earth track

MEMORANDUM

To: Lorne Stockman and Collin Rees, Oil Change International

From: Doug Koplow, Earth Track

Subject: Updated subsidy estimates for 45Q, Master Limited Partnerships and the Strategic Petroleum Reserve

Date: April 17, 2025

This memo provides updated subsidy estimates and background information on three subsidies benefiting the oil and gas industry. These include 45Q tax credits for carbon capture, utilization and storage (CCUS); tax exemptions for Master Limited Partnerships (MLPs), used heavily by the oil and gas sector; and the federal Strategic Petroleum Reserve. The memo also highlights an emerging risk area: the use of tax-exempt corporate structures for carbon sequestration activities.

1. Cost of 45Q subsidies likely to be much higher than official government estimates

Summary of 45Q subsidy magnitude

The US Treasury estimates 45Q tax expenditures at $43.3 billion for the period FY25-34. A recent estimate by the Institute for Energy Economics and Financial Analysis (IEEFA) used the CCUS project pipeline as of February 2025 to evaluate taxpayer risk from a larger buildout. Including the roughly 2/3 of the projects listed that had a reasonable carbon storage plan, IEEFA put the taxpayer risk over the eligible claim period of the projects at $835 billion. They also evaluated the impact of 45Q expansions to boost credit rates and extend eligibility (reflective of the types of changes that have been recommended by industry and included in proposed legislation). That scenario would drive taxpayer costs above $2 trillion. Assessments by many other energy models (summarized in Table 1) also project costs well above the Treasury estimates.

Trends

Tax credits under section 45Q of the federal tax code continue to be the most lucrative subsidies to carbon capture, utilization and storage (CCUS) in the United States. Though the provision was first implemented in 2008, successive revisions, most recently in the 2022 Inflation Reduction Act (IRA), have greatly expanded eligibility, increased subsidy rates, and allowed credits to be sold or directly reimbursed by Treasury. The changes allow more projects to claim credits, and to do so more easily regardless of tax liability. The direct pay option has enabled even non-taxable entities such as public utilities to partake.

485 Massachusetts Avenue #3, Cambridge, MA 02139
Tel: 617.661.4700 · e-mail: info@earthtrack.net

The official cost estimate for the expanded version under IRA by the Congressional Budget Office (2022: 9-11) for 45Q was $3.2 billion through 2031 (CBO 2022). Like all federal "scoring" estimates, only a 10-year range was examined. Under the provisions of the law, however, new projects can qualify until 2032 and with a 12-year allowable claim window. Even with no extension of the statute, revenue losses to Treasury will occur through 2043. Nearly all other estimates of 45Q expect much more extensive use of the subsidy, with many projecting taxpayer costs one or more orders of magnitude higher.

The formal government estimates, first from CBO and later by the Treasury in its annual tax expenditure reports, tend to be far lower than the independent estimates of revenue losses done at the same time (Daly and Koplow 2025). Some notable trends:

- **Even official estimates now sharply higher than original scoring at IRA passage.** Treasury cost estimates for 45Q have been significantly higher than the original CBO scoring, with a 10-year subsidy value of $30.6 billion in the FY24 tax expenditure budget, the first one that included IRA provisions. Treasury's estimate (FY24-33) more than doubled to $61.8 billion in FY25, before dropping sharply again to $43.3 billion (FY25-34) in FY26 (Treasury 2023, Treasury 2024).

- **Ten-year reporting window on official estimates results in significant undercount.** Because the eligibility period for specific projects to claim 45Q is longer than the official reporting window (12 versus 10 years), and a ramping of CCUS projects means many won't start their 12-year claim window until later in the JCT and Treasury estimation range (with fewer claim years counted in the estimates), the official estimates will always be lower than what will be claimed over the full project eligibility period.

- **Estimates heavily reliant on modeled projections.** Because the vast majority of CCUS projects are in the development stage, the modeling assumptions on the number, speed, and type of projects are driving the estimates. Treasury and JCT provide little specific information on their assumptions or what is driving changes in their estimates from year-to-year.

- **Large downward adjustment for 45Q revenue losses in Treasury's FY26 tax expenditure report warrants additional explanation.** Between FY25 and FY26, Treasury's 10-year estimate dropped by roughly 30% with the most substantial revisions occurring in the latter half of their 10-year estimation window. A delay in new project start dates would likely result in drops in tax expenditure estimates in the earlier years, and a ramping up in these latter years. Perhaps changing assumptions on the timing or capacity of CO_2 pipelines could result in the observed pattern. Ideally, Treasury would publish a variance report for large changes in any of its estimates, explaining the main driver(s). Treasury staff did not respond to emails seeking clarification on the issue.

- **Direct pay option is a large and consistent share of total tax credit claims**. Based on Treasury estimates, the share of 45Q subsidies delivered in a direct pay format (listed separately in their Table 5) is between 40 and 44% of the total revenue loss. This share did not change materially

between FY25 and FY26 estimates despite the drop in total estimate. Even private projects are allowed to use direct pay during their first five years of operation. Thus, the consistent direct pay ratio over the total 10-year reporting period suggests either that many tax-exempt entities are driving the estimate (making the 5-year phaseout immaterial), or that new private projects continually replace the older ones as their direct pay eligibility window closes on the earlier projects.

Overview of Independent Estimates

As shown in Table 1, with few exceptions independent modeling of projected 45Q claims generate much higher values than those produced thus far by the federal government. Even modeling of just the electric power sector by independent analysts often estimates significantly larger subsidy levels than what Treasury has projected for the full economy.

Potential factors behind these differences are presented below. See also Daly and Koplow 2025, and Bistline et al. 2023 for additional discussion.

- **Shorter reporting window.** A shorter reporting window captures only part of the subsidies available on the projects. The undercount will be larger for projects achieving a start of construction deadline closer to the end of the eligibility period on 45Q, as fewer of their eligible claim years will show up in the Treasury estimate.

- **Less developed project pipeline at time of estimate.** Estimates done closer to the passage of the IRA were based on a smaller project pipeline, and likely to understate the aggregate subsidies. There is often a surge in projects pushing for eligibility close to the end of the eligibility window (i.e., 2032 for 45Q); that is not reflected even in the higher IEEFA estimate.

- **Variation in modeling approach, core assumptions, and hard-wired constraints.** Different models have varying assumptions on inputs, modeling approaches, as well as some hardwired constraints on the pace or scale of adoption for carbon capture (which affected some of the lower values reported on 45Q in Bistline et al. (2023)). Inflection points may exist in the models as well, such as when a coal plant will shut permanently rather than adopt CCS. For example, Bistline et al. notes that the MARKAL-NETL model in particular "exhibits an increase in coal consumption due to its high CCS deployment in the power sector with 45Q credits, which entails parasitic energy penalties relative to coal capacity without CO2 capture."

Because the modeling of 45Q uptake in specific sectors or the full economy is so complex, model results can helpfully be evaluated as a group. The IEEFA analysis provides a very useful upper bound on taxpayer costs and the scale of exposure from a major CCUS buildout. The others indicate that the subsidy magnitude to carbon capture, even with more limited buildouts, is still likely to be well above the official estimates.

Table 1.
Selected Independent Estimates of 45Q Subsidies

Analysis	Institution	Cost ($bils) of 45Q from Passage of the IRA through:					Selected technology-specific model expansion constraints**
		2025	*2030*	*2035*	*2043*	*2050*	
Multi-sector							
EPS-EI	Energy Innovation	-	3.6	29.7			No obvious constraints causing low CCS uptake.
GCAM-CGS	University of MD - CGS	35.7	147.4	128.3			
NEMS-RHG	Rhodium Group	-	22.6	135.5			
REGEN-EPRI	Electric Power Research Institute	15.7	109.6	202.9			
RIO-REPEAT	Evolved Energy Research and ZERO Lab	1.1	13.2	31.7			Annual limit on geological sequestration that ramps slowly.
IEEFA-current rules					835.0		
IEEFA-enhanced						2,100.0	
Power sector only							
Haiku-RFF*	Resources for the Future	-	1.7	4.6			Model constrains NG, coal, CO2 storage
IPM-NRDC*	Natural Resources Defense Council	7.7	44.6	113.3			
MARKAL-NETL*	NETL DOE	-	36.2	313.7			
ReEDS-NREL*	NREL	-	73.7	204.4			
Grubert & Sawyer – min						492.4	
Grubert & Sawyer – max						3,974.8	

**Presented here only for models with low 45Q estimates.
Sources: Bistline et al. (2023), Grubert and Sawyer (2023); IEEFA (2025); Ec. Report of the President (2025).

Some modeled scenarios incorporate more generous subsidy rules than what is in current law; increased subsidies per metric ton and longer claim periods are examples. These modifications capture some of the items on the industry policy wish lists, and that are showing up in legislative proposals (Table 2). While taxpayer costs are often markedly higher in these scenarios, they provide a more accurate view of taxpayer risks in a politically dynamic environment. Clearly, the project pipeline has continued to grow, though project start-up has also been slower than initially projected. Industry continues to push for more subsidies, against a backdrop with poor visibility of claimants and limited or no auditing of claims. This mixture seems to put the credit at high risk for fraud.

Industry and Congressional Initiatives to Expand 45Q

Although the modifications to 45Q under the Inflation Reduction Act greatly increased the expected cost of the subsidy to taxpayers, industry and some members of Congress have consistently pressed for more. This has included a range of strategies, including higher tax credits per ton captured, modifications to the inflation adjustment on existing credit rates to boost the credit value in real dollar terms, a longer eligibility window for new projects, a longer period of time over which credits can be earned on a project, and a shorter period at risk for having to return the credit due to sequestration failures. A further strategy includes self-certification of life-cycle assessments to expedite credit eligibility on new projects, though at a potential cost of subsidizing projects with weak or no climate benefits. Table 2 provides a more detailed summary.

Table 2.
Industry efforts to boost value of 45Q

Strategy to Increase 45Q Subsidies	Description
Increase allowable credit rate	-Increase credit on EOR and utilization to match sequestration (from $60 to $85/mt) (S. 425). -Increase credit on DAC used in EOR from $130 to $180/mt (S. 425). -Increase credit on capture for utilization to $85/mt if captured from industry or utilities, and $180/mt if via DAC (S. 542 2023; CCS 2023). -Increase credit on non-EOR carbon capture to $100/mt (ExxonMobil 2021). -Increase subsidy rate on CCS to $110/mt (NPC 2019: 3-31).
Increase value of credit rate in real dollars	-Adjust base index year to 2021, with the effect of increasing the nominal value of the credit by ~25% by 2026 (CCC 2025: 21).
Extend eligibility period for new projects	-Extend eligible start dates to “mitigate the financial impacts of unforeseeable and unavoidable operational disruptions…” (CCC 2025: 21). This likely would include political challenges on permitting. -Extend period during which projects can claim credits from 12 to 30 years (ExxonMobil 2021).
Increase number of years over which credit can be claimed	-Extend period for direct pay option to the full duration of the credit, even with for profit developers (CCC 2025: 24).

Strategy to Increase 45Q Subsidies	Description
Reduce recapture period	-Limit tax credit recapture period to 3 years after time of injection (NPC 2019: 3-20).
Replace formal life cycle analysis with self-certification	-Allow for 45Q the same process as permitted for 45V, where a taxpayer attests to the lifecycle emissions data with their filing instead of requiring preapproval of the lifecycle impact (CCC 2025:23).
Sources: CCS 2025; S. 425; S. 542; NPC 2019; ExxonMobil 2021, CCS 2023	

2. Master Limited Partnerships (MLPs) remain substantial in fossil fuel industry

Summary of MLP subsidy magnitude

Following passage of the Tax Cuts and Jobs Act in 2017, corporate tax rates dropped sharply and the tax benefits from the MLP structure were reduced. Many MLPs have since disbanded, often through mergers or buyouts. Further, larger firms frequently now run parallel structures, with both traded partnership and c-corp shares. From a subsidy perspective, this reduces the share of their operations exempt from federal income taxes. Despite these changes, fossil fuel companies have, and continue to, dominate the MLP space.

In its first estimate post-TCJA, JCT estimated 5-year subsidies of only $100 million, down from $1.8 billion the prior year (JCT 2018, JCT 2017). The following year, JCT revenue loss estimates were up again to 1.7 billion, and reached $3 billion in the most recent analysis covering FY23-27 (JCT 2024).

Background and Trends

While federal tax treatment of different types of corporate structures varies, publicly traded firms were historically subject to corporate-level income taxes (see Koplow 2013 for a more detailed history of MLPs). Publicly traded partnerships (PTPs) were developed in the early 1980s to change that. The form blended an ability to tap into valuable public capital markets while avoiding federal corporate taxes in the same way as much smaller, privately held partnerships could. MLPs provide subsidies because they allow firms to avoid corporate level income taxes entirely, as well as to distribute cash to owners on a tax-deferred basis.

Because of its tax benefits, the PTP structure was widely adopted across many sectors of the economy. Facing growing losses to the country's corporate income tax base, Congressional action in 1987 largely ended the tax exemption of PTPs. The fossil fuels sector is the primary beneficiary of a narrow exemption created by Congress at that time and continues to vastly dominate the sector (see Table 3). As of February 2025, fossil fuels comprised 90% of total MLP market capitalization and nearly 95% once firms with mixed activities that include significant fossil fuels are included.

Within the sectors still allowed to form PTPs after the 1987 Congressional action, growth continued. Often, private letter rulings by the Internal Revenue Service provided written determinations that

specific parts of the industry were eligible to form MLPs (Koplow 2013: 9-10). While the determinations apply to a specific (anonymous) petitioner only, and do not have the force of law, they nonetheless provided comfort for similarly situated firms about establishing or restructuring as an MLP. By mid-2015, there were nearly 150 MLPs with a market capitalization of nearly $675 billion.

This trend has reversed due to two main factors. First, many MLPs were mid-stream companies, operating like toll collectors and generating reliable income streams for investors. However, a sharp decline in oil prices in 2014 lasted long enough so that contract renewals for these firms faced downward pressure and investor income came down with it. Distributions by many MLPs were cut (Rapier 2024).

Second, passage of the Tax Cuts and Jobs Act of 2017 also contributed to declining interest. Managing MLPs was more administratively complicated for both the company and its shareholders. The reductions in corporate tax rates in TCJA (from 35% to 21%) diminished the tax savings from the MLP format significantly, and many firms shifted course.

Between 2015 and 2025, the number of MLPs dropped from 146 to 37. Fossil fuel MLPs dropped from 115 to 28. Some of the largest firms exiting this space were publicly traded investment firms with large market valuations. Thus, the fossil fuel share of MLP market cap has increased from 77% to 90% since 2015, and despite the reduced market cap for the sector overall.

While MLP market capitalization today is only half of what it was in 2015, it has been growing again in recent years. Further, the remaining firms are on average larger than they were ten years ago: the average market cap per MLP in the fossil fuel sector was $4.5 billion in 2015 versus more than $10 billion today.

Table 3.
Trends in the number and market cap of MLPs, 2013-25

	2025.03	2019.01	2015.05	2013.03
	(1)	(2)	(3)	(4)
Number of MLPs, all listed	37	82	146	68
Number all or mostly FF	29	71	116	67
Number all FFs only	28	70	115	66
Market cap, total, $mils	322,120	286,313	674,112	389,720
Market cap, total, ff-heavy, $mils	301,595	268,979	525,599	387,720
Market cap, total, ff only, $mils	288,555	257,079	518,339	380,720
Avg mkt cap/MLP - All listed, $mils	8,706	3,492	4,617	5,731
Avg mkt cap/MLP - All or mostly in FF sector, $mils	10,400	3,788	4,531	5,787
Avg mkt cap/MLP - All in FFs only, $mils	10,306	3,673	4,507	5,768
Mostly FF as share of total MLP market cap	94%	94%	78%	99%
FF-only as share of total MLP market cap	90%	90%	77%	98%
Sources				
(1) MLP listing from the Energy Infrastructure Council, 4 February 2025 update; market cap information from Fidelity Investments, as of 12 March 2025. (2) MLP listing from the Energy Infrastructure Council, August 2019; market cap information from E-Trade, as of 1 October 2019. (3) MLP listing from the National Association of Publicly Traded Partnerships, 1 May 2015 update; market cap information from Google Finance, as of 1 May 2015. (4) MLP listing from the National Association of Publicly Traded Partnerships, 2013; market cap information from Google Finance, as of 28 Mach 2013.				

3. Emerging tax-exempt structures for carbon sequestration warrant watching

Summary of subsidy magnitude to carbon sequestration REITs

This is an emerging area, driven by an IRS private letter ruling, though for which there is little current data. While the initial focus of this IRS private letter ruling focused on timberland REITs, nothing in the IRS response indicates the approach would be restriction just to timberlands. Rather, any land associated with REITs would seem eligible if acceptable for carbon sequestration. Further, creating new REITs just for this purpose also seems acceptable. Legal reviews suggest MLP structures would also be eligible for this use of the partnership. As CCUS continues to scale, this ruling could potentially allow large amounts of income to escape taxation as firms work to segregate sequestration sites into tax-favored corporate structures.

Background

Another economic sector that was allowed to continue with a form of tax-exempt publicly traded partnerships was real estate. Real estate investment trusts (REITs) are covered in a different part of the statutes from MLPs and historically haven't seemed to have much overlap with fossil fuels. This may be changing, and if it does, the IRS private letter ruling pathway would again be the driver.

In 2023, the IRS determined in Private Letter Ruling 202334007 (IRS 2023) that income associated with a carbon storage agreement entered into with an unrelated third party would we treated similarly to income earned from core real estate activities in terms of meeting the requirements of a REIT and being exempt from corporate level income taxation. In this particular case, the REIT owned timberlands. Carbon dioxide was generated and captured off site, transported via pipeline to the site, and injected beneath the land owned by the REIT. The Vinson & Elkins law firm noted that:

> *The IRS concluded that each Operational Term payment will be "a payment for the use of the Premises during the term of the agreement, a payment for a permanent interest in the Premises, or a combination of both." Because the surface and subsurface of the Premises constitute "real property," the IRS determined that, to the extent an Operational Term payment is for a permanent interest in the Premises, the Storage User's rights are akin to a permanent easement, and therefore such payment is a payment for a sale of an interest in real property, and, to the extent an Operational Term payment is for the use of the Premises during the term of the agreement, such payment meets the general definition of "rents from real property." As such, all three types of payments will be "qualifying income" for purposes of the REIT gross income tests." (Vinson&Elkins, 7 Sept. 2023).*

While the letter does not specifically mention MLPs, Vinson & Elkins do in their write-up, suggesting that they believe the same approach could be used to sequester carbon on land owned by MLPs.

4. Incomplete accounting masks significant subsidies to the Strategic Petroleum Reserve

Summary of SPR subsidy magnitude

Taxpayer costs to build and maintain the Strategic Petroleum Reserve, as well as to fill it with oil, are only partially reflected in the Reserve's annual Report to Congress. While budget appropriations to SPR capture core expenses, significant costs are left out. This includes the inventory holding cost of more than $12 billion in oil inventory (quantified below); depreciation of the facilities (only partially reflected through annual appropriations to facilities maintenance and replacement); asset retirement obligations (not currently tracked or estimated, though very large in other sectors of the O&G industry); insurance (captured on oil purchases and sales, but insurance for core operations appears to rely primarily on implicit self-insurance by the government); and return on invested capital (necessary to remain a going concern were the stockpile private, so like financing costs, this is a *de facto* subsidy to oil markets).

Appropriations to SPR in FY2022 (the most recent year for which a Report to Congress is available) were $226 million. Financing costs for the $12.8 billion in capitalized oil inventory, though unreported, amount to nearly $400 million using the long-term borrowing rate of the US Treasury (the risk-free rate), and more than $1.1 billion using the weighted average cost of capital for private industry (based on a subset of US integrated oil and gas companies compiled by faculty at New York University). At the lower end, financing costs are more than 1.7x the budget appropriations; at the higher end, they are more than 5x. Total quantified subsidies to SPR in 2022 are between $624 and $1,392 million.

Adding the other missing elements would illustrate a more accurate and much higher cost of the SPR to taxpayers. Further, since the debt associated with financing the oil continues year-to-year with no repayment, the interest due would compound. This would further drive up the costs of funding the SPR. Though the degree would vary by the interest rates prevailing at the time of analysis, detailed calculations of compounding done in Koplow and Martin (1995) for SPR estimated they increased the annual financing costs by 3-4 fold. Modeling a compounded interest approach would involve integrating an ability to refinance the holding costs to more accurately reflect the options the operator would have to reduce costs if interest rates fell.

While SPR may still make sense for the United States in terms of energy security for the country and its key allies, funding full costs via a user fee on beneficiaries would be a better model than taxpayer subsidy.

Background

The US Strategic Petroleum Reserve (SPR) is a government-owned and operated crude oil stockpile created to provide a buffer against political or other disruptions to oil markets. SPR is managed under the US Department of Energy's Office of Petroleum Reserves, which also oversees other, smaller stockpiles including the Northeast Home Heating Oil Reserve, the Naval Petroleum Reserves, and the Northeast Gasoline Supply Reserve (DOE 2025). These other programs are much smaller than the SPR and though they do have similar issues to SPR regarding full accounting for their costs, they have not been evaluated here.

SPR was established in 1975 following severe oil market dislocations driven by a political embargo of the United States by major oil producers and concurrent large production cuts. The initial purposes of the reserve identified by Congress were to reduce the impact of energy supply disruptions on the US economy and to meet obligations under the international energy program (IEP). The IEP is a multilateral agreement subject to international law that is administered by the International Energy Agency (Brown, 2022).

The IEP requires minimum levels of stockpiling based on days of consumption. However, it applies only to net importing countries, which the US no longer is. However, SPR is viewed as both a national security and an energy security asset, and the US continues to have obligations to share supply with allies during times of shortage. Each member country is responsible for a share of the total release that is

proportionate to that Nation's share of total IEA oil consumption. For the U.S., this share was 42.3 percent as of December 2022 (DOE 2023b: 23).

SPR as a subsidy to oil markets

Stockpiling requirements to IEA can be met using a mix of public and private stockpiles. Although industry holds stocks in multiple forms, it is to support commercial operations, not national security. As a result, it is not counted (Greenley, 2020: 3). The need for stockpiling reflects a continuing dependence of many sectors of the US economy on petroleum, and while the country's diversification from oil has improved in some areas, it remains insufficient to hedge against supply disruptions. By buffering price shocks, the reserve provides widespread benefits to both oil producers and consumers. Further, "[t]hrough their sheer existence, strategic stocks have also served as an effective deterrent against cartel-like behavior by raising the cost of an oil embargo for producing countries to prohibitive levels" (Bordoff, Halff and Losz, 2018:22)

Estimating Taxpayer Subsidies to SPR

The financial cost of SPR is normally presented in terms of annual appropriations. However, it is an ongoing enterprise with large amounts of public capital invested into the construction and maintenance of its facilities and in the oil inventory itself. A cost of capital for these elements is needed to accurately represent the cost to taxpayers (see Koplow, 1993: B4-65 and Koplow and Martin, 1995: 4-17).

While the SPR annual Report to Congress (e.g., DOE 2023b) does not incorporate it, the cost of holding inventory has long been recognized as properly includible; and subject to compounding if not paid back. For example, a report by the Congressional Budget Office back in 1981 noted that

> *Any SPR debt instrument would create a short-term budgetary impact equal to the interest payments on the debt created to fill the reserve. Assuming a long-term interest rate of 12 percent, these costs would amount to about $6 per barrel per year. Thus, each year in which the SPR is not depleted would require a budgetary outlay of about $6 per barrel. It should be noted that, under any financing system, a resource cost equal to this amount would be incurred, since funds for the SPR could have been invested at the market rate of interest (CBO 1981: 23).*

The financing cost of the SPR inventory is estimated in two ways here.[1] First, we use the government's long-term Treasury bond interest rate (since SPR is a long-term investment). This estimates SPR's hidden cost to the taxpayer and serves as a lower-bound of the subsidy. Second, we calculate the cost of the

[1] While the cost of finance the oil inventory is important to recognize, total inventory holding costs are likely much larger. Components of a standard formula to assess inventory holding costs illustrates this. The formula include capital cost (as a percentage and includes interest and the cost of money invested in the unsold inventory); inventory service cost (expenses related to tax, hardware and any applicable insurance depending on the type of inventory stored); storage space cost (rent a firm would pay for a warehouse or other facility used to store unsold inventory, as well as any related fees such as utility or transportation expenses); and inventory risk (to address for theft, product value depletion, administrative errors or inventory shrinkage due to factors unrelated to sales) (Indeed 2025). Some of these elements may be captured in SPR appropriations; others (e.g., taxes) may not show up because of the government ownership of SPR.

capital as if the SPR were owned and operated by the private sector instead of a service provided by the government. For this second calculation, we use the weighted average cost of capital (WACC) for the largest oil refining companies because low-cost government debt would not be available. This second approach estimates not only the hidden interest costs of SPR, but also the benefit to oil markets of having this service publicly provided.

Table 4.
Cost of the Strategic Petroleum Reserve

	Risk Free Rate	Corporate Rate	Discussion
Appropriations to SPR, CY2022, $mils			
Net Oil purchases	7	7	
Facilities	193	193	Likely captures repairs; does not capture depreciation or return on equity
Management	26	26	
Expansion	0		
Total	226	226	
Average, CY2012-21	233	233	Current data reasonable reflection of longer-term patterns
SPR capitalized cost of crude through end of CY22, $mil	12,800	12,800	Single value reported; no details.
SPR cumulative spending (net of credits) through end of CY22, $mil	16,000	16,000	Higher costs would generate higher inventory carrying cost subsidies
Cost of capital, 2022	3.11%	9.11%	
Metric	30- yr T-bond	Integrated O&G WACC	Other sectors of the industry had higher WACCs.
Improved costing			
Total appropriations	226	226	
Financing cost of inventory, $mil	398	1,166	Rate x capitalized cost of crude
Sum of appropriations + inventory financing costs	**624**	**1,392**	
Inventory interest as ratio to appropriations in CY22	1.76	5.15	Missing costs > reported budget
Sources: DOE (2023a); Damodaran (2023); Economic Report of the President (2025)			

5. References

Barrasso, John (2025). "News Releases: Barrasso, Colleagues Introduce Enhancing Energy Recovery Act," Office of Senator John Barrasso, 25 February.

Bistline, John, et al. (2023). Supplementary materials, "Figure S21. Cross-model comparison of cumulative IRA tax credit value by category over time," with data in the figures provided by the author. Materials support "Emissions and energy impacts of the Inflation Reduction Act," *Science*, Vol. 380, Issue 6652, 30 June.

Bordoff, Jason, Antoine Halff and Akos Losz, Rethinking the Strategic Petroleum Reserve," Columbia University Center onf Global Energy Policy, May 2018.

Brown, Phillip (2022). US Congressional Research Service, "Strategic Petroleum Reserve Oil Releases: October 2021 Through October 2022," US Congressional Research Service, 22 April, IN11916.

CBO (1981). US Congressional Budget Office, "Financing Options for the Strategic Petroleum Reserve," April.

CBO (2022). US Congressional Budget Office, Estimated Budgetary Effects of Public Law 117-169, to Provide for Reconciliation Pursuant to Title II of S. Con. Res. 14, 7 September.

CCS (2023). Carbon Capture Coalition, "Carbon Capture Coalition Endorses the Bipartisan Captured Carbon Utilization Parity Act," 28 February.

CCS (2025). Carbon Capture Coalition, 2025 Federal Policy Blueprint, February.

Congressional Budget Office, "Estimated Budgetary Effects of Title I, Committee of Finance, of Public Law 117-169, to Provide for Reconciliation Pursuant to Title II of S. Con. Res. 14," September 7, 2022.

Daly, Lew and Doug Koplow (2025). "Fact Sheet: Taxpayer Costs for Carbon Capture, Utilization, and Storage: A Fiscal Disaster in the Making," Just Solutions and Earth Track, April.

Damodaran, Aswath (2023). "Cost of Equity and Capital," 2022, updated January 2023; last accessed 10 April 2025.

DOE (2023a). US Department of Energy, "Strategic Petroleum Reserve," US Department of Energy FY 2024 Budget, https://www.energy.gov/sites/default/files/2023-03/doe-fy-2024-budget-vol-3-spr-v2.pdf

DOE (2023b). "Strategic Petroleum Reserve Annual Report for Calendar Year 2022," Report to Congress, October.

DOE (2025). US Department of Energy, "Office of Petroleum Reserves," accessed 9 April.

Economic Report of the President (2025). "Table B-42: Bond yields and interest rates, 1953-2024," accessed on 26 March.

Exxon Mobil Low Carbon Solutions (2021). "Advancements in CCS and Hydrogen," presentation by Erik Oswald at the Annual Meeting of the Interstate Oil and Gas Compact Commission, slide 10, 9 November.

Greenley, Heather (2020). "The Strategic Petroleum Reserve: Background, Authorities, and Considerations," US Congressional Research Service, R46355, 13 May.

Grubert, Emily and Frances Sawyer (2023). "US power sector carbon capture and storage under the Inflation Reduction Act could be costly with limited or negative abatement potential," *Environmental Research: Infrastructure and Sustainability*, Volume 3, Number 1, 10 March.

Indeed (2025). "Holding Costs Formula," Indeed Career Guides, accessed 26 March.

Institute for Energy Economics and Financial Analysis (2025). Tax credits for carbon capture utilization and storage, 11 February.

IRS (2023). US Internal Revenue Service. Private Letter Ruling 202334007, 25 August 2023 regarding treatment of income associated with carbon storage and REIT requirements. Accessed 11 March 2025.

JCT (2018). Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2018-2022," JCX-81-18, 4 October.

JCT (2019). Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2019-2023," JCX-55-19, 18 December.

JCT (2019). Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2017-2021," JCX-34-18, 25 May.

JCT (2024). Joint Committee on Taxation, "Estimates of Federal Tax Expenditures for Fiscal Years 2024-2028," JCX-48-24, 11 December.

Koplow, Doug (1993). "Strategic Petroleum Reserves," in Federal Energy Subsidies: Energy, Environmental and Fiscal Impacts - Report and Appendices, (Washington, DC: Alliance to Save Energy), pp. B4-65 et seq.)

Koplow, Doug (2013). "Too Big to Ignore: Subsidies to Fossil Fuel Master Limited Partnerships," Earth Track and Oil Change International, July.

Koplow, Doug and Aaron Martin (1995). "Strategic Petroleum Reserves," in Fueling Global Warming: Federal Subsidies To Oil In The United States, (Washington, DC: Greenpeace), pp. 4-17 – 47-25.

NPC (2021). National Petroleum Council, "Meeting the Dual Challenge: A Road Map to At-Scale Deployment of Carbon Capture, Use, and Storage," Chapter 3, published 2019, last updated 12 March 2021.

Rapier, Robert (2024). "Master Limited Partnerships: A Decade Of Challenges And Resilience," Forbes, 3 April, accessed 11 March 2025.

S.425 (2025). "Enhancing Energy Recovery Act," introduced by Senator John Barrasso (R-WY), 119th Congress (2025-2026), 5 February.

S.542 (2023). "CCU Parity Act of 2023," introduced by Senator Sheldon Whitehouse (D-RI), US Senate, 118th Congress (2023-2024), on 28 February.

Strategic Petroleum Reserve (2023). US Department of Energy FY 2024 Budget, https://www.energy.gov/sites/default/files/2023-03/doe-fy-2024-budget-vol-3-spr-v2.pdf

Treasury (2023). US. Department of the Treasury, Office of Tax Analysis, "Tax Expenditure Budget for Fiscal Year 2025," Tables 1 and 5, 11 March.

Treasury (2024). US. Department of the Treasury, Office of Tax Analysis, "Tax Expenditure Budget for Fiscal Year 2026," Tables 1 and 5, 27 November.

Vinson & Elkins (2023). "IRS Releases Favorable Guidance on the Tax Treatment of Payments to REITs and MLPs for Subsurface Carbon Dioxide Storage," 7 September. Accessed on 11 March 2025.