

Bipartisan Policy Center Response to Request for Information on Deployment and Demonstration for Carbon Reduction and Removal Technologies

TO: Office of Fossil Energy and Carbon Management, U.S. Department of Energy

DATE: January 26, 2022

RE: DE-FOA-0002660: Request for Information on Deployment and Demonstration Opportunities for Carbon Reduction and Removal Technologies

FROM: Bipartisan Policy Center's Direct Air Capture Advisory Council¹
Prepared by Danny Broberg, Senior Policy Analyst

Thank you for the opportunity to provide insights and guidance to the Department of Energy's (DOE) and the Office of Fossil Energy and Carbon Management (FECM) plan for the deployment and demonstration of carbon management and clean energy technologies which are a crucial part of a broad strategy to achieve the Biden administration's goals of a net-zero economy by 2050.

Our Council¹ is comprised of industry, business, and policy leaders that represent a diverse array of perspectives and expertise necessary for successfully deploying and scaling DAC technologies in service of our climate goals. In the wake of the 2021 Conference of Parties in Glasgow and the sixth assessment from the Intergovernmental Panel on Climate Change (IPCC), scientific consensus is clear that, in addition to rapid emissions reductions, carbon dioxide removal (CDR) is essential for reaching our climate goals.

As leaders and implementers of DAC and carbon management infrastructure, we have witnessed first-hand the unique opportunity that DAC presents as a climate technology. DAC complements many other essential climate technologies – including nature-based solutions for carbon management and solutions to enable industrial decarbonization and an equitable workforce transition.

While we remain optimistic about progress that has been made over the last decade for demonstrating DAC technologies for rapid scale-up, strategic and holistic programming between DOE and other federal agencies is essential to meeting our climate goals. With the passage of both the Infrastructure Investment and Jobs Act (IIJA) and the Energy Act of 2020, there is an opportunity for DOE and the Biden Administration to meet the scale of ambition that DAC presents through strategic implementation of the following programs:

- Creation of Four Regional DAC Hubs
- Pre-Commercial and Commercial DAC Technology Prize Competitions
- CDR Research, Development, and Demonstration (RD&D) Program
- CDR Task Force
- DAC Test Center
- Carbon Capture Utilization and Storage (CCUS) Pilots and Demonstration Funding

¹ <https://bipartisanpolicy.org/direct-air-capture-advisory-council/>

- Carbon Dioxide Transportation Finance and Innovation (CIFIA) Program
- New Grants for Front End Engineering Design (FEED) Studies for CO₂ Transportation Infrastructure
- New Grants for CO₂ Utilization
- Expanded Carbon Storage and Validation Program
- Office of Clean Energy Demonstrations (OCED)
- (EPA) Grants for Class VI Primacy

To assist the DOE in maximizing the impact of implementing these programs for climate success, we have assembled the following set of principles and recommendations that will enable a domestic carbon management industry that will accelerate U.S. competitiveness, enable community voices and participation, and achieve our climate goals.

1. **Rapid Scaling – New DAC funding streams should be designed to deploy and rapidly scale up Direct Air Capture capacity in the United States while driving down costs, consistent with the goals of DOE’s Carbon Negative Shot program.**

Despite the urgent need to scale up DAC and CDR to the gigaton level, less than 10,000 tons of global DAC capacity are currently operational. A massive scale up in capacity is necessary *this decade* to enable the supply chains and cost declines for gigaton-scale carbon removal with DAC in later decades. The U.S. needs to support DAC RD&D to improve the technology and reduce costs, while simultaneously helping the most mature DAC technologies deploy at scale as soon as possible. Only by accelerating deployment while continuing R&D can the U.S. fully realize DAC’s potential in pursuit of 2050 climate goals.

Although the primary focus of climate policy and investment must continue to be on emissions reductions, setting 2030 CDR and DAC deployment goals for the U.S. will help ensure alignment with what science dictates is necessary for midcentury climate targets. Our Council has recommended² a deployment target of at least 7 million tons of annual DAC capacity (operational or under construction) in the U.S. by 2030 and the DOE’s Carbon Negative Shot target of achieving \$100/net metric ton of CO₂ removal is consistent with this vision of rapid scale-up.

Implementation:

- DAC Hubs should be chosen primarily on their ability to achieve high volumes of net carbon removal, with additional consideration given to project co-benefits and minimizing negative ancillary impacts.
- While adhering to the statutory requirement for geographic diversity, the locations of the DAC Hubs should result from choosing the best projects and potential to scale, rather than forcing projects to locate in different regions.
- DOE should clearly articulate the intent of each new DAC-related funding program, including technologies covered and relative level of technological maturity involved to advance and scale solutions.
 - DAC hub funding should focus on enabling significant scale for installed CDR capacity, as required by statute. A priority should be placed on technologies ready for large scale

² <https://bipartisanpolicy.org/report/federal-dac-recommendations/>

- commercial-adoption and with potential to scale capacity in future years. DOE should also articulate the intended uses of this funding both for initial capital investments and for the ongoing operation of DAC facilities.
- Pilot and demonstration funding in early years, including the pre-commercial DAC Prize, should target technologies that are earlier in the innovation lifecycle, relative to eligible entities funded through the DAC hubs program. DOE should also clearly articulate which funding streams apply to DAC pilots and demonstration projects.
 - CDR RD&D funding should be clearly differentiated from Hubs and deployment efforts, with a focus on earlier stage research that enables new DAC technologies, future cost declines, and deployment capabilities.
 - While these funding streams should be differentiated in accordance with the above bullets, DAC hubs should be designed to enable all of the above projects and funding streams to make use of the shared infrastructure which will lower overall costs for each.
 - DOE should leverage special emergency hiring and direct hire authorities to the maximum extent possible. Moreover, DOE should evaluate the potential applicability of DOE Order 413.3b, Program and Project Management for Acquisitions of Capital Assets as an effective management tool for large-scale demonstrations.
 - DOE should house the newly authorized CIFIA program within LPO, and hire a CIFIA director as soon as practicable, with private sector expertise and knowledge of financing and deploying large-scale infrastructure similar to CO₂ transportation projects. As written in statute, the CIFIA program should prioritize projects that are large capacity, common carrier, have demonstrated demand for use, enable geographic diversity, and are located near existing pipeline corridors.
 - DOE should use the CIFIA program to support development of an interconnected CO₂ transport infrastructure system that facilitates scale-up of a broader carbon management industry. To prepare for this, the program's future growth grants should be leveraged to ensure that new CO₂ transport infrastructure is built with capacity for future growth.
2. **Address the Chicken-and-Egg Problem – Scaling domestic DAC capacity will best be served by simultaneously supporting and scaling the capacity of complementary and enabling infrastructure, such as CO₂ pipelines, CO₂ storage, as well as other carbon management infrastructure, utilization of CO₂, and access to affordable clean power. Simultaneous scale-up and policy support will mitigate the chicken-and-egg problem of each component needing the other before they can proceed.**

In some ways, DAC is in a similar position to where solar and wind energy technologies stood 20 years ago. A major difference, however, is that clean electricity generation can leverage existing transmission and end-use infrastructure that has been used and maintained for decades. To truly enable a carbon managed economy, the capture, removal, transportation, use, and storage of CO₂ need to all be stood up simultaneously – this is the chicken-and-egg problem that presents itself in deploying DAC. New program implementation can address this problem by ensuring holistic and complementary program design and implementation. This will require DOE to support infrastructure development in advance of full demand for its use.

Implementation:

- DOE and the White House should look to maximize coordination between different subgroups designed to form a federal response on CDR and DAC deployment – including the DOE-led CDR taskforce (authorized by the Energy Act of 2020), the CEQ-led taskforces for permitting reform with regard to CCUS (authorized by the USE IT Act), and the Interagency Carbon Dioxide Removal Research Coordination (I-CDR-C) effort led by the US Carbon Cycle Science Program.
 - Reporting requirements and strategic planning should be consistent across every group that is focused on deploying CDR as a climate solution. Over time, an effort should be made to consolidate leadership into a single, interagency CDR taskforce with multiple subgroups that focus on different pathways for deploying CDR (e.g., technological, oceans, geological, terrestrial, and data aggregation).
 - FECM should consider establishing a Selection Board, rather than a Selection Official - similar to how LPO's Credit Review Board operates – to select funding recipients. All officials on the Board should be career federal officials, but a majority of the officials should have private sector project management, financial, or commercialization experience. Additionally, the Board should include officials from LPO, OTT, and appropriate Applied Program office(s).
 - FECM should consider carrying out the DAC Hubs funding and Demonstration efforts as milestone-based demonstration projects including termination criteria, risk/cost thresholds, and hardware, technical and financial milestones.
3. **Program Synergy – The many different funding streams for DAC (such as the DAC Hubs and Technology Prize Competition), along with DAC enabling infrastructure (such as the CIFIA program for CO₂ transport, geologic storage and use programs etc.), should be implemented in a holistic, synergistic, and strategic manner, to minimize repetition and to maximize the efficiency and benefit of each program.**

Intelligent and intentional program design will create multiplier effects for each of the many DAC-related funding streams as well as for other climate technologies that can access transport, utilization, and storage resources built at DAC Hubs. This presents an opportunity to maximize public spending that is greater than the sum of its individual components.

Implementation:

- FECM should critically assess whether the current structure of the Carbon SAFE program, intended to facilitate the creation of commercial scale geologic storage, is designed to facilitate rapid scale-up of safe and reliable geologic storage projects to support the DAC Hubs.
- When choosing DAC Hubs, FECM should consider how the Hubs may provide opportunities to site and facilitate other relevant CDR RD&D efforts in future years. This should include considerations for the newly authorized DAC test center.
- *New* pilots and demos should be managed by OCED, new OCED program staff should work closely with FECM staff with relevant expertise to manage these projects. *Existing* pilots and demos should be closely coordinated with OCED, but remain under leadership of FECM. If a project is transitioning to a major new milestone, a smooth transition to OCED should be facilitated by appropriate DOE program managers overseeing the original project. To the extent practicable, pilots and demos should be deployed with an eye towards being able to deploy them at demonstration scale, potentially using the infrastructure at one of the chosen DAC or hydrogen hubs.

4. Room to Grow – DAC hubs must be designed to facilitate further future scale-up of DAC technologies and the associated value chain for carbon management infrastructure over time.

In a similar vein to ensuring program synergy, the selection of the four regional DAC Hubs should place priority on the ability for the hubs to substantially grow and create multiplier effects in the coming decades. While funding for the Hubs from the IIJA only lasts through FY26, DOE and the administration should make clear that these are an initial investment in regional DAC Hubs that will last for many decades.

Implementation:

- In selecting DAC Hubs, DOE should consider synergies with other programs from IIJA, such as the hydrogen hubs, advanced nuclear program, or the newly granted offshore CO₂ storage permitting authority, to tap into the carbon management infrastructure that will be installed for use by DAC technologies.
 - DOE should require that CO₂ transport and storage infrastructure associated with DAC Hubs should be common carrier (consistent with statutory requirements from the CIFIA program) and available to all CO₂ management industries.
 - DOE should consider creating a model anchor tenant authority for financing of CO₂ pipeline capacity, in a similar manner to the Transmission Facilitation Program that was created for electricity transmission projects under the IIJA.
- 5. Community Engagement – Enhancing environmental justice and enabling local community engagement will be important to deploying DAC.**

Environmental justice and addressing the concerns of communities that have been disproportionately impacted by legacy pollution are essential to enabling durable climate solutions. To enable success for deploying DAC, strategic engagement with communities, educational opportunities, and raising awareness of CDR solutions is essential to perform over the coming decade especially in locations where DAC hubs will be developed.

Implementation:

- Consistent with recommendations from the EJ 40 initiative, FECM and DOE should consider supporting community engagement efforts by creating an office of public advocate (similar to the office with the same name at FERC) or a federal advisory committee that will advise on best practices for community engagement. These efforts should be done in consultation with the Office of Congressional and Intergovernmental Affairs on state and local engagement, the Office of Economic Impact and Diversity, and the Office of Environmental Management. The President's Budget Request for FY23 should request appropriate funding needed to sustain this effort.
- Funding should also be made available to facilitate community organizations and front-line stakeholders engaging with DOE during the DAC Hubs solicitation and selection process. The

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- While increasing the staffing capacity for new programming efforts at FECM, prioritization should be given to applicants with career experience in community engagement.
 - New data aggregation efforts for lifecycle assessment and monitoring, as well as for local air quality impacts from the installation of carbon management infrastructure, should be promoted with organizations. Metrics and aggregation of this data should be drafted in consultation with frontline communities.
6. **Transparency – Maintaining transparency on reporting and monitoring protocols and clear lines of communication with stakeholders and frontline communities will be important for building trust.**

Life cycle analyses should be completed in a consistent and transparent manner to build community trust and ensure climate benefits. As new reporting requirements are being drafted, it is important to keep in mind the existing federal reporting and monitoring programs, such as subpart RR for the greenhouse gas reporting program managed by EPA. Existing models for transparent and environmentally robust regulations should be maintained to ensure consistent signals to the private sector.

Implementation:

- Best practices and regulations that promote transparency and environmental stewardship exist in the U.S. government – particularly, Class VI and subpart RR. The reporting and transparency components of these successful programs should be integrated into program solicitations and funding selection process.
 - DOE should work closely with relevant agencies to expeditiously issue new rules regarding CO₂ pipelines. Further regulatory clarity should also be encouraged from federal land management agencies, including USDA and DOI. DOE should ensure these permitting frameworks are as efficient as possible while addressing health and environment concerns and building trust with the community.
7. **Efficiency – Permitting and regulatory processes should be improved to increase efficiency and relieve bottlenecks while maintaining robust environmental standards and advancing environmental justice.**

Implementation:

- DOE and FECM should prepare programmatic environmental impact statements for the various categories of carbon management projects covered by the new programming, to allow shorter and faster environmental assessments on a project-specific basis. As part of this, guidance should also be provided on how to appropriately conduct life cycle analyses of emissions captured and used for various projects within the context of a NEPA review.
- DOE should consult with BLM and EPA on approaches to accelerate the development of new geologic storage options, including the clarification of a pathway for Class II to VI conversion.

- FECM should communicate the benefits of using the FAST-41 process of working with the Federal Permitting Improvement Steering Council (FPISC) and the Permitting Dashboard to expedite permitting processes for DAC Hubs and other carbon management infrastructure, given the new eligibility granted by the USE IT Act.
 - In FY22, EPA should prioritize grants for state level primary enforcement authority over Class VI well permitting, as the application process is lengthy, but can unlock significant geologic storage potential.
8. **Communication – DOE and the administration should provide clear and timely guidance on programming that impacts stakeholders, striving for consistency across programs in a holistic and strategic manner.**

Implementation:

- As soon as practicable, FECM should clarify timelines and funding quantity for each new DAC-related funding opportunity. DAC Hubs are complex large-scale projects, and early clarity on key parameters will be needed to allow applicants the time and certainty needed to appropriately plan and size projects, develop quality proposals, and ensure the most viable projects are proposed and funded.
 - FECM should consider the use of an Independent Merit Review Panel to assess relevant entities and technologies eligible for the DAC Hubs funding and DAC prize competition. Selection criteria should be identified early on, listed publicly, and include a mix of local engagement qualifications, technical feasibility, financial viability, a demonstrable market, and project management plans.
9. **Prioritize Workforce – Program implementation should leverage existing skillsets and expertise of hard-working Americans, including legacy energy workers.**

Many new jobs will be created in pursuit of our climate goals (including through the deployment of DAC technologies), but job transitioning, along with the loss of some jobs, is anticipated as other business practices are phased out. Enabling a net zero future needs to prioritize existing and future American jobs, both within and beyond the energy sector. Appropriate worker transition assistance and support for the re-skilling and up-skilling of certain worker trades can help ensure many people are not left behind. Further, the geographic distribution of new job opportunities is unlikely to align exactly with the distribution of people looking for work.

Government engagement with existing employers is needed to strategically minimize worker dislocation over time. The historically higher wages associated with carbon management careers will ensure job quality is maintained, and existing programs across the federal government should be leveraged in supporting these workers as they enable the deployment of infrastructure at DAC Hubs.

Implementation:

- FECM, with support from other relevant offices within DOE and in other federal agencies, should initiate a taskforce to evaluate existing resources from the federal government to support the upskilling and training of a workforce that can enable DAC Hub deployment. While adhering to

the statutory requirement for providing long-term employment to the greatest number of residents in a region, a priority should also be placed on improving job quality and job mobility.

10. Realistic Timelines – Implementation decisions should maintain realistic expectations and timelines for deployment that are compatible with how the private sector finances and develops projects.

The private sector will ultimately spearhead and manage the deployment of carbon management infrastructure. Investments from the private sector are built on assessments of commercial risk for how a project will be financed and developed over time. Clear timelines for federal support and funding are important for managing risk and will ensure long term success of the DAC Hubs.

Implementation:

- In planning how to disseminate funding from new programing, FECM should follow best practices from other DOE offices that work closely with the private sector, such as LPO or ARPA-e, to ensure that funding solicitations and decisions are administered on a timeline that meets the needs of industrial development.
- FECM should coordinate on information dissemination and solicitation responsibilities with other program offices at DOE - including OTT and OCED – and integrate feedback provided by private sector and local communities.

11. Innovation – Balance support across the entire innovation lifecycle – ranging from early-stage break throughs to the fine-tuning of industrial scale processes.

Despite the progress of the past decade, many DAC and foundational carbon management technologies remain in the early stages of innovation. The government must assume more risk for promising technologies that do not have a bankable track record, to support the “valley of death” between early-stage research and later stage commercial adoption.

Implementation:

- DOE should use the appropriate programs for supporting technologies at the appropriate stage of innovation and technology risk. Early-stage technology R&D can be supported by R&D programs, pilot projects by pilot funding and the pre-commercial DAC prize, and the deployment-focused DAC Hub program should fund technologies ready for large-scale commercial deployment.
- FECM should look to appropriately facilitate information sharing on lessons learned from pilots and demonstration. These lessons learned should be done in a manner that does not compromise IP and supports project deployment.

12. Risk – An appropriate tolerance for risk should be accepted for nascent technologies according to their stage in the technology development.

Implementation:

- FECM and OCED should establish acceptable failure rates and risk levels for each program. As an illustrative example, the Senate has proposed legislation for a Clean Energy Deployment Administration with a 10% project default rate. Individual programs should seek projects at an appropriate level of maturity and risk, commensurate with the size of facility and the purpose of the facility being targeted by the program.
13. **Minimize administrative burden – Utilizing common language and definitions across programs will reduce unnecessary duplication of effort, saving project applicants time and resources.**

Implementation:

- Where possible, FECM and OCED should leverage flexible funding agreements, including the use of Technology Investment Agreements (TIAs), as an alternative to more conventional contracts, cooperative agreements, and grants to ensure the funding mechanism appropriately and cost effectively addresses both public and private sector interests. Consideration should also be given for shared funding arrangements with different DOE offices, and other federal agencies.
- DOE should consider reducing the cost sharing requirements where appropriate. Cost-share requirements should be established at the beginning of a project and if a project is transferred from an Applied Program to FECM or OCED, the cost-share should not be renegotiated.