

FUNDING FAILURE:

CARBON CAPTURE AND FOSSIL HYDROGEN
SUBSIDIES EXPOSED



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Oil Change International is a research, communications, and advocacy organization focused on exposing the true costs of fossil fuels and facilitating the coming transition towards clean energy.

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INTRODUCTION

Despite 50 years of development and an [estimated USD 83 billion](#) in investments since the 1990s, carbon capture has failed to make a dent in carbon emissions. Carbon capture projects consistently fail, overspend, or underperform. In the United States, where most carbon capture projects operate with the help of major federal subsidies, [80% of projects](#) fail due to technical issues, over expenditure, and a lack of financial investment returns. Even if carbon capture functioned as planned, the projects currently operating globally would only capture 0.1% of global emissions. However, many of these projects not only consistently operate below capacity but are predominantly used to boost oil and gas production through enhanced oil recovery (EOR).

Despite this, a tsunami of new carbon capture projects are underway, undermining the imperative to justly and urgently phase out fossil fuels. This new wave is only made possible with hundreds of billions of dollars of public money offered by governments through policies announced since 2020.^a This briefing exposes how governments, primarily in North America and Europe, are continuing to throw away taxpayer dollars to support

the fossil fuel industry's pursuit of the [most expensive and least effective](#) so-called solution to carbon pollution.

This briefing draws from a unique global database compiled by Oil Change International that tracks government awards distributed to companies from 1984 to 2024 for carbon capture and fossil-based hydrogen research, development, and pilot and commercial projects. We have also compiled a policy tracker of existing policies that support both carbon capture and hydrogen with financial incentives. The policy tracker may not be an exhaustive list given the opacity of some governments' policies.

We are in the midst of a climate crisis. Global warming is having a devastating effect on our planet, and is disproportionately felt by communities of color, Indigenous peoples, low-income communities, and other marginalized groups who have contributed the least to the problem. The fossil fuel industry directly harms communities, destroys ecosystems, and drives the climate crisis. In order to achieve climate goals, governments and other decision-makers must support a just and equitable move away from fossil fuels. The current

wave of carbon capture projects and government subsidies will only further entrench the fossil fuel industry and its impacts.

KEY FINDINGS

- **Decades of subsidies have already provided billions in support of carbon capture:**
 - In the past 40 years, nearly USD 30 billion of public money has been spent on carbon capture and fossil hydrogen globally.
 - Five governments spent 95% of that. In descending order, these are:
 - United States (USD 12 billion),
 - Norway (USD 6 billion),
 - Canada (USD 3.8 billion),
 - European Union (USD 3.6 billion)
 - Netherlands (USD 2.6 billion).
- **Subsidies are supporting the production of more fossil fuels:**
 - The United States and Canada have spent over USD 4 billion subsidizing carbon capture for enhanced oil recovery (EOR). This uses public money to pay oil companies to produce more oil.
 - When including an estimate of forgone revenue from the 45Q tax credit, the United States has likely spent at least USD 3 billion subsidizing EOR.

^a While 1984 marks the earliest transactions we found, we chose to start the policy tracker in 2020 since the policies announced since then can be considered currently active.

- Globally, governments have spent USD 4.2 billion on projects that plan to produce hydrogen from fossil fuels using carbon capture. Much more has been committed in announced policies. This is a significant subsidy for a fossil fuel product that is replaceable with renewable energy.
- **Recent policy announcements will greatly increase the scale of subsidies and will result in unprecedented levels of support for carbon capture:**
 - Exxon lobbied for carbon capture subsidies in the United States, telling investors it would reap “trillions” in revenue from carbon capture over the coming decades.
- The United States is estimated to have foregone USD 1.3 billion in tax revenue via the 45Q tax credit for carbon capture up to 2022. Changes under the Inflation Reduction Act (IRA) could lead to much greater losses in the future – [up to USD 100 Billion](#).
- Historical public spending on carbon capture and hydrogen from fossil fuels pales in comparison to the amount of public money recently made available to spend in the coming decade. We track between USD 114 billion and USD 237 billion in available public money announced since 2020.
- **Carbon capture subsidies are breaking promises to end fossil fuel subsidies:**
 - These subsidies will prolong fossil fuel extraction and enhance the industry’s profits, setting back progress made in recent years to eliminate public finance for a sector that is both highly profitable and primarily responsible for the climate crisis we are in.
 - Carbon capture projects frequently fail or deliver well below industry claims of capturing over 90% of emissions. They are often used to justify continuing high emissions activities, diverting research and investment from alternatives and less risky climate policies.

THE PROBLEM WITH CARBON CAPTURE

Carbon Capture, Utilization, and Storage (CCS or CCUS) is a [technology](#) proposed to capture carbon dioxide (CO₂) emissions produced by various industrial processes, particularly those related to fossil fuel combustion. Once captured, the CO₂ is compressed and transported, and attempts are made to utilize or store it, mainly underground. The vast majority of carbon capture projects operating today are designed to capture emissions from processing CO₂-rich fossil gas. In many cases, the CO₂ is then injected underground to extract more oil (EOR), generating further CO₂ emissions and other pollution. In fact, carbon capture was first developed in the 1970s to enhance oil production, and this remains its primary use. Carbon capture barely reduces emissions and actually prolongs the lifetime of dirty energy. Carbon capture has been a proven failure for over 50 years and hasn’t made a dent in global emissions.

Carbon capture is a [dangerous distraction](#) promoted by fossil fuel companies and their government enablers to prolong the use of fossil fuels. It is only a solution for the fossil fuel industry, not for people and the planet.

Carbon capture projects are associated with [health risks](#). They are primarily located in or near communities that are often low income and predominantly Black or Indigenous, perpetuating environmental racism.

The Intergovernmental Panel on Climate Change (IPCC) [lists carbon capture](#) as one of the most expensive and least effective emissions mitigation options available. It is no coincidence that the governments spending the most on carbon capture are the same governments responsible for large shares of emissions via their extensive fossil fuel sectors. These governments have a [historical responsibility](#) to combat the climate crisis, yet their investment in carbon capture merely lends a veneer of climate action to their continued engagement with fossil fuel extraction.

Investing in carbon capture delays the transition to renewable energy. Instead of wasting time and money on technologies that do not work, governments must commit to justly and urgently phasing out fossil fuels before it’s too late.

THE DATA

Oil Change International (OCI) has compiled data on government awards (subsidies) to carbon capture and fossil hydrogen projects using various government sources both online and via direct communication with government officials.^b The available subsidy data covers North America, Europe, and Australia. Attempts were made to find awards data for other countries but with no success. While our database lists projects in countries outside of these regions, data on government financial support for these projects has yet to emerge. We have captured primarily direct grants and some loans and loan guarantees. Other subsidies including tax credits, subsidized credits, and below market

insurance plans and exemptions could be substantial. The database will be updated annually, and we hope to widen coverage as more information becomes available.^c

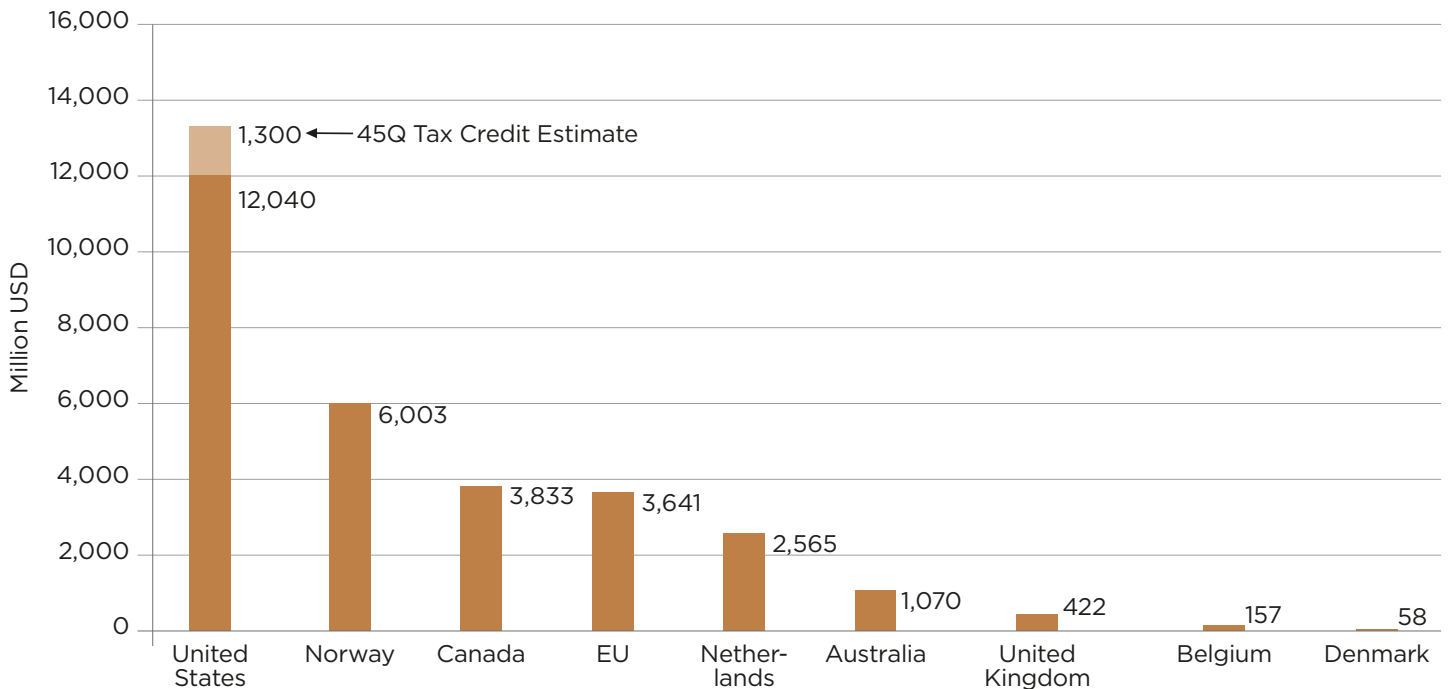
Since 1984, nearly USD 29.8 billion of public money has been spent or allocated to specific carbon capture and fossil hydrogen projects. Five governments are responsible for 95% of that figure. In descending order, these are the United States, Norway, Canada, the European Union (EU), and the Netherlands (Figure 1).

The United States leads with over USD 12 billion in handouts. In addition, we have estimated the expenditure

for the [45Q tax credit](#), a key subsidy instrument that allows companies to write off tax per ton of CO₂ sent underground, much of which is used for enhanced oil recovery (EOR). Our estimate is USD 1.3 billion up to the end of 2022. This brings the total U.S. expenditure to USD 13.3 billion.

Norway ranks second with over USD 6 billion. Canada, the EU, and the Netherlands have spent at least USD 3.8 billion, USD 3.6 billion, and USD 2.6 billion, respectively. All of these countries, among others, have announced policies to substantially increase this spending (see Policy Tracker section).

Figure 1: Total Tracked Public Finance for Carbon Capture and Fossil Hydrogen



Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

^b Sources include data sheets provided on request by U.S. Department of Energy staff, White House data on grants made under the Infrastructure Bill and Inflation Reduction Act, European Union websites for CCS and the Innovation Fund, various government online sources, and company announcements and press releases. Project data is derived from the International Energy Agency and Bloomberg New Energy Finance.

^c For access to the database and if you have information or data to share please email research@priceofoil.org.

FORTY YEARS OF FUNDING FAILURE - WHAT'S IN THE DATABASE

The database contains details for all carbon capture projects operating and proposed globally. We have also tracked over 1,100 awards (government grants, loans, and loan guarantees) totaling USD 29.79 billion (Figures 2 & 3).^d While the first tracked transaction dates back to 1984, most awards have been made since 2008. Large numbers of awards were made for relatively small amounts, i.e. in the single millions of dollars, mostly for research and development projects. However, commercial-scale projects have been supported with subsidies in the hundreds of millions of dollars. Some of these projects are operational today, while some have failed completely. Take, for example, the [FutureGen](#) project in the United States, which swallowed USD 200 million and never materialized. Recent allocations made for projects that are still in the planning stage are included in the database. While some of this money has not yet been transferred to project owners, it has been allocated to

specific projects and will be transferred as the projects proceed. In contrast, the policy tracker only includes funds made available via policies announced since 2020.^e

From 2008 to 2010, a flurry of awards saw over USD 7 billion spent, primarily in the United States, Canada, Norway, and the EU (Table 1). Around 45% of this was spent on projects that are not operational today. Further, currently operating projects are failing to deliver genuine emissions reductions. This is due to either poor performance, the project contributing to continued or increased fossil fuel extraction (through gas processing or EOR), or both.

Norway dominated funding from 2011 to 2020, with over USD 4.4 billion spent. During this period, the United States spent USD 1.5 billion, the EU spent USD 880 million, and Canada and Australia each spent nearly USD 250 million (Table 2).

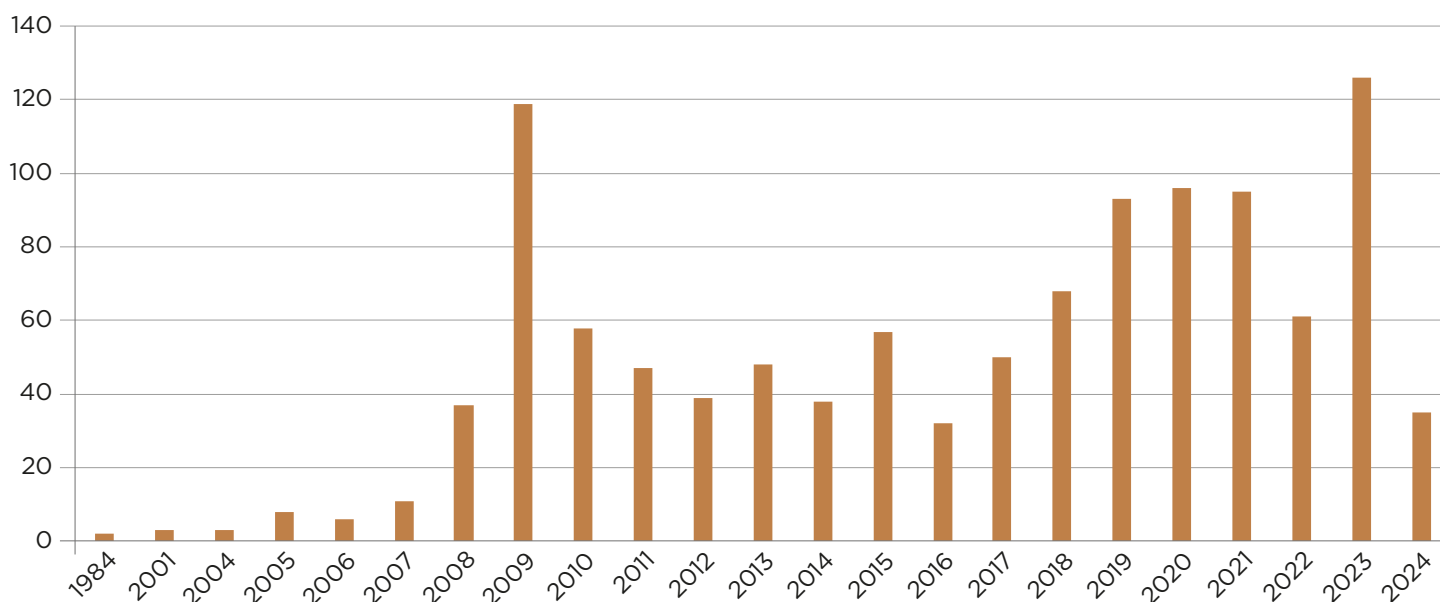
Since 2021, the United States (USD 5.8 billion), the Netherlands (USD 2.5 billion), and the EU (USD 2.1 billion) have dominated, while Australia,

AROUND 45% OF THIS WAS SPENT ON PROJECTS THAT ARE NOT OPERATIONAL TODAY.

Canada, the United Kingdom, Norway, and Belgium have each spent significant sums (Table 3).

2021, with USD 3.9 billion awarded, was a peak year for awards, heavily dominated by a USD 2.5 billion award from the Netherlands for the Porthos Project (Port of Rotterdam CO₂ Transport Hub and Offshore Storage). However, 2024 (USD 4.8 billion) has already surpassed this peak with nearly half the year still to go. The total allocated since 2021 amounts to almost USD 13.2 billion (Table 3). Much of this money has been allocated to projects that are still in the planning stage, and the full allocations will only be spent if the projects move forward into construction.

Figure 2: Number of Annual Awards

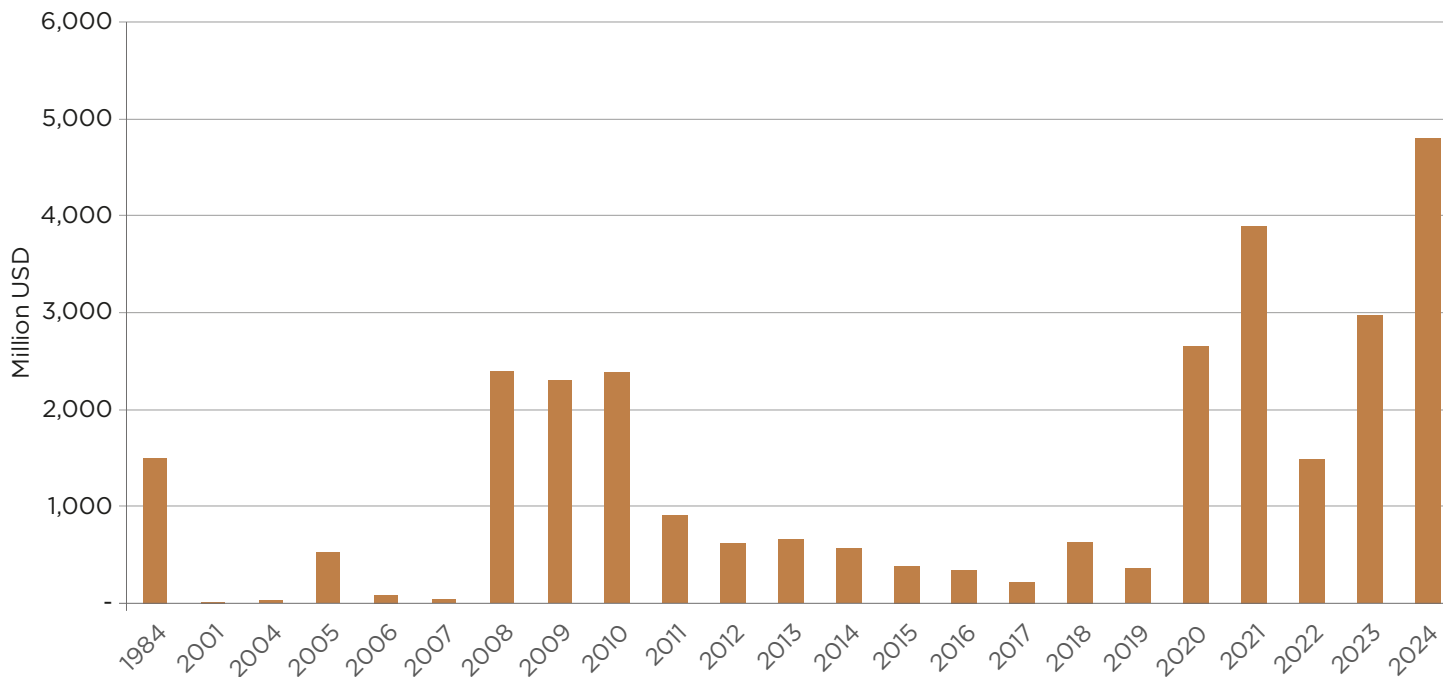


Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

^d All figures are nominal. Awards made outside of the United States have been converted to USD using the average rate in the year they were awarded.

^e There is some crossover in that some of the policy tracker finance has begun to be allocated to projects.

Figure 3: Total Annual Award Amount



Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Table 1: 2008-2010

| Financing Country | Awards (MUSD) ^f |
|-------------------|----------------------------|
| United States | 2,748 |
| Canada | 2,591 |
| Norway | 1,096 |
| EU | 580 |
| Netherlands | 37 |
| Australia | 22 |
| Total | 7,073 |

Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Table 2: 2011-2020

| Financing Country | Awards (MUSD) ^f |
|-------------------|----------------------------|
| Norway | 4,407 |
| United States | 1,483 |
| EU | 881 |
| Australia | 248 |
| Canada | 245 |
| United Kingdom | 82 |
| Denmark | 11 |
| Netherlands | 7 |
| Total | 7,364 |

Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Table 3: 2021-2024

| Financing Country | Awards (MUSD) ^f |
|-------------------|----------------------------|
| United States | 5,759 |
| Netherlands | 2,522 |
| EU | 2,115 |
| Canada | 983 |
| Australia | 755 |
| Norway | 479 |
| United Kingdom | 340 |
| Belgium | 157 |
| Denmark | 47 |
| Total | 13,157 |

Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

^f MUSD = Million US Dollars

LOW CARBON CAPTURE RATES

The annual capacity of global carbon capture projects operating today is 51 million metric tons. This is slightly over 0.1% of annual global emissions. The amount of emissions actually captured is likely much lower. In November 2023, [OCI analyzed](#) six of the leading carbon capture plants in the United States, Australia, and the Middle East, revealing that they all either operate significantly below capacity, ranging from an estimated 10% to 60% of capacity, or are designed to capture only a fraction of the emissions produced by the facilities they are attached to. In some cases, it is both.

The Institute for Energy Economics and Financial Analysis (IEEFA) found that while the industry claims carbon capture can capture 95% of emissions, real-world performance is consistently much lower, and no plant has captured more than 80% (see Figure 4).

Scenarios for future climate policy ([including the IPCC's](#)) developed by governments or the industry often assume capture rates of 90% to 95%, exaggerating the potential role of carbon capture.

CARBON CAPTURE BOOSTS OIL & GAS PRODUCTION

Where does captured CO₂ come from?

The majority of CO₂ being captured today is not from the air, power plants, or industrial processes like steel or cement, which is how CCS is often marketed. Instead, 60% of CO₂ captured today comes from fossil gas processing plants (Figure 5).

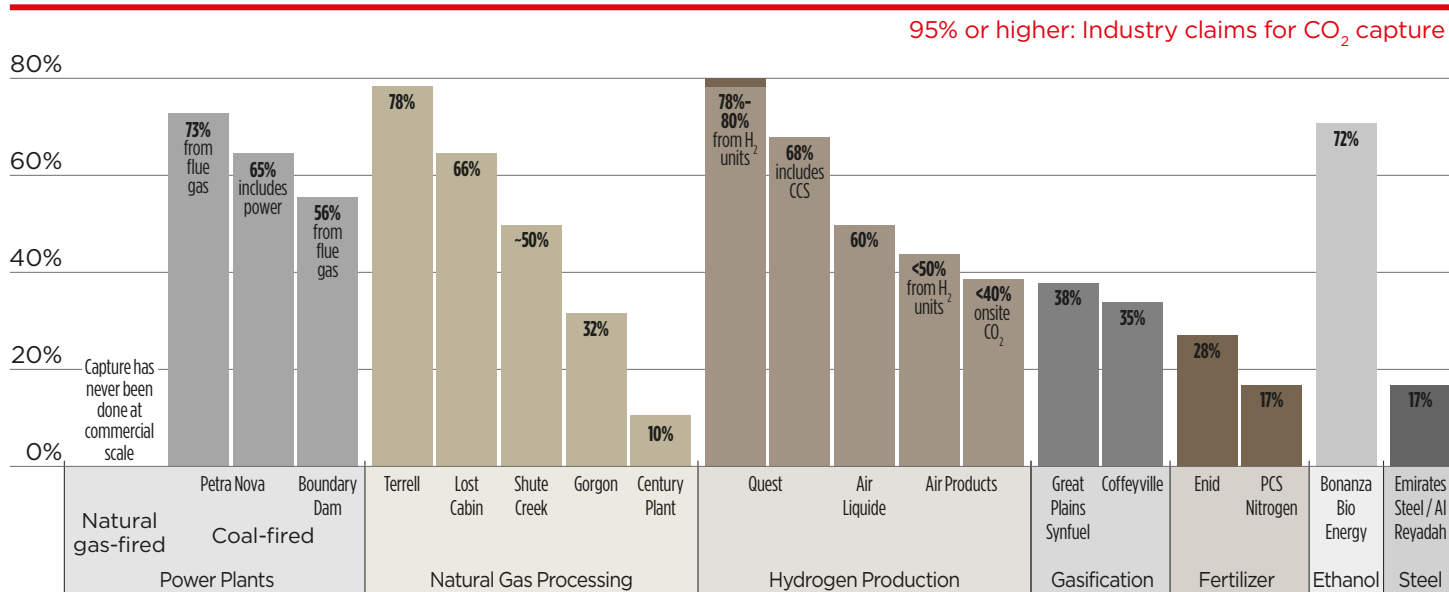
These fossil-fuel production plants separate gasses extracted from oil and gas wells. CO₂ is often one of the gasses present in oil and gas reservoirs and must be separated out to produce marketable gas. Some reservoirs have particularly high concentrations of

CO₂, making carbon capture more viable there than in places where the gas is less CO₂-rich. This is the lowest-hanging fruit for carbon capture because the separation of CO₂ from the gas stream is already required to market the gas. At the vast majority of gas processing plants globally, this CO₂ is simply vented to the atmosphere.

Crucially, this process has no effect on the release of CO₂ emissions when the gas is actually burned, meaning the net emissions reductions are very low. For example, the fossil gas produced at Norway's Sleipner and Snøhvit fields emitted [an estimated 25 times more CO₂](#) when burned than the CO₂ captured during processing of the gas. Additionally, the availability of public subsidies for carbon capture can lead fossil fuel companies to extract such CO₂-rich gas streams in cases where they would otherwise leave them the ground due to the high cost of gas processing.

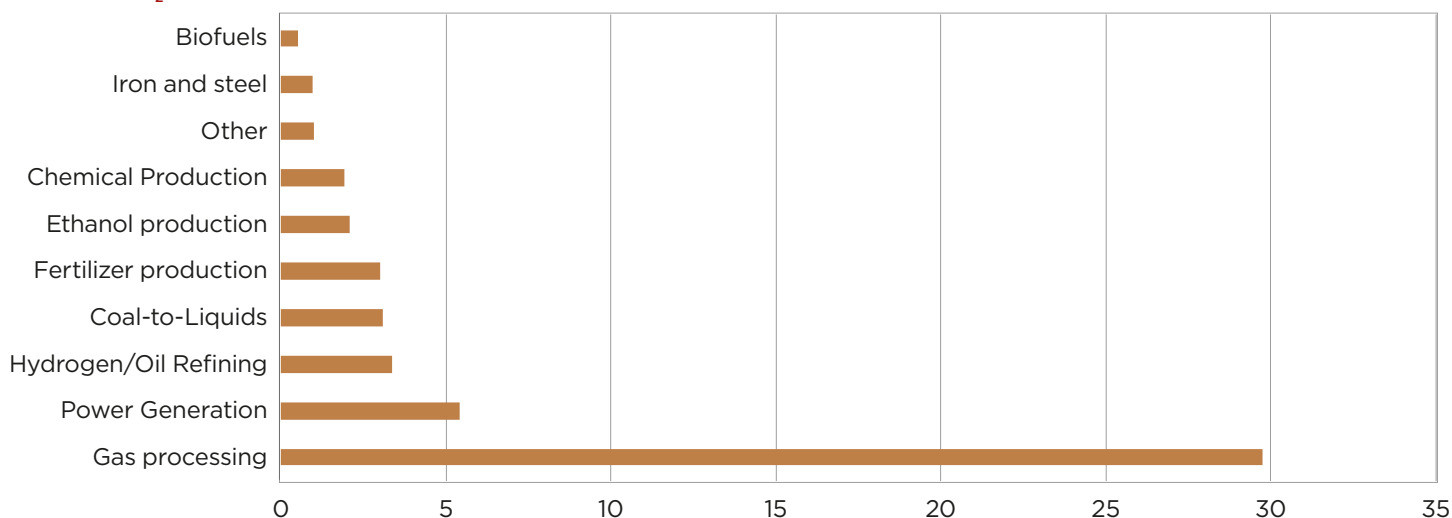
Figure 4: Real-World CO₂ Capture is never above 80%

100% carbon capture



Source: [IEEFA](#)

Figure 5: CO₂ Source for Currently Operating Carbon Capture Projects



Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Where does captured CO₂ go?

The vast majority of currently captured CO₂ is not sent for permanent underground storage but instead used to produce more pollution. CO₂ is used to stimulate oil production in aging oil wells (EOR). According to our data, projects accounting for 72% of today’s operating global carbon capture capacity send captured CO₂ to an EOR project (Figure 6).

Pumping CO₂ into old oil wells increases pressure and provides lubrication to send oil to the surface that would otherwise be left in the ground. There are serious questions about how much of the CO₂ stays underground after it is pumped into old oil wells and about the net

emissions reduction results given the addition of oil supply. According to a recent [analysis](#), on average, an injection of one ton of CO₂ produces two to three barrels of oil; when burned, that oil emits around 1.2 tons of CO₂.

Giving oil companies public money to produce more oil

According to our data, the United States and Canada are home to the vast majority of EOR projects. The governments of these countries have subsidized EOR projects with nearly USD 4.3 billion to date (Figure 7). The United States leads with nearly USD 2.3 billion, while Canada has spent just over USD 2 billion. However, the U.S. figure does not include support for

EOR from the 45Q tax credit. The tax credit was first enacted in 2008 and offered USD 10 per ton of CO₂ used for EOR. In 2018, this was increased under a budget bill and allowed to rise to USD 35 per ton by 2026. In the 2022 Inflation Reduction Act (IRA), this was drastically increased to USD 60 per ton.

Our [estimate](#) of the total value of the 45Q tax credit through 2022 is USD 1.3 billion. However, due to an appalling lack of transparency, there is no way to determine precisely how much of this went to EOR. According to the U.S. [Environmental Protection Agency](#), at least 60% of CO₂ captured in the United States was sent to EOR. However, others have [estimated](#)

that the figure could be up to 83%. Therefore, we estimate that between both tax credits and subsidies, at least USD 3 billion of U.S. taxpayer money has been spent on EOR to date.

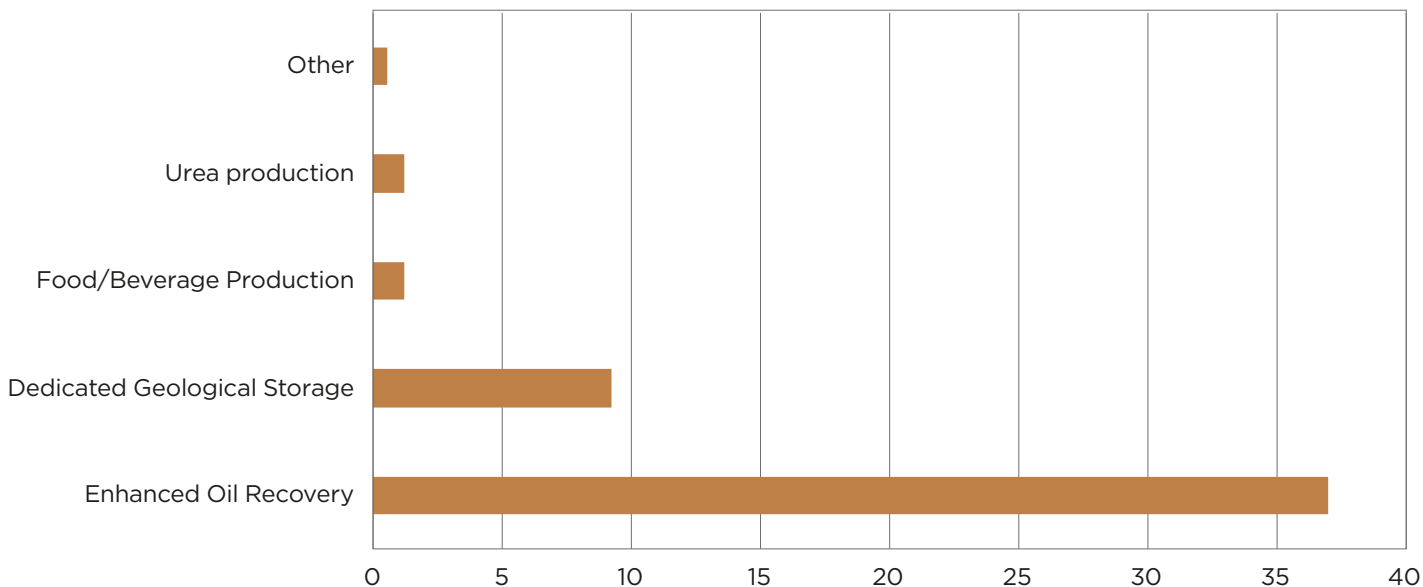
Due to the increased rate passed in the IRA, the amount of tax credit claimed for EOR in the coming 10 years could be substantially higher. Up to USD 100

billion could be claimed on the 45Q tax credit by the 2030s.¹

In July 2024, several U.S. climate advocacy groups, including OCI, [wrote](#) to Congressional leaders urging them to end the 45Q tax credit for EOR. A [bill](#) is set to be reintroduced to the U.S. House of Representatives seeking to remove EOR from the tax credit.

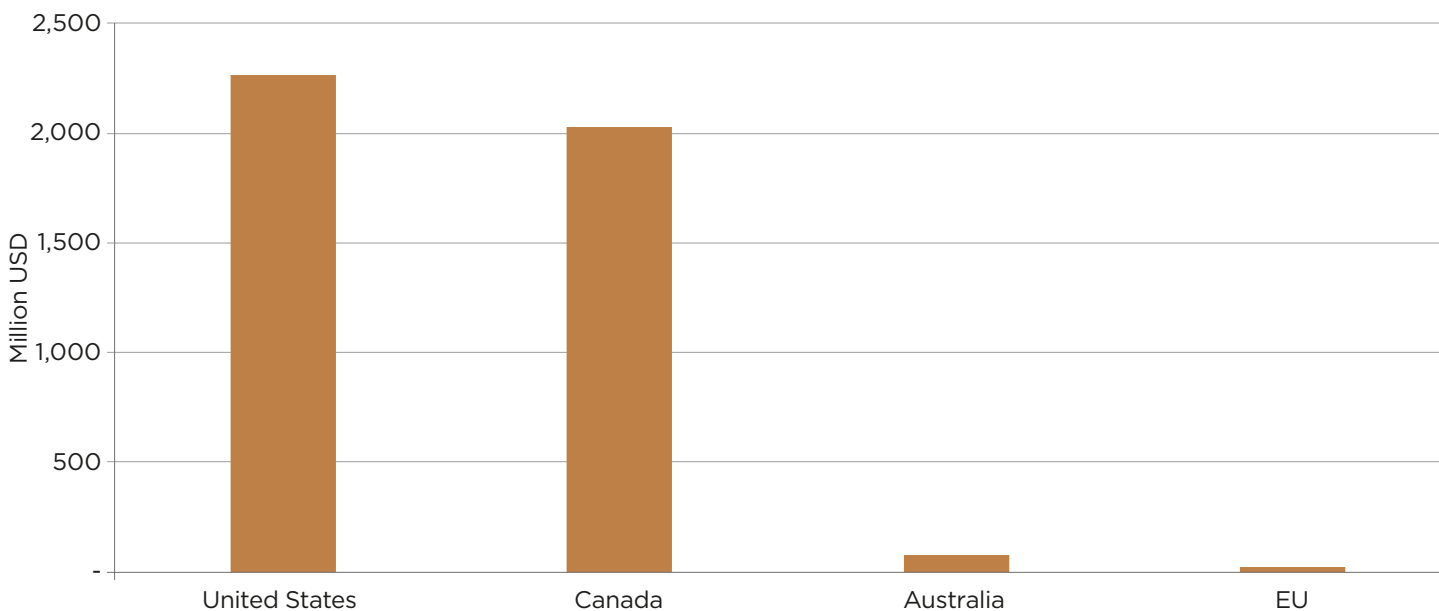
After [introducing](#) new [rules](#) to end fossil fuel subsidies, the Canadian government introduced a 50% tax [break](#) to carbon capture projects that could cost Canadian taxpayers over USD 7 billion over the next eight years. These projects are allowed to have up to 90% of their carbon go to EOR, essentially making it yet another fossil fuel subsidy.

Figure 6: CO₂ Destination for Currently Operating Projects



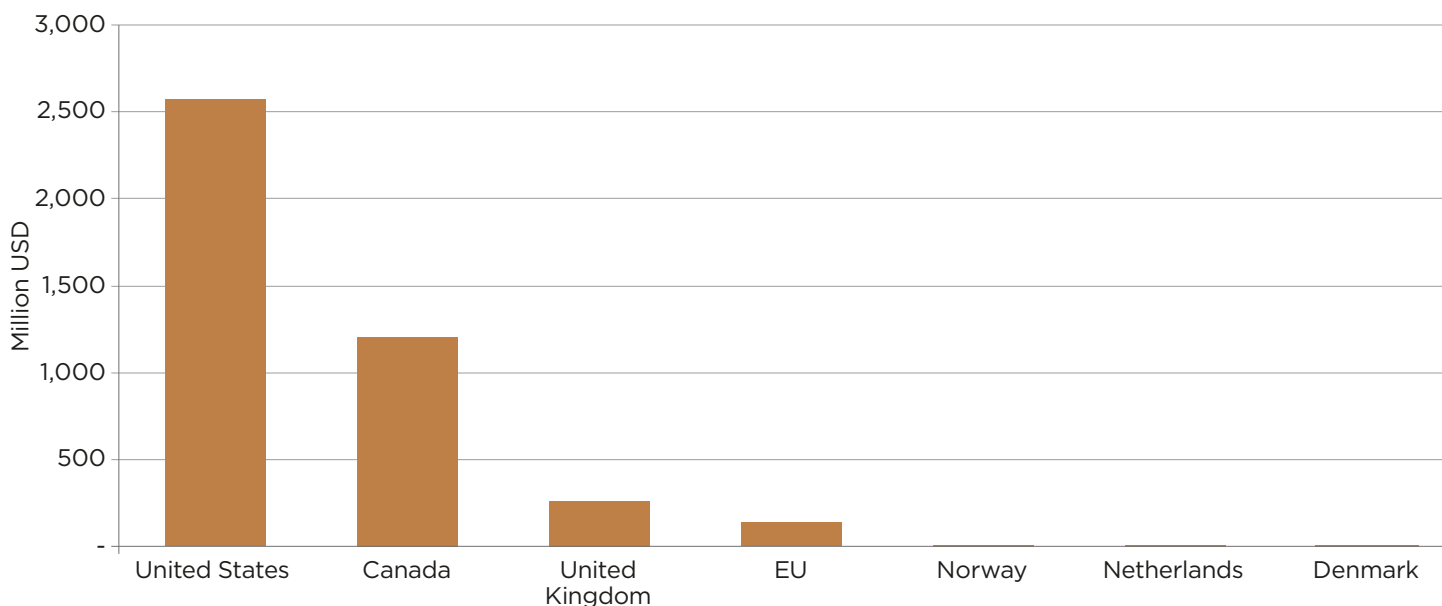
Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Figure 7: Awards for EOR Projects



Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

Figure 8: Awards for Hydrogen Projects



Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

FOSSIL HYDROGEN AWARDS

Globally, awards for hydrogen projects that involve fossil fuels and carbon capture amount to just over USD 4.2 billion so far. This figure is dominated by the recent U.S. Department of Energy funding awarded to two so-called [hydrogen hubs](#) planned in Appalachia (USD 925 million) and the U.S. Gulf Coast (USD 1.2 billion). This funding is, therefore, yet to fully transfer to companies but has been committed in phases as the projects develop. These projects face community [opposition](#) that cites the role of fossil hydrogen in extending the life of dangerous and toxic fracked gas extraction and processing, as well as the dangers of hydrogen storage and

transport. A 2021 [study](#) found that the full lifecycle emissions of producing hydrogen with fossil gas and carbon capture could be greater than simply burning the gas. This is due to methane emissions from gas extraction and processing and the additional gas supply and combustion required for the carbon capture facilities.

Canada is the second largest funder of hydrogen to date. This amount is set to increase significantly as Canada just finalized a hydrogen investment tax credit that allows for funding of blue hydrogen projects. (Blue hydrogen describes a process where gas is used to produce hydrogen, with the emissions captured). The vast

majority of the USD 1.2 billion it has spent so far on fossil hydrogen went to Shell's Quest project at the Scotford refinery in Alberta. Most of this, over USD 600 million, was provided by the Government of Alberta. This project captures CO₂ from the process of producing hydrogen for upgrading tar sands crude oil, a highly energy-intensive and polluting source of oil. The project has captured less than 70% of the emissions from the plant (see Figure 4). Greenpeace recently [revealed](#) that Shell has made an additional USD 145.4 million through a 2-for-1 deal struck with the Albertan government on carbon credits associated with the project. This figure is not included in our database.

HISTORICAL VS. FUTURE SUBSIDIES

Historical spending of public funds for carbon capture and hydrogen from fossil fuels is a fraction of the amount of public money recently made available to spend in the near future. Policies announced since 2020 and tracked in our database could amount to over USD 230 billion in public money to support carbon capture and hydrogen. This would be over seven times the subsidies to the sector made during the first 50 years of its existence.

Table 4 shows the range of potential government expenditures announced since 2020. The ranges for some countries are primarily due to uncertainties for potential tax credit claims. For example, the [45Q CCS tax credit](#) expansion passed in the IRA was uncapped – estimates of its potential impact range from USD 32 billion to USD 100 billion.

Some of the money available here has already been spent or committed to projects and that expenditure is in the database and part of the USD 29.4 billion discussed above. However, the vast majority of this money is yet to be allocated.

These policies risk directing additional public money to carbon capture and hydrogen despite these technologies' track record of failure and the relatively minor role they will likely play in future decarbonization.

Table 4: Estimated Value of Policies Announced Since 2020 to Support Carbon Capture and Hydrogen

| Financing Country | Low (Million USD) | High (Million USD) |
|-------------------|-------------------|--------------------|
| United States | 43,662 | 112,962 |
| Canada | 12,330 | 41,362 |
| United Kingdom | 27,350 | 32,282 |
| European Union | 8,784 | 16,861 |
| The Netherlands | 2,205 | 13,650 |
| Denmark | 7,525 | 7,525 |
| Sweden | 3,810 | 3,810 |
| France | 3,150 | 3,150 |
| Japan | 2,572 | 2,572 |
| Norway | 1,779 | 1,779 |
| Australia | 1,148 | 1,148 |
| Finland | 143 | 143 |
| Total | 114,460 | 237,246 |

Source: OCI Public Finance for CCS and Hydrogen Database. For further information and sources, see footnote b

CASE STUDIES EXXONMOBIL: FROM CARBON CAPTURE SKEPTIC TO ENTHUSIAST

A review of Exxon's statements and documents released from a U.S. congressional investigation reveals Exxon's shift from carbon capture skeptic to vocal supporter. This shift followed successful lobbying efforts to secure billions in subsidies.

For decades, Exxon's scientists studied the potential of carbon capture to reduce carbon emissions.² However, the technology was [dismissed](#) within the company as too expensive, too polluting, and too energy-intensive. The oil giant has operated carbon capture at fossil gas processing plants, sending the captured CO₂ to EOR projects, but did not see carbon capture as a mechanism to reduce carbon emissions.

From 2009 until 2023, Exxon's efforts outside of oil and gas were focused on

researching algae to make biofuels. It spent hundreds of millions of dollars on an ultimately failed program. Despite worrying that critics would accuse it of "[greenwashing](#)," Exxon heavily promoted algae in its [advertisements](#). Exxon worked with advertising giant BBDO to refine its public [messaging](#), [spinning](#) that it was part of the climate solution, not the problem. Carbon capture was barely mentioned.

Exxon launched its carbon capture business in 2018, the same year that the U.S. Congress passed an extension and increase for the [45Q](#) carbon capture tax credit. [Before then](#), sources within Exxon conceded that all its efforts were "entirely focused on enhanced oil recovery," with a team brought in that year to "see if it was even possible to permanently store captured carbon."

However, by 2019, with the algae program faltering, carbon capture is growing as a distinct strategy within the company's lobbying and public

relations efforts. Exxon lobbied the U.S. Congress for increased carbon capture subsidies, stating that carbon capture might have a role to play in the climate fight, but [only](#) in the [future](#). As part of this effort, Exxon worked to shift the debate away from transitioning to renewables and toward abating fossil fuel emissions. The thinking was simple: If you can reduce emissions from burning fossil fuels, the oil and gas business can endure. Exxon CEO Darren Woods later said he was “encouraged” by how quickly the company had managed to change the debate regarding carbon capture and renewables.³

That same year, Exxon’s lobbying intensified. The company [pushed](#) for direct government funding for carbon capture, particularly at the U.S. Department of Energy (DOE). With the passage of the Bipartisan Infrastructure Bill in November 2021, in which [USD 12 billion was allocated](#) for “carbon management research, development, and demonstration,” Exxon got what it asked for.

But DOE grants are apparently not enough. The company also played a [“central role”](#) in drafting a 2019 DOE-sponsored report on carbon capture that determined Congress would need to create an incentive of around USD 90 to USD 110 per ton to support carbon capture deployment. Woods stated that the 45Q tax credit, which, following the changes passed in the 2018 Bipartisan Budget Act, gave companies USD 35 to USD 50 per ton, [“wasn’t sufficient.”](#)

In 2021, Exxon was still lobbying for further regulatory certainty and additional fiscal incentives, which the company argued were “critical” to unlocking the full potential of

carbon capture.⁴ By the summer, U.S. lawmakers were advocating for bipartisan legislation [specifically for carbon capture](#). Exxon was now [pushing](#) for a USD 100-per-ton subsidy for CCS.

Parts of the carbon capture bill were eventually passed as part of the IRA in August 2022. Exxon did not get USD 100 per ton, but the rate increased significantly from USD 35 to USD 60 per ton for EOR, and from USD 50 to USD 85 for permanent storage.

The company was quick to take advantage of the increased incentives in the IRA, with Woods stating that the IRA had [“especially benefited”](#) the company. Exxon [bought](#) Denbury in 2023 for USD 4.9 billion, acquiring its strategic CO₂ pipeline network, EOR assets, and storage facilities. This [“cemented the supermajor’s lead”](#) in the race to develop CCS.

Exxon could now brag about how much money it would make from carbon capture. Dan Ammann, the head of its Low Carbon Business Unit, [told](#) investors that the business would eventually be worth “hundreds of billions of dollars” and grow to be “larger than ExxonMobil’s base business.” In April 2023, Exxon [told](#) investors that the opportunities for its low-carbon business were “immense”: a USD 14 trillion potential market, with carbon capture, hydrogen and biofuels worth USD 6 trillion by 2050. The company [also said](#) it will make trillions with “double-digit” returns, growing the business by an order of magnitude. At the same time, Exxon [conceded](#) that its plans for carbon capture were economic before the IRA and that the company is [being paid](#) to reuse and repurpose existing infrastructure.

Exxon and other oil companies worked the U.S. Congress like a well-oiled machine. They used the American public’s increasing concern about the climate crisis to deliver a massive transfer of taxpayers’ money to corporate coffers.

NORWAY’S FAILED “MOON LANDING”

Norway’s USD 6 billion positions it second only to the United States in terms of taxpayer money spent on carbon capture. But Norway has yet to deliver on the promise of capturing emissions from anything other than gas production. In his 2007 New Year’s address, then-prime minister Jens Stoltenberg described plans for a full-scale carbon capture project at the Mongstad oil refinery as Norway’s “moon landing.” Yet in 2014, the former prime minister would be hauled before a parliamentary inquiry that was highly critical of his government’s failure to deliver the Mongstad project. The project was abandoned in 2013 immediately after Stoltenberg lost a general election.

The project followed the trajectory of many carbon capture projects globally: exaggerated promises and underestimated risks leading to spiraling costs, ending in scaling back or ultimately abandoning the once-lofty ambitions. In the end, only a test center (Technology Centre Mongstad, TCM) was completed, while the full-scale carbon capture facility failed. Though the completion of TCM complicates an accurate estimate of costs for the entire project, the full-scale carbon capture facility received direct subsidies of around NOK 3 billion (over USD 280 million), not including certain [additional subsidies](#) given to research and other aspects related to the earlier stages of project



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Mongstad oil refinery in Norway.

development. Meanwhile, the costs associated with TCM itself were underestimated and heavily criticized by both the parliamentary [inquiry](#) and the Office of the Auditor General's [investigation](#).

This same cycle is being followed by Norway's second attempt to "land on the moon." The flagship carbon capture projects pursued since 2020, Northern Lights and Longship, aim to capture CO₂ from a waste incineration facility and a cement factory and transport it to old oil and gas reservoirs in the North Sea for storage. This is also seen as the first step toward Norway's North Sea reservoirs receiving huge volumes of CO₂ captured in other European countries. However, plans to capture CO₂ at the waste incinerator in Oslo have been delayed due to rising costs,

which could mean [reduced](#) capture rates or another abandoned project. Similarly, carbon capture at Norcem's cement [factory](#) in Brevik is projected to capture a maximum of only half of the emissions at the facility. Despite this, Norway is using its carbon capture plans as a fundamental justification for even more fossil gas exploration for use in blue hydrogen. Norway is hoping to export large quantities of blue hydrogen to Germany and the rest of Europe, despite many of those countries touting plans for hydrogen made from renewable electricity.

JAPAN'S EFFORTS TO PROLONG FOSSIL FUELS IN ASIA

While we have not found data for Japan's past financial support for carbon capture, there is substantial evidence that the Japanese

government is aggressively promoting carbon capture, hydrogen, and other fossil-based technologies across the Asia-Pacific region. Japan attempts to position itself as a leader in the region's energy transition, but its prime strategy is to promote dangerous, unproven technologies for the benefit of Japanese corporate interests. Instead of supporting the transition to renewables, Japan risks locking the region into fossil fuels for decades to come.

One particularly egregious way in which Japan is derailing the energy transition is through the so-called "Asia Zero Emissions Community" (AZEC). AZEC, [launched](#) by Japanese Prime Minister Fumio Kishida in 2022, purports to support decarbonization in the region. However, the primary technologies backed by this initiative –

LNG, ammonia co-firing at coal plants, hydrogen co-firing at gas plants, and carbon capture – will only prolong gas and coal use with little guarantee of substantive emissions reductions.

Through AZEC, Japan is supporting the development of a regional master plan for hydrogen and ammonia, common technical standards for hydrogen and carbon capture, and a “Joint Crediting Mechanism.” For the last several years, Japan has supported the Japan Energy Summit and convened an annual Asia CCUS Network Forum to support the expansion of CCUS deployment in the region.

Japan is using AZEC to mobilize financing and spur the development of hydrogen, LNG, carbon capture, and ammonia co-firing infrastructure across Asia. The Japan Bank for International Cooperation has set up a [finance office](#) to promote hydrogen supply chain creation and development. In May 2024, the Japanese Diet approved legislation to advance hydrogen and carbon capture development. Japan has set a [goal](#) of storing 120 to 240 million tons of CO₂ by 2050 (roughly 10% to 20% of Japan’s current emissions) and commercializing carbon capture by 2030.

In a recent speech, Kishida said:

We will share the knowledge of these systems with Asia and make the construction of a hydrogen supply chain that spreads across Asia and the transportation of CO₂ for carbon capture across borders a reality. We will create a common Asian market connected by common rules and infrastructure. We believe that this is the future that AZEC is [aiming for](#).

Japan also stands out for its plans to export domestically generated CO₂ for storage in Southeast Asia and the Pacific. The government-owned Japan Energy and Metals National Corporation (JOGMEC) recently announced nine carbon capture projects to provide priority support, three of which involve shipping and storing carbon in Malaysia. JOGMEC has also organized staff trainings and carbon capture feasibility studies in Vietnam and Australia. Furthermore, Japan is aggressively [lobbying](#) the Australian parliament to allow for carbon capture produced by Japan-backed projects to be “dumped” in Northern Australia, harming Aboriginal People who reside near these projects. A growing number of civil society groups and movements, including the Fossil Free Japan Coalition, are mobilizing to stop Japan from derailing the energy transition to Asia.

PUBLIC FINANCE FOR CARBON CAPTURE AND FOSSIL HYDROGEN IS A BAD USE OF PUBLIC FUNDS

The UNEP, OECD, and International Institute for Sustainable Development (IISD) [methodology](#) for measuring fossil fuel subsidies, based on the WTO definition of a subsidy, counts government funding for fossil fuel clean-up or efficiency improvements as a form of fossil fuel subsidy. This, therefore, includes CCS subsidies, which are clearly not in line with [the polluter pays principle](#).

Our database documents tens of billions of dollars of public spending on carbon capture that has failed to deliver tangible emission reductions. Carbon capture remains expensive and energy-intensive while threatening to intensify the impacts associated

with fossil fuel extraction, processing, transportation, and use. As additional fossil fuel is generally required to run carbon capture infrastructure, communities that have long borne the burden of the fossil fuel industry face increasing infrastructure impacts and pollution rather than the phase-out and relief from fossil fuel infrastructure they seek.

The availability of hundreds of billions of additional taxpayer dollars for carbon capture does not in any way ensure that its costs or efficacy will significantly improve or that it will ameliorate the impacts of fossil fuels on communities and the environment. Recent evidence of ongoing project delays, cost overruns, and community opposition signal that governments are poised to throw away taxpayer dollars for the most expensive and least effective solution to carbon pollution:

- The United Kingdom government recently [announced](#) delays at several planned projects as their projected costs soar. A Carbon Tracker [report](#) noted rising costs and outdated and unrealistic assumptions in the United Kingdom’s carbon capture plans.
- Canada’s largest project to capture emissions from a gas-fired power plant was [shelved](#) in May 2024, citing prohibitive costs despite generous subsidies and tax credits. Tensions between Canadian oil and gas executives and federal government officials were [reported](#) as the industry demands ever-greater government financial support to guarantee returns for investors in carbon capture.
- In the United States, planned [hydrogen hubs](#) and [CO₂ pipelines](#)

face community opposition, delays, and rising costs as communities refuse to prolong the fossil fuel industry's toxic legacy.

Whereas wind, solar, and energy storage technology have proven [track records](#) of [cost reductions](#) and [increasing productivity](#), carbon capture's record is one of [underperformance](#), [rising costs](#), and [failure](#). Statements by some of Exxon's top executives clearly show that one of the world's most profitable industries sees carbon capture as an opportunity for shareholders to reap profits via generous government handouts.

An Oxford University [study](#) found that relying on carbon capture as a decarbonization strategy would be "highly economically damaging," costing as much as USD 30 trillion dollars more, globally, than a strategy based on renewable energy, electrification, and energy efficiency.

The financial and liability risks related to carbon storage are likely to be transferred from the private sector to the public. There are already examples of this in [Alberta](#), as well as in Indiana, [Texas](#), and [Louisiana](#). There are long-term concerns regarding responsibility for the CO₂ once it is stored underground, including monitoring storage sites, remediating CO₂ leaks, providing financial security, and paying for any harm to the climate, environment, or human health if leaks occur. Governments are already struggling to deal with [enormous unfunded financial liabilities](#) of the oil and gas sector. Many governments have established governance systems in which the long-term liability is transferred from the proponent to the taxpayers, without an appropriate system to collect adequate bonds or dues.

The time to end the carbon capture gravy train is now. Governments are in danger of locking in fossil fuel use for decades to come, with billions in taxpayer finance that has no end in sight. Public policy and finance should focus on proven technologies for decarbonization, wind, solar, energy storage, and efficiency, with much greater emphasis on efficiency, waste reduction, a circular economy, and global equity. The planet cannot sustain a continuation of the fossil fuel economy.

CARBON CAPTURE SUBSIDIES ARE BREAKING PROMISES TO END FOSSIL FUEL SUBSIDIES

Subsidies for carbon capture are, in effect, fossil fuel subsidies. Paying fossil fuel companies to continue producing, processing, and burning fossil fuels provides a lifeline to an industry whose demise is fundamental to preserving a safe climate. Countries committed to phasing out fossil fuel subsidies must end support for all forms of fossil fuel production and use, including carbon capture.

The largest providers of carbon capture subsidies listed in this report (the United States, Canada, Norway, the EU, and the Netherlands) all have long-standing commitments to end fossil fuel subsidies and align their financial flows with climate goals. In 2009, these countries [committed](#) to phasing out "inefficient" fossil fuel subsidies over the medium term at the G20. As G7 members, the United States, Canada, and the EU have additionally [committed](#) to do so by 2025. Listed countries are also bound by the commitment to align financial flows with climate goals under Article 2.1(c) of the [Paris Agreement](#) and have

called for reform of inefficient fossil fuel subsidies at the UN Framework Convention on Climate Change in the [Glasgow Climate Pact](#).

Despite these long-standing commitments, little structural progress has been made in ending fossil fuel subsidies. In fact, subsidies have continued to increase. In part due to rising energy prices linked to Russia's invasion of Ukraine, they reached an all-time high in 2022 at an [estimated](#) USD 1.7 trillion. All the while, the fossil fuel industry made record [profits](#).

Past efforts to reform fossil fuel subsidies have often concentrated on global south countries with large consumption subsidies rather than global north countries or fossil fuel production subsidies. Fossil fuel subsidy reform in these global south countries has often been made a condition for IMF or World Bank loans, with reforms implemented overnight, causing electricity and fuel prices to spike. In countries like Nigeria, Mexico, Ecuador, and France, sudden reforms without effective compensation measures have harmed vulnerable households and caused large-scale protests.

Where we have seen more progress, this has often resulted from a combination of national commitments by domestic leadership and civil society groups actively holding governments accountable. One such example is the [Clean Energy Transition Partnership](#) launched at COP28 in Glasgow, under which 41 countries and institutions committed to end their international public finance for fossil fuels and instead prioritize finance for clean energy. This initiative is [shifting](#) an estimated USD 6.5 billion a year out of fossil fuels, with a potential USD

30.2 billion shift if all members fully meet their commitment and even more if countries also end their domestic fossil fuel subsidies.

Some progress has also been made in Canada and the Netherlands, where domestic fossil fuel subsidy removal has been a central demand of civil society campaigns. The Canadian government, which will hold the G7 presidency in 2025 – the year of the agreed G7 deadline for ending inefficient fossil fuel subsidies – has published a [methodology](#) for identifying inefficient fossil fuel subsidies that need to be removed. Civil society pressure in the Netherlands has encouraged the Dutch government to acknowledge

that it does provide fossil fuel subsidies after years of claiming that it does not. The government now [estimates](#) these at between USD 43.8 and USD 51.38 billion a year. In addition, the Netherlands launched a Fossil Fuel Subsidy Phase-Out [coalition](#) at COP28, joined by Canada and others.

However, as this briefing shows, both Canada and the Netherlands provide large subsidies for carbon capture. To be effective in their ambition to demonstrate credible leadership on ending fossil fuel subsidies, these countries need to remove and avoid further introduction of new carbon capture subsidies as other fossil fuel subsidies are removed.

Recent efforts by the Netherlands and Canada to remove some fossil fuel subsidies illustrate this is a real risk. While the previous Dutch government took steps to remove some fossil fuel subsidies (such as for the use of fossil gas in the horticulture industry), it also committed to USD 17.7 billion in subsidies for hydrogen and USD 1.18 billion for CO₂-free gas power plants without specifying how the gas power plants would be made CO₂-free. Canada's fuel subsidy phase-out [methodology](#) explicitly allows subsidies to “abated” production processes, including carbon capture, or projects that “have a credible plan to achieve net-zero emissions by 2030” to continue.

RECOMMENDATIONS

Any technology that allows corporations to continue extracting oil and gas is a dangerous distraction from the core strategy required to prevent overshooting 1.5 degrees Celsius: justly and urgently phasing out fossil fuels. Supporting carbon capture and fossil hydrogen with public money must cease. The following recommendations align with our broader advocacy on fossil fuel subsidies.

- **Remove subsidies**
 - Governments must meet their longstanding commitments to eliminate subsidies and domestic and international public finance for fossil fuel extraction or infrastructure, including for carbon capture and fossil hydrogen. They should do so by 2025 in line with the [G7 commitment](#).
 - Specifically, Japan must fulfill its G7 commitment to end its international public finance for fossil fuels without exception, and stop backing the expansion of hydrogen, carbon capture, ammonia co-firing, and LNG through the Asia Zero Emissions Community initiative.
- Governments must pay their fair share of global, public climate finance for loss and damage, adaptation, and mitigation. They must exceed existing climate finance commitments; ambitiously negotiate for a new cross-cutting climate finance goal ([NCQG](#)); and support fair updates to the international finance, trade, debt, and tax architecture that currently locks in fossil fuel dependency.
- Governments must not grant fossil fuel companies, which have knowingly and systematically blocked, delayed, and undermined climate solutions, access to climate and energy policymaking.
- The United States should fulfill its commitment to end international public finance for fossil fuels under the [Clean Energy Transition Partnership](#).
- Following its commitment at COP28, Norway should adopt a clear policy to end international public finance for fossil fuels including any subsidies to carbon capture or blue hydrogen – stop all exploration for oil and gas, and plan for a just transition to phase out its oil and gas industry.
- **Introduce and expand policies that make polluters pay:**
 - Governments must put tax policies in place that disincentivize investment in new fossil fuels and maximize public funds in order to pay for a just transition and climate impacts at home and abroad.
- **Apply public resources, including funds from removing CCS subsidies, to true climate finance:**
 - Governments must prioritize public finance for the communities and countries that need it most (those that have done the least to cause the climate crisis and are enduring its greatest impacts) and for key enabling infrastructure for a just energy transition (such as 100% renewable-ready grids, universal affordable energy access, housing retrofits, and electrified public transportation).
 - The U.S. Congress should pass the *End Polluter Welfare for Enhanced Oil Recovery Act* for EOR to be removed from the list of accepted activities to claim the 45Q tax credit.

ENDNOTES

- 1 Bloomberg New Energy Finance, "Carbon Capture Could Get \$100B in Credits from US Climate Bill, Analyst Reaction," August 16, 2022.
- 2 House Natural Resources Subcommittee on Energy and Mineral Resources Hearing; "The Opportunities and Risks of Offshore Carbon Storage in the Gulf of Mexico." Testimony by Carroll Muffett, President and CEO, Center for International Environmental Law, Washington, DC, April 28, 2022.
- 3 ExxonMobil Corp Earnings Call - Final, April 30, 2021.
- 4 Exxon Mobil Corp Annual Shareholders Meeting - Final, May 26, 2021.



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