



CARBON CAPTURE COALITION

To: Office of Clean Energy Demonstrations, US Department of Energy

From: Carbon Capture Coalition

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Re: DE-FOA-0003333

Executive Summary

Members of the Carbon Capture Coalition (the Coalition) have prepared these comments in response to the Office of Clean Energy Demonstrations' DE-FOA-0003333-RFI.

The [Carbon Capture Coalition](#) is a nonpartisan collaboration of more than 100 companies, unions, conservation and environmental policy organizations, building federal policy support to enable economywide, commercial-scale deployment of carbon management technologies. This includes carbon capture, removal, transport, reuse, and storage from industrial facilities, power plants, and ambient air. Coalition members recognize that economywide adoption of carbon management technologies is critical to achieving net zero emissions to meet midcentury climate goals, strengthening and decarbonizing domestic energy, industrial production and manufacturing, and retaining and expanding a high-wage jobs base. Successful commercial deployment of these technologies requires prioritizing meaningful engagement and consultation with local communities and associated workforce development.

Carbon capture, direct air capture (DAC), carbon utilization, transport and storage projects and associated infrastructure must be deployed quickly to reach a critical mass by 2030. Doing so will establish new benchmarks in technical maturity, ease of construction, affordability, and effective and timely permitting processes. Meeting these benchmarks will enable the industrial, power, and CO₂ transport and storage sectors to make the robust carbon capture investments necessary for achieving net-zero emissions economywide by 2050.

The Coalition recognizes that while a full suite of emissions reduction and carbon dioxide removal strategies must be deployed to meet midcentury climate targets, scaling available direct air capture technologies is increasingly recognized as a central

component to both offsetting emissions in the heaviest emitting sectors, such as shipping and aviation, and post-2050, reducing the concentration of CO₂ remaining in the atmosphere. Furthermore, as commercial deployment of carbon management technologies, including DAC, matures, so does the enormous potential to spur regional economic growth, improve air quality, and create high-paying job opportunities for communities nationwide.

The Department of Energy has a critical role to play in putting innovative industries like carbon management technologies on a pathway to meet 2030 commercialization targets by enabling pilot scale to commercial demonstrations, lowering technology risk, and attracting private capital in the process. If we fail to commit to a broader federal policy portfolio now to enable significant carbon capture deployment by 2030, the US and other countries risk being left without essential options needed to avoid the worst impacts of climate change.

Category 1

1. Are DOE's views on the need for public funding to support mid-scale DAC facilities generally accurate? Please provide a yes or no answer and elaborate on the reason.

Yes. The Coalition appreciates DOE identifying the role mid-scale commercial DAC (MSC DAC) facilities will play in the buildout of a robust carbon management industry. This directly corresponds with the Coalition's priorities to support advancing a full suite of carbon management technologies at various technology readiness levels, as reflected in the Coalition's [2023 Federal Policy Blueprint](#).

While recent federal investments from the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA) have provided engineered carbon dioxide removal (CDR) technologies like DAC greater federal support, to meet net zero emissions by midcentury, this nascent but important sector must be scaled up globally to capture more than 85 million tons of CO₂ per year by 2030, and nearly 1 gigaton (or billion tons) of CO₂ per year by 2050.

MSC DAC facilities face fundamental challenges to scale, as DOE has correctly identified in the request for information (RFI), which will likely require additional federal policy support beyond that which is currently being implemented under the authority given through the BIL, IRA, and CHIPS and Science Act. However, we anticipate that the development of large-scale (1 million TPY and larger) carbon management infrastructure and hubs as prioritized in the BIL will be essential to help lower the barriers that MSC DAC facilities face, as they will directly benefit from the infrastructure and learnings of those projects. While the Coalition supports technology innovation and

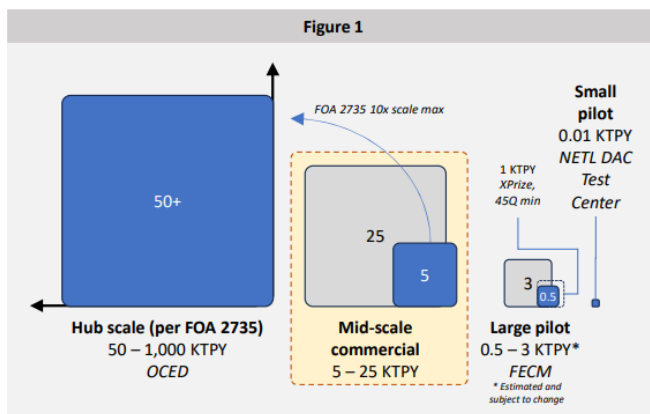
the intent behind the MSC DAC program, it is equally important that DOE ensure that the DAC Hubs authorized under the BIL are implemented as congressionally intended.

Furthermore, the expansion of policies to support MSC DAC should not slow down the implementation and progress of those TA-1, TA-2, and TA-3 projects that have already been selected under the Regional DAC Hubs program by DOE. These projects will lower barriers for subsequent smaller-scale carbon management project deployment (including MSC DAC), through the existing program that is statutorily intended for large-scale deployment.

2. Has DOE accurately reflected the description of a mid-scale commercial (MSC) DAC facility?

No. DOE proposes defining MSC DAC as those projects within the range of 5,000 and 25,000 TPY capture capacity. While DOE's identified capture capacity range is intended to fill existing gaps in federal funding, as highlighted in the RFI notice DE-FOA-0003333 and depicted on the diagram below, the gap will still exist between 25,000 to 50,000 TPY and 3,000 to 5,000 TPY within DOE's current proposed definition of MSC DAC.

To address these existing gaps within DOE programs, the Coalition recommends that the definition of MSC DAC be adjusted to include DAC facilities from 1,000 to 50,000 TPY capture capacity. This definition adjustment would remove the gap in federal support across the spectrum of the capture capacity and be consistent with the capture thresholds for DAC facilities to claim the federal Section 45Q tax credit. Removing this capture capacity gap will foster the advancement of the technology across the spectrum of capture capacity up to 1,000 KTPY and provide an equal opportunity for DAC companies to transition to a larger capture capacity to be eligible for future Regional DAC Hubs awards.



(Source: DE-FOA-0003333)

In addition, some DAC companies have reported to the Coalition that the financial breakeven point is around a capture capacity of 20,000 TPY, and therefore, it is important that federal funding can provide the continuity needed at capture capacities where DAC projects can become financially stable. However, it is also important to ensure that the MSC DAC program does not provide an incentive to downsize capture capacity to qualify for the MSC DAC funding. Hence, the Coalition reiterates its position in adjusting the capture capacity from 1,000 to 50,000 TPY to allow for greater flexibility and uptake from prospective DAC companies.

4. Has DOE accurately reflected the challenges related to financing MSC DAC facilities? Please provide a yes or no answer and elaborate on the reason.

Yes, DOE has accurately identified the challenges related to financing MSC DAC facilities. Carbon Capture Coalition members have reported that there are financial challenges in attracting investments for an MSC DAC facility (with a capture capacity defined in response to *Question 2*, i.e., 1 KTPY to 50 KTPY), as investors typically choose to invest in facilities with a larger capture capacity ranging above 100 KTPY. This is mainly due to economies of scale that serve to reduce the cost per unit of CO₂ removal from a larger DAC facility, as the fixed capital investment costs of the facility are spread across a higher amount of CO₂ removed, therefore increasing the possibility of a higher profit margin and consequently, a higher rate of return for investors. Therefore, the Coalition believes that federal support for financing MSC DAC facilities will help remove the barriers for MSC DAC developers in securing necessary funds for the deployment of these facilities.

5. Has DOE accurately reflected the challenges related to finding and accessing storage and utilization for MSC DAC facilities? Please provide a yes or no answer and elaborate on the reason.

No, not entirely. While the Coalition agrees with DOE RFI notice DE-FOA-0003333 that the volume of the CO₂ from MSC DAC (with a capture capacity defined in response to *Question 2*, i.e. 1 KTPY to 50 KTPY) may be too low for securing off-takers for the end use of the captured carbon for geologic storage or utilization, there are additional barriers to storage and utilization that DOE has not identified in the RFI, including securing permits for geologic storage and pre-approval processes for carbon utilization.

Electing the 45Q tax credit for carbon utilization

Electing the 45Q tax credit has been a significant challenge for carbon reuse projects. Relative to using CO₂ to produce additional oil, reusing carbon to produce valuable

products is not yet cost-competitive with incumbent technologies. Under the current statute, there is a \$25 per ton disparity between those projects that reuse carbon emissions versus those that securely and permanently store the captured carbon. This disparity effectively disincentivizes the development and deployment of relatively new carbon reuse technologies, essentially acting like a tax on such operations. This disparity rises to \$50 per ton for direct air capture projects.

There have also been significant challenges for carbon utilization project developers to claim the 45Q tax credit, specifically due to the current pre-approval requirement associated with the lifecycle analysis (LCA) that must be submitted before claiming the credit. The current pre-approval requirement of LCA to be prepared by using actual and retrospective data puts carbon utilization projects and technologies in a precarious position and at a significant disadvantage relative to other pathways under 45Q, as project developers need up-front financing to provide certainty to build a project. In addition, the Coalition is aware that at least 20 LCA applications, and likely many more, have been filed with the Treasury since guidance was issued in 2021. Only a small handful of those applications have been recently approved to begin electing the tax credit.

Class VI well permits

There are also challenges relating to permitting Class VI wells. The uncertainty that the Class VI review and approval process presents is compounded by the relatively lower capture and subsequent storage capacity for an MSC DAC. Currently, securing an EPA Class VI well permit for secure geologic storage can take several years with no certainty in terms of the timeline for review and final determination from EPA. This uncertainty can place carbon management projects at greater risk of missing critical project deadlines, including obtaining financing, as well as other necessary components of project development like project planning and engineering.

To date, EPA has permitted four Class VI wells, with draft permits issued for another four wells. An additional 43 projects, corresponding to 128 individual well applications, are under review with the EPA. Additionally, North Dakota, Wyoming, and Louisiana have been granted primacy to oversee Class VI well permitting, with North Dakota having approved six permits. The notable increase in project applications to obtain Class VI well permits and the growing interest from states in applying for primacy highlights the importance of federal and state efforts to prioritize the timely review of state primacy and individual Class VI well applications.

Addressing these challenges is necessary to ensure that MSC DAC facilities are provided with support for accessing the storage and utilization facilities, and requires coordination between DOE, EPA, and other federal agencies.

6. Has DOE accurately reflected the challenges related to siting and operating MSC DAC facilities? Please provide a yes or no answer and elaborate on the reason.

Yes, but beyond the permitting and policy challenges related to deploying the full suite of carbon management technologies, as mentioned in the response to *Question 5*, there are challenges associated with the supply of low- and zero-emissions energy sources.

MSC DAC facilities require a reliable supply of low- and zero-emissions energy sources to achieve the net removal of carbon dioxide from the atmosphere. However, current challenges within low- and zero-emissions energy infrastructure, including but not limited to the permitting of interstate transmission lines, competing demand for low- and zero-emissions energy sources, the need for upfront financing to procure low- and zero-emissions energy, and a lack of low- and zero-emissions energy supply in the grid will continue to exacerbate the inherent challenges of MSC DAC.

Therefore, a DOE funding program specifically targeted toward the buildout of MSC DAC facilities will not serve the intended purpose if the supporting infrastructure and low- and zero-emissions energy supply are not in place. Hence, there should be support and coordination with other relevant DOE offices and federal agencies in ensuring that there is a reliable supply of low- and zero-emissions energy sources (in addition to this response, please refer to the Coalition's response in *Question 11*).

7. What challenges related to MSC DAC facilities were not addressed? In what ways could DOE support MSC DAC facilities that were not mentioned?

DOE could support MSC DAC facilities by addressing the policy and permitting challenges mentioned in the Coalition's response to *Question 5*. Additionally, the DOE could help support the challenges related to the low- and zero-emissions energy supply mentioned in the response to *Question 6*.

8. How would a future program most effectively support MSC DAC demonstration facilities? Please address total funding amount, cost share percentage, requirements for facility operational life, specific technology types, or other topics that may help further define a future DOE program.

There are several topics DOE should consider in designing an MSC DAC demonstration program.

Initial screening of applications

The provision of an initial screening and phased down-selection of applications may help new innovators and DAC companies (with a capture capacity near the lower limit or 1,000 TPY), as proposed in the Coalition's response to *Question 2*) to quickly identify applicants to progress to the next stage of the award process. This would be helpful to the potential applicants to determine if they would benefit by investing resources in the application process. This would also help smaller- and therefore less-resourced DAC companies by providing them with early signals of their potential to receive the awards and would add efficiency to DOE in making award selections and announcements.

DAC technology types and methods

The Coalition urges DOE to embrace technology neutrality, to provide all potential DAC technology pathways (e.g. liquid absorption, solid adsorption, mineralization, etc.) with equal consideration and opportunity to compete for the MSC DAC funding award. As the DAC industry evolves, requiring any specific DAC technology type might discourage the innovation of state-of-the-art technology with low cost and higher scalability.

9. What timing and frequency would be most effective for DOE to offer funding for MSC DAC demonstration facilities? (e.g., a specific calendar year, recurring offerings in multiple years, rolling applications).

First and foremost, the Coalition recommends DOE ensure the previously announced DAC Hubs authorized under the BIL are implemented as congressionally intended as early as possible, and before further selection and awarding of any potential MSC DAC funding.

With regards to the timing and frequency of the MSC DAC demonstration facilities, the Coalition recommends that multi-year funding will be best suited for the program with regular updates.

Specific dates for the recurring funding announcement and award selection with adequate time in between the awards would help shorten the learning curve for DAC companies to innovate. Such a time frame will aid collaboration and foster healthy competition between technology providers and provide technological advancement. Uniform funding streams through multi-year announcements will help both early and medium-term innovators benefit from the public funds and transition to a larger scale of deployment in the future.

Updates delivered through regular communication from OCED in the form of website announcements, emails, webinars, and listening sessions can help inform the development and deployment of these projects at the ground level. The Coalition strongly encourages DOE to disseminate information on the full scope of the program, funding mechanisms, funding sources, and regular updates on the transfer of funds to the awardees. Publicly accessible and available information on project selections should be easily accessible to the public through a centralized online platform to readily provide the latest information, create transparency, build trust, and foster the overall collaboration and engagement of the DAC community and stakeholders.

10. Are there more effective ways DOE could support the direct air capture field that would be higher priorities than MSC DAC facilities?

The Coalition applauds DOE's initiation of the Regional DAC Hubs program, announcing the initial selections under Topic Areas 1, 2, and 3. However, out of the \$1.236 billion announced for the selected Regional DAC Hubs program projects, Coalition members have reported that only about \$50 million has been awarded to one of the Topic Area 3 projects, leaving 19 other earlier-stage projects and one Topic Area 3 selectee without the funding necessary to develop projects. The Coalition is concerned that with the apparent delay in awarding the funding for selected projects, the DOE may not utilize the \$3.5 billion appropriated for the Regional DAC Hubs program before the authorization expires in fiscal year 2026.

While the Coalition supports technology innovation and the intent behind an MSC DAC program, DOE should also ensure that the existing DAC Hub projects are funded and implemented as congressionally intended. The Coalition urges DOE to ensure that the implementation of the MSC DAC facilities does not impact the timing and funding amount for projects and timelines that have already been selected under the DE-FOA-0002735. Furthermore, the creation of an MSC DAC should not slow down the implementation and progress of those TA-1, TA-2, and TA-3 projects that have already been announced under the Regional DAC Hubs program. The Coalition believes that the MSC DAC program should be complementary to the previously announced support and not at the expense of projects selected under the Regional DAC Hubs program.

11. Would it be advantageous for DOE to fund shared facilities offering DAC developers access to clean energy and CO₂ offtake, where a mid-scale facility could be built, in lieu of funding that directly supports the DAC facility's development and construction?

Yes. The Coalition supports a shared offering of DAC developers access to low- and zero-emissions energy and CO₂ offtake as it would sufficiently reduce a major financial burden for project developers by reducing CAPEX and OPEX and making the projects within a range of 1,000 to 50,000 TPY financially viable. The Coalition believes that such a shared facility will maximize usage of the available low- and zero-emissions energy resources and agglomerate a sufficient supply of captured carbon for CO₂ off-takers for end use in carbon utilization or for geologic storage. In addition, the Coalition believes that funding a shared facility complements the concept of a DAC Hub by advancing the interconnectivity of the full suite of carbon management technologies.

Category 3

16. In what ways, if any, do you anticipate this program could impact the workforce?

MSC DAC facilities offer abundant job opportunities across a wide range of skill sets. As these facilities expand across the US, they will require workers from diverse occupations, such as engineers, construction trades, metalworkers, assemblers, executive and business operations, machinery installers, maintenance, and repairers.

According to the Rhodium Group's latest [analysis](#), a commercial 500-kiloton DAC facility creates an average of 1,215 jobs annually during its five-year construction phase, encompassing roles in construction, engineering, materials, and supply chain management. Once operational, the facility sustains 340 jobs, with approximately 220 dedicated to the ongoing maintenance and repair of the DAC equipment throughout its lifespan. While the above estimation on jobs for 500-kiloton might not accurately reflect the job opportunities stemming from MSC DAC facilities, deploying the full suite of DAC technologies will create additional jobs in the construction, operation, and maintenance sectors.

Additionally, CO₂ offtake and reuse of captured CO₂ in valuable products will the widescale deployment of carbon management technologies, including carbon reuse, has the potential to safeguard and create highly skilled jobs that sustain local economies and the families that depend upon them. These jobs in the traditional manufacturing, industry, and energy sectors, as well as new job types associated with carbon reuse, can bring significant benefits to communities and regions through high wages and benefits that have long been a traditional pathway to the middle class for many American families.