

 DATA FOR **PROGRESS**

A PROGRESSIVE PLATFORM FOR CARBON REMOVAL

Federal Action Plan

Celina Scott-Buechler

ACKNOWLEDGMENTS: This report would not have been possible without independent review by: Olufémi Táíwò, Georgetown University; Wil Burns, Institute for Carbon Removal Law & Policy at American University; Danny Cullenward, CarbonPlan; Becca Ellison, Evergreen Action; Jake Higdon, Environmental Defense Fund; Ugbaad Kosar, Carbon180; Holly Buck, University at Buffalo.

July 2021

SECTION 1. Legislative Building-Blocks & Lessons Learned

Well-defined governance structures and adequate funding will be essential to the achievement of negative emissions. Already, mechanisms to reach the goals laid out in the first report of this series, *A Progressive Platform for Carbon Removal: Guiding Principles*, are being developed on Capitol Hill. As President Biden works with Congress to flesh out the American Jobs Plan, carbon removal projects present exciting opportunities for quality job creation and climate solution-building. Recent developments in climate policy laid some of the groundwork for American innovation on carbon removal; now, executive and legislative branches should seize on the opportunity to Build Back Better to advance a bold, diversified suite of negative emissions policies through new public financial institutions like the National Investment Authority and paving the way for publicly-owned and -operated carbon removal infrastructure. This report reviews existing legislative building blocks for progressive carbon removal innovation and deployment, and lays out recommendations for American leadership in this critical and underdeveloped area of climate policy.

SELECT COMMITTEE ON THE CLIMATE CRISIS: FOLLOWING RENEWABLE'S TRAJECTORY

Congress is increasingly realizing that “net-zero” emissions targets are not enough. In its 2020 report, Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America, the House Select Committee on the Climate Crisis put forward plans not only for climate change mitigation and adaptation, but for negative emissions as well. After extensively reviewing scientific research and consulting with experts, the committee concluded that the U.S. would have to achieve net-negative greenhouse gas emissions by no later than 2050. To achieve this goal, Congress would need to “dramatically increase federal investment in carbon removal research and development” by establishing financial incentives, funding demonstration projects, and bolstering markets. The Senate Democrats’ Special Committee on the Climate Crisis further emphasizes the need for carbon removal, identifying “[development of] natural and negative emissions technologies” as a key component of bold climate policy.

The Congressional Action Plan points to renewable energy as a useful analog for advancing carbon removal while lowering their costs. In recent decades, the cost of solar and wind renewable energy has plummeted, making them the most affordable sources of electricity today. They did not do so alone, however — solar and wind relied on large-scale government investment to go through cycles of innovation that would eventually make them affordable. The policies responsible for the solar and wind boom also spurred American job creation by incentivizing domestic production that played a central role in the United States’ emergence from the 2009 Great Recession. Now, many of the same strategies that allowed renewable energy to outcompete fossil fuels must also be applied to strategies and technologies that remove atmospheric carbon pollution.

POTENTIAL FOR COOPERATION ACROSS THE POLITICAL DIVIDE

In addition to being necessary for climate action, negative emissions projects also present a unique opportunity for bipartisan climate policy, as carbon removal has garnered support among moderate Democrats and Republicans alike. For example, the CREATE Act (S.4341) was introduced in the 116th Congress by Senator Kyrsten Sinema (D-AZ), a centrist Democrat, and co-sponsored by Senators Lisa Murkowski (R-AK) and Shelley Moore Capito (R-WV). The bill would establish a committee for comprehensive carbon removal advancement within the National Science and Technology Council, with the objective of launching a federal Carbon Removal Initiative. Although the bill stops short of providing funding for innovation and bold targets, the bill represents centrist interest in carbon removal and would go a long way toward federal coordination on innovation.

Most notably, the Energy Act of 2020, squeezed through in the final days of the 116th Congress, exemplifies bipartisan potential for carbon removal legislation. In it, Congress approved \$1.33 billion in research and development for large-scale carbon removal and long-term storage projects to be spent out over 5 years. Among the budget lines for this year are \$200 million for carbon storage research and testing, \$50 million for the National Academies of Science, Engineering, and Medicine to conduct feasibility research on a new circular carbon economy, and \$100 million for commercial direct air capture (DAC). In total, this was the largest single appropriations package for large-scale carbon removal in U.S. history.

Despite its triumphs, however, the bill also demonstrates fossil fuels' continued influence on lawmakers, and their attempts to use carbon removal as life support for their dying industry. Countering the \$1.33 billion in positive funding was a \$6.61 billion carve-out for coal and natural gas under the guise of carbon capture, utilization, and storage (CCUS). Where DAC demonstration projects were allotted \$100 million, fossil fuel power generation with CCUS were allotted \$500 million.¹

The COVID relief bill should serve as a warning for what progressives are up against. It is clear that removing carbon from the atmosphere is critical to fixing the climate crisis. It is also clear, however, that fossil fuel companies are leveraging their significant wealth and influence to advance carbon capture policies that muddy the waters, as they always have. As such, it is incumbent upon progressives to keep close watch on carbon removal legislation to ensure it cannot serve as a trojan horse for fossil interests; to do so, a clear progressive platform on carbon removal (definitions for which can be found in our [*Guiding Principles report*](#)) and increased engagement on the topic are critical. As Data for Progress has argued in our [*Progressive Climate Innovation Agenda*](#) trio of reports, progressives have divested from debates shaping the next generation of essential clean and climate-oriented technologies at our own peril.

SECTION 2. Putting Carbon Removal to Work for Climate Remediation: The American Jobs Plan

President Biden and Vice President Harris must make good on the promises they made to progressives on bold climate action. This includes many of the objectives laid out in the American Jobs Plan, and pledges made in the Biden-Harris [transition playbook](#) to rapidly expand the U.S.'s carbon drawdown capacities while creating well-paying, union jobs. In addition to expediting decarbonization, the administration should deliver on climate promises in ways that advance carbon removal. This can be accomplished by:

- ▶ Making large-scale investments in carbon removal strategies and technologies as a whole (“drive dramatic cost reductions in ... [carbon removal]”),
- ▶ Promoting new long-lived products made of permanently-stored carbon (promise: “drive dramatic cost reductions in ... the next generation of building materials”),
- ▶ Creating jobs for transitioning fossil fuel workers to fill abandoned oil and gas wells with captured emissions (promise: “[create] 250,000 jobs plugging abandoned oil and gas wells”), and
- ▶ Keeping environmental justice front and center, including where carbon removal infrastructure is concerned (“ensure that environmental justice is a key consideration”).

President Biden's American Jobs Plan lays out an ambitious climate agenda that would advance carbon removal alongside deep decarbonization. The plan would revitalize American manufacturing sectors while focusing on communities that have historically been excluded from and harmed by industrial growth: communities of color, low-income communities, and frontline communities. Alongside significant investments in electric vehicles and renewable energy, the Biden administration includes a number of provisions that, if implemented effectively, could put the U.S. on the road to significant carbon removal. The following sections identify policies that could turn the progressive vision for large-scale carbon removal into reality, including many that build on the American Jobs Plan.

DECOMMISSION FOSSIL FUEL INFRASTRUCTURE AND CREATE JOBS

Echoing its campaign and transition promises, the Biden-Harris administration's American Jobs Plan emphasizes opportunities for a green, just transition, including “[putting] the energy industry to work plugging orphan oil and gas wells and cleaning up abandoned mines.” The plan lays out a \$16 billion investment in communities that rely on extractive industries like fossil fuels. These investments are projected to create hundreds of thousands of well-paying, unionized jobs — an important step in justly transitioning communities to the green economy. They could also help advance environmental justice by cleaning up toxic sites that are disproportionately located in underserved communities.² To maximize benefits, however, the Biden administration should allocate some of this funding toward infrastructure for securely transporting, storing, and monitoring captured emissions in decommissioned oil and gas wells.

Long-term geologic storage is a critical component of several carbon removal options, including DAC and BECCS. Once captured, emissions must be stored securely so as to prevent leakage. Deep sedimentary rock formations, including saline aquifers and depleted oil and gas wells, are some of the safest storage sites for CO₂ — in human terms, effectively permanent.³ Fossil fuel workers possess unique skills that would be invaluable to carrying out large-scale geologic storage of carbon pollution. They have already been trained to handle the machinery to remove carbon (in the form of fossil fuels) from the earth, and now that training can be used to put it back. By prioritizing the development of a new carbon economy that removes and permanently stores past emissions, the Biden administration could create high-wage, union jobs that draw on the skills already possessed by the fossil fuel workforce.

INVEST IN “TECHNOLOGIES OF THE FUTURE”

The Obama administration played a pivotal role in driving down the costs of renewable energy, paving the way for emissions intensity reductions — a playbook the Biden administration seems keen to follow for other climate-positive technologies. Shepherded through Congress by then-President Obama, the 2009 American Recovery Act made the largest investment in renewable energy the country had ever seen. Direct federal investment amounted to more than \$90 billion in renewables like wind and solar, and signaled to industry that the administration was committed to growing the clean energy sector. This infusion of funding also enabled the Obama administration to strategically leverage private and non-federal funds exceeding the initial investment: over \$150 billion. The White House Council of Economic Advisors estimated that ARRA provisions for renewable energy created approximately 900,000 jobs.⁴ Similar investments in carbon removal technologies today could thus propel the U.S. toward global leadership while spurring job creation.

To best facilitate public benefits of carbon removal, it is important that financing be channelled through a public institution like the National Investment Authority (NIA): a public institution set up to promote environmentally sustainable and socially inclusive growth and revival. The NIA, or a similar institution, would serve as the central source of funding for public carbon removal projects as well as a hub for cross-economy coordination on climate-positive infrastructure. A national network of public carbon removal projects will require careful carbon accounting and monitoring to ensure that this infrastructure adheres to the standards outlined in our Guiding Principles report. The NIA would serve these functions, as well as pave the way for carbon removal as a public utility. In addition to making direct investments, the NIA could extend Obama-era loan guarantees for carbon removal projects undertaken in public and private sectors. Strict monitoring, measurement, and enforcement will be critical to ensure accurate carbon removal accounting and prevent the problems of double-counting and greenwashing described in our Guiding Principles report.

In cooperation with the NIA, the Biden administration should repurpose Obama-era alternative fuel mandates. Working with Congress, the president should push for DAC-based fuels to be included under the federal Renewable Fuels Standard, which requires the federal government to include a minimum of 36 million gallons of alternative fuels (currently biofuels and advanced biofuels) in its transportation fuel mix in 2022.⁵ Although they do not constitute permanent carbon removal, DAC-based fuel production can drive down technology costs and thus pave the way for cost-effective DAC negative emissions. Analysis by the Rhodium Group demonstrates that credits should begin at \$2.50 per gallon.⁶

In addition to a federal fuel mandate, the Biden administration should advance a federal construction material mandate — that is, place requirements on the sustainability of high-emissions materials like cement and steel in federal construction projects. By 2050, at least 50 percent of materials should provide long-term carbon storage, derived using innovative technologies like carbon capture and storage that aid both in addressing sector emissions and lowering costs for related negative emissions strategies like BECCS.

JUMPSTART INNOVATION IN CARBON REMOVAL INFRASTRUCTURE AT DOE

Federal policy for innovation in carbon removal infrastructure is currently enacted through various agency offices that lack specific direction for advancing a holistic carbon removal portfolio. The Department of Energy’s Office of Fossil Energy has, over the years, come to host much of the government’s work on chemical approaches to carbon removal — including those that do not involve fossil fuels. To most effectively coordinate innovation on carbon removal, the Office of Fossil Energy should be remodeled to be the Office of Carbon Management, to be housed in DOE. Further, the office should represent a progressive vision for carbon removal by disentangling itself from fossil fuel interests. Per the recommendations of this report, and the definitions laid out in our [Guiding Principles report](#), this would mean establishing robust carbon removal monitoring and accreditation mechanisms, and ending hand-outs to fossil fuel companies in the forms of enhanced oil recovery and fossil-energy carbon capture and storage tax credits, among others.

The Office of Fossil Energy’s (FE) existing mission is to “discover and develop advanced fossil energy technologies to ensure American energy dominance, create American jobs, support a resilient infrastructure, maintain environmental stewardship, and enhance America’s economy. FE ensures America’s access to and use of safe, secure, reliable, and affordable fossil energy resources and strategic reserves.” Instead, we propose that the new Office of Carbon Management adopt the following mandate:

“The Office of Carbon Management’s (OCM) mission is to complement federal mandates to decarbonize the American economy with sustainable, robust, and equitable atmospheric carbon removals while creating jobs, engaging communities, and protecting biodiversity. OCM coordinates efforts across federal agencies to meet national carbon removal targets, build capacity to counteract residual emissions, and eventually allow the U.S. to achieve net-negative emissions.”

Given the disparate nature of federal action on negative emissions, OCM could provide a hub for cross-government collaboration as well as reliable funding for research, development, and demonstration projects. OCM should prioritize projects that show promise for large-scale, permanent negative emissions but that remain in early stages of commercialization. In particular, OCM should use its position in DOE to develop carbon removal strategies that can either co-produce energy (i.e. BECCS) or that would benefit from co-location with renewable energy development (i.e. DAC). Further, OCM should work with USDA and NOAA to establish clear lines of communication and coordination on a robust negative emissions portfolio.

CREATE A MASSIVE JOB TRAINING PROGRAM FOR THE WORKFORCE OF THE FUTURE

One of the critical ways that carbon removal can benefit people and the economy in the immediate term is through job creation in partnership with labor groups. Carbon removal's sister industry, renewable energy, proves how effective new, green programs can be for employing large numbers of people. Between 2014 and 2019, the solar workforce grew five times faster than the U.S. workforce on the whole. Growth came so quickly, however, that 57 percent of employers found it challenging to find suitably trained employees, and most employers found it difficult to find enough of them. Researchers forecast that transitioning the American power supply to 90 percent clean energy by 2035 could more than double union construction jobs compared with business-as-usual. These are quality jobs, too: renewable energy jobs pay a median \$24.85 per hour, which is estimated to be 25 percent higher than the national median and even slightly higher than fossil jobs' median \$24.37 per hour.⁷ Although solar energy growth is a success story overall, it has failed in one critical respect: its workforce remains predominantly white, and employment rates for BIPOC and women are below the national average. While wind employs a large share of Latinx workers (20 percent), its Black and female workforce remains below the national average. On the whole, less than 10 percent of the renewable energy workforce is Black and less than 20 percent are women.⁸

The Biden administration can learn from the experience of the renewable energy boom by establishing a robust job creation and training program for the workers that will fill the broad spectrum of carbon removal jobs, as well as those in renewable energy and other sectors critical to climate action. As Governor Jay Inslee called for on our blog in 2019, progressives should push for a Civilian Climate Corps that expands on FDR's New Deal Civilian Conservation Corps program, which put thousands of young men to work in green jobs. **A reimagined CCC could put millions of Americans to work fighting climate change, including carbon removal, and is extremely popular among voters: 85 percent of Democrats and more than 60 percent of all voters supported the creation of a robust CCC to repair infrastructure and address pollution.**⁹

The original CCC aimed primarily to employ young men and veterans in posts lasting from a few months to a few years. To best meet the needs of American workers, a new CCC should provide short-term traineeships for young people in addition to more stable employment opportunities for workers of all age groups and genders. In this way, the new CCC should be co-modelled after the New Deal-era Works Progress Administration (WPA), which was launched in 1935 with an initial grant of \$4.9 billion and aimed to expand employment opportunities for un- and under-employed Americans, from construction workers to artists. Adjusted for inflation, this initial investment would amount to approximately \$93.07 billion today. With this funding, the WPA was able to create 8.5 million jobs across the U.S. between 1935 and 1943.¹⁰ The COVID crisis has left the U.S. with even larger unemployment figures, however — the Economic Policy Institute estimated that more than 18 million Americans were unemployed at the end of 2020.¹¹ **To meet the scale of this challenge, we reiterate the recommendation (first made on our blog¹²) to equip the modern CCC with \$250 billion to create well-paying, accessible, unionized jobs while delivering much-needed climate solutions for decarbonization as well as carbon removal.**

With these funds, we propose the Biden administration establish the Civilian Climate Corps, an agency housed in the Department of Labor, with the following mission:

“The Civilian Climate Corps (CCC) shall leverage public funds toward mass job-creation in critical climate action sectors, including renewable energy, negative emissions, community resilience, adaptation, and environmental justice. In addition to implementing readily available climate solutions, CCC will strive to cultivate American innovation for new and emerging technologies and practices to address the climate crisis. CCC will emphasize job creation and training in traditionally underserved and climate-frontline communities, including poor communities, communities of color, and rural communities.”

Through the CCC, Congress should strive to prioritize jobs for fossil fuel communities and environmental justice communities. Carbon removal facilities and projects constructed under the CCC should also strive toward public ownership, as well as community control and direct benefits, to maximize long-term public benefits. Congress should also fund public sector organizations to center community needs for successful rollout. Organizations with existing community roots and experience in job transition/training programs will be critical to tailoring job training opportunities to specific communities; examples include WE ACT for Environmental Justice, Green Door Initiative, GRID Alternatives, Deep South Center for Environmental Justice, and unions. Congress should further partner with organizations, especially those focused on environmental justice and labor, with community roots that have not yet been able to launch job training programs by creating a competitive grants program. In addition to financial resources, agencies should be tasked with compiling staff assistance and training materials and convening an EJ roundtable to discuss how best to roll out such a program.

Put together, the varied job opportunities presented by a growing carbon removal sector could provide critical economic stimulus. Congress should prioritize partnering with fossil fuel and environmental justice communities where appropriate, as well as labor groups, relying on existing networks of community-based organizations to tailor job creation efforts. In addition to creating millions of jobs and revitalizing the public sector, funding the construction of carbon removal infrastructure through the CCC would allow the federal government to build out a network of publicly owned and operated carbon removal facilities and projects. Public procurement and ownership of carbon removal infrastructure would provide effective means to ensure that these strategies work toward the public’s interest and do not reproduce historic inequities.

SECTION 3. Putting Carbon Removal to Work for Climate Remediation: Governing Negative Emissions Technologies & Practices

The 117th Congress has a unique opportunity to set in place policies that will not only propel the U.S. to leadership on carbon removal, but also stimulate the economy and reinvigorate American innovation. To deliver in this moment, Congress should build on existing policies while ensuring that they adhere to the principles of progressive carbon removal policies presented above.

ESTABLISH FEDERAL TARGETS FOR CARBON REMOVAL, AND FUND ACCORDINGLY

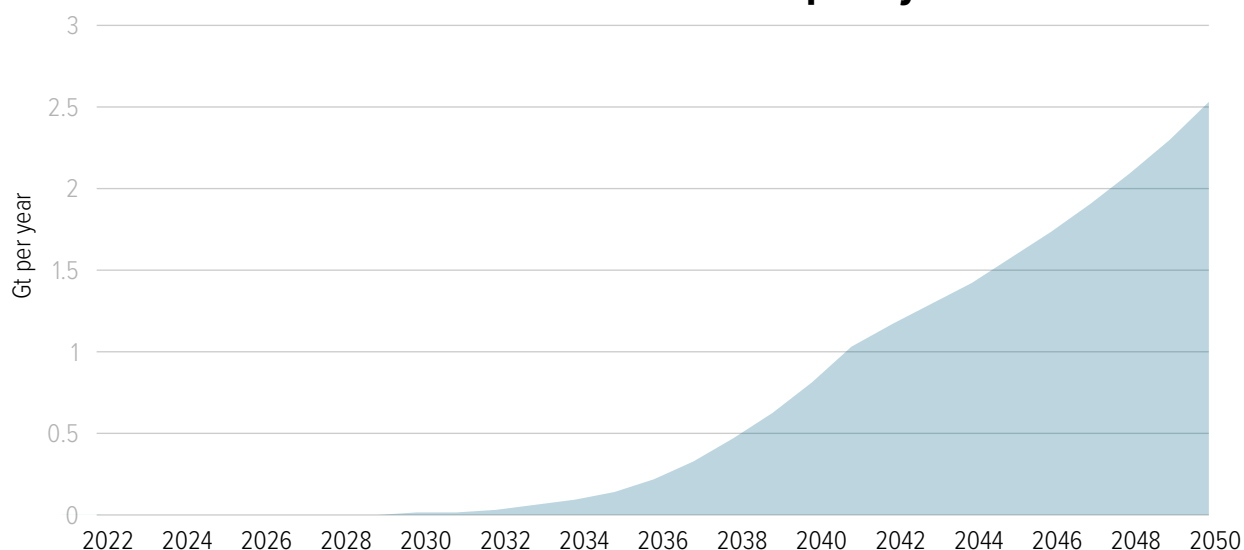
The first step in undertaking an ambitious project like carbon removal is to set clear goals. To best complement other environmental priorities, it is critical that negative emissions targets be set separately from decarbonization, emissions avoidance, climate change adaptation, and biodiversity targets. Doing so will reduce the risk that one category of climate action detracts or distracts from another — specific to this report, ensuring that carbon removal projects do not provide policymakers with an excuse to avoid rapidly decarbonizing the U.S. economy. Setting specific benchmarks for carbon removal innovation will also allow Congress to regularly gauge its progress, which should be done in partnership with the National Academies of Science, Engineering, and Medicine as the Select Committee on the Climate Crisis laid out in its report.

Given the gravity of the climate crisis, progressives must continue to insist that developed economies like the U.S. prioritize rapid and equitable decarbonization, reaching net-zero by mid-century at the latest. To help meet net-zero targets, we should first set our sights on removing emissions equal to those of industries that are difficult to decarbonize (also called “residual emissions”), including steel and cement production, aviation, and heavy shipping: 1.5 to 3.1 Gt.¹³ Because the U.S. has contributed 25 percent of cumulative global emissions, it should also be responsible for 25 percent of removals needed to balance out residual emissions. **We propose the U.S. begin to ramp up national carbon removal capacity to reach 25 percent of the upper bound of global residual emissions (25 percent of 3.1 Gt = 0.78 Gt per year) by 2040.**

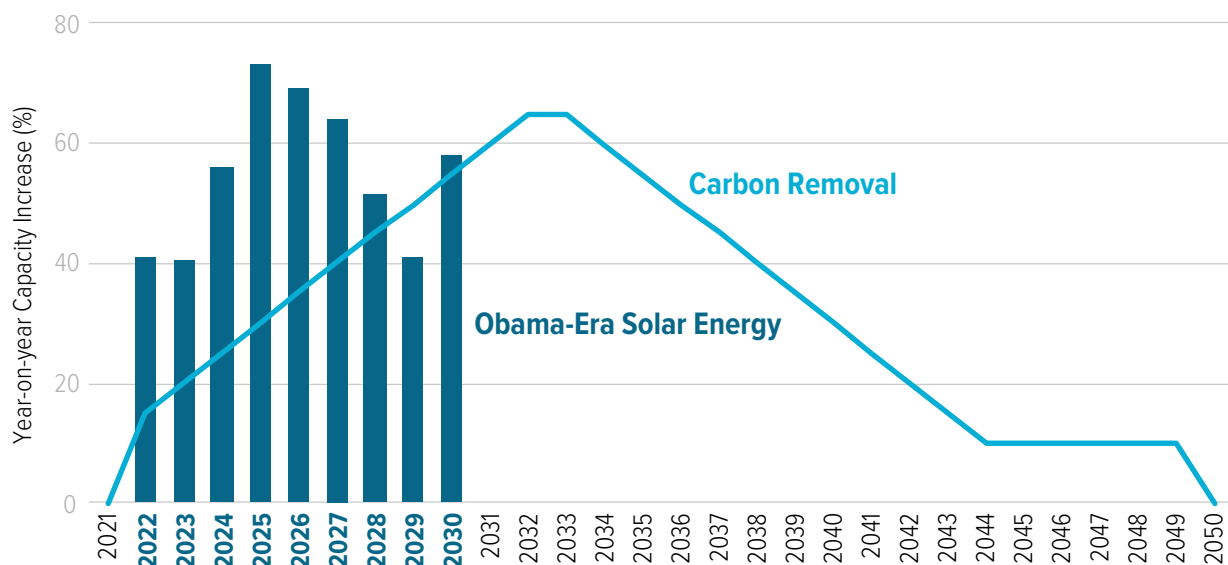
By 2050, IPCC models expect that the world will be able to remove between 5 and 15 Gt of carbon pollution from the atmosphere per year to keep warming below 1.5°C.¹⁴ The National Academies of Sciences, Engineering, & Medicine (NASEM) estimated a global need for 10 Gt per year.¹⁵ If progressives are successful in pushing the Green New Deal agenda and meeting ambitious decarbonization goals, we can minimize the amount of carbon removal needed, aiming for 5 Gt of global annual carbon removal capacity. Assuming that not all countries, especially developing countries, will be able to decarbonize as rapidly, the U.S. should supply at least 25 percent of the NASEM 10 Gt carbon removal target for 2050. **We therefore recommend the U.S. develop the capacity to remove 2.5 Gt of greenhouse gas emissions annually by 2050, emphasizing carbon removal strategies that leverage technology for permanent carbon storage.**

These are ambitious goals, but they are not without precedent. Installed solar energy capacity experienced year-on-year increases of ~15 percent in the late 1990s and jumped to between 20 and 30 percent in early 2000s. During the Obama administration, annual growth rates soared, reaching a high of 73 percent in 2011.¹⁶ Although current U.S. carbon removal capacity is unknown, assuming we start with 0.001 Gt per year (ten-fold the minimum removal capacity for a direct air capture facility to qualify for the 45Q tax credit) this year, carbon removal would need year-on-year capacity increases beginning at a meager 15 percent and scaling up by 5 percent each year to a high of 65 percent in 2032, then slowly ramping back down again to 10 percent by 2044. This would be lower than the rates of capacity deployment for solar energy under the Obama administration.

U.S. Carbon Removal Capacity



Innovation Rate to Meet Progressive Carbon Removal Targets



To achieve these ambitious carbon removal goals, Congress should launch a 20-year RD&D initiative for carbon removal innovation across federal agencies. Funding for this initiative should be approximately equivalent to current annual expenditure on fossil fuels — if negative emissions infrastructure is going to clean up the mess created by fossil fuels since the Industrial Revolution, it will need an equal if not greater budget than the one that has funded polluters. In a recent study, the Environmental and Energy Study Institute provided a conservative estimate of direct fossil fuel subsidies: \$20 billion per year.¹⁷ Accounting for indirect subsidies, the IMF estimated total U.S. fossil fuel support in 2017 to equal \$649 billion.¹⁸ To meet the challenge of carbon pollution management, Congress should redirect fossil fuel subsidies toward a broad portfolio of carbon removal approaches. **To this end, we urge Congress to appropriate an annual \$20 billion for carbon removal.** A carbon removal budget of this scale would still only be approximately 3 percent of total fossil fuel subsidies. It would, however, go a long way to helping the U.S. achieve net-negative emissions in the coming decades and lead the world in an underdeveloped area of climate action.

LEAD THE WORLD BY EXAMPLE

As the U.S. rejoins the Paris Climate Agreement, the Biden administration can provide much-needed leadership on meeting the negative emissions requirements set forth by the IPCC — targets that have yet to be codified in countries' international climate plans. Across multiple fora, President Biden, Vice President Harris, and Special Presidential Envoy for Climate John Kerry should encourage nations to set separate goals for climate change mitigation, climate risk adaptation, biodiversity preservation, and carbon removal. This could be modelled after the EU's clarified climate targets, which define the role of carbon removal in reaching net-zero emissions.¹⁹ Establishing distinct, bold action plans for each goal will be critical to advancing holistic — and ultimately successful — multilateral climate policy.

But the U.S. must do more than encourage other countries to re-examine nationally determined contributions (NDCs) under the Paris Accords and should lead by example. To do so, the Biden-Harris administration could declare new overarching climate goals for the U.S. that include carbon removal. In addition to bolder decarbonization targets set in the Biden administration's Earth Day summit, the administration must commit the U.S. to its fair share of the global carbon removal burden on the global stage while working with Congress to enshrine this goal in legislation.

The U.S. is the single largest cumulative emitter in the world, responsible for one-quarter of cumulative global emissions. If the U.S. is now to resume global climate leadership, it is incumbent on the federal government to clean up a proportional share of greenhouse gas emissions. President Biden must commit to addressing one-quarter of the total carbon removal burden.

ESTABLISH A CROSS-AGENCY, STAKEHOLDER-ENGAGED CARBON REMOVAL COUNCIL

The House Select Committee makes clear the need for a coordinated strategy for climate restoration and negative greenhouse gas emissions for the second half of the century. It also proposes an accountability structure for itself — namely, that the National Academies of Science, Engineering, and Medicine provide Congress and the public regular progress updates. According to the committee's report, these should include updates on meeting negative emissions goals, as well as assessments of the distributional

impacts of carbon removal implementation and scale-up. Such an accountability structure would be key, not only to earn the public's trust and uphold promises made to them, but also to ensure that carbon removal projects contribute to rather than detract from environmental justice.

Given the diversity of carbon removal options, innovation currently occurs across multiple federal agencies. While it can be useful to have independent streams of research, delivering a diversified carbon removal portfolio will require active communication and collaboration between agencies, especially given the cross-cutting nature of many negative emissions technologies and practices. To best carry this out, we propose that Congress build on the House Select Committee's recommendations by establishing a cross-agency council on carbon removal that shall meet at least once per calendar year, be coordinated by DOE's new Office of Carbon Management, and consist of at least one representative from each of the following agencies:

- ▶ **Environmental Protection Agency**
- ▶ **Department of Agriculture**
 - ▶ Agricultural Research Service
 - ▶ Farm Service Agency
 - ▶ Forest Service
 - ▶ National Institute of Food and Agriculture
 - ▶ Rural Development
 - ▶ Rural Business-Cooperative Service
- ▶ **Department of Commerce**
 - ▶ Economic Development Administration
 - ▶ National Institute of Standards and Technology
 - ▶ National Technical Information Service
 - ▶ NOAA
 - ▶ Minority Business Development Agency
- ▶ **Department of Defense**
 - ▶ U.S. Air Force
 - ▶ U.S. Navy
- ▶ **U.S. State Department**
- ▶ **United States Agency for International Development**
- ▶ **Department of Energy**

- ▶ Office of Carbon Management
- ▶ Artificial Intelligence & Technology Office
- ▶ Office of Indian Energy Policy and Programs
- ▶ Office of Science
- ▶ **Department of Interior**
 - ▶ Bureau of Indian Affairs
 - ▶ Bureau of Land Management
 - ▶ Bureau of Safety and Environmental Enforcement
 - ▶ National Park Service
 - ▶ Office of Surface Mining Reclamation and Enforcement
 - ▶ U.S. Fish and Wildlife Service
 - ▶ U.S. Geological Survey
- ▶ **Department of Labor**
 - ▶ Employee and Training Administration
 - ▶ Mine Safety and Health Administration
 - ▶ Occupational Safety and Health Administration
 - ▶ Further, to ensure meaningful inclusion of multiple stakeholders, the Council should include an advisory board consisting of representatives from:
 - National Academies of Science, Engineering, and Medicine
 - Environmental justice communities
 - Labor unions
 - American Indian and Alaska Native tribes
 - Small- to medium-scale farmers
 - Public utility companies
 - Youth groups
 - Environmental NGOs

This body's primary mission will be to cross-pollinate carbon removal-related research and policy across agencies and work collaboratively toward gigaton-scale carbon removal, at home and abroad. State and USAID representatives would be tasked with cross-border technology and IP sharing to ensure that other countries interested in developing carbon removal capacity are able to. The Council would also be a forum for collaborative projects relating to carbon removal. For example, the Department of Interior might purchase privately-owned land that had once been forested. Once under public control, Interior could work collaboratively with USDA and EPA to reintroduce forests and establish demonstration projects for forest carbon measurement.

The Council's most immediate task, however, will be to establish comprehensive federal guidelines for carbon removal projects, which will clarify at minimum:

- ▶ Federal definitions for "removal" of emissions from the atmosphere and/or biosphere
- ▶ Minimum storage length to count toward the national removal target
- ▶ Contingency plans for leaked and/or reversed negative emissions, including buffer pools proportional to each carbon removal method
- ▶ Standards for price controls on removed emissions, which should reflect lifetime costs that include monitoring, maintenance, and replacement when necessary
- ▶ The architecture of a public option for carbon removal infrastructure, akin to public utilities

Further, the body should draw on agency expertise and guidance from stakeholders to assemble recommendations for a national carbon removal monitoring program. This program should be a centralized effort to verify removed emissions using the highest standards and monitor these stores to prevent and respond to incidences of leakage or reversal.

AMEND THE 45Q TAX CREDIT

One of the most impactful policies for carbon removal technological advancement in the U.S. has been the 45Q tax credit, which awards eligible projects a rate per metric ton of carbon oxide (a category that includes carbon dioxide) captured and sequestered. Despite the good it has done in jumpstarting innovation, however, 45Q remains limited by its entanglement with fossil fuel interests, providing incentives for enhanced oil recovery (EOR) and fossil fuel power with carbon capture and storage without requiring projects in either category to present plans for phasing out fossil fuel use. In early 2020, the IRS issued a clarification on the tax credit to include DAC among qualifying projects, among other actions. DAC projects are now awarded \$28.74 per ton of CO₂ captured and securely stored in geologic formations, exceeding EOR's \$17.76. New fossil CCS facilities also qualify, however, for the higher rate.²⁰ To maximize this policy's climate efficacy, Congress should:

- ▶ Increase the tax credit for direct air capture with geologic storage from \$50 to \$180/ton (inflation-adjusted), per the recommendation of the Rhodium Group;²¹
- ▶ Increase the tax credit for direct air capture with carbon utilization, i.e. for long-lived products and/or fuels;

- ▶ Phase out eligibility for EOR and fossil fuel power plants paired with CCS;
- ▶ Continue to incentivize BECCS, as well as CCS use in hard-to-abate industries such as steel and cement production, and increase the tax credit to \$100/ton;
- ▶ Extend the construction commencement requirement from 2024 to 2040 to allow project developers more time to innovate new carbon removal;
- ▶ Lower the capture capacity requirement to 10,000 tons of carbon oxides per year;
- ▶ Per the proposed ACCESS 45Q Act (H.R.8858), enable direct payment of the tax credit to streamline the process for developers, especially amidst the economic recession.

The 45Q tax credit is helping pave the way for American carbon removal capacity; however, it must be amended to protect against greenwashing. Robust monitoring of removed emissions is especially important, and currently lacking. A 2020 audit found that 87 percent of rebates were out of compliance with the EPA's requirements for credits. These rebates amounted to close to \$900 million of taxpayers' money.²²

Conclusion

The landmark IPCC [Special Report on 1.5°C](#), published in 2019, stresses the need to “compensate for residual emissions and achieve net-negative emissions to return global warming to 1.5 °C following a peak.” Combined with the assumptions of negative emissions made in global climate models, there is growing scientific consensus that negative emissions technologies and practices are now necessary to keep global warming below 1.5°C under all scenarios. In addition to preventing future emissions, ambitious climate policies will need to remove past emissions. The U.S. is the largest cumulative emitter in the world, responsible for one-quarter of anthropogenic emissions, and therefore has a duty to lead the world in carbon removal development and deployment. By building on existing federal governance structures, Congress and the Executive have myriad opportunities to enact negative emissions-enabling policies. Lawmakers across the political spectrum are already working to enact legislation that advances carbon removal. Working with stakeholders such as labor unions and environmental justice organizations, policymakers on the left should push to include progressive priorities such as those outlined in this report. Failing to do so would mean passing up a rare opportunity for bipartisan and cross-coalition cooperation on climate action. By front-loading investment in carbon removal in coming decades, the U.S. can capitalize on economic opportunities presented by this emerging sector to create jobs, expand public innovation, and boost industry. At every stage of carbon removal development, the U.S. should strive toward global equity while promoting racial, economic, and environmental justice at home.

ENDNOTES

1. US Congress. (Dec 2020). *Consolidated Appropriations Act, 2021*. <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR133SA-RCP-116-68.pdf>
2. Bullard, R. D. (1993). Environmental racism and invisible communities. *W. Va. L. Rev.*, 96, 1037. <https://core.ac.uk/download/pdf/230407999.pdf>
3. Morrow, D. et al. (Dec 2020). *Reduce, Remove, Recycle: Clarifying the Overlap between Carbon Removal and CCUS*. Institute for Carbon Removal Law and Policy, American University.
4. The White House. (Feb 2016). *FACT SHEET: The Recovery Act Made The Largest Single Investment In Clean Energy In History, Driving The Deployment Of Clean Energy, Promoting Energy Efficiency, And Supporting Manufacturing*. <https://obamawhitehouse.archives.gov/the-press-office/2016/02/25/fact-sheet-recovery-act-made-largest-single-investment-clean-energy>
5. Congressional Research Service. (Apr 2020). *The Renewable Fuel Standard (RFS): An Overview*. <https://fas.org/sqp/crs/misc/R43325.pdf>
6. Larsen, J. et al. (May 2019). *Capturing Leadership: Policies for the US to Advance Direct Air Capture Technology*. Rhodium Group. <https://rhg.com/research/capturing-leadership-policies-for-the-us-to-advance-direct-air-capture-technology/>
7. Smith & Walker. (Apr 2021). *The promise of the clean energy economy for American workers*. Environmental Working Group. <https://www.ewg.org/research/promise-clean-energy-economy-american-workers>
8. Environmental Justice Leadership Forum. (Dec 2020). *Green Jobs Report. Creating a Green Workforce: Community-Based Solutions for a Diverse Green Jobs Sector*. https://www.weact.org/wp-content/uploads/2020/12/FINAL-2_Green-Jobs-Report_Full-Report-Full-View.pdf
9. Inslee, J. (May 2019). *A call to action for a Climate Conservation Corps*. Data for Progress. <https://www.dataforprogress.org/blog/a-call-to-action-for-a-climate-conservation-corps>
10. New York Times. (Jul 1943). *WPA Pays Up and Quits*. <https://timesmachine.nytimes.com/timesmachine/1943/07/01/88549554.html?pageNumber=9>
11. Shierholz, H. (Nov 2020). *What the next president inherits: More than 25 million workers are being hurt by the coronavirus downturn*. The Economic Policy Institute. <https://www.epi.org/blog/what-the-next-president-inherits-more-than-25-million-workers-are-being-hurt-by-the-coronavirus-downturn/>
12. Levin, S. (Jan 2021). *Developing a pro-worker Civilian Climate Corps*.
13. Bergman, A. & Rinberg, A. (2021) The Case for CDR: From Science to Justice. *CDR Primer*. eds: Wilcox, J. et al.
14. Fuss et al. (2018). Negative emissions—Part 2: Costs, potentials and side effects. *Environmental Research Letters*.
15. NASEM. (2018). Negative emissions technologies and reliable sequestration.
16. Wikipedia. (Acc. Jun, 2021) Solar power in the United States. https://en.wikipedia.org/wiki/Solar_power_in_the_United_States
17. EESI. (Jul 2019). *Fact Sheet: Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Costs*. <https://www.eesi.org/papers/view/fact-sheet-fossil-fuel-subsidies-a-closer-look-at-tax-breaks-and-societal-costs#:~:text=Conservative%20estimates%20put%20U.S.%20direct,total%2055%20billion%20euros%20annually.>
18. Coady, D. et al. (May 2019). *Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates*. IMF. <https://www.imf.org/en/Publications/WP/Issues/2019/05/02/Global-Fossil-Fuel-Subsidies-Remain-Large-An-Update-Based-on-Country-Level-Estimates-46509>.
19. Aragonès, M.P. & Wang, F. (May 2021). *New EU climate law delivers innovative policy framework to advance carbon removal and avoid moral hazard*. Climateworks Foundation. <https://www.climateworks.org/blog/innovative-european-union-climate-law/>
20. Congressional Research Service. (Mar 2020). *The Tax Credit for Carbon Sequestration (Section 45Q)*.
21. Larsen et al. (May 2019). *Capturing Leadership: Policies for the US to Advance Direct Air Capture Technology*. Rhodium Group. <https://rhg.com/research/capturing-leadership-policies-for-the-us-to-advance-direct-air-capture-technology/>
22. Franzin, R. (Apr 2020). *Government probe finds companies claiming carbon capture tax credit didn't follow EPA requirements*. The Hill. <https://thehill.com/policy/energy-environment/495526-government-probe-finds-companies-claiming-carbon-capture-tax-credit>

COVER PHOTO
Nico Roicke/Unsplash