Offshore Oil and Gas Lease Sales

BACKGROUND AND BOEM's FIVE-YEAR PLAN

There is a five-step process for federal offshore oil and gas development on the Outer Continental Shelf (OCS) in the United States.[1] First, the Bureau of Ocean Energy Management (BOEM) develops a five-year program for offshore oil and gas leasing, considering environmental, economic, and social factors. The latest such program was finalized in September of 2023.[2] Next, BOEM conducts lease sales, where companies bid for the rights to explore and develop specific areas. Winning bidders pay upfront bonus payments to the federal government, along with annual rent payments, plus royalties on revenues once production is underway. Third, companies conduct geological and geophysical surveys, and drill exploratory wells to assess potential resources. Fourth, if commercially viable resources are found, companies submit development and production plans for approval. Once approved, they can begin drilling and extracting oil and gas. Finally, when a lease is no longer productive, companies must safely plug wells, remove equipment, and clear the seafloor, although in some cases some equipment is left to form reefs to support marine life.[3] The whole process from lease sale to decommissioning can take 35 to 70 years.[4]

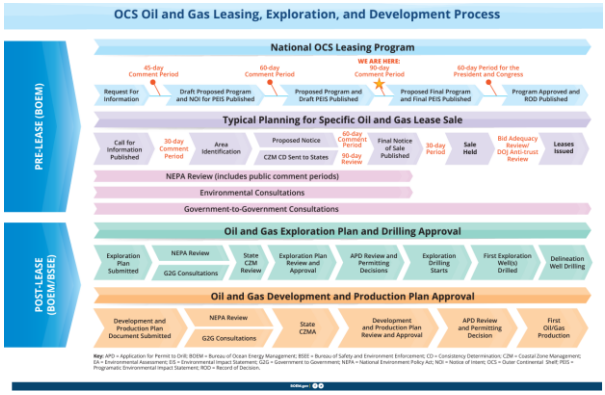
Figure 1: OCS Oil and Gas Leasing, Exploration and Development Process

[1] "Offshore Oil and Gas," U.S. Department of Interior, Natural Resources Revenue Data, accessed September 2, 2024, https://revenuedata.doi.gov/how-revenue-works/offshore-oil-gas/

[2] "National OCS Oil and Gas Leasing Program," U.S. Department of Interior, Bureau of Ocean Energy Management, accessed September 2, 2024, https://www.boem.gov/oil-gas-energy/national-program/national-ocs-oil-and-gas-leasing-program.

[3] "Rigs-to-Reefs," Bureau of Safety and Environmental Enforcement, accessed September 29, 2024, https://www.bsee.gov/what-we-do/environmental-compliance/environmental-programs/rigs-to-reefs.

[4] Bureau of Ocean Energy Management, "Economic Analysis Methodology for the 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program," 2024, p. 8-1, https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/Final_Economic_Analysis_Methodology_2024-2029Program.pdf.



Source: https://www.boem.gov/sites/default/files/documents/oil-gas-energy/national-program/OCS%20Leasing%20Process%20Diagram.pdf

BOEM is required to maintain a national five-year program that lays out proposed oil and gas lease sales on the U.S. OCS as mandated by the Outer Continental Shelf Lands Act.[5] BOEM's current five-year offshore oil and gas leasing program for 2024-2029 proposes a total of three lease sales (see table 1).[6] The Secretary of the Interior approved this schedule on December 14, 2023.[7] All three proposed lease sales are located in the Gulf of Mexico region. The lease sales are scheduled to be held in 2025, 2027 and 2029 (years 1, 3 and 5 in the attached spreadsheet).

For comparison, an earlier version of the five-year plan put forth by the Trump administration analyzed 47 OCS oil and gas lease sales over a five-year period.[8] However, that plan was not finalized, and based on the history of lease sales (again, see table 1), 47 sales probably represented an ambition rather than a realistic expectation of the number of sales that would be held. In practice, virtually all lease sales relate to the Gulf of Mexico, while occasionally some occur in Alaska, but the Trump administration's projection of 47 sales included 12 in the Gulf of Mexico region, 19 in the Alaska region, 9 in the Atlantic region, and 7 in the Pacific region.[9]

[5] The Outer Continental Shelf Lands Act, 43 U.S.C. §§ 1331 et seq.

[6] Bureau of Ocean Energy Management, "2024-2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program," September 2023, p. 3, https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/2024-2029_NationalOCSProgram_PFP_Sept_2023_Compliant.pdf.

[7] U.S. Department of Interior, "Record of Decision and Approval of the 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program," December 14, 2023, https://www.boem.gov/sites/default/files/documents/oil-gas-energy/Decision-Memo-National-Program-SIGNED.pdf.

[8] Bureau of Ocean Energy Management, "2019-2024 National Outer Continental Shelf Oil and Gas Leasing: Draft Proposed Program," January 2018, at https://www.boem.gov/NP-Draft-Proposed-Program-2019-2024/.

[9] The accompanying model could be easily adapted to account for more sales than have been the historical norm, or to incorporate sales from other OCS regions should they be opened up for energy exploration and production. This would simply require a projection of the number of barrels of oil and cubic feet of gas likely to be produced from a sale (or sales) in the relevant region.

There were eleven lease sales as part of the prior five-year plan, and the number of proposed sales in five-year plan submissions ranged from 11 to 18 between 1992 and 2022.[10] However, in nearly every case the number of actual sales fell below the number of proposed sales in BOEM's five-year plans. Still, three is the lowest number of lease sales proposed in any offshore five-year leasing program to date.[11] Notably, the Energy Permitting Reform Act of 2024, legislation being considered in the senate as of late 2024, would require at least one lease sale each year from 2025 to 2029.[12]

Table 1: OCSLA Five-Year Programs Submitted to Congress Since 1992

Years	Administration Submitting Plan	Number of Sales Listed in Submission	Number of Sales Held	Acres Listed (millions)
2024-2029	Biden	3	TBD	TBD
2017-2022	Obama	11	11	9.7
2012-2017	Obama	15	13	7.4
2007-2012	Obama/G.W. Bush	16*	11	21.7
2002-2007	G.W. Bush	20	15	20.5
1997-2002	Clinton	16	12	22.9
1992-1997	G.G.W. Bush	18	12	22.6

Source: Congressional Research Service[13]

LEASED TERRITORY

Lease sales can cover very large areas. For example, the Trump administration held nine offshore lease sales during its term,[14] including eight in the Gulf of Mexico seven of which offered more than 75 million acres each. The current 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program includes an area that covers 94.1 million acres in the Gulf of Mexico.[15]

Tracts are specific areas of the OCS that are offered for lease during a sale. Each lease sale offers multiple tracts for bidding. Companies can bid on individual tracts within the area offered in a lease sale. Not all tracts offered in a sale receive bids or result in leases being issued. The number of tracts leased is generally lower than the total number of tracts offered in a sale.

The number of tracts leased per sale varies significantly, as does the number of acres leased (see table 2). Bureau of Ocean Energy Management data on lease sales demonstrates that, for Gulf of Mexico lease sales between 2017 and 2021, the lowest number of leases issued as part of a sale

[10] Congressional Research Service, "Five-Year Offshore Oil and Gas Leasing Program: History and Background," January 9, 2024, https://crsreports.congress.gov/product/pdf/R/R44504.
[11] Congressional Research Service, "Five-Year Offshore Oil and Gas Leasing Program: Status and Issues in Brief," Updated January 8, 2024, p. 4, https://crsreports.congress.gov/product/pdf/R/R44692.
[12] S.4753 - Energy Permitting Reform Act of 2024, 118th Congress (2023-2024).
[13] Congressional Research Service, "Five-Year Offshore Oil and Gas Leasing Program: History and Background," p. 10.
[14] Bureau of Ocean Energy Management, "All Lease Offerings," updated April 2024, https://www.boem.gov/oil-gas-energy/leasing/outer-continental-shelf-lease-sale-statistics.
[15] S&P Global, "US BOEM to consider entire Gulf of Mexico program area for offshore oil, gas leasing," April 1, 2024, https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/oil/040124-us-boem-to-consider-entire-gulf-of-mexico-program-area-for-offshore-oil-gas-leasing.

was 63 (Sale 254 in March 2020) and the highest number of leases issued was 306 (Sale 257 in November 2021).[16] Acres leased in this timeframe ranged from 456,256 in 2017 to 1,711,301 in 2021.

Table 2: Gulf of Mexico Lease Sales, 2017-2023

Sale #	Date of Sale	Number of Leased Tracts Issued	Number of Acres Leased	Total Bonus for Leased Tracts
249	8/16/2017	81	456,256	$110,878,165
250	3/20/2018	139	764,324	$115,329,139
251	8/15/2018	141	784,009	$175,489,464
252	3/20/2019	211	1,171,260	$231,790,063
253	8/21/2019	147	811,967	$154,994,527
254	3/18/2020	63	351,206	$86,240,453
256	11/18/2020	86	477,413	$111,559,312
257	11/17/2021	306	1,711,301	$187,031,781
259*	3/29/2023	295	1,576,409	$248,614,236
261*	12/20/2023	299	1,659,224	$372,460,408

* Held pursuant to requirements in the Inflation Reduction Act
* Data excludes the much smaller lease sale 258, for Cook Inlet, Alaska, on 12/30/2022.
Source: "All Lease Offerings," Bureau of Ocean Energy Management, https://www.boem.gov/sites/default/files/documents/about-boem/Swiler-Table-All-Lease-Offerings.pdf.

QUANTITY OF OIL & GAS PRODUCED

Overall U.S. oil production averaged 12.9 million barrels per day in 2023.[17] This was more than any country has ever produced. The Gulf of Mexico, where BOEM holds nearly all of its offshore lease sales, is a significant source of U.S. oil production. In 2023, average oil production from the Gulf of Mexico was about 1.9 million barrels of oil per day.[18] BOEM projects this total to largely hold steady in the next few years. However, absent lease sales production output is projected to eventually drop off as production on existing leases declines in the 2030s.[19]

Total federal offshore production in FY 2022 reached approximately 624.1 million barrels of oil and 775.5 billion cubic feet of gas, almost all of which was produced in the Gulf of Mexico.[20] Currently,

[16] Bureau of Ocean Energy Management, "BUDGET JUSTIFICATIONS: Department of the Interior and Performance Information," Fiscal Year 2024, p. 59, https://www.doi.gov/sites/doi.gov/files/fy2024-boem-greenbook.pdf-508.pdf.
[17] U.S. Energy Information Agency, "United States produces more crude oil than any country, ever," March 11, 2024, https://www.eia.gov/todayinenergy/detail.php?id=61545.
[18] Ehsan Soltani, "Crude Oil Production Across U.S. States (2023)," Visual Capitalist, https://www.voronoiapp.com/energy/-Crude-Oil-Production-Across-US-States-2023-2018.
[19] Bureau of Ocean Energy Management, "U.S. Outer Continental Shelf Gulf of Mexico Region Oil and Gas Production Forecast 2022-2031," U.S. Department of Interior, p. 23, https://www.boem.gov/sites/default/files/documents/regions/gulf-mexico-ocs-region/US%20OCS%20GOMR%20Oil%20and%20Gas%20Production%20Forecast%202022-2031.pdf.
[20] Bureau of Ocean Energy Management, "BUDGET JUSTIFICATIONS Department of the Interior and Performance Information," Fiscal Year 2024, https://www.doi.gov/sites/doi.gov/files/fy2024-boem-greenbook.pdf-508.pdf.

producing leases on the OCS account for about 15 percent of all domestic oil production and 2 percent of domestic natural gas production.[21]

The Gulf is the nation's primary offshore source of oil and gas, generating about 97% of all U.S. OCS oil and gas production.[22] Hence, this analysis will focus on GOM region sales. As of September 2024, there are 2,249 active leases in the GOM region.[23]

BOEM attempts to make projections for the amount of oil and gas production that will occur from lease sales in its five-year plan. In the report, BOEM comes up with projections under two plausible scenarios, a five-sale scenario and a ten-sale scenario, as well as under different "activity levels," which adjust for fluctuations in market conditions, changes in consumer demand, volatility in oil and gas prices, and other variability. According to BOEM, "typically, lower activity levels would be associated with lower oil and gas prices, and higher activity levels would be associated with higher oil and gas prices."[24] BOEM uses a single, representative sale in the 10-sale scenario and then scales it for low-, mid-, and high-activity environments to analyze how potential production volumes may differ in a 5-sale scenario. Table 3 presents this information.

Table 3: Potential Production in the Gulf of Mexico

Scenario	Production Category	Low Activity Level	Mid-Activity Level	High-Activity Level
Baseline	Oil (billions barrels)	0.34	1.45	2.23
	Gas (Tcf)	0.52	1.872	2.96
Gulf of Mexico, 5-Sale Scenario	Oil (billions barrels)	0.57	2.41	3.72
	Gas (Tcf)	0.86	3.12	4.93
Gulf of Mexico, 10-year Scenario	Oil (billions barrels)	0.57	3.22	7.45
	Gas (Tcf)	0.86	4.16	9.87

Note: Estimates represent total potential production over up to 44 years (5-sale scenario) and 47 years (10-sale scenario).[25] Baseline estimate is associated with a 41 year production schedule.[26]

[21] Bureau of Ocean Energy Management, "BOEM Funding," *Bureau Highlights,* p. BH-22, FY 2022, https://www.doi.gov/sites/doi.gov/files/fy2022-bib-bh021.pdf.

[22] "Oil and Gas - Gulf of Mexico," Bureau of Ocean Energy Management, accessed September 11, 2024, https://www.boem.gov/regions/gulf-mexico-ocs-region/oil-and-gas-gulf-mexico.

[23] BOEM "2024-2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program," p. 4-3, where a September 2024 count was 2,249. For regular updates of this count, see GOM Interactive Lease Statistics Dashboard BOEM, Bureau of Ocean Energy Management, accessed September 11, 2024, https://www.boem.gov/gom-interactive-lease-statistics-dashboard.

[24] Bureau of Ocean Energy Management, "2024-2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program," September 2023, p. 5-10.

[25] Bureau of Ocean Energy Management, "Economic Analysis Methodology for the 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program," p. 8-12.

[26] This is chosen because it is the time horizon for the "no sale" scenario reviewed by BOEM. See Bureau of Ocean Energy Management, "Economic Analysis Methodology for the 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program," p. 8-14.

Source: Author's calculations, and BOEM, "2024-2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program," p. 5-10.

For the purposes of this analysis, we assume a baseline of three lease sales, consistent with the current five-year plan, and we compare this scenario to the alternatives that BOEM considered of a 5-sale scenario and a 10-sale scenario. BOEM's projections allow us to bypass consideration of the number of leased acres and tracts in each sale, since BOEM's representative sale accounts for these factors. We calculate the baseline scenario as 3/5 the level of the 5-sale scenario.

TIMING

Leases typically have a primary term of 5-10 years, during which companies are exploring the lease area, at the end of which they must begin production or risk losing the lease.[27] Companies can request lease extensions or suspensions if they are actively working toward production but need more time. Not all leased areas end up producing oil or gas. Companies evaluate the commercial prospects of leased areas and may not develop them if they are deemed unprofitable. Changes in oil prices significantly affect the profitability of offshore operations. When prices drop, previously profitable leases may become unprofitable. In this analysis, we assume no slowdown in the exploratory and drilling process once leases are issued. However, it is worth noting that it is common for declines in leasing activity to be accompanied by additional policies that make the process of translating "leases into actual drilling permits, new drilling activity, and eventual production" "more difficult, expensive and time-consuming."[28]

The process generally takes longer in frontier areas with less existing infrastructure and data compared to more mature production areas, like the Gulf of Mexico. According to the American Petroleum Institute, for offshore leases, the average development time is 7-8 years given the engineering and logistical challenges.[29] This analysis centers on two scenarios, one where it takes seven years before production begins and a second where it takes ten years. Under both these scenarios, we calculate total production over a 10-, 15-, and 20-year period. This analysis looks at the effect of changes in the current five-year plan, in terms of number of lease sales, over this one-to-two decade time horizon. In line with the Congressional Budget Office's scoring methodology,[30] we do not discount cash flows in the year in which they occur. However, we provide ~~We assume~~present value estimates using a 7% discount rate on future revenues for informational

[27] Bureau of Ocean Energy Management, "Gulf of Mexico Outer Continental Shelf Oil and Gas Lease Sale 261," *Federal Register*, Vol. 88, No. 193, p. 69663, https://www.federalregister.gov/documents/2023/10/06/2023-22316/gulf-of-mexico-outer-continental-shelf-oil-and-gas-lease-sale-261.

[28] American Petroleum Institute, "Employment, Gov't Revenue and Energy Security Impacts of Current Federal Lands Policy in the Western U.S.," January 2012, p. 17, https://www.api.org/-/media/Files/Oil-and-Natural-Gas/Exploration/EIS-Solutions-Western-Land-Policy-Jan_2012.pdf.

[29] American Petroleum Institute, "Federal Oil & Gas Leasing and Permitting FACT SHEET," 2021, https://www.api.org/-/media/files/policy/exploration/2022/federal-lands-and-waters-leasing-and-permitting-fact-sheet.pdf?la=en&hash=2D81B1752B5A2693A1549CDB43D8CEC800CD706E.

[30] Congressional Budget Office, "How CBO Uses Discount Rates to Estimate the Present Value of Future Costs or Savings," October 2024, https://www.cbo.gov/publication/60815.

purposes. We also assume~~and~~ a 3% inflation rate over time. These assumptions can be adjusted in the model.

BONUS PAYMENTS, RENT, AND ROYALTIES

Production from offshore leases is a significant source of federal revenue, generating more than $7.6 billion in revenue in 2023.[31] For the purposes of this study, we assume 94.7% of bonus, royalty and rent payments fully are retained by the federal government, since some revenues will be distributed to states and local jurisdictions.[32] According to the Natural Resources Revenue Data database, disbursements to states ranged from 2.4 to 8.7 percent of total disbursements from 2019 to 2023.[33] We assume the midpoint of these estimates, 5.3%, is the amount of revenues distributed to states and localities.

Revenues from offshore oil and gas leases include high bids (known as bonus payments), rental payments, and royalty payments on the energy resources produced. Bonuses refer to the upfront payments that companies make to secure the right to explore and potentially develop oil and gas resources in a given lease area. These bonuses are determined through competitive bidding processes during lease sales.

During the bidding process, companies submit bids for offshore tracts during lease sales. The highest bid for a tract is considered the bonus payment, provided it meets or exceeds the fair market value as determined by BOEM. BOEM uses a valuation process to ensure that the government receives a fair market value for the lease rights granted. This process involves assessing the economic viability of the tracts and comparing industry bids to these valuations.

The average bonus payment revenue across the ten lease sales in table 2 was $179,438,755. The high was $372,460,408 and the low was $86,240,453. These data, from BOEM, provide the basis for estimates of bonus payments per lease sale in our model.

According to the Department of Interior, rents range from $7 to $44 an acre, depending on water depth and the year in which the lease has been active.[34] However, upwards of 90 percent of offshore leasing areas being considered in the Gulf of Mexico are at depths greater than 800 meters,[35] where rents range from $11 to $16/acre, depending on the year. We assume a typical rental rate of $13 an acre. Multiplying this by the average acres in a sale from table 1, yields

[31] "Revenue Type," Natural Resources Revenue Data, accessed September 21, 2024, https://revenuedata.doi.gov/query-data/?dataType=Revenue.

[32] ~~Congressional Research Service, "Revenues and Disbursements from Oil and Natural Gas Production on Federal Lands," September 22, 2020, https://crsreports.congress.gov/product/pdf/R/R46537#:~:text=Federal%20revenues%20from%20oil%20and,totaled%20%244.202%20billion%20in%20FY2019.~~

[33] Revenues from bonus payments, royalties and rent tend to be roughly in line with disbursements. See https://revenuedata.doi.gov/query-data/?dataType=Disbursements.~~-~~

[34] "Revenues," U.S. Department of Interior, Natural Resources Revenue Data," accessed September 12, 2024, https://revenuedata.doi.gov/how-revenue-works/revenues/#Oil-and-gas.

[35] Bureau of Ocean Energy Management, "Economic Analysis Methodology for the 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Program," p. 8-12.

$13/acre x 976,337 acres = $12,692,380 per sale per year. For comparison, in FY 2023, BOEM's offshore energy activities generated $128,787,712.96 in revenues from rental income.

Royalty rates are a percentage of the revenue or production value. For federal offshore leases, the royalty rate of 18.75%, a rate that has held steady since the George W. Bush administration.[36] Royalties in the model are assumed to kick in during production years and will depend on oil prices at that time. Oil prices over the last three years have ranged from a low of $50 a barrel to a high of about $100 a barrel.[37] Prices of natural gas in recent years have range from $2 to $9 / MMBtu.[38] (1,000 cubic feet (Mcf) of natural gas equals 1.038 MMBtu.[39]) For the purposes of this analysis, however, we will estimate royalty payments based on historical royalties revenues per barrel of oil produced. Royalty revenues for the last decade are presented in table 3. The average royalty payment per barrel of oil over this time period was $7.12 and per mcf of natural gas was $0.29.

Table 4: Royalties from Oil and Gas, 2013-2023

Year	Royalties Oil	Barrels of Oil	Royalty $/Barrel	Royalties Gas	Gas Production (mcf)	Royalty $/mcf
2013	$5,434,009,241	488,070,766	$11.13	$500,024,503	1,447,785,125	$0.35
2014	$5,408,463,684	513,933,920	$10.52	$514,643,920	1,333,135,239	$0.39
2015	$3,734,142,482	554,675,064	$6.73	$402,383,179	1,356,474,048	$0.30
2016	$2,216,474,458	582,949,888	$3.80	$199,121,958	1,275,281,422	$0.16
2017	$2,777,779,324	628,823,966	$4.42	$259,415,289	1,185,071,539	$0.22
2018	$3,956,903,791	620,838,717	$6.37	$229,187,427	991,813,453	$0.23
2019	$4,627,716,945	689,237,779	$6.71	$283,413,808	1,061,212,748	$0.27
2020	$3,189,153,328	653,923,977	$4.88	$140,387,586	921,222,875	$0.15
2021	$3,490,149,539	611,324,810	$5.71	$177,395,023	796,563,641	$0.22
2022	$5,802,353,255	628,937,669	$9.23	$369,579,805	815,965,741	$0.45
2023	$5,989,675,373	675,660,550	$8.86	$347,032,857	799,486,806	$0.43

Source: https://revenuedata.doi.gov/query-data/.

FEDERAL SALES TAXES

Crude oil is the main driver of gasoline price.[40] The federal excise tax on gasoline is currently 18.4 cents per gallon, and for diesel fuel it is 24.4 cents per gallon (this is flat tax irrespective of the price

[36] "Revenues," U.S. Department of Interior, Natural Resources Revenue Data," accessed September 12, 2024, https://revenuedata.doi.gov/how-revenue-works/revenues/#Oil-and-gas.
[37] "Petroleum & Other Liquids: Federal Offshore Gulf Coast First Purchase Price," U.S. Energy Information Administration, accessed September 12, 2024, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?f=m&n=pet&s=f003075__3.
[38] "Natural Gas," Trading Economics, accessed September 12, 2024, https://tradingeconomics.com/commodity/natural-gas.
[39] "Frequently Asked Questions (FAQs): What are Ccf, Mcf, Btu, and therms? How do I convert natural gas prices in dollars per Ccf or Mcf to dollars per Btu or therm?," U.S. Energy Information Administration, accessed September 12, 2024, https://www.eia.gov/tools/faqs/faq.php?id=45&t=8.
[40] "Gasoline Explained: Factors affecting gasoline prices," U.S. Energy Information Administration, accessed September 21, 2024, https://www.eia.gov/energyexplained/gasoline/factors-affecting-gasoline-prices.php.

of oil/gas).[41] These taxes are collected at the point of sale for gasoline and diesel fuel, not directly from oil production. In that sense, the tax is indirect but still can be a sizeable source of income for the federal government. Additionally, the federal excise tax is 21.9¢ per gallon on jet fuel. For commercial operations, the federal excise tax rate for jet fuel is 4.4¢ per gallon.[42] Commercial aviation typically accounts for around 85% of jet fuel consumed in the United States.[43]

A typical barrel of oil can produce about 19 gallons of gasoline. According to the U.S. Energy Information Administration, each 42-gallon barrel of oil entering American refineries produces approximately 19 gallons of gasoline, 12 gallons of diesel fuel, and 4 gallons of jet fuel.[44] (Plus additional products like kerosene, residual fuel oil, road oil, asphalt, naphtha, and lubricants are produced.)

There is also a federal alternative fuels tax on natural gas. Compressed natural gas (CNG) is subject to a federal excise tax of $0.183 per gasoline gallon equivalent and liquefied natural gas (LNG) is taxed at a rate of $0.243 per diesel gallon equivalent (DGE). However, CNG is primarily used for transportation, especially in vehicles like buses and trucks. LNG is mainly used for long-distance transportation of natural gas where pipelines are not feasible. The Gulf Coast region has extensive infrastructure for processing and transporting natural gas, including numerous processing plants and pipelines. This indicates that Gulf of Mexico natural gas is primarily used for power generation, industrial use and residential and commercial use. For our purposes we will assume the fraction of natural gas produced in the Gulf devoted to alternative fuels is not significant enough to raise significant federal tax revenue.

A further consideration is the substitution of foreign production for domestic production in cases where domestic production is cut or otherwise lower than it would be. BOEM estimates that under conditions of no future lease sales under the current five-year plan, 23% of lost oil production is made up for by onshore production; 58% is made up from imports; 7% from other sources; and 10% from a reduction in demand.[45] In other words, consumption of oil and gas products would fall by an estimated 10% of the total output decline. Because the government still collects taxes on fuel generated from onshore and imported oil, we assume under such conditions, federal excise tax revenue would only fall by 10% of the total one would expect if there was no offset from foreign or domestic onshore production. However, it should be noted that it is plausible that foreign and

[41] "Frequently Asked Questions (FAQs): How much tax do we pay on a gallon of gasoline and on a gallon of diesel fuel?," U.S. Energy Information Administration, accessed September 12, 2024, https://www.eia.gov/tools/faqs/faq.php?id=10&t=5

[42] PriceWaterhouseCoopers, "Aircraft Club November 2023: Air transport excise tax rates for 2024," November 2023, https://www.pwc.com/us/en/services/tax/library/aircraft-club-nov-2023-air-transport-excise-tax-rates-for-2024.html.

[43] U.S. Energy Information Administration, "U.S. jet fuel consumption in 2023 remained below the pre-pandemic high," July 8, 2024, https://www.eia.gov/todayinenergy/detail.php?id=62443.

[44] "Oil and petroleum products explained: Refining crude oil," U.S. Energy Information Administration, accessed September 12, 2024, https://www.eia.gov/energyexplained/oil-and-petroleum-products/refining-crude-oil.php; "Fact #676: May 23, 2011 U.S. Refiners Produce about 19 Gallons of Gasoline from a Barrel of Oil," U.S. Department of Energy, accessed September 12, 2024, https://www.energy.gov/eere/vehicles/fact-676-may-23-2011-us-refiners-produce-about-19-gallons-gasoline-barrel-oil.

[45] Bureau of Ocean Energy Management, "2019-2024 National Outer Continental Shelf Oil and Gas Leasing: Draft Proposed Program," p. 5-17.

onshore production could fully offset any shortfalls from the domestic offshore oil and gas sector, in which case federal sales tax revenues would be unaffected by changes in the number of lease sales in the Gulf of Mexico.

CORPORATE INCOME TAX

The profit earned per barrel of oil produced depends on the specific company, time period, and market conditions, especially oil prices. However, in recent years, major oil companies have been highly profitable, with net margins ranging from about 14% to 28%.[46] For this reason, we believe a profit margin of 20 percent is reasonable.

The federal corporate tax rate is 21 percent.[47] It is reasonable to conclude most oil and gas companies pay less than this rate, due to various tax credits and deductions affecting the industry. Businesses can also defer certain tax payments. A Tax Foundation study found that the effective tax rate for the U.S. oil and gas extraction industry in 2018 was 19.3 percent.[48]

Finally, profits will depend on energy prices. We use projections from the Energy Information Administration and assume a $100 barrel of oil and price of $4 per mmBTU of natural gas.[49] We assume corporate tax and sales revenues, like royalty payments, only accrue in production years.

Like with federal sales taxes, additional production in the Gulf of Mexico would likely be replaced by production from other sources absent that production taking place. Onshore domestic companies pay corporate taxes to the U.S. government, but foreign oil producers do not. Hence, we assume here 68 percent of OCS production generates new sources of revenue for the federal government (10 percent by increasing consumption and 58 percent by offsetting foreign production).

SOURCES OF UNCERTAINTY

The analysis presented in the accompanying model relies on the data presented in this explanatory document. The model draws heavily from BOEM's projections of barrels of oil produced under alternative sale scenarios in the agency's five-year plan. Technological advancements in drilling

[46] "Oil And Gas Production Industry Profitability," CSI Market, accessed September 12, 2024, https://csimarket.com/Industry/industry_Profitability_Ratios.php?ind=602.

[47] "United States Federal Corporate Tax Rate," Trading Economics, accessed September 12, 2024, https://tradingeconomics.com/united-states/corporate-tax-rate.

[48] Alex Muresianu and William McBride, "A Guide to the Fossil Fuel Provisions of the Biden Budget," Tax Foundation, September 27, 2023, https://taxfoundation.org/research/all/federal/biden-oil-gas-energy-budget/.

[49] See "Annual Energy Outlook 2023," Energy Information Administration, accessed September 29, 2024, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=1-AEO2023&region=0-0&cases=ref2023&start=2021&end=2050&f=A&linechart=ref2023-d020623a.52-1-AEO2023~ref2023-d020623a.53-1-AEO2023&map=&ctype=linechart&sourcekey=0. EIA assumes a 2.4% growth rate in the price of West Texas Crude oil prices between 2022 and 2050. We account for this growth in the inflation rate, which we assume is 3% in our base case scenario. Note that moving sales forward in time that would otherwise occur later can sometimes have the effect of lowering revenues due to higher anticipated future oil and gas prices. See Congressional Budget Office, "Cost Estimate for H.R. 6106 Common Sense Permitting Act," September 12, 2018, https://www.cbo.gov/publication/54465.

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capabilities and the ever-changing landscape of energy policy across time and administrations introduce further elements of uncertainty into the analysis.

Onshore Oil and Gas Leasing

(Note that some statistics presented in the previous section are incorporated into the onshore oil and gas lease model. For the sake of brevity, the duplicate material is not repeated.)

OUTPUT PER LEASE

According to the US Department of Interior, as of October 1, 2023 there were 33,702 active onshore leases on federal lands, with 23,641 producing.[50] Total production on onshore federal lands was 552,162,925 barrels of oil in fiscal year 2023.[51] Gas production was 3,802,043,455 mcf of gas. Meanwhile total acres in effect in FY 2023 was 23,196,348. This yields an average of 23.8 barrels of oil per active acre per year and 163.9 mcf of gas per acre.

NEW LEASES AND ACRES

In Fiscal Year 2023, there were 144 new leases, down from a decade high of 1,841 in Fiscal Year 2019 (see table 5). The low during this time period was 120. The average over the period was 964. Acres ranged from a low of about 75,000 in FY 2022 to a high of 2.2 million in FY 2019. As a baseline, we use the average over the last three years, 138,534. The average over the prior seven years was 1,280,438.

Table 5: New Leases, Acres Leased, and Bonus Payments Over Time, FY 2013-FY 2023

	New Leases	New Acres Leased	Acres per new lease	Bonus Payments	Bonus Payments/Acre
FY2013	1,468	1,172,808	799	$652,384,699.80	$556.26
FY 2014	1,157	1,197,852	1,035	$612,339,234.17	$511.20
FY 2015	852	810,068	951	$566,989,936.86	$699.93
FY 2016	520	577,317	1,110	$508,049,591.56	$880.02
FY 2017	902	1,114,218	1,235	$329,777,871.96	$295.97
FY 2018	1,333	1,253,369	940	$282,988,274.21	$225.78
FY 2019	1,841	2,245,906	1,220	$1,219,042,587.02	$542.78
FY 2020	899	1,871,962	2,082	$103,114,744.14	$55.08
FY 2021	407	249,132	612	$75,876,642.60	$304.56
FY 2022	120	74,758	623	$20,401,072.60	$272.89
FY 2023	144	91,712	637	$103,349,644.40	$1,126.89

Sources: Bureau of Land Management, Oil and Gas Statistics; Natural Resources Revenue Data; author's calculations.

BONUS PAYMENTS, RENT AND ROYALTIES

[50] "Oil and Gas Statistics: Fiscal Year 2023 Statistics," U.S. Department of Interior, Bureau of Land Management, accessed September 21, 2024, https://www.blm.gov/programs-energy-and-minerals-oil-and-gas-oil-and-gas-statistics.

[51] "Production," Natural Resources Revenue Data, Department of Interior, accessed September 21, 2024, https://revenuedata.doi.gov/?tab=tab-production.

Bonus payments on federal land have a floor of $2/acre,[52] though typically payments are far in excess of this. For the last three years, bonus payment receipts have been $103 million for FY 2023, $20 million for FY 2022, and $76 million for FY 2021 (see table 1).[53] Dividing annual bonus payments received by the number of acres leased over the last decade yields a range of $55.08 in 2020 (likely unusually low due to the COVID-19 pandemic) and a high of $1,126.89. As a baseline, we take the average bonus payment per acre over the last three years, which is $568. The average for the prior seven years was $471, while the average over the entire period was $497/acre.

Rental payments are $1.50 an acre.[54] Meanwhile, the onshore royalty rate was recently increased from 12.5% to 16.67%.[55] This increase was mandated by the Inflation Reduction Act of 2022 and applies for the next 10 years. The 12.5% rate had been in place since 1920, making this the first increase in more than 100 years.

Like with offshore lease ~~sakes~~sales, ~~note that~~ some ~~of the sources of~~ revenue~~s for the federal government (~~from royalty, rent and bonus payments~~)~~ are disbursed to the states, while the rest is retained by the federal government. These disbursements tend to be higher for onshore than offshore leasing. [56] ~~Disbursements to states ranged from 3.6 to 4.1 percent of total disbursements during the years 2019 to 2023. We use the midpoint of these estimates, 3.8%, meaning~~We assume 50~~96.2~~% of revenues from onshore bonus payments, rent and royalties are ~~projected to be~~ retained by the federal government.[57]

TIMING

For onshore leases, according to the American Petroleum Institute the average development time is 3-4 years given the engineering and logistical challenges.[58] The model on two scenarios, one where it takes 5 years before production begins and a second where it takes 3 years. Under both these scenarios, we calculate total production over a 10-, 15-, and 20-year period. Like with the

[52] "Oil and Gas Statistics," U.S. Department of Interior, Bureau of Land Management, accessed September 21, 2024, https://www.blm.gov/programs-energy-and-minerals-oil-and-gas-oil-and-gas-statistics.
[53] Note that these payments include payments for lease land used for mining activities, in addition to oil and gas.
[54] "Oil and Gas Statistics," U.S. Department of Interior, Bureau of Land Management, https://www.blm.gov/programs-energy-and-minerals-oil-and-gas-oil-and-gas-statistics.
[55] Bureau of Land Management, "BLM ensures fair taxpayer return, strengthens accountability for oil and gas operations on public lands," April 12, 2024, https://www.blm.gov/press-release/blm-ensures-fair-taxpayer-return-strengthens-accountability-oil-and-gas-operations
[56] ~~Data are from the Natural Resources Revenue Data database. Revenues from bonus payments, royalties and rent tend to be roughly in line with disbursements. See https://revenuedata.doi.gov/query-data/?dataType=Disbursements.~~
[57] Congressional Research Service, "Revenues and Disbursements from Oil and Natural Gas Production on Federal Lands," September 22, 2020, p. 10, https://crsreports.congress.gov/product/pdf/R/R46537#:~:text=Federal%20revenues%20from%20oil%20and,totaled%20%244.202%20billion%20in%20FY2019.
[58] American Petroleum Institute, "Federal Oil & Gas Leasing and Permitting FACT SHEET," 2021, https://www.api.org/-/media/files/policy/exploration/2022/federal-lands-and-waters-leasing-and-permitting-fact-sheet.pdf?la=en&hash=2D81B1752B5A2693A1549CDB43D8CEC800CD706E.

offshore leasing, the model looks at the effect of changes in sales in a five year window, in terms of the number of acres made available for leasing. Then it tracks revenues stemming from these sales over a one-to-two decade time horizon. We assume a 7% discount rate on future revenues and a 3% inflation rate over time.

FEDERAL EXCISE AND CORPORATE TAXES

See tax information above related to offshore leasing. Again, there is the question of the extent to which a decline in onshore leasing will be offset by production on non-federal lands or abroad. To the extent such a decline is fully offset by these other sources, federal tax revenues will be unaffected. We assume the same supply elasticities as for offshore drilling, such that a decline in onshore production is accounted for by a 10 % decline in domestic consumption of oil and gas products, with 58% of the decline offset by imports from foreign producers. These factors are used in the calculation of federal excise and corporate tax revenues.