Direct Air Capture in Wyoming

Barriers, Opportunities, and Lessons from Project Bison

The Nature Conservancy

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Disclaimer
The authors acknowledge that while this paper was in production, the business environment for Direct Air Capture (DAC) rapidly changed. The new federal administration has brought federal support for the industry into question, and some potential buyers of carbon credits have reduced net-zero goals. Investment in new, high-risk sectors like DAC face challenges due to a shift in the U.S. economy. The high levels of macroeconomic uncertainty brought on by tariffs and changing policies make it difficult for DAC companies to access other types of financing, such as venture capital.

However, we believe the perspectives and recommendations shared in this paper portray valuable information that will remain relevant after the current economic and political cycles. While DAC and other Carbon Dioxide Removal technologies may take longer to deploy, they still represent a significant opportunity for Wyoming's economy and carbon management industry.

Cover: Wyoming's communities can benefit from business investment in emerging technologies such as Direct Air Capture. © Doug Tunison/Shutterstock

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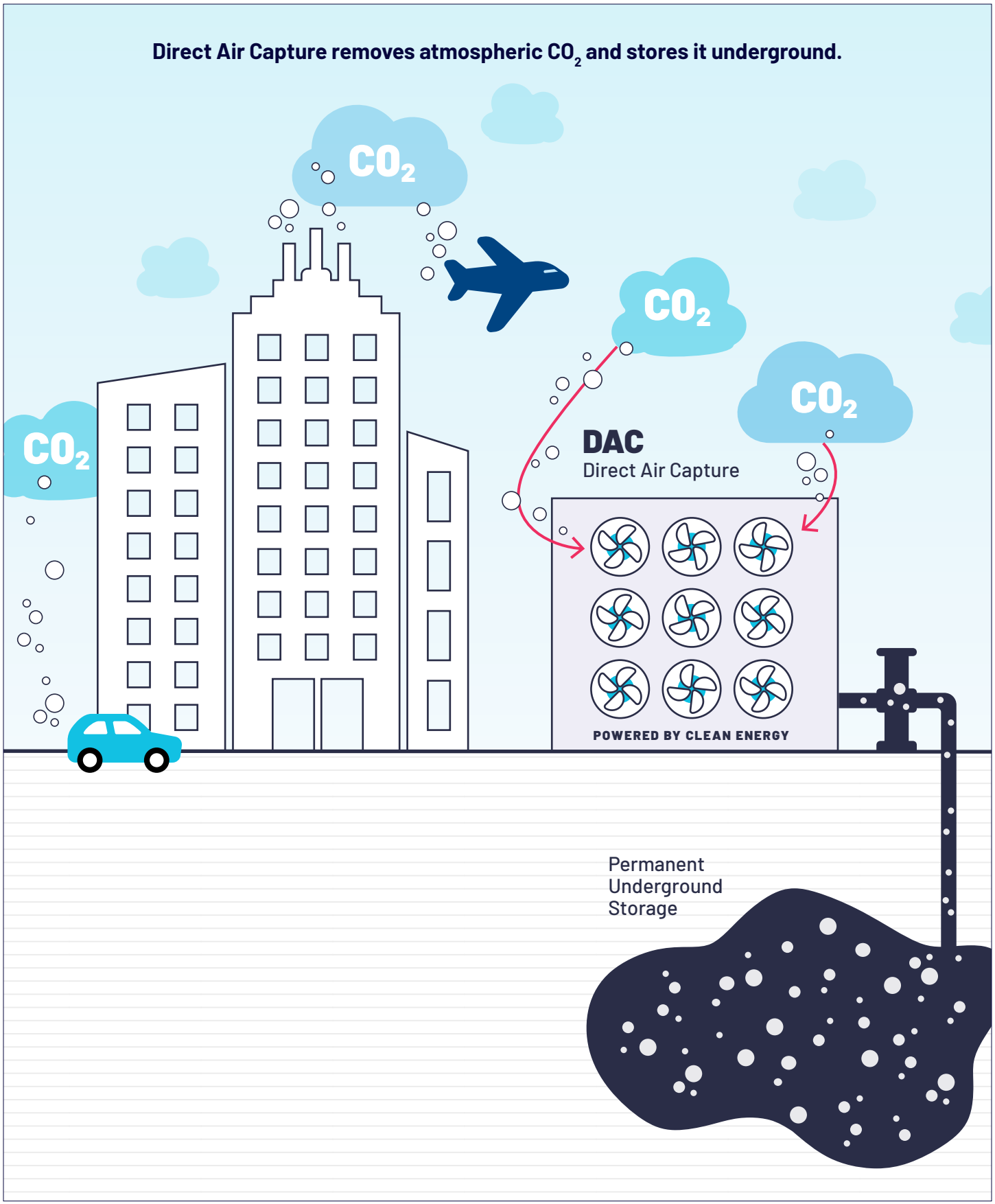

Direct Air Capture removes atmospheric CO_2 and stores it underground.
CO_2
CO_2
CO_2
CO_2
DAC
Direct Air Capture
POWERED BY CLEAN ENERGY
Permanent
Underground
Storage

Executive Summary

This white paper explores the Direct Air Capture (DAC) industry and offers recommendations to industry actors, state policymakers, agencies and other state-level leaders to foster a sustainable industry and positive outcomes for communities, private enterprises and the state. The Wyoming chapter of The Nature Conservancy (TNC) conducted extensive interviews with industry professionals, academics and non-governmental organizations with expertise in DAC. This paper examines the current political landscape of DAC and the potential benefits for rural energy-producing states undergoing economic transitions. It also provides recommendations to both industry and policymakers to better integrate the DAC industry in Wyoming, creating a sustainable sector for the state's economy.

Introduction

DAC can play a crucial role in the carbon management industry by extracting carbon dioxide (CO_2) directly from the atmosphere. When combined with carbon storage solutions such as deep geologic sequestration, CO_2 removed through DAC systems can be permanently stored, with credits sold based on the tons captured. By investing in these credits, companies can reduce their carbon footprint and meet sustainability goals. But to maximize carbon removed, DAC units must be powered by low-carbon electricity to avoid contributing additional emissions.

A DAC facility consists of large fans that pull in air, filters that capture carbon dioxide and separate systems to either store the CO_2 underground or use it for industrial purposes. States like Wyoming, which have existing energy infrastructure and geology conducive to permanent storage, are particularly promising locations for these facilities. Wyoming has a rich and expansive energy history and has recently emerged as a leader in carbon management due to its unique geological features and supportive policy environment. The state has vast areas with world-class geology for permanent sequestration of carbon, extensive CO_2 pipeline infrastructure and a workforce of oil and gas professionals with the highly technical skills necessary to work in several areas of carbon management. Wyoming has also already undertaken the arduous steps of developing a regulatory framework, receiving Class VI well primacy from the Environmental Protection Agency and providing clarity on pore space ownership and liability questions.

Project Bison, envisioned as one of the world's largest DAC facilities, was slated to be built in Wyoming in early 2022.[1] The project, a collaboration between CarbonCapture Inc. and Frontier Carbon Solutions, aimed to permanently remove five million tons of atmospheric CO_2 annually by 2030 and store it in nearby deep geologic reservoirs. However, the project faced significant setbacks in Wyoming. CarbonCapture Inc. cited the competition for clean power from other industries like data centers and cryptocurrency mining, combined with Wyoming's reliance on coal-fired power plants, as key factors that hindered the project's viability.[2] The company ultimately decided to halt development in Wyoming and explore other locations for its first commercial-scale DAC project.

This white paper examines the interplay between carbon capture, transport and storage issues; energy procurement; state and federal incentives; and community and cultural issues to understand the barriers faced by efforts like Project Bison in Wyoming. The paper aims to identify ways to overcome these challenges and better inform both DAC companies and state decision-makers to create a new, thriving economic sector. TNC conducted anonymous interviews with a variety of key players and stakeholders in the DAC space to gain insider knowledge and form the recommendations that follow.

For definitions of technical language used throughout, please consult the glossary on page 14.

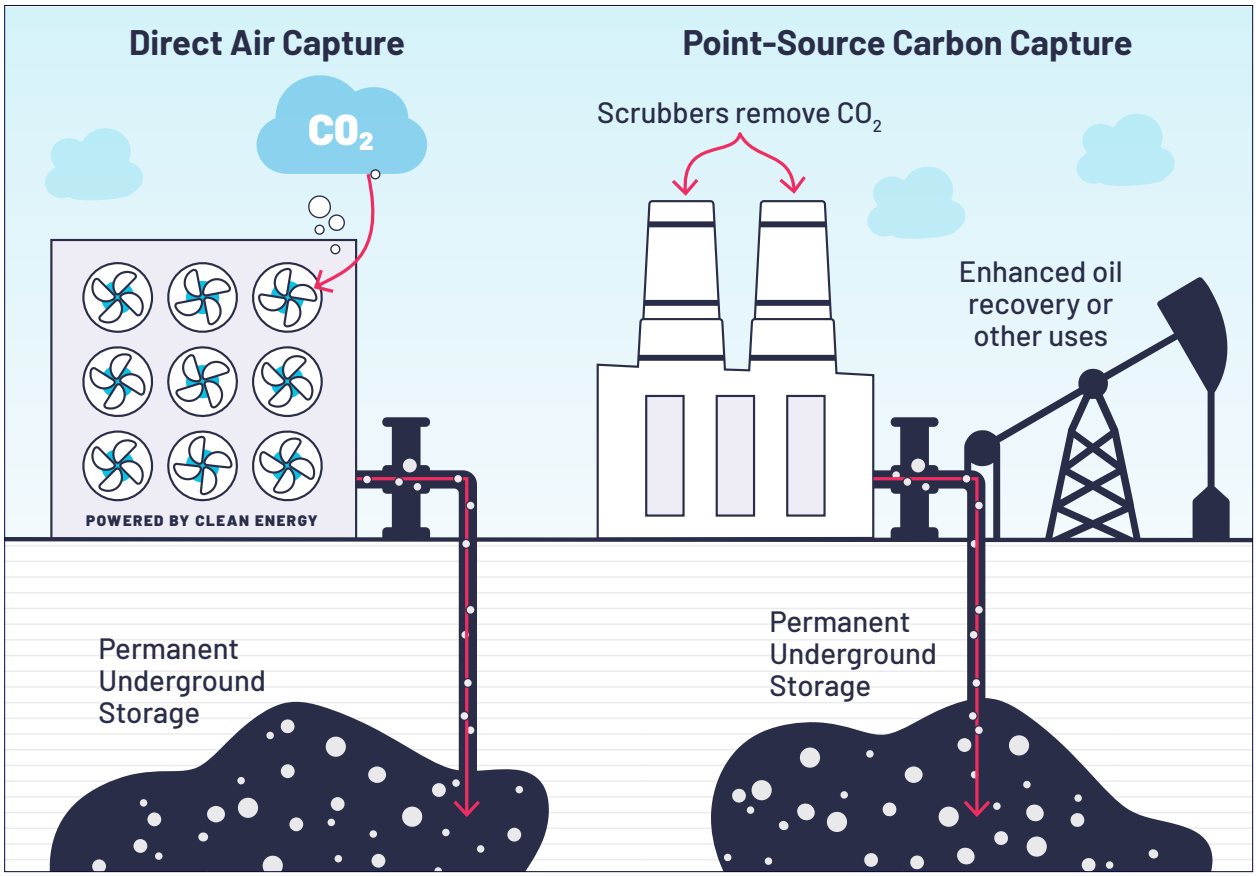
1 Wyoming Business Council. (n.d.). The state of Wyoming welcomes direct air capture project to Wyoming. Retrieved from https://wyomingbusiness.org/news/the-state-of-wyoming-welcomes-direct-air-capture-project-to-wyoming/

2 E&E News. (n.d.). Project Bison fails: What's next for the carbon removal megaproject? Retrieved from https://www.eenews.net/articles/project-bison-fails-whats-next-for-the-carbon-removal-megaproject/

Current State of DAC in Wyoming

The DAC industry in Wyoming faces both challenges and opportunities. The regulatory structure is as advanced as anywhere in the nation, though it lacks a compliance mechanism and a few other key pieces (see Recommendations section). The proposed project that would have been the most high-profile DAC endeavor in Wyoming, CarbonCapture Inc.'s Project Bison, has failed, and the company has moved on to other project locations. Others in the Carbon Dioxide Removal (CDR) space, such as Cowboy Clean Fuels' projects in the Powder River Basin, are picking up steam, generating renewable natural gas while sequestering carbon through non-DAC processes. Several other DAC start-ups have projects in the works or are doing diligence in the state, but none are known to be particularly close to deploying and starting capture operations.

The most significant development of late is the Class VI sequestration wells being drilled at the Sweetwater Carbon Storage Hub in southwest Wyoming by Frontier Carbon Solutions. These would be the first operational Class VI wells in the state. The Sweetwater Carbon Storage Hub is one of three major sequestration hubs that have been announced in Wyoming. The hubs are explored in more depth in the Carbon Storage section of this paper. At each hub location, the developers sought high-quality geologic storage but also prioritized access to CO_2 transportation infrastructure, such as pipeline and rail, and proximity to point sources of CO_2. Point-source CO_2 occurs when large amounts of carbon dioxide are released from smokestacks or other exhaust streams. Point-source carbon capture projects draw CO_2 from industrial exhaust smokestacks and can either store the carbon permanently underground or sell it for enhanced oil recovery, which uses carbon to stimulate marginal well production. Whereas DAC extracts carbon directly from ambient air and stores it permanently underground. The primary concerns developers are prioritizing include proximity to point sources of CO_2, transportation infrastructure and appropriate geology. Access to electrical power, particularly from carbon-free sources, appears to be a secondary consideration. It is clear that in Wyoming, sequestration investments and project deployment are advancing at a far faster pace than capture projects, whether atmospheric or point source.



Wyoming's first Class VI well, drilled in Sweetwater County, specifically for the long-term geologic storage of carbon dioxide (CO_2)

DAC facilities use large volumes of electricity to scrub CO_2 from the atmosphere. To maximize carbon credits created, DAC facilities need access to clean energy generation. Buyers and markets require clean energy to be "new," meaning very recently deployed, and "local," meaning on the same electricity grid. In some instances, clean energy must also be "hourly matched," which refers to a system where electricity consumption is matched with generation on an hour-by-hour basis. This approach ensures that energy users are consuming power from carbon-free sources at the exact time that they are using it, rather than relying on offsets or Renewable Energy Credits (RECs).

Access to clean energy that meets this high standard of new, local and hourly matched is still a difficult barrier in Wyoming. Clean energy investment in the state has slowed as utilities change plans, risk factors rise and other energy markets allow faster deployment. DAC companies developing low-energy demand technology would be well positioned in Wyoming as sequestration capacity outpaces demand and the energy picture continues to be challenging.

All of this is taking shape as Wyoming citizens grapple with a changing energy landscape and shifting political dynamics. In the following sections, we will explore the topics of carbon storage, energy procurement, community and cultural dynamics and state and federal incentives.

DAC companies developing low-energy demand technology would be well positioned in Wyoming as sequestration capacity outpaces demand and the energy picture continues to be challenging.

Carbon Storage

DAC companies are interested in deploying projects in Wyoming because the state contains large areas with the geologic features needed to store carbon permanently underground and has one of the most advanced regulatory structures in the nation. This section will explore geologic storage services, how DAC can integrate with existing sequestration projects and the remaining gaps in the regulatory structure.

While the sources and methods of capturing CO_2 use a wide variety of technologies, the compression, transportation and injection of CO_2 are essentially the same regardless of where or how the CO_2 was captured. This has led to the commoditization of the industry into "sequestration as a service" in Wyoming, where specialists offer geologic storage to any company wishing to offload CO_2. Several companies have worked to consolidate rights to injection in strategic locations in Wyoming, where appropriate geology, access to transportation infrastructure and proximity to point sources of CO_2 emissions are found. These have come to be called "sequestration hubs." The three listed in the table below are the furthest along in their development, though other hubs are in earlier stages across the state.

Project name	Project capacity	Pipeline access	Rail access	DAC project nearby	Point-source adjacent	Point-source connected	Type of source	Interstate connection
Sweetwater Carbon Storage Hub	10M tons/yr	Yes	Yes	No, previously Carbon-Capture Inc.	Yes	Yes	Coal, trona, gas processing	Yes
Eastern Wyoming Sequestration Hub	5.1M tons/yr	Yes	Unknown	Unknown	No	Yes	Ethanol, gas processing	Yes
Casper Carbon Storage Hub	10M tons/yr	Planned	No	Yes, Spiritus	No	Yes	Coal, gas processing	No

These three sequestration hub projects in Wyoming are the most developed to date and share many characteristics.

The Eastern Wyoming Sequestration Hub has secured leases to geologic storage in Wyoming that abut the state's borders with Nebraska and Colorado, which brings an outstanding policy question to the fore. Many of Wyoming's top carbon storage basins are located near or extend into neighboring states, including the Greater Green River Basin (into Colorado and Utah), the Bighorn and Powder River Basins (into Montana), and the Denver Basin (into Nebraska and Colorado).[3] Once CO_2 is injected underground, it can migrate through rock formations and subsurface pathways across state lines, bringing the CO_2 into the regulatory jurisdiction of Wyoming's neighbors. Because other states either have conflicting policies or have not passed laws governing the ownership of storage, monitoring requirements and questions of liability, projects near state lines cannot fully utilize their leased assets at this time. Interstate compacts may be required to allow these storage basins to be accessed and utilized in full.

Even factoring in time to forge these interstate storage agreements, carbon sequestration companies are still poised to be ready to store large quantities of carbon before major point-source or atmospheric carbon

3 University of Wyoming School of Energy Resources. (n.d.). Pore space and energy regulation policy. Retrieved from https://www.uwyo.edu/ser/research/centers-of-excellence/energy-regulation-policy/_files/pore-space-compressed.pdf

The opportunity to locate a project in proximity to a sequestration hub to share the costs of sequestration across several carbon sources is a boon for a small nascent industry like DAC.

capture projects have begun. The companies operating these sequestration hubs are hoping to leverage voluntary decarbonization initiatives and compliance markets to accelerate the speed at which industrial operators and DAC companies seek out their sequestration services.

This sequestration hub model is a positive development for DAC companies. Small start-up DAC companies will have difficulty deploying custom sequestration wells because of the level of expertise and capital costs involved. The opportunity to locate a project in proximity to a sequestration hub to share the costs of sequestration across several carbon sources is a boon for a small nascent industry like DAC. Both CarbonCapture Inc.'s Project Bison and Spiritus' Orchard One DAC project chose locations adjacent to sequestration hubs. Similar projects are likely to follow. However, there are still challenges to DAC deployment.

Many DAC projects currently charge between $500 and $1000 per ton of carbon removed from the atmosphere and sequestered, while other types of CDR are regularly delivering products for below $100 per ton.[4] DAC companies justify this price by touting the high durability of their stored carbon solution. In the context of carbon removal, durability refers to how long the captured CO_2 remains sequestered before it is potentially released back into the atmosphere. Non-DAC carbon removal and storage can be relatively insecure in many instances. In contrast, carbon captured through DAC is usually injected deep underground to be stored for thousands of years. Depending on the surrounding geology, carbon stored in this way mineralizes or turns into rock over a period of many years. Measurement of DAC-captured carbon is also relatively simple; a flowmeter is attached to the injection pipeline to measure injected volumes. This can be simpler and more straightforward to measure than carbon removed in other ways, such as improving forest management and quantifying carbon uptake by trees. (While both DAC and other types of carbon removal can provide a positive impact on climate, this paper focuses on DAC due to the large opportunity for deployment in Wyoming, where the arid climate can make other sequestration pathways difficult).

The state of Wyoming's deep interest in and support for these economic sectors has led to a mature regulatory environment for carbon sequestration that can benefit DAC companies should they choose to deploy in the state.

But sequestration wells cannot be drilled everywhere. These wells must be located near specialized geology where high volumes of CO_2 can be injected and will remain for a long period of time. Transport and injection of CO_2 also require specialized skills that are typically practiced primarily by oil and gas companies. Geologic sequestration is also useful for other industries like point-source carbon capture and enhanced oil recovery (injecting carbon dioxide into low-producing oil and gas wells). The state of Wyoming's deep interest and support for these economic sectors has led to a mature regulatory environment for carbon sequestration that can benefit DAC companies should they choose to deploy in the state.

Another issue is that most sequestration wells are built for significantly larger quantities of CO_2 than early-stage DAC projects can supply. The wells require steady injection rates at a uniform pressure for safe operation. DAC industry project announcements generally quote megaton-level capture numbers as their aspiration, but plan on first deployments in the 1k–25k tons/year range. This is problematic because sequestration wells, in order to justify their capital investment, are typically sized to inject 500k–1M tons/year and cannot economically operate below 100k–125k tons/year due to the high costs of financial assurances required by regulatory agencies.

4 GoSupercritical. (n.d.). How much do carbon removal credits cost in 2024? Retrieved from https://gosupercritical.com/blog?p=how-much-do-carbon-removal-credits-cost-in-2024

This creates an environment where the early-stage DAC projects are then reliant on other sources of carbon, such as point-source capture, that are outside their sphere of control, to ensure that they can deliver their product to carbon credit purchasers. Considering the slow rate at which point-source projects have been deployed up to now, this is a serious concern. In addition, companies capturing sources of carbon may be interested in selling CO_2 to enhanced oil recovery operations when market conditions allow. Given that DAC operators are dependent upon other companies delivering agreed-upon amounts of CO_2 to a shared sequestration well in order to maintain the required well pressure, individual DAC projects could find themselves unable to complete delivery of their product through no fault of their own. This issue is remedied as the DAC project comes to scale and meets the minimum requirements to operate a well independently, but the early years of a project are unstable enough without this added uncertainty.

It may prove wise for early-stage DAC projects to seek out other uses for their CO_2 for first deployments until projects scale to significant volume. Some other uses for CO_2 that may be viable for DAC companies include building materials and sustainable aviation fuels. A project that provides an alternate use for small-to-mid-scale volumes of CO_2 adjacent to a sequestration hub could provide mutual benefit to both capture operations and the sequestration hub.

DAC companies should seek to take advantage of Wyoming's rapidly maturing sequestration services by deploying close to these resources and outsourcing the skills and capital they would need to deploy in other regions. At the same time, they may need to reduce the risk of early-stage deployments by locating near other, larger-scale capture projects (which are not currently operational in Wyoming), storing CO_2 for the interim while the project scales up or identifying alternate uses for their CO_2.

Energy Supply

Currently, most technological carbon removal technologies, like DAC, require large amounts of energy (primarily in the form of electricity) to power their processes. Industrial heat used in the capture and compression of CO_2 for transport and its sequestration are extremely energy intensive. To maximize net tons of CO_2 sequestered by their operations, DAC companies seek out low-carbon sources of power.

Carbon credit buyers, non-governmental organizations (NGOs), and governments have supported the carbon removal industry but have concerns about the origins of DAC's energy supply. DAC companies that are purchasing RECs on an open market or are merely paying a renewable energy tariff to a large grid operator are widely considered to be inadequately sourcing clean power for reporting and life-cycle analysis purposes. By adding to global energy demand, they are perceived to be slowing the global energy transition and possibly increasing carbon emissions in the short term. In response, buyers, governments and advocates have set a standard that power for DAC projects be newly constructed clean generation, or "additional," locally produced, and preferably hourly matched to the DAC operation's demand.

This is proving to be an exceedingly difficult standard to satisfy for early-stage DAC projects due to the slow rate at which new energy projects are interconnected to the grid and the cost of financing them. In the section that follows, we examine the pathways to powering DAC projects in Wyoming and offer recommendations to encourage additional deployment.

Currently in Wyoming, there are two pathways to energizing industrial projects with large energy demand. The standard pathway is to work with a utility, just like commercial or residential power users. Utilities provide expertise, access to massive, reliable energy grids, and the assurance of working with a stable, long-term partner. In exchange, the customer pays the utility a premium for its power and investments. A downside to this pathway is that the electric utilities in Wyoming are regulated monopolies that move deliberately to address needs and integrate new large loads or generation resources, but often not at the speed desired by individual customers. Project developers shared with TNC that large load tie-in requests can take 18 months to six years to fulfill in Wyoming. New energy generation projects also see long interconnection timelines, frequently four to six years or longer. The power user must also grapple with the energy mix provided by the

Access to low-carbon sources of power are crucial for DAC companies to maximize net CO_2 sequestration. © Marekuliasz/Shutterstock

utility, possibly paying a premium over typical rates for clean power. These factors can make it difficult for DAC projects to satisfy buyers' demands for a new, local, and hourly-matched power supply.

Utilities are increasingly facing headwinds from long-term risks, like increasing wildfire liability and policy whiplash, like conflicting energy resource portfolio standards, across their territories. These factors lead to uncertainty and cost increases for customers that undermine the business case of working with utilities for large power users. The new paradigm of rising energy demand is also a challenge for energy-intensive industries, like DAC. Longer waits to interconnect to the grid and competition from other projects that may be able to pay higher prices for power create significant barriers to traditional grid integration of DAC projects.

DAC developers may instead choose to construct and manage their own energy generation system; this is called the "behind-the-meter" pathway. However, Wyoming does not currently allow behind-the-meter energy generation facilities to be owned by a third-party independent power producer (IPP). They *must* be owned by the ultimate power user or be connected to the utility (and subject to the utility's regulations). Many DAC companies have millions of dollars in funding from venture capital or other sources. But the capital cost of energy generation on the scale required to power DAC projects can easily run into the billions for an expense that is not part of their core business. Financing the energy generation required to power DAC projects out of pocket is clearly beyond the capacity of start-ups in the industry.

Even if Wyoming were to change the behind-the-meter law to allow third-party ownership, it may not help DAC start-ups with no credit rating. IPPs are unwilling to construct facilities and sign long-term contracts with high-risk partners, like DAC start-ups, because if the energy user disappears, the IPP has no way of selling the energy they produce. They would then need to negotiate a power purchase agreement with the local utility while at the considerable negotiation disadvantage of having already invested in the project. Unless the DAC start-up is in a unique financial position, contracting for third-party generation is very difficult.

Behind-the-meter generation is attractive because it can be deployed quickly, avoiding a utility's time-consuming regulatory processes, and because costs are fixed by long-term contracts for non-fuel energy generation sources. But the disadvantages of this pathway are also considerable. Financing, owning and operating an energy generation facility requires enormous capital investments and an entirely new set of core competencies for DAC companies. Both are tall orders for small, specialized start-ups.

Interviews with experts revealed that two changes to Wyoming's energy policies would make it easier for start-ups and other industrial projects to deploy in Wyoming. These changes may have different impacts on residential or other small-scale power users but would likely be beneficial to economic development efforts at large.

- The state should consider allowing third-party ownership of behind-the-meter projects, perhaps in a limited capacity, with each project serving no more than 4–5 customers or staying below a certain generation capacity threshold. This would allow industrial projects, including DAC projects, to move more quickly to access new and local energy generation, while allowing them to outsource energy generation expertise to specialists and utilize long-term contracts to avoid large capital costs.

- In order to de-risk long-term contracts and incentivize both utilities and IPPs to invest in Wyoming, the state should encourage and embrace day-ahead markets and explore mandating that the utilities join a regional transmission organization (RTO). Day-ahead markets, like the California Independent System Operator (CAISO) Extended Day-Ahead Market (EDAM) or the Southwestern Power Pool (SPP) Markets+, provide energy generators with a secondary path to selling power if a high-risk primary partner is delayed or fails. This de-risking is critical to bringing new power-sector investment to Wyoming. Without making these changes, Wyoming stands to miss out on the opportunity to build a DAC industry, while more open and dynamic energy markets reap the benefits, despite the state's considerable investment in sequestration-related industries.

Due to the above factors, companies with technologies that require less energy-intensive processes to capture CO_2 may be better suited to Wyoming's regulatory environment in the near term.

Community, Culture and Public Knowledge

Community outreach for DAC projects in Wyoming requires careful consideration to foster acceptance, as these initiatives are closely tied to the often-debated topic of climate change. Without thoughtful engagement, projects may struggle to gain local support, so it is essential to address concerns, provide clear information and ensure transparency in their development.

Many in Wyoming hold varying views on climate science, making discussions around related topics complex and nuanced.[5] DAC companies would be wise to publicize their projects through the employment and tax dollars they will bring, not their climate benefit. Some interviewees felt that Project Bison's initial announcement did not fully align with Wyoming's values or diverse perspectives on climate change, so the project did not resonate with local communities as well as it could have. Additional concerns were raised about the facility's impact on wildlife and grazing, compounded by out-of-state interests demanding more carbon-free power—a political trend that has adversely affected Wyoming's coal industry.[6]

Unlike for coal, oil, gas and uranium extraction, Wyoming currently does not impose a tax or fee on permanently sequestered carbon that could benefit the state's general fund, which supports services like education, healthcare and public safety. This is despite the argument that geologic storage space is a finite resource, much like Wyoming's mineral resources. Through Wyoming's regulatory process, Class VI well developers are charged a fee for the permit application, and then a small fee of $.07/ton of carbon sequestered is collected to administer Wyoming's Underground Injection Control Program, but no money goes toward broader state-level and community-level services in the way that traditional severance taxes on coal, oil and gas do.[7] Implementing such a measure in Wyoming could provide state-level and community support for carbon storage projects, especially if communities and state leadership felt that their constituents were benefiting from the

5 WyoFile. (2025). Make carbon dioxide great again: Law would ban carbon reduction efforts in Wyoming. Retrieved from https://wyofile.com/make-carbon-dioxide-great-again-law-would-ban-carbon-reduction-efforts-in-wyoming/
6 Inside Climate News. (2022). Carbon removal and fossil fuels in Wyoming. Retrieved from https://insideclimatenews.org/news/04122022/carbon-removal-fossil-fuels-wyoming/
7 Wyoming Legislature. (2023). Annual fees presentation. Retrieved from https://wyoleg.gov/InterimCommittee/2023/09-202305182-04Annual_Fees_Presentation.pdf

arrangement. Some sequestering partners in the DAC start-up space have expressed willingness to pay a fee per ton of injected carbon to foster greater community support and contribute to the state's coffers, ensuring long-term sustainability of the industry. However, other industry actors are wary of additional taxes or fees that could increase project costs, particularly given the nascent state of the industry.

The community of Rock Springs is well-situated for DAC projects.
© Jacob Boomsma/Shutterstock

Another community-level issue is the hesitancy of companies to provide hard numbers on job creation due to the long timeline for deployment. According to a study by Rhodium Group, a 1-megaton capacity DAC plant could generate roughly 3,500 jobs across the DAC supply chain, including up to 300 permanent operations and maintenance jobs.[8] However, it is unclear how many of these jobs would be based in Wyoming without the state playing a key role in the manufacturing supply chain of the modules that draw carbon from the atmosphere. In addition, interviewees emphasized the importance of focusing on Wyoming workers' current skillset and marketing these jobs as opportunities for oil and gas workers to appeal to the public and gain a stronger social license to operate in the state.

While messaging effectively and providing a realistic outlook on the benefits to Wyoming communities and families are crucial, a knowledge gap in the state regarding carbon capture projects remains prevalent. Wyoming communities have a strong familiarity with industrial development projects, a factor that has attracted interest from several DAC companies looking to establish operations in the state. However, polling results indicate ambivalence and a potential lack of knowledge about DAC and permanent sequestration of carbon, with many residents reporting neutrality or uncertainty. Permanent sequestration in Wyoming of carbon that had been produced out of state received the most opposition, with 43% of respondents expressing opposition and just under 20% of respondents noting that they either opposed or supported DAC technology, but they were "not sure" about it.[9]

While it is clear there is a need for more public knowledge on carbon capture technology and DAC, it is not obvious who the best messenger is for this information. One option is the University of Wyoming's School of Energy Resources (UW SER), which is playing a key role in educating and supporting Wyoming residents as the state advances in carbon capture technology. The school recently released a comprehensive resource guide titled "What Every Wyoming Landowner Should Know About Carbon Capture and Storage (CCS)".[10] This guide aims to address common questions and concerns that landowners may have regarding CCS technology. As a trusted academic institution, UW SER is viewed as a neutral, third-party source, without ties to industry, profit or advocacy-related bias toward addressing global carbon emissions.

As Wyoming navigates the complexities of DAC and carbon storage, the industry's long-term success will largely depend on its ability to align with local values, address economic concerns and build trust with communities. Clear communication, tangible benefits such as job creation and tax revenue, and careful consideration of land use and infrastructure will be key factors in fostering broader public acceptance. While skepticism remains, Wyoming's deep-rooted expertise in industrial development offers a strong foundation for integrating DAC into the state's evolving energy landscape. If approached strategically and transparently, DAC could become a valuable tool for economic resilience while respecting the livelihoods and perspectives of Wyoming residents.

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8 Rhodium Group. (2020). Capturing new jobs and new business. Retrieved from https://rhg.com/research/capturing-new-jobs-and-new-business/

9 University of Wyoming School of Energy Resources. (2022). Social license report 2022. Retrieved from https://www.uwyo.edu/ser/research/centers-of-excellence/energy-regulation-policy/_files/social-license-report-2022.pdf

10 University of Wyoming. (2023). UW's SER releases landowners' resource guide for carbon capture and storage. Retrieved from https://www.uwyo.edu/news/2023/08/uws-ser-releases-landowners-resource-guide-for-carbon-capture-and-storage.html

Wyoming is poised to be a leader in DAC development due to its energy expertise, regulatory environment and geology conducive to permanent CO_2 storage. However, in many cases it lacks statewide incentives and adequate access to clean energy generation to bolster the industry.

Wyoming state incentives that could prove useful to DAC investors include the Energy Matching Fund. © Randy Runtsch/Shutterstock

State and Federal Incentives

As mentioned above, Wyoming is poised to be a leader in DAC development due to its energy expertise, regulatory environment and geology conducive to permanent CO_2 storage. However, in many cases it lacks statewide incentives and adequate access to clean energy generation to bolster the industry.

One potential incentive, Wyoming's Energy Matching Fund (EMF), is a strategic initiative designed to spur innovation and bring transformative energy projects like Project Bison to the state. Since its inception in 2022, the Wyoming Legislature has appropriated $255 million to support research, demonstration, pilot projects and commercial deployment related to Wyoming's energy needs.[11] The fund is established to support projects utilizing various technologies, including carbon capture, utilization and storage; carbon dioxide transportation; industrial carbon capture; coal refining; hydrogen production; biomass and biochar; hydropower; battery storage; and wind and solar energy. However, in the 2025 legislative session, some legislators sought to remove the "carbon storage" portion of the fund's enabling legislative language while also filing bills and amendments to allow for more oversight of how the funds are granted.[12] Despite the innovative goal of the EMF to welcome new and nascent industries, Project Bison never benefited from EMF contributions due to concerns and uncertainty around the company's plans to procure their carbon-free power in order to operate their modules (see Energy Supply section).

Wyoming also currently lacks statewide incentives for purchasing carbon removal credits, which could further hinder the growth of its carbon capture industry. Without these incentives, companies may be less motivated to invest in carbon removal projects. In contrast, states such as California have implemented robust carbon pricing policies and financial incentives to encourage carbon removal and capture. California's Cap-and-Trade program, for example, allows companies to purchase carbon credits to offset their emissions, creating a market-driven approach to reducing emissions and fostering economic diversification.[13] Industrial actors in the DAC space reported to TNC that Wyoming wouldn't need to pass a cap-and-trade bill to incentivize industry deployment. Instead, the state could offer to purchase credits from DAC companies to create more security for a start-up and utilize those credits to help meet the state's "net negative" goal announced by Wyoming Governor Mark Gordon in 2021.[14]

As previously discussed, Wyoming has yet to implement a revenue-generating scheme for permanently stored carbon. Policymakers have strongly felt that carbon imported from across state borders should be taxed at a higher rate than carbon captured within the state. Taxing carbon imported from out of state could be a strategic move for Wyoming, providing a new revenue stream without burdening businesses operating in Wyoming. However, it could also pose a financial disincentive for successfully standing up and de-risking the state's carbon storage hubs and associated local storage projects.

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11 Wyoming Energy Authority. (n.d.). Energy matching funds. Retrieved May 19, 2025, from https://wyoenergy.org/energy-matching-funds/

12 Tan, C. (2025, January 28). Lawmakers discuss oversight of Wyoming's large energy project funding. Wyoming Public Media. Retrieved May 19, 2025, from https://www.wyomingpublicmedia.org/natural-resources-energy/2025-01-28/lawmakers-discuss-oversight-of-wyomings-large-energy-project-funding

13 Center for Climate and Energy Solutions. (2025). U.S. state carbon pricing policies. Retrieved May 19, 2025, from https://www.c2es.org/document/us-state-carbon-pricing-policies/

14 Associated Press. (2023, October 10). Joe Biden technology business science Mark Gordon. AP News. https://apnews.com/article/joe-biden-technology-business-science-mark-gordon-d87892cc65ee90d156488060151eb680

The fledgling DAC industry also continues to experience unpredictability in terms of the federal policy landscape. Shifting presidential priorities have significantly influenced the availability of incentives for DAC technology. For instance, in 2022, Congress expanded the 45Q tax credit and allocated up to $180 per ton of CO_2 captured and stored using DAC technologies.[15] The same year, the Department of Energy committed $3.5 billion to develop four regional DAC hubs, each aiming to capture at least one million metric tons of CO_2 annually. More recently, DAC technology continues to receive support, albeit with some uncertainties. The House's recent budget reconciliation bill included changes to 45Q carbon sequestration tax credits, accelerating their phaseout and introducing new restrictions. The House bill also proposed repealing the credit transferability provision starting two years after enactment, which could impact financing options for carbon capture projects. However, the final version of the budget reconciliation bill preserved key elements of the 45Q carbon sequestration tax credit, including lifetime transferability. Despite efforts by some to repeal the credit, the final bill maintains the credit's core provisions, signaling continued federal support for carbon management technologies.

Wyoming stands at a pivotal moment in shaping the future of its DAC industry. Strategic action—whether through tax structures, market-based incentives or strengthened support for emerging technologies—could help Wyoming capitalize on its advantages while fostering community acceptance and long-term economic viability.

Recommendations

As Wyoming solidifies its leadership in carbon management, the DAC industry has a valuable opportunity to grow by leveraging the state's energy strengths and evolving regulatory framework. Thoughtful policy decisions, targeted investment incentives and strong community engagement will be essential in ensuring that DAC projects integrate effectively while addressing feasibility and long-term sustainability challenges. The following recommendations outline how Wyoming can establish itself as a leading hub for DAC innovation and deployment.

Outdoor and solar panel inspection © PeopleImages.com, Yuri A/Shutterstock

Allow third-party ownership of behind-the-meter energy generation

Wyoming should consider changing its regulations to allow third-party ownership of behind-the-meter energy generation, perhaps in a limited capacity, with each project serving no more than 4-5 customers. This would allow industry, including DAC projects, to move more quickly to access new and local energy generation, while allowing them to outsource that expertise to specialists and utilize long-term contracts to avoid large capital costs. Wyoming's currently deployed energy generation is already allocated to customers, making it difficult for large loads to gain entry to the grid. Long interconnection timelines for both power users and generators complicates the ability of businesses to deploy in Wyoming. This would offer an alternate pathway. To some DAC developers, long-term contracts that are insulated from utility price increases are also attractive.

Third-party ownership of behind-the-meter power generation in Wyoming is a significant change to the state's current regulated utility structure. Concerns that this policy change could increase the cost of electricity for residential and commercial power users are legitimate and deserve close scrutiny. But the state must also weigh the pros and cons of the status quo and consider that its current electric utility regulatory environment is one of the largest factors stymying economic development in Wyoming for several industries, not just DAC.

15 Carbon Capture Coalition. (2023). Primer: 45Q tax credit for carbon capture projects. Retrieved May 19, 2025, from https://carboncapturecoalition.org/wp-content/uploads/2023/11/45Q-primer-Carbon-Capture-Coalition.pdf

Help Wyoming utilities integrate with western day-ahead markets

Encouraging Wyoming's utilities to integrate with western day-ahead power markets would also be a powerful driver for bringing new economic investment into the state. These markets de-risk new energy projects by providing an alternate possible source of revenue to power plant owners. De-risking new energy generation makes it easier to deploy projects, such as DAC, that have large energy loads. The ability to deploy new energy generation quickly is a foundational element of Wyoming's pursuit of a thriving and diversified economy, and joining a regional market could be a significant driver.

Implement a state tax on stored carbon

Wyoming should consider the pros and cons of implementing a tax or fee on stored carbon similar to how the state levies a severance tax on mineral resources. For instance, Mississippi levies a 1.5% gross income tax on businesses involved in carbon sequestration activities, similar to how that state also taxes gross income from electricity sales.[16] Wyoming policymakers should also consider whether there are aspects of the tax that could relieve financial burden to DAC companies given their early stage of development. A sliding-scale fee based on tons of carbon sequestered or phased-in implementation that allows time for businesses to scale up initial operations could make a new tax or fee less burdensome. To balance this potential disincentive, Wyoming policymakers should consider ways to make the state attractive to developers through providing additional security to DAC companies.

Clarify pore space ownership near state lines

As discussed, several of Wyoming's high-potential carbon storage basins extend into neighboring states such as Colorado, Utah, Montana and Nebraska. West Virginia has empowered their state regulatory authorities to collaborate with other governments or government entities for the purpose of regulating carbon dioxide storage projects that extend beyond state's borders.[17] Wyoming should consider the potential for creating interstate agreements that clarify pore space ownership and utilization regulations across state lines.

The Eastern Wyoming Sequestration Hub already holds leases to pore space adjacent to the Wyoming borders with Colorado and Nebraska. Other projects will likely explore sites near state borders in the future. But geology, of course, does not stop at borders and stored carbon will freely move across them. To buoy the growing carbon management industry, Wyoming should clarify regulatory issues across borders such as measurement, reporting and verification standards, tax law and pore space ownership.

Establish a market for verified carbon removal credits

While the adoption of a carbon compliance market may be improbable given Wyoming's conservative landscape, its implementation would mark a significant opportunity for the state's DAC sector. By establishing a reliable market for verified carbon removal credits, such a framework would enable long-term private investment, promote fiscal certainty and strengthen Wyoming's standing as a leader in energy innovation. Rather than speculative spending, compliance-driven DAC would evolve into critical infrastructure—creating jobs, attracting capital and positioning Wyoming at the forefront of pragmatic carbon management solutions.

The DAC industry in Wyoming faces significant challenges in gaining community acceptance due to its association with climate change action, an issue that is generally viewed negatively in the state. Effective communication, community engagement and addressing local concerns about job creation, safety and economic benefits are crucial for fostering support. By leveraging trusted institutions like the University of Wyoming's School of Energy Resources and considering policies that ensure community benefits, the DAC industry can work toward building a more sustainable and accepted presence in the state.

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16 Mississippi Legislature. (2009). House Bill 1459. Mississippi Legislative Bill Status System. https://billstatus.ls.state.ms.us/documents/2009/pdf/HB/1400-1499/HB1459SG.pdf

17 West Virginia Legislature. (2009). House Bill 2860. West Virginia Legislative Bill Status System. http://www.legis.state.wv.us/Bill_Status/bills_text.cfm?billdoc=HB2860%20ENR%20SUB.htm&yr=2009&sesstype=RS&i=2860

Glossary of Terms

45Q tax credit—A federal tax incentive that provides financial benefits to companies that capture and store CO_2. In 2022, Congress expanded the credit to offer up to $180 per ton of CO_2 stored using DAC technologies.

Additionality—A standard in carbon markets requiring that energy for DAC projects come from new renewable generation, rather than existing infrastructure, to ensure a net reduction in emissions.

Behind-the-meter pathway—A model in which companies generate their own electricity on-site rather than purchasing it from a utility, reducing dependence on grid infrastructure but requiring substantial investment.

California Independent System Operator (CAISO)—A nonprofit organization that oversees the electricity grid in California and operates energy markets, including the Extended Day-Ahead Market (EDAM) for scheduling electricity purchases in advance.

Cap-and-trade program—A market-based system, implemented in states such as California, that allows companies to buy and sell carbon credits to offset emissions. This approach aims to reduce greenhouse gas emissions while encouraging investment in carbon reduction technologies.

Carbon credits—Tradeable certificates representing one metric ton of CO_2 emissions that has been avoided, reduced or removed through an approved climate project.

Carbon Dioxide Removal (CDR)—A broad category of technologies that remove CO_2 from the atmosphere, including DAC, afforestation and bioenergy with carbon capture and storage.

Carbon management industry—The sector focused on reducing, capturing and storing CO_2 emissions through technologies such as DAC, carbon capture and storage and enhanced carbon sequestration practices.

Carbon removal credits—A type of carbon credit earned specifically by extracting and permanently storing CO_2 from the atmosphere.

Class VI well—A type of injection well regulated by the Environmental Protection Agency for the permanent underground storage of CO_2.

Class VI well primacy—A designation given by the Environmental Protection Agency that allows states to regulate and permit underground CO_2 storage wells independently from federal oversight.

CO_2 transport—The movement of captured carbon dioxide from its source to a storage site, often via pipelines. Safety concerns arise due to potential leaks, pipeline failures and land-use conflicts.

Day-ahead markets—Energy markets where electricity purchases are scheduled one day in advance, helping stabilize power availability and pricing while reducing financial risks for power producers.

Department of Energy (DOE) DAC hubs—A federal initiative allocating $3.5 billion to establish four regional DAC hubs, each with a goal of capturing at least one million metric tons of CO_2 annually.

Direct air capture (DAC)—A technology that removes carbon dioxide (CO_2) directly from the atmosphere using chemical processes. The captured CO_2 can be stored permanently or used in industrial applications.

Durability (in carbon removal)—The length of time that captured CO_2 remains securely stored before it is likely to be re-released into the atmosphere. DAC generally offers higher durability than other removal methods, such as forest carbon sequestration, which can be affected by wildfires or land-use changes.

Eminent domain—A legal process that allows governments or authorized entities to acquire private land for public use, often in exchange for compensation. In Wyoming, debates continue over whether eminent domain should be used for CO_2 pipeline construction.

Energy intensity—The degree to which energy is required for a process or technology to function. DAC has high energy intensity because capturing and compressing CO_2 for storage requires substantial power.

Energy Matching Fund (EMF)—A Wyoming state initiative created in 2022 to support energy innovation, including carbon capture, storage and other technologies. The fund has allocated $255 million for research, pilot projects and commercial energy developments.

Energy resource portfolio standards—Policies that dictate the mix of energy sources that utilities must incorporate, often including mandates for renewable energy and emissions reduction targets.

Enhanced Oil Recovery (EOR)—A process in which CO_2 is injected into depleted oil and gas reservoirs to increase production by pressurizing the remaining hydrocarbons, which also serves as a form of geologic sequestration.

Flowmeter—A device used to measure the volume of CO_2 injected into geological storage sites, providing a more precise measurement than methods like forest carbon monitoring.

Geologic storage—A method of permanently storing captured CO_2 deep underground in suitable geological formations such as saline aquifers or depleted oil and gas reservoirs.

Hourly-matched energy supply—A practice where DAC operations match their energy consumption in real time with clean energy production to avoid contributing to peak demand pressures or increasing fossil fuel reliance.

Independent Power Producer (IPP)—A third-party entity that generates electricity and sells it to utilities or end users. In Wyoming, IPPs are currently prohibited from owning behind-the-meter generation systems.

Interstate compact—A formal agreement between two or more states to manage shared resources or resolve policy conflicts, which may be necessary for coordinating carbon storage regulations across state lines.

Macro-economic uncertainty—Large-scale economic instability caused by factors such as trade policies, inflation, interest rates or global market fluctuations.

Net zero goals—Targets set by governments, businesses, or organizations to balance the amount of greenhouse gases emitted and removed from the atmosphere, typically by mid-century.

Point-source carbon capture—The process of capturing CO_2 directly from industrial emission sources, such as smokestacks at power plants or factories, before it enters the atmosphere.

Pore space ownership—Legal rights to underground cavities or formations where CO_2 can be stored, which must be clearly defined for carbon sequestration projects.

Power Purchase Agreement (PPA)—A legal contract between an electricity producer and a buyer that ensures a long-term purchase of power at a fixed price, reducing investment risk for energy developers.

Project Bison—A proposed DAC facility in Wyoming intended to remove five million tons of atmospheric CO_2 annually. Its development faced setbacks due to energy competition and regulatory challenges.

Regional Transmission Organization (RTO)—An independent entity that manages electricity transmission over large geographic areas, increasing grid efficiency and allowing states to access broader energy markets.

Renewable Energy Credits (RECs)—Certificates representing proof that electricity was generated from renewable sources. Some DAC companies purchase RECs rather than directly sourcing clean power, which has raised concerns about their actual impact.

Renewable natural gas: A sustainable biofuel made from organic waste, refined to be compatible with conventional natural gas systems.

Sequestration as a service—A model where specialized companies offer underground carbon storage to organizations that need to offload captured CO_2, treating carbon storage as a commercial service.

Sequestration hubs—Strategic locations, with appropriate geological conditions, transportation infrastructure and proximity to emission sources for efficient geologic carbon storage.

Severance taxes—Taxes imposed on the extraction of natural resources such as coal, oil, gas and uranium in Wyoming. Unlike these industries, carbon sequestration does not currently face such taxes.

Social license to operate—Public acceptance of a company or project, often influenced by community engagement, local benefits and alignment with local values.

Southwestern Power Pool (SPP) Markets+—A regional electricity market that provides a structured way for utilities and power producers to sell excess electricity and stabilize grid reliability.

Sustainable Aviation Fuels—Low-carbon fuels designed to reduce greenhouse gas emissions from air travel, sometimes incorporating captured CO_2 in their production.

Tariffs—Taxes or duties imposed on imported or exported goods, which can impact economic activity and industrial investment.

Transferability (45Q tax credit): A provision allowing eligible taxpayers to sell all or part of their 45Q carbon sequestration tax credits to unrelated parties in exchange for cash, enabling broader access to project financing.

Underground Injection Control program—A regulatory framework to ensure safe injection of fluids and gases, including CO_2, into underground reservoirs.

Venture capital—Private equity funding provided by investors to startups or emerging businesses with high growth potential but significant risk.

Wildfire liability—A financial risk for utilities, which may be held responsible for wildfires linked to their infrastructure, and which leads to increased costs and operational challenges.


The Nature Conservancy