

Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Atlantic Outer Continental Shelf, 2014 Update

Using a geologic play-based assessment methodology, the Bureau of Ocean Energy Management estimated a mean of 4.72 billion barrels of undiscovered technically recoverable oil and a mean of 37.51 trillion cubic feet of undiscovered technically recoverable natural gas in the Atlantic Outer Continental Shelf of the United States.

Introduction

This 2014 report summarizes the results of an update to the Bureau of Ocean Energy Management (BOEM) 2011 Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Atlantic Outer Continental Shelf. Relevant data and information available as of December 2013 are considered for this assessment update. The area assessed comprises the portion of the submerged seabed within the 200 nautical mile U.S. Exclusive Economic Zone (EEZ) whose mineral resources are subject to federal jurisdiction.

BOEM has assessed ten geologic plays within the Atlantic OCS Region (Figure 1), including nine conceptual plays where there is little or no specific information available, and one established play where hydrocarbon accumulations are known to exist. Water depths in these plays range from less than 100 ft. to over 10,000 ft. Drill depths in these plays are estimated to range between 7,000 and 30,000 ft below the sea floor.

Commodities Assessed

Commodities assessed are crude oil, natural gas liquids (condensate), and natural gas that exist in conventional reservoirs and are producible with conventional recovery techniques. Crude oil and condensate are reported jointly as oil; associated and nonassociated gas are reported as gas. Oil volumes are reported as billions of barrels of oil (Bbo) and gas as trillion standard cubic feet of gas (Tcft). Oil-equivalent gas is a volume of gas (associated and/or nonassociated) expressed in terms of its energy equivalence to oil (i.e. 5,620 cubic feet of gas per barrel of oil). The combined volume of oil and oil-equivalent gas resources is referred to as barrel of oil-equivalent (BOE) and is reported in billions of barrels of oil. This assessment does not include potentially large quantities of hydrocarbon resources that could be recovered from future fields by enhanced recovery techniques. It also does not consider gas in geopressured brines, methane hydrates, or oil and natural gas that may be present in insufficient quantities or quality (low permeability “tight” reservoirs) to be produced by conventional recovery techniques.

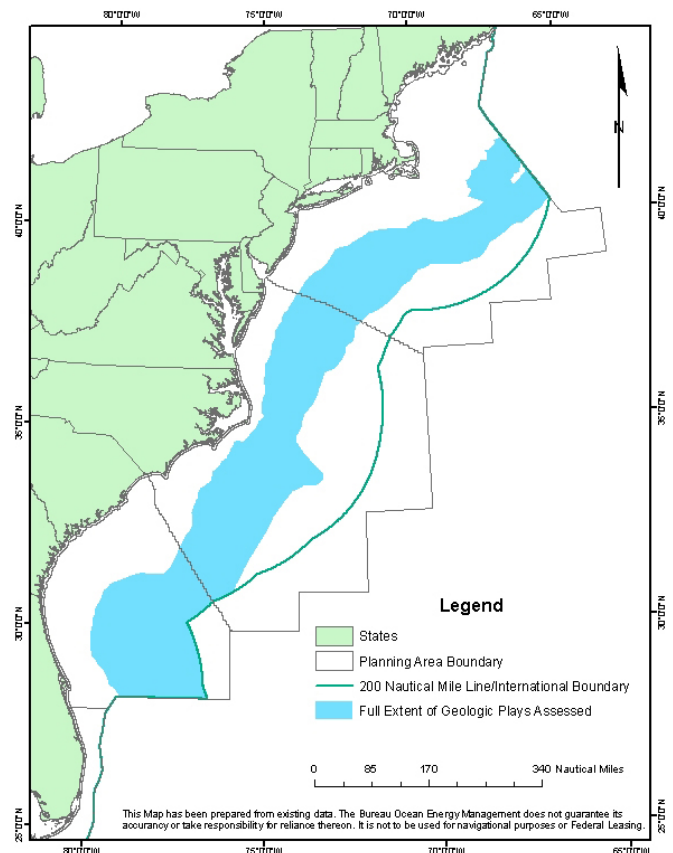


Figure 1. Full extent of geologic play outlines for the Atlantic OCS.

Analog Development

This assessment update incorporates important new information from recent oil and gas discoveries considered analogous to selected geologic plays in the Atlantic OCS. Since the 2011 National Resource Assessment, the number of analogous discoveries that are appropriate for use in developing the field size distributions for two of the conceptual plays in the Atlantic OCS has increased nearly three-fold. All of the analogous new field discoveries are located offshore East Africa and West Africa. They display similar geologic settings and petroleum system elements to what is observed in the Atlantic OCS.

The analog development process includes extensive research into the geologic, geochemical, and lithological characteristics of analogous discoveries. Specific information analyzed within analog plays include the style of oil and/or gas trap, reservoir depositional environment and lithology, reservoir age, and analysis of existing drilling and well bore information. Separate conceptual play models were developed using regional geophysical and geologic data, along with the information from the analog plays and discoveries to model probabilistic estimates of resources.

Region Planning Area	Undiscovered Technically Recoverable Oil and Gas Resources (UTRR)								
	Oil (Bbo)			Gas (Tcfg)			BOE (Bbo)		
	95%	Mean	5%	95%	Mean	5%	95%	Mean	5%
Atlantic OCS	1.32	4.72	9.23	11.81	37.51	67.69	3.42	11.40	21.27
North Atlantic	0.06	1.75	5.19	1.05	11.94	32.53	0.25	3.88	10.98
Mid-Atlantic	0.06	2.42	5.58	1.01	23.38	48.45	0.24	6.58	14.20
South Atlantic	0.00	0.55	1.16	0.00	2.18	6.31	0.00	0.94	2.29

Table 1: Undiscovered Technically Recoverable Resources of Atlantic OCS Planning Areas for 2014. Resource values are in billion barrels of oil (Bbo), and trillion standard cubic of gas (Tcfg). 95% indicates a 95 percent chance of at least the amount listed, 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.

Technology

Progress in drilling technology has enabled the exploration for hydrocarbons located in water depth of up to 12,000 feet and 40,000 feet total depth. Recent technological advancements, such as horizontal wells and multi-lateral completions, enable the recovery of a higher percentage of the in-place resources from a field. Also, the introduction of drill ships and semi-submersibles capable of drilling in up to 12,000 feet of water depth, coupled with dual gradient drilling techniques, will likely expand the envelope of producible oil and gas resources in very challenging environments.

In the Atlantic OCS, the water depth and drill depth ranges associated with the geologic plays that comprise the resource estimates for this assessment fall within the current technology envelope. Therefore, BOEM assumes that existing technologies are sufficient to explore, develop and produce the undiscovered oil and gas resources in the Atlantic OCS.

Assessment Results

This assessment update is based on information available as of December 2013. Undiscovered Technically Recoverable Resource (UTRR) estimates are reported at the 95th (low) and 5th (high) percentiles, as well as at the mean. For the Atlantic OCS, oil estimates range from 1.32 Bbo at the 95th percentile to 9.23 Bbo at the 5th percentile with a mean of 4.72 Bbo. Gas estimates range from 11.81 Tcfg to 67.69 Tcfg with a mean of 37.51 Tcfg. Table 1 contains the 2014 UTRR volume estimates for the North, Mid-, and South Atlantic Planning Areas and for the total Atlantic OCS. The results supersede those that appear in the Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Atlantic Outer Continental Shelf, 2011.

Comparison with Previous Assessments

Mean UTRR oil resources have increased from 3.30 Bbo in 2011 to 4.72 Bbo in 2014, representing a 43% increase for technically recoverable oil. For gas, mean UTRR values have increased from 31.28 Tcfg in 2011 to 37.51 Tcfg in 2014, representing a 20% increase for technically recoverable gas. The increase in mean resources is accompanied by an increase in the range between

the 5th and 95th percentile values for UTRR. This widened gap between the 5th and 95th values indicates an increase in the range of uncertainty for this assessment update. This is significant because it shows the UTRR high potential (5%) volume estimate for oil increased more than 65%, from 5.58 Bbo in 2011 to 9.23 Bbo in 2014 and gas increased 26%, from 53.62 Tcfg in 2011 to 67.69 Tcfg in 2014.

The change in mean UTRR for the Atlantic OCS is a result of revisions within four of the ten Atlantic geologic plays. Mean UTRR within two plays increased significantly since the 2011 assessment: the Cenozoic-Cretaceous & Jurassic Paleo Slope Siliciclastic Core and Extension Plays. The mean UTRR increased in these two plays because of the rapid evolution of the analogous East African discoveries, which increased both the number of discoveries and the field sizes in our analog database. Approximately 50 new analog discoveries were incorporated into the BOEM field size distributions for the Core and Extension Plays. On average, the mean pool size for the Core and Extension Plays increased from ~40 million BOE in 2011 to ~105 million BOE in 2014.

Conversely, the mean UTRR of the Triassic-Jurassic Rift Basin Play and the Cretaceous & Jurassic Hydrothermal Dolomite Play decreased slightly. These reductions were the result of improved seismic interpretation techniques that better delineated the areal extent of the play areas.

Summary

The 2014 Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Atlantic Outer Continental Shelf covers BOEM's current understanding of assessing and identifying undiscovered fields of offshore oil and gas. A 43% increase in Atlantic undiscovered oil and a 20% increase in undiscovered gas are a result of how improved data analysis techniques coupled with emerging fields in worldwide analogs can affect the undiscovered resource base for the United States.

List of Terms

Analog Plays: As used in resources assessments, have similar rock and fluid properties, reservoir conditions (depth, temperature and pressure) and drive mechanisms, but are typically at a more advanced stage of development than the play of interest and thus may provide concepts to assist in the interpretation of more limited data and estimation of recovery.

Field: Area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same general geologic structural feature and/or stratigraphic trapping condition. There may be two or more reservoirs in a field that are separated vertically by impervious strata, laterally by local geologic barriers, or by both.

Geologic Play: A group of pools that share a common history of hydrocarbon generation, migration, reservoir development, and entrapment.

Pool: An individual and separate accumulation of petroleum in a reservoir.

Resources: Concentrations in the earth's crust of naturally occurring liquid or gaseous hydrocarbons that can conceivably be discovered and recovered.

Undiscovered technically recoverable resources (UTRR):

Oil and gas that may be produced as a consequence of natural pressure, artificial lift, pressure maintenance, or other secondary recovery methods, but without any consideration of economic viability.

Selected References

Bureau of Ocean Energy Management, 2011. Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf. BOEM Fact Sheet RED-2011-01b, 6 p.

Bureau of Ocean Energy Management, 2011. Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Atlantic Outer Continental Shelf. BOEM 2012-016, 40 p.

Minerals Management Service, 2006. Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf. MMS Fact Sheet RED-2006-01b, 6 p.

Minerals Management Service, 2006. Planning Area Resources Addendum to Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf. MMS Fact Sheet RED-2006-02, 2 p.

Minerals Management Service, 1996. An assessment of the undiscovered hydrocarbon potential of the Nation's Outer Continental Shelf. OCS Report MMS 96-0034, 40 p.

Society of Petroleum Engineers, et al., 2007. Petroleum Resource Management System, 49 p.

For Further Information

Supporting geological studies, previous assessment results, and methodologies used by BOEM for resource assessment can be found on BOEM's web site, www.boem.gov.

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