OCS Report
BOEM 2017-082

U.S. Outer Continental Shelf
Gulf of Mexico Region
Oil and Gas Production Forecast:
2018-2027

U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

Cover: Shell's Olympus tension leg platform (TLP) is part of the Mars B development (forefront), located in 3,100 feet of water (945 m), installed in 2013 and designed with a production capacity to exceed over 100,000 BOE per day. Other owners include BP. Photo from Offshore magazine (accessed on 10/25/2017): http://www.offshore-mag.com/articles/2013/08/shell-s-olympus-tlp-in-place-on-target-for-2014-startup.html

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A MESSAGE FROM THE REGIONAL DIRECTOR

The Gulf of Mexico (GOM) remains an important basin for the exploration and development of oil and gas resources necessary to meet our Nation's energy needs. Oil production, in the GOM, is at an all-time high and I remain positive about the future production potential which is projected to continue to rise over the coming years. As of December 2017, 17% of U.S. oil production and 5% of natural gas production comes from federal Outer Continental Shelf (OCS) leases in the GOM with more resources yet to be discovered. Estimates of undiscovered technical recoverable resources for the GOM range from 39.48 billion barrels of oil (Bbo) at the P_{95} percentile to 58.53 Bbo at the P_5, with a mean of 48.46 Bbo. Similarly, gas estimates range from 124.01 trillion cubic feet of gas (Tcfg) to 159.63 Tcfg, with a mean of 141.76 Tcfg (BOEM, 2017).

The Bureau of Ocean Energy Management's (BOEM), Gulf of Mexico Region is charged with managing the development of U.S., Gulf of Mexico, Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way. Proper stewardship of the OCS requires knowledge of our resources based on the best available science.

As directed by the Outer Continental Shelf Lands Act (OSCLA), BOEM strives to share this knowledge by developing important technical information regarding hydrocarbons on the OCS that may be useful to industry, federal and state agencies, and the general public for policy and planning decisions related to the management of OCS resources. In fulfillment of this requirement, I am pleased to present the *U.S. Outer Continental Shelf Gulf of Mexico Oil and Gas Production Forecast: 2018-2027*.

Michael A. Celata
Regional Director
Gulf of Mexico Region
Bureau of Ocean Energy Management

FORECAST HIGHLIGHTS

The Bureau of Ocean Energy Management (BOEM), Gulf of Mexico Region (GOMR) forecasts annual oil production from the U.S. Outer Continental Shelf (OCS), Gulf of Mexico (GOM) in 2018 will set a new record high, extending the trend of increased annual production volumes to five consecutive years (2014-2018). BOEM forecasts total annual oil production from the GOM in 2018 will be 606.9 million barrels (MMbbls), an increase of more than 3.7 MMbbls from expected 2017 annual oil production volumes (Figure 2, Table 2). BOEM also anticipates the trend of increased annual oil production will continue through 2024, based on the expectation that the contribution of oil production volumes from new and existing fields situated in water depths greater than 400 meters will increase at a rate of 1 to 10 MMbbls per year higher than the expected decline in oil production from existing fields and new discoveries in less than 400 meters of water (Figure 4 and 6, Table 4 and 6).

BOEM's forecast of total annual natural gas production from the GOM in 2018 is estimated to be 1,121 billion cubic feet of gas (BCFG), a decline of 3.8% from expected 2017 gas production volumes. Throughout the forecast period, 2018 - 2027, BOEM anticipates that annual gas production volumes will continue to decline but at a lesser rate than the historical annual decline rates recorded for the Region since 1990. BOEM anticipates annual gas production volumes from 2018 to 2027 will remain relatively consistent, ranging between 1,065 and 1,121 BCF per year and forecasts the average rate of decline for gas production during the period will be less than 1% annually (Figure 3, Table 3). The improvement in the forecast annual rate of decline for gas production from the GOM is based on the expectation that the production of associated-gas from fields in water depths greater than 400 meters will offset the anticipated decline of gas production from fields situated in less than 400 meters of water (Figures 5 and 7, Tables 5 and 7).

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ABBREVIATIONS AND ACRONYMS

Bbbl	billion barrels
bbl	barrels
Bbo	billion barrels of oil
BCF	billion cubic feet
BCFG	billion cubic feet of gas
BCFPD	billion cubic feet per day
BOE	barrels of oil equivalent
BOEM	Bureau of Ocean Energy Management
FMV	Fair Market Value
ft	feet
GOM	Gulf of Mexico
m	meters
Mcf	thousand cubic feet
MMbbls	million barrels
MMBOE	million barrels of oil equivalent
MMS	Minerals Management Service
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
PRMS	Petroleum Resource Management System
RE	Office of Resource Evaluation
SPE	Society of Petroleum Engineers
Tcfg	trillion cubic feet of gas
UERR	undiscovered economically recoverable resources
U.S.	United States
UTRR	undiscovered technically recoverable resources

INTRODUCTION

The *U.S. Outer Continental Shelf Gulf of Mexico Region Oil and Gas Production Forecast: 2018 – 2027* provides the public with the Bureau of Ocean Energy Management's 10-year annual oil and gas production outlook for the U.S. Outer Continental Shelf (OCS), Gulf of Mexico (GOM). The OCS of the GOM comprises all areas of the submerged seabed in the Gulf of Mexico where the mineral estate is subject to U.S. Federal Government jurisdiction; however, the forecasts provided in this report are limited to oil and gas volumes produced from the Central and Western planning areas and a small portion of the Eastern planning area that is available for leasing under BOEM's 2017-2022 National OCS Oil and Gas Leasing Program. (Figure 1).

This forecast provides estimates of annual oil and gas production volumes and average daily oil and gas production rates. Production estimates are provided for both shallow water and deepwater. In this report, shallow water is defined by water depths less than 400 meters (1312 ft.) and deepwater is greater than or equal to 400 meters (Figure 1). The water depth category of an oil and gas field is defined by the deepest water depth found on a lease within that field.

The petroleum commodities assessed and reported in this forecast 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 non-associated gas are reported jointly as gas. Oil volumes are reported as stock tank barrels (bbl) and gas as a thousand cubic feet (Mcf).

The *U.S. Outer Continental Shelf Gulf of Mexico Region Oil and Gas Production Forecast: 2018 – 2027* is the first production forecast report published by BOEM and the first report of its kind published by the Gulf of Mexico Region since 2009 (MMS, 2009).

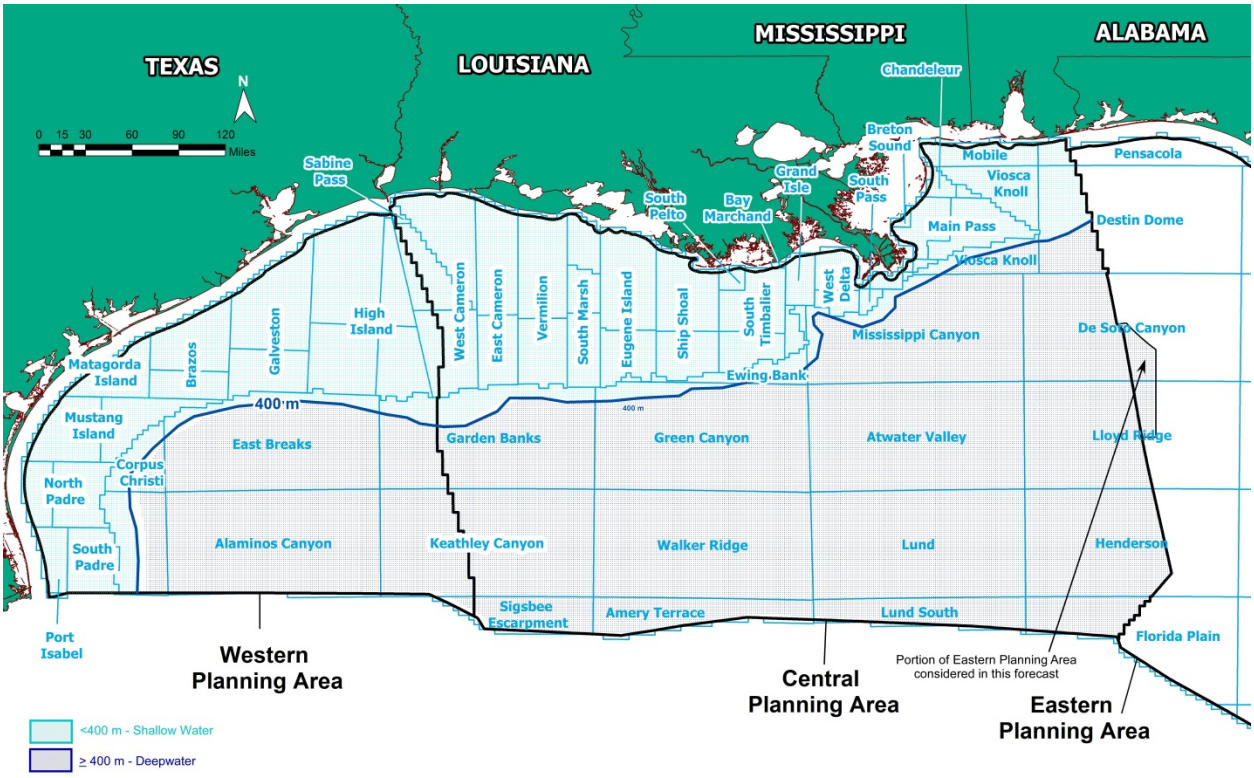

Figure 1. OCS, Gulf of Mexico Deepwater and Shallow Water Areas Considered in this Report.

FORECAST FRAMEWORK

There have been significant changes to the production forecast framework and methodology since the 2009 report. Starting with the December 31, 2008 Estimated Oil and Gas Reserves Report published in 2012, BOEM revised its resource and reserve classification system (Table 1) to closely align to the Society of Petroleum Engineers (SPE) Petroleum Resources Management System (PRMS).

BOEM Classification Framework	
Classes	**Sub-Classes**
Cumulative Production	
Reserves	Developed Producing
	Developed Non-Producing
	Undeveloped
	Reserves Justified for Development
Contingent Resources	
Unrecoverable	
Undiscovered Resources	***UERR estimates for leased prospects, unleased prospects, and resources yet to be identified are forecast in this report.***
Unrecoverable	

Increasing Chance of Commerciality

Table 1. BOEM Classification Framework. Modified from ***Burgess et al. (2016)****.*

Consistent with this framework, this report forecasts production by Reserves, Contingent Resources, and Undiscovered Resources. In contrast, the *Gulf of Mexico Oil and Gas Production Forecast: 2009-2018* included a committed scenario, full potential scenario, and undiscovered resources. These categories roughly align with Reserves, Contingent Resources, and Undiscovered Resources respectively; however, there are differences in the data sets and methodologies relied upon to develop the forecast.

This report relies solely on independent estimates of oil and gas reserves and resources derived by geologists, geophysicists, and engineers within the BOEM, Gulf of Mexico, Office of Resource Evaluation (RE). BOEM, GOMR has production data, reservoir data, and reserves estimates on over 1300 fields comprised of ~36,000 reservoirs in the GOM. A complete discussion of the terminology and methods used to estimate reserves is provided in the BOEM report, *Estimated Oil and Gas Reserves Gulf of Mexico OCS Region, December 31, 2015*.

Estimates of Contingent Resources are derived using similar methodologies to those used to estimate Reserves. Previous production forecast reports relied on industry surveys to provide estimates of newly discovered fields or projects as the basis for the full potential scenario. BOEM, GOMR does utilize industry announcements and plan submittals to determine when a project or field may come online (begin production); however, all volumetric estimates are independently derived.

Forecasts of production from Undiscovered Resources were developed by considering risked Undiscovered Economically Recoverable Resources (UERR) that include oil or gas prospects identified on leased acreage, prospects or leads identified on unleased acreage, and yet to be identified oil and gas resources on unleased acreage. BOEM, GOMR maintains an extensive database of leased and unleased prospects identified and evaluated for the purpose of determining the Fair Market Value (FMV) of tracts bid upon during GOM OCS Lease Sales. Prospects on leased acreage are assumed to begin production earlier than prospects on unleased acreage. Both contribute to the production forecast more significantly in later years. UERRs resulting from the BOEM, *Assessment of Technically and Economically Recoverable Hydrocarbon Resources of the Nation's Outer Continental Shelf as of January 1, 2014 (i.e. yet to be identified oil and gas resources)* are the final category of resources considered for this report. These UERRs are a portion of the assessed Undiscovered Technically Recoverable Resources (UTRR) considered to be economically recoverable at a price of $40/bbl and $2.14/Mcf. Estimates are developed using complex computer models that incorporate specific geologic information, mathematical and statistical analyses, risk and probability, and assumptions pertaining to economic scenarios, petroleum engineering data, and technical assumptions (BOEM, 2017). Given the extended time period needed to take a prospect from discovery to production, prospective resources that have not been identified have the least amount of impact initially on the production forecast.

RISK AND UNCERTAINTY

This report contains forward looking statements concerning exploration, development, production activity, and operations of a wide range of private businesses that are directly or indirectly involved in the development of oil and gas resources on the OCS of the U.S. Gulf of Mexico. All text, figures, tables, charts, and graphs other than those that state or represent historical fact are forward-looking statements. Forward-looking statements in this report reflect BOEM, GOMR's current expectations for oil and gas production from the GOM, OCS and include known and unknown risks and uncertainties that may cause actual results to differ materially from those expressed or implied.

There are numerous factors which may alter the results of the forecasts. Production volumes from undiscovered oil and gas accumulations, anticipated new projects, expected volumes from new in-field drilling, and re-completions in existing fields represent the most critical elements of risk in the latter years of the forecast, more-so than in the early years, when the production profiles are based predominantly on oil and gas production volumes derived from active completions in existing fields. Uncertainty exists throughout the forecast period; it is initially introduced to the production profiles through the decline analysis performed on active completions, and later compounded by variables associated with initial production, peak rate, decline rate, recoverable volume, activity scheduling, and market volatility.

METHODOLOGY

The oil and gas production forecasts were developed using oil and gas reservoir analysis software and spreadsheet-based data analysis tools. Historical data and forward-looking information were used in the analyses conducted to develop the forecasts. Historical data used includes oil and gas leasing, exploration, development, production, infrastructure fabrication and installation activity, and activity trends. Forward looking information used in the analyses was gathered from proprietary and publically

available oil and gas activity plans, company reports, press releases, professional journals and industry publications.

RESERVES

The Reserves portion of the production forecast is comprised of hydrocarbons that are discovered, recoverable, commercial, and remaining. Reserves are divided into four sub-classes: Developed Producing, Developed Non-Producing, Undeveloped, and Reserves Justified for Development (Table 1). For forecasting purposes, Reserves subclasses were combined into two main categories; Developed and Undeveloped Reserves. Developed Reserves include both Developed Producing and Developed Non-Producing Reserves whereas the Undeveloped Reserves category includes Undeveloped Reserves and Reserves Justified for Development.

The expected production from Developed Reserves was forecast by performing exponential decline curve analysis on each producing reservoir. The Undeveloped Reserves are the remaining volumes of oil and gas that would not be produced from the currently producing completions. The production from Undeveloped Reserves was forecast using a spreadsheet-based data analysis tool to estimate the annualized oil and gas production volumes. Historical field production profiles, individual well performance, and exploration and development activities were analyzed and used in the model to schedule out future production.

CONTINGENT RESOURCES

The Contingent Resources contain reservoirs that are in developed fields and in Contingent Resource fields that are yet to be developed. Production from Contingent Resource reservoir volumes that are in developed fields is forecast using the same spreadsheet-based data analysis tool as the Undeveloped Reserves.

The production forecast of the Contingent Resource fields that are yet to be developed is based on the following assumptions:

1.) Ultimate recoverable volumes are taken from independent, proprietary BOEM assessments.

2.) During the first year of production, each project is assumed to produce at half its peak rate.

3.) Projects with discovered resource volumes over 200 MMBOE are assumed to reach peak production in their second year, sustain that peak rate for a total of 4 years, then decline at an effective annual 12 percent rate from that time forward.

4.) The estimated peak production rate for each project is based on the estimated recoverable reserves as follows: **Peak Rate = (0.0003)*(ult rec rsvs) + 11025**

The peak rate is in barrels of oil equivalent (BOE) per day and the ultimate recoverable reserves (ult rec rsvs) are in BOE. This relationship was derived by plotting maximum production rates of known fields against the ultimate recoverable reserves of those fields and performing a linear regression. BOE production rates were separated to oil and gas streams based on the anticipated gas oil ratios for each field. Note that BOEM reserve estimates are on a field basis, so we assume that this relationship, based on historic field trends, can be applied on a project basis.

5.) The year when each discovery is expected to begin production is estimated by using available information from exploration and development plans as well as press releases.

UNDISCOVERED RESOURCES

The Undiscovered Resources section of the forecast is represented by oil and gas production volumes that exist in yet-to-be discovered fields that are anticipated to commence production during the forecast period. There are three categories that we evaluated for Undiscovered Resources. The first is leased identified, which is primarily made up of leased prospects that BOEM evaluated during the Fair Market Value determination process on tracts bid upon in GOM lease sales. The next component is unleased identified resources, which is comprised of prospects that were evaluated during a lease sale, but are not leased. The third category is unleased, unidentified resources, which are portions of

assessed resource volumes from the BOEM, *Assessment of Technically and Economically Recoverable Hydrocarbon Resources of the Gulf of Mexico Outer Continental Shelf as of January 1, 2014*.

The forecast methodology for the Undiscovered Resources is very similar to that of the Contingent Resources in undeveloped fields as explained in the previous section. The historical annual data for past field discoveries, development activities, and production are used to predict how the identified resources will be developed during the forecast timeline. BOEM assumes that the leased identified resources will begin producing before the unleased identified resources. The unleased unidentified resources are; last to contribute to the forecast, most uncertain category of undiscovered resources, and not expected to contribute greatly to the production forecast until the very last few years.

CONCLUSIONS

Historic oil production in the Gulf of Mexico increased steadily from 1990 through 2002, leveled off in 2003, and declined dramatically in 2004 and 2005 (Figure 2, Table 2). The sharp decline seen was caused in large part by Hurricane Ivan in 2004 and hurricanes Katrina and Rita in 2005. During 2006 and 2007, oil production remained steady, but had not reached pre-hurricane Katrina production volumes. The 2008 oil production volumes again show a sharp decline, due in large part to damage from hurricanes Gustav and Ike. In 2009 and 2010, oil production increased to 2002 levels; however, following the 2010 Deepwater Horizon incident, production dropped back down to 2005 levels. Hurricane Isaac in 2012 may have also had some impact in this time period. In 2014, oil production started to increase and is expected to reach a record high in 2017. Although shallow water oil production declined steadily since 1997 (Figure 4, Table 4), increasing deepwater oil production offset most of these losses during that period (Figure 6, Table 6).

Historic gas production in the GOM was fairly level from 1990 through 2001 when the Gulf OCS contributed between 4,750 to 5,260 BCFG to the total annual volume of U.S. domestic natural gas production (Figure 3, Table 3). From 2002 to 2012, total annual gas production declined 66% from 4,539

billion cubic feet (BCF) in 2002 to 1,542 BCF in 2012, an average annual decline rate of just over 10%. Since 2013, annual gas production volumes from the GOM have continued to decline from 1,334 BCF in 2013 to 1,166 BCF in 2017 (forecast) but the annual rate of decline over the five-year period has slowed to an average annual rate near 5% due, in part, to a modest increase of 2.3% in 2015 from 2014 annual volumes. The significant shallow water gas production decline since 2002 (Figure 5, Table 5), was not offset by deepwater gas production during that period (Figure 7, Table 7).

Total annual oil production from the GOM, OCS in 2017 is expected to exceed 603 MMbbls, making it the fourth consecutive year of increased annual oil production since 2013 when total annual oil production was just under 459.3 MMbbls (Figure 2, Table 2). BOEM forecasts total annual oil production from the OCS, GOM, in 2018 will again set a new record high at 606.9 MMbbls, exceeding the total volume produced in 2017 by more than 3.7 MMbbls. BOEM expects the trend of annual increased oil production volumes to continue adding between 1 and 10 MMbbls per year, setting new record highs in each successive year through 2024 when 642 MMbbls are expected to be produced from the Region. BOEM's forecast identifies 2026 as the peak year for total annual oil production during the 10-year forecast period when total annual oil production is forecast to reach 644.7 MMbbls, an increase of 41.6 MMbbls from the expected 2017 annual oil production volumes. The anticipated increase in oil production reflects the addition of volumes associated with Undeveloped Reserves, Contingent Resource reservoirs, and Undiscovered Resources that are expected to be developed. Although shallow water oil production is expected to decline slightly (Figure 4, Table 4), deepwater oil production is expected to more than offset the shallow water production decline (Figure 6, Table 6).

The forecast of total annual natural gas production from the GOM in 2018 is estimated to be 1,121 billion cubic feet of gas (BCFG), a decline of 3.8% from expected 2017 gas production volumes but a slight improvement in the annual rate of decline since 2015 (Figure 3, Table 3). During the forecast period 2018 - 2027, the BOEM, GOMR anticipates that the average annual rate of decline for gas

production will be less than 1%, holding annual gas production volumes relatively consistent, ranging between 1,045 and 1,121 BCF per year. The improvement in the forecast annual rate of decline for gas production from the GOM is based on the expectation that the production of associated-gas from fields in water depths greater than 400 meters will offset the anticipated decline of gas production from fields situated in less than 400 meters of water (Figures 5 and 7, Tables 5 and 7).

Each component described in this report (Reserves, Contingent Resources, and Undiscovered Resources) adds potential GOM oil production to the forecast and maintains GOM gas production during the forecast period; however, uncertainty increases with each subsequent component. The data from each component used in this report are presented in Figures 2 and 3, and Tables 2 and 3 on a total annual basis, and in Figures 4 through 7, and Tables 4 through 7 on a daily basis for shallow water and deepwater. GOM oil production is expected to increase within the forecast period and GOM gas production is expected to remain somewhat flat. The contributions from Undiscovered Resources in the later years of the forecast period show the importance of BOEM, GOM Region's mission to support the continued exploration and development of the nation's offshore hydrocarbon resources.

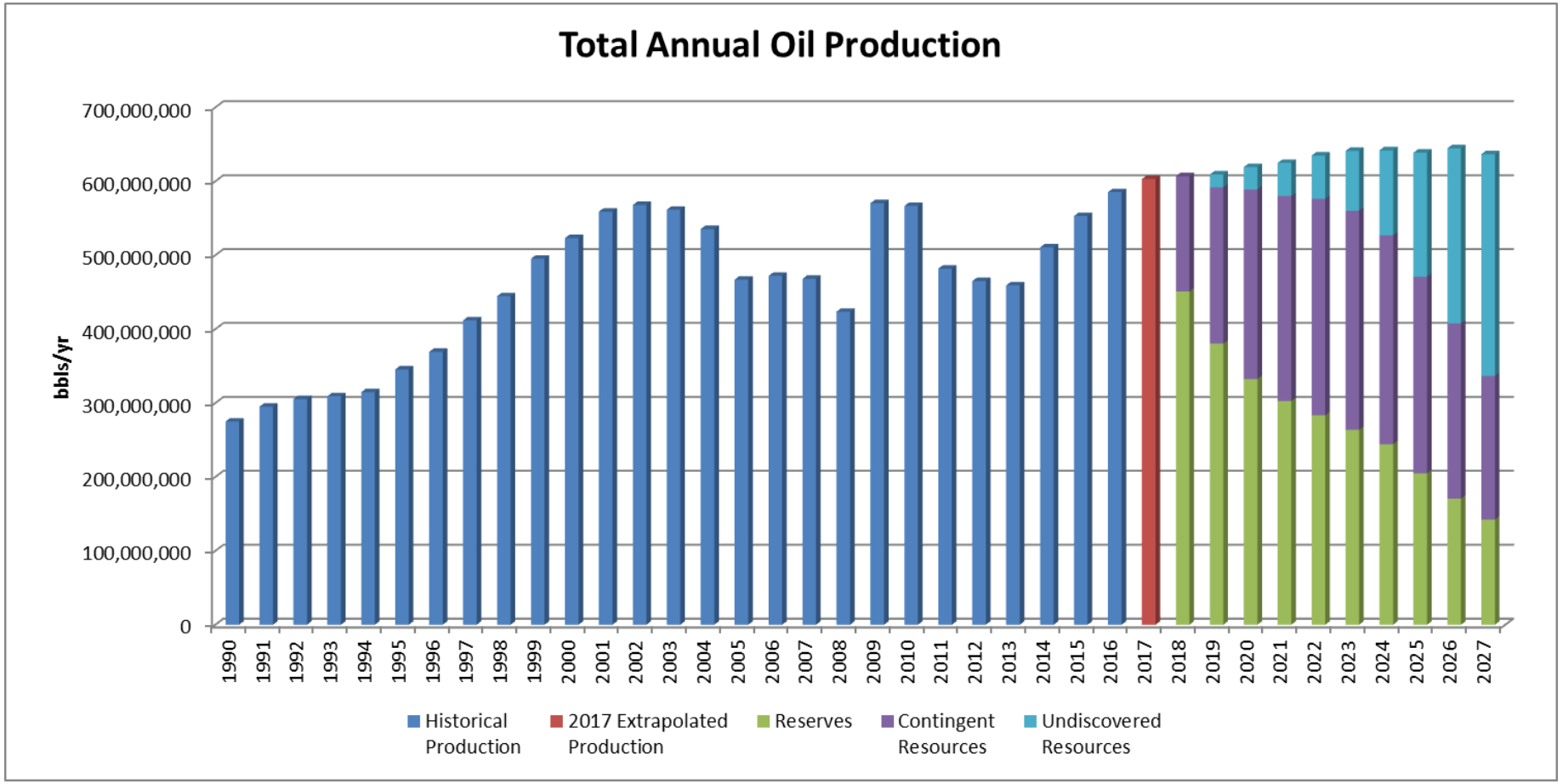

Figure 2. Gulf of Mexico, Annual Oil Production (bbls/year).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Total Annual Oil Projection
1990	274,955,773					
1991	295,129,769					
1992	305,282,682					
1993	309,229,380					
1994	314,742,346					
1995	345,525,211					
1996	369,269,670					
1997	411,913,886					
1998	444,498,780					
1999	495,339,750					
2000	523,157,864					
2001	558,938,960					
2002	568,009,060					
2003	561,560,868					
2004	535,423,633					
2005	466,967,259					
2006	472,112,025					
2007	468,038,728					
2008	423,479,098					
2009	570,347,473					
2010	566,690,147					
2011	481,878,171					
2012	464,960,434					
2013	459,264,419					
2014	510,699,768					
2015	553,112,427					
2016	585,361,959					
2017		603,118,204				
2018			450,934,491	155,916,755		606,851,246
2019			380,439,096	211,208,259	17,589,002	609,236,357
2020			332,601,021	256,435,866	30,230,503	619,267,390
2021			302,736,022	277,378,154	44,815,499	624,929,675
2022			283,414,376	292,760,907	58,686,082	634,861,365
2023			263,639,899	296,525,733	80,939,122	641,104,754
2024			244,295,547	282,483,166	115,220,339	641,999,052
2025			205,013,484	265,908,910	167,728,316	638,650,710
2026			170,673,854	237,202,675	236,816,959	644,693,488
2027			142,407,979	194,311,636	300,019,047	636,738,662
	Volume in bbls/year					

Table 2. Gulf of Mexico, Annual Oil Production (bbls/year).

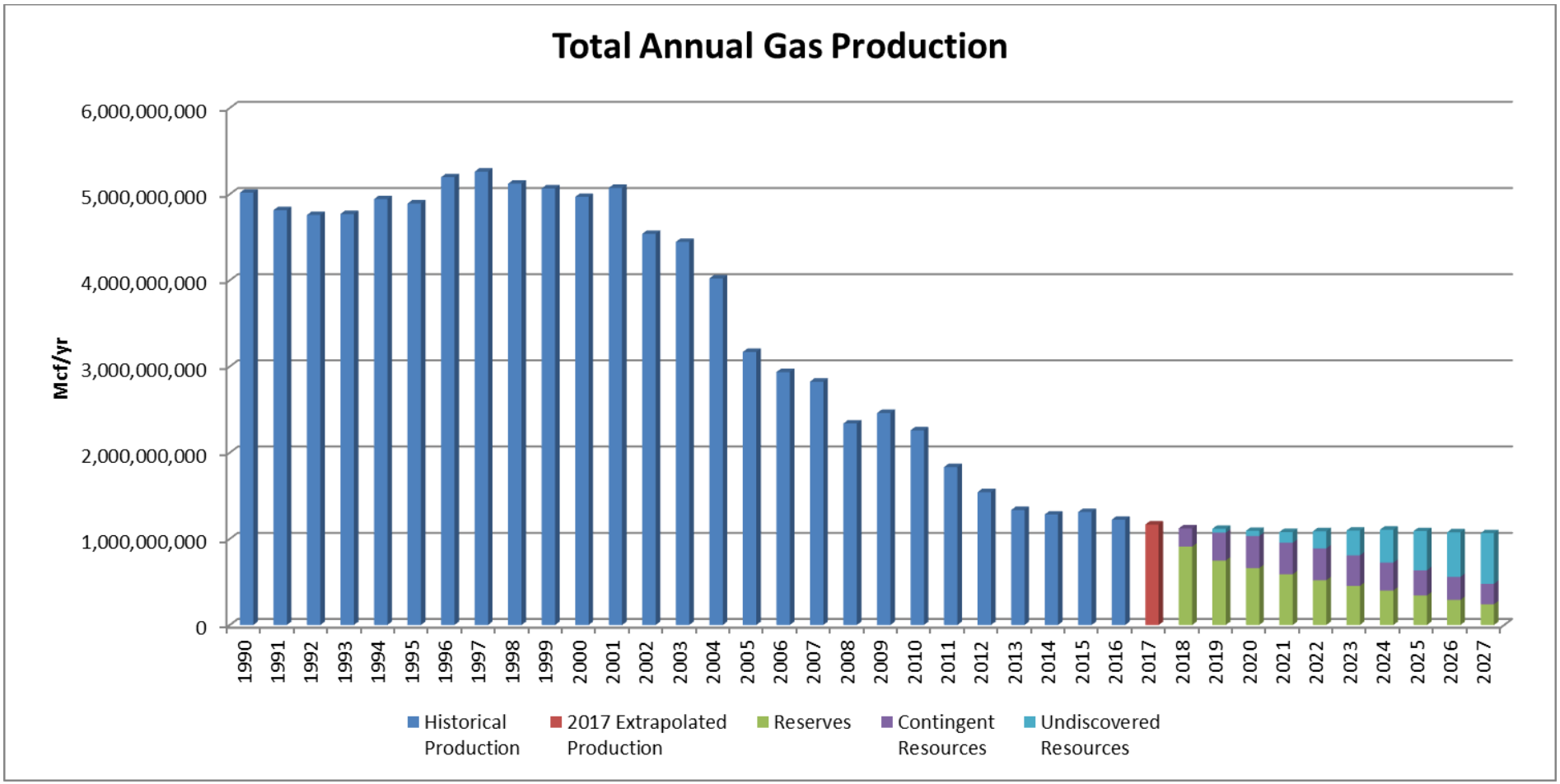

Figure 3. Gulf of Mexico, Annual Gas Production (Mcf/year).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Total Annual Gas Projection
1990	5,016,785,083					
1991	4,813,611,605					
1992	4,757,596,972					
1993	4,769,304,128					
1994	4,942,082,167					
1995	4,891,500,605					
1996	5,195,917,133					
1997	5,260,944,236					
1998	5,121,525,173					
1999	5,066,308,789					
2000	4,967,713,338					
2001	5,071,903,996					
2002	4,539,103,249					
2003	4,445,395,755					
2004	4,021,219,002					
2005	3,169,173,384					
2006	2,935,031,341					
2007	2,823,886,250					
2008	2,339,071,022					
2009	2,459,593,465					
2010	2,258,820,892					
2011	1,833,258,206					
2012	1,542,020,105					
2013	1,334,095,147					
2014	1,281,803,765					
2015	1,311,675,117					
2016	1,221,892,669					
2017		1,165,960,926				
2018			909,860,240	211,566,466		1,121,426,706
2019			748,420,545	322,711,839	44,906,900	1,116,039,284
2020			660,376,509	372,562,396	59,389,279	1,092,328,184
2021			589,547,154	364,699,596	124,809,353	1,079,056,103
2022			519,414,350	370,111,207	198,404,006	1,087,929,563
2023			453,935,985	353,585,067	287,942,074	1,095,463,126
2024			400,874,473	322,386,257	382,865,522	1,106,126,252
2025			341,612,515	293,309,969	454,587,289	1,089,509,773
2026			290,912,348	267,520,021	517,205,894	1,075,638,263
2027			240,896,293	236,553,482	587,910,854	1,065,360,629
	Volume in Mcf/year					

Table 3. Gulf of Mexico, Annual Gas Production (Mcf/year).

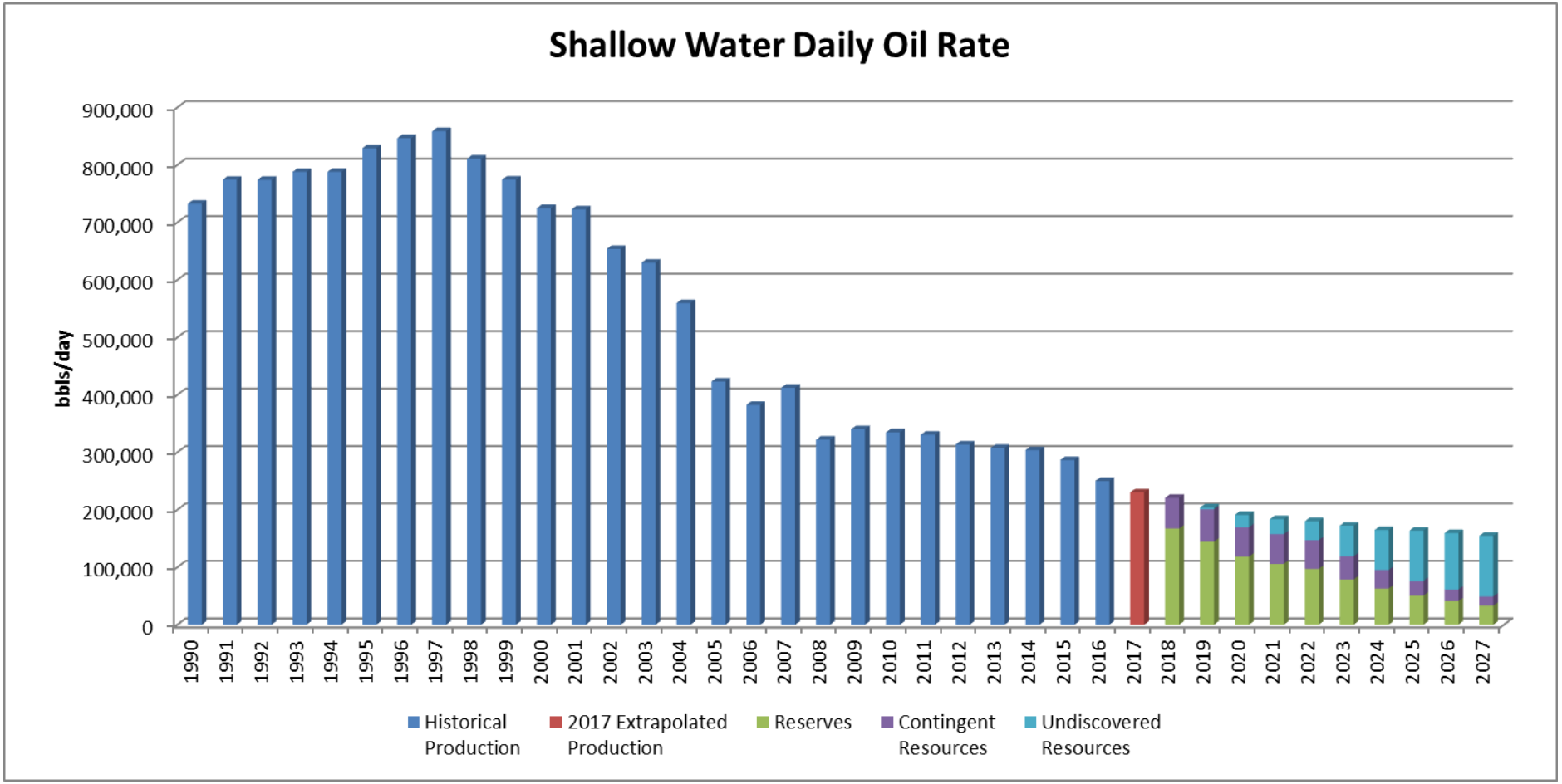

Figure 4. Gulf of Mexico, Shallow Water, Daily Oil Production Rate (bbls/day).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Shallow Water Projection
1990	732,667					
1991	774,350					
1992	774,345					
1993	787,872					
1994	787,994					
1995	829,317					
1996	846,630					
1997	858,883					
1998	810,861					
1999	774,429					
2000	724,842					
2001	722,912					
2002	653,893					
2003	630,072					
2004	559,782					
2005	423,194					
2006	382,429					
2007	412,364					
2008	322,114					
2009	340,079					
2010	334,678					
2011	330,571					
2012	313,717					
2013	307,614					
2014	303,748					
2015	286,575					
2016	250,180					
2017		230,271				
2018			167,353	53,479		220,832
2019			144,423	56,351	3,189	203,963
2020			118,371	51,194	21,610	191,175
2021			105,969	51,649	25,945	183,564
2022			97,196	50,010	32,819	180,025
2023			78,729	40,510	53,022	172,261
2024			63,091	32,173	69,532	164,796
2025			50,654	25,553	87,800	164,007
2026			40,861	20,294	98,388	159,544
2027			33,094	16,118	105,533	154,745
	Volume in bbls/day					

Table 4. Gulf of Mexico, Shallow Water, Daily Oil Production Rate (bbls/day).

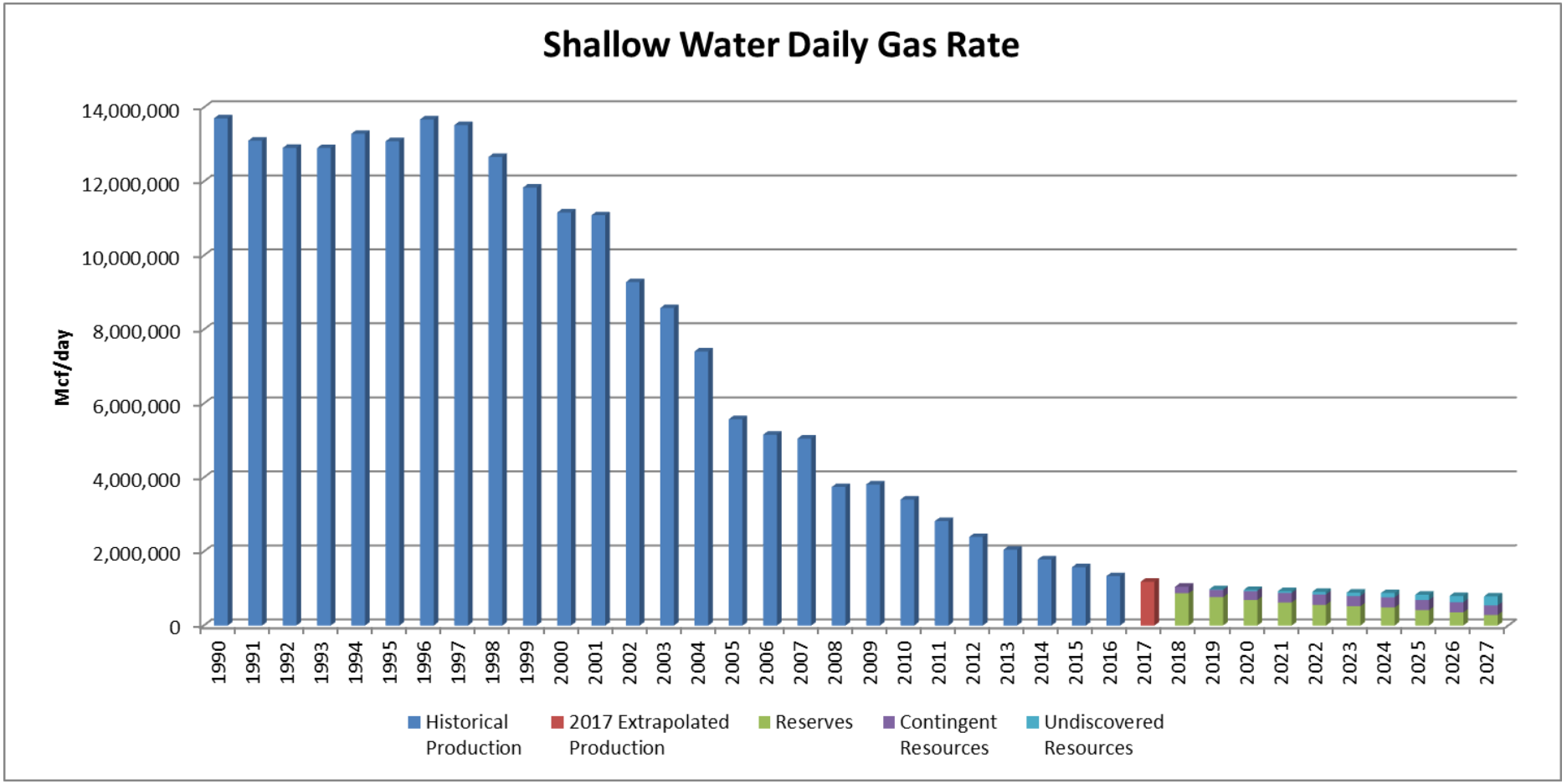

Figure 5. Gulf of Mexico, Shallow Water, Daily Gas Production Rate (Mcf/day).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Shallow Water Projection
1990	13,709,004					
1991	13,106,750					
1992	12,908,708					
1993	12,906,414					
1994	13,291,342					
1995	13,089,559					
1996	13,678,385					
1997	13,523,813					
1998	12,666,004					
1999	11,834,996					
2000	11,163,738					
2001	11,090,001					
2002	9,282,638					
2003	8,582,072					
2004	7,410,054					
2005	5,577,506					
2006	5,159,226					
2007	5,054,901					
2008	3,746,518					
2009	3,812,786					
2010	3,405,534					
2011	2,822,740					
2012	2,392,958					
2013	2,050,227					
2014	1,788,031					
2015	1,579,286					
2016	1,336,301					
2017		1,185,292				
2018			874,429	175,000		1,049,429
2019			768,919	194,457	18,033	981,408
2020			692,361	241,495	30,393	964,249
2021			626,290	254,510	51,070	931,871
2022			563,142	278,814	72,035	913,990
2023			521,947	278,817	90,022	890,786
2024			487,362	276,472	115,330	879,163
2025			417,228	274,461	143,131	834,820
2026			356,024	272,737	172,492	801,253
2027			286,336	257,560	244,295	788,191
	Volume in Mcf/day					

Table 5. Gulf of Mexico, Shallow Water, Daily Gas Production Rate (Mcf/day)

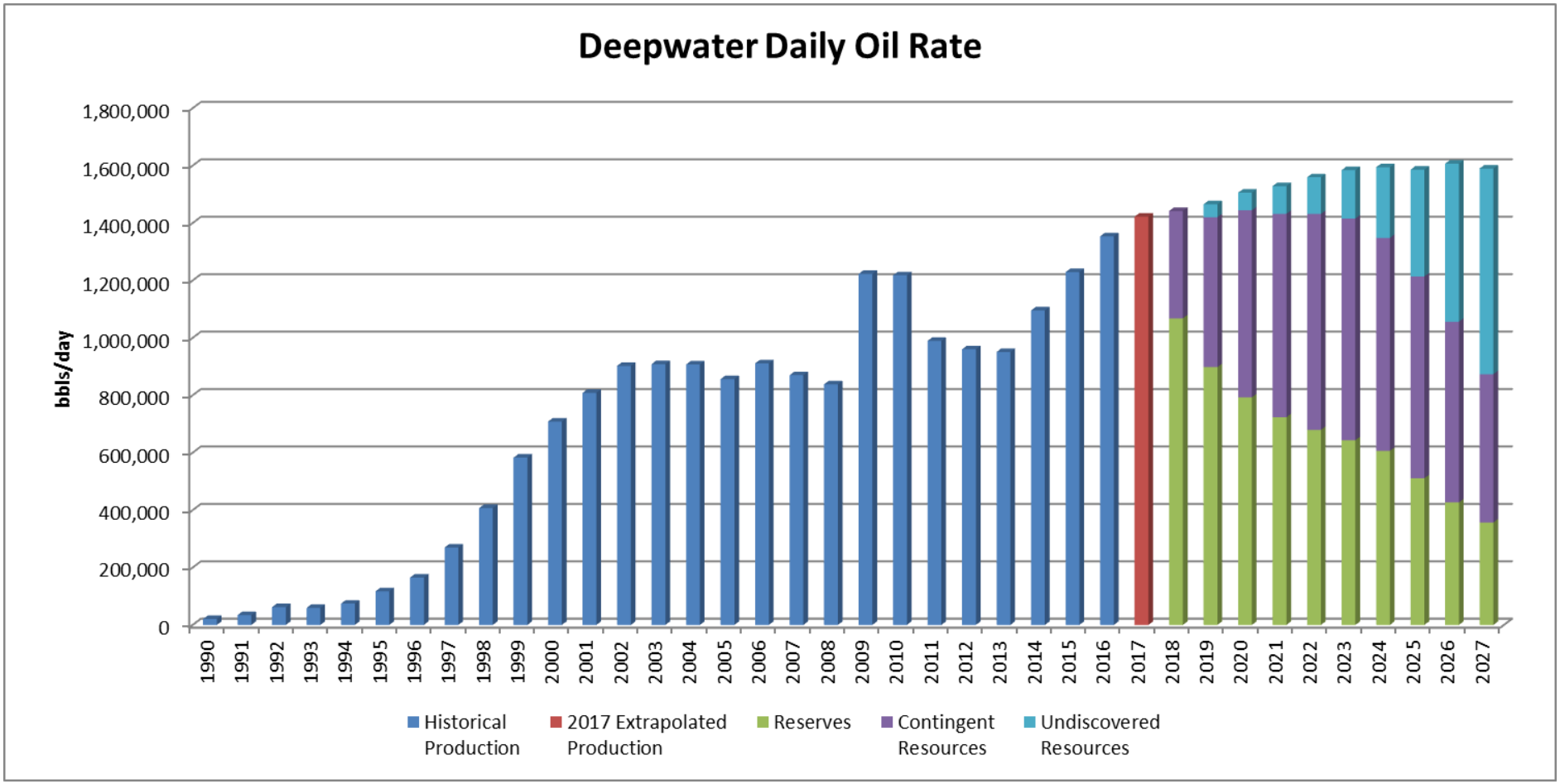

Figure 6. Gulf of Mexico, Deepwater, Daily Oil Production Rate (bbls/day).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Deepwater Projection
1990	20,637					
1991	34,225					
1992	62,046					
1993	59,331					
1994	74,313					
1995	117,327					
1996	165,068					
1997	269,648					
1998	406,944					
1999	582,667					
2000	708,467					
2001	808,428					
2002	902,296					
2003	908,451					
2004	907,132					
2005	856,169					
2006	911,028					
2007	869,934					
2008	838,103					
2009	1,222,517					
2010	1,217,898					
2011	989,643					
2012	960,147					
2013	950,645					
2014	1,095,430					
2015	1,228,801					
2016	1,353,551					
2017		1,422,108				
2018			1,068,084	373,690		1,441,774
2019			897,876	522,302	45,000	1,465,177
2020			792,865	651,370	61,214	1,505,448
2021			723,444	708,291	96,837	1,528,573
2022			679,282	752,075	127,965	1,559,321
2023			643,572	771,889	168,729	1,584,190
2024			606,212	741,753	246,140	1,594,105
2025			511,027	702,965	371,730	1,585,721
2026			426,738	629,576	550,425	1,606,740
2027			357,065	516,243	716,437	1,589,744
	Volume in bbls/day					

Table 6. Gulf of Mexico, Deepwater, Daily Oil Production Rate (bbls/day).

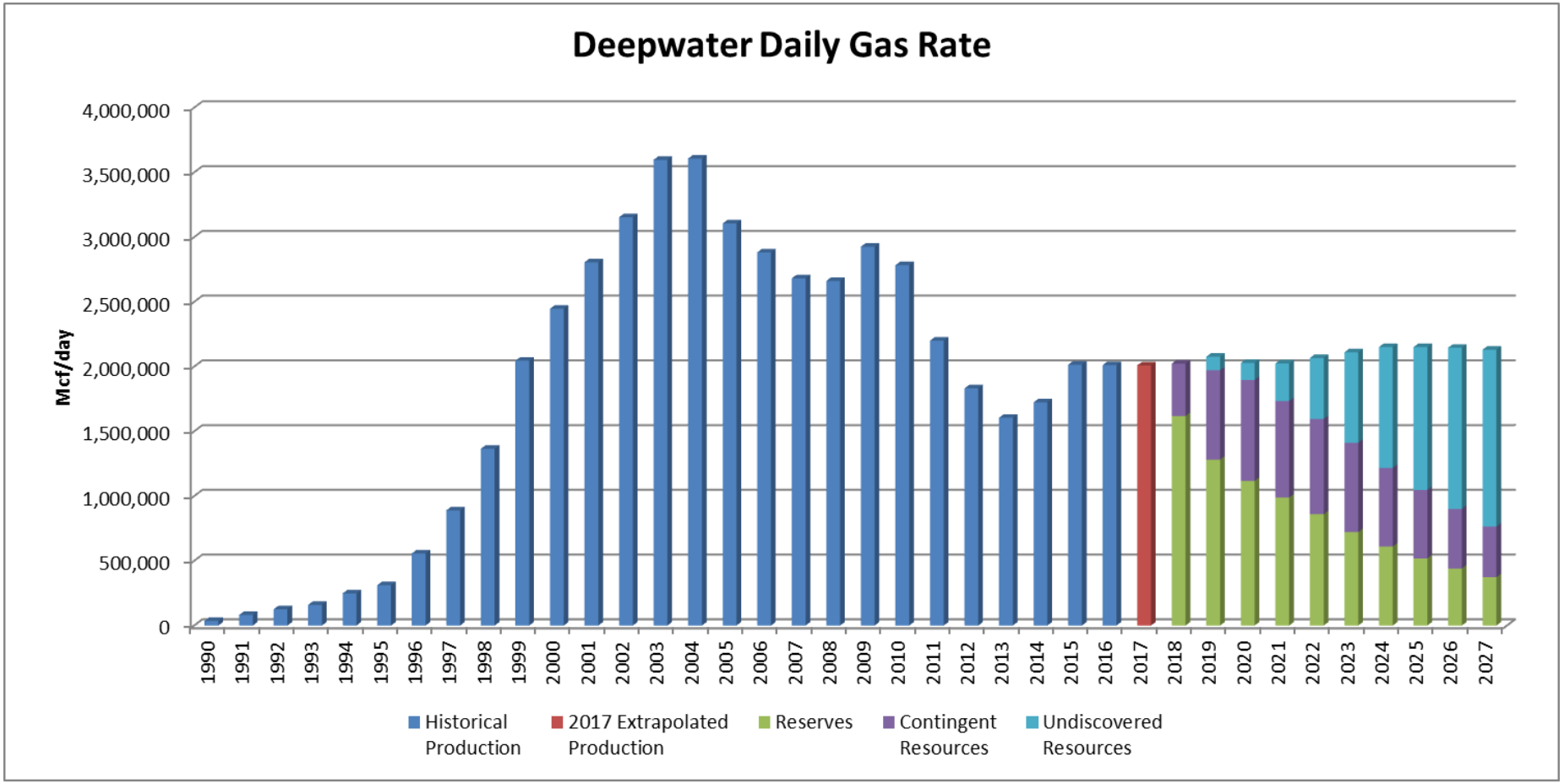

Figure 7. Gulf of Mexico, Deepwater, Daily Gas Production (Mcf/day).

Year	Historical Production	2017 Extrapolated Production	Reserves	Contingent Resources	Undiscovered Resources	Deepwater Projection
1990	35,613					
1991	81,227					
1992	125,804					
1993	160,173					
1994	248,610					
1995	311,812					
1996	557,004					
1997	889,733					
1998	1,365,572					
1999	2,045,302					
2000	2,446,435					
2001	2,805,627					
2002	3,153,261					
2003	3,597,095					
2004	3,606,984					
2005	3,105,160					
2006	2,881,956					
2007	2,681,774					
2008	2,661,896					
2009	2,925,826					
2010	2,783,017					
2011	2,199,885					
2012	1,831,755					
2013	1,604,828					
2014	1,723,760					
2015	2,014,344					
2016	2,011,350					
2017		2,009,122				
2018			1,618,338	404,634		2,022,972
2019			1,281,548	689,685	105,000	2,076,234
2020			1,116,889	779,223	132,318	2,028,431
2021			988,907	744,667	290,873	2,024,448
2022			859,911	735,190	471,538	2,066,639
2023			721,713	689,909	698,861	2,110,482
2024			610,924	606,778	933,617	2,151,320
2025			518,697	529,128	1,102,314	2,150,138
2026			440,996	460,195	1,244,510	2,145,701
2027			373,653	390,532	1,366,419	2,130,605
	Volume in Mcf/day					

Table 7. Gulf of Mexico, Deepwater, Daily Gas Production (Mcf/day).

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GLOSSARY

Field: A producible accumulation of hydrocarbons consisting of a single or multiple reservoirs all related to the same geologic structure and/or stratigraphic condition. In general usage, this term refers to a commercial accumulation.

Reservoir: A subsurface, porous, permeable rock body in which an isolated accumulation of oil and/or gas has accumulated.

Project: A *Project* represents the link between the petroleum accumulation and the decision-making process, including budget allocation. A project, for BOEM's classification of Resources and Reserves, is the Field (see also Field).

Resources: Concentrations in the earth's crust of naturally occurring liquid or gaseous hydrocarbons that can conceivable be discovered and recovered. Normal usage encompasses both *Discovered Resources* and *Undiscovered Resources*.

Undiscovered Resources: Hydrocarbons postulated, on the basis of geologic knowledge and theory, to exist outside of known fields or accumulations.

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.

Undiscovered Economically Recoverable Resources (UERR): The portion of the *Undiscovered Technically Recoverable Resources* that is economically recoverable under imposed economic and technologic conditions.

Discovered Resources: Hydrocarbons in which the location and quantity are known or estimated from specific geologic evidence. Included are *Reserves* and *Contingent Resources* depending upon economic, technical, contractual, or regulatory criteria.

Contingent Resources: Those quantities of hydrocarbons estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects but which are not currently considered to be commercially recoverable due to one or more contingencies.

Reserves: Those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. Reserves must further satisfy four criteria: They must be discovered, recoverable, commercial, and remaining (as of a given date) based on the development project(s) applied. Reserves are further sub-classified based on economic certainty.

Cumulative Production: The sum of all produced volumes of oil and gas prior to a specified date.

Developed Reserves: Developed Reserves can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as Developed Reserves only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed Reserves may be sub-categorized as Producing or Non-producing.

Developed Producing Reserves: Reserves that are expected to be recovered from completion intervals that are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation.

Developed Non-Producing Reserves: Reserves that are precluded from producing due to being shut-in or behind-pipe. Shut-in includes (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe refers to zones in existing wells which will require additional completion work or future re-completion prior to the start of production. In both cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.

Undeveloped Reserves: Reserves that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree

of certainty in reservoirs which have previously shown favorable response to improved recovery projects.

Reserves Justified for Development: The lowest level of reserves certainty. Implementation of the development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting and that there are reasonable expectations that all necessary approvals/contracts will be obtained.