HOUSE COMMITTEE ON

NATURAL RESOURCES

CHAIRMAN BRUCE WESTERMAN

To:	House Committee on Natural Resources Republican Members
From:	Energy and Mineral Resources Subcommittee staff, Ashley McManus (ashley.mcmanus@mail.house.gov) x63044 and Will King (will.king@mail.house.gov) x59297
Date:	Wednesday, March 20, 2024
Subject:	Oversight Hearing titled *"Assessing Domestic Offshore Energy Reserves & Ensuring U.S. Energy Dominance"*

The Subcommittee on Energy and Mineral Resources will hold an oversight hearing titled *"Assessing Domestic Offshore Energy Reserves & Ensuring U.S. Energy Dominance"* on **Wednesday, March 20, 2024, at 2:00p.m. in 1334 Longworth House Office Building.**

Member offices are requested to notify Lonnie Smith (lonnie.smith@mail.house.gov) by 4:30 p.m. on Tuesday, March 19, 2024, if their Member intends to participate in the hearing.

I. KEY MESSAGES

- The Bureau of Ocean Energy Management (BOEM) publishes comprehensive assessments of undiscovered oil and gas resources on the Outer Continental Shelf (OCS) every five years. The results are presented as both Undiscovered Technically Recoverable Resources (UTRR) and Undiscovered Economically Recoverable Resources (UERR). These resource assessments are crucial for informed decision-making but are currently hindered by outdated information and inadequate instruments.

- The U.S. has robust oil and gas reserves on the OCS but much is still unknown about the true resource potential of most offshore regions. Ensuring access to offshore domestic resources and developing accurate resource assessments are increasingly important as OPEC nations, China, and Russia, have ramped up production and consolidated efforts to diminish U.S. market share and increase global reliance on their resources.

- U.S. offshore oil and gas production is among the cleanest in the world. Expanding access to offshore resources will displace oil supplies from our adversaries, benefiting both the U.S. and global markets.

II. WITNESSES

- ***Dr. Walter Cruickshank,*** Deputy Director, U.S. Bureau of Ocean Energy Management, Washington, DC
- ***Mr. Joe Dryer***, President & CEO, Fairfield Geotechnologies, Houston, TX
- ***Mr. Erik Milito,*** President, National Ocean Industries Association, Houston, TX
- ***Mr. Amir Zaman,*** Partner & Commercial Director, Rystad Energy, New York, NY
- ***Mr. Kendall Dix,*** National Policy Director, Taproot Earth, Charlottesville, VA *[Minority Witness]*

III. BACKGROUND

National Assessment of Undiscovered Oil and Gas Resources on the OCS

The Department of the Interior (DOI) has released a report titled the "National Assessment of Undiscovered Oil and Gas Resources on the OCS" every five years since 1975.[1] This assessment includes information about the estimated undiscovered oil and gas resources on the OCS. These estimates are presented in terms of UTRR and UERR. UTRR is defined as "oil and gas that could be produced as a consequence of natural pressure, artificial lift, pressure maintenance, or other secondary recovery methods, but without any consideration of economic viability."[2] UERR is defined as "the portion of the undiscovered technically recoverable resources that is economically recoverable under imposed economic and technologic conditions."[3]

UTRR estimates play a crucial role in assessing potential oil and gas reserves beneath the ocean floor. These estimates are generated using a stochastic process, which means BOEM considers various probabilities and uncertainties in their calculus. BOEM presents UTRR assessments in a conservative scenario (95 percent) and an optimistic scenario (5 percent), as well as the mean estimate. These estimates offer valuable insight into resource development possibilities solely based on technological advancements in offshore extraction, regardless of economic considerations.

UERR analysis incorporates price-supply curves,[4] which depict the relationship between commodity prices and resource availability. These assessments are vital for understanding the dynamics of the energy market and informing strategic decisions regarding resource development. UERR assessments offer valuable insights into potential resource development opportunities under various market conditions while taking technological capabilities into account.

The "2021 National Assessment of Undiscovered Oil and Gas Resources on the OCS" is the most recent assessment published by BOEM and is based on data available as of January 1,

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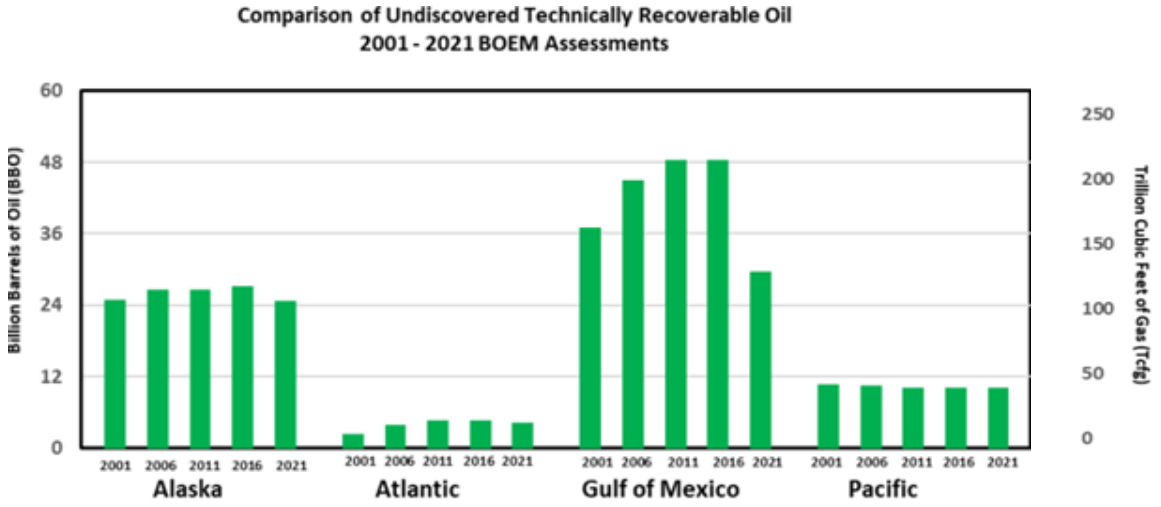
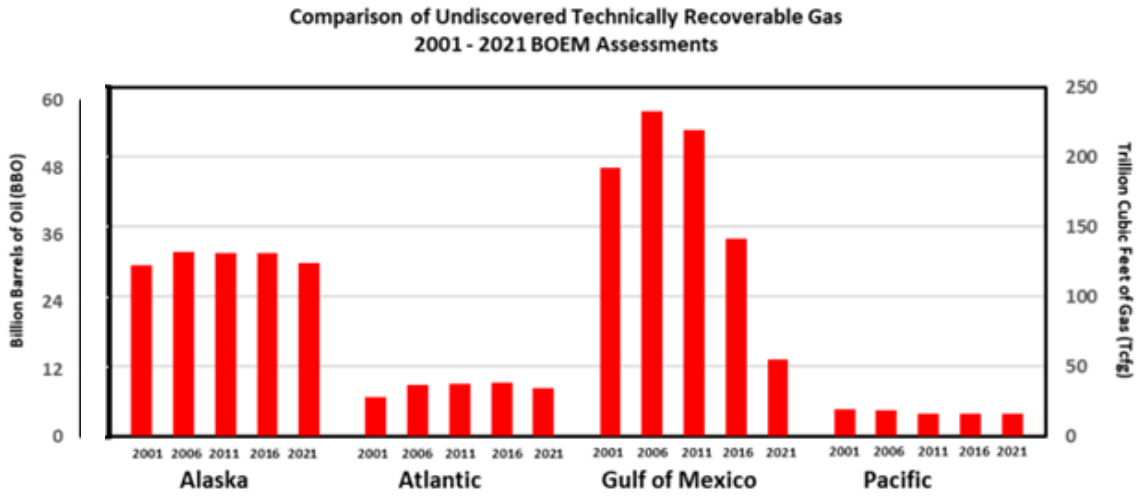
[1] U.S. Bureau of Ocean Energy Management; Resource Evaluation; Undiscovered Resources; https://www.boem.gov/oil-gas-energy/resource-evaluation/undiscovered-resources.
[2] 2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. OCS; November 2021; https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf.
[3] Id.
[4] U.S. Bureau of Ocean Energy Management, Undiscovered Resources Fact Sheet; 2001 https://www.boem.gov/sites/default/files/documents/oil-gas-energy/resource-evaluation/2021%20Fact%20Sheet_0.pdf.

2019.[5] While this assessment provides valuable insights, BOEM is not mandated to conduct new seismic surveys to enhance accuracy. As the agency states in its analysis, "no government-sponsored geological or geophysical data acquisition projects were conducted specifically for this assessment."[6] In fact, some of the data utilized for the 2021 assessment dates back to 1960, including exploratory well results and seismic surveys from over 55 years ago.[7] While this assessment provides a framework within which industry can operate, more information about offshore reserves is needed for operators to make exploration investment decisions.





A comparison of the 2000, 2006, 2011, 2016, and 2021UTRR assessment results[8]
Source: 2021 U.S. Bureau of Ocean Energy Management, Undiscovered Technically Recoverable Reserves, adjustments by assessment, 2000-2021.

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[5] 2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. OCS; November 2021; https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf.
[6] U.S. Bureau of Ocean Energy Management, 2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf, Page 3. https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf.
[7] U.S. Bureau of Ocean Energy Management, 2021 National Assessment of Undiscovered Oil and Gas Resources; Section 5.2 Exploration and Discovery Status, Page 48 https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf.
[8] Id. at 4

The Energy Policy Act of 2005: Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources

The Energy Policy Act of 2005 requires DOI to publish a "Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources" every five years, which aggregates the UTRR and UERR assessments along with information from the industry about known reserves and operations.[9] This directive outlines specific parameters for the inventory and analysis, aiming to provide a comprehensive understanding of the nation's offshore energy potential. However, the implementation of this section has been primarily focused on specific regions within the Gulf of Mexico rather than providing a comprehensive assessment of the entire OCS. More information about the Gulf of Mexico and other regions of the OCS is needed to provide an accurate and up-to-date inventory of our offshore reserves and production capacity.

Current Assessments of U.S. Offshore Oil and Gas Reserves

2021 UTRR Results

UTRR estimates provide a range of possible technically recoverable oil and gas reserves beneath the ocean floor. These are not exact numbers, and each new report accounts for technological innovations that might make new areas of production possible. In the 2021 report, BOEM reported mean estimates of 68.79 billion barrels of undiscovered oil and 229.03 trillion cubic feet of undiscovered gas, which are technically recoverable.[10]

Alaska's 2021 UTRR assessment reveals significant potential, with estimates ranging from 17.00 billion barrels of oil (bbo) and 91 trillion cubic feet (tcf) of gas in the conservative (95 percent) scenario to 34.08 bbo and 161 tcf in the optimistic (5 percent) scenario; with mean figures at 24.7 bbo and 124 tcf respectively.[11] The Pacific and Atlantic regions also present substantial prospects, with the Pacific's mean estimates at 10.20 bbo and 16 tcf and the Atlantic's at 4.31 bbo and 34.09 tcf.[12] The Gulf of Mexico stands out with mean estimates at 29.59 bbo and 54.84 tcf, highlighting its critical role in U.S. offshore resource potential and strategic energy planning.

2021 UERR Results

UERR estimates show the volume of recoverable resources at different oil and gas price points. This analysis demonstrates how changes in oil and gas prices impact producers' ability to extract these resources and bring them to market.

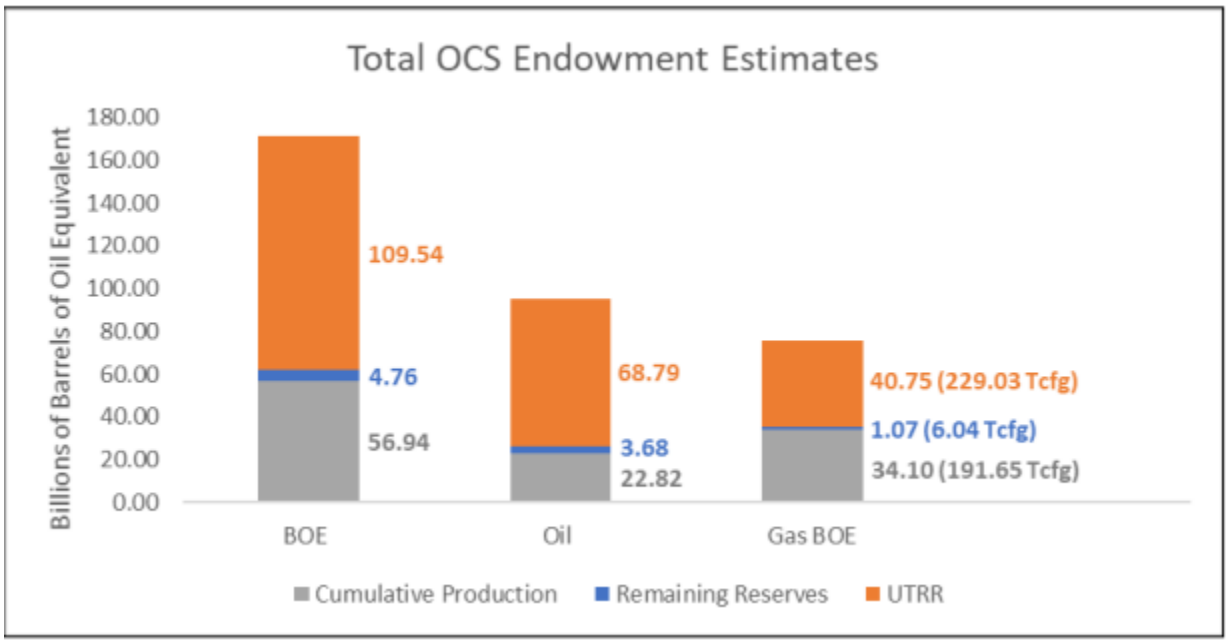
The 2021 UERR analysis includes oil and gas price scenarios ranging from $30 per barrel (bbl) and $1.60 per thousand cubic feet (mcf) to $160/bbl and $8.54/mcf.[13] These estimates reveal varied economically recoverable reserves across different U.S. OCS regions. In Alaska, no resources are deemed recoverable at the lower price point, yet a shift to $160/bbl and $8.54/mcf

[9] 42 USC 15912
[10] U.S. Bureau of Ocean Energy Management, 2021 National Assessment of Undiscovered Oil and Gas Resources; Section 5.2 Exploration and Discovery Status, Page 2 https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf
[11] Id. at 28.
[12] Id.
[13] Id. at 29.

unveils significant reserves. The Atlantic and Pacific regions also display a growth in reserves with escalating prices. The Gulf of Mexico stands out for its considerable potential across all price scenarios. Both the 2021 UTRR and UERR results can be found in the addendum to this memo.

2023 Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources Results

The 2023 Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources, published by BOEM, estimates U.S. offshore reserves and production to date to equal 108.31 bbo and 461.15 tcf.[14] Notably, approximately two-thirds of these resources are located within the Gulf of Mexico region, underscoring its significance in the nation's energy portfolio.[15] The Comprehensive Inventory estimates that total OCS production to date is equal to approximately 22.81 bbo and 191.65 tcf, of which 94 percent of the oil and 99 percent of the gas were produced in the Gulf of Mexico.[16]



Source: U.S. Bureau of Ocean Energy Management, 2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf

Geophysical and Geotechnical Surveys

Before offshore oil and gas exploratory drilling can occur, operators must obtain geophysical and geotechnical seismic surveys. These surveys provide high-resolution images of resource basins, giving operators the information they need to move forward with drilling activities. Advancements in geophysical and geotechnical technologies have significantly enhanced our ability to identify and characterize potential hydrocarbon reserves, leading to more precise

[14] U.S. Bureau of Ocean Energy Management, Oil and Gas Revenue, Comprehensive Inventory, 2023 https://www.boem.gov/sites/default/files/documents/oil-gas-energy/resource-evaluation/2023%20Sec%20357%20Comprehensive%20Inventory%20Report.pdf.
[15] Id.
[16] Id.

estimates of undiscovered resources. As highlighted in the BOEM's 2021 UTRR and 2024-2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Program, "seismic surveys are critical to improving knowledge and reducing resource uncertainty and to better understand hydrocarbon potential."[17] While exploration and drilling remain essential for confirming resource presence, these surveys serve as a preliminary step towards transitioning from undiscovered to discovered resources, mitigating geological risk, and refining resource estimates.

As noted previously, BOEM does not conduct new seismic surveys as part of either UTRR or UERR assessments. Thus, BOEM's 2021 assessment does not provide the information needed for operators to invest in exploratory drilling activities. The industry must conduct its own surveys to determine the resource potential of a given area.

American Innovation and Technological Advancements

American innovation and technological advancements in the oil and gas sector have continually redefined the limits of offshore energy development, enabling producers to consistently surpass previous resource estimates. In 1985, the Minerals Management Service (the predecessor to the present-day BOEM and the Bureau of Safety and Environmental Enforcement) estimated that the U.S.OCS contained 22.97 billion barrels of oil.[18] In 2021 BOEM estimated 68.79 billion undiscovered barrels exist, and accounted 22.82 billion barrels had been produced.[19] This stark contrast from forecast to realized production, highlights the profound impact of innovation and efficiency improvements on the industry's ability to unlock new reserve potential.

The energy industry has pioneered techniques that have unlocked offshore resources previously thought to be inaccessible. These techniques include advanced seismic mapping, ocean bottom node surveying, and the ability to drill at unprecedented depths of up to 40,000 feet in the Gulf of Mexico.[20] The industry is also advancing techniques that will enable offshore carbon capture, utilization, and storage (CCUS) and enhanced oil recovery (EOR) methods, optimizing legacy production areas.[21] Moreover, American oil and gas operators produce some of the cleanest barrels of oil globally, setting a standard that positions the U.S. to displace less environmentally efficient barrels from international markets.[22]

These advancements underscore the important role of American ingenuity in shaping a future where energy production is cleaner, more efficient, and more sustainable in the long term without compromising on performance or affordability. This record of innovation also demonstrates the importance of continually updating reserve assessments and conducting seismic

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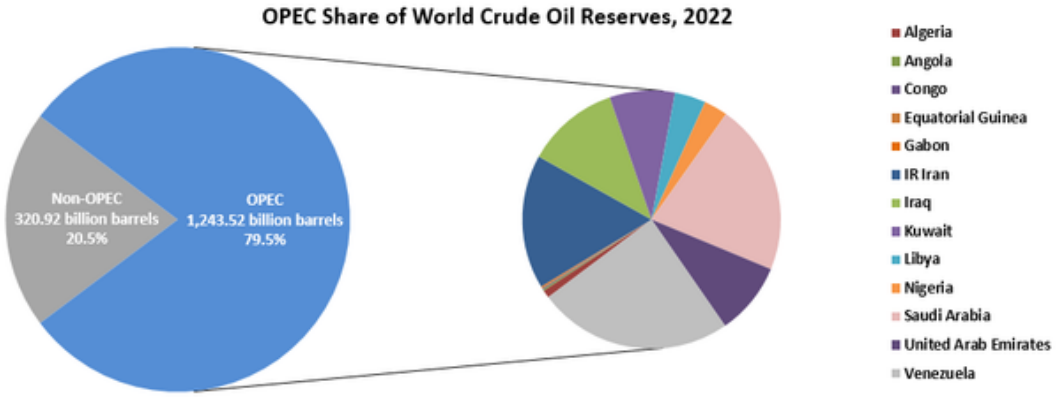
[17] This is analyzed in the paper by Rothkopf et al. (2006), Optimal Management of Oil Lease Inventory
[18] U.S. Bureau of Ocean Energy Management; Comprehensive Inventory of U.S. OCS Resources, 2023 Update; https://www.boem.gov/sites/default/files/documents/oil-gas-energy/resource-evaluation/2023%20Sec%20357%20Comprehensive%20Inventory%20Report.pdf.
[19] Id. at 3
[20]Offshore Engineer Magazine; Diamond Offshore's Drillship on Extended Stay with BP in GOM; March 2024 https://www.oedigital.com/news/511960-diamond-offshore-s-drillship-on-extended-stay-with-bp-in-gulf-of-mexico.
[21] Hart Energy, Exploration and Production, Enhanced Oil Recovery, https://www.hartenergy.com/ep/exclusives/enhancing-offshore-oil-recovery-30198.
[22] NOIA, Study, GHG Emission Intensity of Crude Oil, 2022 https://www.noia.org/wp-content/uploads/2023/05/NOIA-Study-GHG-Emission-Intensity-of-Crude-Oil-and-Condensate-Production.pdf?utm_source=Mailchimp&utm_medium=email&utm_campaign=ICF+study+emissions+.

surveys of undeveloped areas. Without this information, we risk overlooking areas that could one day yield significant production.

Competitiveness and American Energy Independence

To maintain the U.S.'s role as the leading global energy producer,[23] we must have a full understanding of where our most valuable untapped resources exist. The ability to actively quantify domestic resources is the first step toward achieving energy independence and supporting strategic positioning on the global stage.



OPEC proven crude oil reserves, at end 2022 (billion barrels, OPEC share)

Venezuela	303.22	24.4%	United Arab Emirates	113.00	9.1%	Algeria	12.20	1.0%	Equatorial Guinea	1.10	0.1%
Saudi Arabia	267.19	21.5%	Kuwait	101.50	8.2%	Angola	2.55	0.2%			
IR Iran	208.60	16.8%	Libya	48.36	3.9%	Gabon	2.00	0.2%			
Iraq	145.02	11.7%	Nigeria	36.97	3.0%	Congo	1.81	0.1%			

Source: Organization of the Petroleum Exporting Countries; Share of World Crude Oil Reserves, as of 2022[24]

The geopolitical landscape, particularly the tactics of nations such as Russia, China, and Iran, deeply influences the global energy sector. Russia has vast energy reserves and continues to play a pivotal role in supplying energy to Europe.[25] In response to the conflict in Ukraine, nations around the world have stopped importing Russian energy resources.[26] As a result, Russia has continued to look for ways to sell its oil and gas and is turning to the Arctic for energy development.[27] Leveraging U.S. domestic resources in this increasingly contested region is crucial for enhancing national energy independence.

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[23] Reuters, US leads global oil production for sixth straight year; https://www.reuters.com/markets/commodities/us-leads-global-oil-production-sixth-straight-year-eia-2024-03-11/.

[24] Organization of the Petroleum Exporting Countries; Share of World Crude Oil Reserves, as of 2022; Annual Statistical Bulletin; Organization of the Petroleum Exporting Countries; Share of World Crude Oil Reserves, as of 2022; https://www.opec.org/opec_web/en/publications/202.htm.

[25] Oil Price.com; Europe's Secret Weapon In Its Energy War With Russia; March 2024; https://oilprice.com/Energy/Energy-General/Europes-Secret-Weapon-In-Its-Energy-War-With-Russia.html.

[26] Id.

[27] Russia Dispatches First-ever conventional oil tanker across Northern Sea; September 2023; https://www.highnorthnews.com/en/russia-sends-oil-tanker-without-ice-protection-through-arctic-first-time#:~:text=In%20what%20will%20likely%20become,2023%20with%20destination%20Ningbo%2C%20China.

The Arctic Circle may contain 160 billion barrels of oil and 30 percent of the planet's undiscovered natural gas.[28] Because the Arctic is mostly sea, there is no international treaty protecting its environment from economic development, as there is for the Antarctic.[29] Russian oil companies have been operating in the Arctic for more than a decade. In 2007, Russian explorers alarmed Arctic neighbors by planting their national flag on the seabed at the North Pole.[30] Matters have escalated ever since. In 2022, Russian energy giant Rosneft announced it had started construction of an Arctic oil terminal at the Bukhta Sever port, part of its Vostok Oil project, aimed at facilitating the development of the Northern Sea Route. The company has stated that the port will become Russia's largest oil terminal, with 102 reservoirs to be built by 2030.[31] During the summer of 2023, there was a sharp increase in the number of Russian oil tankers shuttling crude to ports in China via polar waters.[32] Perhaps most concerning, Barents Observer reported in July of 2023 that the Russian drillship Bavenit "has sailed to the Chukchi Sea and started exploration drilling just a few kilometers from the maritime border to the USA."[33] The vessel "is engaged in studies of the eastern part of the Chukchi Sea on behalf of Russian state oil company Rosneft."[34] The drillship aims "to obtain drill cores from remote and unexplored parts of the east Arctic continental shelf."[35]

China continues to engage in aggressive offshore exploration efforts. In March of 2024, China announced a significant discovery in the South China Sea.[36] The China National Offshore Oil Corporation (CNOOC) has stated in its business strategy and development plan for 2024 that the company plans to ramp up oil and gas production offshore and step up natural gas exploration activities.[37]

Iran was the fifth-largest crude oil producer in OPEC in 2021 and the third-largest natural gas producer in the world in 2020.[38] It holds some of the world's largest deposits of proved oil and natural gas reserves, ranking as the world's third-largest oil and second-largest natural gas reserve holder in 2021. At the end of 2021, Iran accounted for 24 percent of oil reserves in the Middle East and 12 percent in the world.[39] Although Iran is a member of OPEC, it is exempt from the production cuts under the OPEC+ agreement because its crude oil production is

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[28]BBC; Arctic Oil and Gas, Riches and Problems https://www.bbc.com/news/business-14728856.
[29] Bradley Group; Insights, Melting Arctic Ice to Open New Trade; 2023, https://www.bradley.com/insights/publications/2023/08/melting-arctic-to-open-up-new-trade-routes-and-geopolitical-flashpoints#:~:text=Unlike%20Antarctica%2C%20a%20land%20mass,control%20navigation%20has%20already%20begun.
[30] BBC, Russia Plants Flag under North Pole, 2007 http://news.bbc.co.uk/2/hi/europe/6927395.stm.
[31] Reuters, Russia Rosneft Starts Construction, July 2022https://www.reuters.com/business/energy/russias-rosneft-starts-construction-huge-arctic-oil-terminal-2022-07-26/.
[32] NPR; World; Russia is sending crude through the Arctic to China; August 2023; https://www.npr.org/2023/08/31/1197084341/russia-is-sending-crude-through-the-arctic-to-china.
[33] The Barents Observer, 2023 July, Russian Drillship Explores Ground Along U.S. Border; https://thebarentsobserver.com/en/2023/07/russian-drillship-explores-ground-along-us-border#:~:text=The%20Bavenit%20has%20sailed%20to,maritime%20border%20to%20the%20USA.
[34] Id.
[35] Id.
[36] Offshore Energy Magazine, CNOOC unveils new discovery, March 2024 https://www.offshore-energy.biz/cnooc-unveils-fresh-oil-gas-discovery-off-china/.
[37]Offshore Energy Business; CNOOC plans for 2024 hydrocarbon production; January, 2024, Cavic, Melissa https://www.offshore-energy.biz/cnoocs-plans-for-2024-upping-hydrocarbon-production-natural-gas-exploration-and-green-power-ante/.
[38] U.S. Energy Information Administration, Short-Term Energy Outlook, September 2022 and International Energy Statistics
[39] Oil & Gas Journal, Worldwide look at reserves and production (December 2021).

constrained as a result of sanctions.[40] While sanctions on its oil exports remain in place, Iran continues to ship crude oil to China and elsewhere.[41]

A strategy of energy dominance starts with mapping and understanding our domestic energy resources. Any policy impacting access to offshore resources and federal energy leasing plans must account for our full domestic energy potential. To effectively manage our offshore energy resources, BOEM must maintain an accurate inventory of offshore oil and gas reserves rather than relying on outdated information. This will enable more precise forecasting of our ability to meet domestic energy demand and the energy needs of our allies for decades to come.

Addendum

Region	Risked Undiscovered Technically Recoverable Oil and Gas Resources (UTRR)								
	Oil (Bbo)			Gas (Tcfg)			BOE (Bbo)		
Planning Area	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%
Alaska OCS*	**17.00**	**24.69**	**34.08**	**91.07**	**124.03**	**161.63**	**33.21**	**46.76**	**62.84**
Beaufort Sea	2.30	5.74	11.19	6.57	16.10	30.18	3.47	8.61	16.56
Chukchi Sea	9.69	15.72	23.69	51.31	79.58	113.94	18.82	29.88	43.96
Cook Inlet	0.38	1.04	1.94	0.63	1.18	1.76	0.49	1.25	2.26
Gulf of Alaska	0.11	0.66	1.59	0.67	4.33	10.27	0.23	1.43	3.41
Hope Basin	0.00	0.14	0.41	0.00	3.51	9.92	0.00	0.77	2.18
Navarin Basin	0.00	0.26	0.75	0.00	2.14	5.70	0.00	0.64	1.76
North Aleutian Basin	0.10	0.79	1.96	1.33	9.02	18.45	0.34	2.39	5.24
Norton Basin	0.00	0.06	0.20	0.00	3.35	11.10	0.00	0.66	2.18
St. George Basin	0.02	0.22	0.52	0.31	2.81	6.66	0.07	0.72	1.70
Shumagin	0.00	0.01	0.05	0.00	0.41	1.75	0.00	0.08	0.36
Kodiak	0.00	0.04	0.17	0.00	1.60	6.76	0.00	0.33	1.38
*The Aleutian Arc, Aleutian Basin, Bowers Basin, and St. Matthew-Hall Planning Areas in the Alaska OCS Region were not evaluated in this study as their petroleum potential is negligible.									
Atlantic OCS	**0.64**	**4.31**	**9.94**	**5.94**	**34.09**	**70.10**	**1.70**	**10.38**	**22.41**
North Atlantic	0.04	1.87	6.36	0.35	11.50	38.00	0.10	3.91	13.12
Mid-Atlantic	0.00	2.25	6.30	0.04	21.42	49.02	0.01	6.06	15.02
South Atlantic	0.00	0.20	0.57	0.00	1.17	3.62	0.00	0.41	1.22
Gulf of Mexico OCS	**23.31**	**29.59**	**36.27**	**46.88**	**54.84**	**62.56**	**31.65**	**39.35**	**47.40**
Western Gulf of Mexico	4.45	6.05	7.80	9.33	11.39	13.36	6.11	8.08	10.18
Central Gulf of Mexico	14.59	18.65	22.99	26.37	31.19	36.17	19.29	24.20	29.43
Eastern Gulf of Mexico	3.27	4.87	6.78	7.86	12.25	17.06	4.67	7.05	9.81
Straits of Florida	0.00	0.02	0.05	0.00	0.01	0.04	0.00	0.02	0.06
Pacific OCS	**6.91**	**10.20**	**14.20**	**10.15**	**16.07**	**23.43**	**8.72**	**13.06**	**18.37**
Washington/Oregon	0.00	0.40	1.14	0.03	2.25	5.89	0.01	0.80	2.19
Northern California	1.06	2.07	3.49	2.13	3.55	5.32	1.44	2.70	4.43
Central California	1.22	2.41	3.89	1.18	2.49	4.19	1.43	2.85	4.64
Southern California	2.58	5.33	8.81	3.51	7.78	13.75	3.20	6.71	11.25
Total U.S. OCS	**57.32**	**68.79**	**81.75**	**183.46**	**229.03**	**278.22**	**89.96**	**109.54**	**131.25**

Risked Undiscovered Technically Recoverable Resources of OCS Planning Areas. Resource values are in billion barrels of oil (Bbo) and trillion cubic of gas (Tcfg). A 95 percent chance of at least the amount listed is indicated as 95%; 5% indicates a 5 percent chance of at least the amount listed. Only mean values are additive. Some total mean values may not equal the sum of the component values due to independent rounding. Values for UTRR results are for both leased and unleased lands of the OCS.[42]

[40]The 10th OPEC and non-OPPEC Ministerial Meeting Notes, 2020 April; https://www.opec.org/opec_web/en/press_room/5891.htm.

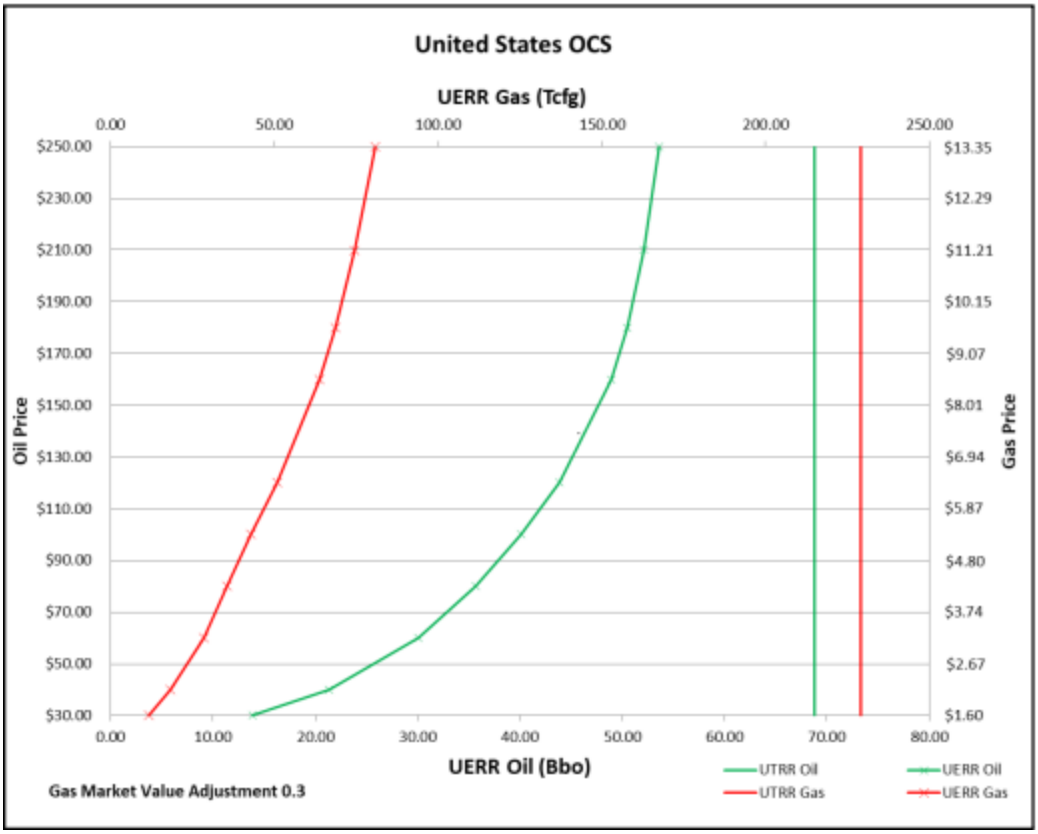
[41] Reuters, Nuclear Talks resume on Irans Oil Exports, 2022 https://www.reuters.com/business/energy/nuclear-talks-resume-irans-oil-exports-increase-2022-02-10/.

[42] Id. At 4

Region / Planning Area	Risked Undiscovered Economically Recoverable Oil and Gas Resources (UERR)									
	$30/Bbl $1.60/Mcf		$40/Bbl $2.14/Mcf		$60/Bbl $3.20/Mcf		$100/Bbl $5.34/Mcf		$160/Bbl $8.54/Mcf	
	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas	Oil	Gas
Alaska OCS*	**0.00**	**0.00**	**0.02**	**0.01**	**0.60**	**0.24**	**5.62**	**5.68**	**12.24**	**18.82**
Beaufort Sea	0.00	0.00	0.00	0.00	0.08	0.04	1.67	1.42	2.99	2.89
Chukchi Sea	0.00	0.00	0.00	0.00	0.02	0.02	2.80	3.75	7.69	14.97
Cook Inlet	0.00	0.00	0.02	0.01	0.40	0.15	0.72	0.28	0.89	0.36
Gulf of Alaska	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.08	0.22
Hope Basin	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.05
Navarin Basin	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.05
North Aleutian Basin	0.00	0.00	0.00	0.00	0.10	0.03	0.37	0.17	0.47	0.24
Norton Basin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
St. George Basin	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.05	0.05
Shumagin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kodiak	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*The Aleutian Arc, Aleutian Basin, Bowers Basin, and St. Matthew-Hall Planning Areas in the Alaska OCS Region were not evaluated in this study as their petroleum potential is negligible.										
Atlantic OCS	**2.06**	**0.00**	**2.88**	**0.00**	**3.51**	**0.00**	**3.83**	**0.92**	**3.95**	**4.38**
North Atlantic	1.05	0.00	1.37	0.00	1.61	0.00	1.73	0.50	1.77	2.25
Mid-Atlantic	1.00	0.00	1.50	0.00	1.85	0.00	2.02	0.42	2.08	2.12
South Atlantic	0.01	0.00	0.03	0.00	0.06	0.00	0.09	0.00	0.11	0.01
Gulf of Mexico OCS	**8.27**	**6.81**	**13.73**	**12.20**	**19.84**	**20.39**	**23.53**	**27.17**	**25.14**	**30.85**
Western Gulf of Mexico	1.80	1.28	2.89	2.32	4.14	4.03	4.94	5.61	5.28	6.51
Central Gulf of Mexico	5.59	4.75	8.98	8.14	12.76	13.20	15.05	17.42	16.05	19.74
Eastern Gulf of Mexico	0.89	0.78	1.86	1.74	2.94	3.15	3.53	4.13	3.80	4.59
Straits of Florida	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Pacific OCS	**3.55**	**4.81**	**4.69**	**6.11**	**6.15**	**7.81**	**7.15**	**9.05**	**7.63**	**9.73**
Washington/Oregon	0.05	0.18	0.07	0.24	0.11	0.36	0.15	0.49	0.18	0.58
Northern California	0.72	0.76	0.92	0.98	1.21	1.30	1.43	1.57	1.53	1.71
Central California	0.99	1.03	1.33	1.38	1.69	1.74	1.92	1.99	2.04	2.10
Southern California	1.79	2.84	2.37	3.52	3.14	4.40	3.64	5.01	3.88	5.34
Total U.S. OCS	**13.88**	**11.63**	**21.32**	**18.32**	**30.11**	**28.44**	**40.12**	**42.83**	**48.95**	**63.77**

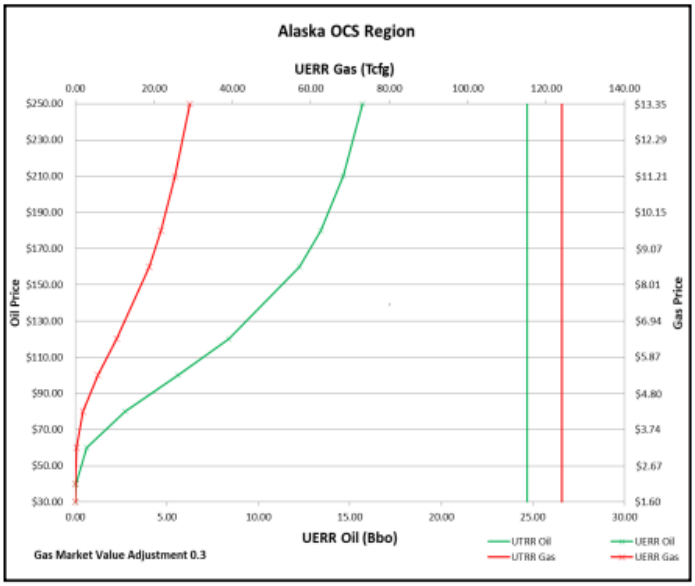
Risked Undiscovered Economically Recoverable Resources of OCS Planning Areas. Resource values are in billion barrels of oil (Bbo) and trillion cubic of gas (Tcfg). Some total mean values may not equal the sum of the component values due to independent rounding. Prices are in dollars per barrel ($/Bbl) for oil, and dollars per thousand cubic feet ($/Mcf) for gas. Table 2 represents a gas price adjustment of 0.3. Values for UERR results are for both leased and unleased lands of the OCS.[43]

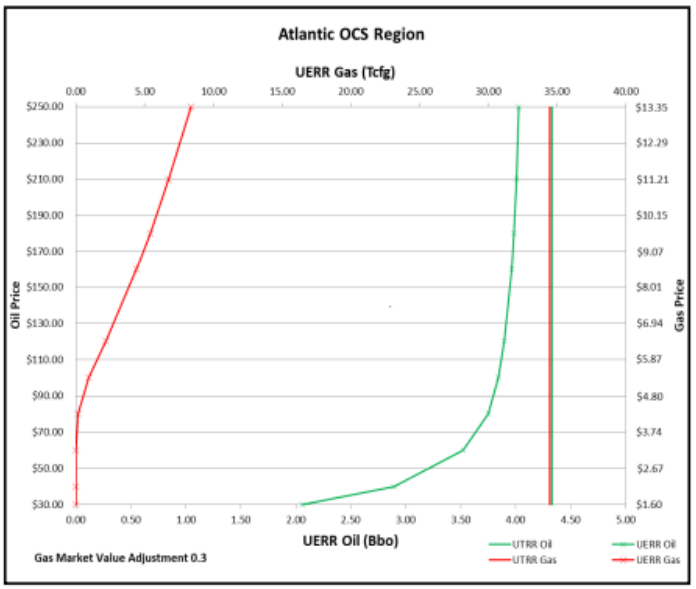
[43] Id. at 4

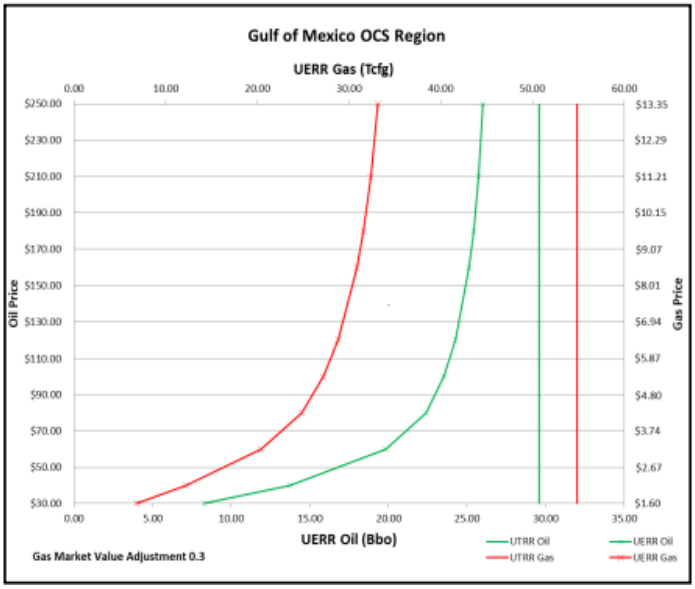


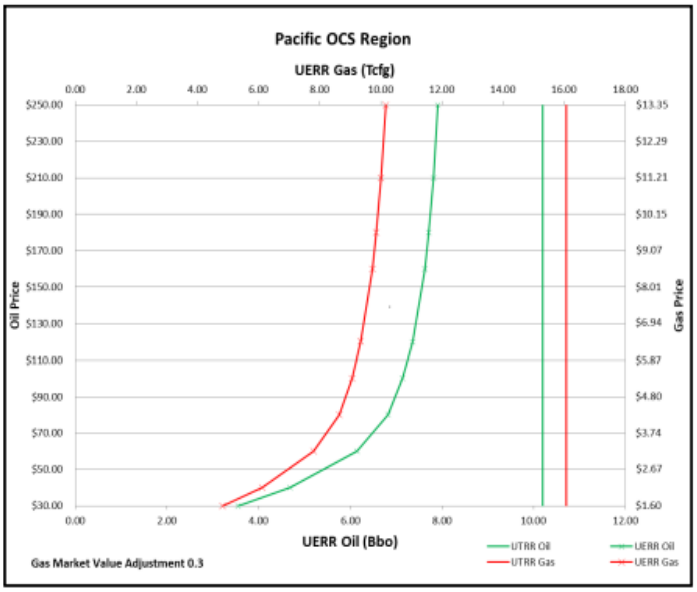
Price supply curve of the entire United States OCS. Vertical lines represent UTRR and are independent of commodity price. Curved lines represent UERR and are price dependent.[44]

[44] Id. at 4



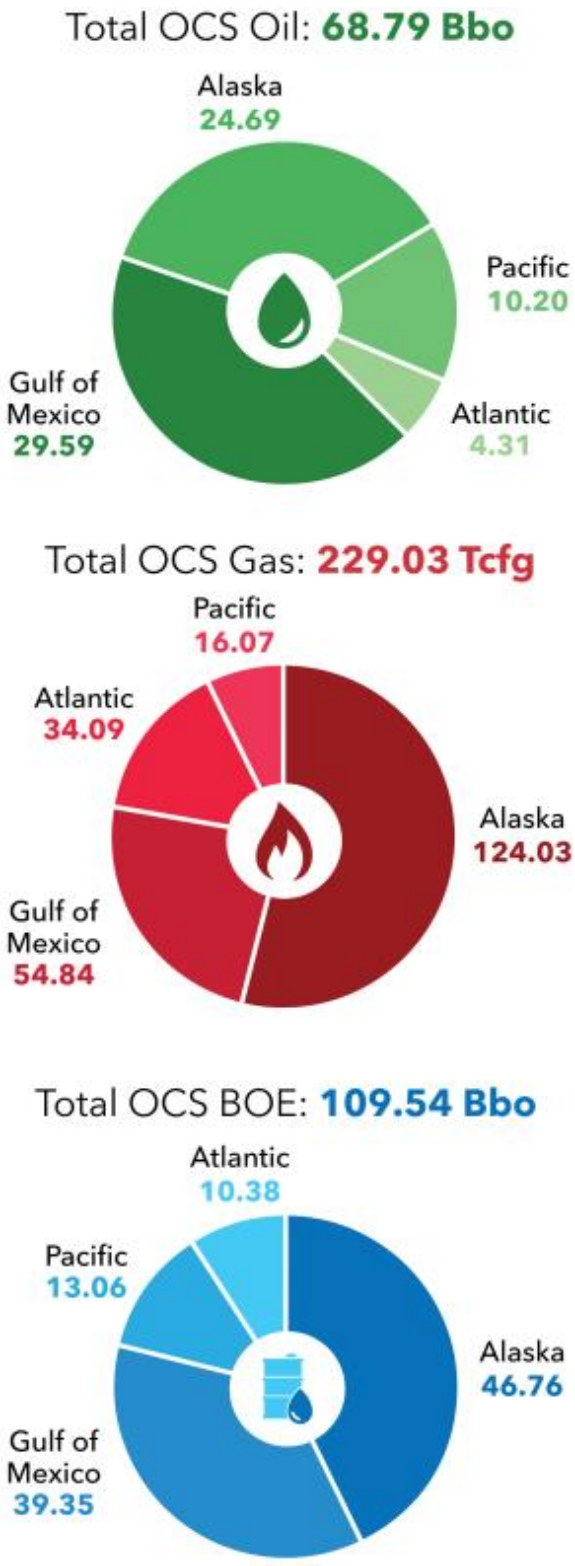






Price supply curves for the four OCS regions. Each graph shows the geologic resources recoverable regardless of price and the economic resources recoverable at various oil and gas prices. In these graphs, oil prices are coupled with a specific gas price assuming a 30 percent economic value of gas relative to oil. Price supply curves representing a 20 percent, a 40 percent, a 60 percent, and a 100 percent economic value of gas relative to oil are available at www.boem.gov.[45]

[45] Id. at 4



Total OCS, Oil, Gas and BOE 2021 UTRR[46]

[46] Id. at 4