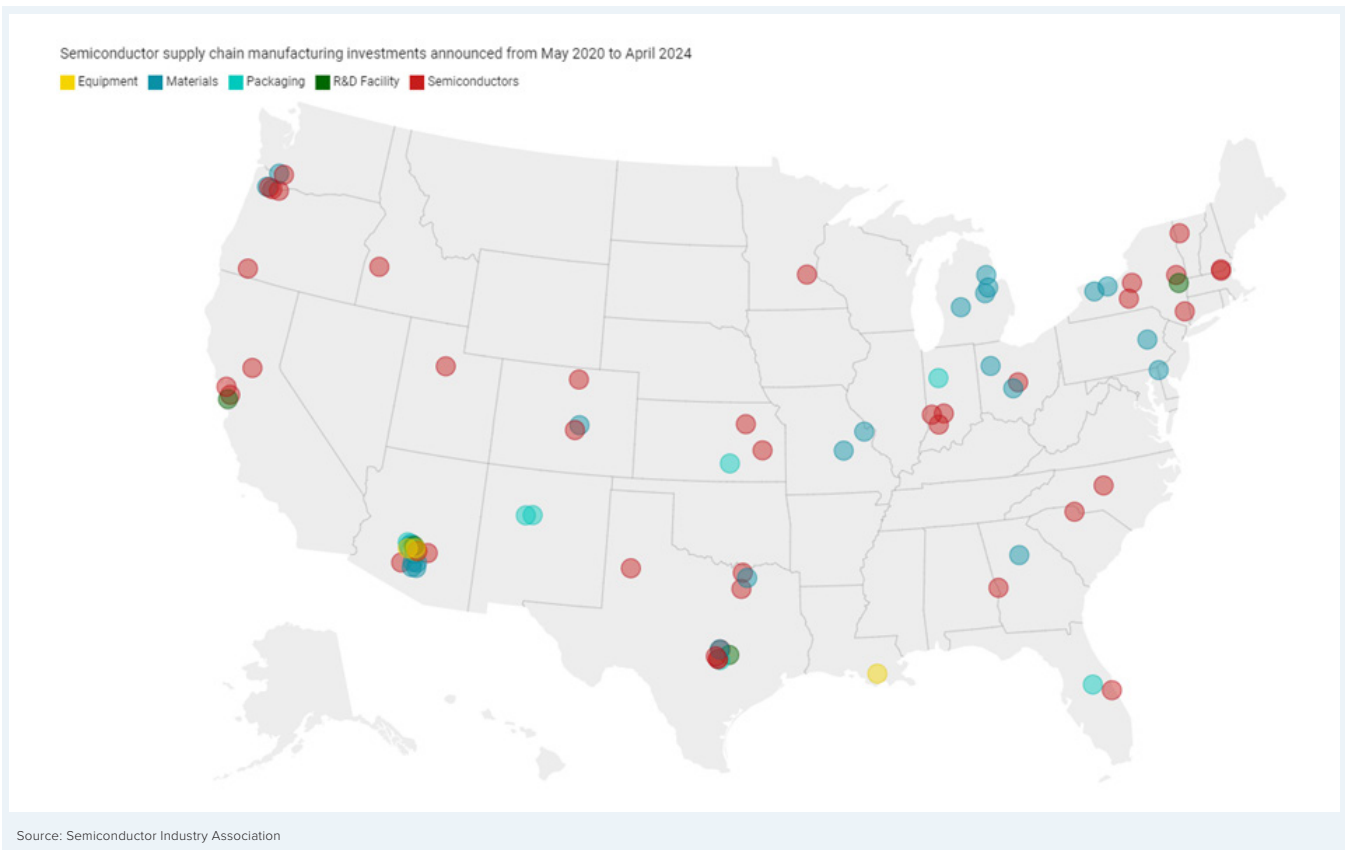
The CHIPS Act is designed to strengthen American manufacturing, supply chains, and national security, and invest in research and development, science and technology, and the workforce of the future to keep the United States the leader in the industries of tomorrow, including nanotechnology, clean energy, quantum computing, and artificial intelligence.

It includes \$39 billion in manufacturing incentives, including \$2 billion for the legacy chips used in automobiles and defense systems, \$13.2 billion in Research and Development (R&D) and workforce development, and \$500 million to provide for international information communications technology security and semiconductor supply-chain activities. It also provides a 25% investment tax credit for capital expenses for manufacturing of semiconductors and related equipment.

Scientific R&D is critical to economic development, public health, and national defense, with as much as 85% of U.S. productivity growth in the first half of the 20th century resulting from technological advances. Meanwhile, U.S. Federal R&D spending as a percentage of GDP is near its lowest point in over 60 years.

To bolster U.S. R&D, the CHIPS Act provides the largest five-year investment in public R&D in the nation's history. The National Science Foundation (\$36 billion), the Department

Chart 3: The CHIPS Act in Action



of Commerce (\$11 billion), the National Institute of Standards and Technology (\$5 billion), and the Department of Energy (\$30.5 billion) will see a total of \$82.5 billion in increased spending, 94% above the baseline five-year authorization.

While the CHIPS Act directly benefits the semiconductor industry, other winners include U.S. technology leadership, other manufacturing industries, future productivity growth, and the overall future health of the U.S. economy.

CHIPS ACT SPARKING SIGNIFICANT INVESTMENT

The U.S. semiconductor industry is one of the world's most advanced manufacturing and R&D sectors. This semiconductor ecosystem includes R&D, intellectual property and chip design software providers, chip design, semiconductor fabrication, and manufacturing by suppliers of semiconductor manufacturing equipment and materials.

According to the Semiconductor Industry Association (SIA), the CHIPS Act's manufacturing incentives have sparked substantial investments in the U.S. Since the CHIPS Act was introduced, companies in the semiconductor ecosystem have announced dozens of new projects across America—totaling nearly \$450 billion in private investments. These announced projects will create more than 56,000 jobs in the semiconductor ecosystem and support hundreds of thousands of additional U.S. jobs throughout the U.S. economy.

As of June 2024, the CHIPS Program Office (CPO) has announced \$29.556 billion in grant awards and up to \$25.1 billion in loans to 10 companies across 19 projects in 12 states. These projects include a total investment of at least \$348 billion over two decades, with the vast majority invested by 2030. The projects are also expected to create over 100,000 new jobs—over 33,000 manufacturing jobs and over 75,000 construction jobs. Dozens of additional award announcements are expected by the CPO in the coming months.

Please contact your Janney Financial Advisor for additional details and actionable investment ideas.

The Importance of Semiconductors

Semiconductors are the brains of modern electronics, enabling technologies critical to U.S. economic growth, national security, and global competitiveness. Semiconductors have driven advances in communications, computing, health care, military systems, transportation, clean energy, and countless other applications.

Rapid progress in chip performance has been a key feature and will be a critical attribute in the future. Around 1970, several thousand transistors could be built on a given chip; by 2000, the figure was roughly 10 million; by 2015 or so, it exceeded 1 billion. Even if the pace of advancement slows, countless ways will continue to be invented to take advantage of growing computing capacity, with significant undeveloped potential in many areas. Improved computing power coupled with big data, advanced algorithms, and artificial intelligence enable many breakthrough technologies for military and commercial applications.

Given Russia's invasion of Ukraine and ongoing geopolitical tensions with China, leadership in semiconductor technology has never been more critical for national defense and overall global technological leadership.

United States Has Major Infrastructure Investment Needs

America's physical infrastructure has been a catalyst for making our economy the largest and most vibrant in the world. However, decades after building out the core of our infrastructure, much of it needs repair, expansion, and modernization. The World Economic Forum ranked America's overall infrastructure 9th in the world and the quality of its roads 11th.

Once every four years, the American Society of Civil Engineers (ASCE) comprehensively assesses the nation's major infrastructure categories in ASCE's Report Card for America's Infrastructure.

The 2021 Report Card for America's Infrastructure reveals we have made some incremental progress toward restoring our nation's infrastructure. For the first time in 20 years, our infrastructure is out of the D range. The 2021 grades range from a B in rail to a D- in transit. Five category grades—aviation, drinking water, energy, inland waterways, and ports—went up, while just one category grade—bridges—went down. Also, stormwater infrastructure received its first grade: a disappointing D. Overall, eleven category grades were stuck in the D range, a clear signal that our overdue bill on infrastructure is a long way from being paid off.

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