

The Inflation Reduction Act: A Boon for American Clean Energy—But When?

Richelle Elberg
Principal Research Analyst

Christopher Cooper
Senior Research Analyst

The IRA Is Pro Clean Energy and Pro-American

The Inflation Reduction Act (IRA) has been called historic, transformative, and imperfect. But despite detractors' critiques, the IRA is the most significant piece of climate change legislation US lawmakers have ever passed—albeit some 57 years after an American president (Lyndon B. Johnson) was first briefed on the potential crisis. With the recent rise in extreme weather events, drought, heat waves, and forest fires, the detrimental impacts of climate change can no longer be denied, and Congress has taken action. **But in negotiating a bill all parties could support, potentially negative near-term outcomes could result.**

The IRA commits nearly \$370 billion in funding and tax incentives to clean energy investment and emerging technologies, along with placing emphasis on the decarbonization of manufacturing in the US, domestic sourcing of materials, providing new energy economy jobs for Americans, and supporting electrification and energy efficiency in disadvantaged communities. It promises a significant step toward the Biden administration's stated goal of cutting greenhouse gas (GHG) emissions to just half of 2005 levels by 2030; indeed, according to several early analyses, the Act could result in a ~40% reduction in GHG by that year.

The IRA represents a massive policy shift that can only benefit green energy economy stakeholders over the long term, but it includes provisions that could slow or inhibit immediate investment. For example, **domestic content requirements for materials such as lithium immediately disqualify certain EVs available in the US today from the IRA's attractive tax incentives.**

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In this white paper, Guidehouse Insights provides its early-stage analysis of key provisions of the IRA and suggests how vendors and OEMs should prepare to meet its requirements and take full advantage of the funding and incentives offered to maximize their—and their customers'—benefit.

What Does the IRA Mean for Greentech Vendors and OEMs?

Guidehouse Insights has identified several overriding themes and goals of the IRA that will affect greentech vendors and OEMs; each of these is discussed further in the following sections.

The IRA Encourages Energy Stakeholders to:



(Source: Guidehouse Insights)

Materials Sourcing and Supply Chains

COVID-related supply chain challenges notwithstanding, there are certain components critical to green energy technologies that will continue to create a bottleneck in terms of accelerated deployment. In particular, **the IRA’s aggressive stance on domestically produced critical minerals could hamper the bill’s objectives, particularly in the near term.**

Hi Ho, Hi Ho: Critical Mineral Mining Encouraged

The IRA emphasizes development of domestic materials sourcing over foreign sources. In particular, the legislation addresses supply chain and environmental issues in the mining and processing of rare earth and other critical minerals.

Today, the US relies heavily on foreign sources for critical minerals such as copper, lithium, nickel, cobalt, and other rare earth elements. According to the Mineral Commodity Summaries 2020,¹ of the 35 mineral commodities deemed critical by the Department of the Interior, the US was totally reliant on foreign sources for 13 as of 2019. And for 31 of the 35, which range from lithium used in EV batteries to tellurium used in solar cells, the US imports more than half its annual consumption. Of course, production of rare earth elements has long been dominated by China, with which tensions are recently high.

A typical EV requires 6x the minerals of a conventional car; an onshore wind plant may take 9x more mineral resources than a similarly sized gas-fired power plant.

¹ U.S. Geological Survey, *Mineral Commodity Summaries 2020*, 2020, <https://pubs.usgs.gov/periodicals/mcs2020/mcs2020.pdf>.

These minerals are critical to the energy transition, and global demand is set to surge in coming years and decades. Reportedly, a typical EV requires 6x the minerals of a conventional car; an onshore wind plant may take 9x more mineral resources than a gas-fired power plant of similar capacity.

Technology vendors and OEMs are clearly being encouraged to identify and make use of domestic minerals—but, for now, that could be difficult.

The Biden administration's intent to promote domestic mineral production was also evident in the 2021 Infrastructure Investment and Jobs Act (IIJA), which funds mapping of critical mineral resources in the US and promises to improve the mining permitting processes with the Bureau of Land Management (BLM) and US Forest Service. The IIJA also included grant programs in support of research into mineral recycling.

The IRA takes these efforts to the next level, codifying significant tax credit bonuses for domestically sourced components and restricting tax incentives for buyers of EVs or other equipment made with foreign sourced materials. Of note, in some cases, materials sourced from countries with which the US has free trade agreements are permissible.

Technology vendors and OEMs are clearly being encouraged to identify and make use of domestic minerals—but, for now, that could be difficult. Critics of both the IIJA and the IRA note that mining disproportionately affects disadvantaged communities such as Native American reservations, and litigation is already underway. For example, a proposal to start mining a large lithium deposit in Nevada was approved by the BLM in January 2021, but several environmental groups and tribes brought legal action, halting the mine's construction.

Finding adequate domestic sources for these critical minerals could prove challenging for manufacturers, limiting the upside benefits of the IRA's tax incentives in the early years. There are, however, numerous projects underway in support of domestic mineral production.

In June 2021, the Biden administration released a supply chain assessment² that found the US' over-reliance on foreign sources and adversarial nations for critical minerals and materials posed national and economic security threats. In the wake of the assessment's recommendations, the following pilots and projects have been touted by the administration:

- The Department of Defense's Industrial Base Analysis and Sustainment program awarded **MP Materials** \$35 million to separate and process heavy rare earth elements at its facility in Mountain Pass, California, establishing a full end-to-end domestic permanent magnet supply chain. MP Materials has committed to invest another \$700 million in the magnet supply chain by 2024. Permanent magnets are used in EV motors, defense systems, electronics, and wind turbines.
- **Berkshire Hathaway Energy Renewables** is building a demonstration facility in Imperial County, California, to test the commercial viability of its sustainable lithium extraction process from geothermal brine as part of a multibillion-dollar investment

² The White House, *Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth*, June 2021, <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>.

in sustainable lithium production over the next 5 years. If successful, the company plans commercial-scale production of battery-grade lithium hydroxide and lithium carbonate by 2026.

- **Redwood Materials**, in partnership with **Ford** and **Volvo**, is working on a pilot for the collection and recycling of end-of-life lithium ion (Li-ion) batteries at its Nevada facilities to extract lithium, cobalt, nickel, and graphite. In addition, Redwood has announced a joint venture with Ford to build a recycling facility in Tennessee.

Greentech vendors and OEMs should look to these and other possible project partners to begin seeking out domestic sources for their critical mineral components. Additionally, mineral recycling endeavors may represent important—and profitable—commercial ventures worth exploring.

- The **Department of Energy** (DOE) has a \$140 million demonstration project³ funded by the Bipartisan Infrastructure Law (BIL) to recover rare earth elements and critical minerals from coal ash and other mine waste.
- Another \$3 billion in BIL funding⁴ will go toward investment in refining battery materials such as lithium, cobalt, nickel, and graphite, and battery recycling facilities.
- **MP Materials** is building a rare earth metal, alloy, and magnet manufacturing facility in Texas and has a long-term supply agreement with **General Motors** (GM) to power the motors in more than a dozen of GM's EV models. The facility is expected to produce enough magnets to power 500,000 EV motors annually.
- **Tesla** intends to source high-grade nickel for EV batteries from **Talon Metals'** Tamarack nickel project under development in Minnesota. Talon Metals and the United Steelworkers have established a workforce development partnership⁵ for the project to train workers on next-generation technologies in the local community and from mining regions facing declining demand.

Greentech vendors and OEMs should look to these and other possible project partners to begin seeking out domestic sources for their critical mineral components. Additionally, mineral recycling endeavors may represent important, and profitable, commercial ventures worth exploring.

³ Energy.gov, "DOE Launches \$140 Million Program to Develop America's First-of-a-Kind Critical Minerals Refinery," February 2022, <https://www.energy.gov/articles/doe-launches-140-million-program-develop-americas-first-kind-critical-minerals-refinery>.

⁴ Energy.gov, "Biden Administration, DOE to Invest \$3 Billion to Strengthen U.S. Supply Chain for Advanced Batteries for Vehicles and Energy Storage, February 2022, <https://www.energy.gov/articles/biden-administration-doe-invest-3-billion-strengthen-us-supply-chain-advanced-batteries>.

⁵ Talon Metals Corp and United Steelworkers, "Talon Metals and Steelworkers Union Partner to Advance the Tamarack Nickel Project for US EV Battery Supply Chain," July 2021, <https://talonmetals.com/talon-metals-and-steelworkers-union-partner-to-advance-the-tamarack-nickel-project-for-us-ev-battery-supply-chain/>.

Tax Credits Endure for Critical Minerals But Phased Out for Downstream Solar and Wind

The IRA establishes a new Advanced Manufacturing Production Tax Credit at Section 45X of the Internal Revenue Code. The credit will provide critical mineral mining companies with a credit equal to 10% of their production costs for some 50 metals named in the Act. The new tax credit will also apply to several downstream products, including solar energy components, wind energy components, power inverters, and battery components. For these downstream products, the tax credit will begin to phase out in 2030 and phase out completely by 2033. However, the tax credit for production of critical minerals will not be phased out.

Critics of this favorable treatment of domestic mining operations point out that mines such as these can result in reduced air and water quality in surrounding communities, which are, often, disadvantaged, lower-income communities. A near-term focus on job creation at the expense of environmental protection in the development of mines may undermine the climate and social equity benefits of the IRA.

Companies working with critical mineral producers should get involved locally and strive to minimize negative environmental impacts on local communities. State and local governments should be included in collaborative efforts.

Interconnection Delays Remain a Significant Challenge

Furthermore, the phase out of credits for downstream solar and wind could lead to rushed efforts in geographies where inadequate transmission corridors exist to deliver the green energy to urban centers. Even prior to the IRA, a backlog of transmission interconnection requests meant that many proposed clean energy projects languished in the interconnection queue for more than 4 years awaiting permits. Often, projects would lose financing mid-way through the interconnection process as investors grew weary of waiting on promised returns. Indeed, as of 2021, fewer than 25% of all projects that entered the US transmission interconnection queue became operational.

Although the IRA supercharges investment in solar, wind, and other clean energy production, it is silent on the backlog of interconnection requests delaying most projects. A recent study by the Lawrence Berkeley National Laboratory found that more the 1 TW of solar and energy storage capacity—more than the entire capacity of the US power system—was sitting in the interconnection queue awaiting permits. A side deal to the IRA, which would address corridor permitting, is presently being negotiated in Congress.

The Federal Energy Regulatory Commission has issued a notice of proposed rulemaking that would reform permitting of transmission interconnection requests and bundle similar projects to streamline permitting. Streamlined interconnection permitting could be beneficial for large solar and wind projects, but fast-tracking interconnection impact studies could raise additional transmission complications. Analysts have suggested⁶ that the IRA's lack of attention to transmission issues could lead to increased energy price volatility as load balancing challenges intensify, particularly if the Act incentivizes the development of clean energy projects where their interconnection is less optimal due to transmission constraints.

Vendors providing equipment to solar and wind projects should pay close attention to the side deal related to transmission corridor permitting and understand the ramifications that substantial permitting delays might create.

Advanced Energy Manufacturing and Green Industry

The IRA represents a significant shift in policy designed to revitalize American industry through direct investments in advanced energy manufacturing, building a US manufacturing base for the products that decarbonize the electric power and transportation sectors. More than \$50 billion in the IRA is reserved for clean energy manufacturing, the largest investment ever of its kind, which, according to estimates, could create more than 900,000 jobs over a 10-year period.

... by linking jobs growth to green energy manufacturing, legislators were able to shore up political support for a climate issue that was previously considered by many to be nebulous and 'in the future.'

Of the \$50 billion included in the IRA, \$40 billion goes for investments in domestic production. The \$40 billion is divided between two types of tax credits: \$30 billion for a new production credit that narrowly targets large-scale projects such as solar, wind, battery manufacturing, and critical minerals processing. The remaining \$10 billion expands 48C manufacturing tax credits, established under the American Recovery and Reinvestment Act of 2009,⁷ which go to new projects once DOE determines they meet clean **energy** criteria.⁸

⁶ Robert Walton, Utility Dive, "Inflation Reduction Act Could Raise Prices on Clean Energy, Warns Bank Of America," September 2022, <https://www.utilitydive.com/news/inflation-reduction-act-clean-energy-boa-bank-of-america/631608/>.

⁷ Energy.gov, *Fact Sheet: 48c Manufacturing Tax Credits*, <https://www.energy.gov/sites/prod/files/FACT%20SHEET%20--%2048C%20MANUFACTURING%20TAX%20CREDITS.pdf>.

⁸ The White House, *Fact Sheet: \$2.3 Billion in New Clean Energy Manufacturing Tax Credits*, January 2010, <https://obamawhitehouse.archives.gov/the-press-office/fact-sheet-23-billion-new-clean-energy-manufacturing-tax-credits>.

Let's Get Green: Industrial Processes

One-third of US carbon emissions⁹ come from the industrial sector, and before the IRA, it was the only sector in which emissions were expected to rise.¹⁰ The IRA is designed to decouple the growth in domestic manufacturing from the continued growth of emissions by incentivizing manufacturers to acquire their materials from clean energy US producers. **And by linking jobs growth to green energy manufacturing, legislators were able to shore up political support for a climate issue that was previously considered by many to be nebulous and in the future.**

The IRA reserves **\$6 billion for manufacturers to invest in emissions-reducing upgrades at steel, aluminum, cement, and other energy-intensive industrial facilities.** Those upgrades are estimated to represent a reduction of nearly 70 million metric tons of global pollution.

Furthermore, the strict sourcing provisions of the IRA support long-ignored labor and human rights violations overseas. In the past, outsourcing was seen as a net good. In the name of efficiency, cobalt mined by children in the Democratic Republic of Congo or polysilicon, produced by the forced labor of the Uyghurs in China, were used in domestic production of Li-ion batteries and solar panels.

It could take time for cost parity [of domestic versus foreign sourced inputs] to be reached; tariffs applied to foreign sourced equipment—and whether they outlive the current administration—should also be considered.

Such offshoring has allowed the US to see its total emissions drop since 2005,¹¹ even as importing these inputs from countries with lower energy standards has heightened the level of emissions in those nations.

In addition to supporting domestic jobs growth (and removing support for inhumane labor practices overseas) **these incentives are designed to make domestic, green material inputs into manufacturing and green energy technology cost-effective with foreign sourced inputs.**

Vendors and OEMs are cautioned to perform careful cost/benefit analyses before assuming this is true from day one. It could take time for cost parity to be reached; tariffs applied to foreign sourced equipment—and whether they outlive the current administration—should also be considered.

⁹ BlueGreen Alliance, *FACT SHEET: Clean Manufacturing: Investments in the Inflation Reduction Act*, <https://www.bluegreenalliance.org/wp-content/uploads/2022/08/BGA-IRA-Manufacturing-Investments-Factsheet-82422-FINAL.pdf>.

¹⁰ Energy Information Administration, *Annual Energy Outlook 2021*, 2021, <https://www.eia.gov/outlooks/aeo/pdf/08%20AEO2021%20Emissions.pdf>.

¹¹ Center for Climate and Energy Solutions, U.S. Emissions, <https://www.c2es.org/content/u-s-emissions/>.

Flexible Financing and Social Equity

The IRA creates new incentives for equity investment and the financing of clean energy and cleantech manufacturing and production. Importantly, it also establishes a secondary market for clean energy tax credits and (for the first 5 years) opens that market to individual taxpayers.

Historically, Wall Street investors have steered clear of manufacturing investments due to the unknown timelines for profitability and the massive upfront costs required. But with the provision of a secondary market for tax credits, **the IRA provides liquidity to the market for tax investors** and makes available substantial funding in support of advanced green energy manufacturing and the greening of industrial processes.

In addition to the \$50 billion for clean energy manufacturing described in the prior section, the IRA offers \$127 billion in clean electricity tax credits that incentivize the use of domestic parts and materials. To qualify for an additional 10% in clean energy tax credits, electricity producers must use domestically produced iron and steel¹² where US production accounts for roughly half of the value. These requirements also apply to nonprofits and government entities that want to use direct-pay options.

Social Equity: Efficiency Rewarded But Pollution Impacts Still Concentrated in Disadvantaged Communities

Residential electrification is supported by \$9 billion in IRA funding to offset costs. Low- and moderate-income households will receive direct rebates for the installation of electric efficient appliances, including heat pumps, electric stoves, heat pump water heaters, electric clothes dryers, electrical panels and wiring upgrades, and insulation. Many rebates range in the thousands of dollars (for example, up to \$8,000 for a heat pump or \$1,750 for a heat pump water heater), in many cases making these appliances more affordable than fossil fuel alternatives.

In addition to direct rebates, new tax credits up to 30% will be available to a wider range of households (by income) for equipment and installation costs for the same categories of equipment. The credits may drive down the costs for low-income households while incentivizing higher income households to electrify and improve efficiency.

Manufacturers and OEMs should partner with state and local governments applying for these competitive grants to ensure participation in awarded funds and projects. They should also understand that the competitive grant process can be time consuming.

In addition, the IRA reserves \$4 billion for targeting communities that have faced the economic consequences of the energy transition. The Act's targeted investments prioritize swaths of the country that have faced economic disenfranchisement, including incentives for facilities built in energy communities that are brownfield sites, areas that have or had significant employment losses

¹² BlueGreen Alliance, FACT SHEET: Clean Manufacturing: Investments in the Inflation Reduction Act, <https://www.bluegreenalliance.org/wp-content/uploads/2022/08/BGA-IRA-Manufacturing-Investments-Factsheet-82422-FINAL.pdf>.

related to oil, gas, or coal activities, or a census tract or any adjoining tract in which a coal mine closed after December 31, 1999, or in which a coal-fired electric power plant was retired after December 31, 2009.

State and Local Governments Will Compete for Free Money

Credits are available as direct payments from the US Treasury Department, with tax-exempt entities such as state and local government eligible to receive all credits as direct payments. Credits can also be transferred, which will allow companies to work with a broader range of financiers. The bonus credit is available to those meeting prevailing wages and apprenticeship requirements.

Although funding in prior recovery and rebuilding legislation such as the IIJA was allocated through formula grants to states, local governments, and tribes, the IRA relies more heavily on competitive grants. Energy, the environment, and local infrastructure are all key areas of the IRA that state and local governments need to understand and prepare for to access opportunities.

Manufacturers and OEMs should partner with state and local governments applying for these competitive grants to ensure participation in awarded funds and projects. They should also understand that the competitive grant process can be time consuming.

Carbon Capture and Alternative Fuels

The IRA supports investments in alternative fuels with subsidies designed to make these cleaner energy sources competitive with carbon-based fuels. The bill authorizes DOE to make commitments for \$40 billion in loan guarantees under Title XVII of the Energy Policy Act of 2005, on top of DOE's existing commitment authority of approximately \$24 billion. Title XVII (also known as the Innovative Technologies Loan Guarantee Program) authorizes the Secretary of Energy to make loan guarantees for projects that:

- (1) “avoid, reduce, utilize, or sequester” air pollutants or anthropogenic emissions of greenhouse gases; and
- (2) employ “new or significantly improved technologies” as compared with commercial technologies in service in the US at the time the guarantee is issued.

This program should be beneficial to developers and vendors of emerging technologies such as carbon capture, utilization, and sequestration (CCUS), green hydrogen, and biofuels.

Extending Carbon Capture Credits

CCUS has long struggled with commercial viability due to high CO₂ capture costs, which can exceed \$300 per metric ton of CO₂ for direct air capture (DAC). Since the first CCUS project came online 50 years ago, CCUS activity has seen several ups and downs, with most projects either capturing the CO₂ from highly diluted sources such as natural gas processing, which is among the cheapest ways to capture CO₂; or using the captured CO₂ for enhanced oil recovery (EOR), which creates value for the CO₂, especially when oil prices are high.

The 45Q federal income tax credit, introduced in 2008 and then enhanced in 2018, has encouraged new CCUS investment. Prior to the IRA, the 45Q credit was set to rise annually¹³ before capping out in 2026, when it would pay projects \$35 per ton of CO₂ if the emissions were utilized¹⁴ (for EOR, for instance) or \$50 per ton if the CO₂ was permanently stored underground in secure geologic formations.

The IRA substantially increases the availability of credits, makes it easier for CCUS projects to qualify, provides significant new avenues for monetizing 45Q credits, and extends the deadline to begin construction on eligible projects from 2026 to 2033. The new law increases the value of the credit for industrial facilities and power plants to \$85 per ton if the captured CO₂ is sequestered, \$60 per ton if the CO₂ is utilized, and \$60 per ton for CO₂ stored in oil & gas fields. For DAC, which filters CO₂ from ambient air and is among the most expensive CCUS technologies,¹⁵ the credit increases to \$180 per ton for sequestration, \$130 for utilization, and \$130 for CO₂ stored in oil & gas fields.

Leveling the Playing Field for Green Hydrogen

The IRA includes tax credits for clean hydrogen projects designed to eliminate the biggest barrier to industry scale-up: a lack of cost competitiveness with grey hydrogen produced from unabated fossil fuels. **Until recently, green hydrogen produced from renewable electricity was the most expensive source available, averaging around \$5-\$6/kg.** Cost targets of \$2/kg, required to reach cost parity with grey hydrogen, were not expected to be achieved until the 2030s in most locations. Recent fossil fuel price spikes have shifted this outlook over the short term—however, volatile prices aren't sufficient to justify investments in projects with lifetimes measured in decades.

With the IRA, green hydrogen can be produced at an effective rate of \$2/kg well ahead of schedule. Hydrogen projects that begin construction prior to 2033 will be eligible to receive a credit of \$3/kg produced providing lifecycle emissions are below 0.45 kg of CO₂ equivalent. In practice, this level of emissions intensity is likely to be achieved only by hydrogen produced using zero emissions electricity generated by renewables or nuclear energy. Credits will be awarded over a 10-year period, with developers given the option to receive the credit as a direct payment for at least the first 5 years. Developers will also need to meet a variety of employment-related requirements to be eligible for the credit.

Cheaper sources of clean hydrogen will enable usage across a range of applications which had previously been uneconomic, provided that supplies and infrastructure are able to scale effectively.

Less generous credit rates will be awarded to projects with higher emissions intensity levels, i.e., blue hydrogen. The lowest credit rate of \$0.6 will be granted to projects with GHG emissions of between 2.5 kg and 4 kg of CO₂ equivalent per kilogram produced. Although production costs are lower for blue hydrogen than green hydrogen under ordinary gas

¹³ Serkan Birgel, Guidehouse Insights, "Enhancements to the 45Q Tax Credit Can Boost CCUS Deployment," January 2022, <https://guidehouseinsights.com/news-and-views/enhancements-to-the-45q-tax-credit-can-boost-ccus-deployment>.

¹⁴ Ashtynn Trauth, Guidehouse Insights, "Carbon Capture Is Emerging in the Cement Industry, Part 3," August 2022, <https://guidehouseinsights.com/news-and-views/carbon-capture-is-emerging-in-the-cement-industry-part-3>.

¹⁵ Peter Marrin, Guidehouse Insights, "When It Comes to Pulling CO₂ Out of the Air, the Bigger the Better," July 2022, <https://guidehouseinsights.com/news-and-views/when-it-comes-to-pulling-co2-out-of-the-air-the-bigger-the-better>.

pricing conditions, lifecycle emissions are higher due to incomplete capture rates and upstream methane leakage. Linking credits to emissions intensity will incentivize producers to opt for autothermal reformers with high capture rates and natural gas supplies with limited methane emissions.

By leveling the playing field between different hydrogen sources, the IRA builds on the technology-neutral approach established in IIJA. The IIJA provided \$8 billion to establish hydrogen hubs across the US, targeting a mix of green hydrogen, blue hydrogen, and pink hydrogen produced from nuclear energy.

Cheaper sources of clean hydrogen will enable usage across a range of applications that had previously been uneconomic, provided that supplies and infrastructure are able to scale effectively. Interest is likely to be focused on applications that are difficult or impossible to electrify, including existing feedstock uses for grey hydrogen, iron and steel production, shipping, aviation, and long-haul trucking, which accounts for a disproportionate share of emissions from the heavy-duty vehicle segment.

Cleaning Up Transportation with Biofuels

The IRA establishes tax credits for sustainable aviation fuel (SAF),¹⁶ clean transportation fuels, and clean hydrogen, and extends several existing tax credits that benefit transportation biofuels, such as renewable diesel and biodiesel. The EU is considering similar mandates, and both the EU and US laws should stimulate growth and investment in the use of low-carbon renewable fuels such as ethanol, bringing meaningful benefits to both farmers and ethanol producers. The IRA tax credit starts at \$1.25 per gallon but could reach \$1.75 per gallon depending on the GHG reduction achieved.

The law also creates a new technology-neutral Clean Fuel Production Tax Credit, which aims to support the production of low-emissions transportation fuel¹⁷ that is sold in 2025, 2026, and 2027. The legislation extends several existing bioenergy and biofuel tax credits. The \$1 per gallon blends tax credit for biodiesel and renewable diesel is extended through the end of 2024. In addition, the existing \$0.50 per gallon alternative fuels tax credit (which was set to expire after 2024) was extended through 2025; the second-generation biofuel income tax credit (which expired at the end of 2021) was extended through 2024; and the alternative fuel vehicle refueling property credit (which expired at the end of 2021) was extended through 2032. The longer-term tax credits should help biofuels and biogas providers attract investment for projects that can take years to build.

¹⁶ Yuchen Hu, Guidehouse Insights, "Oil Majors Accelerate Moves into Biofuels," April 2022, <https://guidehouseinsights.com/news-and-views/oil-majors-accelerate-moves-into-biofuels>.

¹⁷ Serkan Birgel, Guidehouse Insights, "Biofuels Can Still Play a Part in Decarbonizing the Transportation Sector," January 2022, <https://guidehouseinsights.com/news-and-views/biofuels-can-still-play-a-part-in-decarbonizing-the-transportation-sector>.

In addition to the various tax credits, the legislation aims to establish a competitive grant program to support alternative aviation fuels and low-emission aviation technologies, which could lead to greater production capacity and increased biofuel blending with existing conventional fuels. In part, the program would provide grants to eligible entities to carry out projects located in the US that produce, transport, blend, or store SAF. Nearly \$250 million in funding would be available to support SAF projects, many of which are constrained by a lack of infrastructure. SAF currently accounts for approximately 0.01% of aviation fuel use, with most deliveries occurring via truck.

The IRA is not a panacea and it's unlikely to drive a parabolic shift in greentech investments in the near term. Vendors and OEMs need to fully understand its provisions and restrictions, especially related to domestic-sourced materials and employment and wages, if they want to participate fully in the longer-term upside benefits promised by the bill.

The IRA also should lead to increased blending and faster uptake for other alternative transportation fuels. The legislation appropriates \$500 million to support the much-needed development of biofuel infrastructure, including infrastructure improvements for blending, storing, supplying, or distributing biofuels. The IRA also supports installing, retrofitting, or upgrading fuel dispensers to supply higher blends of biofuels.

Market players should take a close look at how carbon capture and alternative fuels can be integrated into their offerings. They should also investigate whether tax incentives and competitive grants increase cost savings relative to conventional fuels and provide a sufficient business case for pursuing an environmental, social, and governance (ESG) strategy that incorporates these technologies.

Conclusions and Recommendations

The IRA is a significant bill that promises to accelerate US green energy and sustainability investments in everything from manufacturers and industry to utilities to state and local programs aimed at not only climate change mitigation but also rebalancing of social equity. Direct funding and flexibility in terms of tax credits should interest investors who had previously shown little interest in funding climate change-related initiatives.

That said, the IRA is not a panacea and it's unlikely to drive a parabolic shift in greentech investments in the near term. Vendors and OEMs need to fully understand its provisions and restrictions, especially related to domestic-sourced materials and employment and wages, if they want to participate fully in the longer-term upside benefits promised by the bill.

In summary, Guidehouse Insights recommends greentech manufacturers consider the following:

- **Find domestic critical mineral partners for sourcing product inputs**
- **Evaluate opportunities to participate in critical mineral recycling efforts**

- **Get involved with state and local governments where projects are planned to ensure public agencies have the information necessary to win competitive grants**
- **Support state and local government in minimizing possible negative environmental impacts of critical mineral mining**
- **Perform cost/benefit analyses to ensure domestic materials have reached cost parity, after tax credits and other incentives, with other sources before committing to long-term purchases**
- **Understand the transmission corridor permitting process and study the expected side deal with Senator Joe Manchin to ensure planned solar and wind projects will not get mired down in permitting delays**
- **Expect competitive grant awards to take some time to receive**
- **Take advantage of newly liquid tax credit markets to maximize benefits under the IRA and attract investors to large projects**
- **Expect CCUS, hydrogen, and biofuels to become more cost competitive under the IRA; and industry should take a close look at how these technologies can be integrated into their offerings and ESG strategies**

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1676 International Drive, Suite 800
McLean, VA 22102 USA
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