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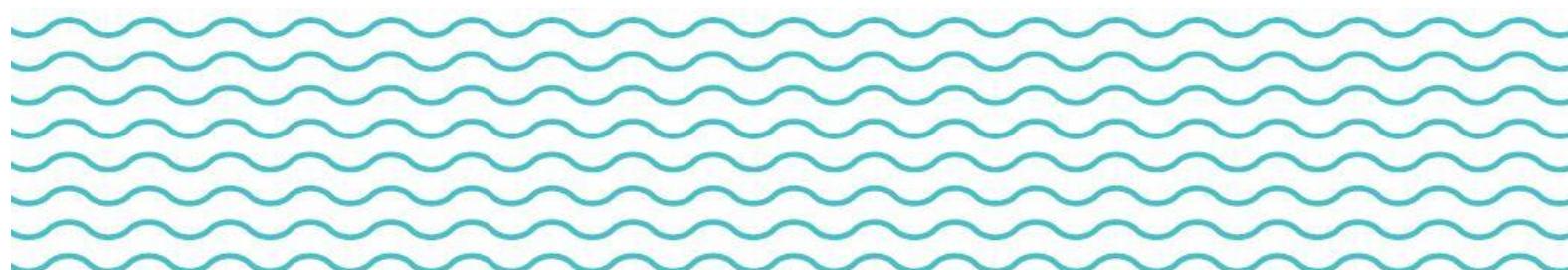
## Brief

# Surveying the U.S. Federal CCS Policy Landscape in 2021

Global CCS Institute

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## 1. Introduction

In the first three months of 2021, legislators in the United States House of Representatives and the United States Senate introduced five bills that aim to accelerate the deployment of carbon capture and storage (CCS). This accomplishment is remarkable for several reasons: first, because of the depth and breadth of the policy provisions inherent in the bills; second, because all of the bills have bipartisan cosponsors; and third, because of the speed with which the bills were released.

From a political standpoint, it is noteworthy that these bills were introduced at all. Fresh off the passage of the Energy Act of 2020<sup>i</sup> – a giant bill that effectively triples Congress’ yearly authorized spending levels for CCS – Congressional advocates chose not to coast after their big legislative accomplishment and instead doubled down on filling out the policy landscape with new bills aimed at the long-term growth of the CCS industry.

Thus, CCS again shows evidence that it might be the only major climate change technology that enjoys such a robust level of support from both sides of the aisle. The increase in both enacted and introduced CCS legislation over the past three years should encourage many more potential developers and investors to get serious about deploying CCS.

This brief was born out of necessity, to keep track of the five new CCS bills. It details both the contents of the bills and the rationale behind their policy proposals. It starts with a list of terms germane to U.S. policy, then follows by outlining the three broad categories (pillars) of CCS policy that support the entire CCS enterprise. Next, it gives a history of major CCS policy provisions enacted into law and carried out by the U.S. government. This context is important to bring the reader into the present and helps frame the discussion of the current CCS bills introduced over the past three months. The last section concludes with a discussion of the current bills.

This brief is intended to be useful to a global audience as a general primer on broad CCS policy themes affecting many countries in 2021. In this way, the U.S. CCS policy landscape can be viewed as a lens to magnify the challenges and opportunities that lie ahead for global CCS deployment in the coming decades.

## 2. List of Terms Germane to U.S. Policy Adoption

- *Authorization* – What occurs when Congress passes a (non-appropriations) bill that is then signed into law by the President. The Bill ‘authorizes’ or allows Congress to spend a certain amount of money on a stipulated project in a designated amount of time. The great majority of bills introduced in Congress are authorization bills. If passed into law, they do not guarantee that funds will be spent.
- *Appropriations* – The process of determining how much money Congress will spend on projects. Appropriations to fund the entire U.S. government are determined annually in the form of 12 appropriations bills that focus on the separate branches of government. The 12 appropriations’ bills are frequently



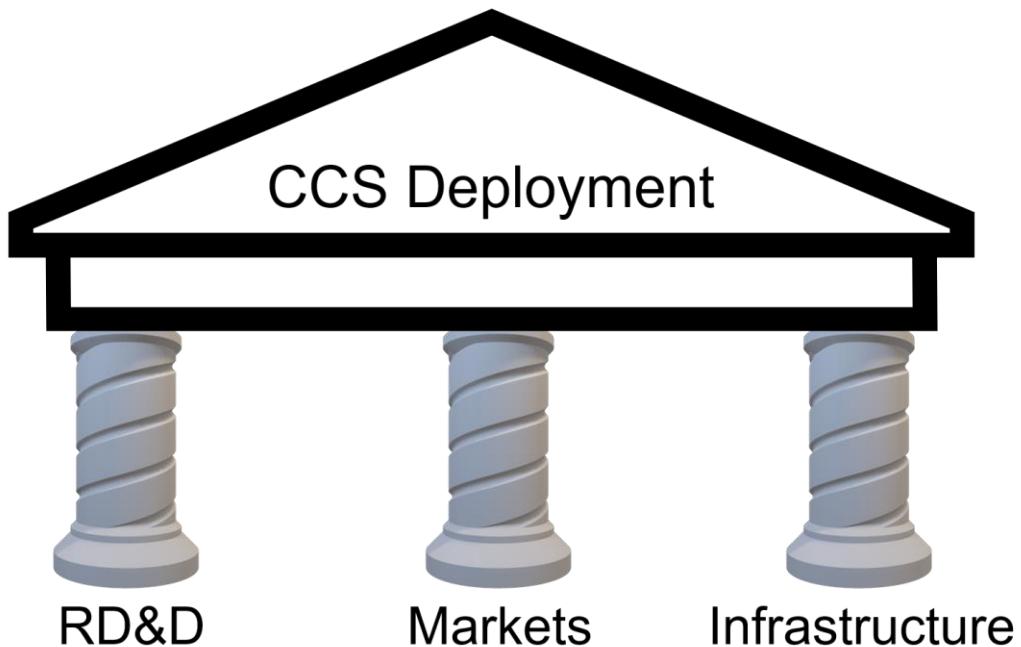
grouped together and passed as an omnibus piece of legislation. Separate appropriations (often done in emergency situations) can occur at any point.

- *Introducing a Bill* – The act of formally submitting a piece of legislation for consideration by the entire House of Representatives or Senate. Bills can be introduced into either chamber or both at the same time.
- *H.R. xxx* – Indicates a bill introduced in the House of Representatives.
- *S. xxx* – Indicates a bill introduced in the Senate.
- *Sponsor of a Bill* – The member of Congress who formally submits a bill for introduction in either chamber and consequently the one who is listed first on the bill.
- *Cosponsors of a Bill* – Sponsors of a bill who have their names added in support of the bill other than the first sponsor who formally introduced the bill. Original Cosponsors are sponsors of the bill (other than the first Member) who sponsored the bill at introduction.
- *Passing a Bill* – When the majority of both chambers of Congress vote to pass a bill which is then signed into law by the President. Once a bill passes one chamber, the bill transfers to the other for consideration. Bills must be passed in identical form by both chambers before being transferred to the President for signing into law.
- *Statutory* – Referring to the language contained in a public law passed by Congress and signed by the President.
- *Rules and Guidance* – How Executive Branch departments (e.g., Department of Energy, Treasury Department or Internal Revenue Service) choose to implement and administer the statutory language in a passed bill. Typically, a department issues guidance and preliminary rulings that are open to public comment for 60 or more days before proceeding to the final ruling.
- *Final Guidance* – The complete set of rules and regulations that apply to the administration of a tax credit or government funding opportunity.

### 3. The Three Pillars of U.S. CCS Policy

CCS policy measures implemented in the US. can be grouped in one of three distinct categories: 1) Research, Development and Demonstration (RD&D), 2) Market Development, 3) Infrastructure. It is best to think of these categories as pillars because they work in tandem to support widespread CCS deployment; all three must be present in some form to fully undergird the enterprise.





**Figure 1:** A visual representation of the three pillars of CCS policy which support widespread deployment.

### 3.1 CCS Research, Development and Demonstration (RD&D)

From bench-scale research to large-scale demonstration facilities, CCS RD&D has historically been the first policy pillar to be constructed around the globe and has consequently provided the most robust support for advancing CCS technology. Many governments are currently funding CCS RD&D programs<sup>ii</sup>.

### 3.2 CCS Market Development

The ‘Markets’ pillar includes any policy that supports the business case for companies to invest in CCS facilities. Examples of policies that fall under this category are tax credits, carbon prices, carbon trading markets, regulations and standards that require a certain amount of ‘low carbon’ energy generation.

### 3.3 CCS Infrastructure

Infrastructure is the third pillar and encompasses policies that facilitate CO<sub>2</sub> transportation, utilisation and underground storage. These measures frequently involve regulations, permitting, licensing and citing as well as the creation of common carrier pipelines or other transportation routes.

Like pillars that support an actual physical edifice, the stronger the pillar, the stronger the building it can support. Likewise for CCS deployment, robust government investment in the CCS policy trifecta is necessary to achieve the 100-fold increase



needed to meet climate scenarios laid out by the Intergovernmental Panel on Climate Change (IPCC)<sup>iii</sup>. Individual facilities can and do exist apart from policy support, but in order to accelerate the deployment of CCS facilities and the growth of a truly global industry, all three policy pillars will need to be significantly strengthened.

## 4. A History of Enacted CCS Policy in the United States

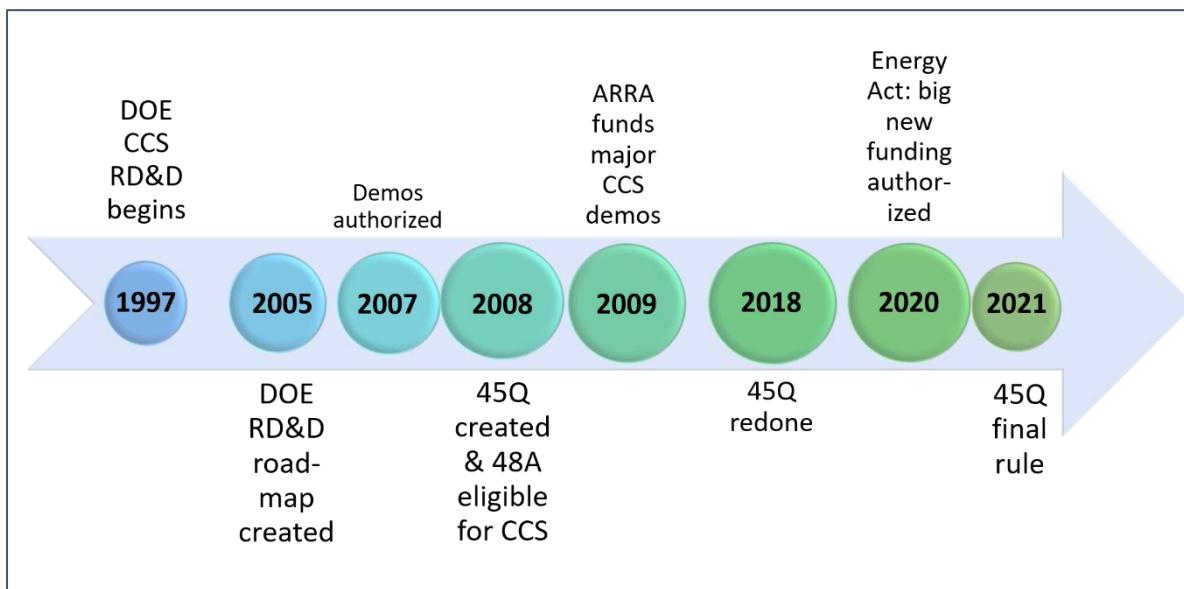


Figure 2. Timeline of major CCS policy enacted in the U.S.

### 4.1 1997: Department of Energy (DOE) Begins CCS RD&D

Most emerging technologies are fostered by RD&D policy support, and the same was true for CCS in the U.S. Though the first global CCS facility was erected in Terrell, Texas in 1972<sup>iv</sup>, Congress did not begin appropriating money for CCS RD&D in the DOE's Office of Fossil Energy until 1997<sup>v</sup>. Funding levels were small in the beginning, and it would take more than a decade before legislators would appropriate the requisite funds to achieve significant results from its fledgling CCS RD&D program.

### 4.2 2005-2007: First Authorizations for DOE's CCS RD&D Program

Congress passed the Energy Policy Act of 2005 which provided a 10-year authorization roadmap for the DOE's CCS RD&D program<sup>vi</sup>. This blueprint was further enhanced with the passage of the Energy Independence and Security Act of 2007 which authorized seven large-scale demonstration projects that integrated capture, transport and storage. In the upcoming years, appropriations would finally begin to match the ambitions of the authorized RD&D program.

### 4.3 2008-2009: First Significant CCS Market Development and Appropriations Legislation

Beginning in 2008, two significant pieces of legislation led to the major growth of CCS



deployment through market development and RD&D support. The first was the passage of the Energy Improvement and Extension Act of 2008<sup>vii</sup>. The second was the passage of the American Recovery and Reinvestment Act (ARRA) of 2009<sup>viii</sup> to pull the U.S. out of the Great Recession.

#### **4.3.a. CCS in The Energy Improvement and Extension Act of 2008**

Tucked into the Energy Improvement and Extension Act are two provisions that established the second policy pillar (CCS Markets) in the U.S. The first provision authorized an additional \$1.25 billion (adding to \$1.3 billion previously authorized) for the Section 48A (48A) investment tax credit which was established by Congress in Energy Policy Act of 2005. With the passage of the 2008 bill, 48A was modified to cover 30% of a developer's investment in CCS retrofits that could capture and store between 65% and 75% of CO<sub>2</sub> emissions from qualifying advanced coal and integrated gasification combined cycle facilities<sup>ix</sup>. The second provision in the legislation created the Section 45Q tax credit (45Q) for carbon oxide sequestration (between 2008-2018 only applicable to CO<sub>2</sub>).

At first glance, Section 48A would appear to provide a significant incentive for investing in CCS retrofits on coal fired power generation, however it has never realized its full potential because of difficulties in the statutory language. When the legislation creating 48A was first enacted in 2005, the statutory language required certain efficiency standards for new and existing coal-fired plants to be able to realize the credit. When the law was amended in 2008, the statutory language regarding the efficiency requirements was not updated, and these standards are impossible to meet for power plants that install carbon capture (though the emissions reductions from the retrofit would be greater than those of the efficiency standard)<sup>x</sup>.

Unlike 48A, 45Q remains a potent force to the present day, but its beginnings were humble. Between 2008 to 2018, 45Q offered \$10/tCO<sub>2</sub> captured and stored via enhanced oil recovery (EOR) and \$20/tCO<sub>2</sub> captured and stored in geologic formations<sup>xi</sup>.

Both the 48A and 45Q tax credits will be revisited farther down in this brief.

#### **4.3.b. CCS in The American Recovery and Reinvestment Act (ARRA) of 2009**

ARRA significantly advanced CCS RD&D by prioritizing large-scale commercial scale deployment. It appropriated \$3.4 billion for CCS activities of which \$2.65 billion was spent on nine large-scale demonstration projects<sup>xii</sup>. Each of the nine projects received at least \$100 million between 2009 and 2015.

### **4.4 2018: 45Q Reformed in the Bipartisan Budget Act**

Over the six years between 2011 and 2018, Congress allotted \$4 billion in appropriations (not including the \$3.4 billion in ARRA supplemental appropriations) to DOE's CCS RD&D program – an average of \$571 million/year<sup>xiii</sup>. Though annual appropriations for CCS RD&D at DOE have declined since those years (In FY2020, direct carbon capture or carbon storage programs were funded at around \$250 million<sup>xiv</sup>.), it was the reformation of the 45Q tax credit in the Bipartisan Budget Act of 2018 that has breathed significant new life into the CCS value proposition. This bill raised the value of the 45Q tax credit to \$35/tCO<sub>2</sub> for EOR and non-EOR CO<sub>x</sub>



utilisation and \$50/tCO<sub>2</sub> for CO<sub>x</sub> secure geologic storage<sup>xv</sup>. (To read more about the current status of 45Q, read the Institute's Insight, "45Q: The 'Most Progressive CCS-Specific Incentive Globally' Is Now Open for Business<sup>xvi</sup>.)

## 4.5 2020: Energy Act Triples CCS RD&D Authorization Levels

The passage of the Energy Act of 2020<sup>xvii</sup> at the end of December gave CCS RD&D authorizations a dramatic boost back up to levels not seen since ARRA was passed. In total, \$6.72 billion was authorized for CCS spending between FY2021 and FY2025: \$2.6 billion for six commercial-scale demonstration projects, \$1 billion for large-scale pilot projects, \$910 million for low-TRL level RD&D, \$800 million for carbon storage, \$447 million for direct air capture (DAC) RD&D, \$283 million for a carbon utilization program, and \$250 million for FEED studies.

## 4.6 2021: Final Treasury Department and IRS 45Q Guidance

Three months ago, the Treasury Department and IRS issued their Final Guidance for the administration of the 45Q tax credit<sup>xviii</sup>. This Guidance provides certainty for CCS project investors and developers by establishing transparency about how to build a CCS project to achieve the full value of the reformed 45Q tax credit in a timely manner.

# 5. Major CCS Bills Introduced in 2021

On 3 January, 2021 the 117<sup>th</sup> Congress was sworn in. It includes the most closely divided House and Senate in decades. Yet, in the space of three months, this new Congress has introduced five major bipartisan bills to increase the deployment of CCS.

## 5.1 ACCESS 45Q Act – H.R. 1062

On 16 February, Representative David McKinley (R-WV) and original co-sponsor Rep. Marc Veasey (D-TX) introduced the ACCESS 45Q Act<sup>xix</sup>. As its title suggests, the bill would amend 45Q to include a 100% direct pay option (cash payments in lieu of the tax deduction), a 10-year extension (end of 2035) of the commence construction deadline (the date when a project must break ground) to qualify for the credit and would also allow 45Q the same exception against the base erosion and anti-abuse tax (BEAT) as is enjoyed by wind and solar tax credits. (The BEAT is a form of alternative minimum tax for corporations to ensure multinationals cannot use deductions based off taxes paid abroad to reduce their US tax liabilities below a certain threshold.)

Currently, the ACCESS 45Q Act has five Republican and five Democratic cosponsors.

## 5.2 Carbon Capture Modernization Act – S. 661, H.R. x

This bill, introduced on 10 March, amends the statutory language passed in 2005 and



2008 to allow coal-fired power generation carbon capture retrofits to profit from the 30% 48A tax credit<sup>xx</sup>. Specifically, the bill would relax the efficiency requirements for new and retrofit projects if they have CCS equipment on them thereby making it technically possible for a coal-fired power generation facility to deploy carbon capture technology and meet the efficiency requirements to qualify for the tax credit. In total, there is \$1.25 billion authorized for facilities that can invest in a CCS retrofit.

The bill currently has five Republican and three Democratic sponsors in the Senate and six Republican and two Democratic cosponsors in the House.

### **5.3 Storing CO<sub>2</sub> and Lowering Emissions (SCALE) Act – H.R. 8995**

Introduced on 17 March, the SCALE Act<sup>xxi</sup> is the first major bipartisan bill introduced in both chambers of Congress to focus solely on the third policy pillar: CCS infrastructure. It builds on the INVEST CO<sub>2</sub> Act introduced by Rep. Cheri Bustos in 2019<sup>xxii</sup> and authorizes \$4.9 billion in spending over 5 years.

Major bill provisions include: 1) The establishment of the CO<sub>2</sub> Infrastructure Finance and Innovation Act (CIFIA) program which would make flexible, low-interest loans for CO<sub>2</sub> transport infrastructure projects available and provide grants for initial excess capacity on new infrastructure in order to incentivize building bigger pipelines; 2) The establishment of the Secure Geologic Storage Infrastructure Development Program to make cost-sharing available for the development of large-scale saline geologic storage sites that can serve as hubs for multiple CCS facilities; 3) More funding for Environmental Protection Agency (EPA) Class VI permitting (the permit needed to do underground CO<sub>2</sub> storage) in saline geologic formations and gives grants that benefits states establishing their own Class VI permitting programs; 4) Grants for states and municipalities to buy low and zero-carbon products made from CO<sub>2</sub> and carbon oxides.

In the House of Representatives, the Bill has three Democratic and two Republican cosponsors. In the Senate, the bill is sponsored by six Democratic and five Republican Senators.

### **5.4 Carbon Capture, Utilization and Storage Tax Credit Amendments Act – S. x.**

On 25 March, an evenly split bipartisan group of six Democrats and six Republicans introduced the Carbon Capture, Utilization and Storage Tax Credit Amendments Act<sup>xxiii</sup>. It contains three provisions (with minor variations) found in the ACCESS 45Q Act. First, the bill extends the commence construction deadline for 45Q project eligibility but only for 5 years. (It's 10 years in ACCESS 45Q.) It also establishes a direct pay for both 45Q and 48A tax credits. Moreover, it allows 45Q the same exception against the BEAT tax as is enjoyed by wind and solar tax credits. Like the Carbon Capture Modernization Act, the Carbon Capture, Utilization and Storage Tax Credit Amendments Act would fix the 48A tax credit language to make coal-fired power retrofits eligible for a 30% investment tax credit. Finally, the Carbon Capture, Utilization and Storage Tax Credit Amendments Act increases the 45Q credit value from \$50 to \$120 per metric ton for direct air capture (DAC) facilities that capture and securely store carbon dioxide (CO<sub>2</sub>) in saline geologic formations and from \$35 to



\$75 per ton for DAC facilities that store captured CO<sub>2</sub> in oil and gas fields.

## **5.5 Financing Our Energy Future Act – S. x., H.R. x.**

One day after the introduction of the Carbon Capture, Utilization and Storage Tax Credit Amendments Act, 26 March, five Democratic and four Republican Senators introduced the Financing Our Energy Future Act, and a Democrat and Republican Representative released the same bill in the House<sup>xxiv</sup>. The bill allows CCS projects to avail themselves of tax-advantaged master limited partnerships (MLPs). By doing this, it reduces the cost of equity and provides CCS developers with access to capital on better terms. MLPs are important tool for financing all types of CCS projects including DAC and also carbon utilisation projects.



**Table 1. Summary of the Policy Provisions in the five CCS Bills Introduced in the 117<sup>th</sup> Congress, 2021-Present.**

Bills in 117 <sup>th</sup> Congress	RD&D Pillar	Markets Pillar	Infrastructure Pillar
ACCESS 45Q Act	x	<ul style="list-style-type: none"> <li>• 45Q Direct Pay</li> <li>• 10-year Commence Construction extension</li> <li>• BEAT exception</li> </ul>	x
Carbon Capture Modernization Act	x	<ul style="list-style-type: none"> <li>• 48A tax credit fix</li> </ul>	x
SCALE ACT	x	x	<ul style="list-style-type: none"> <li>• CIFIA program</li> <li>• Develops Secure Storage</li> <li>• EPA Class VI Well Permitting</li> <li>• Grants for states to buy low-C products</li> </ul>
CCUS Tax Credits Amendments Act	x	<ul style="list-style-type: none"> <li>• 45Q direct pay</li> <li>• 45Q 5-year commence construction extension</li> <li>• BEAT exception</li> <li>• 48A tax credit fix</li> <li>• 45Q credit for DAC - \$120/tCO<sub>2</sub> stored, \$70/tCO<sub>2</sub> in oil fields</li> </ul>	x
Financing Our Energy Future Act	x	<ul style="list-style-type: none"> <li>• CCS qualifies for MLP</li> </ul>	x



## 6. Discussion and Conclusions

U.S. federal policy support for CCS has increased dramatically in scope since its inception 24 years ago. The fact that the U.S. leads the world in CCS deployment<sup>xxv</sup> is a testament in large part to its commitment to policy. Moreover, the twelve commercial CCS projects currently in operation in the U.S.<sup>xxvi</sup> in 2021 demonstrate that the DOE's focus on funding demonstration projects under ARRA was largely a successful venture (though the Agency dealt with significant setbacks with the FutureGen<sup>xxvii</sup> and Kemper<sup>xxviii</sup> facilities). It is very clear that the technical aspects of capturing carbon from a point source (especially post-combustion technology) work well, and that is a tribute to the DOE RD&D enterprise.

More CCS demonstrations on novel applications in industry and power generation will be needed to foster widespread deployment that leads to the 15% cumulative reduction in global emissions provided by CCS in the International Energy Agency's (IEA) Sustainable Development Scenario<sup>xxix</sup>. Authorizations in the Energy Act of 2020 focus support on these areas, but it remains to be seen whether Congress will appropriate the robust funding needed to deploy large-scale demonstrations in novel areas. Strengthening this policy pillar is vital to spur new industries to invest in CCS.

Importantly, while the first enacted bills focused on the RD&D policy pillar, the current crop of introduced bills concentrate on the second and third pillars: markets and infrastructure. RD&D increases, while desired, are much lower on the advocacy priority scale for the U.S. CCS advocates in 2021, who are focusing on making 45Q more favorable for long-term investment and the buildout of CCS infrastructure.<sup>xxx</sup>. CO<sub>2</sub> transport infrastructure, especially, has largely been neglected in introduced legislation until the past two years.

The five bills released by Congress over the past three months are remarkable. Many of the bills contain overlapping policy priorities (e.g., direct pay or extending the commence construction deadline for 45Q), and that augurs well for their inclusion in a future omnibus piece of legislation. These days Congress almost exclusively passes small bills via omnibus – a large group of bills all rolled into one. The more that a policy position is included in multiple smaller bills, the higher the likelihood that the policy will be included in a big omnibus bill. Moreover, the bipartisan nature of these climate change bills is impressive. CCS again shows evidence that it might be the only major climate change technology that enjoys such a robust level of support from both sides of the aisle. The increase in enacted CCS legislation and introduced CCS legislation over the past three years should encourage many more potential developers and investors to get serious about deploying CCS.



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