

Federal Offshore Gulf of Mexico

Comparison of Shallow vs. Deepwater Spending, Government Revenue, and Production

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Presented to:
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Executive Summary

- **This study was prepared to highlight the growing role played by the deepwater (200 meters or greater water depth) as a component of total Gulf of Mexico (GoM) oil and gas activity.**
 - The shallow area made up approximately 20% of production/spending in 2016 down from approximately 33% of production/spending in 2010.
 - In contrast, the deepwater area made up 80% production/spending in 2016 compared to 67% of production/spending in 2010.
- **The 2017 AEO Reference Case projects that this trend toward increased activity shares from the deepwater area will continue in the future.**
 - By 2025 the deepwater area will make up over 90% of the GoM production and spending.



Scope of Study and Methodology

Scope of Study and Methodology: Definitions and Data Sources

- This study presents a compilation of historical and forecasted data related to Federal Gulf of Mexico (GoM) oil and gas activity broken out by water depth.
- The shallow GoM is defined as Federal lands with water depths up to 200 meters (656 feet). The deepwater is defined as 200 meters or greater water depth.
- The historical data for production and revenues are compiled from the Department of Interior's (Dol) Office on Natural Resources Revenue (ONRR) information. Other data come from Bureau of Ocean Energy Management (BOEM) databases.
- Published data is generally not reported by water depth and has to be estimated by allocating GoM-wide data to water depths using detailed field, lease, or well databases.

Scope of Study and Methodology: Estimation of Royalties

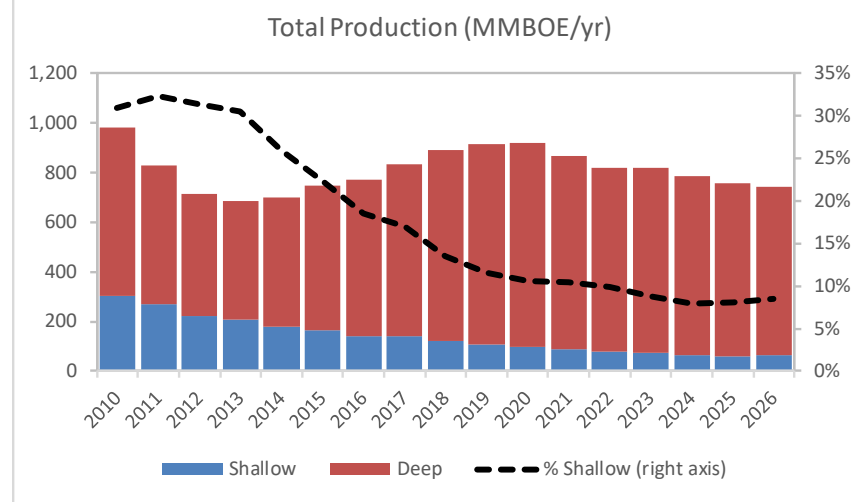
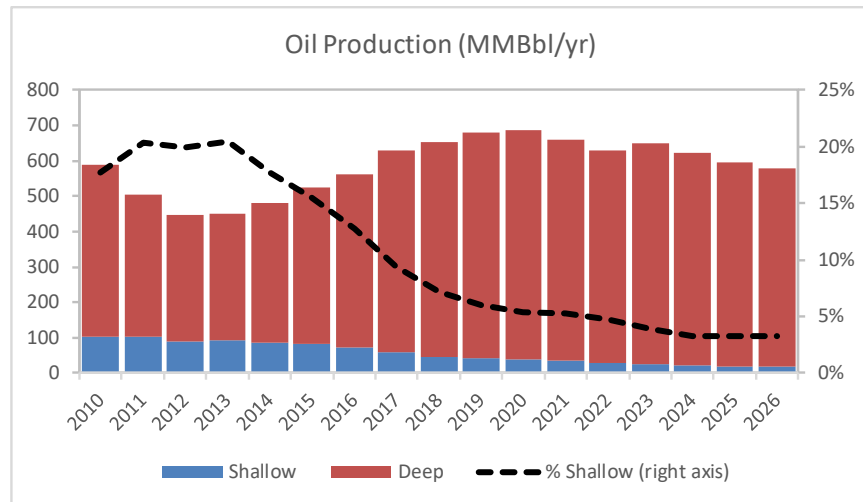
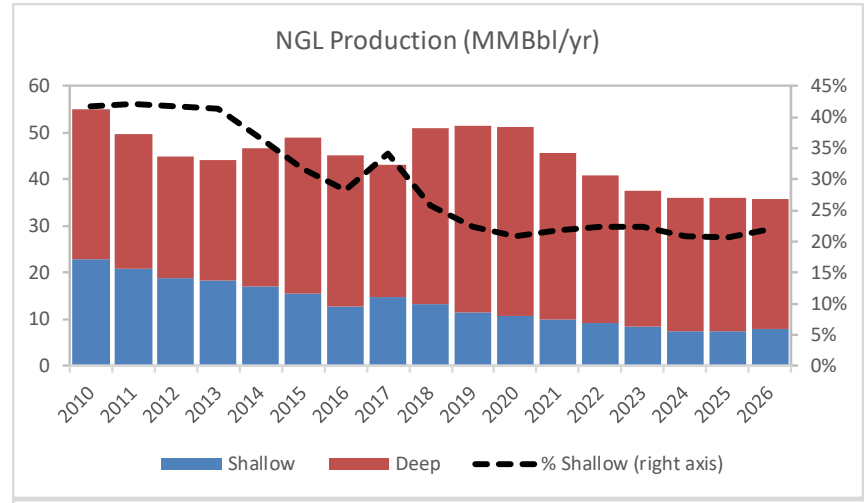
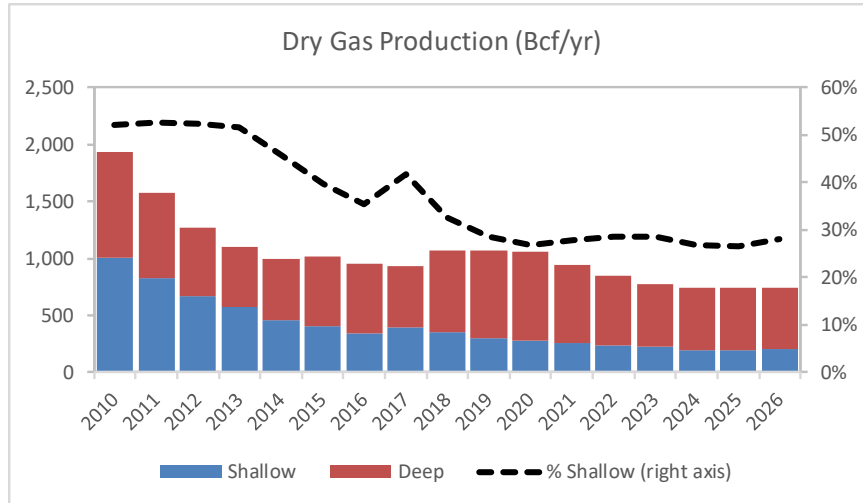
- Due to the complexity of royalties rates (which vary by date, water depth, drilling depths, field size and (sometimes) oil/gas prices), the estimation process has a wide degree of error for allocating royalties by water depth.
- Forecasted royalty rates are based on holding recent average realized rates (by hydrocarbon type and water depth) constant in the future.
- Actual royalties may differ from forecast because BOEM has the flexibility to change rates to reflect economic conditions. Also BOEM has expressed an interest in wider use of sliding scale royalties for future lease sales.

Scope of Study: Forecasted Data

- **Forecasted data are based on the 2017 EIA Annual Energy Outlook (AEO). This includes future prices for oil, gas and NGLs.**
- **The AEO breaks out future Federal GoM production in <200 meters versus \geq 200 meters. But there are no AEO estimates of expenditures, which ICF estimated using its own methods.**
- **The historical estimates of expenditures are also from ICF and are based on various sources including the JAS Drilling Cost Survey, compiled financial reports, and other sources.**

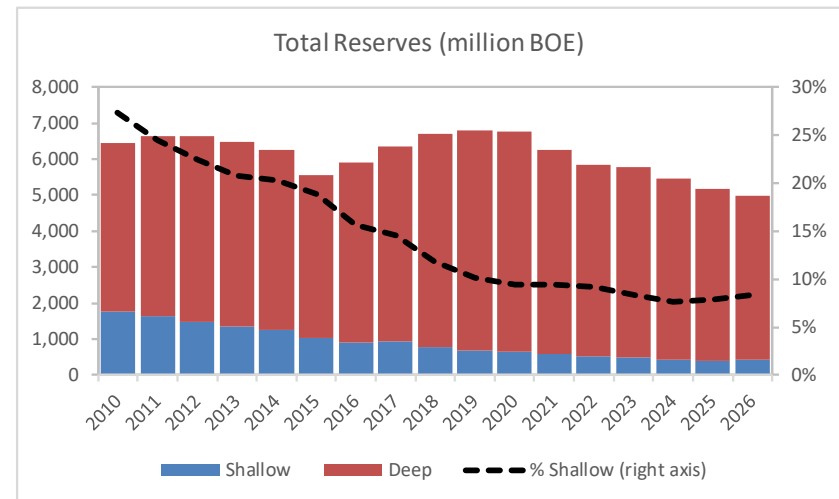
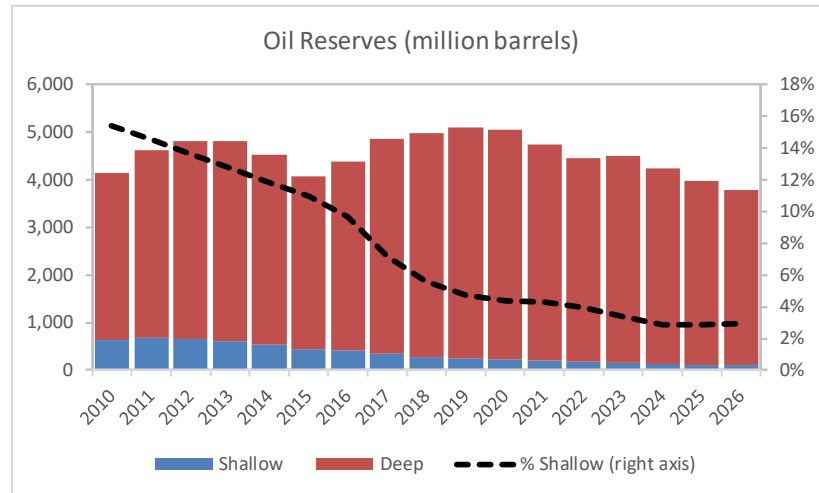
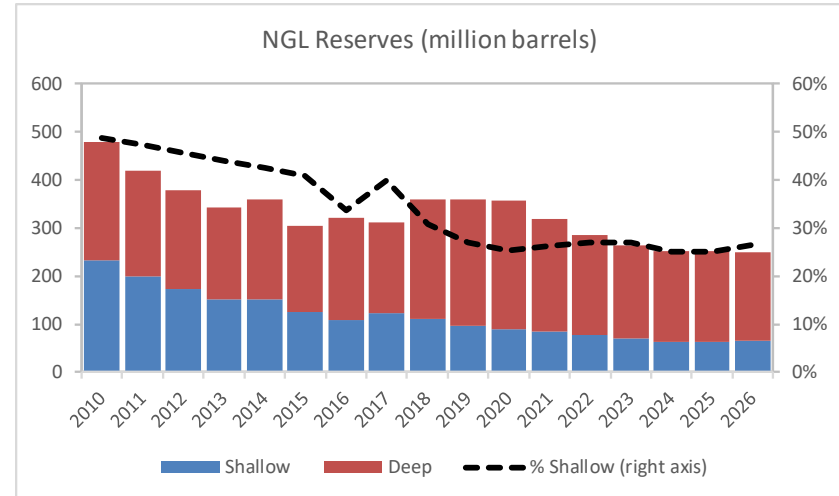
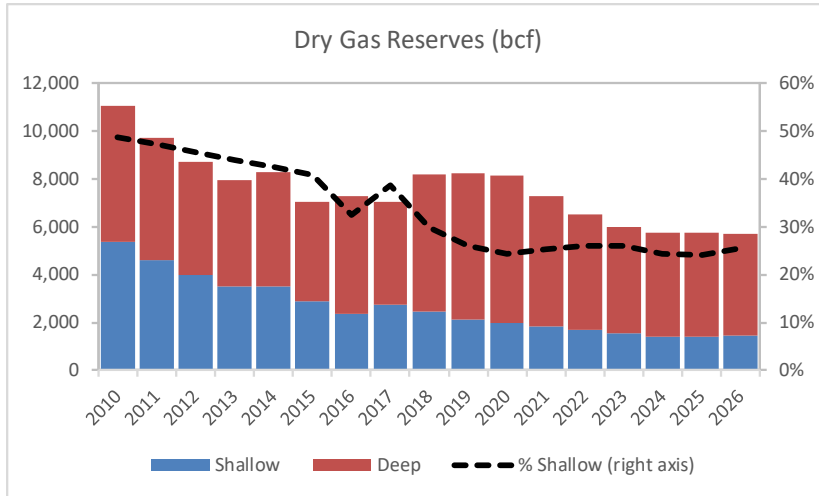
Study Results

Gas, NGL, and Oil Production



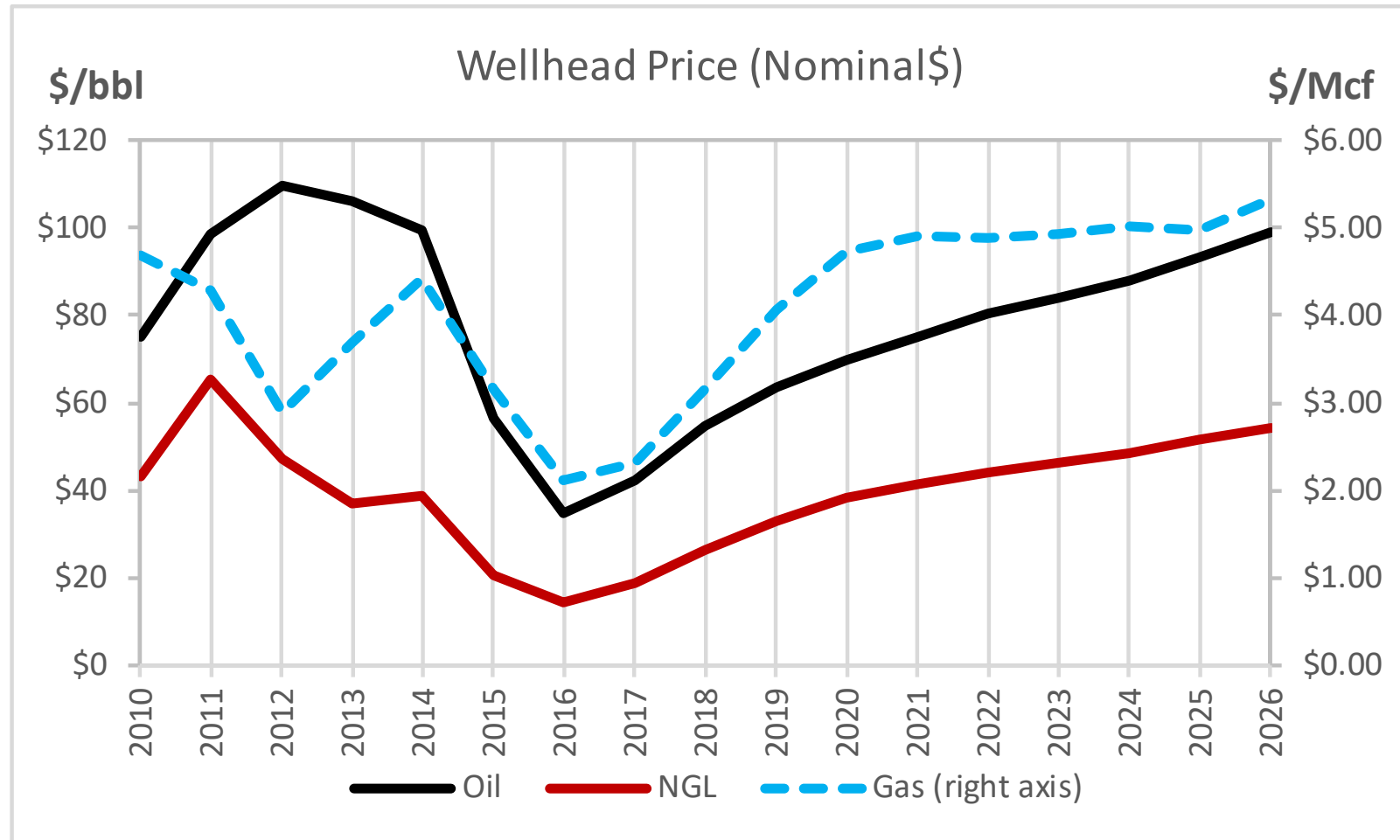
- The shallow water area accounted for 31% of production of all hydrocarbons in 2010 and 19% in 2016 (measured by energy content). By 2026, the EIA expects that number to fall further to 8%.

Gas, NGL, and Oil Reserves



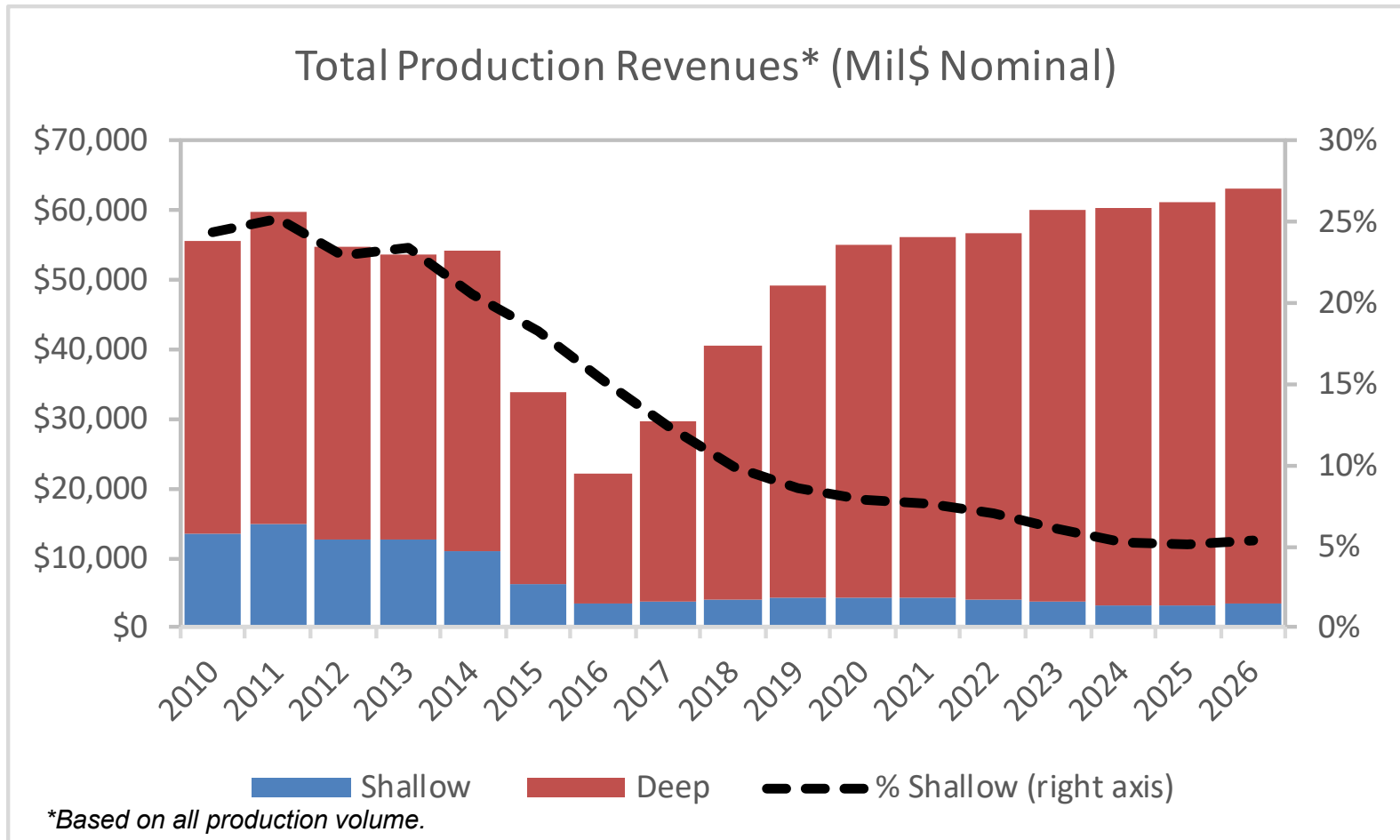
- The shallow water area accounted for 27% of proven reserves of all hydrocarbons in 2010 and 16% in 2016 (measured by energy content). By 2026, the EIA expects that number to fall further to 8%.

Gas, NGL, and Oil Wellhead Prices



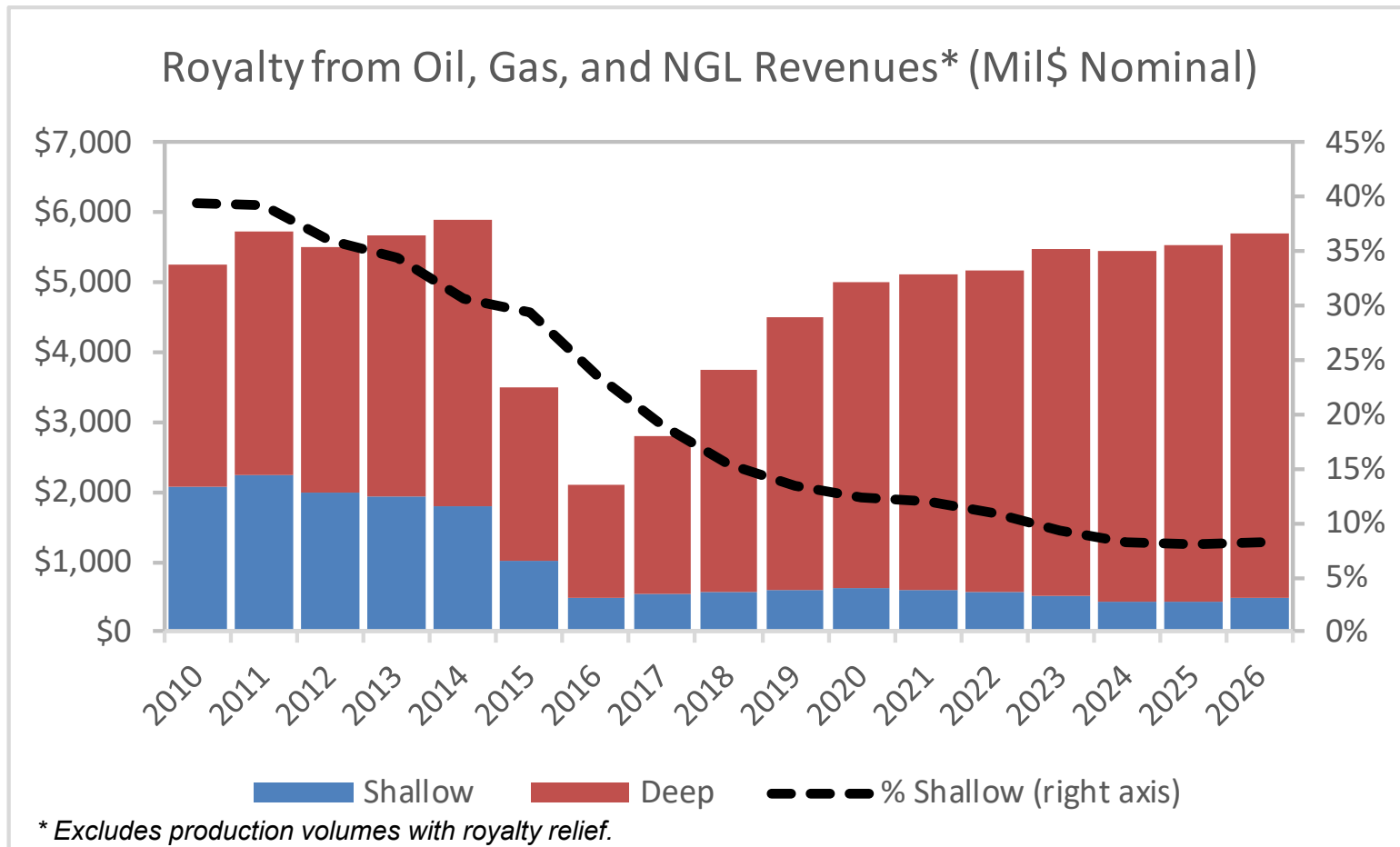
- The EIA 2017 AEO Reference Case calls for crude oil prices to rebound to over \$80/bbl in nominal dollars by 2022. Natural gas prices begin to exceed \$4.00 per MMBtu starting in 2019.

Production Revenues (value of produced oil and gas)



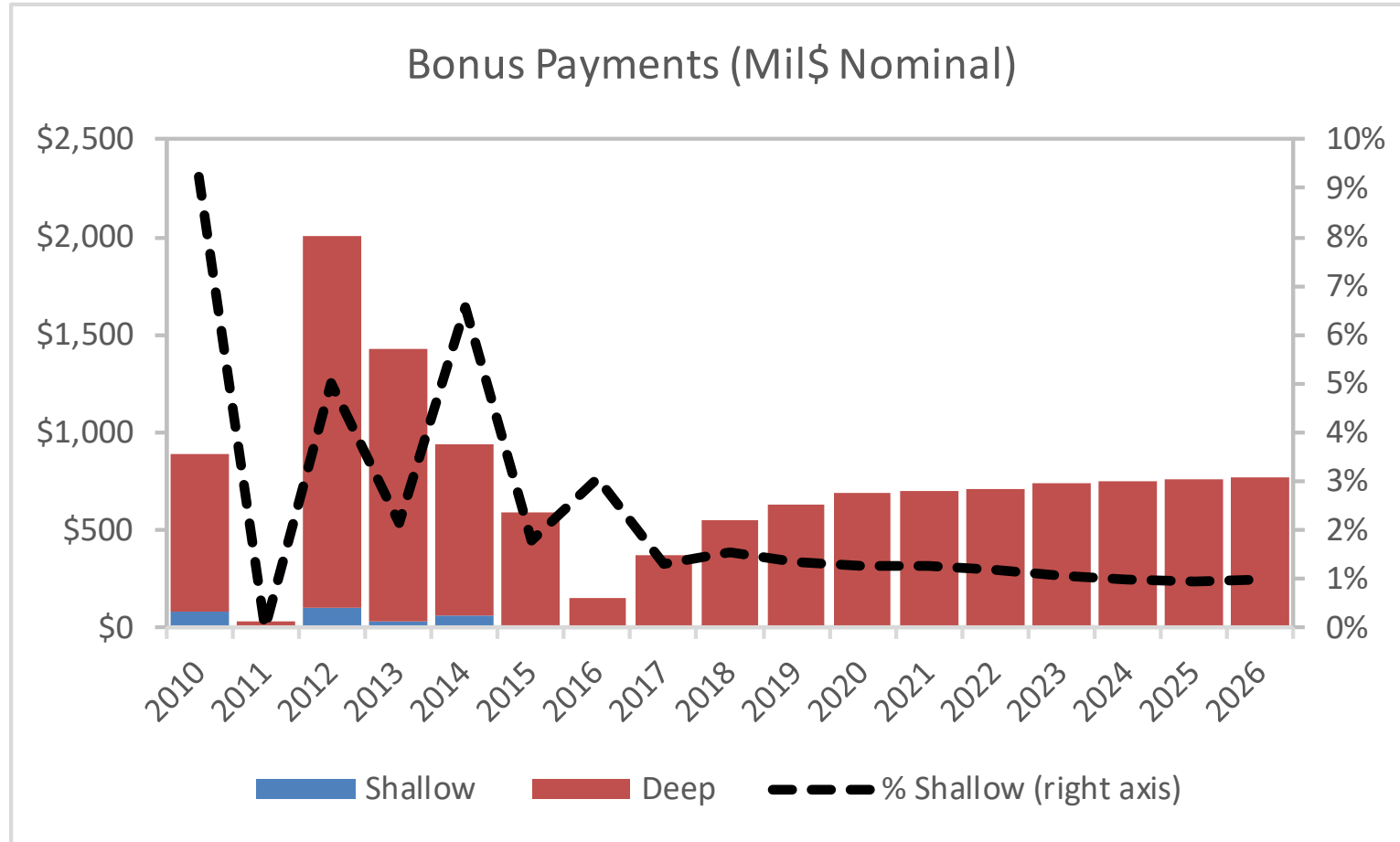
- The shallow water area accounted for 24% of the value of all Federal GoM hydrocarbons in 2010 and 15% in 2016. Based on the EIA Reference Case production volumes and prices, by 2026 the shallow water areas will account for 5% of the value of produced hydrocarbons.

Royalty (that part of the value of produced oil and gas paid to the US government as the mineral rights owner)



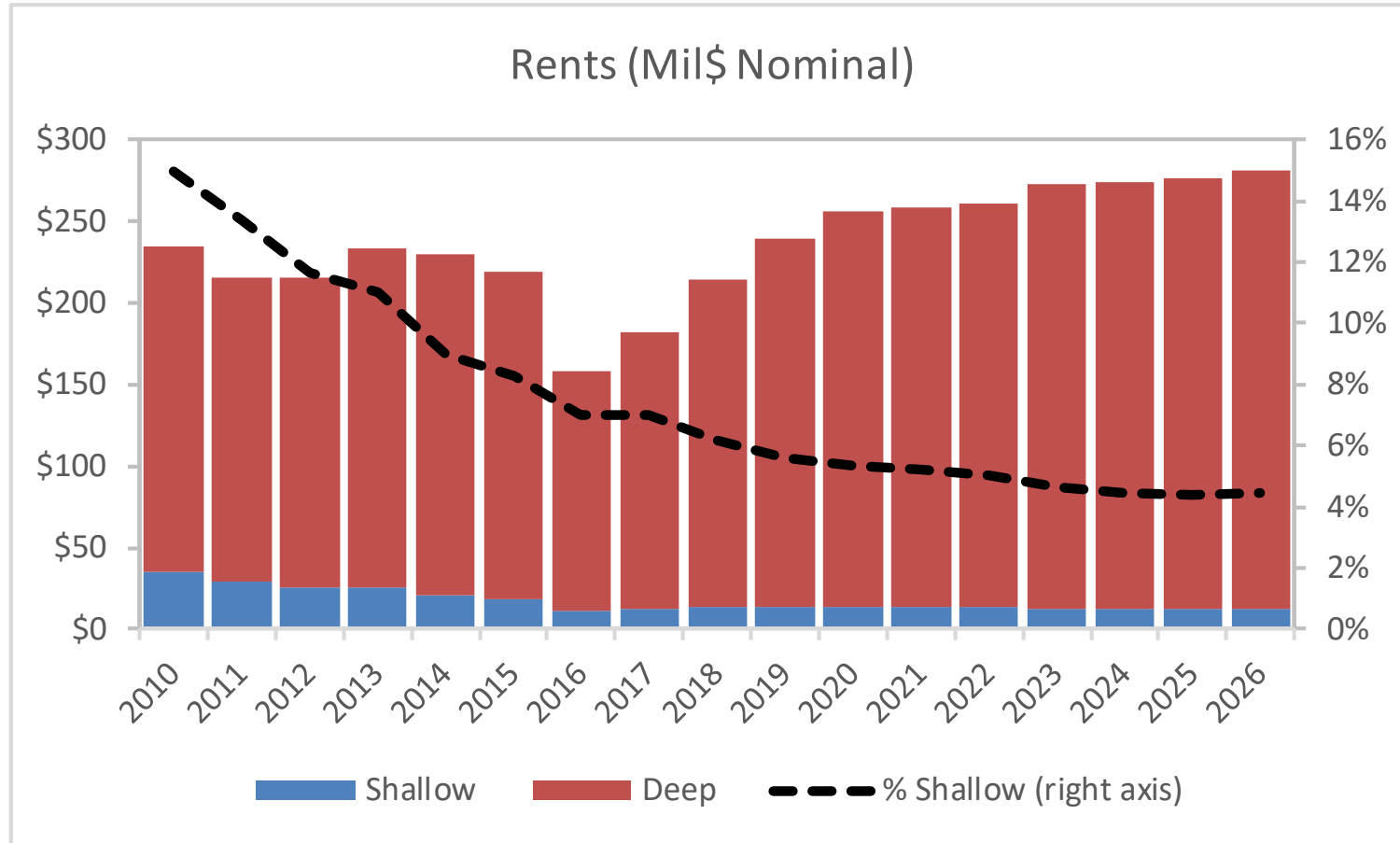
- The shallow water area accounted for 39% of all Federal GoM royalties in 2010 and 24% in 2016. Based on the EIA 2017 Reference Case, by 2026 the shallow water areas will account for 8% of royalties.

Bonus Payments (up-front payment to US government for leasing rights)



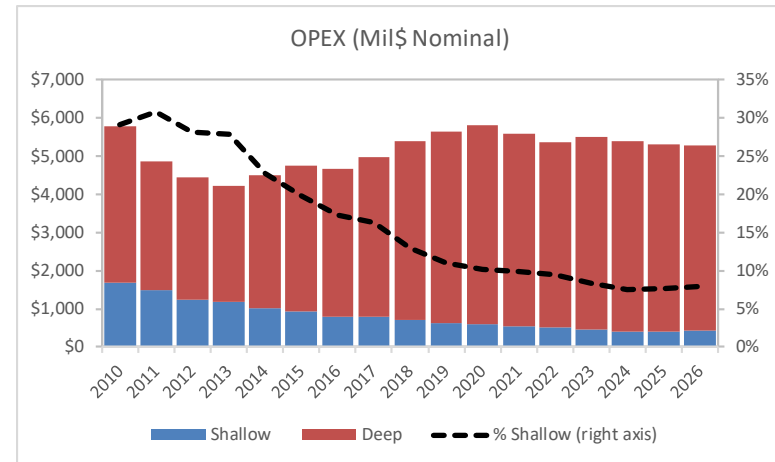
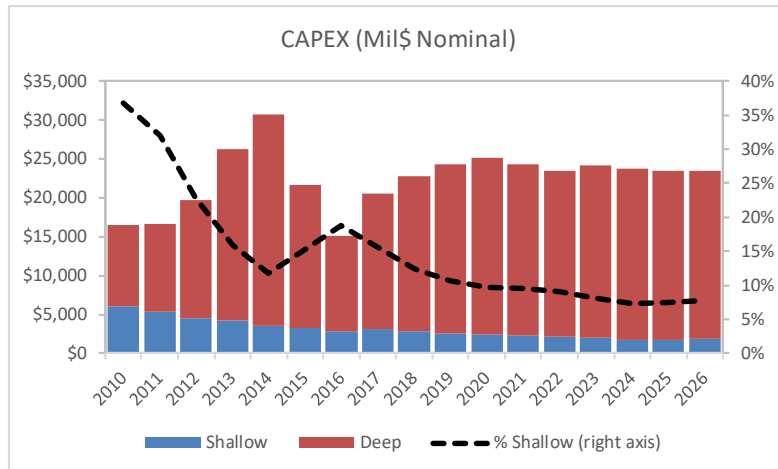
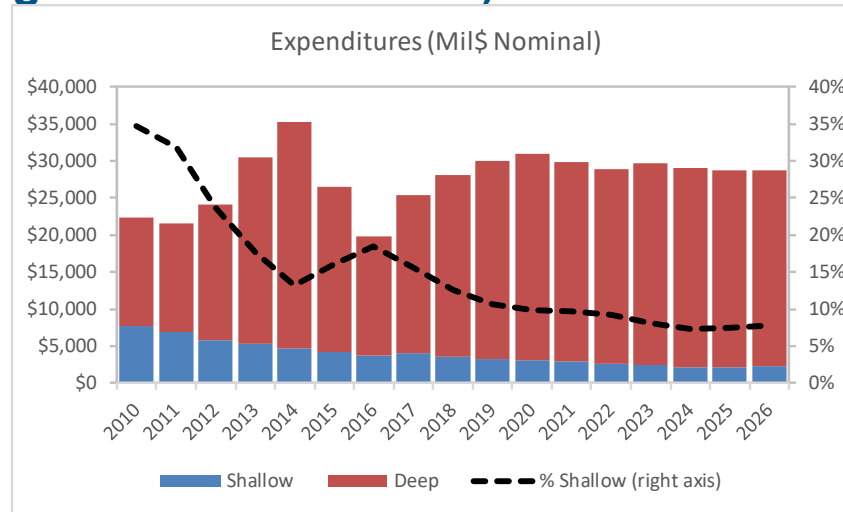
- The shallow water area accounted for 9% of all Federal GoM bonuses in 2010 and 3% in 2016. The shallow water areas are projected to account for 1% of bonuses in 2026.

Rents (annual payments to US government for leases not yet producing oil or gas)



- The shallow water area accounted for 15% of all Federal GoM rents in 2010 and 7% in 2016. In 2026, the shallow water areas are projected to account for 4% of rents based on ICF's interpretation of the EIA 2017 AEO Reference Case.

Expenditures (producers spending on wells, platforms, O&M costs, etc. but excluding bonuses and rents)



- The shallow water area accounted for 35% of all producer expenditures in 2010 and 18% in 2016. By 2026, the shallow water areas are projected to account for 8% of producer expenditures as estimated by ICF from the 2017 AEO Reference Case.

Summary Statistics for Federal GoM

	2010		2016		2025	
	Shallow Water	Deep Water	Shallow Water	Deep Water	Shallow Water	Deep Water
Expenditures (\$million/year)	\$7,764	\$14,556	\$3,665	\$16,159	\$2,147	\$26,672
<i>Expenditures (%)</i>	35%	65%	18%	82%	7%	93%
Total Government Revenue (\$million/	\$2,189	\$4,192	\$512	\$1,895	\$462	\$6,097
<i>Total Government Revenue (%)</i>	34%	66%	21%	79%	7%	93%
Production (MMboe/year)	304	677	143	628	61	698
<i>Production (%)</i>	31%	69%	19%	81%	8%	92%

Note: Government revenue is bonus plus rents plus royalties. Bonus is the upfront payment made to gain rights to a lease. Rents are annual payments made for leases that are not yet producing oil and gas. Royalties are a portion of the value of produced oil and gas paid to the owner of the mineral rights (here the US government).

- All of the measures used in this report indicate that the recent historical trends in declining importance of the shallow water area relative the growing importance for the deepwater will continue in the future according to the EIA 2017 AEO Reference Case.

Conclusions

- **The shallow GoM (up to 200 meters or 656 feet) has declined in importance relative to the deepwater area over the last several years.**
 - The shallow water area in the U.S. Gulf of Mexico is very mature having been produced for over 60 years
 - The shallow area has fallen from approximately 33% of production/spending in 2010 to under 20% in 2016.
 - In recent years, large accumulations of oil and natural gas are primarily being found in the less mature deepwater area.
 - The deepwater area has gone from 67% of production/spending in 2010 to over 80% in 2016.
- **The projection of GoM production in the 2017 AEO Reference Case suggests that this trend toward reduced activity shares from shallow water area will continue in the future.**
 - By 2025 the deepwater area will make up over 90% of the GoM production and spending.

Appendices

Field Counts and Average Size by Water Depth

Table 3. Field and Reserves Distribution by Water Depth					
Water Depth Range (Feet)	Number of Fields	Cumulative Production (MMBOE)	Reserves (MMBOE)	Original Reserves (MMBOE)	Original Reserves (MMBOE / Field)
< 500	1,082	41,331	899	42,230	39.0
500 - 999	54	1,260	33	1,293	23.9
1,000 - 1,499	26	1,388	98	1,486	57.2
1,500 - 4,999	97	6,431	1,993	8,424	86.8
5,000 - 7,499	35	1,883	1,403	3,286	93.9
>= 7,500	18	483	353	836	46.4
Totals:	1,312	52,776	4,779	57,555	43.9
source: BOEM					

Reserves by Water Depth (as of end of 2015)

Federal GoM Field Statistics as of
December 2015

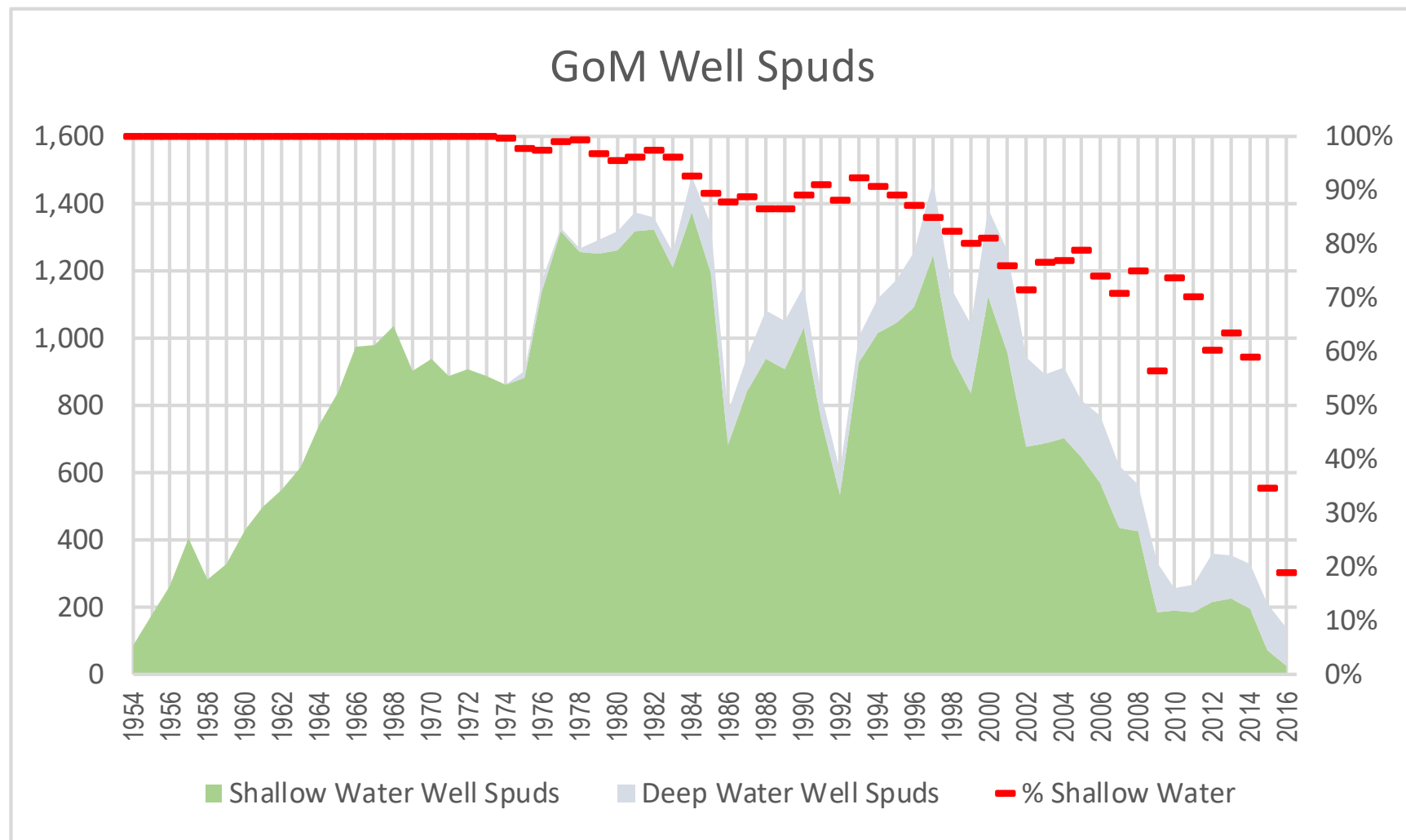
Field Count	Oil Fields	Gas Fields	Both O&G Field	Field Gas to Oil Ratio (GOR)	Original Reserves		
					Oil	Gas	BOE
				(SCF/STB)	(MMbbl)	(Bcf)	(MMbbl)
Shallow Water <200 meters	1,103	954	149	0	13,034	12,816	167,035
Deep Water >=200 meters	209	97	111	1	2,617	10,244	26,812
Federal GoM Total	1,312	1,051	260	1	8,406	23,059	193,847

Federal GoM Field Statistics as of
December 2015

Cumulative Production through 2015			Reserves			Original MMBOE/ Field
Oil	Gas	BOE	Oil	Gas	BOE	
(MMbbl)	(Bcf)	(MMbbl)	(MMbbl)	(Bcf)	(MMbbl)	
12,435	164,055	41,628	381	2,981	913	
7,145	22,500	11,149	3,099	4,311	3,866	
19,579	186,555	52,777	3,480	7,292	4,779	

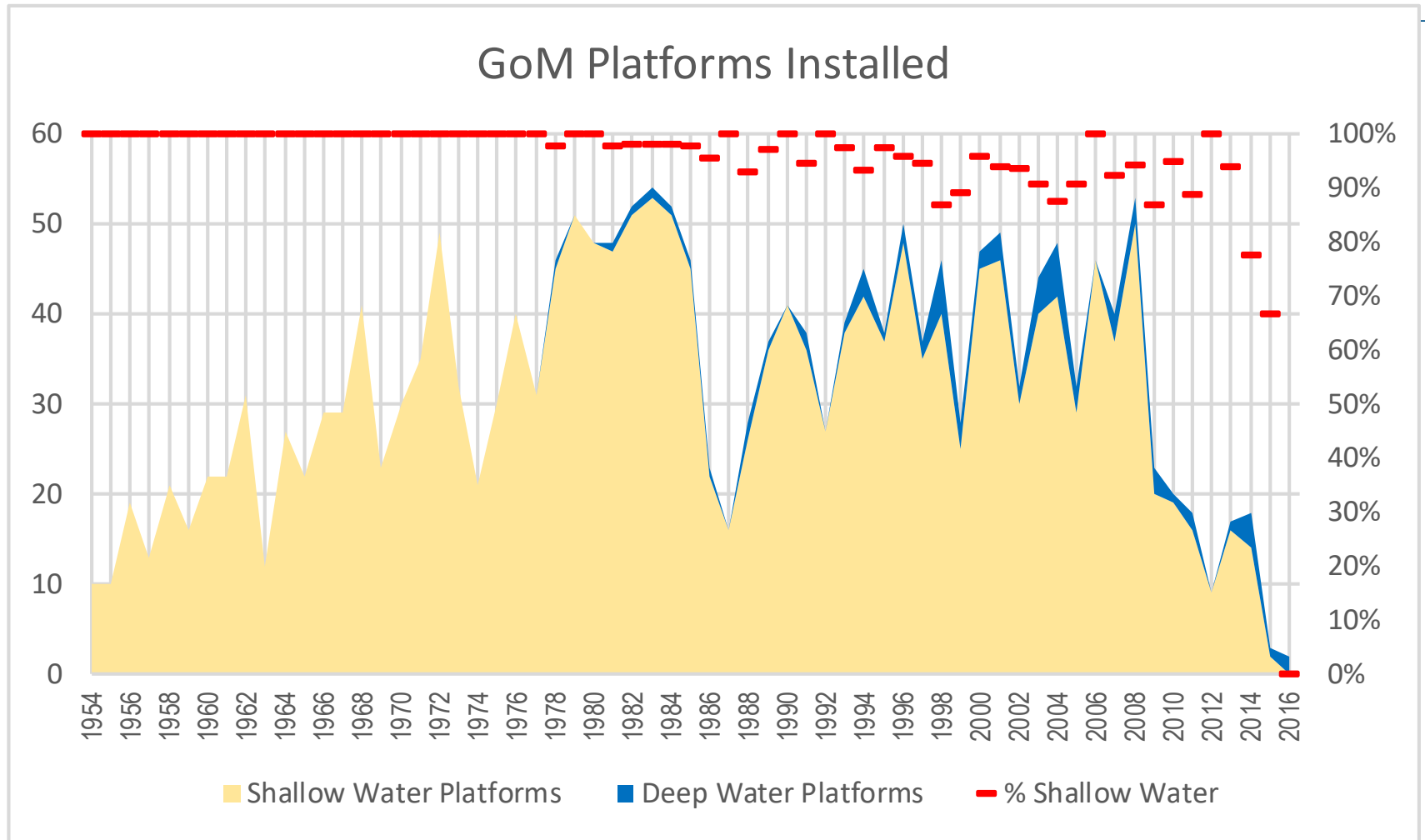
Source ICF compilation of BOEM field-level data.

Wells Spudded by Year and Water Depth



Source: BOEM databases for Federal waters. Includes both new boreholes and sidetracks.

New Platforms Installed by Year and Water Depth



Source: BOEM databases for Federal waters.

Platforms Removed Each Year

Platforms Removed Each Year

	2010	2011	2012	2013	2014	2015	2016
Shallow Water	219	294	286	223	201	128	199
Deep Water	1				2		1
Total	220	294	286	223	203	128	200

Note: in 2016 there were 2,415 operating platforms in shallow water and 68 in deep water.

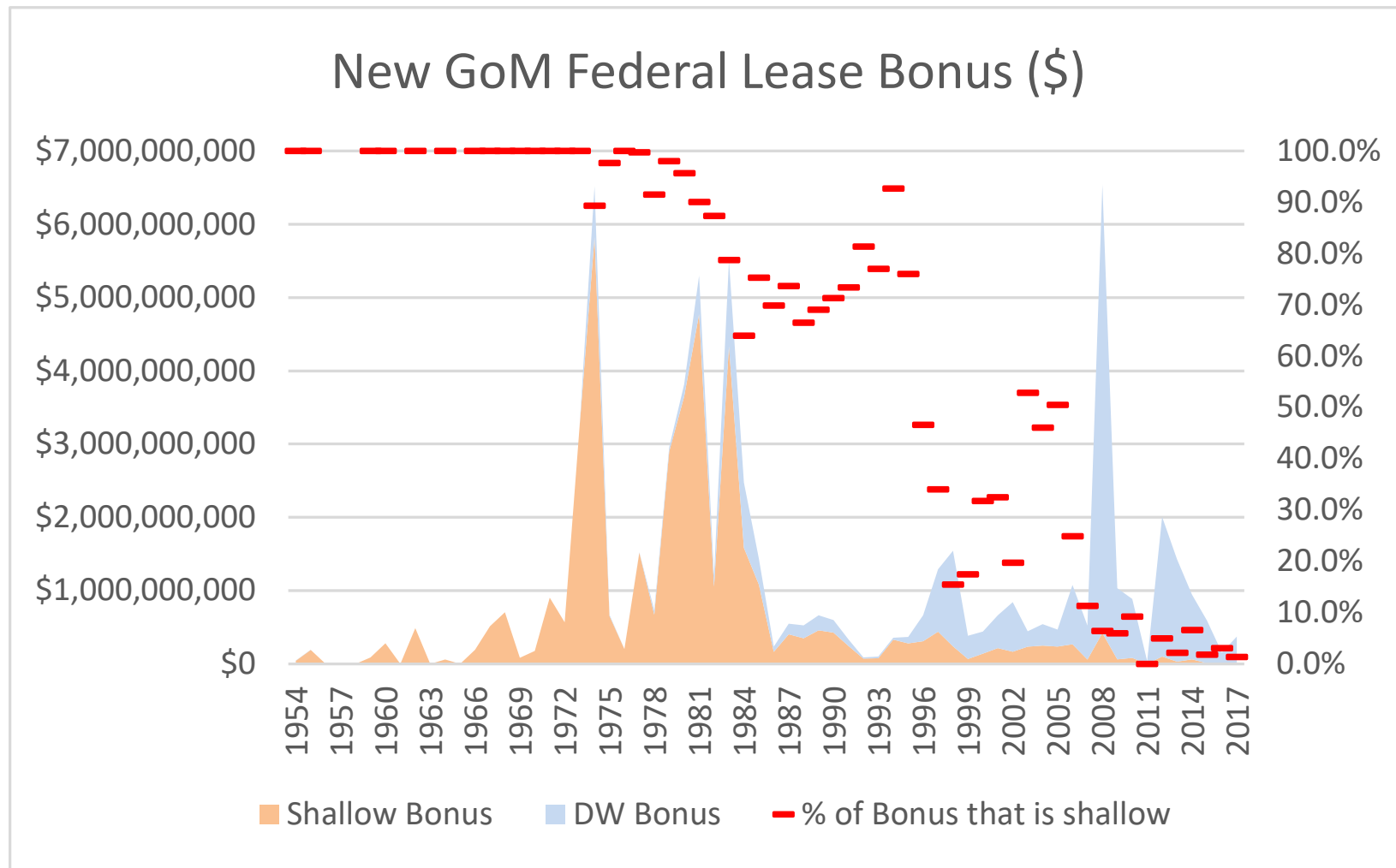
Source: BOEM database for Federal waters.

Operating Platforms in 2016

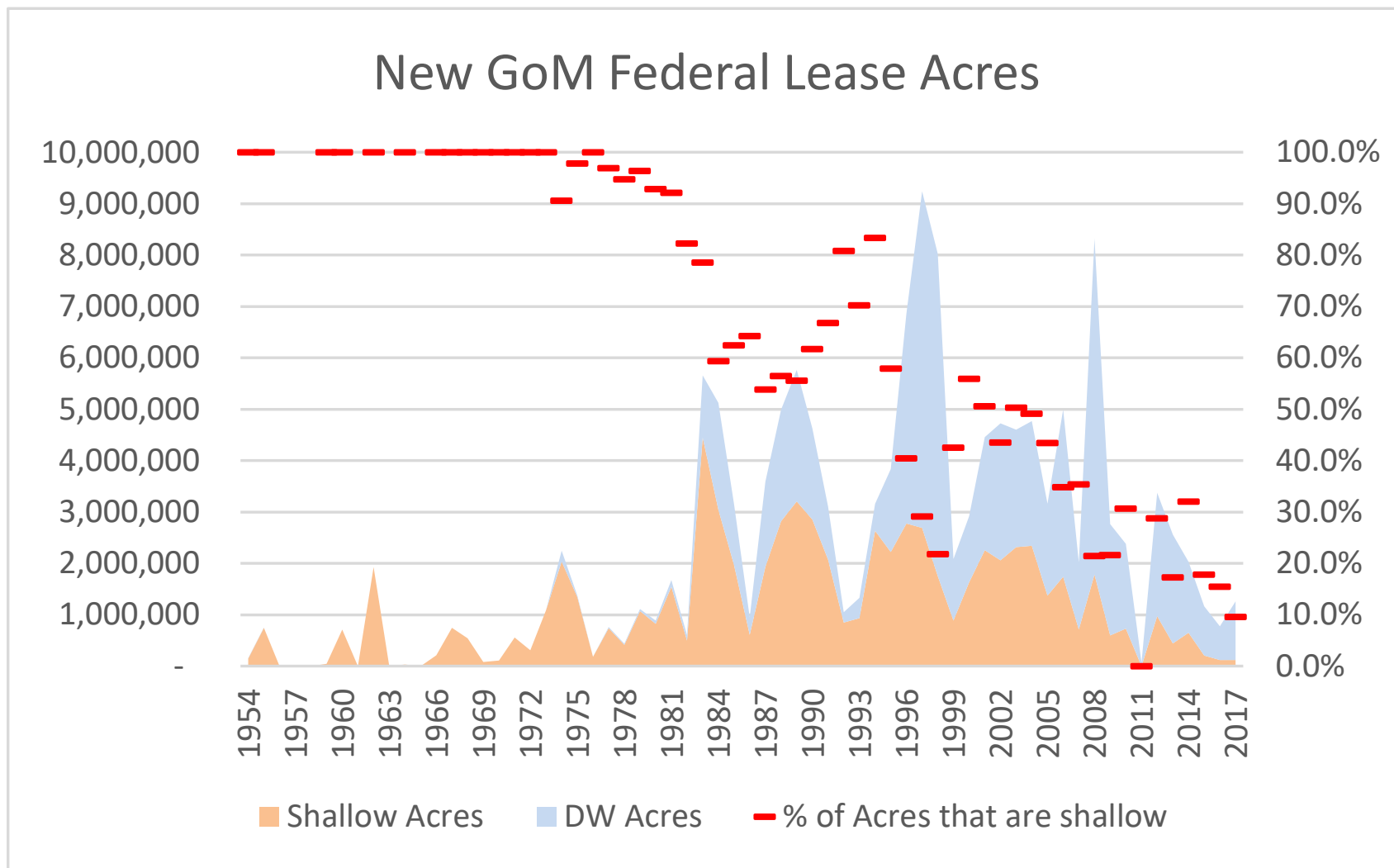
Shallow	(CAIS) Caisson platform (hollow tube, or braced hollow tube)	693
Shallow	(FIXED) Fixed platform (tower)	1,482
Shallow	(WP) Well Protector Platform (similar to small fixed towers or braced caissons)	240
Shallow	--- All Structures	2,415
Deep Water	(CT) Complaint Tower (thin tower that can bend)	3
Deep Water	(FIXED) Fixed platform (tower)	20
Deep Water	(FPSO) Floating Production Storage and Offloading (a moored ship)	1
Deep Water	(MOPU) Mobile offshore production unit	1
Deep Water	(MTLP) Mini TLP	4
Deep Water	(SEMI) Semisubmersible platform	10
Deep Water	(SPAR) Floating Production Platform (SPAR type)	17
Deep Water	(TLP) Tension Leg Platform	12
Deep Water	--- All Structures	68

Source: BOEM database.

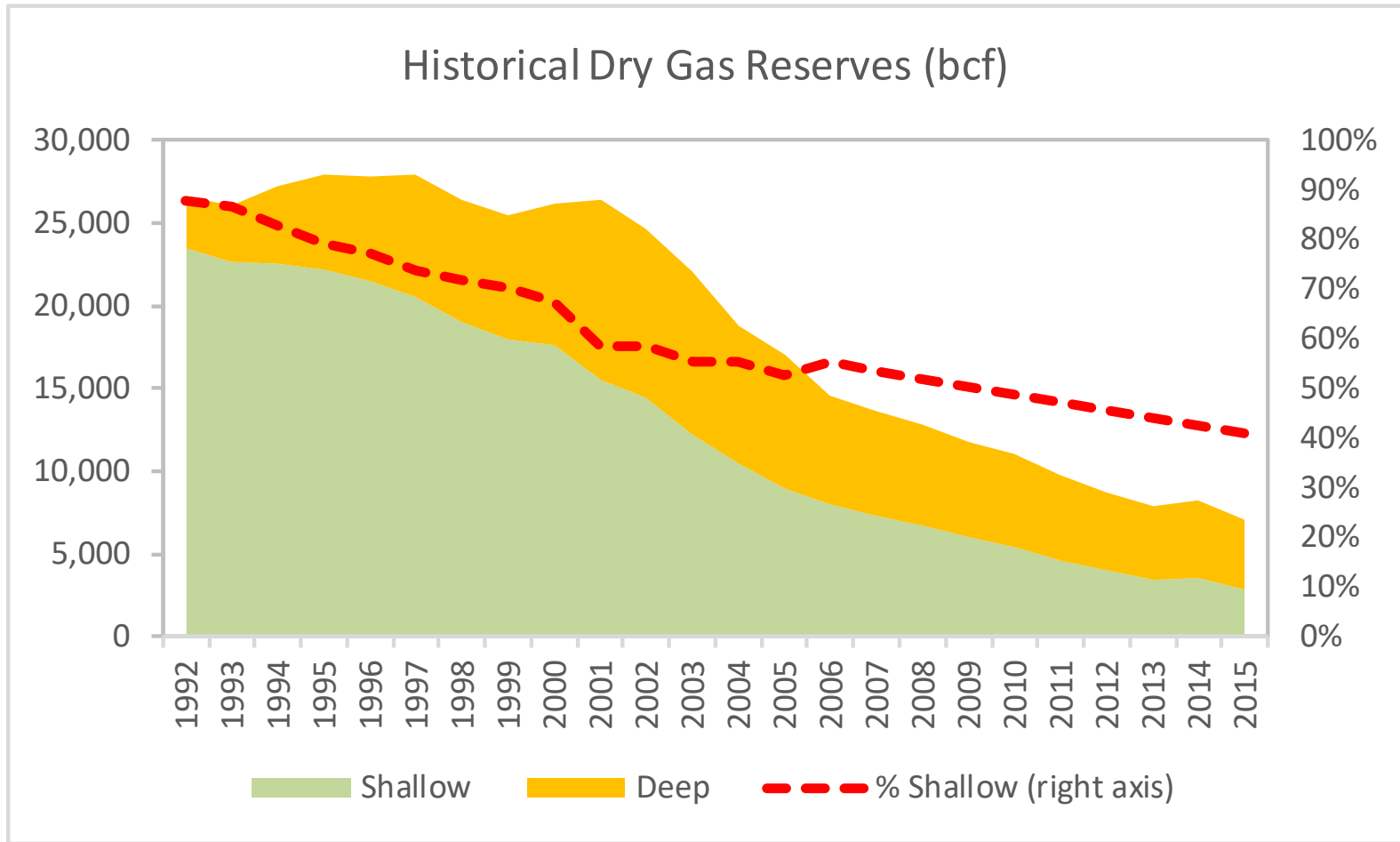
Historical Bonus Data



Historical Newly Leased Acres

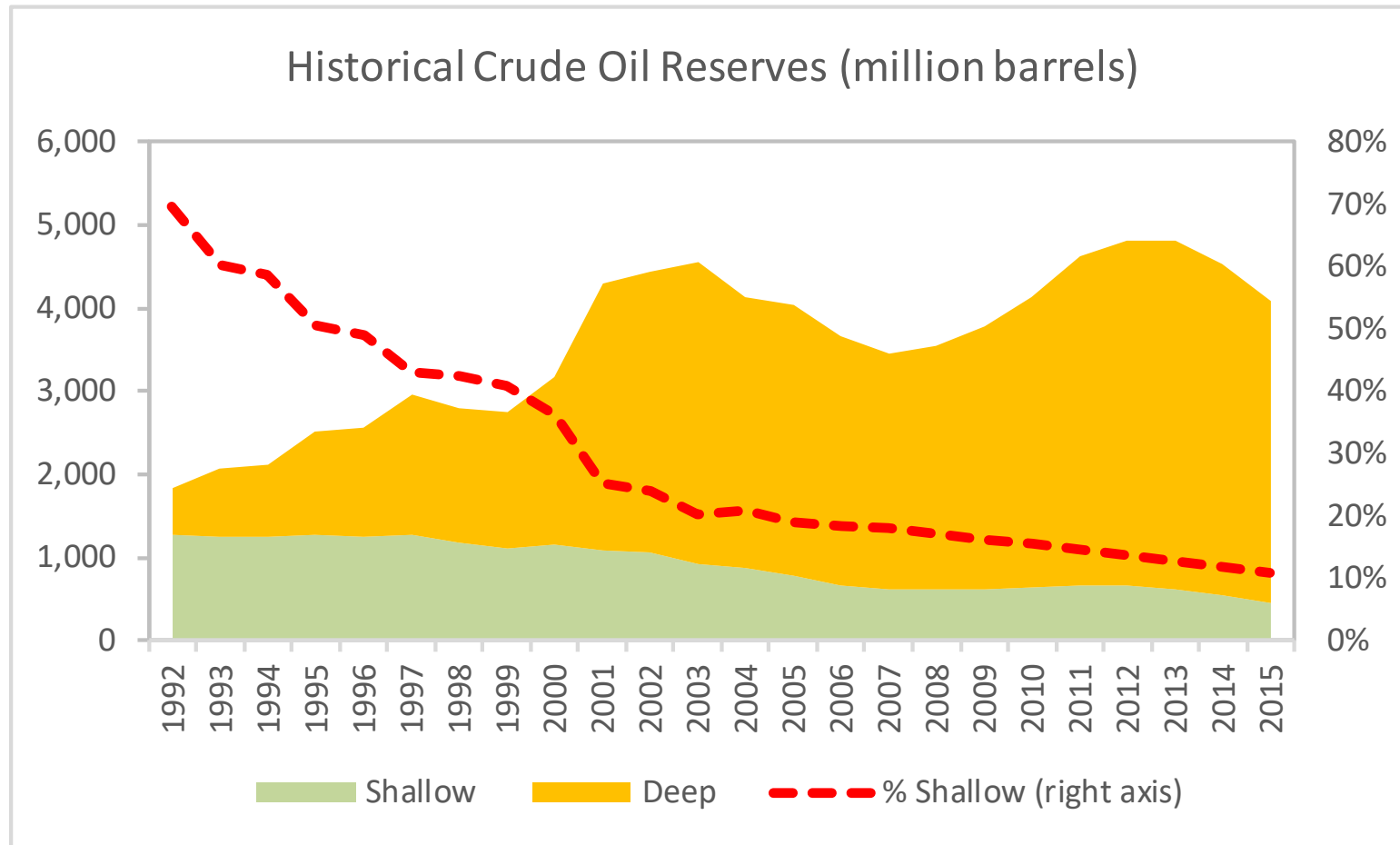


Historical EIA Dry Gas Reserves for Federal GoM



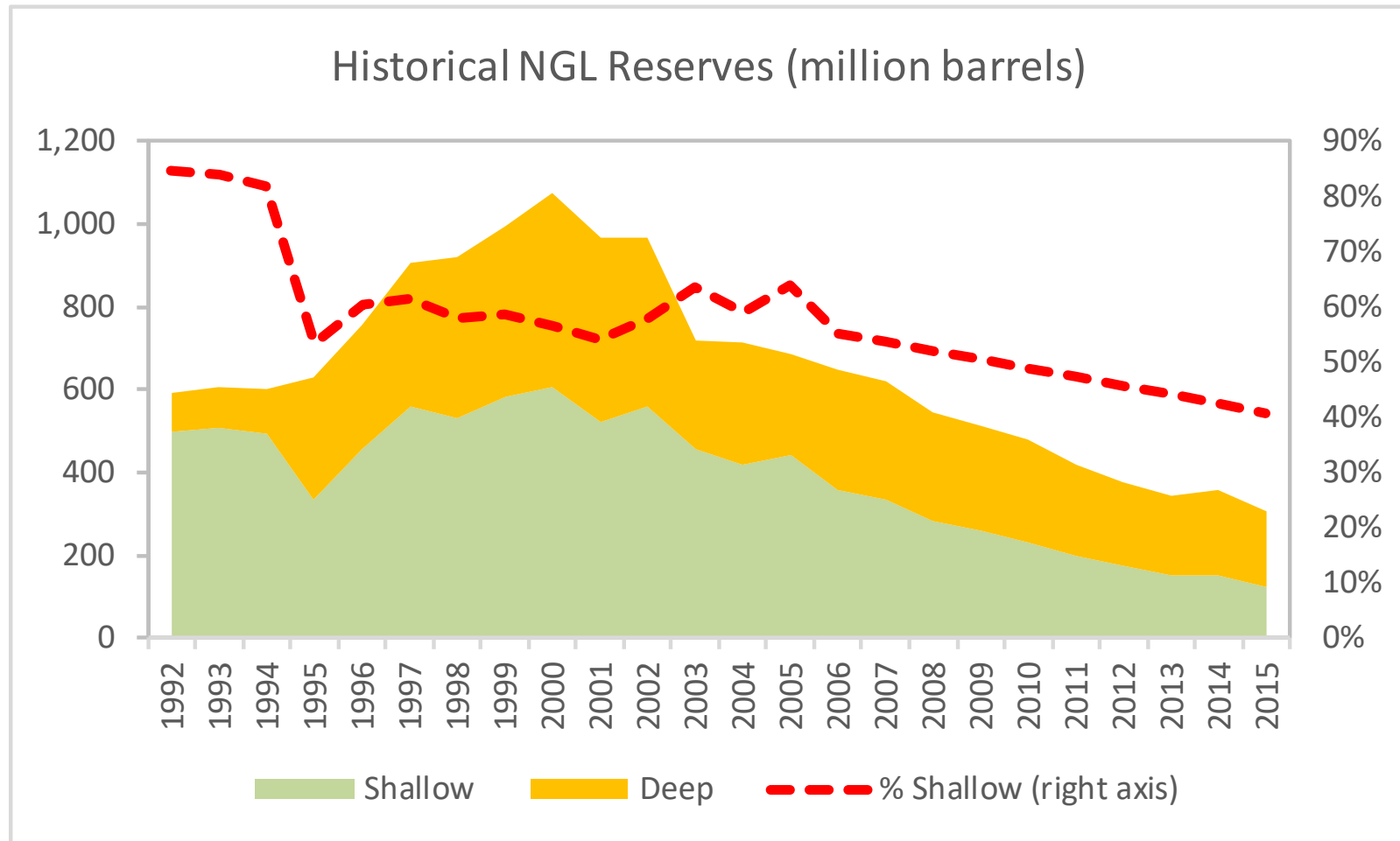
Data on proven reserves on this chart are from EIA Form 23, which included breakdown by water depth from 1992 through the year 2006. Breakdown by water depth for later years are ICF estimates made using BOEM reserve data, which differ from reserve estimates made by EIA.

Historical EIA Crude Oil Reserves for Federal GoM



Data on proven reserves on this chart are from EIA Form 23, which included breakdown by water depth from 1992 through the year 2007. Breakdown by water depth for later years are ICF estimates made using BOEM reserve data, which differ from reserve estimates made by EIA.

Historical EIA NGL Reserves for Federal GoM



Data on proven reserves on this chart are from EIA Form 23, which included breakdown by water depth from 1992 through the year 2006. Breakdown by water depth for later years are ICF estimates made using BOEM reserve data, which differ from reserve estimates made by EIA.

Gulf of Mexico Lease Terms¹ & Royalty Relief²

Timeline	Apr 1996	Mar 2001	Mar 2002	Mar 2003	Aug 2005	May 2007	Aug 2007	Mar 2008	Mar 2010	Aug 2010	May 2013	Aug 2017
Shallow Water (0 – 399m)												
5 year initial period ³												
Royalty Rate: 16 ² / ₃ %												
18 ³ / ₄ %												
0 – 199 m - 12 ¹ / ₂ % 200-399 m - 18 ³ / ₄ %												
Royalty Suspension Volumes (RSVs) per Lease: MMBOE = million barrels oil equiv, Bcf = billion cubic ft, Bcfe = billion cubic ft of gas equiv												
Water Depth												
200 m (656 ft) 17.5 MMBOE												
400 m (1,312 ft)												
Well Depth (TVD subsea)												
15,000 ft												
18,000 ft												
20,000 ft												
20 Bcf ⁴												
15 Bcf ^{5,6,7} – Also applies to pre-2001 leases												
25 Bcf ^{4,5,6,7} (with 2 or 5 Bcfe supplement for up to 2 unsuccessful wells)												
35 Bcf ^{5,8} – Also applies to pre-2001 leases												
Deep Water (>=400m)												
400 - 799m – 8 year initial period ⁹ >=800m – 10 year initial period												
400 - 799m – “5 + 3” year initial period ¹⁰ 800 - 1599m – “7 + 3” year initial period ¹¹ >=1600m – 10 year initial period												
Royalty Rate: 12 ¹ / ₂ %												
16 ² / ₃ %												
18 ³ / ₄ %												
Royalty Suspension Volumes (RSVs) per Lease: MMBOE = million barrels of oil equiv												
Water Depth												
400 m (1,312 ft) 52.5 MMBOE												
800 m (2,624 ft) 5.0 MMBOE ⁵												
1600 m (5,248 ft) 9.0 MMBOE ⁵												
2000 m (6,560 ft) 87.5 MMBOE												
12.0 MMBOE ⁵												
16.0 MMBOE ⁵												

***Footnotes:**

- For minimum bid and rental rates over time see http://boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/Fair_Market_Value/GOMLeaseTermHistory.xls
- For Gulf of Mexico leases wholly west of 87 degrees, 30 minutes West longitude where royalty relief before production starts is authorized by the DWRRA Sec.302. See regulations 30 CFR260.112-116, 260.120-124, 203.40-49, 203.30-36.
- 5-year initial period extended for 3 years after 25,000-foot well with escalation of rentals beginning in August 2007.
- 20 Bcf or leases can opt for incentives for pre-2001 leases.
- Subject to price thresholds ([http://boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/Price_Thresholds/CurrentPT\(12\).pdf](http://boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Energy_Economics/Price_Thresholds/CurrentPT(12).pdf)) specified in lease term or regulations.
- For wells spud on or after March 26, 2003 and producing before May 3, 2009 on leases in 0-200m water or on or after May 18, 2007 and producing before May 3, 2013 in 200-400 m water on leases with no deepwater royalty relief.
- Sidetrack wells producing by May 2009 in 0-200 water or May 2013 in 200-400m water qualify for RSV based on length of sidetrack. Ultra-deep sidetracks at least 20,000 ft long qualify for full RSV.
- Authorized by Sec. 344 of EPCA05, Final Rule AD33 limits relief to wells spud on or after May 18, 2007 on leases with no deep wells nor deepwater royalty relief in 0-400m water.
- For lease with an 8-year term, spudding a well is required within the first 5 years of the 8-year term initial period to avoid lease cancellation.
- For lease with a “5+3” year term, spudding a well within the first 5 years prolongs the initial period by 3 years.
- For lease with a “7+3” year term, spudding a well within the first 7 years prolongs the initial period by 3 years.