

 DATA FOR *PROGRESS*



# Charting a Path to Just Direct Air Capture Hubs

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By Celina Scott-Buechler and Simone H. Stewart, Ph.D.

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## Introduction

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Last month, significant portions of the Democrats' climate agenda made their way to the White House and were signed into law after decades of stagnation on domestic climate efforts. The Inflation Reduction Act (IRA) invests a landmark \$369 billion to scale clean energy production, create new clean energy technologies and jobs in America, and reduce pollution in overburdened communities. As many have pointed out, the IRA is nowhere near a perfect bill. But it does make significant strides toward decarbonizing some of the nation's most emissions-intensive sectors: energy production, transportation, and heating and cooling. As agencies begin to direct federal dollars toward Congress' chosen climate efforts, however, another equally pressing threat must be addressed: environmental injustice. As environmental justice advocates have made clear, the U.S. cannot afford to tackle the climate crisis without also tackling the country's long-standing legacy of racist pollution, siting injustices, and undelivered promises to workers and marginalized communities. Rather, the recent influx of funding for climate via both the IRA and the Infrastructure Investment and Jobs Act (IIJA) passed late last year presents an opportunity to ensure even the most vulnerable among us is ushered into a future where climate solutions improve the state of our planet as well as the prosperity and health of our communities.

The bill is projected to get the U.S. back on track to meet its international climate commitments. Even so, after years of political inaction on the climate crisis, decarbonization alone is no longer enough to keep global warming below 1.5 degrees Celsius. Meeting this goal, as laid out in the international Paris Climate Agreement, increasingly requires the use of carbon dioxide removal (CDR): taking past emissions out of the atmosphere and storing them indefinitely. To be clear, CDR is no replacement for aggressive decarbonization — we still have to focus the majority of our efforts on rapidly deploying renewable energy, using less carbon-intensive building materials, shrinking the footprint of our food systems, and rapidly phasing out fossil fuels. But we'll also need to work to clean up legacy carbon pollution already in the atmosphere, and our ways of doing so are still in the early stages of development and deployment. This means that government support will be critical to the development of cost-effective CDR, and government leadership will be critical to ensuring that CDR is a tool to help rectify carbon pollution injustices of the past.

One CDR approach in particular has gained significant attention in Congress: direct air capture (DAC), which filters carbon dioxide out of the air using large fans. The IIJA demonstrated just how interested Congress is in advancing this technology, allocating \$3.5 billion to develop DAC in "regional hubs" across the country. Not only is this the largest government investment in DAC in the world, it's also the largest for any kind of CDR. For an underdeveloped climate tool, this is a big deal.

But how the Department of Energy (DOE) chooses to roll out these DAC hubs, and which projects it chooses to fund, may be more than just a question of how much or little the technology can be advanced with government funding; it may well be a question of whether the public, and especially local communities, will accept CDR projects at all. With only four large-scale DAC facilities in existence today in countries like Iceland and Switzerland, where climate and clean energy technologies are already being deployed at scale, most of the world has very little experience with DAC. The world will be watching as the U.S. adds four more, doubling the global total. With additional incentives in the IRA, DAC is likely to expand beyond these four additional projects, so it will be important to watch what precedent DOE sets with the hubs.

## The DAC Hub Model

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What exactly are DAC hubs and what will they mean for the communities located near potential project sites? And how should DOE prioritize projects to ensure they benefit communities, avoid perpetuating systemic environmental injustices, and contribute to tangible and sustained climate progress?

First, we must consider the hub itself. The IIJA requires that each of the four regional hubs has the capacity to remove at least 1 million metric tons of CO<sub>2</sub> per year for long-term storage and/or carbon reuse (also called “utilization”). This means that the hubs would incorporate the direct air capture technologies themselves along with transportation and sequestration infrastructure. The IIJA further specifies that hub projects should be selected to maximize the following: proximity to existing or recently retired carbon-intensive industry, diversity of geographic distribution of the four hubs, potential for carbon sequestration and/or utilization, location within economically distressed communities presently or historically reliant on fossil fuel employment, scalability of the operation, and long-term job creation. In a win for labor, Congress specified that hubs should work with DOE-sponsored training programs to provide new employment opportunities for fenceline workers — those who have traditionally relied on industries like coal, oil, gas, steel, and mining for employment. This could help ensure that local workers are able to access employment opportunities in the hubs, helping to address the trend in infrastructure development whereby communities who live near the project site aren’t able to benefit economically.

How and where exactly DAC is established, however, is left up to DOE. There are several opportunities that DAC might offer communities. Each hub will cost at least one-quarter of the \$3.5 billion allocated, and is more likely than not going to require additional capital investments that bring each project into the ballpark of \$1 billion apiece. The most obvious benefit, then, is an enormous tax base that a community looking for economic invigoration might invite. DAC is also expected to offer jobs: Rhodium Group estimates that upward of 250 new, permanent jobs would be created per facility, and that many more temporary jobs would be created in the construction phase. Further appealing to communities that have traditionally relied on fossil fuel employment, the process of putting carbon back into the ground relies on many of the same skill sets that are required to take it out. A DAC hub could therefore provide employment bases in the parts of the country where the fossil fuel workforce is shrinking as the U.S. turns to more renewable energy sources.



Climeworks direct air capture facility. Photo credit: Climeworks.

## Getting DAC Hubs Right

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Although DAC has the potential to advance a just transition to economic opportunity based on clean industry, this vision may not be realized. DAC is fundamentally a waste management solution, cleaning up carbon dioxide emissions just as municipal waste management cleans up household trash. It's well known that pollutive industries are responsible for the bulk of the carbon emissions in the atmosphere. However, company executives who profit most from carbon pollution haven't historically borne the burden of cleaning up their mess. If this trend continues, at least some of these hubs are more likely to be sited in the communities that have contributed least to the climate crisis: economically disenfranchised communities, rural communities, blue-collar communities, and communities of color.

Several factors could stand in the way of communities meaningfully benefiting from the development of DAC hubs. Namely, while DAC removes carbon dioxide pollution from the atmosphere, it does not address the emissions most directly harmful to human health, which disproportionately cloud economically disadvantaged and blue-collar communities, as well as communities of color. While DAC itself does not produce emissions, its energy source does if it is operated by fossil fuels. Climeworks, one of the leading DAC companies, has vowed not to use fossil fuels to power its facilities, but other companies have not made such promises. Fossil fuel production and use is one of the leading sources of the emissions that cause preterm births, asthma, heart disease, and other serious ailments.

Another major concern is that communities may not be given a seat at the table. The U.S. has a long history of siting projects in marginalized communities without their free, prior, and informed consent. While extractive industries like fossil fuels and mining have the worst track record, even climate-positive industries like renewable energy production and transmission haven't always been fair in where and how they site their projects.

If the Biden Administration's DOE is sincere about establishing DAC as a tool in the climate justice solutions arsenal, there are several criteria the agency should prioritize beyond the statutory requirements it plans to use to evaluate DAC hub proposals. Congress also enabled DOE to create "additional criteria" to evaluate DAC hubs. To this end, DOE should use the agency afforded it by Congress to:

- **NOT PERPETUATE ENVIRONMENTAL INJUSTICES.** Communities of color and low-income communities have borne the brunt of systemic environmental harms: disproportionately high levels of air and water pollution, toxic waste dumped in their backyards, fossil fuel projects established without their consent, and the severe health effects and lost economic activity associated with these actions. As the U.S. has worked to clean up carbon emissions and other forms of pollution, the communities that are suffering the most are not typically the ones to see the benefits. Too often, the very communities that have endured legacies of pollution are now being forced to shoulder the "solutions" to environmental harms without reaping any of the benefits themselves. If DAC is to contribute to climate solution-building then it must, at the very least, avoid replicating these harms, and potentially help build a new model for climate infrastructure siting. This means:
  - a. Following requirements for free, prior, and informed consent in site permitting in environmental justice and Indigenous communities, as defined by the EPA's online tool, EJScreen, and the Climate and Economic Justice Screening Tool;

- b. Rejecting any proposals outright that do not have comprehensive plans for community engagement and mitigating unforeseen impacts on people and their environment, especially if sited in or near EJ communities; and
  - c. Not assuming that low-income communities will necessarily be interested in hosting a DAC hub for the jobs and economic opportunities it may create because of persistent cumulative pollution impacts and related negative health consequences.
- **NOT PERPETUATE FOSSIL FUEL USE.** Already, many climate and environmental justice organizations and communities fear that CDR generally, and DAC specifically, are ploys by oil and gas companies to advance their bottom lines and continue freely polluting without making meaningful changes to their fossil fuel-based profit models. And there’s good reason: Oil and gas companies have used the idea of offsets to undergird false “net-zero” promises that buck the clear need to transition society rapidly off fossil fuel use. The first government procurement efforts in this space must demonstrate the U.S. government’s commitment to shifting away from fossil fuels. This means:
    - a. Committing to only using zero-carbon energy sources for DAC hubs. Prominent DAC companies like Climeworks have demonstrated that high-quality removals can be powered by renewable energy sources like geothermal, wind, and solar power;
    - b. Deprioritizing projects that provide or sell CO<sub>2</sub> for enhanced oil recovery, which uses captured CO<sub>2</sub> to extract more oil and gas from wells. Although the process could theoretically be net-negative under some circumstances, the perpetuation of oil and gas infrastructure is inimical to the urgent need to ramp down society’s reliance on fossil fuels — both for climate and environmental justice reasons; and
    - c. Employing a multi-round development track that allows promising new tech and smaller companies to join the hubs when ready. Doing so would advance technology diversification, creating room for a range of strategies, supply chains, and more diverse leadership in the industry. It would also ensure that fossil fuel companies cannot dominate the selection process or disproportionately benefit from hub participation. Further, DOE should work to ensure that companies with clear and robust decarbonization goals in line with the Paris Agreement are prioritized throughout application review, helping ensure taxpayer dollars go only to those companies committed to the needed energy transition.

Instead, here’s what DAC hubs **should** do:

- **ALIGN WITH THE PRESIDENT’S JUSTICE40 INITIATIVE.** This initiative ensures 40 percent of federal investments in climate and energy flow into disadvantaged communities, and was designed to address long-standing issues around the disenfranchisement and environmental injustices that often plague marginalized communities. CDR programs across agencies fall under the initiative, including the Regional Direct Air Capture Hubs, under the DOE’s Office of Fossil Energy and Carbon Management. Therefore, the DAC hubs should incorporate the following Justice40 requirements and recommendations:

- a. Consulting with stakeholders and local, state, and Tribal governments, alongside communities, to assess what constitute “benefits” of the hubs;
  - b. Employing tools like EJScreen and the Climate and Economic Justice Screening Tool to help identify communities that fall under the initiative’s definition of disadvantaged; and
  - c. Developing or following equity-centered program models to set goals, identify metrics, and track progress to then publicly report.
- **PRIORITIZE COMMUNITY NEEDS.** Stakeholder engagement should take place at the beginning of the siting discussion process, especially if the proposed location is near Tribal lands or other disadvantaged communities. Community considerations should be a part of the siting and decision-making process, and concerns should be uplifted, including the right of refusal. Agreements made between communities and project developers should be well-defined and include specific benefits for the community, including job training and leadership development opportunities for frontline community workers. Examples of this could look like:
    - a. Community benefit agreements (CBA) ensuring clear communication between communities and developers;
    - b. Project labor agreements (PLA), which enable collective bargaining with trade unions, labor unions, and other worker cooperatives;
    - c. Developing pathways toward cooperative and/or community ownership of the DAC hubs that allow communities to benefit from the carbon they remove; and
    - d. Listening sessions, public education and engagement campaigns, and community advisory committees.
  - **VALUE QUALITY OVER EXPEDIENCY.** Recognize that the hubs have been and will continue to be highly scrutinized by the general public, local communities, and climate and environmental justice organizations, as technologies are when they are first rolled out. If they are not deployed responsibly, equitably, and with tremendous accountability, public outcry and opposition could be cemented for decades, making any future work toward CDR difficult, if not impossible. To that end, these hubs need to represent the best of what DAC can and must be:
    - a. Powered by non-fossil energy, capitalizing on ample national opportunities in wind, solar, geothermal, and nuclear power;
    - b. Paired with high-quality and public monitoring at all stages of capture, transport, and storage. While the risks of leakage are very low, any new technology should be rigorously and regularly checked to ensure it is operating smoothly. In the unlikely event that something does go wrong, contingency plans must be in place in order to identify the problem and address it quickly and safely;

- c. Equipped with robust and transparent reporting mechanisms that track the amount of carbon being captured and communicate that to the public; and
- d. Linked with permanent geologic storage of captured carbon dioxide. While removing CO<sub>2</sub> from the atmosphere and using it to replace emissions-intensive products like fuels is useful to avoid emissions, DAC hubs must emphasize emissions removal to have the greatest contribution for climate solution-building. Where possible, DOE should emphasize mineralization storage pathways, which permanently store CO<sub>2</sub> as rock underground or as long-lived building materials like concrete.

- **INSPIRE CONGRESS TO CLARIFY THE ROLE DAC, AND BY EXTENSION CDR, SHOULD PLAY IN CLIMATE ACTION.** While CDR opportunities, including DAC, are increasingly vital climate solutions, they cannot be allowed to detract from the urgent need for decarbonization. The science is clear: CDR alone cannot stave off the worst effects of the climate crisis. Indeed, the role CDR can and should play is relatively small compared with decarbonization efforts like expanding renewable energy, improving building efficiency, and transitioning to cleaner building materials. Rather than pitting CDR against decarbonization, Congress should separate its emissions reduction goals from its emissions removal goals, assigning clear definitions and timelines for deployment of each.

## Conclusion

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With the passage of historic legislation like the IIJA and IRA, and with the 1.5 degree Celsius temperature limits speeding ever closer, we are at a critical point for climate where every decision we are currently making will play an irrevocable role in determining our future as a planet and society. At the center of this decision-making is an opportunity to correct historical precedents rooted in injustice against marginalized and disenfranchised communities.

The carbon dioxide removal sector is growing rapidly, thanks in part to the federal government's leadership, and will continue to play an important role in achieving national net-zero goals. How CDR, especially infrastructure-based solutions like DAC, is implemented on the project level will largely define the sector's success as a tool for climate action. Congress' direct air capture hubs present an unprecedented opportunity to clean up the atmosphere of centuries of historical emissions, as well as shift the paradigm for infrastructure siting and development. As DOE considers project applications for DAC hub funding, it is crucial that the agency center equitable development of new infrastructure in ways that rewrite the role of the fossil fuel industry and, most importantly, meet the needs of communities most vulnerable to the climate crisis. This is an opportunity for DOE to demonstrate to skeptics that DAC is not a "false solution" that perpetuates environmental injustices and fossil fuel use; rather it is a vital tool for meeting our climate goals as a country and a society. We urge the agency to rise to the challenge, and will be there to help every step of the way.

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