



# The Procurement Toolbox

Leveraging Federal Purchasing Power  
to Advance High-Quality Carbon Removal

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**ABOUT CARBON180**

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Carbon180 is a climate NGO with a vision to remove legacy carbon emissions from the atmosphere and create a livable climate in which current and future generations can thrive. Based in Washington, DC, we design and champion equitable, science-based policies that bring carbon removal solutions to gigaton scale.

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*Section One*

# Introduction



Climate scientists agree that even with steep cuts to emissions, we'll need to remove billions of tons of carbon dioxide annually to meet our climate targets.<sup>1</sup> While the nascent carbon dioxide removal (CDR) industry has made tremendous technological progress in recent years, the scale of removal we'll need by midcentury is more than we can expect to deliver, given the federal policies on the books today.

1. Smith, S. M., et al. *The State of Carbon Dioxide Removal - 1st Edition*. (2023). *The State of Carbon Dioxide Removal*. <https://static1.squarespace.com/static/633458017a1ae214f3772c76/t/64d2223cab34856349188e07/1691492940765/SoCDR-1st-edition-2023-V9.pdf>

We need a package of policies that position the federal government as a direct buyer of carbon removal, leveraging its enormous purchasing power to set high standards for the industry, speed deployment of existing carbon removal solutions, and incentivize the development of new technologies.

The US federal government is the world's largest purchaser of goods and services, spending \$650 billion annually.<sup>2</sup> That volume of demand confers the government with a tremendous ability to shape markets and mobilize taxpayer resources. As such, industry, climate advocates, and a growing cohort of policymakers agree that direct public purchasing of carbon removal can catalyze innovation, expand the portfolio of high-quality carbon removal solutions, and drive down costs.

Further, the federal government's role in carbon removal is unique and essential because, unlike physical commodities such as concrete or steel, carbon removal is a public good with limited opportunities for revenue today. While voluntary corporate purchasers of carbon removal have catalyzed the market to date, the public sector will ultimately need to step in as a major purchaser to help the US reach the scale of removals necessary to meet our national climate goals under the Paris Agreement and to address legacy carbon emissions.

**In this report, we present a comprehensive vision for carbon removal procurement policy across the federal government, one that creates market certainty by setting “fit-for-purpose” standards for just, durable, and verifiable carbon removal across different technologies and pathways. Ultimately, this can help lay the groundwork for more ambitious federal policies to further accelerate carbon removal deployment.**

This report aims to serve as an actionable guide for policymakers interested in designing ambitious demand-side policies that leverage federal purchasing as a tool to establish high-quality carbon removal. It likewise aims to inspire further thinking, experimentation, and adaptation in this emerging area of climate policy. The analysis draws extensively from approaches that are being implemented, adapted, and advocated for in voluntary markets, federal and state policy, and successful procurement policies in other sectors, such as heavy industry.

2. *Fact sheet: President Biden signs executive order catalyzing America's clean energy economy through Federal Sustainability*, (2021, December 13). The White House. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/08/fact-sheet-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/>

# Background

As governments pursue decarbonization across their economies with the goal of zeroing out emissions by midcentury, every sector, firm, and jurisdiction needs to aim for zero emissions. Beyond that, the world will need billions of tons of high-quality carbon removal each year for two purposes: first, to address legacy emissions already in the atmosphere, which are fueling record-setting temperatures and worsening natural disasters across the world today; and second, to neutralize remaining emissions from certain sectors of the economy like heavy industry while old technologies are phased out and new clean technologies are adopted.

However, the market for carbon removal today faces a significant deficit in public trust and knowledge. This is due, in part, to skepticism about certain leading carbon removal technologies, as well as a lack of rigorous, independent standards for verifying how much CO<sub>2</sub> has been removed from the atmosphere and durably stored. Furthering distrust, many industries have exploited poorly regulated voluntary carbon markets to continue polluting. This has resulted in minimal climate or public benefit and too often left already vulnerable communities bearing the brunt of continued local air and water pollution. And finally, in agriculture-specific voluntary carbon markets, even producers with the means to participate in these markets are often deterred by low payments for carbon sequestration, a high paperwork burden for entry, and confusion about how payments are determined.<sup>3</sup>

In recognition of these opportunities and challenges, Congress has acted on a bipartisan basis to fund carbon removal research, development, and demonstration (RD&D), as well as dedicate billions more for deployment via tax credits, cost-share payments, and grants. But despite this early momentum, critical gaps remain in the package of federal policies supporting the carbon removal sector. Most notably, there is an insufficient focus on demand-side policies to help shape and grow the market for high-quality carbon removal services.

Well-designed demand-side policies that make the federal government a principal purchaser of carbon removal can help address these challenges. Carbon180 believes that taken together, the following four policy objectives offer an ambitious vision for how the federal government can adopt a holistic carbon removal procurement strategy that leverages its enormous purchasing power across federal agencies — such as the Department of Energy (DOE), Department of Transportation (DOT), and Department of Agriculture (USDA) — to be a market standard-setter, deliver a diverse portfolio of scalable, high-quality carbon removal solutions, and seed commercial pathways for carbon utilization across multiple sectors of the US and global economies.

3. Barbato, CT., Strong AL. Farmer perspectives on carbon markets incentivizing agricultural soil carbon sequestration. (2023). Njip Climate Action 2 (26) <https://www.nature.com/articles/s44168-023-00055-4>

## GLOSSARY

### Voluntary carbon market

A market where companies voluntarily purchase carbon credits to compensate for their own emissions. Currently, the majority of available credits are purchased by companies to pay someone else not to pollute. In contrast, carbon removal credits represent one ton of CO<sub>2</sub> already in the atmosphere that is removed and durably stored.



*First, federal procurement policy should be seen as a key vehicle for setting high standards for the carbon removal field that are fit for purpose and tailored to diverse carbon removal pathways.*

The public health sector provides a comparable template, in which the government communicates standards for vaccines and promises to purchase the resulting product. With a guaranteed market, private companies then have an incentive to innovate and deliver high-quality vaccines.

In a public procurement market for carbon removal, the government can establish a high bar for duration and certainty as it relates to monitoring, reporting, and verification (MRV) for eligible projects. For example, projects that capture and inject CO<sub>2</sub> underground will require MRV over several decades to ensure its safe and continued storage. Meanwhile, climate-smart agricultural practices that help soils sequester more CO<sub>2</sub> will require MRV standards that account for natural fluxes in soil carbon levels.

*Second, federal procurement policy should make full use of a range of complementary policy tools — notably, pay-for-practice set-asides — to support land-based removal pathways, compensating farmers or ranchers that adopt and sustain carbon-sequestering practices.*

Such practices are often characterized by greater uncertainties around MRV, necessitating alternative standards for procurement while more advanced MRV methods are developed. Building on current pay-for-practice models for certain carbon removal services, particularly in agriculture and forestry, would equip the federal government to not only incentivize adoption of carbon removal management practices but also reward producers for their work in sustaining these practices. Ultimately, our ability to confidently measure the carbon removal impacts of some or all of these practices may improve, such that they may be added to a federal procurement program on the basis of durable tons of carbon removed.

## GLOSSARY

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### **Monitoring, reporting, and verification (MRV)**

The scientific process of measuring and continually confirming the amount of carbon removed from the atmosphere and then durably stored. MRV methods and tools, and the difficulty of quantifying removals, differ across removal pathways.

### **Pay-for-practice**

A policy that would, in this case, compensate farmers and ranchers on a continual basis for implementing and sustaining carbon sequestering practices.

*Third, federal procurement policy should define competitiveness for carbon removal projects as explicitly inclusive of factors other than price — namely, environmental justice, public safety, workforce development, and environmental protection and co-benefits in project selection.*

Procurement policies can and must be designed in a way that ensures that non-CO<sub>2</sub> pollution impacts — such as air, soil, and water quality; traffic; seismic impacts; and adverse land-use impacts — are minimized and controlled, and that inclusive, accessible, and equitable community engagement is a prerequisite for understanding those priorities. Public procurement of carbon removal should explicitly prioritize projects that direct benefits toward and risks away from disadvantaged workers and communities. This includes projects that maximize workforce development, technical assistance and education, and unionized employment opportunities in the communities where carbon removal projects are deployed. In terms of land-based carbon removal, procurement projects that maximize workforce development can benefit rural communities by bringing new high-quality and permanent technical assistance positions close to home.

*And fourth, policymakers should examine ways to leverage existing government procurement programs to support carbon removal.*

The federal government procures \$650 billion in goods and services each year, some of which have the potential to utilize captured carbon, including carbon removed from ambient air.<sup>4</sup> It can bolster demand for carbon removal by identifying opportunities to procure such products — including agricultural commodities grown with climate-smart practices and concrete poured for transportation infrastructure and federal buildings. The market for construction materials that utilize captured carbon, for instance, could reach \$1 trillion and remove more than a gigaton of CO<sub>2</sub> annually by 2050, according to a recent University of Michigan study.<sup>5</sup> An early and robust commitment from the government to purchase these innovative products can help bend their cost curves, making them economical options for the broader private market.

4. Fact sheet: President Biden signs executive order catalyzing America's clean energy economy through Federal Sustainability. (2021, December 13). The White House. <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/08/fact-sheet-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/>
5. Sick, V., Stokes, G., & Mason, F. C. *CO<sub>2</sub> utilization and market size projection for CO<sub>2</sub>-treated construction materials*. (2022). *Frontiers in Climate*, 4. <https://doi.org/10.3389/fclim.2022.878756>



*Section Two*

# Designing a Just and Effective Procurement Policy

Federal procurement policies can and should be designed to align with the specific characteristics of the carbon removal sector and varying pathways. The policy discourse to date has primarily focused on how to bring down costs and drive investments in a diversified portfolio of carbon removal solutions.

For example, in a reverse auction, developers are incentivized to reduce their costs to compete for federal dollars. Promoting a variety of technologies and cost competitiveness among the industry is central to good carbon removal procurement policy and aligns with an essential function of many prior government purchasing initiatives: to gradually increase the supply and decrease the costs of innovative products that may initially require a “green premium.”

Alongside these traditional factors, policymakers must develop a clear vision for how public procurement policy can also drive rigorous, fit-for-purpose standards for high-accountability carbon removal across highly heterogeneous technologies and pathways. They must also embed justice and equity in the carbon removal market and dovetail with other federal policies (e.g., pay-for-practice payments or set-asides) that can complement direct procurement of long-duration and highly verifiable carbon removal.

Here, we propose 10 key building blocks of ambitious and effective public procurement policies. While many are important to the carbon removal sector in their own right, integrating these blocks into a comprehensive program can multiply and accelerate their impact. Congress should work hand in hand with DOE and USDA to include the below components in their respective federal purchasing programs.

## 1. Set ambitious annual targets.

A federal procurement policy should aim to procure a certain number of tons of carbon removal annually and incrementally increase its target in a transparent way. If in any year procurement targets are not fully met, any remaining tonnage can be rolled over into the following year’s target. This approach prioritizes a desired amount of high-quality carbon removal over costs per ton, which provides market certainty to developers and investors as the industry scales. To help control costs and ultimately bring them down over time, policymakers can implement a price ceiling based on the average price per ton among eligible applicants.

### GLOSSARY

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#### Green premium

The additional cost of purchasing climate-friendly products, compared to an average industry baseline.

## 2. Focus on innovation and fostering a diverse portfolio of long-duration carbon removal and storage solutions.

A publicly purchased portfolio should comprise a range of high-quality and durable carbon removal solutions with the potential to scale. The program should favor commercial-scale technologies with demonstrated ability to remove carbon from the atmosphere and safely and verifiably store it for more than 1,000 years.

Critically, the most cost-effective solutions today may not be the most cost-effective solutions in the future. This program shouldn't reject emerging technologies that are economically uncompetitive today but show promise to reduce costs as they scale. Rather, the overall portfolio should allocate its budget across different technologies, with no single technology representing a majority. Furthermore, a small portion of the portfolio should be dedicated to pilot-stage projects that have not yet reached commercial scale but demonstrate a credible plan to be cost effective.

## 3. Establish high standards for monitoring, reporting, and verification (MRV) certainty that guide eligibility for the public procurement market.

Along with the carbon removal technologies themselves, we need to build out MRV data infrastructure to validate the industry's impact on the climate. This involves ongoing measurement and continued monitoring of the amount of carbon removed from the atmosphere and adjacent environmental factors that affect ecosystems and public health.

A credible carbon removal industry can only exist with a universally recognized framework for evaluation and shared oversight body. That framework must set a high bar to protect against the degradation of a carbon removal credit market wherein both producers and buyers are incentivized to buy and sell credits at the lowest price possible. Ensuring that developers adhere to strong standards is the only way to build trust in the carbon removal industry and hold it accountable for its claims of climate and environmental impact.

Congress can and should continue to invest in efforts to improve MRV across different carbon removal pathways, including those storing carbon

underground and in materials, oceans, and soil. Ideally, government agencies would work with representatives from industry, academia, and the environmental nonprofit community in a coordinated effort to develop standards and participate in subsequent oversight, drawing on a broad pool of expertise that can be leveraged in a public-private partnership.

6. *DOE Selects Four National Laboratory-led Teams to Accelerate Commercialization of Carbon Dioxide Removal Technologies with \$15 Million in Funding.* (2023, May 17). U.S. Department of Energy. <https://www.energy.gov/technologytransitions/articles/doe-selects-four-national-laboratory-led-teams-accelerate>

## 4. Dedicate funding for complementary “pay-for-practice” cost-share payments for “climate-smart” agricultural and forestry practices.

Procurement of climate-smart agriculture and forestry management services necessitates different considerations compared to federal procurement of technology-based carbon removal. This is in large part because MRV currently lags in land-based or open systems. Therefore, procurement for climate-smart services should instead rely on a pay-for-practice model where producers are paid to implement and sustain carbon sequestration practices such as agroforestry, enhanced rock weathering, and biochar. This differs from the “pay-for-delivery” method of procurement that compensates carbon removal developers for each ton of carbon removed from the atmosphere.

This services procurement program should equitably engage producers in practice adoption and maintenance and continuously verify their activities to determine eligibility. As MRV practices improve, land-based pathways could become eligible, with DOE approval, for the pay-for-delivery program.<sup>6</sup>

## 5. Prohibit projects that increase local pollution or result in other adverse environmental or public health impacts.

Many carbon removal solutions present the opportunity to learn from and remediate past environmental injustices. The fossil fuel and agricultural industries have long legacies of polluting the communities in which they’ve operated, posing risks to local environmental and human health.

As the carbon removal industry begins to grow and projects are sited, the federal government should make sure each company operates in coordination with the communities and their best interests.

Procurement-eligible projects should be required to demonstrate that they will not generate local pollution burdens (to the soil, air, and water,

### GLOSSARY

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#### Open systems

Carbon removal in open systems accelerates natural processes to sequester carbon and has more variabilities and uncertainties outside of human control. Examples include soil carbon sequestration practices and ocean-based carbon removal.

for example), establish preemptive mitigation measures for potential harms, and set monitoring plans with transparent, public data-sharing protocols to ensure pollution avoidance.

## 6. Require life cycle assessments (LCAs) to ensure climate and environmental benefits.

Projects eligible for federal procurement must have a net-negative carbon impact, as measured by a cradle-to-grave LCA. In other words, we only want to subsidize projects that remove more carbon than they emit. This could mean exclusively using additional renewable energy to power direct air capture (DAC) facilities or in the case of biomass with carbon removal and storage (BiCRS) pathways, restricting the use of certain feedstocks that could ultimately increase climate pollution and cause other environmental damage without proper safeguards in place.<sup>7</sup>

## 7. Prohibit projects that use CO<sub>2</sub> in extraction or recovery of oil or gas.

The ultimate goal of scaling carbon removal to reach global net-zero targets is incompatible with the continued use of fossil fuels. We want to invest public resources to address climate pollution, not subsidize it. As such, no project that uses carbon to extract oil — a process known as enhanced oil recovery — should be eligible for a federal procurement program.

## 8. Require robust and tailored community engagement.

A federal procurement policy should set standards that maximize public understanding, consequential public input, and community participation in project development and deployment. Applicants should be required to present community engagement plans at the outset to be eligible for consideration; once greenlit, projects should demonstrate early community engagement and trust-building activities that continue throughout the life of the project to maintain eligibility.

Community engagement is a spectrum ranging from informing the public of project happenings to fully empowering communities by placing final decision-making power in their hands.<sup>8</sup> While community empowerment should be the goal of all community engagement

7. Denvir, A. *Biomass Can Fight Climate Change, but Only if You Do it Right*. (2024, January 16). World Resources Institute. <https://www.wri.org/insights/sustainable-biomass-carbon-removal>

8. *Spectrum of public participation*. (2019, November 5). Organizing Engagement. <https://organizingengagement.org/models/spectrum-of-public-participation/>

### GLOSSARY

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#### **Cradle-to-grave life cycle assessment**

A report that quantifies the total embodied emissions of a product or process over its lifetime, from the mining of its raw materials to its final disposal or recycle.

processes, different standards will be needed for existing versus new procured projects. Existing projects will likely already have most project decisions finalized at the point of application, and thus cannot fully empower communities through engagement processes, whereas new projects just getting off the ground can still meaningfully collaborate, problem-solve, and make decisions with communities.

Thus, when considering new carbon removal projects for procurement eligibility, the government should set engagement standards that involve partnership with communities (e.g., leaders, groups, advocates, officials) on project decisions, placing at least partial authority in community participants. Existing carbon removal projects could also involve community partnerships, depending on how far along they are commercially. At minimum, we recommend engagement standards that inform the public of project happenings and consult community stakeholders on their viewpoints, opinions, and preferences.

Underpinning all of these standards is a requirement that engagement processes be transparent, unbiased, and tailored to the specific characteristics of a community (e.g., language, internet accessibility, childcare, transportation, work hours, religious service hours). Engagement plans should use screening tools to identify vulnerable and historically marginalized community stakeholders and understand their existing burdens and barriers. Furthermore, social characterization, racial equity, and other assessments should be used to understand a community's history and dynamics, with acknowledgement reflected in engagement planning, project goals, and benefits delivery. Lastly, engagement plans must build local capacity for residents and groups to be able to engage, including through education- and information-sharing, financial support for disadvantaged groups, and other resource-sharing.

## 9. Give preference to projects that demonstrate direct community benefits.

There are many potential benefits associated with carbon removal approaches, including jobs, workforce development opportunities, improved air and water quality, improved soil health, expansion of renewable energy, and more. What is considered a benefit will vary place to place, and it's critical that engagement processes empower host communities to define for themselves the benefits delivered by procured carbon removal projects.



Policymakers should prioritize applications that demonstrate direct community benefits in the contract selection process. Applicants should explain how the proposed benefits of their project align with community priorities identified in early engagement activities, prioritizing benefits for disadvantaged stakeholder groups within communities. While workforce and economic benefits are meaningful, the federal government should place added value on applications that incorporate a wide range of benefits such as public health, environmental, social, and infrastructure.

The government should also prioritize applications that demonstrate concrete plans to enter into legally enforceable agreements (e.g., community benefit agreements, project labor agreements, community workforce agreements) with communities to ensure delivery of mutually aligned benefits. The standard for these agreements should include negotiation with a comprehensive range of community stakeholders (e.g., environmental justice, labor, religious, environmental and climate nonprofit, Tribal, academic, and local government communities), a wide range of benefits, clear metrics for measuring the success of benefits over time, acceptable mitigation and compensation measures for potential adverse project impacts, penalties for noncompliance, and successor clauses to ensure continuation of the community benefits agreement throughout the project's life.

9. *Remarks by President Biden on creating Good-Paying Union Jobs, investing in America, and building the clean energy future.* (2023, October 14). The White House. <https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/10/14/remarks-by-president-biden-on-creating-good-paying-union-jobs-investing-in-america-and-building-the-clean-energy-future/>
10. Jones, W, et al. *Direct Air Capture Workforce Development: Opportunities by Occupation.* (2023, October 12). Rhodium Group. <https://rhg.com/research/direct-air-capture-workforce-development/>

## 10. Give preference to projects that offer high-quality jobs.

As President Joe Biden has said repeatedly since taking office, “When I think climate, I think jobs.”<sup>9</sup> Our economy-wide clean energy transition presents a generational opportunity to reinvest in communities that have seen industrial facilities close and jobs disappear or move overseas. New industries, including carbon removal, now have the federal and private sector resources to reinvigorate these communities across the country, supporting high-quality, family-sustaining careers in the process.

A recent study from the Rhodium Group estimates that a single commercial-scale DAC facility will generate 1,215 annual average jobs over its five-year construction period and an additional 340 annual average jobs to operate the facility over its lifetime.<sup>10</sup> Each DAC project will need electricians, carpenters, plumbers and pipefitters, masons, roofers, and others in the construction trades to build the facility; metal workers to provide the needed materials; and engineers to provide

design support. When applicable, CDR project developers can and should engage with organized labor to draw on the expertise of its members to build their facilities and bolster the community workforce in which they operate. As an example, DOE requires applicants for the Regional Direct Air Capture Hubs program to engage with local labor groups as part of its mandatory community benefits plan. A federal procurement program can go one step further and prioritize projects that utilize union labor throughout the value chain of eligible projects.

Scaling land-based carbon removal will require growing the workforce that provides technical assistance to producers interested in transitioning to or sustaining climate-smart practices. This workforce development can bring a diversity of long-term employment opportunities to rural communities and ensure that technical assistance staff understands the community needs.

Once the federal government begins purchasing removals, it will need to clarify how it accounts for those removals on a national and global scale. To date, questions around cross-border transactions and credit trading in the voluntary market have introduced the risk of “double counting,” adding a layer of complexity to measuring the impact of the carbon removal industry. To alleviate these challenges, policymakers can limit their purchases to tons removed within US borders. As the purchaser, the US government should claim ownership for the ton of carbon removed in service of its net-zero commitment under the Paris Agreement, rather than the carbon removal company. Finally, the goal of any such program should be to grow and build trust in the carbon removal industry, not to establish the federal government as a de facto broker for commoditized removal credits, which would open the door for further risks of double counting. Therefore, policymakers should aim to build a system in which publicly purchased credits are “retired” once they are counted, rather than traded as commodities.

*Section Three*

# Building on Existing Efforts

While this procurement framework would represent the most ambitious demand incentive for carbon removal to date, we’re not starting from scratch. DOE and USDA have programs to accelerate carbon removal deployment and can leverage our recommendations to ensure the industry scales effectively and responsibly.

## A program at DOE

In September 2023, DOE announced the first-ever procurement program for carbon removal. As authorized by the Infrastructure Investment and Jobs Act (IIJA) and directed by Congress in its fiscal year 2023 budget, the Office of Fossil Energy and Carbon Management established a \$35 million Carbon Dioxide Removal Purchase Pilot Prize to provide offtake agreements for a suite of carbon removal technologies, including DAC with storage, BiCRS, enhanced weathering and mineralization, and planned or managed carbon sinks. Eligible projects will be evaluated on a range of criteria including:

<b>CARBON REMOVAL OFFERING</b> Deliver an actionable plan to remove at least 1,000 tons of CO <sub>2</sub> per year	<b>ADDITIONALITY</b> Demonstrate positive climate impact (i.e., net removal of CO <sub>2</sub> )
<b>INDEPENDENTLY VERIFIED REMOVAL</b> Substantiate removals based on a DOE-approved MRV methodology	<b>SCALABILITY</b> Demonstrate a feasible plan to reach gigaton-scale removal
<b>SOCIETAL CONSIDERATIONS AND IMPACTS</b> Engage with local community and labor groups to advance environmental, public health, social justice, and workforce benefits	<b>SECURE STORAGE</b> Ensure that CO <sub>2</sub> is safely and permanently removed from the atmosphere

## GLOSSARY

### Offtake agreement

A contract in which a buyer agrees to purchase a specified amount of upcoming goods or services from a seller, ahead of its production. This provides certainty for the seller and their investors, making it easier to obtain the financing necessary to scale operations and deliver on the pre-specified amount of goods or services. In today’s voluntary market for carbon removal, private buyers have contracted with a number of startups to purchase a set of removals over a specific time period.

Implemented well, this program could help shape how this nascent industry develops and begin to lay groundwork for a robust, regulated market with a reliable demand signal. Based on its initial program design and adjacent efforts to establish principles guiding community engagement, environmental justice, workforce development, emergency response plans, and other necessary pillars of an equitable and just clean energy transition, DOE has demonstrated its commitment to helping build a triple bottom line carbon removal industry that benefits companies and their workers, the communities in which they operate, and the environment at large.<sup>11</sup>

But the work is not done. Congress needs to continue to invest in the physical and data infrastructure (i.e., MRV standards and oversight) to ensure carbon removal developers can meet these purchasing requirements. For MRV standards, DOE should leverage its existing work at the national labs and continue to formally partner with the nonprofit and academic communities on the development of standards that inform offtake agreements.<sup>12</sup> Relative to government agencies, civil society groups have access to more financial and personnel resources, can respond more quickly to evolving science, and can more readily coordinate with foreign bodies (e.g., the European Union and United Nations) to develop internationally recognized standards for carbon removal. Formalizing a public-private effort to establish these scientifically rigorous standards could be an effective way to improve MRV and build trust in a carbon removal market that distinguishes it from the current voluntary carbon market and its questionable climate impact.

11. *U.S. Department of Energy Announces its Intent to Launch a Responsible Carbon Management Initiative.* (2023, August 11). U.S. Department of Energy. <https://www.energy.gov/fecm/articles/us-department-energy-announces-its-intent-launch-responsible-carbon-management>
12. *DOE Selects Four National Laboratory-led Teams to Accelerate Commercialization of Carbon Dioxide Removal Technologies with \$15 Million in Funding.* (2023, May 17). U.S. Department of Energy. <https://www.energy.gov/technologytransitions/articles/doe-selects-four-national-laboratory-led-teams-accelerate>

## A program at USDA

Current USDA programs, notably the Environmental Quality Incentives Program (EQIP), the Conservation Stewardship Program, and the Conservation Reserve Program pay producers “pay-for-practice” incentives to implement conservation practices. These programs, however, are currently limited in scope, reach, and coordination across all of USDA. They do not support producers for sustaining soil carbon sequestration practices in the long term, which is crucial to catalyzing land-based carbon removal and ensuring durable carbon sequestration. Extending these programs to support long-term implementation of these practices, by paying producers bonuses for years of deployment and number of practices implemented, could help ensure carbon is sequestered and maintained in soils.

Recently, there is political will to change these limitations: Through the Commodity Credit Corporation (CCC), USDA has broad authorization to support domestic agricultural commodity markets and carry out conservation and environmental programs. USDA has allocated \$3 billion in CCC money to pilot market expansion, technical and financial assistance, and MRV for climate-smart commodities

through the Partnerships for Climate-Smart Commodities program. In addition, USDA is focused on establishing a Soil Carbon Monitoring Network, which would improve MRV of soil carbon and provide insight on how specific management practices affect soil carbon sequestration. With these pieces in place, USDA can further leverage its purchasing power in a way that integrates with and bolsters these efforts to support producers and activate agricultural lands as carbon sinks.

## Embedding Carbon Removal into Broader Procurement Practices

No single policy on its own will put us on a path to gigaton-scale carbon removal. Renewable energy technologies like wind and solar benefitted from a combination of sustained policies and programs that worked together over decades to drive down costs and increase deployment. Similarly, carbon removal needs a package of federal policies that are tailored to the heterogeneous portfolio of carbon removal technologies and pathways. Advancing a range of enabling policies can bolster our vision for a whole-of-government approach to high-quality carbon removal procurement. In addition to a dedicated program with a mission to procure carbon removal and storage as a service, the federal government should:

### 1. Leverage purchasing power across federal agencies to bolster demand for carbon-utilizing products.

An emerging set of technologies, mainly in pilot or small commercial phases, use CO<sub>2</sub> captured from ambient air as a feedstock to make a range of products commonly procured by the government. One of the most ubiquitous and promising examples is concrete.<sup>13,14</sup> Carbon mineralization methods in which CO<sub>2</sub> is captured or removed and injected into fresh concrete represent a pathway for that carbon to be permanently locked away and can actually help improve the concrete's strength. At scale, these solutions can one day lead to carbon-negative concrete, the point at which more emissions are captured and stored in the material than are generated in its production and use.<sup>15</sup>

While these processes are not yet economically competitive with less sustainable incumbents, a number of new policies can help change that. For instance, the Biden administration recently announced a \$100 million Carbon Utilization Procurement Grants program to subsidize state and local government procurement of carbon-utilizing products.<sup>16</sup>

13. Berghout, N., et al. *Putting CO<sub>2</sub> to Use: Creating Value From Emissions*. (2019). International Energy Agency. [https://iea.blob.core.windows.net/assets/50652405-26db-4c41-82dc-c23657893059/Putting\\_CO2\\_to\\_Use.pdf](https://iea.blob.core.windows.net/assets/50652405-26db-4c41-82dc-c23657893059/Putting_CO2_to_Use.pdf)
14. Hillsdon, M. *Concrete progress on constructing buildings to soak up carbon*. (2023, October 11). Reuters. <https://www.reuters.com/sustainability/climate-energy/concrete-progress-constructing-buildings-soak-up-carbon-2023-10-11/>
15. Talati, S., et al. *Paving the Way for Low-Carbon Concrete*. (2020, December). Carbon180. <https://static1.squarespace.com/static/5b9362d89d5abb8c51d474f8/t/5fd95907de113c3cc0f144af/1608079634052/Paving+the+Way+for+Low+Carbon+Concrete>
16. Biden-Harris Administration Announces \$100 Million to Transform Climate Pollution into Sustainable Products. (2023, July 24). U.S. Department of Energy. <https://www.energy.gov/articles/biden-harris-administration-announces-100-million-transform-climate-pollution-sustainable>



Additionally, as the single largest customer of concrete, the federal government can send a powerful market signal to carbon removal developers and investors by committing to purchase products that incorporate captured or removed carbon.<sup>17</sup> Through its Federal Buy Clean Initiative, the Biden administration is prioritizing the procurement of low-carbon construction materials, recently announcing a \$2 billion investment across 150 projects in 39 states.<sup>18</sup> Buy Clean requires federally funded infrastructure projects to use materials that meet a certain embodied carbon threshold, relative to industry averages, and in doing so encourages producers of common construction materials like concrete to lower their emissions. Congress can build on this momentum by adopting a federal program that incentivizes the use of increasingly cleaner materials, effectively raising the bar for what constitutes “clean.”

Several states have initiated efforts to implement such a program. New York and New Jersey have recently signed into law similar versions of a bill, titled the Low Embodied Carbon Concrete Leadership Act (LECCLA), that functionally subsidizes up to 5 percent of the cost of low-carbon concrete for use in state infrastructure projects. In New Jersey, producers can take advantage of additional financial incentives of up to 3 percent to incorporate captured or removed carbon in their concrete mix, making their products more economically competitive while lowering their emissions at the same time. A federal version of LECCLA would similarly grow market demand for concrete that utilizes carbon in its mix and necessarily accelerate the deployment of carbon removal technologies. While Buy Clean pushes up the “floor” of what constitutes “clean,” LECCLA raises the “ceiling” by rewarding the highest-performing producers and spurring continued innovation in both the concrete and carbon removal industries.

## 2. Expand existing USDA food and commodity purchasing programs to procure more products grown with carbon-sequestering practices.

The federal government spent \$9.1 billion on direct food procurement in fiscal year 2021, with USDA alone accounting for half of all purchases.<sup>19</sup> This figure does not include the additional \$27 billion the agency reimburses primarily to school districts for providing meals to children in need through the National School Lunch Program, among other direct and indirect food purchasing programs.<sup>20</sup>

17. Milko, J. Smarter Procurement: Federal Construction Spending is a Huge Opportunity to Advance National Goals. (2021, February 1). Third Way. <https://www.thirdway.org/memo/smarter-procurement-federal-construction-spending-is-a-huge-opportunity-to-advance-national-goals>
18. Biden-Harris Administration announces \$2 billion for cleaner construction projects to tackle the climate crisis, spur American innovation, and create good-paying jobs as part of Investing in America agenda. (2023, November 6). GSA. <https://www.gsa.gov/about-us/newsroom/news-releases/bidenharris-administration-announces-2-billion-for-cleaner-construction-projects-to-tackle-the-climate-crisis-spur-american-innovation-and-create-good-paying-jobs-as-part-of-investing-in-america-agenda-11062023>
19. Richardson, S., Waterman, C. Measuring and Modeling Climate, Environmental, and Social Impacts of Federal Food Procurement. (2023, November). Federal Good Food Purchasing Coalition. <https://www.fedgoodfoodpurchasing.org/resources/impact-analysis-full-report>
20. Jones, J. W., Toossi, S., Hodges, L. The Food and Nutrition Assistance Landscape: Fiscal Year 2021 Annual Report. (2021). U.S. Department of Agriculture & Economic Research Service. [https://www.ers.usda.gov/webdocs/publications/104146/eib-237\\_summary.pdf?v=6381.7](https://www.ers.usda.gov/webdocs/publications/104146/eib-237_summary.pdf?v=6381.7); USDA programs support procurement of agricultural commodities either through directly procuring and pricing agriculture and forestry products (e.g. BioPreferred, Commodity Procurement Program); providing grants and loans to organizations to procure crops (e.g. Local Foods for Schools Cooperative Agreement Program), and advance market development (Local Agricultural Marketing Program (LAMP) and the Value-Added Producer Grants (VAPG)).

USDA can leverage its substantial procurement power to encourage food producers to adopt sustainable practices that effectively remove carbon from the atmosphere. By purchasing climate-smart commodities at a “green premium” and supporting robust soil carbon MRV as a public good, USDA could provide an important “demand pull” for climate-smart commodities, incentivizing producers to implement carbon-sequestering practices.

To rapidly scale carbon removal in agriculture and forestry, USDA can offer additional premiums for crops and products for which growers employ more than two practices that increase soil carbon sequestration, develop public-private partnerships to increase the adoption of these practices in the broader agriculture and forestry markets, or set ambitious annual targets to increase adoption.

*Section Four*

# The Future of Federal Carbon Removal Policy

# Near-term Opportunities to Advance Carbon Removal

Growing the carbon removal industry to reach gigaton-plus scale on an annual basis requires a tiered approach to government investment, including funding for procurement as well as continued RD&D. A growing number of policymakers have introduced legislation in recognition of these complementary needs.

## Federal Carbon Dioxide Removal Leadership Act (CDRLA)

Builds on the existing Carbon Dioxide Removal Purchase Pilot Prize and requires DOE to purchase an increasing amount of carbon removal annually, ultimately more than 10 million tons in 2035 and each year thereafter.

## Carbon Removal and Emissions Storage Technologies (CREST) Act

This bipartisan legislation includes a more modest proposal, authorizing \$230 million over five years for a procurement pilot program, in addition to expanding carbon removal research and development (R&D).

## Carbon Dioxide Removal Research and Development (CDR R&D) Act

Likewise authorizes new research and development funding, directing nine federal agencies to advance a diverse suite of carbon removal pathways, including nascent ocean-based removal methods.

While ocean-based removal methods could prove an important component of our overall carbon removal portfolio, we need more research to better understand and quantify their promise. Therefore, at this time, ocean-based pathways are best supported through RD&D funding, rather than procurement.

In addition to funding continued research development for new potential pathways, the government can implement cost-sharing programs across several agencies (e.g., DOE and USDA, among others) to support a diverse suite of carbon removal technologies at the pilot stage. This holistic approach to government support throughout the innovation cycle — from early R&D support to final offtake — creates a glidepath for new technologies to reach commercial viability.

# Exploring Long-term Opportunities to Advance Carbon Removal

Looking beyond the immediate policy landscape, a federal procurement program could eventually enable shifting the costs of carbon removal from taxpayers to the polluters themselves. A robust procurement policy makes trusted carbon removal more readily available, clearing a path for the federal government to one day compel private industrial polluters to pay for their emissions as they progress toward decarbonization.

By establishing high standards across MRV, equity, and labor, federal procurement can provide a necessary foundation in defining a “product profile” for any long-duration carbon removal used to neutralize ongoing emissions in the economy. In this context, the standard for carbon removal must tell us what it means to permanently “take back” a ton of fossil carbon emissions that was emitted into the atmosphere.

With this foundation in place, federal policymakers could turn their attention to a federal polluter-pays mandate requiring large industrial emitters to purchase high-quality carbon removal to neutralize their residual emissions. In parts of the economy like heavy industry, only high-quality carbon removals can substitute for direct emissions cuts by neutralizing remaining emissions while old technologies are being phased out and new zero-emissions technologies are built. Such a mandate would serve as an effective tax on continuing to emit. As such, it would incentivize polluters to eliminate their direct emissions to the absolute extent possible, and as soon as possible, as this is likely to be easier and cheaper than purchasing high-quality carbon removals for remaining emissions year over year. Such a policy would have several benefits, including but not limited to shifting a significant share of the burden of funding carbon removal at scale from taxpayers alone to polluters.

The goal of such a policy should be to drive residual emissions to zero over time. This requires governments to advance a package of economy-wide policies to chart a path to full decarbonization. Policymakers will need to define, quantify, and reassess residual emissions over time as part of setting emissions reductions targets and as climate technologies evolve. Those carbon removal

*Establishing high standards across MRV, equity, and labor, federal procurement can provide a necessary foundation in defining a “product profile” for any long-duration carbon removal used to neutralize ongoing emissions in the economy.*

purchases that neutralize residual emissions should be phased out quickly as low-carbon technologies advance. They exist to incentivize decarbonization and neutralize what should become a slimmer and slimmer slice of residual emissions — not to allow heavy emitters to keep putting more CO<sub>2</sub> into the atmosphere.<sup>21</sup>

Importantly, heavy industrial sectors such as cement and steel are energy-intensive industries that operate on thin profit margins and face significant exposure to global competition. Any federal policy efforts aimed at mandating purchases of high-quality carbon removal to address residual emissions must be designed in a way that preserves the competitiveness of domestic manufacturers and avoids leakage, wherein industrial production simply moves abroad, shifting emissions and/or jobs abroad, too. Similarly, state level policies — such as California’s Carbon Dioxide Removal Market Development Act or S.B. 308 — should be careful not to create a regulatory environment that pushes companies to relocate to states with weaker environmental and labor standards, displacing high-quality jobs in the process. Establishing a shared federal policy alleviates this risk of economic and labor leakage among states.

The ideas in this section represent a long-term vision for how procurement policy could evolve as the carbon removal sector matures and other industries decarbonize. And should policymakers one day decide to enact a polluter-pays regulatory framework, we’ll need a robust and trusted supply of carbon removal, which federal procurement supports in the near term.

21. Khan, A., Stashwick, S. On the road to net negative, carbon removal can help speed decarbonization. (2024, January 9). Carbon180. <https://carbon180.medium.com/on-the-road-to-net-negative-carbon-removal-can-help-speed-decarbonization-c2ccc2400d19>



*Section Five*

# Conclusion



# Advancing well-designed demand-side policies for the carbon removal sector will not only fill a critical policy gap but also complement existing policy supports put in place by Congress.

22. Mannion, P., Parry, E., Patel, M., Ringvold, E., & Scott, J. Carbon removals: How to scale a new gigaton industry. (2023, December 4). McKinsey & Company. <https://www.mckinsey.com/capabilities/sustainability/our-insights/carbon-removals-how-to-scale-a-new-gigaton-industry>

Indeed, we should understand public procurement as only one, albeit powerful, lever within a suite of policy tools federal policymakers have at their disposal to support carbon removal technologies at different stages of technological readiness. In essence, the federal government can both set high standards for the nascent carbon removal sector and help move the supply of quality carbon removal through a range of investments and incentives for research, development, demonstration, and deployment (RDD&D) of long-duration solutions.

Public procurement policies are most powerful when coupled with other types of RDD&D incentives and investments. The 45Q tax credit, which now offers \$180 per ton of carbon removed from ambient air and stored permanently underground, for example, is even more valuable with a long-term public market for durable carbon removal. Projects funded through the Regional DAC Hubs program, which recently distributed \$1.2 billion to over 20 projects at various stages of development, would similarly benefit from federal investments in carbon removal procurement.

Meanwhile, the Partnerships for Climate-Smart Commodities program is already investing \$3.1 billion for 141 pilot projects to develop innovative MRV methods and expand markets for climate-smart commodities, potentially laying the groundwork for scaling land-based carbon removal.

The government has begun investing in a carbon removal market that could be worth \$1.2 trillion by 2050, according to some estimates. If we want to reach our climate goals and benefit US companies and workers in the process, however, we need additional resources and long-term commitment to building a public procurement market for carbon removal.<sup>22</sup>

To learn more, visit [Carbon180.org](https://Carbon180.org).