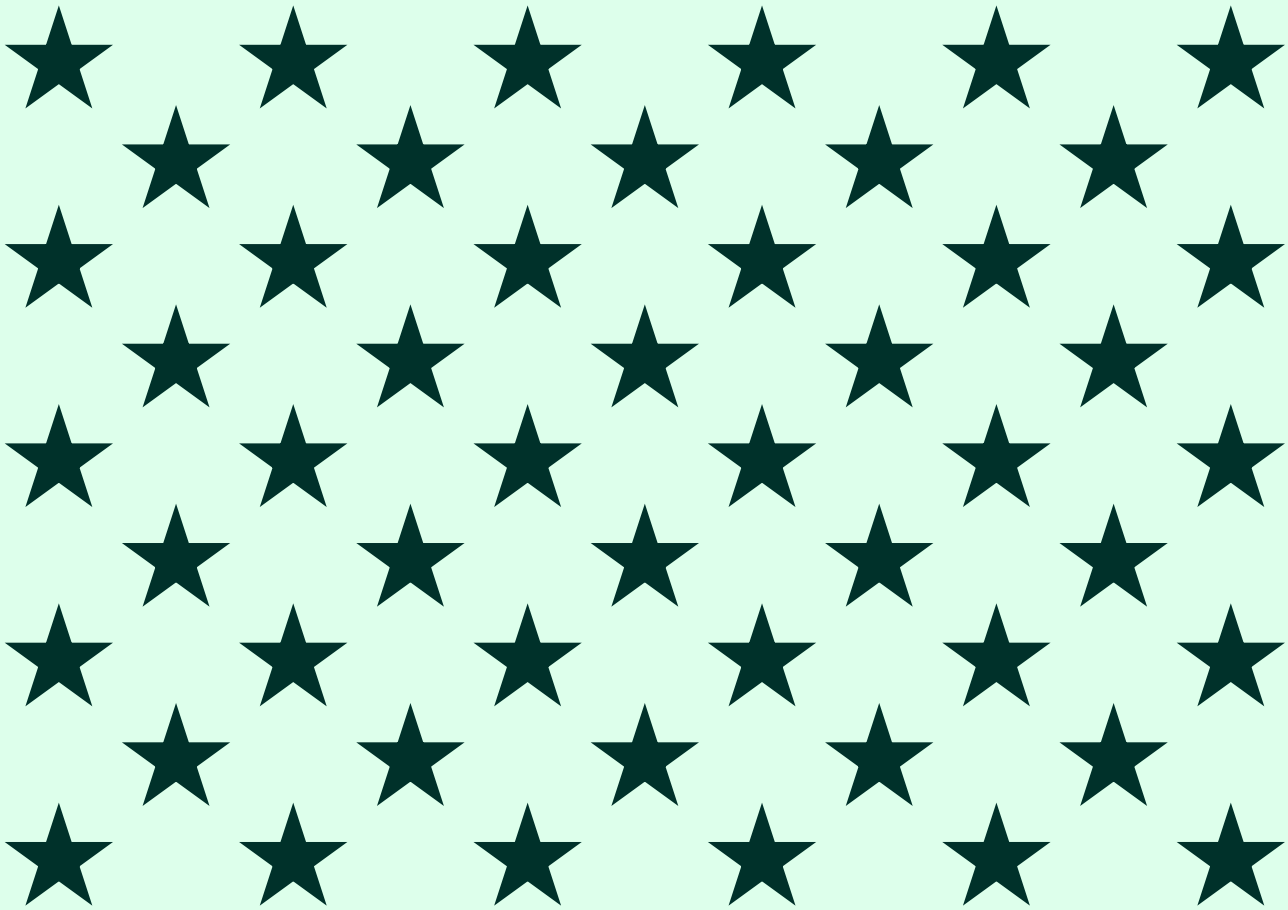

Understanding Carbon Removal Policy Across All 50 US States: An Exclusive Analysis

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May 15, 2023
By Sebastian Manhart, Senior Policy Advisor at Carbonfuture

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Under the Biden Administration, the United States has made some bold and promising moves forward toward tackling climate change. As always, the 50 States play a significant role in exactly how, when, and what that will look like. Within the context of a divided Congress, progressing any new climate legislation will be more difficult. Therefore, we shift focus to look to individual states to see what is possible, for lessons learned, and to pave the way forward for progressive federal carbon dioxide removal (CDR) policies.

Over the course of the last four months, we at Carbonfuture have dug deep into the current state of play of CDR and point-source carbon capture and storage (CCS) policy across the United States. It is worth stressing that CCS is not carbon removal, but emission reduction. Given the long-history and political importance of CCS in the US, we decided to include it in the analysis.

We hope that this report can prove useful in targeting advocacy efforts, as well as serving as a general knowledge base to be further co-developed into a useful tool for the CDR community.

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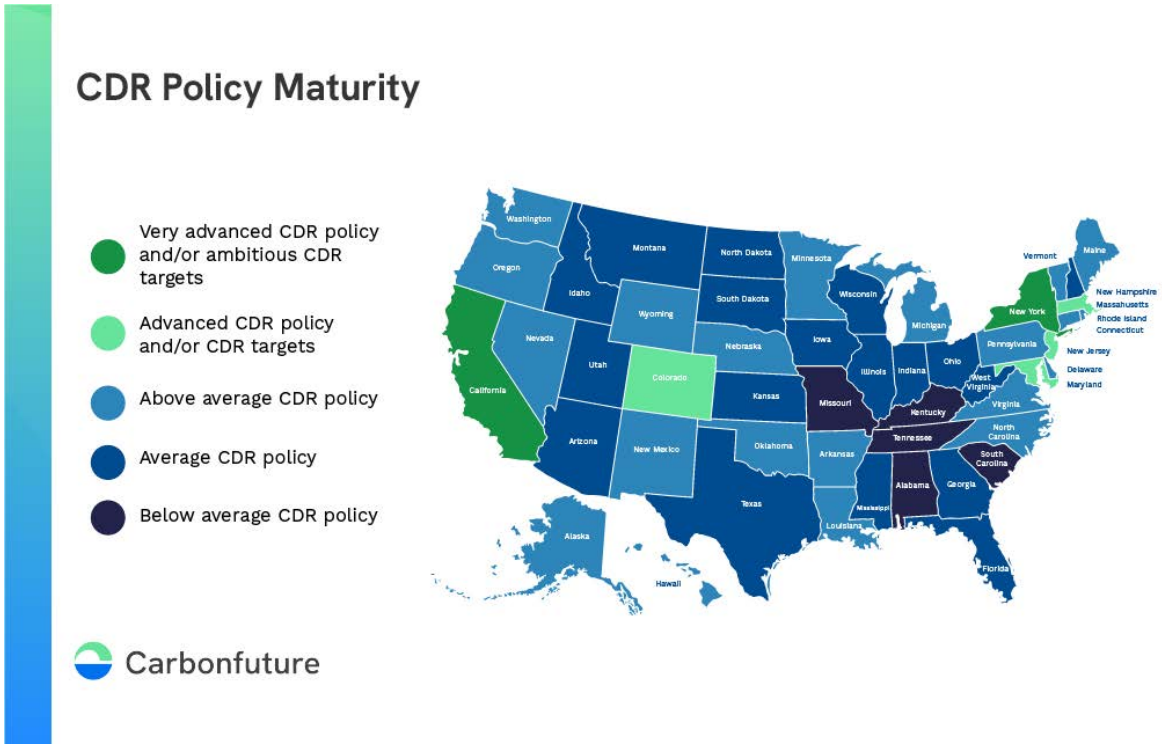
CDR Policy Maturity



A map of CDR policy maturity across all 50 US states

When it comes to overall CDR policy and the development of dedicated, ambitious CDR targets, the following two states are leading the way:

— California, with its 15% emission target for CDR, amounting to 75Mt of CO2 per year by 2045. Also noteworthy is SB308, which would be a landmark legislation for the promotion of CDR at the state level.
— New York, with its soon to be passed Carbon Dioxide Removal Leadership Act (CDRLA) which sees procurement of 10,000 tons of CDR and doubling every year for five years.

Other states, most notably New Jersey, Massachusetts, Maryland, and Colorado have all respectively developed dedicated CDR policies and are set to quickly join California and New York as CDR policy leaders.

Some large states are noteworthily behind: Texas and Florida, both of which do not have a state climate policy and have so far been exclusively focused on CCS (Texas) and forest management (Florida).

With the establishment of the 45Q tax credit for direct air capture (DAC) as well as the $3.5b DAC Hubs Programme, we can expect this map to change. Several

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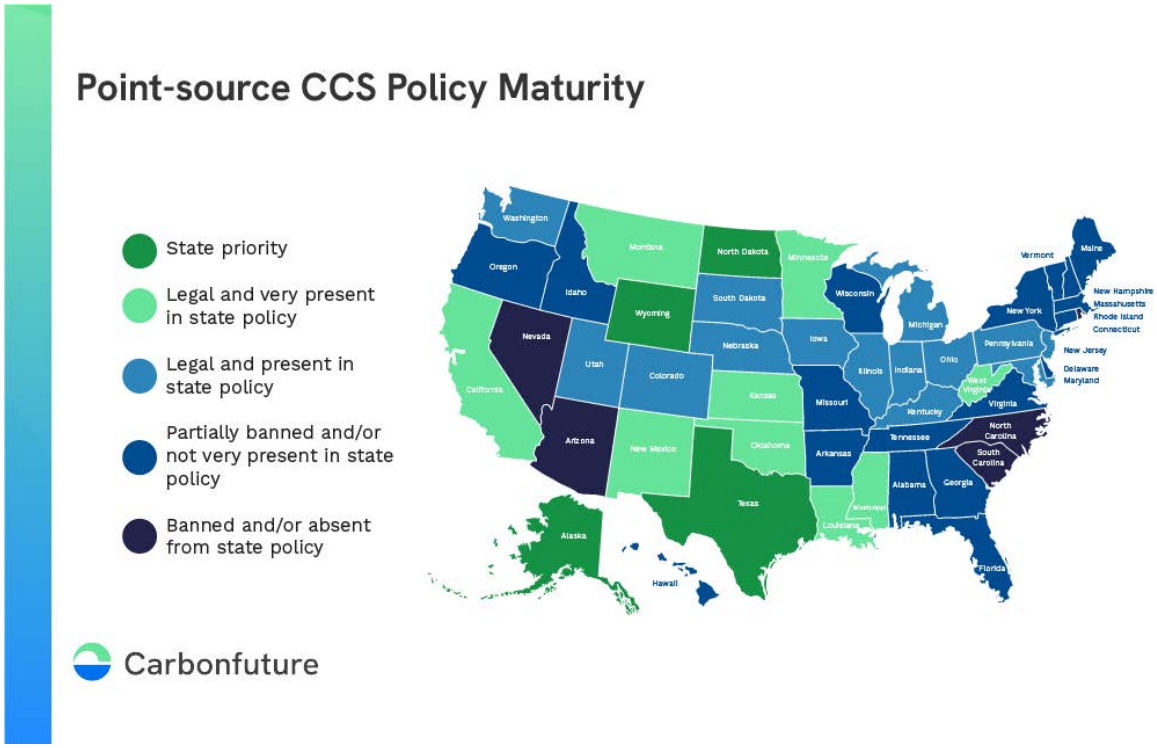
states have expressed strong interest in leading the way on the roll-out of DAC and will likely host projects on their turf, e.g. Texas, Wyoming, Michigan, California, and Louisiana.

Point-source CCS Policy Maturity



Point-source CCS policy maturity across all 50 US states

Overall, CCS enjoys broad support in the US: the 45Q tax credits and recent announcements by the Biden Administration have made it even more prominent and have positioned it as a crucial component of US climate policy.

Unsurprisingly, we are seeing states lead the way that have historically been prominent oil and gas producers, namely Texas, North Dakota, Wyoming and Alaska.

A few states already have legislations that cover questions of liability, ownership and primacy: Wyoming, Montana, and North Dakota. As of last month, Louisiana is also in the final stages of receiving primacy.

In some states, particularly in the Midwest (e.g. Iowa, North Dakota), intense discussions prevail over the construction and safety of CO2 pipelines. Given the need for significant build outs of the pipeline network to over 96,000 miles (from 5,000 today), this could lead to bottlenecks in the future.

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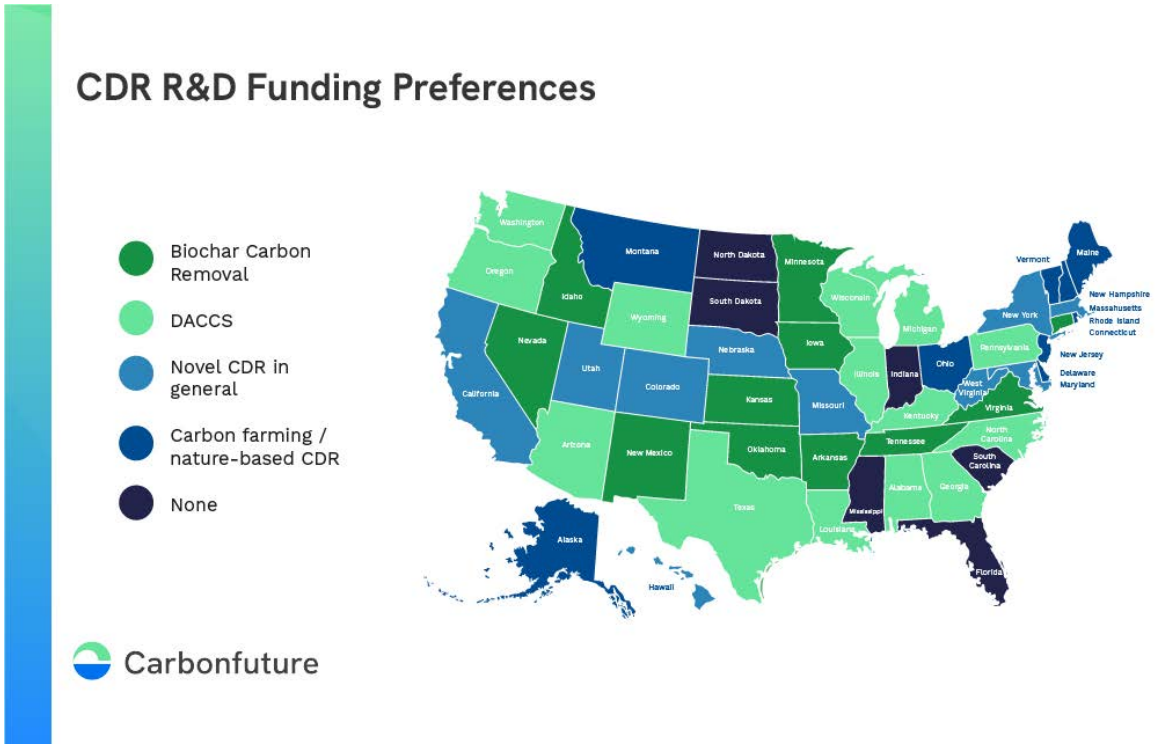
It is fair to say that CCS dominates policy discussions (over CDR) in a number of states, a good example being Illinois, where some legislation would limit CO2 pipelines deployment, and another ban CO2 storage for EOR, while others would incentivize its use by creating a state fund for deployment of CCS in energy infrastructure.

CDR Funding Preferences



CDR Research and Development funding preferences across all 50 US states

The states with the most ambitious CDR policies - California, New York, Massachusetts, and Maryland - also happen to be the ones adopting a portfolio approach to CDR R&D.

Overall, DAC is the preferred CDR technology for R&D. This was boosted by the DOE DAC Hub announcement which triggered some states to focus on DAC development, e.g. Michigan, Wyoming, and Texas.

While biochar carbon removal (BCR) does not yet play a big role in state policies, it is actively being researched and developed by many states, including Iowa, Virginia, Tennessee and Minnesota. Furthermore, some cities are acting as trailblazers (for example Minneapolis, Park City, Cincinnati, Lincoln) and many

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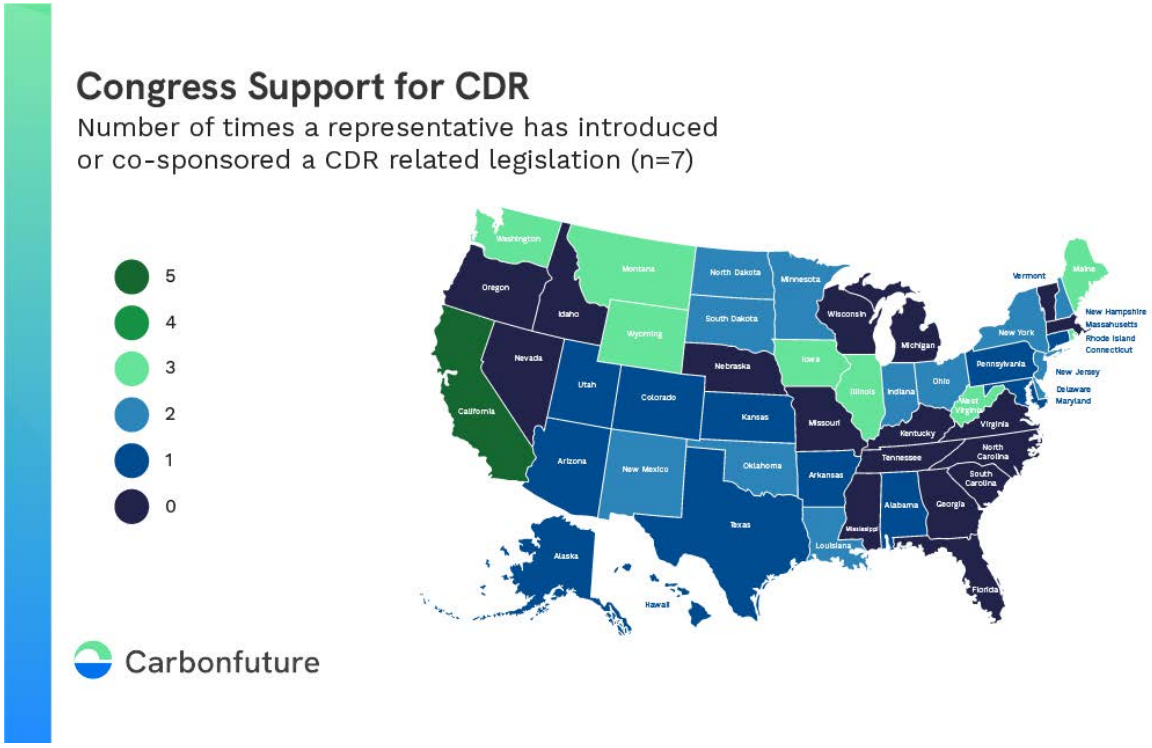
State Universities are researching potential use cases, as well (including Iowa State University which won the first phase of XPRIZE).

Congress Support for CDR



Visualization of Congress support for CDR across all 50 US states

We also looked at where proponents of federal CDR policy come from. For this analysis, we considered the following policies: the Scale Act, the Use It Act, the Biochar Research Act, the Removal and Emissions Storage Technologies Act, the Federal Carbon Dioxide Removal Leadership Act, America's Revegetation and Carbon Sequestration Act and the Biochar Act.

Note: there is a bias for A) bigger states with more Congressman and women (e.g. California), and B) large policies such as the Scale Act, which draws many (co)sponsors.

California is clearly leading the way, with active participation in five out of seven CDR related bills. Eight states supported at least three bills. Interestingly, these are also often states where federal CDR leadership is not necessarily reflected at the state policy level, e.g. Montana, Illinois, or West Virginia. Finally, more than a third of states (n=18) have not supported a single CDR related policy. This, again,

tends to overlap with states that have not seriously considered CDR at the state level, with a notable exception being Massachusetts.

Overall Takeaways

Based on our analysis, we draw six main takeaways

1. California is leading the way: It is the clear leader in CDR nationally. It is among the most advanced states on all fronts, be it policy, R&D or in terms of actions at the federal level.
2. Pioneer states inspire others: The most obvious example is New Jersey's Low Embodied Carbon Concrete Act (shoutout to Open Air Collective), which has inspired similar acts in other states such as Connecticut, California, Illinois, Washington and Massachusetts.
3. Pioneer states adopt a portfolio approach: While every state has to play to its own strengths and weaknesses, it is preferable to look at a broad array of options. This is exactly what California, New York, Massachusetts, and Maryland are doing.
4. Huge gap between the bottom and the top: The contrast between the most advanced and the most behind states is stark; many states do not even have something remotely close to a climate policy. This can be largely explained by a lack of a "policy floor" in the US as it exists, for example, in Europe.
5. Cities can take the lead, too: Even though the state itself is behind, big cities within this state can act as pioneers, particularly on biochar carbon removal. Good examples are Minneapolis, Park City, Cincinnati, and Lincoln.
6. Federal policy influences state preferences: Despite the current lack of a robust CDR policy infrastructure in many states, interest is rising considerably. Federal policies such as the IRA, through the 45Q tax credits mostly, are clearly influencing state-level policies and incentivising states to develop a policy infrastructure to take advantage of federal subsidies.

We hope you enjoyed this brief snapshot of US CDR policy across 50 states. Please note: This analysis is far from exhaustive and will hopefully become outdated quickly, given progress in the CDR space.

You can find the underlying data here.

We welcome your feedback on how we can improve this analysis, which we plan to update at least twice a year. Are we missing a variable? Did we overlook a specific policy in a certain state? Let us know under info@carbonfuture.earth

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Finally, a huge shout-out to our former Research Consultant Alexis Dunand (now at Carbongap) for his dedicated effort on this piece of work.

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For regular CDR policy analysis on Europe, the US, and beyond, follow Sebastian on LinkedIn.