

CHEMISTRY ON THE BALLOT

Research Funding Pharma Employment-based Immigration Pollution Energy

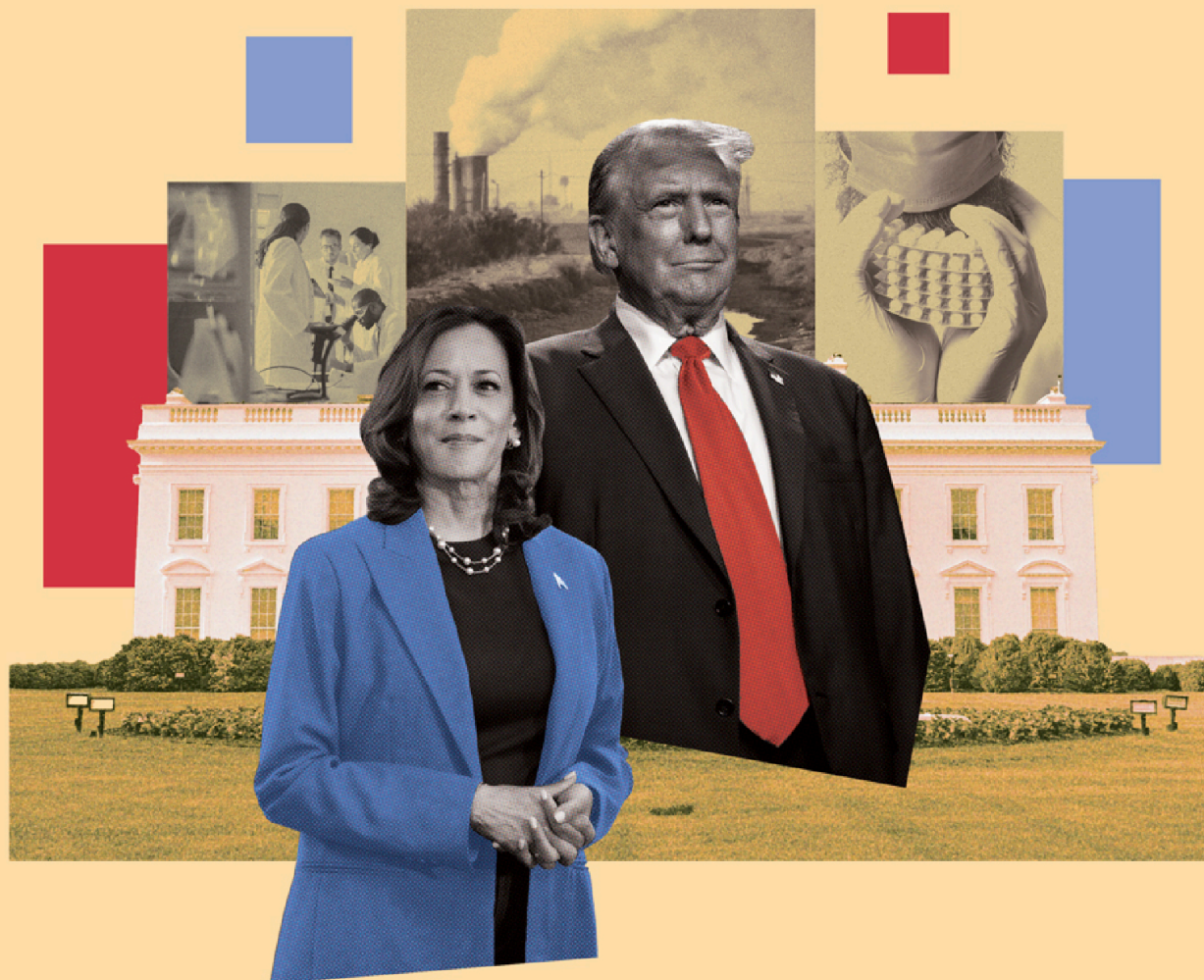
POLICY

The US presidential election's implications for chemistry

With the government's balance of power set to shift after November's election, the implications for science are far from decided

by **C&EN staff**

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Credit: Madeline Monroe/C&EN, Andrew Harnik/Getty Images, Samuel Corum/Getty Images, Nicolas Economou/NurPhoto via AP, AP Photo/Damian Dovarganes, Shutterstock

Next month's US presidential election is sure to affect scientists—but exactly how a win for Donald J. Trump or Kamala Harris would ripple through the chemical enterprise remains unclear.

Science has been a major plank in previous presidential platforms. This time, it's "incredibly conspicuous by its absence," says Andrew Maynard, a policy expert at Arizona State University.

“We very much ascribe to the idea that the government is the lead investor in innovation.”

— **Fred Ledley**, *founding director, the Center for Integration of Science and Industry at Bentley University*

Each candidate's stated priorities and in-office record leave certain science policy questions unanswered. It is unclear how far Harris, who became the Democratic Party's candidate in late July, intends to depart from Biden-Harris administration policies. Meanwhile, Republican Party nominee Trump has a track record in the Oval Office, but his intentions toward the policies described in Project 2025, a detailed agenda developed by conservative think tank the Heritage Foundation and many former Trump administration officials, are murky. **Trump has distanced himself** from the project.

Adding complication, what the next US president can accomplish will depend on the balance of power in Congress—which will also be decided in this election—and a global political context that demands containing wars in Ukraine and the Middle East, as well as reexamining the evolving relationship between the US and China.

Still, chemists can expect starkly different presidential visions to influence the federal budget, the actions of executive agencies, and the fate of various pieces of legislation, such as the Inflation Reduction Act of 2022 (IRA), which affects many industries. These differences will have implications for pharmaceutical and clean technology companies, immigration, academia, and chemical regulations. Here are the details.



Credit: J. Scott Applewhite/AP Photo

The US federal government supports governmental and academic research through agencies in the executive branch; for example, the National Institutes of Health conducts research at its campus in Bethesda, Maryland, and administers external grants.

RESEARCH FUNDING AND SCIENTIFIC INTEGRITY

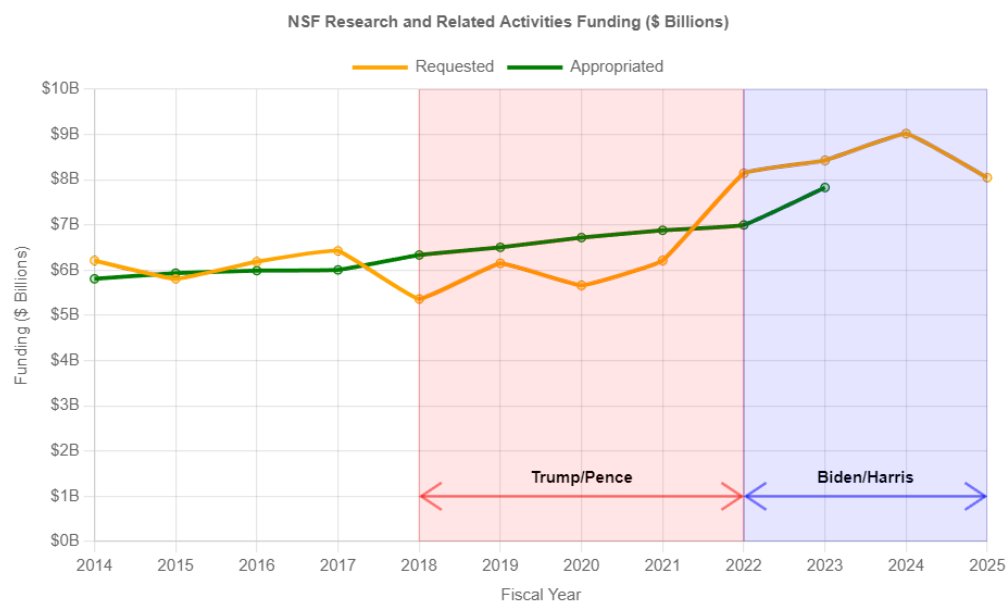
by *Laurel Oldach*

The US federal government spends roughly \$180 billion annually on research and development overseen by federal agencies, universities, and businesses, and the executive branch has considerable influence over how that money is allocated.

Harris, whose first job was cleaning pipettes in her mother's laboratory, **cosponsored a scientific workforce diversity bill** as a senator, and as vice president cast the tiebreaking vote to pass the IRA, investing billions of dollars in research. Given her stated priorities, experts predict that a Harris administration would continue to invest in technology, clean energy, and responsible AI development.

A LONG WAY FROM BUDGET TO SPENDING

The US National Science Foundation's requested and actual budgets for research and related activities show how the appropriations process can buffer presidential budget requests. While the Trump administration proposed cuts and the Biden administration proposed increases to the NSF's budget for research, the agency's actual spending on research and related activities remained fairly steady FY2018–22. Extra funding from the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act began to take effect in FY2023. Although that law would roughly double the NSF budget, Congress must still approve the money as part of the annual federal budget, and so far, lawmakers have not appropriated the full amount.



Source: National Science Foundation Budget Requests to Congress and Appropriations

The policies of a second Trump presidency could be less predictable. Project 2025 proposes a **complete overhaul of federal research infrastructure**, consolidating some agencies and eliminating others altogether. Such a move could disrupt the basic science ecosystem—but experts disagree on whether it is likely to occur. Tepring Piquado, executive director of the advocacy group National Science Policy Network, says “there’s a very serious possibility” that a substantial reorganization might proceed. But Arizona State’s Maynard considers it less likely in the short term because it’s difficult for presidents to make radical changes. For example, although the first Trump administration had proposed “**massive cuts**” to National Institutes of Health and National Science Foundation budgets, by the end of the appropriations process, **research funding had in fact increased**. The uncertainty has ramifications for life science and other research: Trump has attempted to intervene **in US Food and Drug Administration business** before, and he worked to pare down the budgets of federal research agencies during his presidency, which—if repeated—would have a trickle-down effect on the pace of innovation, says Fred Ledley, founding director of the Center for Integration of Science and Industry at Bentley University.

Meanwhile, Maynard says, “there are fears that under a Republican-led administration, there’ll be more restrictions on what funded researchers are allowed to do.” For example, Robert F. Kennedy Jr., Trump’s rival turned political ally, **has proposed an agenda** that would devote half of the NIH budget to “preventive, holistic and alternative” medicine.

Such limits concern advocates of scientific integrity in government, like Andrew Rosenberg, a senior fellow in public policy at the University of New Hampshire. Scientific integrity, Rosenberg says, encompasses any use of data to make decisions—which can have major impacts on constituents. When the Trump White House **altered a hurricane forecast map**, apparently for political benefit, Rosenberg says, “FEMA [the US Federal Emergency Management Agency] had to move resources away from areas that were actually at risk.”

The Union of Concerned Scientists counted over **200 cases of political interference** in science-based decision-making during the Trump administration. (The same report noted 19 cases during two Obama terms, and two in the first 3½ years of the Biden administration). Advocates have pressed for legal protection for scientific integrity in government agencies, but such a law failed to pass. In its place, the Biden administration used an executive memorandum to require federal agencies to **develop scientific integrity policies**. But Jacob Carter, an advocate for scientific integrity policies, says reversing past executive actions is easy for a new president. “With the stroke of a pen, all of that can be undone.”

PHARMACEUTICALS

by Rowan Walrath

One of the few places where Harris and Trump are aligned is in a desire to reduce health-care costs. But their approaches are very different.

Harris has thrown her weight behind the IRA, which she advanced as vice president under Biden. The IRA includes measures that give federal health insurance program Medicare greater power to negotiate the prices of certain drugs. Only 10 drugs have been identified for negotiations since the IRA's implementation in 2022. Harris says that as president, she'd "accelerate" those negotiations to cover more drugs—a change that the biopharmaceutical industry, already upset over the IRA's drug-pricing provisions, has decried. Private insurers typically follow Medicare pricing.



Credit: Shutterstock

Eliquis is among the medications selected for price negotiation under the Inflation Reduction Act.

"Doubling down on failed government price setting schemes—whether in the form of expanding the flawed IRA or copying foreign health care systems—would leave patients with fewer choices and less access to future innovative medicines," Catherine Hill, a spokesperson for the trade group PhRMA, says by email. PhRMA is behind a lawsuit arguing that the IRA's drug-pricing measures are **unconstitutional under the Fifth and Eighth Amendments**.

Trump and running mate J. D. Vance have said they'd undo much of the IRA if elected; Project 2025 calls for its repeal. But repealing legislation is easier said than done, and unless PhRMA prevails in its lawsuit, revising the IRA would require action from Congress, not just the executive branch. "The baseline assumption should be that IRA is here to stay," says Muna Tuna, a partner at EY who advises life science firms on market access, pricing, and reimbursement.

Related: Chemistry awaits US presidential pick

Instead of supporting price negotiations led by the Centers for Medicare and Medicaid Services, Trump has called for the reinstatement of a policy he put forward during his presidential term: a "most favored nation," or MFN, model, which would tie Medicare drug prices to prices paid for drugs in other countries. The rule enacted during his presidency sparked several lawsuits from the pharmaceutical industry that led to a nationwide injunction and was eventually **rescinded**.

Peter Neumann, who studies cost effectiveness in health care at Tufts Medical Center, says that a new MFN rule might have a "much bigger impact than the IRA." But he cautions that it would depend heavily on how it's implemented—and like the IRA, it would likely require legislation.

As November approaches, the biopharmaceutical industry finds itself on uncertain ground.

"We very much ascribe to the idea that the government is the lead investor in innovation," says Ledley of Bentley University. "Whether it's computers or life sciences or anything else, that's the lifeblood that fuels the industry."

EMPLOYMENT-BASED IMMIGRATION

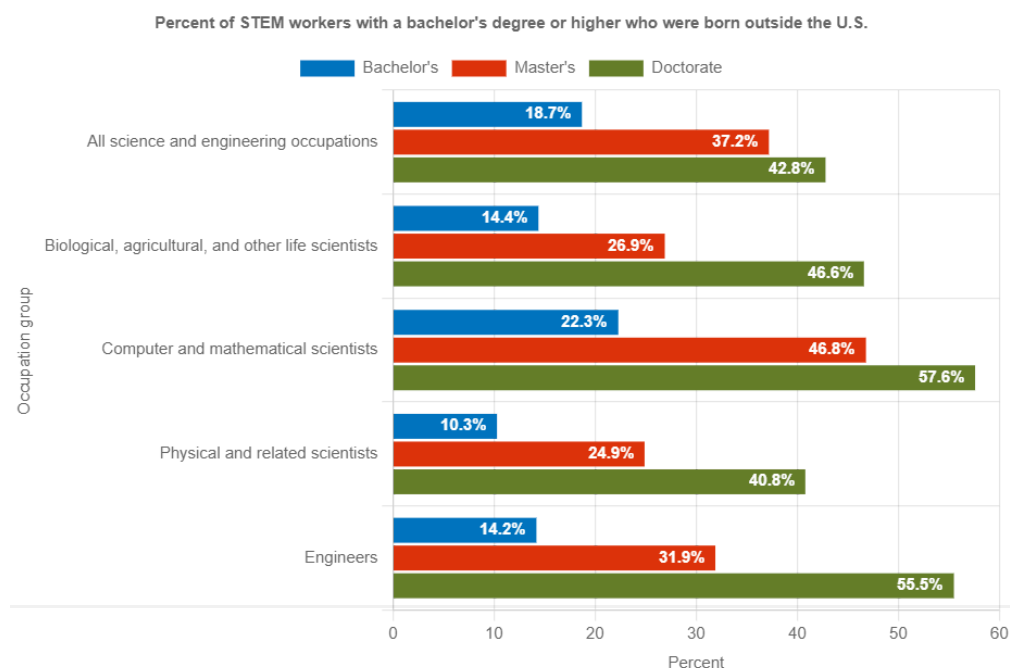
by Priyanka Runwal

Both candidates have vowed to tackle border security and illegal crossings into the US—albeit using different approaches. But it's unclear how rules might change for employment-based immigration, which scientists, institutions, and businesses are monitoring closely.

According to the National Science Foundation's latest report on the state of US science and engineering, individuals born outside the US accounted for **19% of the country's science, technology, engineering, and mathematics (STEM) workforce and 43% of doctorate-level scientists and engineers in 2021**. The federal agency has said that the **US is facing a STEM talent crisis** and must attract and retain high-skilled individuals from around the world while ramping up domestic STEM talent.

SCIENTISTS AND ENGINEERS BORN OUTSIDE THE US

In 2021, 43% of doctorate-level scientists and engineers were born outside the US.



Source: National Center for Science and Engineering Statistics, National Survey of College Graduates (NSCG), Public-Use File, 2021.

Trump, for instance, has proposed granting permanent resident cards, also known as green cards, to vetted citizens of countries outside the US after they've graduated from US colleges and universities. Typically, graduates are able to apply for temporary work visas that are often issued for up to 3 years, while a green card is valid for 10 years and can be renewed to maintain permanent resident status. But Trump's proposed plan would exclude applicants or revoke visas for those considered "**radical Islamists, Hamas supporters, America haters,**" as part of an aggressive vetting process, according to his campaign's national press secretary, Karoline Leavitt.

Trump has also talked about restoring and expanding a travel ban that he imposed in 2017—which Biden rescinded in 2021—to stop the entry of citizens from certain Muslim-majority nations. In 2017, C&EN reported on how this **ban upended the lives of many scientists**.

Trump has mentioned raising tariffs on Chinese imports and **may attempt to reinstate the controversial 2018 China Initiative**, which aimed to address theft of US intellectual property and technology secrets but **reportedly led to racial profiling and increased targeting of scholars and scientists of Chinese descent**. Bringing back such a program could jeopardize lives and careers, erode trust, and "stifle scientific collaboration and compromise America's leadership in global innovation," says Cindy Tsai, interim president of Committee of 100, a nonprofit concerned with Chinese American interests headquartered in New York City.

Harris, on the other hand, is the daughter of immigrant parents, but what her presidency might mean for high-skilled individuals who have already been granted or are seeking work visas and green cards remains to be determined. In the past, she has advocated **lifting per-country caps for employment-based green cards**, since the policy has caused huge backlogs that have particularly affected individuals from India and China.

ENVIRONMENTAL POLLUTION AND GREENHOUSE GASES

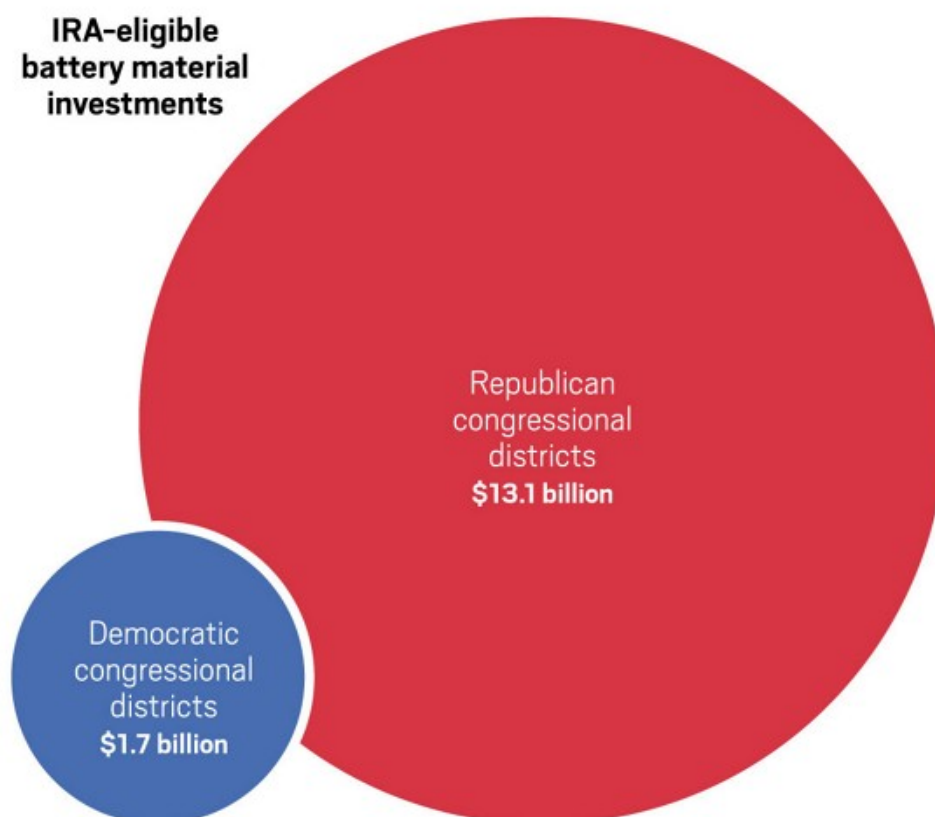
by Leigh Krietsch Boerner and Britt Erickson

The Biden-Harris administration has worked largely to increase environmental protections. In contrast, former president Trump's actions tended to be more deregulatory. One of Trump's first executive orders, issued in 2017, **said that** for every new regulation a federal department or agency put in place, two had to be eliminated.

During the Biden administration, the US Environmental Protection Agency received funding from the IRA, which it used to create the \$27 billion **Greenhouse Gas Reduction Fund**, designed to finance projects to reduce air pollution and greenhouse gas emissions in communities across the country. While running for the presidential nomination in 2020, Harris promised to ban fracking, which releases large amounts of the potent greenhouse gas methane, but she recently walked back those statements, saying she would not ban the practice.

CLEANTECH POLITICS

US Republican leaders have criticized cleantech policies in the Inflation Reduction Act (IRA), but most battery material plants in line to receive IRA tax credits are being built in congressional districts represented by Republicans.



Source: Jay Turner, the Big Green Machine: Clean Energy Supply Chain Investment Database.

During his administration, former president Trump tended to weaken or eliminate policies to reduce greenhouse gases. He pulled the US out of the Paris Agreement, an international treaty to cut greenhouse gas emissions to limit global temperature rise to below 2 °C above preindustrial levels. (Biden rejoined the agreement in 2021.) The Trump administration also worked to erode the National Ambient Air Quality Standards, one of the main national policies to combat air pollution. Some changes included placing more industry-based and anti-regulatory members on scientific advisory committees and limiting the scientific research that these committees are permitted to consider.

Restrictions on toxic chemicals have been a priority for the Biden-Harris administration, but only a handful of regulations have made it onto the books. Environmental advocacy groups worry that a second Trump administration could weaken or completely nix some of those rules, particularly ones that were challenged by chemical companies.

One of the new rules, which the EPA finalized in April, sets **limits for six per- and polyfluoroalkyl substances** (PFAS) in drinking water. In **an analysis released Sept. 19**, the advocacy organization Environmental Working Group (EWG) finds that more than 700 water utilities serving at least 40 million people in the US need to remove PFAS from their water to meet the new limits. “But the next administration could weaken or roll back the standards, which would imperil the safety of drinking water in almost every state,” the EWG report says.

The fates of rules that the EPA has proposed but not finalized and rules not yet officially proposed are up in the air. One example is a **rule to limit wastewater discharges from PFAS manufacturers** that the EPA has yet to propose because of pushback from the chemical industry. A Harris administration **would likely help this rule** across the finish line. The rule's future would be uncertain under Trump because of his administration's record of favoring the chemical industry.

A Trump administration could similarly weaken or overturn recently passed rules banning **chrysotile asbestos** and most uses of **methylene chloride**. Trump has **previously spoken** favorably of asbestos, and his administration's **EPA tried to limit** safety reviews of the carcinogen. Both the asbestos and methylene chloride rules are **being challenged in court**.

The future of these rules and other environmental protections would be uncertain under either potential administration, in part because of pending lawsuits. According to the EWG report, if those lawsuits are successful, “or if the next administration chooses not to fight” them, the court could scrap the rules or send them back to the EPA to revise.

ENERGY AND INFRASTRUCTURE

by Craig Bettenhausen and Matt Blois

The Biden administration poured an enormous amount of government funding into clean technology projects through the bipartisan infrastructure law and 2022's Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act. In addition to addressing drug prices, the IRA also provides expansive support for technologies like batteries, clean hydrogen, and carbon capture.

Several cleantech analysts expect that the smooth implementation of the existing decarbonization laws would be the centerpiece of Harris's energy policy.



Credit: Rick Bowmer/AP Photo

The Joe Biden administration has used the US Department of Energy's Loan Programs Office (LPO) to give out loans for large cleantech projects, such as Lithium Americas' lithium mine and processing plant in Nevada. During Donald J. Trump's presidency, the LPO went nearly dormant.

Meanwhile, Trump **has said he would “rescind all unspent funds”** from the IRA. Project 2025 criticizes the IRA for turning the Department of Energy into a massive cleantech R&D organization, and it calls on Trump to repeal the law and get the government out of the business of commercializing new energy technologies.

But Joseph Brazauskas, an attorney who works on policy at the law firm Bracewell in Washington, DC, says it will be hard to garner enough support in Congress to dramatically cut the IRA's tax credits for cleantech. He and other experts anticipate that Trump would instead use agency rule-making to shape regulations from the IRA and other legislation to be more favorable for oil and gas companies.

Benefits from the IRA have flowed disproportionately toward parts of the country that typically vote for Republicans. In August, a group of 18 Republicans **sent a letter** to the Speaker of the US House of Representatives arguing that Congress should retain some IRA tax credits because they have “spurred innovation, incentivized investment, and created good jobs.”

The results of the upcoming election will nonetheless have a big impact on how tax credits for cleantech are doled out. Federal agencies are still writing final rules for many IRA programs. The current administration has proposed stringent rules to ensure that low-carbon hydrogen doesn't pull existing renewable energy out of the grid. And companies that capture carbon dioxide emissions have to show that they are permanently sequestering carbon, rather than using it for oil production, to secure the largest tax credits.

Related: Scarce science under the Trump administration

Agencies in a second Trump administration could propose looser rules for IRA tax credits related to hydrogen production or carbon capture, according to Derrick Flakoll, a North American policy analyst at the research firm BloombergNEF.

Outside the IRA, Trump has pledged to revoke limits the EPA recently placed on the greenhouse gas emissions from power plants, which would curtail demand for point-source carbon capture technology.

Flakoll says another area to watch is the Department of Energy's Loan Programs Office (LPO), an agency that provides financing for new energy-related technologies.

The executive branch controls the organization, which went nearly dormant during Trump's presidency. Flakoll expects that activity could significantly slow down if Trump wins.

Since Biden took office in 2021, the LPO has given out a flurry of loans for chemical industry projects, such as **Solugen's biobased chemical plant in Minnesota** and **Lithium Americas' lithium mine and processing facility** in Nevada. The agency is working its way through hundreds of applications across the spectrum of biobased and low-CO₂ chemical manufacturing.

Flakoll says the projects funded by the LPO have earned support from **conservative** and **liberal** policymakers who want to strengthen US manufacturing capabilities. But that's no guarantee that Trump will leave the LPO or other federal cleantech programs intact.

"It's hard to say what he will ultimately decide to do, or what his advisors will tell him to do," Flakoll says.

The next president will have a significant impact on the resources available to cleantech companies, Brazauskas says. Industry would rather work within clear and consistent regulation—and whittle away at the bits it doesn't like through lobbying and litigation—than chase after a chaotic and unpredictable regulatory regime.

"Industries really crave certainty," Brazauskas says. "They want to be able to make planning decisions."

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