

The Kiplinger Letter

FORECASTS FOR EXECUTIVES AND INVESTORS

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Dear Client:

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The past few years marked a wake-up call in Washington, with the pandemic and supply chain shortages, rising competition with China, the war in Ukraine, and, now, the specter of recession.

Lawmakers are taking a more active role in the economy to bolster critical industries, key technologies and infrastructure.

It's a sea change in policymaking that will reverberate for years to come, after decades when such direct involvement failed to gain much traction in Congress.

This Letter looks at the new wave of industrial policy over the next five years, examining some of the major investments, key trends, varied risks and big questions.

SPECIAL

**Industrial
Policy**

**AMERICAN
INDUSTRY**

Consider infrastructure, tech and energy spending in the next decade.

It adds up to \$2 trillion from the Infrastructure Investment and Jobs Act, the CHIPS and Science Act, and the Inflation Reduction Act. Though the last one passed with only Democratic votes, many members of both parties have come around to this way of thinking to combat China, help businesses and boost national security.

Nearly \$400 billion is going to energy and climate initiatives via the IRA, to drive down the cost of a variety of noncarbon energy sources to spur production and adoption. Plus, it aims to lift emerging technologies, such as advanced nuclear.

\$53 billion is flowing to homegrown semiconductors: U.S. manufacturing, research, development and workforce efforts. That includes \$2 billion for legacy chips for autos, defense, etc. (The chip shortage has cost hundreds of billions in auto sales.)

And a plethora of other spending will boost American industrial capacity... modernizing the electric grid; electrifying cars, buses, etc.; mining battery materials; creating regional technology hubs; and research aimed at commercializing key tech.

The major trends influencing Washington are affecting the private sector, too.

So private investment is also flowing into U.S. industries, based on demand, not Washington directives, for things such as electric vehicles and computer chips. But recent subsidies and incentives now muddy the water some for these markets.

CHIPS

Uncle Sam's biggest direct bet: Rebuilding America's chipmaking prowess.

It's the first major intervention in the industry since the 1980s, when Japan started racing ahead. Not long ago, the prospects for a state-of-the-art chip plant in the U.S. were grim. America's share of chip manufacturing capacity fell from 37% in 1990 to 12% today, in large part because other countries subsidize their industries.

Early signs of success are already on display, but there's a long way to go.

At least nine new cutting-edge chipmaking facilities are being built across the country in the next five years by Taiwan Semiconductor Manufacturing Co., Intel, Samsung and Micron. Odds favor more plants coming as yearly chip sales rise to \$1 trillion in the early 2030s, from about \$600 billion this year, even if sales flag some years.

Pandemic chip shortages roiled the economy, especially the auto industry.

Our overreliance on Asia has spooked U.S. buyers, including the military.

Note that Taiwan's TSMC makes 92% of chips built with the most advanced process. Even if chips are made here, they're likely packaged, tested and assembled in Asia.

Cue \$39 billion from the feds for domestic production, plus a 25% tax credit for manufacturing and processing equipment, making a big dent in the cost of a plant, which runs \$10 billion-plus. The tax credits phase out, so chip giants are acting fast.

**MORE
CHIPS**

A key place to watch is Licking County, Ohio. Intel's resurgence is at stake and the company is spending \$100 million to develop and attract workers. Suppliers Air Products, Applied Materials, Lam Research and Ultra Clean Technology are already setting up shop in the region based on Intel's plans to create a "small city." The new campus, near Columbus, could eventually lead to \$100 billion in investment.

Beyond making chips, investments are supporting other critical areas.

Lots of federal dollars are going to research, including to help start-ups get access to advanced plants to fabricate small batches of chip designs so they can try them out. Also, domestic final assembly and packaging, the last fabrication step, now mostly done in Asia, is seeing glimmers of life. Intel is investing in advanced packaging in N.M. SkyWater is developing a Fla. facility. Ditto, Northrop Grumman for defense chips. Others expanding operations or mulling it are Amkor, Promex and QP Technologies. Meanwhile, Wolfspeed and SK Siltron are building new facilities for the raw materials of chips, focusing on silicon carbide wafers, used for specialty applications, like EVs. GlobalWafers is building a Sherman, Texas, factory to make traditional silicon wafers.

The semiconductor supply chain involves thousands of global vendors.

That won't change. Shifting production to the U.S. will be slow and steady, no matter how committed policymakers are to building up our industry. America will also face off with new chip subsidies in Europe, Japan, China and elsewhere.

Delays are possible with new plants. Outright failures can't be ruled out, as facilities need to run at near-full capacity to turn a profit over the long run. Hard-to-predict breakthroughs could make certain projects or factories obsolete.

But success...meaning, bringing lots more production home...is a good bet. That shift will be very noticeable in five years as Apple, AMD, Nvidia, Broadcom, Qualcomm, Intel and others start making leading chip designs in local factories.

This U.S. shift comes as concerns escalate over China's meddling in Taiwan and risking the critical supply from Taiwan's TSMC. Beijing is also pushing hard to build a walled-off chip industry, threatening hefty U.S. chip sales to China. U.S. export controls of chips and chip gear to China only heighten increasing tensions. CHIPS includes \$500 million to work with foreign allies to secure chip supply chains.

That's why Congress also made a longer-term play with \$13 billion in R&D and workforce development to continue to out-innovate China and other nations.

Chip Renaissance: Major Plants in the Works

Company	Location	Investment (in billions)	Manufacturing capacity	Technology	Scheduled completion
GlobalFoundries	Malta, NY	\$1 initially	Expansion and 1 new plant	Specialty processors	Not available
Intel	Licking Co., OH	\$20 initially, up to \$100	2 plants; could be hub with 8 plants	Leading-edge logic	2025
Intel	Chandler, AZ	\$20	2 plants	Leading-edge logic	2024
Intel	Rio Rancho, NM	\$3.5	Expansion	Advanced chip packaging	2023
Micron	Clay, NY	\$20 initially, up to \$100	1 plant; potential large expansion	Leading-edge memory	Late 2020s
Micron	Boise, ID	\$15	1 plant	Leading-edge memory	Late 2020s
Samsung	Taylor, TX	\$17	1 plant	Leading-edge logic	2024
Texas Instruments	Sherman, TX	Up to \$30	Up to 4 plants	Analog and embedded processors	2025
TSMC	Phoenix, AZ	\$40	2 plants	Leading-edge logic	2024 and 2026

Sources: Company websites; compiled by Kiplinger

THE RISKS

America's return to full-fledged industrial policy brings many risks. Alienating allies, wasting money and distorting markets, to name a few.

All have long been mentioned when the government meddles in the free market in a bigger-than-usual way to support specific industries. For example, China, which heavily subsidizes all sorts of industries, is prone to wasteful spending and is likely hurting innovation with its heavy-handed, top-down approach.

Government spending can crowd out private investment, hinder profits and produce surpluses, or even gluts, of certain products. To top it all off, supporting an industry can make it reliant on subsidies and less competitive.

It's also a big bet on the feds efficiently managing a mountain of money in grants, loans, incentives and more. While the priority is to move fast, there's always paperwork, regulations and procedures that gum things up. Waste, fraud and abuse for huge programs are inevitable, as are failures. The question is the extent of it. Expect lots of congressional scrutiny for years.

Still, supporters say the new policies are well-designed, with guardrails to avoid the worst problems of industrial policy. For example, to support the shift from fossil fuels to renewables, the IRA mostly uses carrots rather than sticks, in the form of tax incentives, which proponents say is the best way forward.

ENERGY

With wind and solar accounting for only 11% of U.S. electricity generation...

The IRA has incentives to boost installed solar and onshore wind capacity, and early estimates expect the law could boost them by 40% combined by 2030, with an extra 155 gigawatts of capacity coming on line this decade. For wind, that means nearly 280 GW by 2030 (previous forecast: 193 GW), up from 140 now. For solar...270 GW by 2030 (previous forecast: 200 GW), up from nearly 100 now. Even if these projections prove too lofty, it's safe to say that more solar and wind will be built because of the new push than would have been built without it.

The total will depend in part on new transmission infrastructure that the U.S. is able to build to better integrate renewables into the existing grid, which is why lawmakers set aside billions for renewables *and* transmission lines.

New high-voltage direct-transmission capacity is viewed as essential to enabling a long-term transition to renewables and away from fossil fuels.

But U.S. investments in new transmission infrastructure have been paltry, growing about 2% yearly, not keeping up with domestic demand or foreign competition.

The U.S. lacks manufacturing capacity for most of the gear needed and has struggled to build it, due to various legal and regulatory hurdles. Only 23% of transmission projects seeking connection to the grid between 2000 and 2016 ended up reaching commercial operation. Various federal incentives could help. But...

A lot rests on whether Washington can reform current permitting processes to allow more projects to be completed. Success hinges on Congress taking action.

Meanwhile, batteries for electric vehicles are getting a big federal push with tax credits for the four stages of battery production: Mining the materials, refining them, building cells, and assembling them into packs to go into vehicles. Plus, EVs will need North American batteries to qualify for the full \$7,500 tax credit.

U.S. battery-making capacity is going to grow quickly. One estimate from S&P Global shows capacity growing by a factor of 10 between 2021 and 2025, from about 38 gigawatt-hours annually to about 380. The U.S. share of world capacity would go from about 4.7% to almost 14%. Companies involved include automakers (Ford, GM and Tesla, to name three) and the big names in battery production (Samsung, LG Chem and Panasonic). Plant construction is concentrated mostly in the Southeast and southern Great Lakes states...a new "Battery Belt," some say.

MORE ENERGY

Note the new tax credits for critical minerals for batteries and more...

aluminum, cobalt, nickel and rare earth metals. Direct mining incentives are supplemented with EV tax credits with minimum thresholds for U.S. content in batteries, which increase through 2028. Mining industry and supply chain experts have praised the policies but criticized the EV portion for being too aggressive.

It's impossible to fully replace China in EV raw materials anytime soon.

Still, the U.S. has already seen modest success in rebuilding some mining of rare earths at Mountain Pass Mine in Calif. by owner MP Materials. The mine now accounts for 15% of global rare earths production. The Dept. of Defense provided the original push, but new incentives plus growth in EV demand helped.

The U.S. already produces significant quantities of copper and lithium and has seen efforts by automakers to shore up domestic supplies of these minerals.

Other minerals will be more challenging. Permitting is a lingering issue. It takes seven to 10 years to open a mine in the U.S., versus two to three in Canada.

For all these EVs, there's a huge effort to build out a charging network. The infrastructure law provides \$7.5 billion to build EV chargers, and the IRA extends and increases tax credits for installing chargers for both residential and commercial use. GM is pledging to build 40,000 new Level 2 charging stations at or near its dealerships. Those take several hours for a solid amount of range.

However, a nationwide network of chargers is going to be a hard challenge. What's really needed is a lot of Level 3 chargers, which can charge many EVs in 20 to 40 minutes...what Tesla's Superchargers offer. Such chargers won't be profitable anytime soon, especially in rural or remote spots. They can also strain the local grid.

So expect the charging network to increase a lot but mainly in dense areas. Large swaths of the country are not going to have many options, especially Level 3, in the next five years. Meanwhile, EV adoption will grow fairly swiftly in that time, but it's unlikely to surpass gas-powered car sales by 2027. EVs are 6% of sales now.

Billions of dollars are flowing to energy demonstration and research projects to accelerate the development of batteries, carbon capture and storage, nuclear, etc.

Take hydrogen, for example. There's \$10 billion to encourage production, plus generous tax credits, in the recent major laws. \$8 billion of that will be invested over five years to build eight regional hubs, one of the feds' top energy moon shots.

Hydrogen is a long-term prospect at best. It's difficult to transport and store, among other challenges. It'll be years before the necessary infrastructure ramps up. Hydrogen may be more feasible in certain heavy industries and power generation... mixing hydrogen with natural gas to reduce carbon emissions, for example.

Another potential application: Fueling heavy trucks on certain predictable routes.

Overall, doing successful large-scale energy demonstrations will be tough.

FINAL THOUGHTS

This hefty investment in industrial capacity spells tens of thousands of jobs.

A looming constraint will be finding the right workers. Many of the positions will be for technical, high-skill manufacturing fields; others, for varied factory jobs.

Companies will be desperate for workers as new plants near completion. It will be hard for colleges and other programs to keep up, even with new efforts.

Expect the issue to spur a renewed battle over our immigration system. Consider that 40% of high-skilled chip workers were born abroad. Many companies and business trade groups will push for more high-skilled workers via H-1B visas.

The issue will grab Congress's attention as the cold war with China continues.

Yours very truly,


THE KIPLINGER WASHINGTON EDITORS

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