The Economic Impacts of Changes to Vessel Crewing Requirements on the Offshore Energy Industry

Prepared By

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Key Findings

The offshore energy industry is a major (and growing) contributor to domestic energy production. Both offshore oil and natural gas and offshore wind are projected to play a major role in meeting our energy needs over the coming decades. A wide variety of specialized vessels are required for offshore energy project development and operations. Changing the crewing requirements for these vessels, many of which are foreign flagged would significantly reduce vessel availability due to the lack of qualified American and vessel flag nation marine, support, and operations personnel. This change would drastically reduce vessel availability, especially for the specialized drilling and construction vessels required for offshore energy development. A drastic reduction in these vessels' availability would likely have a severe impact on offshore energy development activity. This reduction in development activity is projected to lead to reduced industry spending, supported employment and GDP, government revenues, oil and natural gas production, and electrical generation capacity. (Table 1)

Table 1: Key Findings

		Policy Case Impacts		
Economic Impact	**Base Case Average (2022-2030)**	**Maximum Year Impact**	**Average Impact (2022-2030)**	**Cumulative Impact (2022-2030)**
Capital Investment and Spending ($ Billions)	$41.3	-$23.3 (2026)	-$15.2	-$137.1
Employment (Jobs)	438,332	-200,946 (2026)	-137,432	N/A
Contributions to GDP ($ Billions)	$36.2	-$18.5 (2026)	-$12.6	-$113.4
Government Revenues ($ Billions)	$12.2	-$4.6 (2029)	-$1.4	-$23.9
Oil and Natural Gas Production (MMBOED)	2.62	-1.00 (2030)	-0.60	-2 Billion Barrels
Offshore Wind Generation Capacity (MW)	6,727	-8,587 (2030)	-2,654	N/A

Source: Energy and Industrial Advisory Partners

Executive Summary

Introduction

American consumers continue to face rising energy prices, illustrating the importance of domestic energy production, of which offshore energy production is an important part. Offshore oil and natural gas production is a significant source of employment, gross domestic product, and government revenues. As the offshore wind energy industry grows, it will also begin to support significant employment, gross domestic product, and government revenues.

Language focused on the crewing of installation vessels was included in an amendment (Graves Amendment) to the 2022 Coast Guard Authorization Act (Coast Guard Authorization Act of 2022, H.R. 6865, 117th Congress (2022)), which passed in the U.S. House of Representatives on March 29, 2022. This language, if ultimately implemented, attempts to amend crewing requirements for foreign-owned vessels and terminate all existing exemptions under section 30(c)(2) of the Outer Continental Shelf Lands Act (43 U.S.C. 8 1356(c)(2)) issued before the date of the enactment of this Act. The proposed language attempts to change long-standing rules related to the crewing of vessels operating in support of the U.S.'s offshore energy industry. Offshore energy exploration, development, and operations require a large and varied fleet of vessels. These vessels range from seismic vessels (which identify potential oil and natural gas deposits and study location's suitability for offshore wind farms) to drilling rigs to various installation vessels (such as pipe and cable lay vessels, heavy lift vessels, and multipurpose support vessels). Specialized vessels which support operations, such as offshore support and intervention vessels, are also required. While US mariners crew the vast majority of vessels which support the offshore energy industry, some specialist vessels which typically travel, and work internationally are sometimes crewed with mixed or predominately foreign crews. Rapidly changing long-standing crewing requirements would immediately and significantly reduce the availability of vessels required for offshore energy development and operations. Additionally, the industry's ability to adapt to these proposed changes would be hindered by overall conditions in the employment market and specific sector trends in marine and offshore energy worker availability. These changes would likely fundamentally impact and greatly diminish the development of offshore oil and natural gas and offshore wind projects on the U.S. Outer Continental Shelf (OCS). This impact would be projected to have long-term implications for the offshore energy vessel market. For example, a reduction in operating projects will reduce demand for support vessels and the predominantly U.S. crews that man them.

For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel crewing requirements for offshore oil and gas, wind, and carbon capture and storage (the Base Case), and a scenario examining the potential impacts of implementation of the Graves Amendment and the subsequent reduction in the availability of vessels used in the development and operation of offshore energy projects on these offshore energy activities. (The Policy Case). To develop the policy case, each year, vessel requirements based on activity levels were compared to the projected available crew by crew type and the crewing requirements for each vessel type. Based

on the projected available number of crew, and the year's vessel requirements, an estimate of available vessels by vessel type was then calculated.

Energy and Industrial Advisory Partners (EIAP) was commissioned by The American Petroleum Institute (API) to develop a report forecasting activity levels, spending, oil and natural gas production, supported employment, GDP, and Government Revenues in these scenarios. The scenarios developed in this report are based solely upon government and other publicly available data and EIAP's expertise and analysis.

The Economic Impacts of the Offshore Energy Industry

The OCS offshore energy industry supports significant national employment, gross domestic product, and state and Federal Government revenues. To quantify the potential effects of a change in offshore energy vessel crewing requirements, this study forecasted a Base Case activity level for U.S. offshore oil and natural gas, wind, and carbon capture and storage (CCS) activity to provide a basis of comparison with potential activity levels and economic impacts if changes in the crewing requirements for offshore energy vessels were implemented. The study forecasted key activity indicators, including the number of projects executed, oil and natural gas production and electricity generation capacity, and spending based on projected activity levels. These activity and spending forecasts drive the projected employment, GDP, and government revenue forecasts presented in this report.

- In 2022, OCS oil and natural gas production is projected to be nearly 2.3 million barrels of oil equivalent per day. Oil and natural gas production from the federal OCS is projected to average around 2.6 million barrels of oil equivalent per day over the 2022 to 2030 forecast period. In 2030 at the end of the forecast period, oil and natural gas production is projected to be slightly over 2.8 million barrels of oil equivalent per day. By the end of 2022, installed offshore wind capacity is projected to be 39 megawatts. By 2030 installed capacity is projected at 21,279 megawatts.
- In 2022, OCS oil and natural gas industry spending is projected at just under $29.9 billion. OCS offshore oil and natural gas industry spending is projected at just under $32.6 billion per year on average over the 2022 to 2030 forecast period. 2022 offshore wind industry spending is projected to be around $683 million. Across the 2022-2030 forecast period, average annual offshore wind spending is projected at just over $8.7 billion.
- In 2022, the offshore energy industry is projected to support an estimated 367 thousand jobs in the United States, compared to just over 394 thousand jobs on average across the 2022-2030 forecast period.
- In 2022, the OCS offshore energy industry is projected to support an estimated $30.4 billion of U.S. gross domestic product. The industry is projected to contribute an average of about $33.3 billion of GDP per year over the 2022 to 2030 forecast period.
- In 2022, government revenues due to the offshore energy industry are projected to reach nearly $8.8 billion. Government revenues derived from energy activities in the OCS (excluding personal and corporate income taxes and property taxes) are projected to average just over $7.6 billion per year over the 2022 to 2030 forecast period.

- The OCS oil-producing states are projected to receive $375 million of revenues due to revenue sharing under GOMESA in 2022, which is consistent across the forecast period. The Land and Water Conservation Fund (LWCF) is projected to receive just over $1.6 billion in distributions. Contributions to the LWCF from GOMESA and non-GOMESA offshore sources are projected to average just over $1.4 billion annually across the 2022-2030 forecast period.

Impact of Reduced Offshore Energy Vessel Availability

Terminating all existing exemptions under section 30(c)(2) of the Outer Continental Shelf Lands Act (43 U.S.C. 8 1356(c)(2)) and adding crewing requirements described in the Graves Amendment would likely drastically reduce the availability of the vessels required to explore for, develop, and operate offshore energy projects. This change would likely have a severely negative immediate impact on OCS oil and natural gas and wind project development, spending, supported employment and GDP, and government revenues. For the purposes of this report, a "Policy Case" was developed to compare activity levels (project executions, spending, oil and natural gas production, installed electrical generation capacity), economic impacts, and government revenues to the Base Case scenario. This scenario assumes that the Graves Amendment is implemented as intended and that the vessel crewing requirements proposed in the Amendment are implemented beginning in 2023. This study assumes that no other major policy or regulatory changes impacting the OCS offshore oil and natural gas, and wind industries would be enacted.

- In the Policy Case, in 2023, offshore energy vessel availability is projected at 595 total vessels compared to 707 in the Base Case, an around 16 percent reduction. If the proposed language is adopted and implemented as intended, the availably of several critical vessel categories would be reduced to zero, including drilling rigs, heavy lift vessels, pipe and cable lay vessels, and wind installation vessels. Average vessel availability across the 2022-2030 forecast period is projected at around 600 vessels, compared to around 735 in the Base Case. This includes a reduction in U.S. flagged supply vessels due to anticipated reduced demand due to fewer operating offshore energy projects as a result of reduced vessel availability in previous years.
- In the Policy Case, average combined oil and natural gas production across the forecast period is projected to decline from around 2.6 million barrels of oil equivalent per day to slightly above 2 million barrels of oil equivalent per day (about a 23 percent decline). In 2030, at the end of the forecast period, combined oil and natural gas production is projected to be around 1 million barrels of oil equivalent per day, lower than the Base Case. The average installed offshore wind capacity is projected to decline from 6,727 megawatts on average across the forecast period to 4,072 megawatts. At the end of the forecast period in 2030, installed offshore wind capacity is projected at around 12,700 megawatts in the policy case, compared to 21,279 megawatts in the Base Case.
- In the Policy Case, OCS oil and natural gas industry spending is projected to decline to just under $21.9 billion on average compared to just under $32.6 billion in the Base Case, a 33 percent reduction. In 2023, spending is projected to be reduced by approximately $11.4 billion, a 29

percent reduction. Offshore wind industry spending is projected to decline from just over $8.7 billion to nearly $4.2 billion on average across the forecast period, a 52 percent reduction. In the Policy Case, average employment supported by the offshore energy industry is projected to decline to just above 279 thousand jobs nationally compared to about 394 thousand jobs each year in the Base Case, a 29 percent decline. In the Policy Case, average yearly contributions to GDP by the offshore energy industry are projected at just over $23 billion, around a 31 percent reduction compared to around $33.3 billion in the Base Case.

- In the Policy Case, government revenues due to the offshore energy industry are projected to average around $5.9 billion annually, a 22 percent reduction from the $7.6 billion per year projected in the Base Case.
- Contributions to the Land and Water Conservation Fund (LWCF) are projected to average around $1.1 billion per year, compared to just above $1.4 billion per year in the base case over the forecast period.

Study Limitations

Given the large degree of volatility and uncertainty in energy markets and the global economy, the assumptions and forecasts contained in this report are based on reasonable readings of conditions when this report was developed. Uncertainty around commodity pricing and global economic conditions may significantly affect the forecast contained in this report. EIAP makes no representations as to the impacts of the potential policy environment addressed in this report. These and other policies could impose significantly greater engineering, operational, cost, and other burdens on the energy industry and regulators. The report's projections of the effects of this potential scenario on engineering, operations, and costs are an independent, good faith view derived from reasonable assumptions based on these potential scenarios and the authors' expertise and experience. Energy and Industrial Advisory Partners provided this independent study while expressly disclaiming any warranty, liability, or responsibility for the completeness, accuracy, use, or fitness to any person or party for any reason.

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Introduction

Purpose of the Report

American consumers continue to face rising energy prices, illustrating the importance of domestic energy production, of which offshore energy production is an important part. Offshore oil and natural gas production is a significant source of employment, gross domestic product, and government revenues. As the offshore wind energy industry grows, it will also begin to support significant employment, gross domestic product, and government revenues.

Language focused on the crewing installation vessels has been adopted in the House of Representatives to amend crewing requirements for foreign-owned vessels and terminate all existing exemptions under section 30(c)(2) of the Outer Continental Shelf Lands Act (43 U.S.C. 8 1356(c)(2)) issued before the date of the enactment of this Act. The proposed language, if implemented, would change long-standing rules related to the crewing of vessels operating in support of the U.S.'s offshore energy industry. Offshore energy exploration, development, and operations require a large and varied fleet of vessels ranging from seismic vessels (which identify potential oil and natural gas deposits and study locations suitability for offshore wind farms), to drilling rigs, to a variety of installation vessels (such as pipe and cable lay vessels, heavy lifts vessels, and multipurpose support vessels), to vessels which support operations such as offshore support and intervention vessels. While US mariners crew the vast majority of vessels which support the offshore energy industry, some specialist vessels which typically travel and work internationally to are sometimes crewed with mixed or predominately foreign crews. These changes would likely fundamentally impact and greatly diminish the development of offshore oil and natural gas and offshore wind projects on the U.S. Outer Continental Shelf (OCS). Rapidly changing long-standing crewing requirements would immediately and significantly reduce the availability of vessels required for offshore energy development and operations. Additionally, the industry's ability to adapt to these proposed changes would be significantly hindered by overall conditions in the employment market and specific sector trends in marine and offshore energy worker availability.

For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel crewing requirements for offshore oil and gas, wind, and carbon capture and storage (the Base Case), and a scenario examining the potential impacts of implementation of the Graves Amendment and the subsequent reduction in the availability of vessels used in the development and operation of offshore energy projects on these offshore energy activities. (The Policy Case).

Energy and Industrial Advisory Partners (EIAP) was commissioned by The American Petroleum Institute (API) to develop a report forecasting activity levels, spending, oil and natural gas production, supported employment, GDP, and Government Revenues in these scenarios. The scenarios developed in this report are based solely upon government and other publicly available data and EIAP's expertise and analysis.

Report Structure

In this report, EIAP first outlines the study's methodology, including data development, the limitations of this study, and how the two scenarios in this report were developed. The following section discusses activity levels and the economic impacts of the OCS offshore oil and natural gas industry. The following section discusses activity levels and the economic impacts of the offshore wind industry. The next section outlines the potential impacts of the second scenario developed for the report, the Policy Case on the OCS oil and natural gas industry. The following section outlines the potential impacts of the second scenario developed for the report, the Policy Case on the offshore wind industry. The final section concludes. The study also includes appendices including a more detailed explanation of the report's methodology and data tables of the report's findings.

Excluded from Study

This paper has been limited in scope to assessing the potential impacts of the two scenarios developed for the report. Additional changes to regulations or policies outside of the changes assessed in this report would likely have a more significant effect than the impacts laid out in this report. The study also excludes potential domestic supply chain reductions due to reduced activity levels which could lead to reductions in the domestic economic impacts of the offshore energy industry by, for example, reducing the growth of local content used in the offshore wind industry. The impacts projected in this report would likely be more significant if these potential supply chain changes were included. This study also does not attempt to calculate the effects of these changes on the downstream oil and natural gas industry, potential purchasers of offshore wind energy, or subsequent impacts on other industries (for example, due to reduced energy production) other than the impacts directly due to reduced activity in the offshore energy sector.

Additionally, the projected government revenue impacts do not account for personal income taxes, corporate income taxes, or local property taxes. Due to the exclusion of these impacts, the economic impacts presented in this study likely represent conservative projections of the potential impacts of the scenarios developed. Additionally, the impacts presented could be imprecise by as much as 10% or more due to the impacts of the studied scenarios and other factors.

About EIAP

Energy & Industrial Advisory Partners (EIAP) was founded to provide companies and their management teams, investors, and industry associations across the energy and industrial markets with economic and strategic consulting and M&A advisory services from seasoned advisors with significant industry experience. EIAP is a specialist M&A advisory and consulting firm that utilizes its deep industry experience and rigorous analytical methodologies to help stakeholders gain the insights they require to make more informed, data-driven decisions. For more information, please visit **eiapartners.com**

Methodology

Data Development

As part of the development of this report, a detailed review of the potential impacts of the proposed changes to crewing requirements for offshore energy vessels was conducted. This study is in no way exhaustive, especially considering the uncertainty around how the offshore energy industry would respond to changes in vessel crewing requirements. This report focuses on the potential operational effects of the proposed crewing requirement changes based on a reasonable reading of these proposals and considers the potential operational changes offshore energy companies and their suppliers could undertake to minimize the effects of these changes on their operations. As such, this analysis is inherently forward-looking and subject to significant changes based on the potential development and implementation of these policy changes by Congress, the executive branch, and regulators such as the Department of Homeland Security (DHS) and the Coast Guard.

Limitations

Given the large degree of volatility and uncertainty in energy markets and the global economy, the assumptions and forecasts contained in this report are based on reasonable readings of conditions when this report was developed. Uncertainty around commodity pricing and global economic conditions may significantly affect the forecast contained in this report. EIAP makes no representations as to the impacts of the potential policy environment addressed in this report. These and other policies could impose significantly greater engineering, operational, cost, and other burdens on the oil and natural gas and offshore wind industries and regulators. The report's projections of the effects of this potential scenario on engineering, operations, and costs are an independent, good faith view derived from reasonable assumptions based on these potential scenarios and the authors' expertise and experience. Energy and Industrial Advisory Partners provided this independent study while expressly disclaiming any warranty, liability, or responsibility for the completeness, accuracy, use, or fitness to any person or party for any reason.

Offshore Energy Vessels Crewing

Language focused on the crewing installation vessels has been adopted in the House of Representatives to amend crewing requirements for foreign-owned vessels and terminate all existing exemptions under section 30(c)(2) of the Outer Continental Shelf Lands Act (43 U.S.C. 8 1356(c)(2)) issued before the date of the enactment of this Act. The proposed language, if implemented, would change long-standing rules related to the crewing of vessels operating in support of the U.S.'s offshore energy industry. While US mariners crew the vast majority of vessels which support the offshore energy industry, some specialist vessels which typically travel, and work internationally are sometimes crewed with mixed or

predominately foreign crews. Rapidly changing long-standing crewing requirements would significantly reduce the availability of vessels required for offshore energy development and operations. Additionally, the industry's ability to adapt to these proposed changes would be significantly hindered by overall conditions in the employment market and specific sector trends in marine and offshore energy worker availability.

The primary purpose of this report is to estimate the impact that severely restricting the ability of foreign crews to work on vessels supporting offshore energy development would have on vessel availability and the subsequent impacts reduced vessel availability would have on offshore energy project development and operations, and the impact reduced activity levels would be projected to have on the economy.

A large variety of vessels are required to support offshore energy exploration, development, and operations. These vessels range from seismic vessels (which identify potential oil and natural gas deposits and study locations' suitability for offshore wind farms) and drilling rigs to a variety of installation vessels (such as pipe and cable lay vessels, heavy lifts vessels, and multipurpose support vessels), to vessels which support operations such as offshore support and intervention vessels. For this report's purposes, vessels that support offshore energy operations were divided into 18 different categories. The number of active vessels in the OCS for each category and near-term vessel construction plans were then identified to form the basis of this report's analysis. (Table 2)

Table 2: Vessel Categories, Category Descriptions and Current Active Vessels by Category

Vessel Type	Purpose of Vessel	Active Vessels 2022
Floating Drilling Rig	Deepwater drilling	24
Jackup Drilling Rig	Shallow water drilling	5
Diving Support Vessel	Shallow water construction, maintenance, decommissioning	11
Well Intervention	Operations on producing wells	3
Pipe and Umbilical Lay	Installation of O&G pipelines and control umbilicals	6
Liftboat	Shallow water construction, maintenance, decommissioning	43
Multipurpose Support	Construction, maintenance, decommissioning	11
Stimulation	Pumping of well stimulation fluids to enhance production	4
Well Test	Testing to evaluate oil and gas wells	1
Crane Vessel - Shallow	Shallow water construction, maintenance, decommissioning	2
Heavy Lift	DP crane vessels with lifting capacity of up to 48,000 tons	3
Light Construction Vessel	MPSV with >DP2, >100T & >1,000 M crane capacity.	19
Wind Installation	Install offshore wind turbines and blades	1
Seismic	Gather data on subsurface conditions	5
Fall Pipe	Deposits rocks to cover cables and for scour protection	1
Cable Lay	Installs power cable for offshore wind farms	1
Geotechnical	Conduct coring operations on the seabed	2
Offshore Support	Transports personnel and equipment, support services	567
Total	**N/A**	**709**

Source: Marine Traffic, EIAP

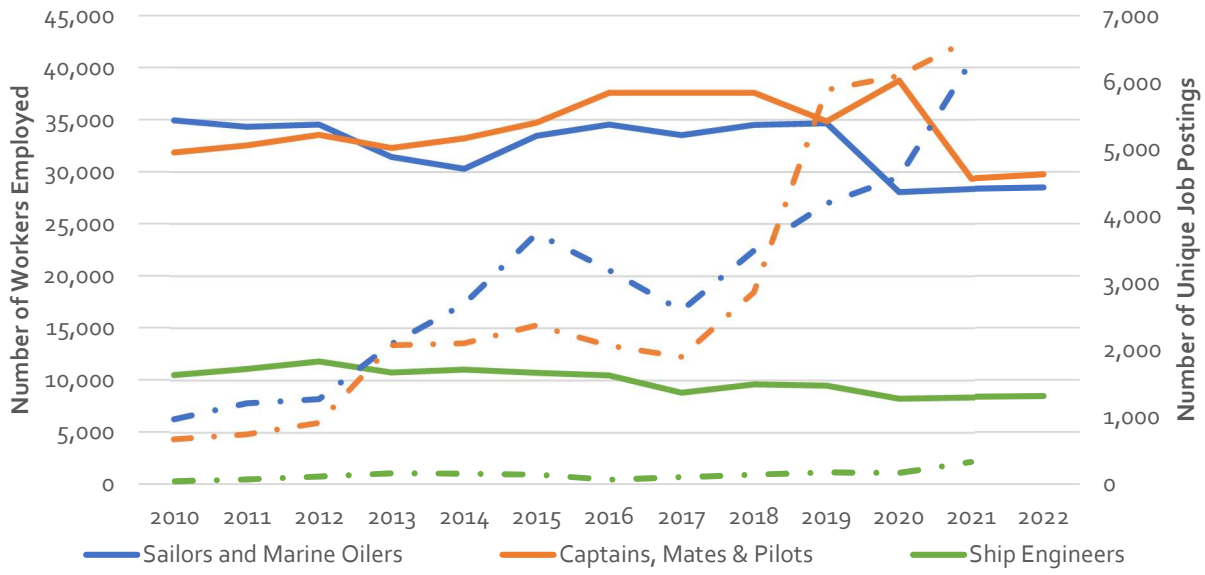
For each identified vessel, the vessel crewing requirements were estimated, with the vessel crew divided into three components:

- **The marine crew** was defined as the crew who operate and navigate the vessel itself, such as captains, engineers, sailors, and deck hands.
- **The support crew** was defined as those who support the vessel's operations and the crew, such as stewards, other food service, and cleaning staff.
- **The operations crew** was defined as those who directly operate the equipment related to the vessel's function, such as drillers, crane operators, welders, and ROV pilots.

Overall Workforce Supply and Demand Trends

As part of the development of the Policy Case, overall workforce trends for relevant occupations were examined. In line with the previously mentioned split in vessel crew types between maritime, support, and operations crews, the overall workforce supply, and demand trends for relevant professions were examined. The following charts show workforce trends for select occupations across three main categories: marine workers, oil and gas workers, and service workers. The solid lines show the number of workers employed in each occupation (supply), while the dashed lines show the number of job postings for the same occupation in a given period (demand). First, the number of workers employed and job postings for marine occupations were examined. (Figure 1)

Figure 1: Maritime Workforce Supply and Demand[1]

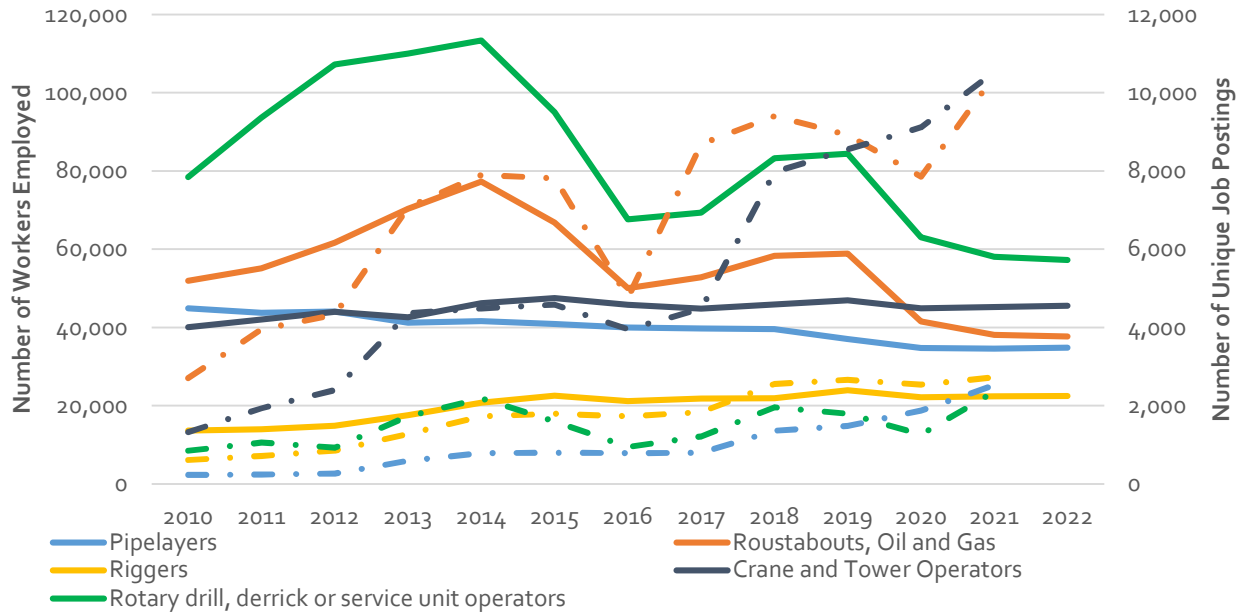


Source: BLS, EMSI Burning Glass

There was an average of three hires for every unique job posting for sailors, marine oilers, captains, mates, and pilots. For every unique posting of ship engineers, there were an average of 18 hires. Overall, the trend shows that overall employment in the marine sector has declined, while at the same time, the number of job postings has increased, indicating that demand outstrips supply for these workers. The workforce trends for oil and natural gas operations personnel were then examined. (Figure 2)

[1] Solid lines indicate supply; dashed lines indicate demand.

Figure 2: Oil and Gas Operations Workforce Supply and Demand[2]

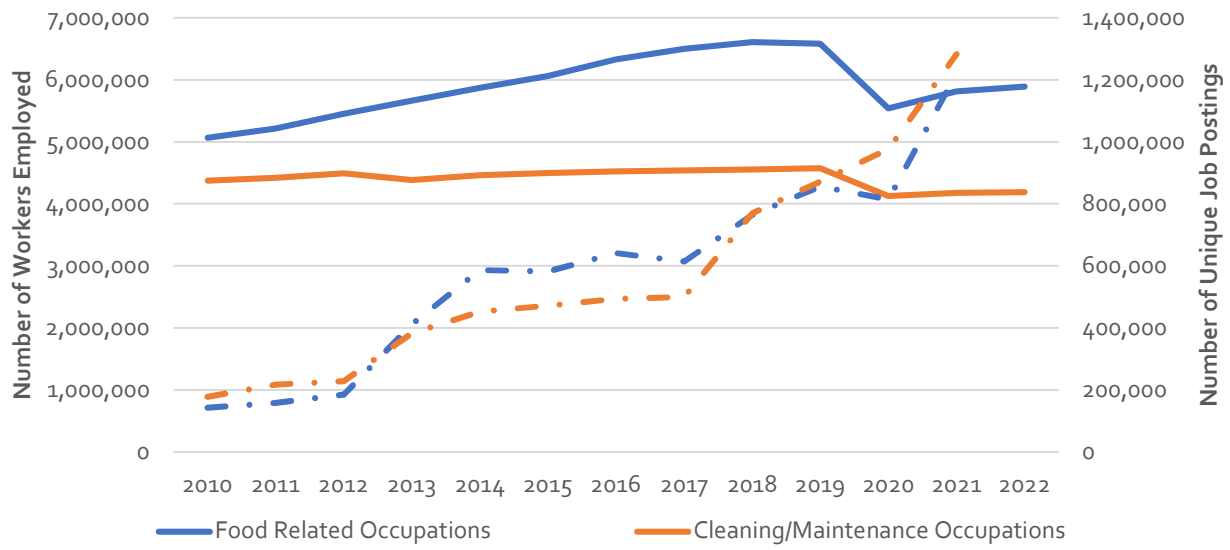


Source: BLS, EMSI Burning Glass

For every unique job posting, more workers were hired. The ratio of hirings to postings is pipelayers 11:1; roustabouts 2:1; riggers 6:1; crane & tower operators 3:1; rotary drill, derrick, or service unit operators 15:1. Apart from riggers, each profession has seen reduced employment compared to 2010, with some cyclicality due to the nature of the oil and natural gas market. As of 2021, all identified professions have seen increased job postings in recent years, indicating greater demand for these workers than the available supply. The overall workforce trends for service personnel were then examined. (Figure 3)

[2] Solid lines indicate supply; dashed lines indicate demand.

Figure 3: Service Workforce Supply and Demand[3]



Source: BLS, EMSI Burning Glass

For every unique job posting, more workers were hired. The ratio of hirings to postings is 6:1 for food related occupations and 3:1 for cleaning/maintenance occupations. Food related occupations include SOC[4] codes 35-2021, 35-2014, 35-1011, 51-3011, and 35-2023. Cleaning/maintenance occupations include SOC Codes 37-2011, 37-2012, and 49-9071. While the service workforce is substantially larger than the other workforces examined, similar trends are observed. Employment levels have been reduced, while job postings have steadily increased, likely indicating that demand for workers outstrips supply.

Almost universally, the number of workers employed in the selected occupations has fallen over the last few years. Typically, the downturn coincides with the onset of the Covid-19 pandemic. Yet while the number of employed workers has fallen, job postings—an indicator of demand—are rising, indicating that employers are actively looking for workers. The steepness of the rise in job postings suggests that employers are both eager to hire and find positions difficult to fill; otherwise, it would be expected that the job postings slope to be flatter or even declining. The rise in job postings combined with the falling supply of workers suggests that the workers who left each occupation are no longer available talent to fill open positions.

[3] Solid lines indicate supply; dashed lines indicate demand.
[4] The Standard Occupational Classification (SOC) Code system is a federal statistical standard used to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.

Offshore Energy Vessel Workforce

After the universe of offshore Energy vessels active in U.S. waters was identified, a detailed analysis of the crewing requirements of these vessels was completed. Based on the vessel's function, flag state, and primary operating locations, data was utilized to estimate offshore vessels' current crews and the total crew composition of offshore vessels active in the OCS. For each vessel, the vessel's size (including its accommodation capacity), typical crewing requirements based on vessel type (for example, marine, support, and operations crew requirements), typical operating location, and typical crew replacement schedules were taken into account to provide estimates on the number of required crew and their likely nationality. This data was then combined for the operating vessel fleet and forecasted through estimations of likely vessel needs by type based on projected activity levels. (Table 3)

Table 3: Estimate of Current Offshore Energy Jobs

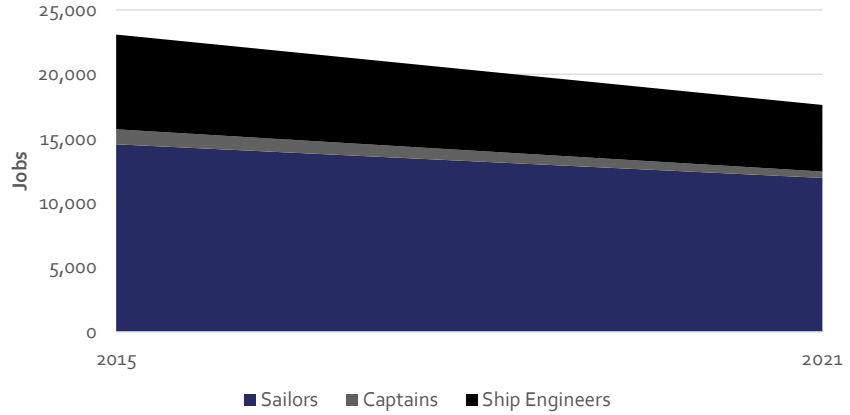
Crew Type	Est. Number
Marine	9,480
Support	5,380
Operations	10,322
Total	**25,182**

Crew Type	Est. Number
US	18,128
Foreign	7,054
Total	**25,182**

Source: EIAP

Once the crew composition of offshore vessels was determined, this composition was compared to data on overall employment in relevant industry sectors. Data on the existing offshore and adjacent industry workforce was examined to determine the potential impact of a rapid, significant increase in demand for American crew. For marine crews, data showed that between 2015 and 2021, there was a cumulative reduction of around 24 percent in these occupations. (Table 4)

Table 4: US Estimate of Marine Crew Job

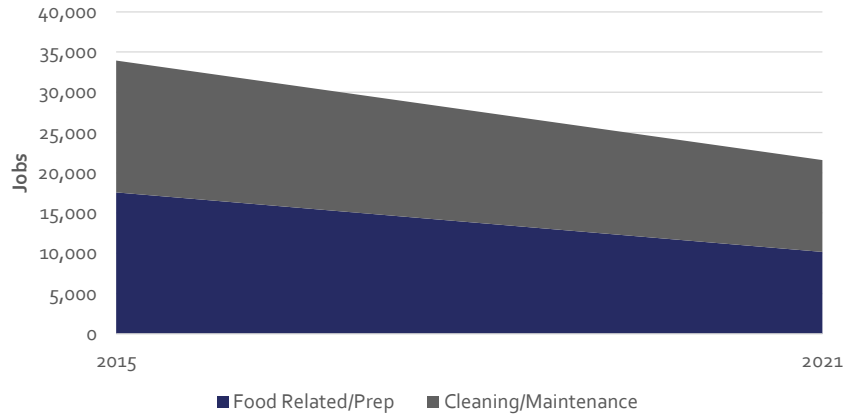


	Occupation Jobs in Industry		Change- 2015 to 2021	
Occupation	**2015**	**2021**	**Jobs**	**%**
Sailors	14,572	11,946	-2,627	-18%
Captains	1,157	502	-655	-57%
Ship Engineers	7,358	5,163	-2,195	-30%
Total	**23,087**	**17,610**	**-5,477**	**-24%**

Source: EIAP, BLS ,EMSI Burning Glass

Due to a lack of detailed data on support personnel working in the maritime industry and workers directly identified in maritime industries, estimates of potential workers in other industries with potentially transferable skills were also included in the available workforce. There was an approximate 36 percent reduction in these occupations between 2015 and 2021. (Table 5)

Table 5: US Estimate of Relevant Support Jobs

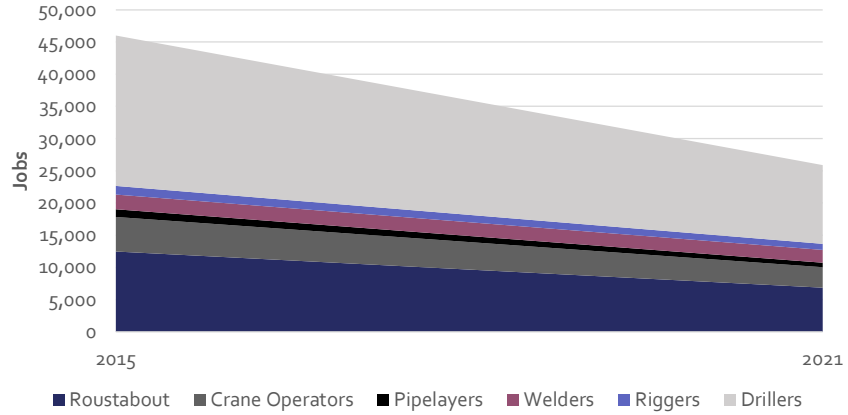


	Occupation Jobs in Industry		Change- 2015 to 2021	
Occupation	**2015**	**2021**	**Jobs**	**%**
Food Related/Prep	17,570	10,181	-7,389	-42%
Cleaning/Maintenance	16,360	11,423	-4,937	-30%
Total	**33,930**	**21,604**	**-12,327**	**-36%**

Source: EIAP, BLS ,EMSI Burning Glass

In addition to operations personnel identified as working in the offshore or maritime industries, estimates of potential workers in other industries with potentially transferable skills were also included in the available workforce. Between 2015 and 2021, the identified workforce declined by approximately 44%. (Table 6)

Table 6: US Estimate of Relevant Operations Jobs

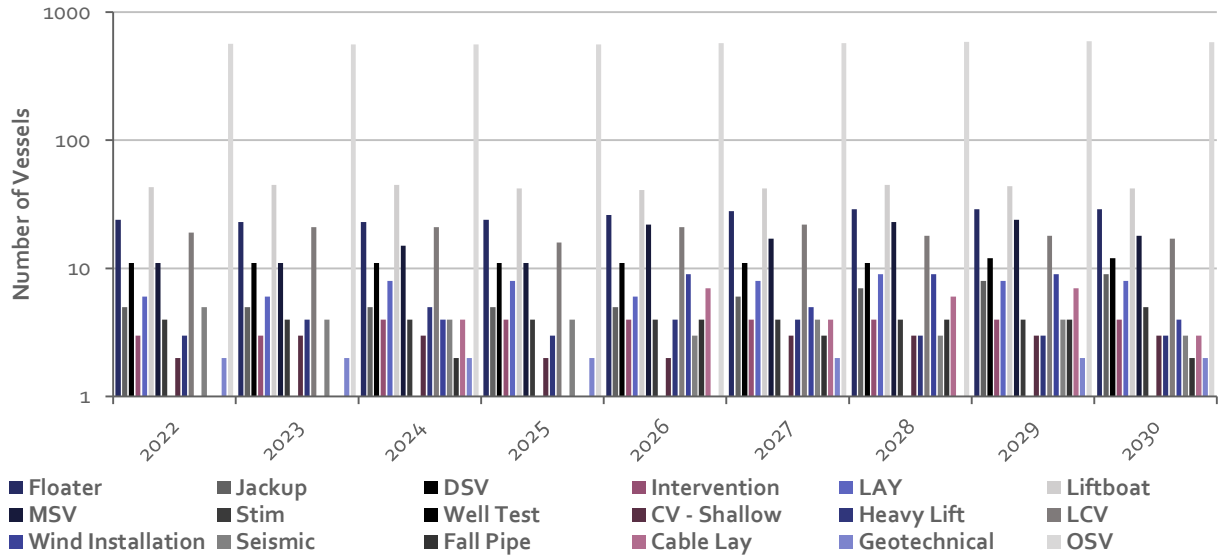


	Occupation Jobs in Industry		Change- 2015 to 2021	
Occupation	**2015**	**2021**	**Jobs**	**%**
Roustabout	12,488	6,848	-5,640	-45%
Crane Operators	5,324	3,182	-2,142	-40%
Pipelayers	1,227	680	-547	-45%
Welders	2,257	2,014	-243	-11%
Riggers	1,362	936	-426	-31%
Drillers	23,349	12,239	-11,110	-48%
Total	**46,007**	**25,899**	**-20,108**	**-44%**

Source: EIAP, BLS ,EMSI Burning Glass

The Base Case's future demand for offshore workers was then calculated based on historical crewing trends, projected activity, and subsequent vessel demand levels across offshore oil and natural gas, carbon capture, and wind. (Figure 4)

Figure 4: Projected Base Case Vessel Demand by Vessel Type



	2023	2026	2030
Floating Drilling Rig	23	26	29
Jackup Drilling Rig	5	5	9
Diving Support Vessel	11	11	12
Well Intervention	3	4	4
Pipe and Umbilical Lay	6	6	8
Liftboat	45	41	42
Multipurpose Support	11	22	18
Stimulation	4	4	5
Well Test	1	1	1
Crane Vessel - Shallow	3	2	3
Heavy Lift	4	4	3
Light Construction Vessel	21	21	17
Wind Installation	1	9	4
Seismic	4	3	3
Fall Pipe	1	4	2
Cable Lay	1	7	3
Geotechnical	2	1	2
Offshore Support	561	573	583
Grand Total	707	744	748

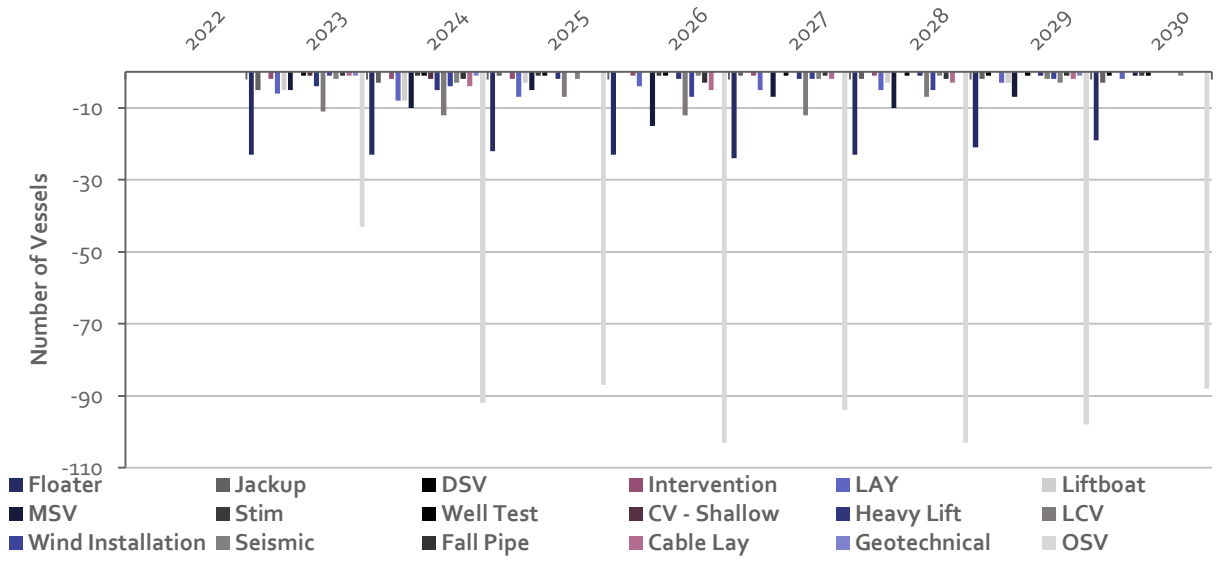
Source: Energy and Industrial Advisory Partners

Once the Base Case vessel demand forecast and subsequent vessel crew demand forecast were completed, the Policy Case forecast was developed. First, future crew requirements were compared to crew availability. Vessel flag states were considered, and vessels flagged in countries with material marine employment, such as the U.K., Norway, Netherlands, and Denmark, were projected to require fewer American crew members. Vessels operating under these flag states are expected to be able to

source crew from these countries in line with the amendment's allowance that both American and vessel flag state crews would be eligible to work on a given vessel. American crew availability was based on the estimates of the current offshore workforce and the size of the total relevant workforce. American workforce availability was projected to grow annually, both through increased offshore industry hiring of the existing relevant workforce and through organic growth.

This workforce availability estimate was utilized to estimate future vessel availability based on the available workforce and vessel demand. Vessel availability was not prioritized for a given activity type (i.e., deepwater vs. shallow water or oil and gas vs. wind). Vessel availability was calculated, when possible, to maximize crew utilization and vessel availability each year. The forecast also considers projected demand levels, which in later years are impacted by reduced activity in previous years. For example, a reduction in operating projects will reduce demand for support vessels. Each year, vessel requirements based on activity levels were compared to the projected available crew by crew type and the crewing requirements for each vessel type. Based on the projected available number of crew, and the year's vessel requirements, an estimate of available vessels by vessel type was then calculated. (Figure 5)

Figure 5: Projected Policy Case Vessel Availability Reductions by Vessel Type



	2023	2026	2030
Floating Drilling Rig	-23	-23	-19
Jackup Drilling Rig	-5	0	-3
Diving Support Vessel	0	0	-1
Well Intervention	-2	-1	0
Pipe and Umbilical Lay	-6	-4	-2
Liftboat	-5	0	0
Multipurpose Support	-5	-15	-1
Stimulation	0	-1	-1
Well Test	-1	-1	-1
Crane Vessel - Shallow	-1	0	0
Heavy Lift	-4	-2	0
Light Construction Vessel	-11	-12	0
Wind Installation	-1	-7	1
Seismic	-2	-1	-1
Fall Pipe	-1	-3	0
Cable Lay	-1	-5	1
Geotechnical	-1	1	0
Offshore Support	-43	-103	-88
Grand Total	-112	-177	-115

Source: Energy and Industrial Advisory Partners

Scenario Development

The study's data development was undertaken by developing a model that accounts for all major parts of the offshore oil and natural gas exploration and production lifecycle. A separate model that accounts for all major parts of the offshore wind development lifecycle was developed. The major sections of the offshore oil and natural gas model are: an Activity Model that assesses near term project activity, OCS reserves and production; and the likely project development and drilling activity necessary to meet production targets; a spending model derived from the activities required to develop and operate offshore oil and natural gas projects and reasonable assumptions around the spending levels typically associated with these activities; a government revenue model which uses forecast production levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and distributions and governmental polices to forecast potential government revenues; and an economic model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated economic activity including employment and gross domestic product.

The major sections of the offshore wind model are: an Activity Model that assesses near term project activity, known and under development offshore wind projects, as well as stated state and Federal policy goals; and the likely project development necessary to meet generation targets; a spending model derived from the activities required to develop and operate offshore wind projects and reasonable assumptions around the spending levels typically associated with these activities based on the National Renewable Energy Laboratory's JEDI offshore wind model; a government revenue model which uses forecast generation levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and governmental polices to forecast potential government revenues; and an economic model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated economic activity including employment and gross domestic product.

The Base Case model for offshore oil and natural gas was initially developed based on forecast production and pricing levels based on the Energy Information Administration's (EIA) Annual Energy Outlook 2022[5] for long-term prices and the EIA's Short-Term Energy Outlook[6] for the near term (2022 and 2023) prices. However, modifications to near-term pricing and production levels were made based on current market conditions. Although these forecasts were utilized to develop the Base Case model, due to differences in modeling techniques, especially the project-based model developed in this report, the report's forecast production levels vary modestly from those provided in the EIA's forecasts.

Following the creation of the Base Case forecast, the potential effects of the additional scenario (reduced vessel availability due to changes in crewing requirements for offshore energy vessels, the "Policy Case")

[5] Annual Energy Outlook 2022, Energy Information Administration
[6] Short Term Energy Outlook, May 6th, 2022, Energy Information Administration

was considered. Amongst other factors, how this scenario would impact new project development of both underway and future projects and existing producing projects were examined.

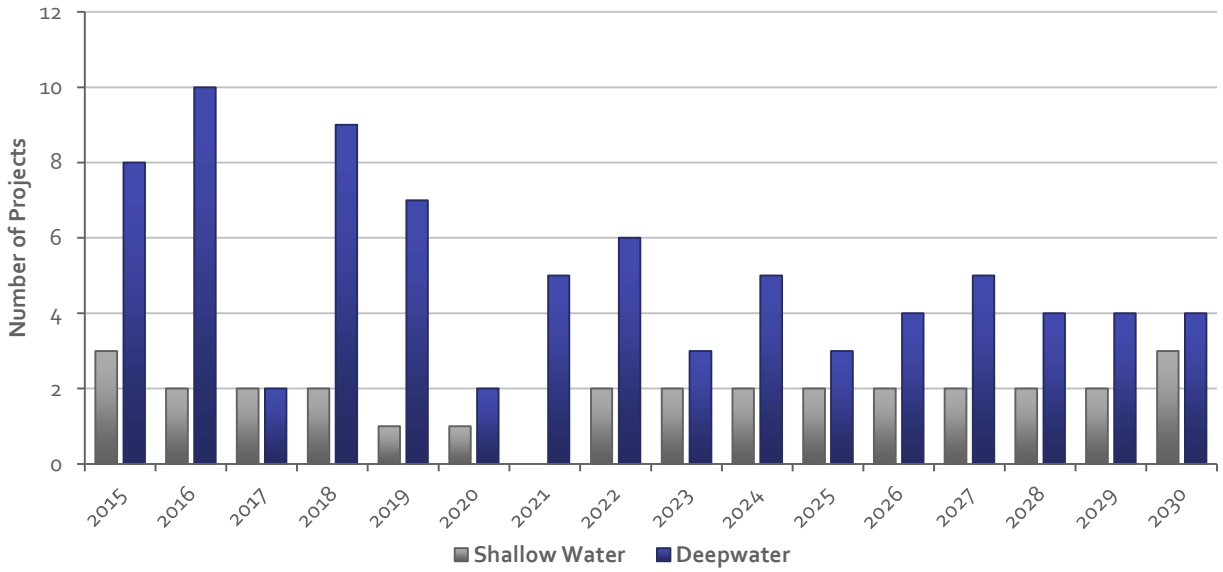
OCS Oil and Natural Gas Economic Impacts[7]

The OCS oil and natural gas industry supports significant employment, gross domestic product, and state and federal government revenues. To quantify the potential policy change's potential effects on offshore vessel crewing requirements, this study developed a Base Case activity level for OCS oil and natural gas activity to compare activity levels and subsequent impacts if the proposed policy was implemented. The study forecasted key activity indicators, including the number of wells drilled, projects executed, oil and natural gas production, and spending based on projected activity levels. These activity and spending forecasts drive the projected employment, GDP, and government revenue forecasts presented in this report.

Projects

The development of new OCS oil and natural gas projects is a significant source of industry capital and operational spending, supports employment and GDP, and oil and natural gas production. New project developments are a key indicator of activity and spending levels that drive economic activity due to the OCS oil and natural gas industry. After a period of decline, OCS project executions are expected to recover strongly in 2022 and subsequent years. Projects delayed by low oil prices and the pandemic begin production, and operators respond to the current high price environment. (Figure 6)

Figure 6: Projected Base Case OCS Offshore Oil and Natural Gas Project Startups by Year



Source: Energy and Industrial Advisory Partners

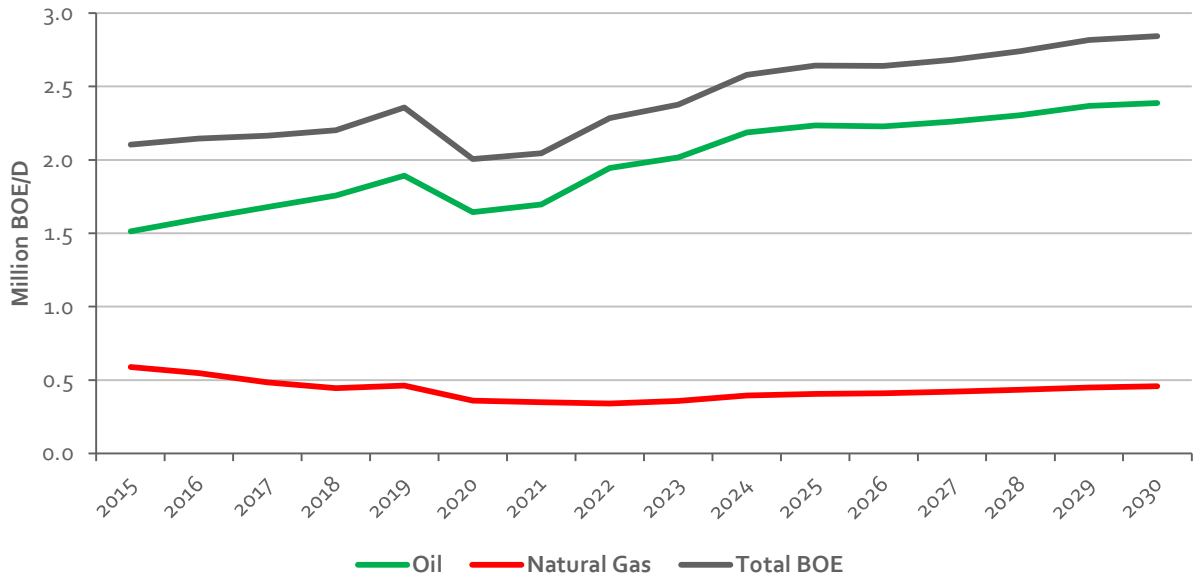
[7] Offshore Carbon Capture and Storage Activity and Economic Impacts are Included in this section

Production

The decline rate of the existing base of producing wells and new project development are the main determinants of OCS oil and natural gas production. Production is influenced by several factors, including reservoir productivity, oil and natural gas production ratios, well counts, and operational choices by operators. To prepare the production forecast, the Energy Information Administration's (EIA) production forecasts from the "Annual Energy Outlook 2022"[8]and the EIA's Short Term Energy Outlook[9] were utilized as the primary indicator of forecast production levels. The Base Case production forecast was developed to be relatively in line with the EIA's long-term forecast. The production forecast in this report differs from this forecast due to the project-based methodology used to develop forecasts for the report. To develop the production forecast for this report, project developments (in addition to the existing production base) were modeled utilizing indicators such as the water depth of the project, the number of projected producing wells, projected per well production levels, assumptions on peak production years, and decline rate assumptions. Due to current market conditions and near-term project development activity, revisions to near-term levels were performed.

This study forecasts that combined OCS oil and natural gas production in 2022 will be nearly 2.3 million barrels of oil equivalent per day, with oil and other liquids accounting for around 85 percent of production and natural gas accounting for 15 percent of production. At the end of the forecast period in 2030, the OCS is projected to produce just over 2.8 million barrels of oil equivalent per day. (Figure 7)

Figure 7: Projected Base Case OCS Oil and Natural Gas Production (BOE/D)



Source: Energy and Industrial Advisory Partners

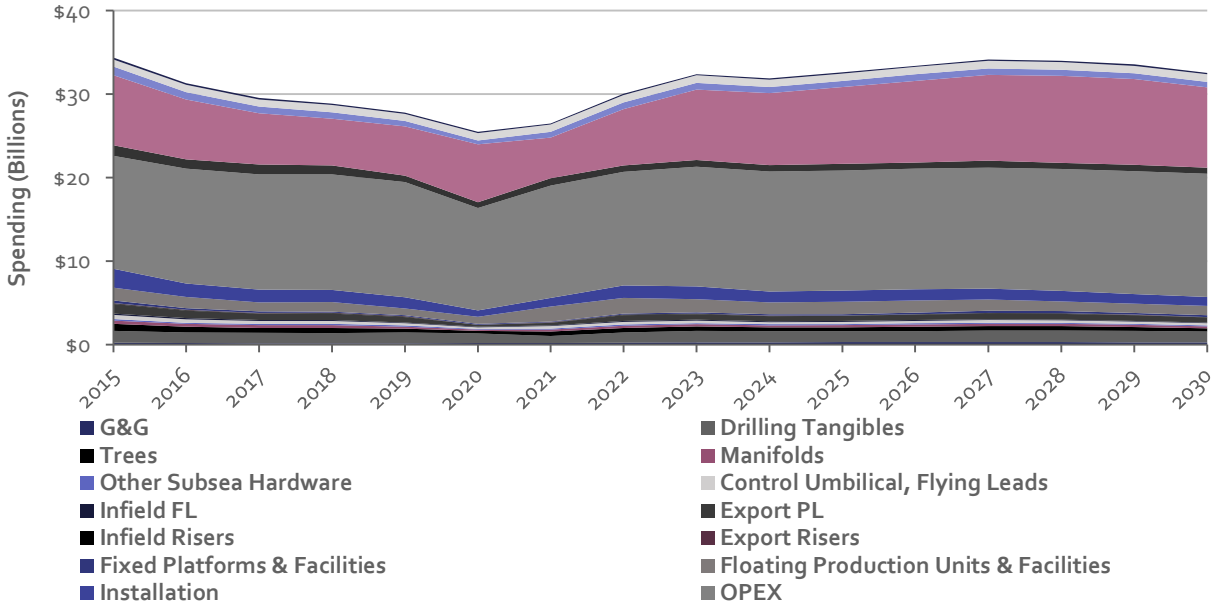
[8] Annual Energy Outlook 2022, Energy Information Administration
[9] Short Term Energy Outlook, May 6th, 2022, Energy Information Administration

Spending

Offshore oil and natural gas exploration, development, and operations require significant investment. These activities include geological and geophysical surveys, drilling, engineering, surface and subsea production equipment, installation, operational expenditures, and decommissioning. For this study, spending was modeled in 19 categories, encompassing the full range of activities required to identify, explore for, develop, operate, and decommission offshore oil and natural gas projects.

In the Base Case scenario developed for this report, offshore oil and natural gas spending is projected at around $29.9 billion in 2022. Across the 2022-2030 forecast period, spending is projected to average just below $32.6 billion. (Figure 8)

Figure 8: Projected Base Case OCS Offshore Oil and Natural Gas Spending

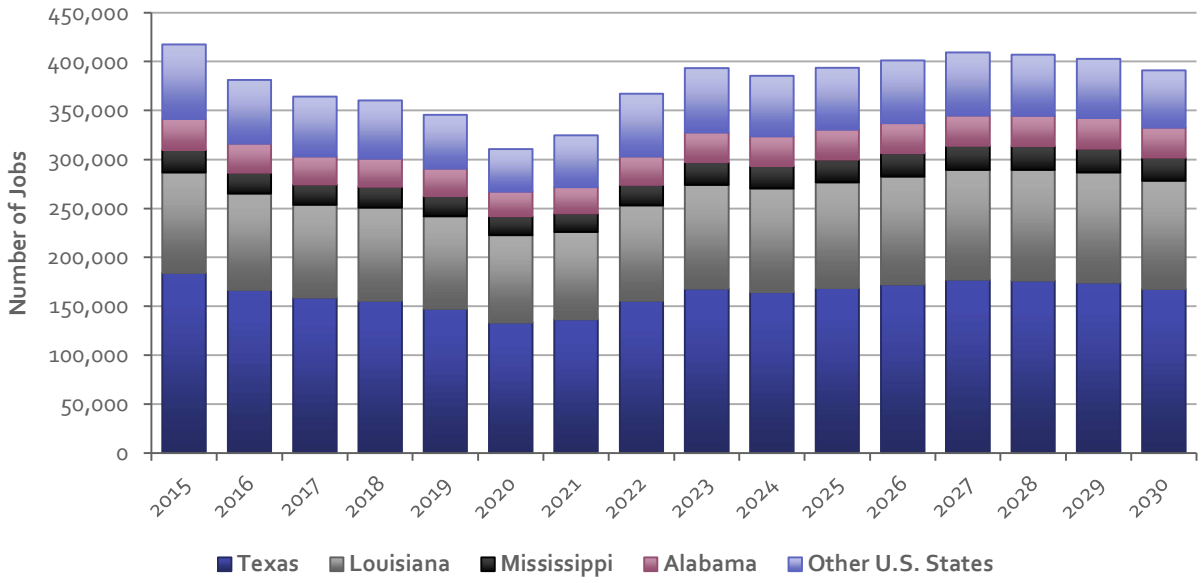


Source: Energy and Industrial Advisory Partners

Employment

The OCS offshore oil and natural gas industry has supported significant levels of employment in the U.S. for decades. While the most significant employment impacts of the industry are focused on the Gulf Coast states, almost all, if not all, states see employment supported due to industry activity. The OCS offshore oil and natural gas industry directly supports many highly paid jobs, especially highly paid blue-collar jobs. The industry also supports significant employment through the industry's supply chain (indirect jobs) and due to increased spending by workers (induced jobs). In 2022, an estimated 367 thousand jobs are projected to be supported by OCS industry activity. (Figure 9)

Figure 9: Projected Base Case OCS Offshore Oil and Natural Gas Supported Employment

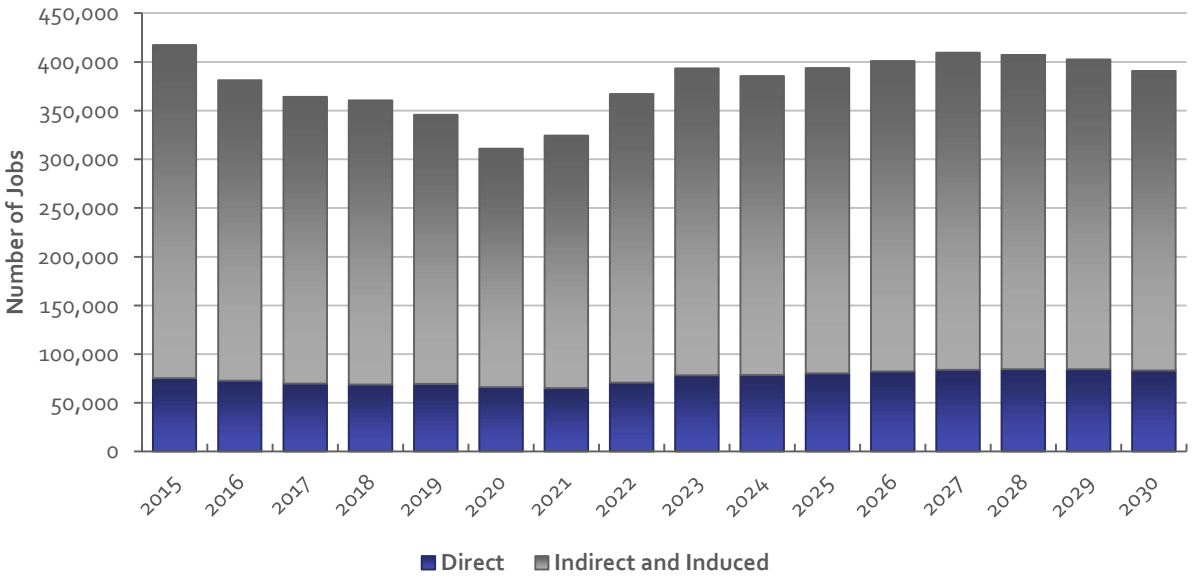


Source: Energy and Industrial Advisory Partners

From 2022 to 2030, around 394 thousand jobs are projected to be supported by the OCS offshore oil and natural gas industry on average. The most significant employment impacts are projected in the Gulf Coast states. An average of about 169 thousand jobs were projected to be supported in Texas across the 2022-2030 forecast period, with just above 108 thousand jobs supported in Louisiana, nearly 31 thousand jobs supported in Alabama, just over 23 thousand jobs supported in Mississippi, and around 62 thousand jobs supported in the rest of the U.S.

The OCS offshore oil and natural gas industry supports employment through direct employment by the industry, indirectly through its suppliers and induced employment. Indirect employment occurs through the industry's purchases of goods and services, while induced employment is due to the impact of higher income in the economy. Direct employment by oil and natural gas companies and their suppliers due to offshore OCS activity in 2022 is projected to be just under 71 thousand jobs. Across the 2022 to 2030 forecast period, direct employment is projected to average slightly below 81 thousand jobs yearly. Indirect and induced employment due to the OCS offshore oil and natural gas industry is projected to be around 296 thousand jobs in 2022. Across the 2022 to 2030 forecast period, supported indirect and induced employment is projected to average just under 314 thousand jobs each year. (Figure 10)

Figure 10: Projected Base Case OCS Offshore Oil and Natural Gas Direct vs. Indirect and Induced Supported Employment

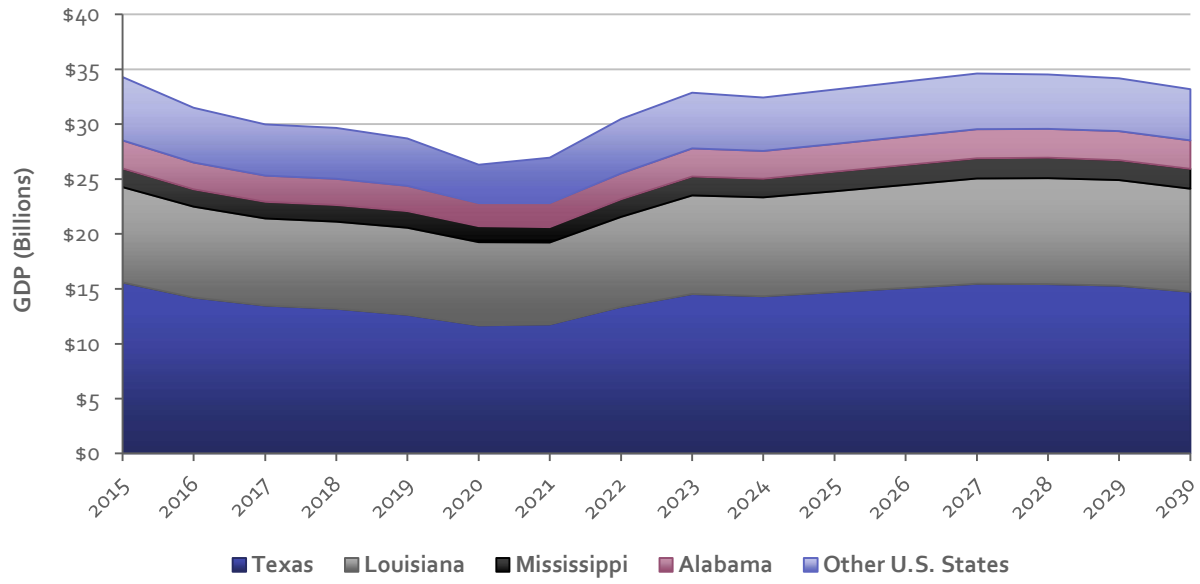


Source: Energy and Industrial Advisory Partners

GDP

The OCS offshore oil and natural gas industry supports significant levels of GDP. In 2022, the industry is projected to support around $30.4 billion of U.S. GDP. Over the forecast period from 2022 to 2030, contributions to GDP are projected to average nearly $33.3 billion per year. (Figure 11)

Figure 11: Projected Base Case OCS Offshore Oil and Natural Gas Contributions to GDP



Source: Energy and Industrial Advisory Partners

Government Revenues

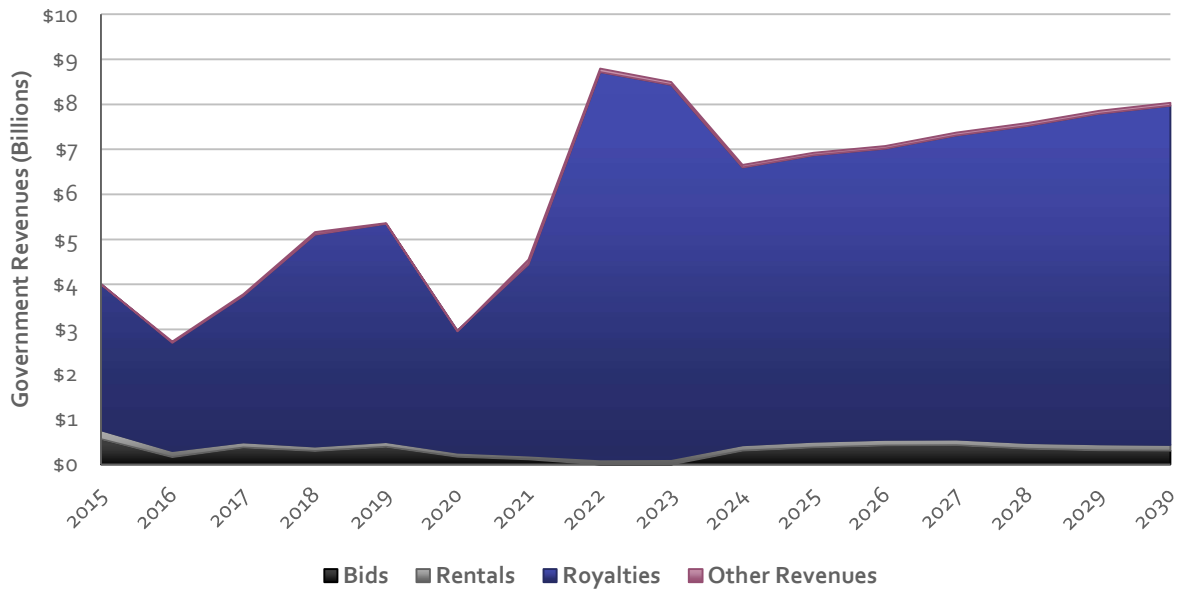
OCS offshore oil and natural gas activity's contributions to government revenues are primarily derived from three main revenue streams; royalties paid on produced oil and natural gas, bonus bids paid to acquire blocks in lease sales, and rents for blocks leased by operators. Several policies impact royalties and lease payments received by the Federal Government, including royalty relief for certain blocks depending on production rates, differing rent and royalty regimes for fields in different water depths, and blocks leased at different times. Additionally, the value of oil and natural gas produced in the OCS typically differs from common indicators such as West Texas Intermediate (WTI) crude due to transportation costs, long-term sales contracts, and differentials due to product quality and location. To calculate government revenues due to offshore oil and natural gas activities, data from the Office of Natural Resource Revenue[10] (ONRR) as well as oil and natural gas price projections from the Energy Information Administration's Annual Energy Outlook 2022[11] and Short-Term Energy Outlook[12] were utilized as the basis of the forecast. Data on disbursements to states are only available as fiscal year data, so for the purposes of this report, fiscal year data was utilized as a stand-in for calendar year data.

In 2022, government revenues due to offshore oil and natural gas activities in the OCS are projected to reach nearly $8.8 billion. On average, across the 2022 to 2030 forecast period, government revenues due to offshore oil and natural gas activities in the OCS (excluding personal and corporate income taxes and property taxes) are projected to average just over $7.6 billion annually. The largest source of government

[10] Natural Resources Revenue Data, Office of Natural Resource Revenue, U.S. Department of the Interior
[11] Annual Energy Outlook 2022, Energy Information Administration
[12] Short Term Energy Outlook, May 6th, 2022, Energy Information Administration

revenues from OCS offshore oil and natural gas activities is from royalties paid on produced oil and natural gas. Across the 2022 to 2030 forecast period, average royalty revenues are projected at over $7.1 billion per year. Bid revenues are projected to average about $274 million per year across the forecast period, rental revenues are projected to average just below $125 million per year, and other revenues are projected to average nearly $63 million per year. (Figure 12)

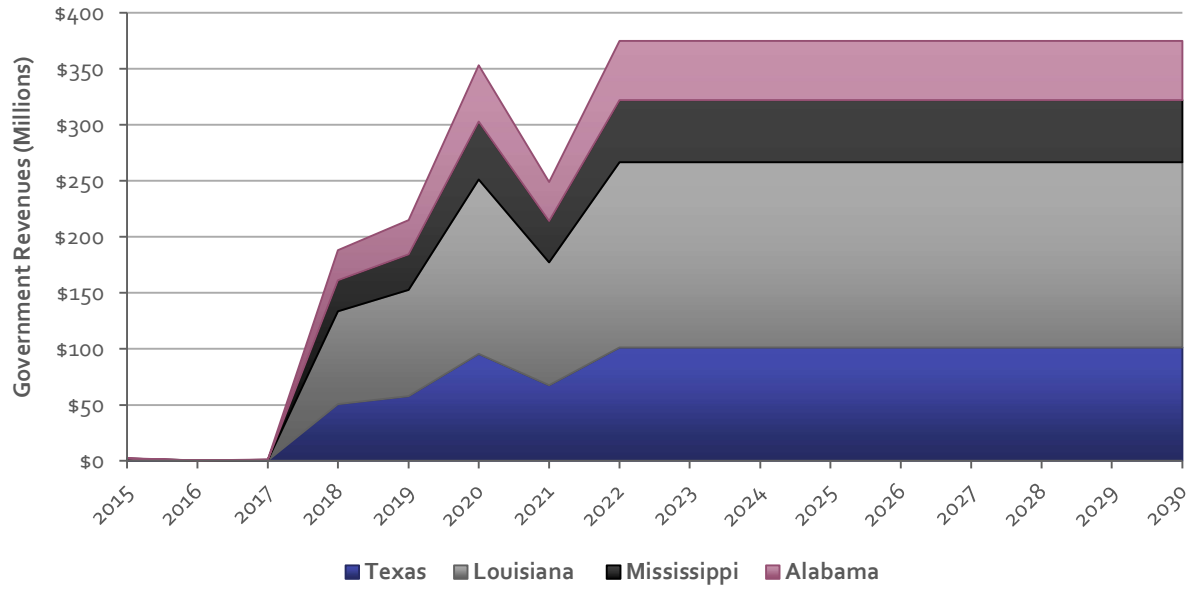
Figure 12: Projected Base Case OCS Offshore Oil and Natural Gas Government Revenues by Type



Source: Energy and Industrial Advisory Partners

In 2006 Congress passed the OCS Energy Security Act (GOMESA), which created revenue-sharing provisions for the four Gulf oil and natural gas producing states (Alabama, Louisiana, Mississippi, and Texas) and their coastal political subdivisions. Revenue sharing was enacted in two phases beginning in 2007 and 2017, respectively, with revenue sharing caps of $375 million for fiscal years 2017–2019, $487.5 million for fiscal years 2020 and 2021, and $375 million for fiscal years 2022–2055. Total projected Federal Government revenues, actual fiscal year distribution data from the ONRR, and analysis of the growth of revenue sharing and the revenue sharing caps were considered to develop the revenue sharing forecasts in this report. In 2022, the OCS oil and natural gas producing states are projected to receive around $375 million due to revenue sharing, with revenue projected to remain flat throughout the forecast period due to the revenue sharing cap. (Figure 13)

Figure 13: Projected Base Case OCS Offshore Oil and Natural Gas Government Revenues by State



Source: Energy and Industrial Advisory Partners

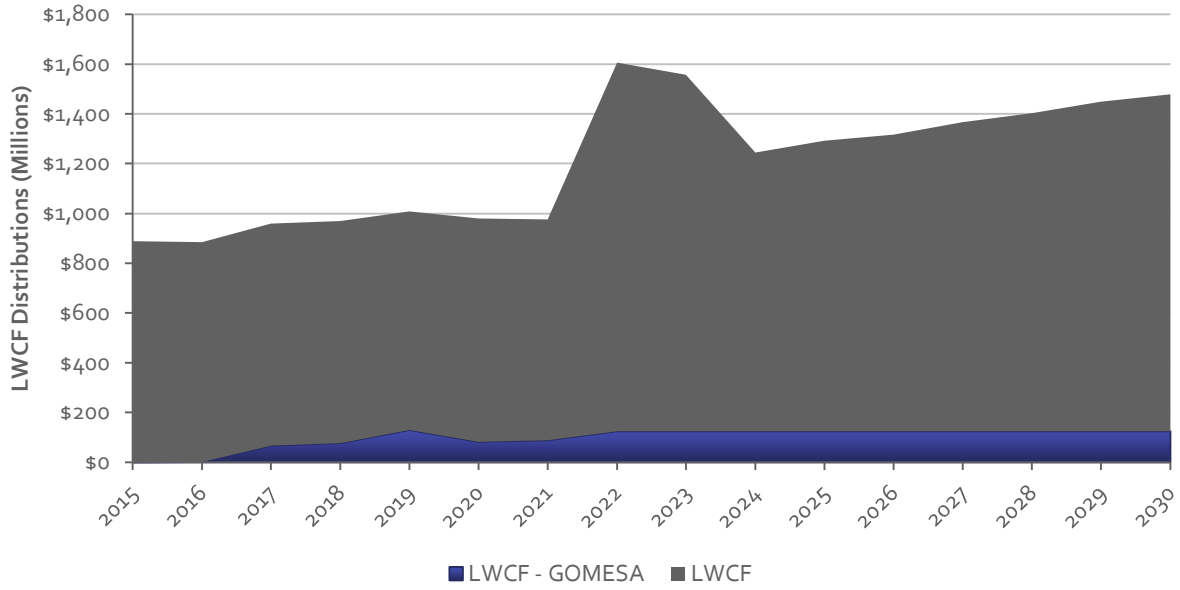
Based on historical distributions, this study projects that Louisiana will see the largest annual distributions due to GOMESA, with distributions averaging around $165 million over the 2022-2030 forecast period. Texas is projected to receive the second-highest average distributions, at over $101 million per year. Mississippi and Alabama are projected to receive distributions of an average of around $55 and $53 million annually, respectively.

In addition to provisions for revenue sharing with the OCS producing States, GOMESA also included a provision for distributions to the Land and Water Conservation Fund (LWCF). The LWCF "supports the protection of federal public lands and waters – including national parks, forests, wildlife refuges, and recreation areas – and voluntary conservation on private land. LWCF investments secure public access, improve recreational opportunities, and preserve ecosystem benefits for local communities."[13] In addition to funding from GOMESA, the LWCF also receives significant additional funding due to offshore oil and natural gas activities.

GOMESA distributions to the LWCF are capped at $125 million per year as part of a total cap with state distributions of $500 million. However, in FY 2019, nearly $130 million was distributed to the LWCF. This study projects that distributions to the LWCF due to GOMESA revenue sharing will remain at or around the $125 million level for the 2022-2030 forecast period. Distributions in 2020 and 2021 were about $83 and $89 million, respectively, due to low oil prices. Non-GOMESA LWCF contributions are projected to average just under $1.3 billion per year. (Figure 14)

[13] Land and Water Conservation Fund, U.S. Department of the Interior

Figure 14: Projected Base Case LWCF Distributions



Source: Energy and Industrial Advisory Partners

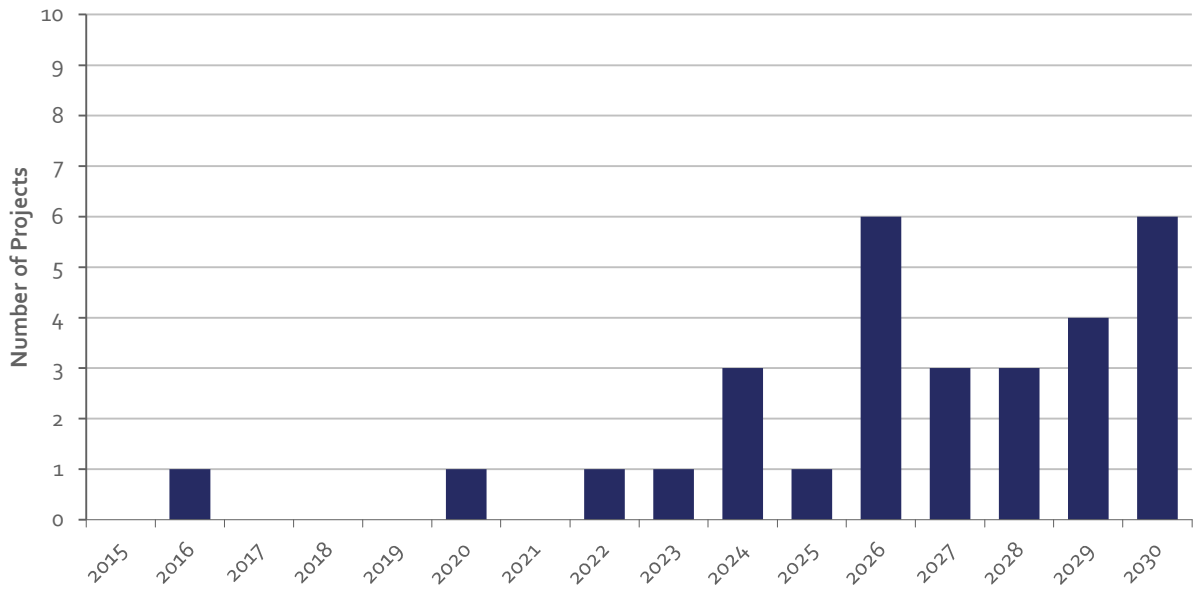
Offshore Wind Economic Impacts

Although the U.S. offshore wind industry is relatively nascent, offshore wind development is projected to grow rapidly over the coming decade due to aggressive plans from developers and state and federal governments. Although a large portion of the offshore wind supply chain is currently located outside the U.S., domestic content is projected to rise as activity levels grow. Increased activity levels and domestic content should lead to increased economic impacts due to offshore wind development. To quantify the potential effects of a potential policy change in offshore vessel crewing requirements, this study developed a Base Case activity level for offshore wind development activity to compare activity levels and subsequent impacts if the proposed policy was implemented. The study forecasted key activity indicators, including the number of projects executed, electrical generation capacity, and spending based on projected activity levels. These activity and spending forecasts drive the projected employment, GDP, and government revenue forecasts presented in this report.

Projects

Although only a few offshore wind projects have been developed in the U.S., project development activity is projected to increase rapidly over the next decade. The development of offshore wind projects requires significant capital investments, supports employment and GDP, and domestic energy production. Over the 2022-2030 forecast period, around 28 offshore wind projects are projected to come online in the U.S. in the Base Case. (Figure 15)

Figure 15: Projected Base Case OCS Offshore Wind Project Startups by Year

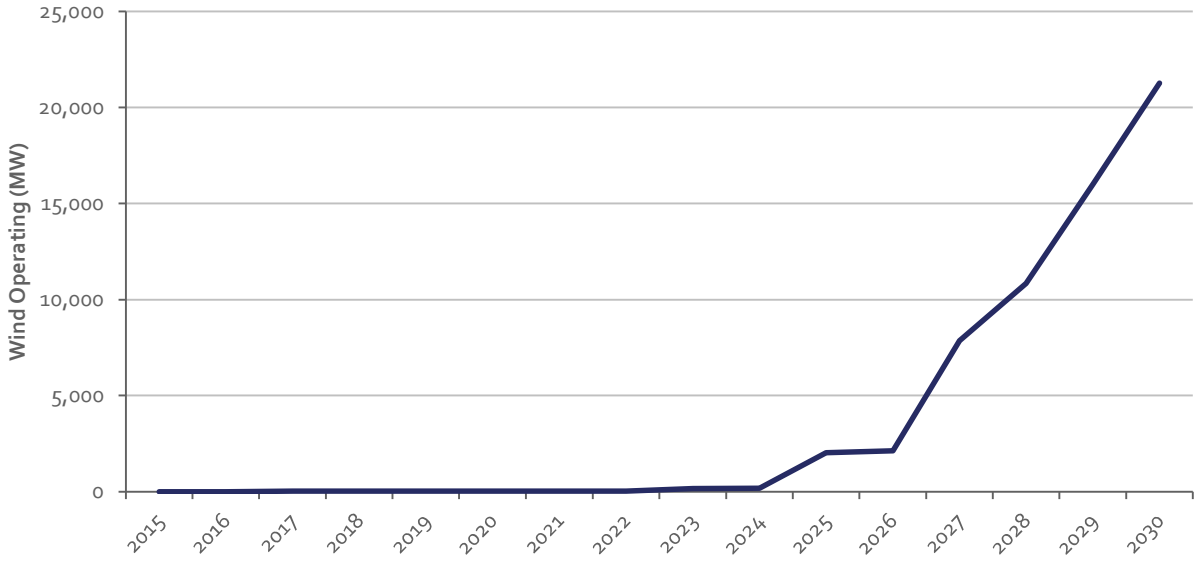


Source: Energy and Industrial Advisory Partners

Generation Capacity

Currently installed U.S. offshore wind projects have relatively low generation capacities; however, larger projects now under development are projected to provide significant generation capacities. Overall offshore wind generation capacity is projected to grow rapidly over the coming decade and beyond. This study forecasts that combined wind generation capacity will reach under 21,300 megawatts at the end of the forecast period in 2030, compared to 39 megawatts in 2022. (Figure 16)

Figure 16: Projected Base Case Offshore Wind Generation Capacity



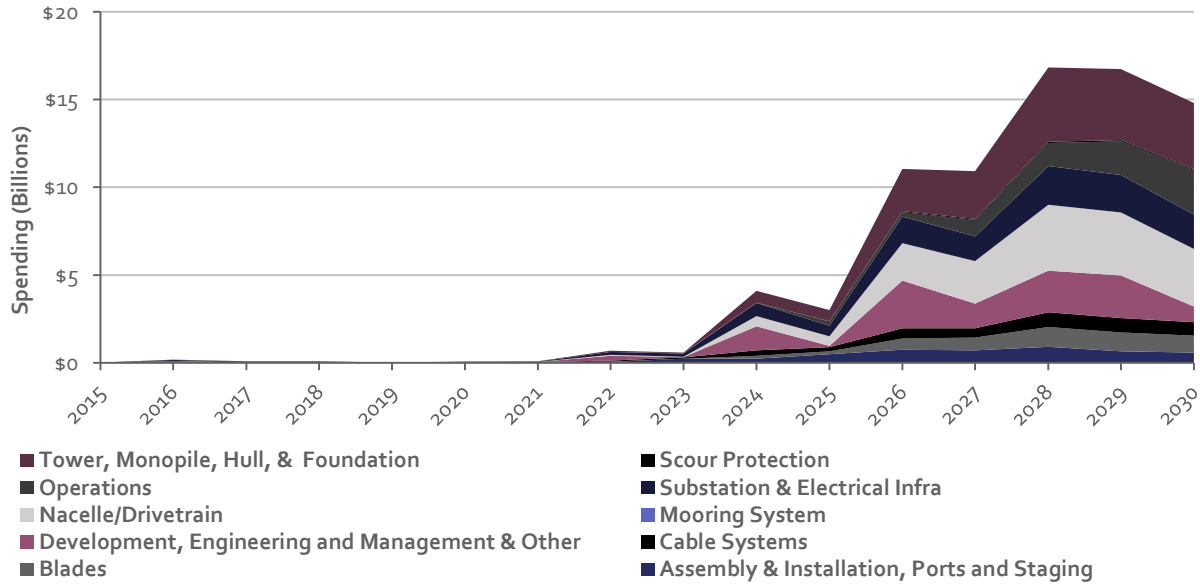
Source: Energy and Industrial Advisory Partners

Spending

Offshore wind development requires significant capital investment. Capital spending includes assembly & installation, blades, cable systems, nacelles, drivetrains, scour protection, and foundations. For this study, spending was modeled in 10 categories, encompassing the full range of activities required to identify, develop, and operate offshore wind projects.

In the Base Case scenario developed for this report, on average, across the 2022-2030 forecast period, spending is projected to average just above $8.7 billion. Offshore wind spending is projected to reach around $14.8 billion in 2030. (Figure 17)

Figure 17: Projected Base Case Offshore Wind Spending

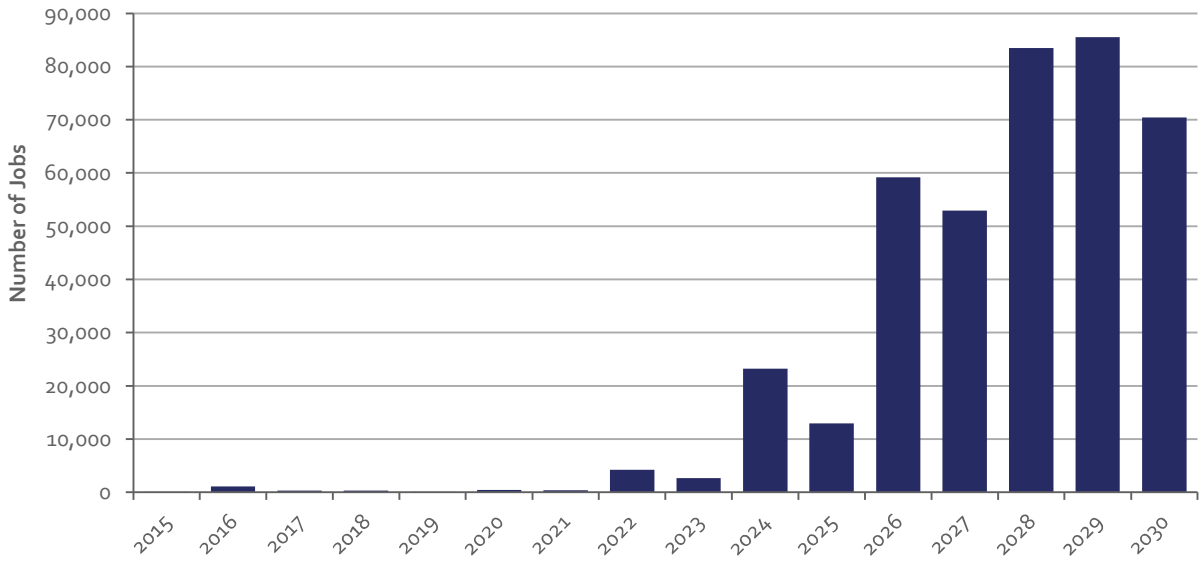


Source: Energy and Industrial Advisory Partners

Employment

Although the U.S. offshore wind energy is still in its early stages of development, supported employment is projected to grow rapidly as the industry grows and domestic content increases. The industry is also projected to support significant employment through the industry's supply chain (indirect jobs) and increased spending by workers (induced jobs). On average, across the forecast period from 2022-2030, the offshore wind industry is projected to support just under 44 thousand jobs. In 2030, an estimated 70 thousand jobs are projected to be supported by offshore wind activity. (Figure 18)

Figure 18: Projected Base Case Offshore Wind Supported Employment

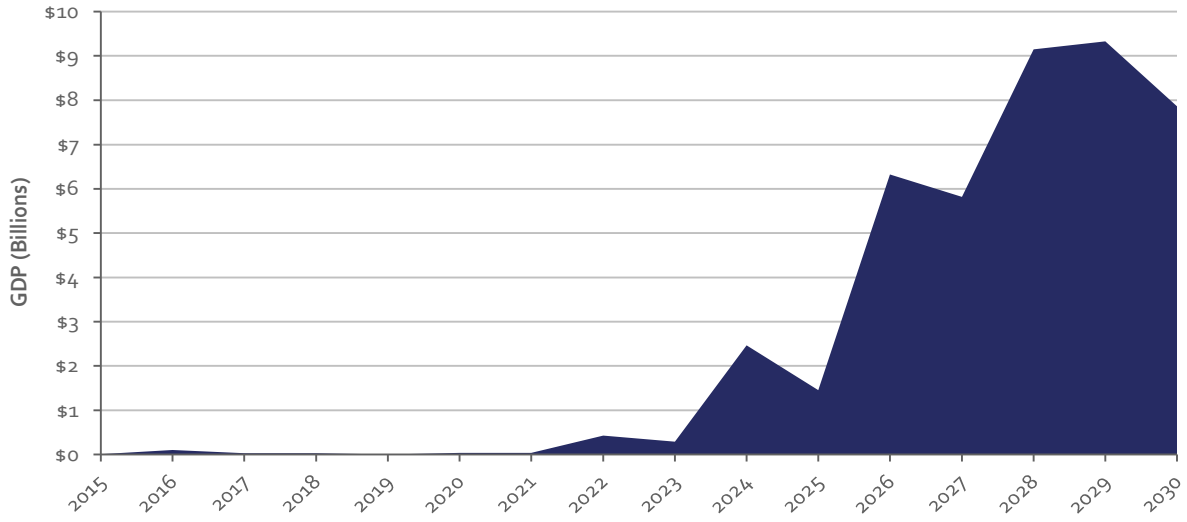


Source: Energy and Industrial Advisory Partners

GDP

As it grows, the offshore wind industry is projected to support significant GDP levels. Over the forecast period from 2022 to 2030, contributions to GDP are projected to average just below $4.8 billion per year. In 2030, the industry is projected to support around $7.8 billion of U.S. GDP. (Figure 19)

Figure 19: Projected Base Case Offshore Wind Contributions to GDP



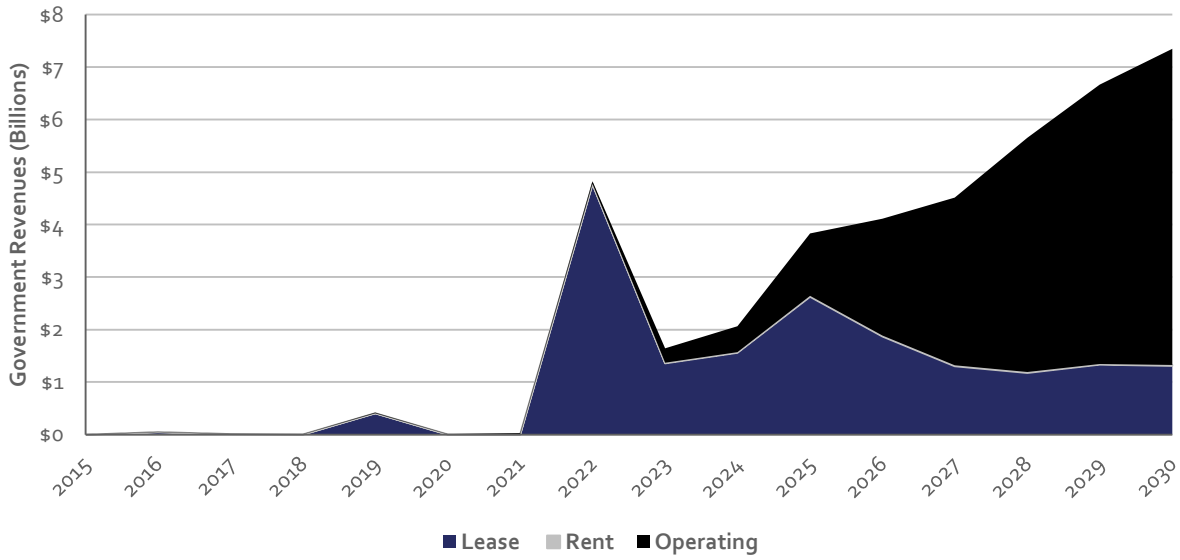
Source: Energy and Industrial Advisory Partners

Government Revenues

Offshore wind development and operations contributions to government revenues are primarily derived from three main revenue streams; payments from installed projects, bids paid to acquire blocks in lease sales, and rents for blocks leased by operators. To calculate government revenues due to offshore wind activities, data from historical lease sales, including bids, rents, and operating fees, were utilized as the basis of the forecast.

Across the 2022 to 2030 forecast period, government revenues due to offshore wind activities (excluding personal and corporate income taxes and property taxes) are projected to average over $4.5 billion per year. In 2030, government revenues due to offshore wind activities are projected to reach just above $7.3 billion. (Figure 20)

Figure 20: Projected Base Case Offshore Wind Government Revenues by Type



Source: Energy and Industrial Advisory Partners

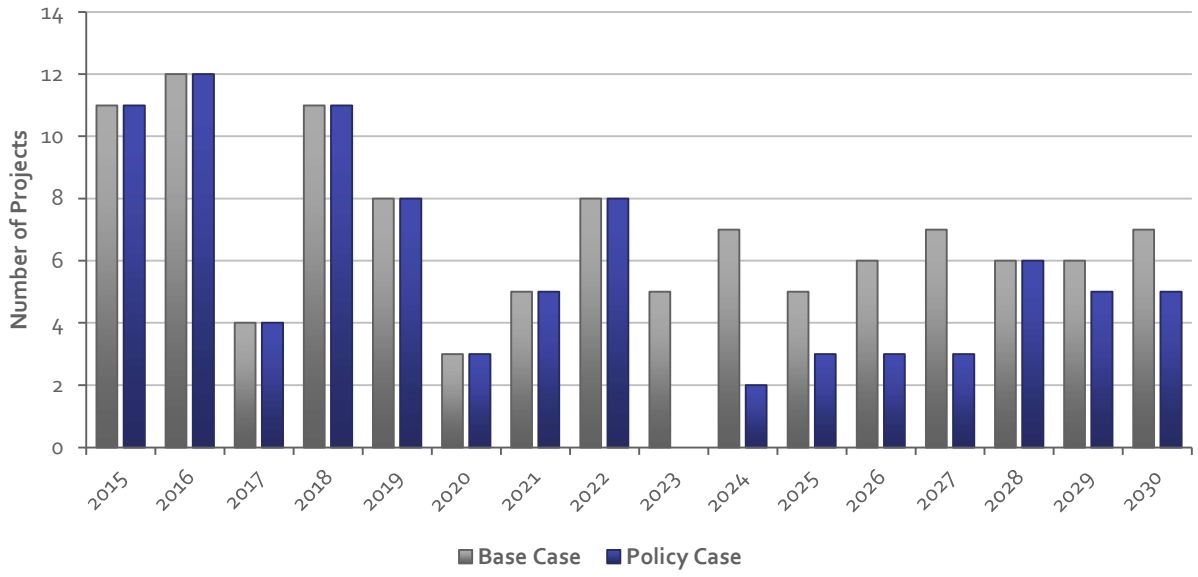
OCS Oil and Gas Policy Case Impacts

A reduction in the availability of drilling, construction, and other vessels would likely have an immediate, long-lasting, negative impact on OCS oil and natural gas project development, spending, supported employment and GDP, and government revenues. For the purposes of this report, a "Policy Case" was developed to compare activity levels (project executions, spending, oil and natural gas production), economic impacts, and government revenues to the Base Case Scenario. This scenario assumes that as of 2023 longstanding exemptions to vessel crewing are eliminated, and the availability of vessels for offshore energy development is reduced. This scenario also assumes no other major policy or regulatory changes impacting the OCS offshore oil and natural gas industry would be enacted.

Projects

Development of new offshore oil and natural gas projects in the OCS drives capital and operational spending, supported employment, oil and natural gas production, and subsequent government revenues. Under the Policy Case, project development activity is projected to be reduced as soon as 2023, as the drilling rigs and construction vessels required for project development are immediately reduced. Over the 2022-2030 forecast period, new project startups are projected to decline by 39 percent, from 57 to 35. (Figure 21)

Figure 21: Projected Base Case vs. Policy Case OCS Offshore Oil and Natural Gas Project Startups by Year



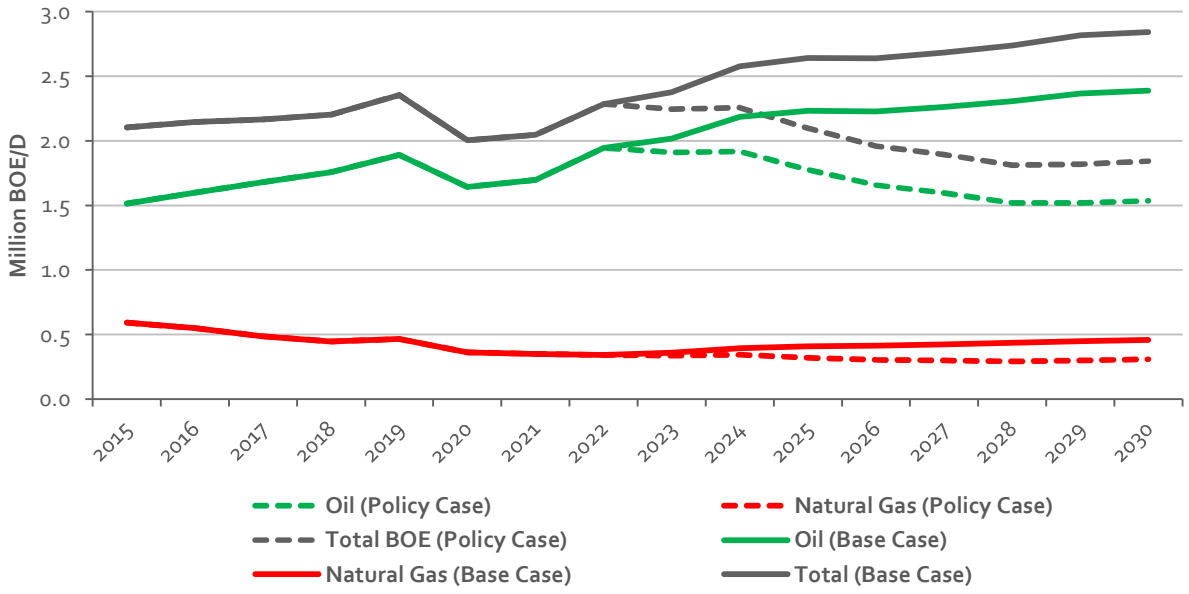
Source: Energy and Industrial Advisory Partners

Production

To develop the production forecasts for this report, project development (in addition to the existing production base) was modeled utilizing key indicators such as the water depth of the project, the number of producing wells, per well production, and assumptions on peak production years, and decline rates. The Policy Case modeled the impact of reduced and delayed project development on production.

The average production from 2022 to 2030 in the Base Case is around 2.6 million barrels of oil equivalent. The average production in the Policy Case over the same time period is slightly above 2 million barrels of oil equivalent, a 23% reduction. In 2030, production is projected to be around 1 million barrels of oil equivalent per day lower than the base case, around a 35 percent reduction. (Figure 22)

Figure 22: Projected Base Case vs. Policy Case OCS Oil and Natural Gas Production (BOE/D)

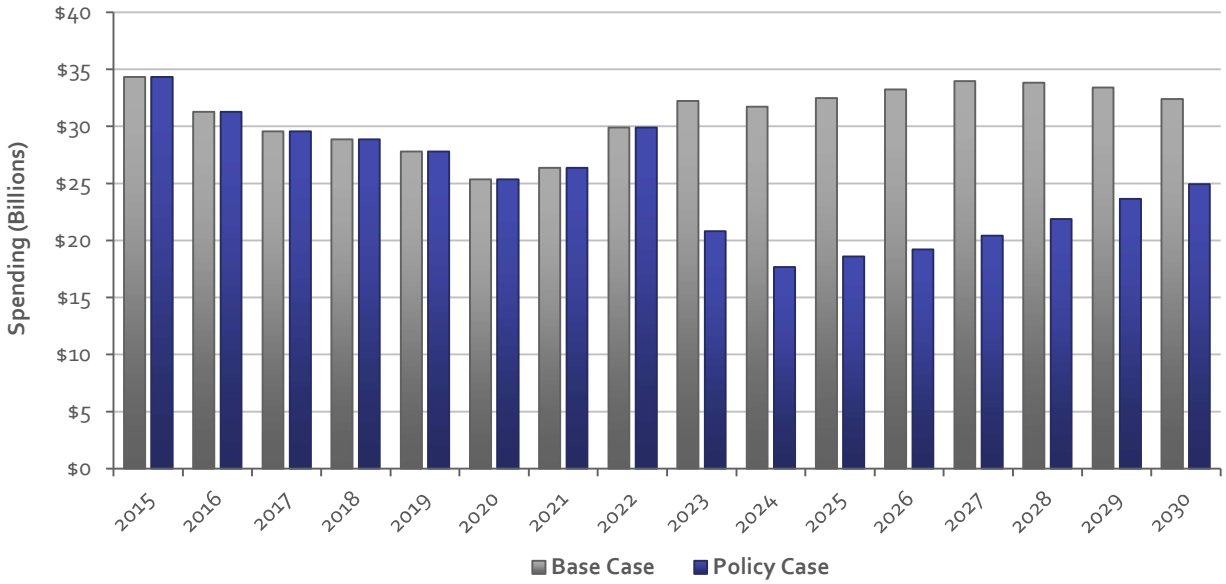


Source: Energy and Industrial Advisory Partners

Spending

In the Policy Case, spending is projected at just under $21.9 billion on average per year from 2022-2030, a 33 percent reduction from the nearly $32.6 billion in the Base Case. In 2030, spending is projected to be about $7.4 billion lower than Base Case spending of just below $32.4 billion, a 23 percent reduction. (Figure 23)

Figure 23: Projected Base Case vs. Policy Case OCS Offshore Oil and Natural Gas Spending



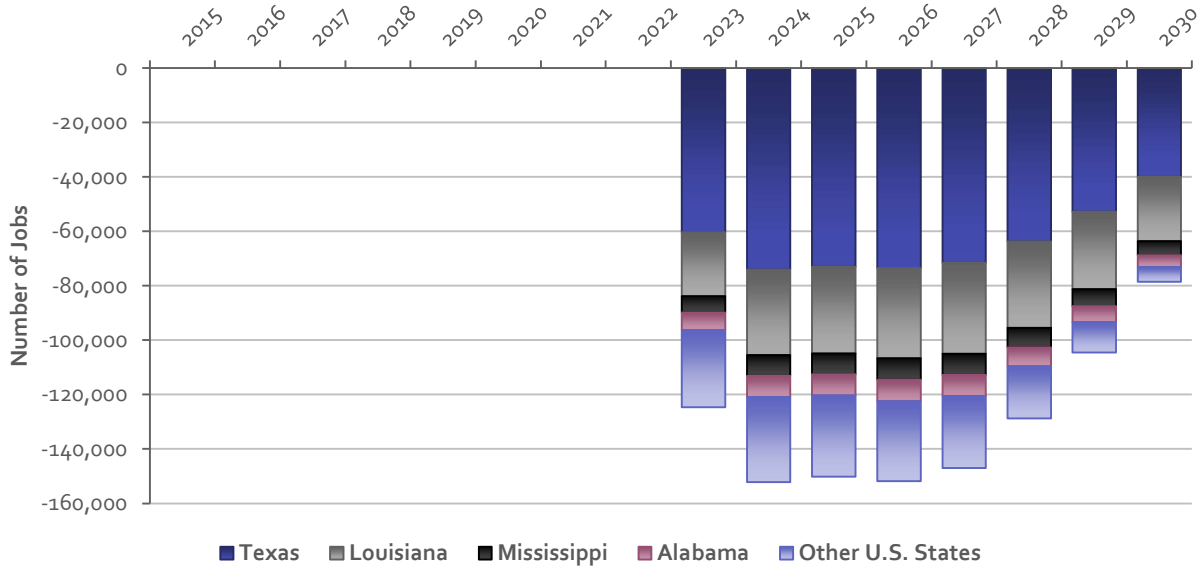
Source: Energy and Industrial Advisory Partners

Employment

This study projects that in the Base Case, during the 2022 to 2030 forecast period, an annual average of around 394 thousand jobs nationally will be supported by OCS offshore oil and natural gas activity. In the Policy Case, average employment is projected to decline to about 279 thousand jobs supported annually (a 29 percent reduction). In 2030, employment supported by the offshore oil and natural gas industry is projected to decline to just over 312 thousand jobs supported in the Policy Case, compared to just below 391 thousand jobs in the Base Case, a 20 percent reduction.

In the Policy Case, Texas' average annual supported employment across the forecast period is projected to decline from just above 169 thousand jobs to just below 113 thousand jobs (a 33 percent decline. Louisiana's average supported employment is projected at nearly 83 thousand jobs in the Policy Case, compared to about 108 thousand jobs in the Base Case. Alabama is projected to see average annual supported employment decline from over 30 thousand jobs to about 24 thousand jobs, a 20 percent decline. Mississippi is projected to see average annual supported employment decline from about 23 thousand jobs to slightly over 17 thousand jobs, a 26 percent decline. The rest of the U.S. is projected to see average annual supported employment decline from nearly 63 thousand jobs to just below 43 thousand jobs, a 32 percent decline. (Figure 24)

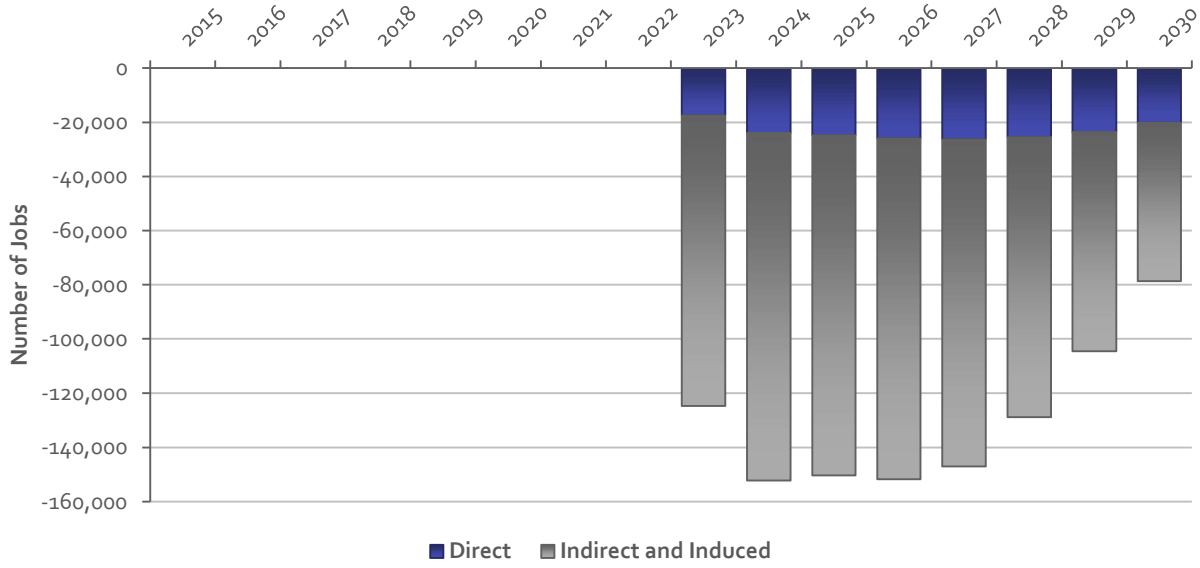
Figure 24: Projected Policy Case OCS Offshore Oil and Natural Gas Supported Employment Reductions



Source: Energy and Industrial Advisory Partners

The OCS offshore oil and natural gas industry supports employment through direct employment by the industry, indirect employment by its suppliers, and induced employment due to increased spending by workers. Across the 2022 to 2030 forecast period, direct employment is projected to average around 81 thousand jobs each year in the Base Case. In the Policy Case, average direct employment across the forecast period is projected at nearly 60 thousand jobs, a slightly below 26 percent decrease. Across the 2022 to 2030 forecast period, supported indirect and induced employment in the Policy Case is projected at around 219 thousand jobs on average, compared to around 313 thousand jobs in the Base Case, a 30 percent decrease. (Figure 25)

Figure 25: Projected Policy Case OCS Offshore Oil and Natural Gas Direct and Indirect and Induced Supported Employment Reductions

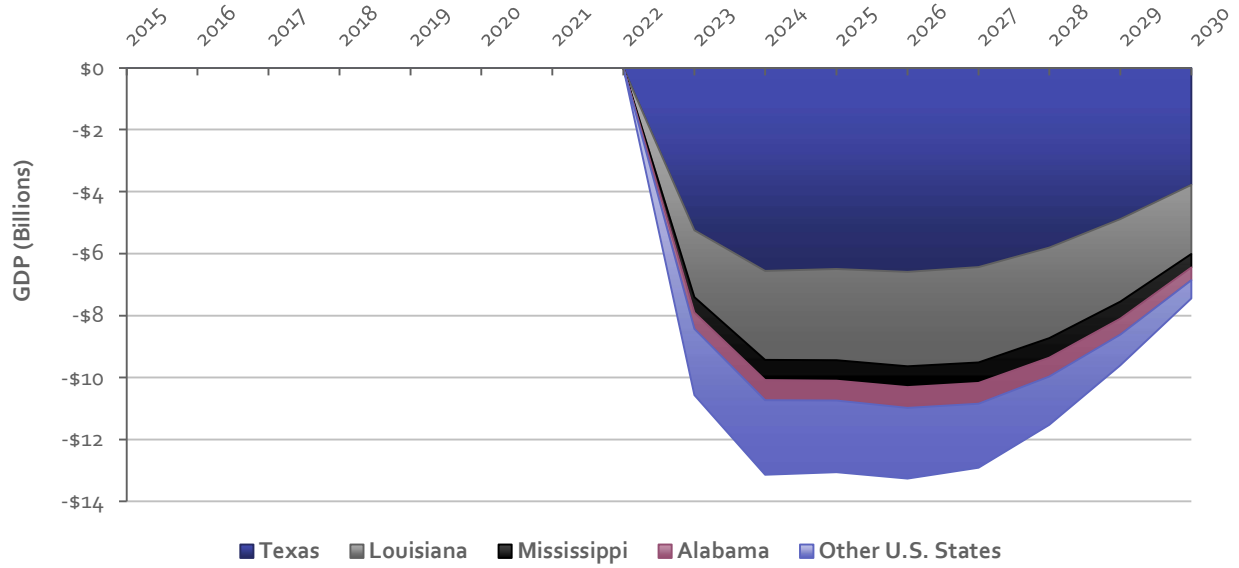


Source: Energy and Industrial Advisory Partners

GDP

The OCS offshore oil and natural gas industry supports significant gross domestic product (GDP) levels in the Gulf Coast states' economies and the national economy. On average, the OCS offshore oil and natural gas industry is projected to contribute just under $33.3 billion to the national GDP annually over the forecast period in the Base Case. In the Policy Case, annual contributions to GDP are projected to average over $23 billion, around a 31 percent reduction. (Figure 26)

Figure 26: Projected Policy Case OCS Offshore Oil and Natural Gas Contributions to GDP Reductions



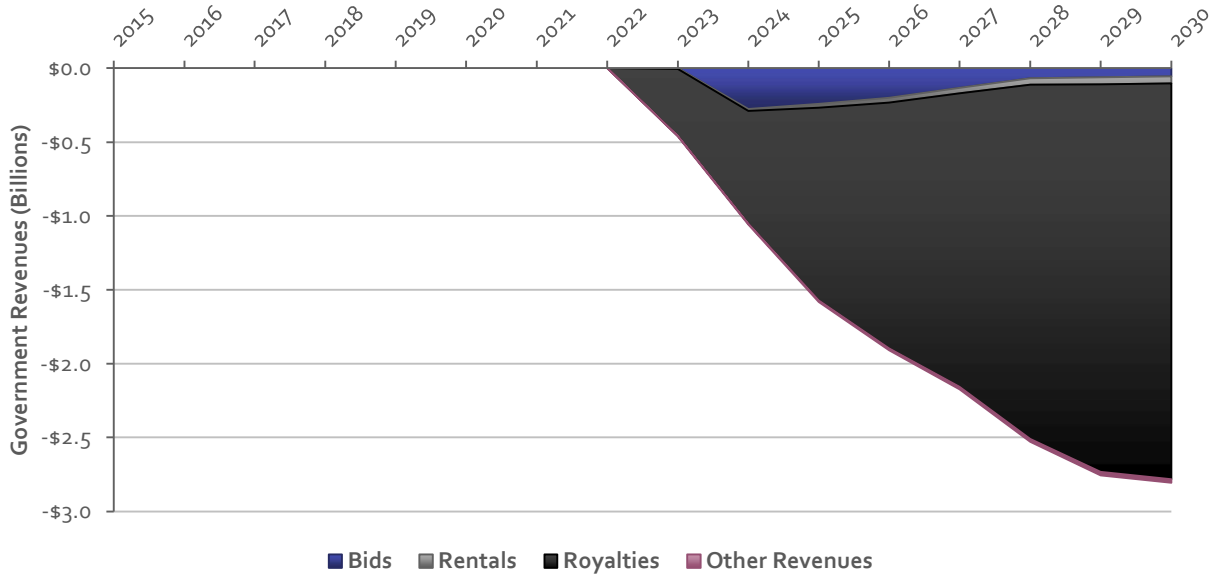
Source: Energy and Industrial Advisory Partners

Government Revenues

In the Base Case developed for this report, average annual government revenues across the 2022 to 2030 forecast period due to OCS offshore oil and natural gas activities (excluding personal and corporate income taxes and property taxes) are projected at over $7.6 billion per year. In the Policy Case, revenues are projected at an average of around $5.9 billion annually, a 22 percent reduction.

Across the 2022 to 2030 forecast period, average royalty revenues are projected to be reduced from slightly under $7.2 billion in the Base Case to about $5.6 billion per year in the Policy Case, a 21 percent reduction. Bid revenues are projected to decline from an average of about $274 million per year in the Base Case to just below $160 million per year in the Policy Case, a 42 percent reduction. Rental revenues are projected to decline from around $124 million per year on average in the Base Case to just above $96 million, a 23 percent reduction. Other revenues are projected to decline to around $49 million per year on average in the Policy Case compared to nearly $63 million, a 21 percent reduction in the Base Case. (Figure 27)

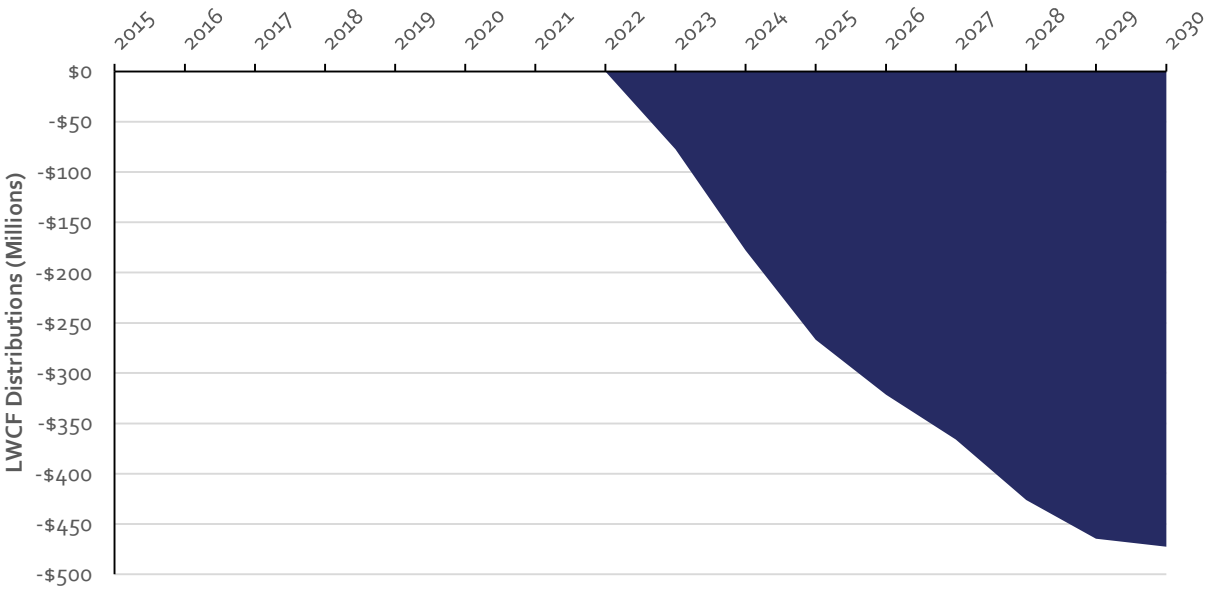
Figure 27: Projected Policy Case OCS Offshore Oil and Natural Gas Government Revenue Reductions by Type



Source: Energy and Industrial Advisory Partners

In the Policy Case, distributions to states due to GOMESA are projected to be relatively in line with distributions in the Base Case due to the cap on distributions to states. If this cap were removed or increased, distributions to states would likely be reduced. Distributions to the LWCF due to GOMESA are also projected to be relatively in line with those in the Base Case. Non-GOMESA distributions to the LWCF due to offshore activities are projected to average just over $1 billion compared to around $1.28 billion in the Base Case, an around 22 percent reduction. (Figure 28)

Figure 28: Projected Policy Case OCS LWCF Distribution Reductions



Source: Energy and Industrial Advisory Partners

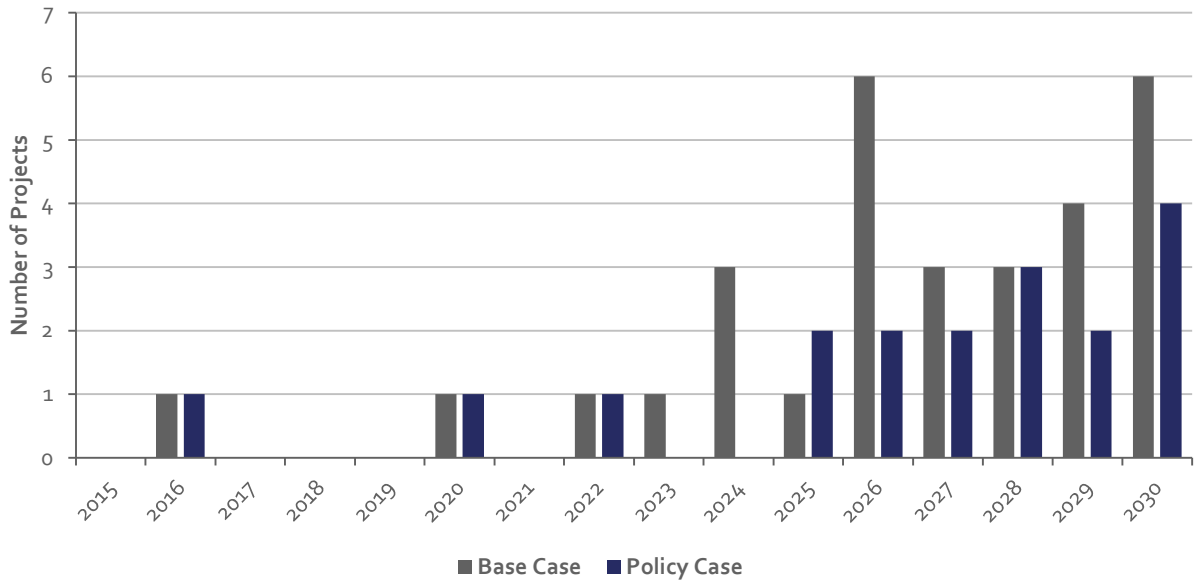
Offshore Wind Policy Case Impacts

Reduced vessel availability for identification, preparation, and construction of offshore wind projects is projected to significantly reduce the development of offshore wind projects over the next decade. This change is projected to lead to reduced domestic energy production, industry spending, and subsequent economic impacts. For the purpose of this report, a "Policy Case" was developed to compare activity levels (project executions, spending, installed generation capacity), economic impacts, and government revenues to the Base Case Scenario. This scenario also assumes no other major policy or regulatory changes impacting the offshore wind industry would be enacted.

Projects

Development of new offshore wind projects drives capital and operational spending, supported employment, electricity production, and subsequent government revenues. In the Policy Case, across the 2022-2030 forecast period, new project startups are projected to decline by 42 percent, from 28 to 16. (Figure 29)

Figure 29: Projected Base Case vs. Policy Case Offshore Wind Project Startups by Year

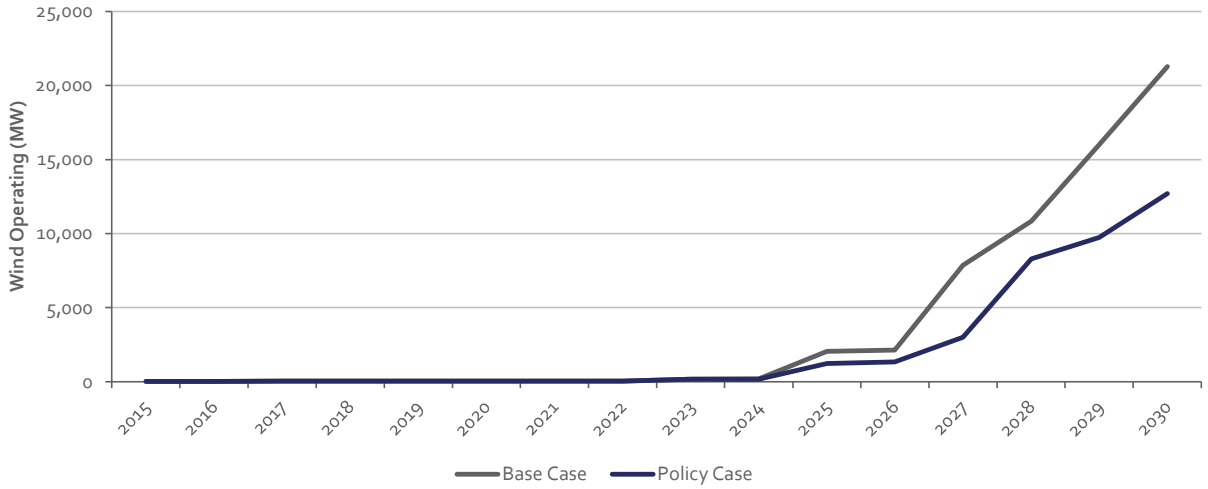


Source: Energy and Industrial Advisory Partners

Generation Capacity

Reduced offshore wind project development activity will significantly reduce installed electrical generation capacity. In 2030, generation capacity is projected to be around 12,700 megawatts, around 8,580 megawatts per day lower than the base case (an around 40 percent reduction). (Figure 30)

Figure 30: Projected Base Case vs. Policy Case Offshore Wind Generation Capacity

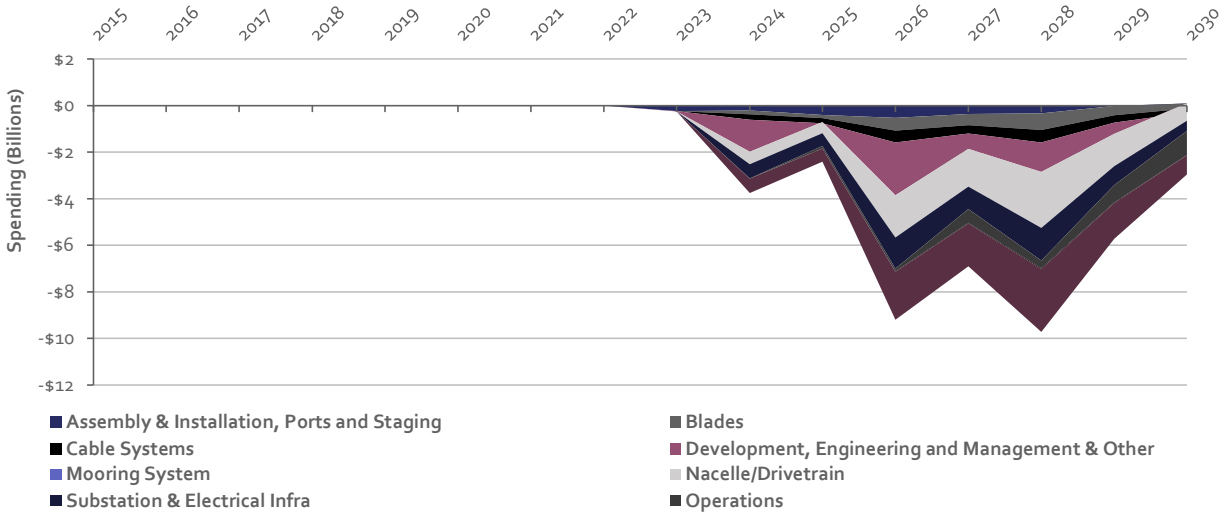


Source: Energy and Industrial Advisory Partners

Spending

In the Policy Case, spending is projected at an average of nearly $4.2 billion annually from 2022-2030, a 52 percent reduction from the over $8.7 billion in the Base Case. (Figure 31)

Figure 31: Projected Base Case vs. Policy Case Offshore Wind Spending



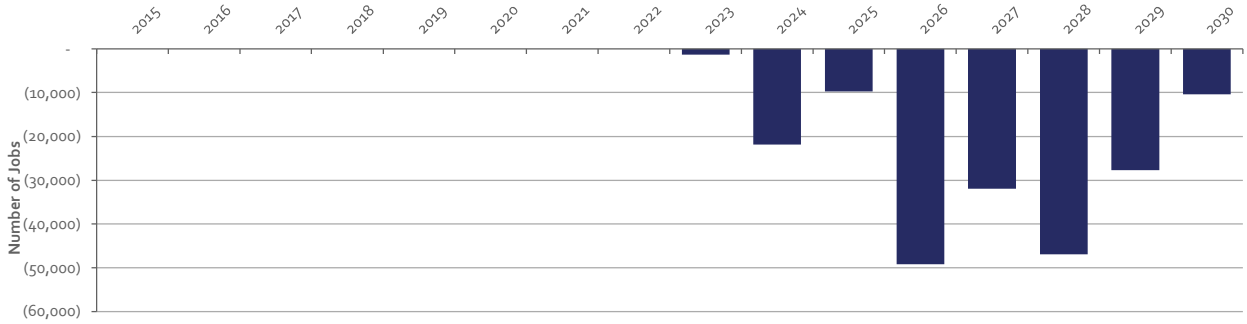
Source: Energy and Industrial Advisory Partners

Employment

As the offshore wind industry continues to grow and domestic content increases, the industry is projected to begin to support significant levels of employment. This study projects that in the Base Case, during the 2022 to 2030 forecast period, an annual average of just below 44 thousand jobs nationally will

be supported by offshore wind activity. In the Policy Case, average employment is projected to decline to nearly 22 thousand jobs supported annually, an approximately 50 percent reduction. (Figure 32)

Figure 32: Projected Policy Case Offshore Wind Supported Employment Reductions

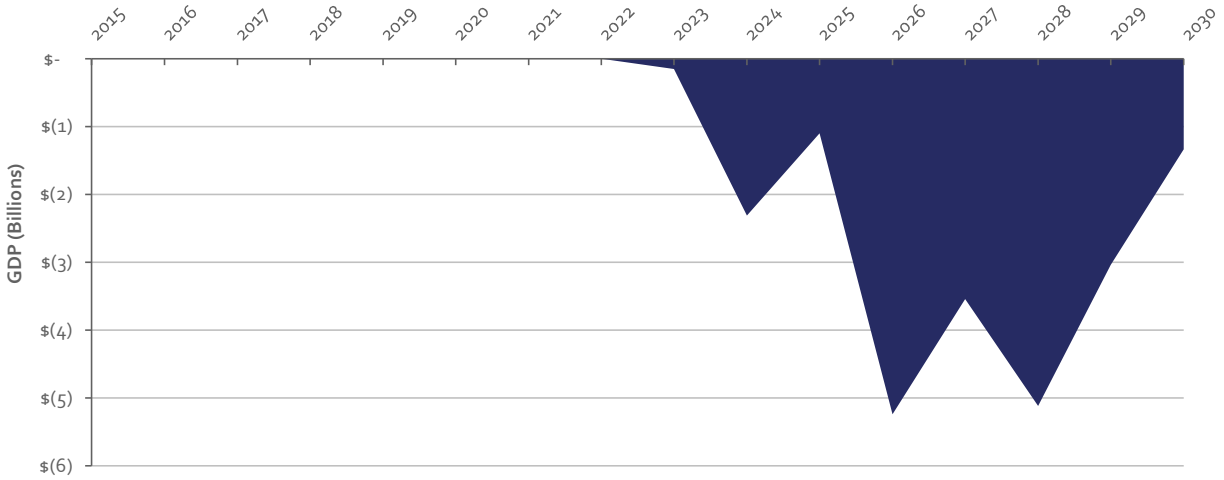


Source: Energy and Industrial Advisory Partners

GDP

As U.S. offshore wind industry activity and domestic content continue to grow, the industry is projected to begin to support significant levels of gross domestic product (GDP). On average, the offshore wind industry is projected to contribute just under $4.8 billion to the national GDP annually over the forecast period in the Base Case. In the Policy Case, annual contributions to GDP are projected to average around $2.3 billion, around a 51 percent reduction. (Figure 33)

Figure 33: Projected Policy Case OCS Offshore Wind Contributions to GDP Reductions

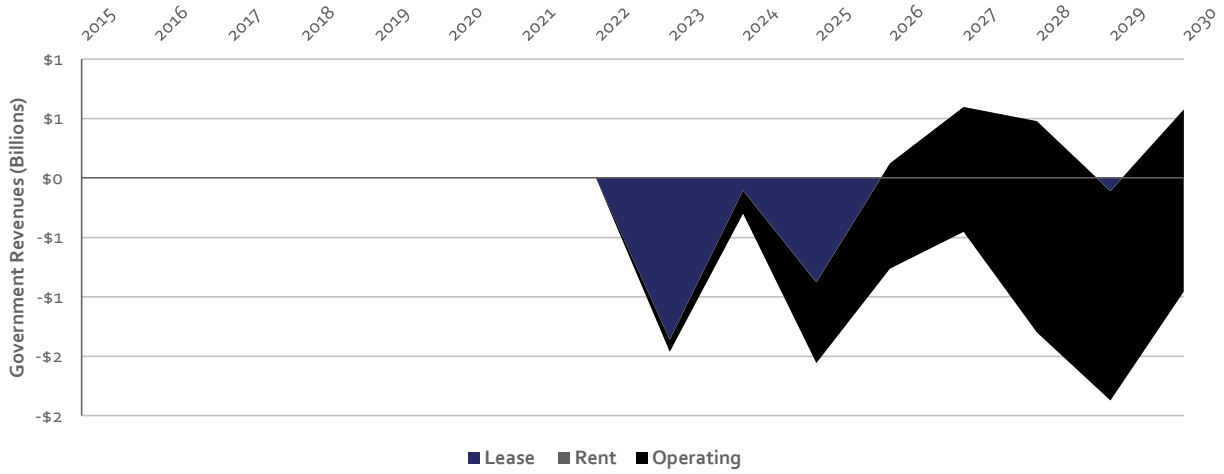


Source: Energy and Industrial Advisory Partners

Government Revenues

In the Base Case developed for this report, average annual government revenues from offshore wind activity across the 2022 to 2030 forecast period (excluding personal and corporate income taxes and property taxes) are projected at over $4.5 billion per year. In the Policy Case, revenues are projected at an average of around $3.5 billion per year, about a 21 percent reduction. (Figure 34)

Figure 34: Projected Policy Case OCS Offshore Wind Government Revenue Reductions by Ty



Source: Energy and Industrial Advisory Partners

Conclusions

The offshore energy sector is a major (and growing) contributor to domestic energy production. Both offshore oil and natural gas and offshore wind are projected to play a major role in meeting our energy needs. A wide variety of specialized vessels are required for offshore energy project development and operations. Changing the crewing requirements for these vessels, many of which are foreign flagged, would significantly reduce vessel availability due to the lack of qualified American mariners, support, and operations personnel. This change would drastically reduce vessel availability, especially for specialized drilling and construction vessels required for offshore energy development. A drastic reduction in these vessels' availability would likely severely impact offshore energy development activity in the U.S. This reduction in development activity is projected to lead to reduced industry spending, supported employment and GDP, government revenues, oil and natural gas production, and electrical generation capacity. (Table 7)

Table 7: Key Findings

		Policy Case Impacts		
Economic Impact	**Base Case Average (2022-2030)**	**Maximum Year Impact**	**Average Impact (2022-2030)**	**Cumulative Impact (2022-2030)**
Capital Investment and Spending ($ Billions)	$41.3	-$23.3 (2026)	-$15.2	-$137.1
Employment (Jobs)	438,332	-200,946 (2026)	-137,432	N/A
Contributions to GDP ($ Billions)	$36.2	-$18.5 (2026)	-$12.6	-$113.4
Government Revenues ($ Billions)	$12.2	-$4.6 (2029)	-$1.4	-$23.9
Oil and Natural Gas Production (MMBOED)	2.62	-1.00 (2030)	-0.60	-2 Billion Barrels
Offshore Wind Generation Capacity (MW)	6,727	-8,587 (2030)	-2,654	N/A

Source: Energy and Industrial Advisory Partners

Appendices

Methodology

Overall Methodology

As part of the development of this report, a detailed review of the potential impacts of a change to offshore energy construction vessel crewing requirements was to take place was conducted. This study is not exhaustive, especially considering the uncertainty around how the offshore energy industry would respond to these changes and a subsequent reduction in offshore energy vessel availability. This report focuses on the potential operational effects of these changes based on a reasonable reading of these proposals and considers the potential operational changes energy companies could undertake to minimize the effects of these changes on their operations. As such, this analysis is inherently forward-looking and subject to significant changes based on the potential development and implementation of policy changes by Congress, the executive branch, and regulators such as the Department of Homeland Security and the Coast Guard.

Scenario Development

The study's data development was undertaken by first developing a model that accounts for all major parts of the offshore oil and natural gas exploration and production lifecycle. A separate model was developed that accounts for all major parts of the offshore wind development lifecycle. The major sections of the offshore oil and natural gas model are: an Activity Model that assesses near term project activity, OCS reserves and production; and the likely project development and drilling activity necessary to meet production targets; a spending model derived from the activities required to develop and operate offshore oil and natural gas projects and reasonable assumptions around the spending levels typically associated with these activities; a government revenue model which uses forecast production levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and distributions and governmental policies to forecast potential government revenues; and an Economic Model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated supported economic activity including employment and gross domestic product.

The major sections of the offshore wind model are: an Activity Model that assesses near term project activity, known and underdevelopment offshore wind projects as well as stated state and Federal policy goals; and the likely project development necessary to meet generation targets; a spending model derived from the activities required to develop and operate offshore wind projects and reasonable assumptions around the spending levels typically associated with these activities based on the National Renewable Energy Laboratory's JEDI offshore wind model; a government revenue model which uses

forecast generation levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and governmental policies to forecast potential government revenues; and an Economic Model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated supported economic activity including employment and gross domestic product.

The Base Case model for offshore oil and natural gas was initially developed based on forecast production and pricing levels based on the Energy Information Administration's (EIA) Annual Energy Outlook 2022[14] for long-term prices and the EIA's Short-Term Energy Outlook[15] for the near term (2022 and 2023) prices. However, modifications to near-term pricing and production levels were made based on current market conditions. Although these forecasts were utilized to develop the Base Case model, due to differences in modeling techniques, especially the project-based model developed in this report, the report's forecast production levels vary from those provided in the EIA's forecasts.

Following the creation of the Base Case forecast, the potential effects of the additional scenario (reduced vessel availability due to attempted changes in crewing requirements for offshore energy vessels, the "Policy Case") was considered. Amongst other factors, how this scenario would impact new project development of both underway and future projects and existing producing projects were examined.

Project and Activity Methodology

When developing this study to forecast activity levels, near-term and longer-term projects not currently under development were considered. Near-term project activity forecasts are based on actual projects operators have stated development plans for or, in some cases, reasonable forecasts for other potential projects when no development decisions have taken place. For long-term activity, project forecasts are based primarily on projected production and generation levels and state and federal generation goals for offshore wind, with project development activity to meet projected production and generation forecasts.

For the Policy Case, the project and activity forecasts presented in the Base Case were used as a baseline for activity levels. For each case, a reasonable reading of this potential scenario's impacts on activity levels was then developed based on the forecast included in this report for offshore energy vessel availability.

Spending Methodology

The spending analysis developed for this report attempts to account for the totality of capital and operational spending associated with offshore oil and natural gas and wind project development throughout a project's lifecycle.

[14] Annual Energy Outlook 2022, Energy Information Administration
[15] Short Term Energy Outlook, May 6th, 2022, Energy Information Administration

Spending for each oil and gas project is divided into nineteen categories, and spending for each offshore wind project is divided into ten categories. Each category accounts for one general activity type required to find, develop, operate, or abandon an offshore energy project. Costs for each category were developed based on general project sizes (and the associated activity levels and equipment requirements), water depths, and other factors. The distribution of spending over time for each category for different project sizes and water depths was then developed.

After the overall spending forecast for OCS oil and natural gas activity was developed, spending was allocated to individual states and international suppliers. Domestic spending is allocated based on a category-by-category analysis of supply chains and Bureau of Economic Analysis data to provide state-specific spending allocations. Spending with international suppliers is not analyzed further and accounts for no economic impacts in the report. Oil and natural gas spending distributions are constant throughout the scenarios presented in this report. It is possible that reduced activity levels may lead to changes in supply chains and thus spending distributions. Offshore wind spending is projected to see growing domestic content throughout the forecast period.

Economic Methodology

The Bureau of Economic Analysis' RIMS II input-output multipliers were used to develop this report's employment and gross domestic product analysis. These multipliers provide state-level employment and gross domestic product estimates based on industry-specific spending levels. For this report, economic activity was also divided into direct (directly related to industries involved in the offshore energy supply chain) and indirect and induced (industries not directly involved in the offshore energy supply chain and economic activity due to increased wages), employment and gross domestic product.

The following RIMS industry categories were used in the development of the report to account for spending by the offshore energy industry (all RIMS categories were used in the output of data):

- Mining and oil and gas field machinery manufacturing
- Steel product manufacturing from purchased steel
- Fabricated metal product manufacturing
- Construction
- Drilling oil and gas wells
- Architectural, engineering, and related services
- Support activities for oil and gas operations
- Natural gas distribution
- Mechanical power transmission equipment manufacturing
- Laminated plastics plate, sheet (except packaging), and shape manufacturing
- Cut stone and stone product manufacturing
- Spring and wire product manufacturing

- Power, distribution, and specialty transformer manufacturing
- Communication and energy wire and cable manufacturing
- Water transportation

Government Revenue Methodology

Government revenues due to offshore oil and natural gas activity are primarily derived from three main revenue streams, royalties paid on produced oil and natural gas, bonus bids paid to acquire blocks in lease sales, and rents for blocks leased by operators. Several policies impact royalty and lease payments received by the Federal Government, including royalty relief for certain blocks depending on production levels and differing rent and royalty regimes for fields in different water depths and blocks leased at different times. Additionally, the value of oil and natural gas produced in the OCS may differ from major indicators such as West Texas Intermediate (WTI) crude due to transportation costs, long-term sales contracts, and differentials due to product quality and location. Data from the Office of Natural Resource Revenue[16] (ONRR) and oil and natural gas price projections from the Energy Information Administration's Annual Energy Outlook 2022[17] and Short-Term Energy Outlook[18] were utilized to calculate government revenues due to offshore oil and natural gas activities. In some cases (especially regarding disbursements to states), calendar year data was unavailable. In these cases, fiscal year data was utilized as a stand-in for calendar year data. Lease sale bid and rental revenues were calculated through the simulation of yearly lease sales based on the return to a regular leasing schedule in 2025. The number of leases acquired and retained was modeled on the oil price forecasts used to develop the report and historical bid numbers and levels correlated with activity levels.

In 2006 Congress passed the OCS Energy Security Act (GOMESA), which created revenue-sharing provisions for the four Gulf oil and natural gas producing states (Alabama, Louisiana, Mississippi, and Texas) and their coastal political subdivisions. Revenue sharing was enacted in two phases beginning in 2007 and 2017, respectively, with revenue sharing caps of $375 million for fiscal years 2017–2019, $487.5 million for 2020 and 2021, and $375 million for 2022–2055 enacted. Total projected Federal Government revenues, actual revenue distribution data from the ONRR, analysis of the growth of revenue sharing based on eligible leases, and the revenue sharing caps were considered to develop the revenue sharing forecasts in this report.

In addition to provisions for revenue sharing with the OCS producing States, GOMESA also included a provision for distributions to the Land and Water Conservation Fund (LWCF). The LWCF "supports the protection of federal public lands and waters – including national parks, forests, wildlife refuges, and recreation areas – and voluntary conservation on private land. LWCF investments secure public access, improve recreational opportunities, and preserve ecosystem benefits for local communities."[19] LWCF

[16] U.S. Department of the Interior, Natural Resources Revenue Data, https://revenuedata.doi.gov/
[17] Annual Energy Outlook 2022, Energy Information Administration
[18] Short Term Energy Outlook, May 6th, 2022, Energy Information Administration
[19] Land and Water Conservation Fund, U.S. Department of the Interior

distribution forecasts are based on total projected Federal Government revenues, actual distribution data from the ONRR, and analysis of revenue sharing growth based on eligible leases and revenue sharing caps.

Offshore wind development and operations contributions to government revenues are primarily derived from three main revenue streams; payments from installed projects, bids paid to acquire blocks in lease sales, and rents for blocks leased by operators. To calculate government revenues due to offshore wind activities, data from historical lease sales, including bids, rents, and operating fees, were utilized as the basis of the forecast, along with forecasts for bidding, development, and operations activities.

Data Tables by Case

OCS Economic Impacts

Table 8: Projected Base Case OCS Oil and Natural Gas Production (BOE/D)

	2015	2016	2017	2018	2019	2020	2021	2022
Oil	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167	1,644,083	1,696,200	1,945,162
Natural Gas	589,930	548,251	484,225	445,142	463,627	360,395	349,089	339,839
Total BOE	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794	2,004,478	2,045,289	2,285,001

	2023	2024	2025	2026	2027	2028	2029	2030
Oil	2,018,640	2,185,452	2,233,902	2,228,199	2,260,732	2,306,239	2,367,733	2,387,588
Natural Gas	357,652	393,450	407,688	411,664	421,572	434,033	448,730	456,204
Total BOE	2,376,292	2,578,902	2,641,590	2,639,863	2,682,304	2,740,273	2,816,463	2,843,792

Source: Energy and Industrial Advisory Partners

Table 9: Projected Base Case OCS Offshore Oil and Natural Gas Spending $ Millions

	2015	2016	2017	2018	2019
G&G	$215	$189	$167	$160	$156
Drilling Tangibles	$1,448	$1,265	$1,227	$1,211	$1,310
Trees	$805	$680	$611	$627	$451
Manifolds	$425	$358	$321	$328	$237
Other Subsea Hardware	$168	$145	$143	$143	$130
Control Umbilical, Flying Leads	$495	$412	$366	$373	$268
Infield FL	$166	$127	$114	$119	$102
Export PL	$1,162	$892	$781	$782	$658
Infield Risers	$85	$66	$60	$61	$53
Export Risers	$44	$33	$29	$30	$25
Fixed Platforms & Facilities	$270	$204	$166	$135	$114
Floating Production Units & Facilities	$1,558	$1,320	$1,082	$1,155	$825
Installation	$2,269	$1,640	$1,527	$1,439	$1,328
OPEX	$13,502	$13,721	$13,783	$13,816	$13,829
Decommissioning CAPEX	$1,257	$1,150	$1,212	$1,100	$773
Drilling	$8,363	$7,157	$6,112	$5,560	$5,847
Engineering CAPEX	$1,063	$874	$808	$792	$663
Engineering OPEX	$844	$858	$861	$863	$864
Natural Gas Processing and Transportation	$199	$189	$172	$163	$157
Total	$34,338	$31,281	$29,542	$28,857	$27,789

Source: Energy and Industrial Advisory Partners

Table 9: Projected Base Case OCS Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2020	2021	2022	2023	2024
G&G	$176	$192	$236	$260	$274
Drilling Tangibles	$1,159	$863	$1,210	$1,422	$1,329
Trees	$328	$506	$541	$495	$464
Manifolds	$167	$261	$281	$258	$242
Other Subsea Hardware	$81	$90	$129	$133	$122
Control Umbilical, Flying Leads	$182	$308	$342	$314	$291
Infield FL	$44	$68	$111	$107	$91
Export PL	$223	$358	$680	$686	$587
Infield Risers	$22	$33	$53	$52	$44
Export Risers	$8	$14	$27	$27	$23
Fixed Platforms & Facilities	$76	$88	$143	$151	$146
Floating Production Units & Facilities	$880	$1,760	$1,833	$1,540	$1,467
Installation	$752	$1,038	$1,511	$1,552	$1,298
OPEX	$12,276	$13,474	$13,583	$14,317	$14,352
Decommissioning CAPEX	$696	$858	$785	$827	$754
Drilling	$6,892	$4,882	$6,719	$8,404	$8,625
Engineering CAPEX	$506	$679	$816	$807	$734
Engineering OPEX	$877	$886	$894	$895	$897
Natural Gas Processing and Transportation	$144	$124	$131	$127	$135
Total	$25,344	$26,359	$29,893	$32,246	$31,740

Source: Energy and Industrial Advisory Partners

Table 9: Projected Base Case OCS Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2025	2026	2027	2028	2029	2030
G&G	$290	$303	$307	$301	$284	$261
Drilling Tangibles	$1,308	$1,341	$1,400	$1,422	$1,402	$1,313
Trees	$477	$502	$512	$485	$445	$406
Manifolds	$249	$263	$271	$258	$237	$215
Other Subsea Hardware	$126	$132	$139	$138	$130	$120
Control Umbilical, Flying Leads	$299	$315	$322	$306	$280	$257
Infield FL	$92	$95	$99	$94	$85	$80
Export PL	$587	$628	$697	$709	$658	$595
Infield Risers	$45	$47	$50	$49	$45	$41
Export Risers	$23	$24	$26	$26	$24	$22
Fixed Platforms & Facilities	$170	$218	$249	$249	$230	$211
Floating Production Units & Facilities	$1,467	$1,412	$1,320	$1,137	$1,100	$1,100
Installation	$1,320	$1,344	$1,349	$1,277	$1,138	$1,082
OPEX	$14,370	$14,417	$14,480	$14,587	$14,690	$14,783
Decommissioning CAPEX	$827	$757	$803	$733	$781	$710
Drilling	$9,182	$9,798	$10,274	$10,411	$10,264	$9,609
Engineering CAPEX	$750	$757	$771	$730	$697	$656
Engineering OPEX	$898	$901	$905	$912	$918	$924
Natural Gas Processing and Transportation	$141	$145	$148	$152	$156	$159
Total	$32,480	$33,254	$33,974	$33,823	$33,408	$32,384

Source: Energy and Industrial Advisory Partners

Table 10: Projected Base Case OCS Offshore Oil and Natural Gas Supported Employment (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021	2022
Texas	183,868	166,737	158,715	155,767	147,462	133,381	136,682	155,565
Louisiana	102,936	98,247	94,932	95,089	94,621	89,432	89,175	97,405
Mississippi	23,024	21,524	20,740	20,926	20,415	19,110	19,116	21,316
Alabama	31,413	29,595	28,870	29,053	28,011	25,157	26,508	28,836
Other U.S. States	76,183	65,041	60,861	59,631	54,989	43,624	52,990	63,843
Total	417,424	381,144	364,119	360,465	345,498	310,703	324,472	366,966

	2023	2024	2025	2026	2027	2028	2029	2030
Texas	167,993	164,396	168,592	172,377	177,074	176,230	174,127	167,638
Louisiana	106,104	106,074	108,066	110,183	112,290	112,887	112,670	110,519
Mississippi	23,081	22,870	23,356	23,791	24,307	24,324	24,208	23,597
Alabama	30,619	30,120	30,574	30,933	31,491	31,418	31,288	30,661
Other U.S. States	65,404	61,816	62,938	63,743	64,253	62,361	60,356	58,531
Total	393,201	385,277	393,526	401,027	409,415	407,219	402,649	390,946

Source: Energy and Industrial Advisory Partners

Table 11: Projected Base Case OCS Offshore Oil and Natural Gas Direct vs. Indirect and Induced Supported Employment (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021	2022
Direct	75,446	72,786	70,085	68,677	69,356	66,074	65,276	70,855
Indirect and Induced	341,978	308,358	294,034	291,788	276,142	244,629	259,196	296,111
Total	417,424	381,144	364,119	360,465	345,498	310,703	324,472	366,966

	2023	2024	2025	2026	2027	2028	2029	2030
Direct	78,189	78,859	80,460	82,327	83,885	84,638	84,604	83,142
Indirect and Induced	315,013	306,418	313,067	318,701	325,530	322,581	318,044	307,804
Total	393,201	385,277	393,526	401,027	409,415	407,219	402,649	390,946

Source: Energy and Industrial Advisory Partners

Table 12: Projected Base Case OCS Offshore Oil and Natural Gas Contributions to GDP $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
Texas	$15,587	$14,208	$13,469	$13,196	$12,638	$11,677	$11,769	$13,377
Louisiana	$8,675	$8,268	$7,950	$7,929	$7,933	$7,576	$7,453	$8,182
Mississippi	$1,702	$1,586	$1,515	$1,525	$1,504	$1,436	$1,399	$1,580
Alabama	$2,562	$2,432	$2,368	$2,381	$2,323	$2,109	$2,198	$2,384
Other U.S. States	$5,768	$5,017	$4,693	$4,609	$4,291	$3,497	$4,138	$4,931
Total	$34,294	$31,511	$29,994	$29,640	$28,690	$26,296	$26,957	$30,455

	2023	2024	2025	2026	2027	2028	2029	2030
Texas	$14,541	$14,330	$14,713	$15,085	$15,487	$15,450	$15,277	$14,731
Louisiana	$8,969	$8,994	$9,178	$9,383	$9,572	$9,634	$9,612	$9,417
Mississippi	$1,728	$1,721	$1,762	$1,803	$1,845	$1,850	$1,840	$1,790
Alabama	$2,543	$2,516	$2,553	$2,589	$2,634	$2,635	$2,626	$2,579
Other U.S. States	$5,081	$4,867	$4,960	$5,033	$5,077	$4,948	$4,819	$4,681
Total	$32,862	$32,428	$33,166	$33,893	$34,614	$34,518	$34,175	$33,198

Source: Energy and Industrial Advisory Partners

Table 13: Projected Base Case OCS Offshore Oil and Natural Gas Government Revenues by Type $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
Bids	$556	$158	$374	$291	$387	$165	$112	$0
Rentals	$201	$133	$111	$103	$107	$94	$83	$109
Royalties	$3,251	$2,408	$3,262	$4,715	$4,852	$2,716	$4,250	$8,611
Other Revenues	-$8	$25	$33	$54	$15	-$14	$104	$75
Total	$4,000	$2,723	$3,780	$5,163	$5,361	$2,961	$4,549	$8,795

	2023	2024	2025	2026	2027	2028	2029	2030
Bids	$0	$301	$375	$418	$423	$343	$309	$299
Rentals	$113	$123	$126	$126	$128	$130	$134	$135
Royalties	$8,316	$6,175	$6,372	$6,475	$6,760	$7,048	$7,351	$7,534
Other Revenues	$73	$54	$56	$57	$59	$62	$64	$66
Total	$8,501	$6,652	$6,928	$7,075	$7,370	$7,583	$7,858	$8,034

Source: Energy and Industrial Advisory Partners

Table 14: Projected Base Case OCS Offshore Oil and Natural Gas Government Revenues by State $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
Texas	$0.29	$0.04	$0.12	$50.62	$57.89	$95.28	$67.38	$101.23
Louisiana	$0.82	$0.10	$0.32	$82.84	$94.73	$155.72	$109.95	$165.44
Mississippi	$0.67	$0.08	$0.25	$27.75	$31.72	$51.91	$36.52	$55.16
Alabama	$0.67	$0.09	$0.26	$26.78	$30.60	$50.05	$35.05	$53.17
Total	$2.44	$0.31	$0.96	$187.99	$214.94	$352.96	$375.00	$375.00

	2023	2024	2025	2026	2027	2028	2029	2030
Texas	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23
Louisiana	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44
Mississippi	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16
Alabama	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17
Total	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00

Source: Energy and Industrial Advisory Partners

Table 15: Projected Base Case LWCF Distributions $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
LWCF	$0.89	$0.88	$0.89	$0.89	$0.88	$0.90	$0.89	$1.48
LWCF - GOMESA	$0.00	$0.00	$0.07	$0.08	$0.13	$0.08	$0.09	$0.13
Total	$0.89	$0.88	$0.96	$0.97	$1.01	$0.98	$0.98	$1.61

	2023	2024	2025	2026	2027	2028	2029	2030
LWCF	$1.43	$1.12	$1.17	$1.19	$1.24	$1.28	$1.32	$1.35
LWCF - GOMESA	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13
Total	$1.56	$1.25	$1.29	$1.32	$1.37	$1.40	$1.45	$1.48

Source: Energy and Industrial Advisory Partners

Table 16: Projected Base Case Offshore Wind Indicators

	2015	2016	2017	2018	2019	2020	2021	2022
Project Developed	0	1	0	0	0	1	0	1
MW Operating	0	0	30	30	29	29	40	39
Jobs	56	1,065	289	288	41	395	380	4,195
GDP ($ Millions)	$6	$110	$32	$32	$4	$41	$42	$430
Government Revenue ($ Millions)	$6	$53	$19	$10	$418	$14	$31	$4,821

	2023	2024	2025	2026	2027	2028	2029	2030
Project Developed	1	3	1	6	3	3	4	6
MW Operating	169	176	2,037	2,125	7,865	10,847	16,003	21,279
Jobs	2,639	23,248	12,964	59,202	52,937	83,521	85,583	70,470
GDP ($ Millions)	$294	$2,469	$1,455	$6,326	$5,820	$9,145	$9,324	$7,863
Government Revenue ($ Millions)	$1,641	$2,066	$3,832	$4,110	$4,519	$5,657	$6,668	$7,345

Source: Energy and Industrial Advisory Partners

Table 17: Projected Base Case Offshore Wind Spending ($Millions)

	2015	2016	2017	2018	2019	2020	2021	2022
Assembly, Installation, Ports and Staging	$10	$10	$0	$0	$4	$4	$45	$47
Blades	$0	$4	$3	$3	$0	$1	$1	$12
Cable Systems	$0	$22	$14	$14	$0	$6	$6	$70
Development, Engineering and Management & Other	$0	$65	$0	$0	$0	$26	$0	$283
Mooring System	$0	$0	$0	$0	$0	$0	$0	$0
Nacelle/Drivetrain	$0	$13	$9	$9	$0	$4	$3	$41
Substation & Elect. Infra	$0	$53	$35	$35	$0	$14	$14	$171
Operations	$0	$0	$4	$4	$3	$3	$5	$5
Scour Protection	$0	$0	$0	$0	$0	$0	$0	$1
Tower, Monopile, Hull, Foundation	$0	$17	$11	$11	$0	$5	$4	$54
Total	$10	$184	$75	$75	$8	$63	$78	$683

	2023	2024	2025	2026	2027	2028	2029	2030
Assembly, Installation, Ports and Staging	$231	$240	$495	$746	$709	$913	$650	$572
Blades	$12	$172	$166	$640	$721	$1,123	$1,075	$980
Cable Systems	$64	$298	$236	$580	$529	$837	$823	$759
Development, Engineering and Management & Other	$10	$1,370	$57	$2,706	$1,424	$2,388	$2,422	$895
Mooring System	$0	$0	$0	$0	$0	$0	$0	$3
Nacelle/Drivetrain	$40	$574	$555	$2,137	$2,407	$3,749	$3,588	$3,271
Substation & Elect. Infra	$157	$751	$601	$1,524	$1,412	$2,211	$2,136	$1,953
Operations	$20	$21	$244	$255	$944	$1,302	$1,920	$2,554
Scour Protection	$1	$10	$10	$38	$43	$68	$67	$61
Tower, Monopile, Hull, Foundation	$51	$668	$640	$2,426	$2,717	$4,233	$4,051	$3,756
Total	$587	$4,104	$3,005	$11,052	$10,907	$16,823	$16,732	$14,804

Source: Energy and Industrial Advisory Partners

Policy Case Impacts

Table 18: Projected Base Case vs. Policy Case OCS Oil and Natural Gas Production (BOE/D)

	2015	2016	2017	2018	2019
Oil (Policy Case)	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167
Oil (Base Case)	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167
Natural Gas (Policy Case)	589,930	548,251	484,225	445,142	463,627
Natural Gas (Base Case)	589,930	548,251	484,225	445,142	463,627
Total BOE (Policy Case)	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794
Total BOE (Base Case)	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794

	2020	2021	2022	2023	2024
Oil (Policy Case)	1,644,083	1,696,200	1,945,162	1,909,589	1,916,787
Oil (Base Case)	1,644,083	1,696,200	1,945,162	2,018,640	2,185,452
Natural Gas (Policy Case)	360,395	349,089	339,839	336,503	341,215
Natural Gas (Base Case)	360,395	349,089	339,839	357,652	393,450
Total BOE (Policy Case)	2,004,478	2,045,289	2,285,001	2,246,092	2,258,002
Total BOE (Base Case)	2,004,478	2,045,289	2,285,001	2,376,292	2,578,902

	2025	2026	2027	2028	2029	2030
Oil (Policy Case)	1,777,627	1,656,704	1,596,640	1,519,741	1,519,327	1,535,012
Oil (Base Case)	2,233,902	2,228,199	2,260,732	2,306,239	2,367,733	2,387,588
Natural Gas (Policy Case)	319,338	302,940	298,024	291,653	298,388	307,383
Natural Gas (Base Case)	407,688	411,664	421,572	434,033	448,730	456,204
Total BOE (Policy Case)	2,096,965	1,959,644	1,894,663	1,811,394	1,817,715	1,842,395
Total BOE (Base Case)	2,641,590	2,639,863	2,682,304	2,740,273	2,816,463	2,843,792

Source: Energy and Industrial Advisory Partners

Table 19: Projected Policy Case OCS Offshore Oil and Natural Gas Spending $ Millions

	2015	2017	2018	2019	2020
G&G	$215	$189	$167	$160	$156
Drilling Tangibles	$1,448	$1,265	$1,227	$1,211	$1,310
Trees	$805	$680	$611	$627	$451
Manifolds	$425	$358	$321	$328	$237
Other Subsea Hardware	$168	$145	$143	$143	$130
Control Umbilical, Flying Leads	$495	$412	$366	$373	$268
Infield FL	$166	$127	$114	$119	$102
Export PL	$1,162	$892	$781	$782	$658
Infield Risers	$85	$66	$60	$61	$53
Export Risers	$44	$33	$29	$30	$25
Fixed Platforms & Facilities	$270	$204	$166	$135	$114
Floating Production Units & Facilities	$1,558	$1,320	$1,082	$1,155	$825
Installation	$2,269	$1,640	$1,527	$1,439	$1,328
OPEX	$13,502	$13,721	$13,783	$13,816	$13,829
Decommissioning CAPEX	$1,257	$1,150	$1,212	$1,100	$773
Drilling	$8,363	$7,157	$6,112	$5,560	$5,847
Engineering CAPEX	$1,063	$874	$808	$792	$663
Engineering OPEX	$844	$858	$861	$863	$864
Natural Gas Processing and Transportation	$199	$189	$172	$163	$157
Total	$34,338	$31,281	$29,542	$28,857	$27,789

Source: Energy and Industrial Advisory Partners

Table 19: Projected Policy Case OCS Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2021	2022	2023	2024	2025
G&G	$176	$192	$236	$37	$26
Drilling Tangibles	$1,159	$863	$1,210	$433	$73
Trees	$328	$506	$541	$136	$98
Manifolds	$167	$261	$281	$70	$50
Other Subsea Hardware	$81	$90	$129	$44	$16
Control Umbilical, Flying Leads	$182	$308	$342	$87	$64
Infield FL	$44	$68	$111	$40	$18
Export PL	$223	$358	$680	$226	$110
Infield Risers	$22	$33	$53	$18	$8
Export Risers	$8	$14	$27	$9	$4
Fixed Platforms & Facilities	$76	$88	$143	$51	$103
Floating Production Units & Facilities	$880	$1,760	$1,833	$495	$458
Installation	$752	$1,038	$1,511	$585	$312
OPEX	$12,276	$13,474	$13,583	$14,139	$14,017
Decommissioning CAPEX	$696	$858	$785	$827	$754
Drilling	$6,892	$4,882	$6,719	$2,396	$453
Engineering CAPEX	$506	$679	$816	$325	$225
Engineering OPEX	$877	$886	$894	$884	$876
Natural Gas Processing and Transportation	$144	$124	$131	$119	$116
Total	$25,344	$26,359	$29,893	$20,803	$17,667

Source: Energy and Industrial Advisory Partners

Table 19: Projected Policy Case OCS Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2026	2027	2028	2029	2030
G&G	$39	$53	$70	$88	$106
Drilling Tangibles	$142	$203	$274	$350	$434
Trees	$125	$165	$232	$311	$381
Manifolds	$65	$86	$122	$163	$199
Other Subsea Hardware	$23	$29	$40	$57	$73
Control Umbilical, Flying Leads	$82	$105	$145	$196	$242
Infield FL	$25	$29	$37	$51	$69
Export PL	$173	$219	$290	$402	$500
Infield Risers	$11	$14	$18	$26	$34
Export Risers	$6	$7	$10	$14	$18
Fixed Platforms & Facilities	$172	$239	$281	$299	$299
Floating Production Units & Facilities	$605	$550	$807	$1,027	$1,393
Installation	$369	$478	$529	$779	$985
OPEX	$13,891	$13,793	$13,739	$13,745	$13,766
Decommissioning CAPEX	$827	$757	$803	$733	$781
Drilling	$892	$1,297	$1,773	$2,311	$2,922
Engineering CAPEX	$284	$310	$385	$469	$575
Engineering OPEX	$868	$862	$859	$859	$860
Natural Gas Processing and Transportation	$112	$107	$104	$104	$105
Total	$18,598	$19,194	$20,412	$21,879	$23,638

Source: Energy and Industrial Advisory Partners

Table 20: Projected Policy Case OCS Offshore Oil and Natural Gas Supported Employment Reductions (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021	2022
Texas	0	0	0	0	0	0	0	0
Louisiana	0	0	0	0	0	0	0	0
Mississippi	0	0	0	0	0	0	0	0
Alabama	0	0	0	0	0	0	0	0
Other U.S. States	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	2023	2024	2025	2026	2027	2028	2029	2030
Texas	-60,317	-74,139	-72,981	-73,616	-71,710	-63,830	-52,812	-39,981
Louisiana	-23,630	-31,311	-31,954	-33,111	-33,343	-31,645	-28,559	-23,760
Mississippi	-5,962	-7,628	-7,665	-7,846	-7,794	-7,191	-6,257	-5,007
Alabama	-6,423	-7,831	-7,748	-7,890	-7,753	-6,944	-5,797	-4,528
Other U.S. States	-28,352	-31,252	-29,888	-29,298	-26,411	-19,215	-11,114	-5,346
Total	**-124,683**	**-152,161**	**-150,237**	**-151,761**	**-147,011**	**-128,825**	**-104,539**	**-78,622**

Source: Energy and Industrial Advisory Partners

Table 21: Projected Policy Case OCS Offshore Oil and Natural Gas Direct and Indirect and Induced Supported Employment Reductions (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021	2022
Direct	0	0	0	0	0	0	0	0
Indirect and Induced	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0

	2023	2024	2025	2026	2027	2028	2029	2030
Direct	-17,463	-23,977	-24,816	-25,945	-26,354	-25,542	-23,668	-20,169
Indirect and Induced	-107,220	-128,185	-125,421	-125,816	-120,657	-103,283	-80,871	-58,453
Total	-124,683	-152,161	-150,237	-151,761	-147,011	-128,825	-104,539	-78,622

Source: Energy and Industrial Advisory Partners

Table 22: Projected Policy Case OCS Offshore Oil and Natural Gas Contributions to GDP Reductions $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
Texas	$0	$0	$0	$0	$0	$0	$0	$0
Louisiana	$0	$0	$0	$0	$0	$0	$0	$0
Mississippi	$0	$0	$0	$0	$0	$0	$0	$0
Alabama	$0	$0	$0	$0	$0	$0	$0	$0
Other U.S. States	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

	2023	2024	2025	2026	2027	2028	2029	2030
Texas	-$5,251	-$6,552	-$6,497	-$6,584	-$6,438	-$5,802	-$4,891	-$3,783
Louisiana	-$2,156	-$2,882	-$2,946	-$3,055	-$3,078	-$2,934	-$2,662	-$2,222
Mississippi	-$499	-$648	-$653	-$670	-$667	-$621	-$547	-$442
Alabama	-$524	-$653	-$652	-$669	-$661	-$604	-$517	-$415
Other U.S. States	-$2,136	-$2,405	-$2,310	-$2,290	-$2,071	-$1,567	-$992	-$584
Total	-$10,567	-$13,138	-$13,058	-$13,267	-$12,915	-$11,527	-$9,609	-$7,446

Source: Energy and Industrial Advisory Partners

Table 23: Projected Policy Case OCS Offshore Oil and Natural Gas Government Revenue Reductions by Type $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
Bids	$0	$0	$0	$0	$0	$0	$0	$0
Rentals	$0	$0	$0	$0	$0	$0	$0	$0
Royalties	$0	$0	$0	$0	$0	$0	$0	$0
Other Revenues	$0	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0

	2023	2024	2025	2026	2027	2028	2029	2030
Bids	$0	-$274	-$241	-$200	-$133	-$66	-$60	-$55
Rentals	-$6	-$15	-$26	-$32	-$37	-$44	-$48	-$48
Royalties	-$451	-$762	-$1,305	-$1,663	-$1,986	-$2,400	-$2,627	-$2,680
Other Revenues	-$4	-$7	-$11	-$15	-$17	-$21	-$23	-$23
Total	-$461	-$1,058	-$1,583	-$1,909	-$2,173	-$2,531	-$2,758	-$2,806

Source: Energy and Industrial Advisory Partners

Table 24: Projected Policy Case LWCF Distributions $ Millions

	2015	2016	2017	2018	2019	2020	2021	2022
LWCF	$0.89	$0.88	$0.89	$0.89	$0.88	$0.90	$0.89	$1.48
LWCF - GOMESA	$0.00	$0.00	$0.07	$0.08	$0.13	$0.08	$0.09	$0.13
Total	$0.89	$0.88	$0.96	$0.97	$1.01	$0.98	$0.98	$1.61

	2023	2024	2025	2026	2027	2028	2029	2030
LWCF	$1.35	$0.94	$0.90	$0.87	$0.88	$0.85	$0.86	$0.88
LWCF - GOMESA	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13
Total	$1.48	$1.07	$1.03	$1.00	$1.00	$0.98	$0.98	$1.01

Source: Energy and Industrial Advisory Partners

Table 25: Projected Policy Case Wind Indicators

	2015	2016	2017	2018	2019	2020	2021	2022
Project Developed	0	1	0	0	0	1	0	1
MW Operating	0	0	30	30	29	29	40	39
Jobs	56	1,065	289	288	41	395	380	4,195
GDP ($ Millions)	$6	$110	$32	$32	$4	$41	$42	$430
Government Revenue ($ Millions)	$6	$53	$19	$10	$418	$14	$31	$4,821

	2023	2024	2025	2026	2027	2028	2029	2030
Project Developed	0	0	2	2	2	3	2	4
MW Operating	169	166	1,221	1,322	2,997	8,297	9,748	12,692
Jobs	1,275	1,391	3,281	10,017	20,981	36,654	57,867	60,045
GDP ($ Millions)	$143	$156	$355	$1,083	$2,278	$4,025	$6,287	$6,527
Government Revenue ($ Millions)	$178	$1,767	$2,277	$3,347	$4,065	$4,357	$4,795	$6,388

Source: Energy and Industrial Advisory Partners

Table 26: Projected Policy Case Offshore Wind Spending ($Millions)

	2015	2016	2017	2018	2019
Assembly, Installation, Ports and Staging	$10	$10	$0	$0	$4
Blades	$0	$4	$3	$3	$0
Cable Systems	$0	$22	$14	$14	$0
Development, Engineering and Management & Other	$0	$65	$0	$0	$0
Mooring System	$0	$0	$0	$0	$0
Nacelle/Drivetrain	$0	$13	$9	$9	$0
Substation & Elect. Infra	$0	$53	$35	$35	$0
Operations	$0	$0	$4	$4	$3
Scour Protection	$0	$0	$0	$0	$0
Tower, Monopile, Hull, Foundation	$0	$17	$11	$11	$0
Total	$10	$184	$75	$75	$8

	2020	2021	2022	2023	2024
Assembly, Installation, Ports and Staging	$4	$45	$47	$0	$22
Blades	$1	$1	$12	$11	$11
Cable Systems	$6	$6	$70	$62	$62
Development, Engineering and Management & Other	$26	$0	$283	$0	$0
Mooring System	$0	$0	$0	$0	$0
Nacelle/Drivetrain	$4	$3	$41	$37	$37
Substation & Elect. Infra	$14	$14	$171	$152	$152
Operations	$3	$5	$5	$20	$20
Scour Protection	$0	$0	$1	$1	$1
Tower, Monopile, Hull, Foundation	$5	$4	$54	$48	$48
Total	$63	$78	$683	$331	$353

Source: Energy and Industrial Advisory Partners

Table 26: Projected Policy Case Spending ($Millions) (Continued)

	2025	2026	2027	2028	2029	2030
Assembly, Installation, Ports and Staging	$99	$220	$353	$583	$640	$671
Blades	$22	$97	$231	$404	$664	$754
Cable Systems	$15	$70	$170	$303	$510	$588
Development, Engineering and Management & Other	$124	$431	$777	$1,125	$1,936	$1,301
Mooring System	$0	$0	$0	$0	$0	$4
Nacelle/Drivetrain	$72	$323	$771	$1,347	$2,217	$2,518
Substation & Elect. Infra	$42	$189	$453	$796	$1,321	$1,506
Operations	$147	$159	$360	$996	$1,170	$1,523
Scour Protection	$1	$6	$14	$25	$42	$47
Tower, Monopile, Hull, Foundation	$82	$365	$871	$1,520	$2,502	$2,935
Total	$604	$1,859	$4,000	$7,097	$11,001	$11,846

Source: Energy and Industrial Advisory Partners

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