

# The Economic Impacts of Allowing Access to the Eastern Gulf of Mexico for Oil and Natural Gas Exploration and Development

Prepared For:

The American Petroleum Institute (API)

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# Executive Summary

## Executive Summary

The U.S. offshore oil and natural gas industry is a significant contributor to domestic energy production, the national economy, employment, and government revenues. New offshore oil and gas exploration and development in the U.S. is currently limited primarily to the Central and Western Gulf of Mexico, with limited legacy production off California and Alaska. In total, approximately 94 percent<sup>1</sup> of the total acreage in federal offshore waters is inaccessible to offshore oil and natural gas development, either through lack of federal lease sales or outright moratoriums. The Eastern Gulf planning area is one such restricted area, with the vast majority of the area under a congressional drilling moratorium until 2022. In January 2018, the administration introduced a new draft proposed program (for 2019 to 2024) with substantially all areas of the federal OCS not under specific moratorium to be offered for lease including the Eastern Gulf of Mexico.<sup>2</sup> Leasing in the Eastern Gulf of Mexico is proposed to begin in 2020, with leasing of areas currently under moratorium proposed to begin in 2023 after the expiration of the moratorium.

This report constructs a scenario of oil and natural gas development in the Eastern Gulf, based on the resource potential of the area, geologic analogs, and the full value chain of oil and natural gas development and production. It quantifies the capital and other investments projected to be undertaken by the oil and natural gas industry, identifies linkages to the oil and gas supply chain at both the state and national levels, estimates both job creation and contributions to economies associated with oil and natural gas development, as well as government revenues due to lease bids, rents, and production royalties. (Table 1)

**Table 1: Summary Table Potential Impacts from Eastern Gulf Oil and Natural Gas Development<sup>3 4</sup>**

Economic Impact	First Leasing + 3 Years	First Leasing + 10 Years	First Leasing + 20 Years	Cumulative 20 Years
Capital Investment and Spending (\$Billions)	\$0.3	\$6.4	\$11.6	\$117.8
Employment	5,324	80,561	164,448	n/a
Contributions to Economy - GDP (\$Billions)	\$0.6	\$8.1	\$14.0	\$149.2
Federal / State Government Revenue (\$Billions)	\$0.3	\$1.3	\$5.0	\$44.0
Natural Gas and Oil Production (MMBOED)	0	0.18	1.01	2.86 Billion BOE

Source: Calash

<sup>1</sup> "2012-2017 OCS Oil and Gas Leasing Program", Bureau of Ocean Energy Management, August 22, 2012, accessed online on September 1, 2017.

<sup>2</sup> "Secretary Zinke Announces Plan For Unleashing America's Offshore Oil and Gas Potential", Department of the Interior, January 4, 2018, January 23 2018

<sup>3</sup> BOED or barrel of oil equivalent per day is unit of combined oil and natural gas based on the energy equivalency of oil and natural gas.

<sup>4</sup> Assumes 37.5 percent revenue sharing with state governments.

## Leasing

This study assumes that leasing will begin in Eastern Gulf of Mexico areas outside the congressional moratorium Eastern Gulf in Year 1, potentially coinciding with 2020 in the draft proposed Bureau of Ocean Energy Management (BOEM) five-year plan. Leasing activity in the initial year of leasing is projected at around 95 leases sold. Leasing in areas under congressional moratorium is projected to begin in Year 4, potentially coinciding with 2023 in the current draft proposed program. Leasing in this year, which would include Eastern Gulf of Mexico areas inside and outside the moratorium area is projected at around 285 leases. After the first five years of leasing annual lease sales are projected to be held every year covering the full Eastern Gulf OCS area. Lease sales are expected to fluctuate annually with overall lease sales trending down throughout the forecast period due to reduced lease availability.

## Drilling

Drilling is the key activity both to discover oil and natural gas resources through exploration drilling as well as to prepare them for production by drilling development wells. With leasing starting in Year 1, Eastern Gulf drilling would be expected to begin years later. An average of around 28 wells per year are expected to be drilled across the forecast period. Around 70 percent of all wells are projected to be drilled in deepwater. Drilling in the area is projected to trend upwards as infrastructure is developed and a higher percentage of development wells are drilled each year. In the last five years of the forecast, an average of around 45 wells is projected to be drilled annually.

## Projects

Offshore project development is the key factor in oil and natural gas production. It is also the main factor driving capital and operational expenditures that lead to increases in employment and economic activity. Offshore projects are complex, requiring a multitude of engineers, contractors, and equipment suppliers working over a number of years prior to oil and natural gas production. For the purposes of this study, offshore project development was generalized into six project types based on project size and water depth. This study estimates that 40 major projects could begin oil and natural gas production in the Eastern Gulf between over the 20-year forecast period, of which 14 are projected to be deepwater projects and 26 are projected to be shallow water projects.

## Oil and Natural Gas Production

Allowing access to the Eastern Gulf to offshore oil and natural gas production is projected to lead to an increase in domestic energy production. The first oil and natural gas production from the Eastern Gulf is projected to start within five years of the beginning of leasing. Within three

years of initial production, Eastern Gulf production is projected to increase to nearly 70 thousand barrels of oil equivalent per day (BOED). Production is projected to reach over 1 million BOED 20 years after leasing begins, with production expected to be around 65 percent oil and 35 percent natural gas.

## Spending

Total cumulative spending across the forecast period is projected to be around \$118 billion. Spending is projected to grow from an average of \$315 million per year during the first five years of initial leasing, seismic, and exploratory drilling to over \$11.5 billion per year 20 years after first leasing begins.

The largest amounts of expenditures are for drilling, operational expenditures, engineering, manufacturing and fabrication of platforms and equipment. Cumulative operational expenditures (OPEX), which occur after a well's initial production, are projected at nearly \$24 billion. Cumulative capital expenditures across the 20 year forecast period are projected at around \$94 billion.

Domestic spending is expected to account for 85 percent of cumulative spending from Eastern Gulf of Mexico offshore development, with the remaining taking place internationally. For domestic spending over 90 percent of spending from Eastern Gulf oil and natural gas developments is expected to take place in the Gulf Coast states, with Texas (39 percent), Florida (22 percent) and Louisiana (17 percent) accounting for the largest shares. Alabama is expected to account for nine percent of total spending, with Mississippi accounting for five percent. States outside of the Gulf Coast are expected to account for nine percent of total spending.

## Employment

Eastern Gulf oil and natural gas development is expected to lead to significant employment gains, both in the Gulf Coast region and nationally. Employment impacts are expected to grow throughout the forecast period, with total incremental U.S. employment supported reaching nearly 165 thousand jobs 20 years after initial lease sales. Total Gulf Coast employment is projected to reach over 152 thousand jobs. States outside the region are projected to see employment gains of nearly 12 thousand jobs by the end of the forecast period. The largest employment impact of Eastern Gulf oil and natural gas activity is projected in Florida and the traditional offshore oil and gas states of Texas and Louisiana. The share of incremental employment within the eastern states of Alabama, Mississippi, and Florida is anticipated to steadily grow as the area is developed – allowing for additional goods and services to be sourced locally.

## Contributions to the Economy and Government Revenues

Spending by the oil and gas industry is expected to lead to a significant increase of the nation's GDP. Total contributions to the economy are projected to be over \$14 billion per year by the end of the forecast period, with nearly \$13 billion of the total expected impact to occur in the Gulf Coast states. The largest contributions to states' economies are expected to be seen in Florida, Texas, and Louisiana.

Eastern Gulf oil and natural gas development has the potential to increase government revenue from royalties, bonus bids, and rents on leases by an estimated \$41.5 billion cumulatively throughout the forecast period. Total government revenues are projected to reach nearly \$5 billion per year 20 years after initial lease sales. The majority of projected cumulative revenues are from royalties on produced oil and natural gas at around \$35 billion. Leasing bonus bids are projected to account for around \$4.5 billion while rental income from offshore blocks is expected to account for approximately \$2 billion.

This report assumes that associated government revenue is split 37.5 percent to the coastal states and 62.5 percent to the Federal government. This is similar to the arrangement in place with currently producing Gulf States but without an associated cap on state government revenue. Actual revenue proportion going to state governments, if any, would be determined by future legislation. Cumulative state revenues through the forecast period for the Gulf Coast states could reach over \$16 billion. Any spending by state governments due to additional revenue has the potential to increase GDP.<sup>5</sup>

Allowing access for Eastern Gulf oil and natural gas development is projected to increase employment, economic activity, and government revenues with comparatively little additional spending required by federal and state governments. The nation as a whole, but especially the Gulf Coast states, would likely see large employment gains, increased economic activity, and additional government revenue. In addition, the nation is projected to see increased domestic oil and natural gas production, thus increasing the nation's energy security.

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<sup>5</sup> Analysis assumes states spend 50 percent of additional revenue.

# Table of Contents

<b>Executive Summary .....</b>	<b>2</b>
Executive Summary .....	2
Leasing.....	3
Drilling .....	3
Projects .....	3
Oil and Natural Gas Production .....	3
Spending .....	4
Employment .....	4
Contributions to the Economy and Government Revenues.....	5
<b>List of Tables.....</b>	<b>8</b>
<b>List of Figures .....</b>	<b>9</b>
<b>Section 1 – Introduction .....</b>	<b>11</b>
1.1 Purpose of the Report .....	11
1.2 Report Structure .....	12
1.3 About Calash.....	12
1.4 The Eastern Gulf .....	13
1.5 2006 GOMESA Moratorium .....	14
1.6 Lease History .....	14
1.7 Seismic.....	15
1.8 Drilling & Production.....	15
1.9 Eastern Gulf Resources .....	16
1.10 Excluded from This Study .....	16
<b>Section 2 – Data Development .....</b>	<b>18</b>
2.1 Data Development .....	18
2.2 Resources .....	18
2.3 Project Spending.....	20
2.4 Economic Data Development.....	21
2.5 Governmental Revenue Development.....	21
<b>Section 3 – National Results .....</b>	<b>23</b>
3.1 Seismic and Leasing Activity.....	23
3.2 Projects .....	24
3.3 Drilling Activity .....	25
3.4 Production Activity.....	27
3.5 Spending Activity.....	28
3.6 Spending Trends.....	31

3.7	Employment .....	33
3.8	State Income Impacts .....	35
3.9	Government Revenue Impacts .....	37
<b>Section 4 – Conclusions.....</b>		<b>41</b>
<b>Section 5 – State Results Appendix .....</b>		<b>43</b>
5.1	Florida .....	43
5.2	Texas.....	45
5.3	Louisiana .....	47
5.4	Alabama .....	49
5.5	Mississippi .....	51

## List of Tables

Table 1: Summary Table Potential Impacts from Eastern Gulf Oil and Natural Gas Development .....	2
Table 2: Oil and Gas Project Development Model .....	18
Table 3: Oil and Gas Project Spending Model .....	20
Table 4: Projected Spending Gulf Coast States and Other U.S. States (\$Millions per Year) .....	33
Table 5: Projected Employment Gulf Coast States and Other U.S. States .....	35
Table 6: Projected Contributions to State Economies Gulf Coast States and Other U.S. States (\$ Millions per Year) .....	37
Table 7: Projected Government Revenues from Rentals, Royalties, and Bonus Bids by State and Federal (\$ Millions per Year) .....	40

## List of Figures

Figure 1: Eastern Gulf Planning Area MapSource: Bureau of Ocean Energy Management .....	13
Figure 2: Eastern Gulf Active Leases.....	15
Figure 3: Projected Leases Sold Eastern Gulf .....	24
Figure 4: Projected Number of Projects by Start-Up Year, Size and Water Depth .....	25
Figure 5: Projected Number of Wells Drilled by Well Type .....	26
Figure 6: Projected Number of Wells Drilled by Water Depth and Year .....	27
Figure 7: Projected Production by Type and Year .....	28
Figure 8: Projected Production by Water Depth .....	28
Figure 9: Projected Overall Spending by Category (\$ Billions per Year) .....	30
Figure 10: Projected Overall Spending Gulf Coast States vs. Other U.S States vs. International (\$ Billions per Year) .....	32
Figure 11: Projected Employment by State .....	33
Figure 12: Projected Employment Direct vs. Indirect and Induced .....	34
Figure 13: Projected Employment by Industry Sector .....	35
Figure 14: Projected Contributions to State Economies Gulf Coast vs. Other U.S. States – Total (\$ Billions per Year) .....	36
Figure 15: Projected Government Revenues – Rentals, Royalties, and Bonus Bid (\$ Billions per Year) .....	38
Figure 16: Projected Government Revenues from Rentals, Royalties, and Bonus Bids, State and Federal (\$ Billions per Year) .....	39
Figure 17: Projected Florida Spending by Sector (\$ Millions per Year) .....	43
Figure 18: Projected Florida Employment Direct vs. Indirect and Induced .....	44
Figure 19: Projected Florida Contributions to the State Economy (\$ Millions per Year) .....	44
Figure 20: Projected Texas Spending by Sector (\$ Millions per Year) .....	45
Figure 21: Projected Texas Employment Direct vs. Indirect and Induced .....	46

Figure 22: Projected Texas Contributions to the State Economy (\$ Millions per Year) ..... 46

Figure 23: Projected Louisiana Spending by Sector (\$ Millions per Year) ..... 47

Figure 24: Projected Louisiana Employment Direct vs. Indirect and Induced ..... 48

Figure 25: Projected Louisiana Contributions to the State Economy (\$ Millions per Year) ..... 48

Figure 26: Projected Alabama Spending by Sector (\$ Millions per Year) ..... 49

Figure 27: Projected Alabama Employment Direct vs. Indirect and Induced ..... 50

Figure 28: Projected Alabama Contributions to the State Economy (\$ Millions per Year) ..... 50

Figure 29: Projected Mississippi Spending by Sector (\$ Millions per Year) ..... 51

Figure 30: Projected Mississippi Employment Direct vs. Indirect and Induced ..... 52

Figure 31: Projected Mississippi Contributions to the State the State Economy (\$ Millions per Year) ..... 52

## Section 1 – Introduction

Oil and natural gas development contributes significantly to the U.S. economy. The impacts of oil and natural gas exploration and production are felt both throughout the nation and throughout all sectors of the economy. Despite the benefits of oil and natural gas development, a significant portion of the oil and natural gas resources of the United States is inaccessible, most notably 94 percent<sup>6</sup> of the U.S. outer continental shelf's (OCS). These offshore areas are limited due to a lack of lease sales by the Federal government or outright moratoriums. The vast majority of the Eastern Gulf planning area is under Congressional leasing moratorium until at least 2022.

In January 2018, the administration introduced a new draft proposed program (for 2019 to 2024) with substantially all areas of the federal OCS not under specific moratorium to be offered for lease including the Eastern Gulf of Mexico.<sup>7</sup> Leasing in the Eastern Gulf of Mexico is proposed to begin in 2020, with leasing of areas currently under moratorium proposed to begin in 2023 after the expiration of the moratorium.

### 1.1 Purpose of the Report

Calash was commissioned by the American Petroleum Institute (API) to provide an independent evaluation of the potential impacts of the development of America's offshore oil and gas resources within the Eastern Gulf if oil and natural gas development restrictions for the Eastern Gulf were lifted. In addition, Calash projected potential impacts on Gulf of Mexico oil and natural gas production, supported employment, GDP, and government revenue. The conclusions set forth in this study are based solely upon government and other publicly-available data and Calash's own expertise and analysis.

The report assumes a favorable regulatory environment for development throughout the forecast period such as regular lease sales and reasonable rate of permit approvals for projects and drilling within areas that are currently under moratorium. The provided analysis uses existing USGS and Bureau of Ocean Energy Management (BOEM) resource estimates.

This scenario in no way covers all previous or possible future proposals for the Eastern Gulf oil and natural gas activity. The analysis tracks the full lifecycle of oil and natural gas development that is projected to take place following the opening of the Eastern Gulf. The report therefore projects spending from leasing and seismic imaging to exploration drilling, onto project

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<sup>6</sup> "2012-2017 OCS Oil and Gas Leasing Program", Bureau of Ocean Energy Management, August 22, 2012, accessed online on September 1, 2017.

<sup>7</sup> "Secretary Zinke Announces Plan For Unleashing America's Offshore Oil and Gas Potential", Department of the Interior, January 4, 2018, January 23 2018

development and through production. The associated ongoing spending needed to maintain and operate projects is also estimated.

The report assumes leasing will begin in Year 1, potentially coinciding with 2020 in the current draft proposed leasing program. The study projects activity, spending, employment, economic impacts, and government revenues associated with these activities for 20 years.

Economic and employment impacts calculated on expected industry spending are based on the report's forecasted timing of oil and natural gas exploration and production activity as well as projections for where the development activity and associated economic activity will take place. The report also projects estimated state and federal government revenues from sources such as bids, rents, and royalties, and projects the economic and employment effects of these where applicable. Assumptions on pricing, the location mix of spending, oil and natural gas prices, and economic multipliers are based on current conditions and are subject to change based on the timing of increased access to Eastern Gulf oil and natural gas reserves.

## **1.2 Report Structure**

The report is structured as follows: preceding this introductory section is the Executive Summary outlining all principal results and findings of this report. Immediately following the section is the Data Development section, outlining Calash's methods for data aggregation and analysis, including a comprehensive overview of the project and model flow. Data Development may further be broken down into subsets based on: resource and production modeling, project spending inputs encompassing capital expenditures (CAPEX) and operational expenditures (OPEX), allocated spending into individual states, economic development representing job growth, and governmental revenues. Applications of the model and its results are presented in further detail within the Results section of the paper. Included within Results are the distributions of production, spending, economic, and governmental effects upon the national, regional, and states. The final Conclusions section provides further assessment and analysis. Additional essential information can be found within the appendix sections following the report.

For the purpose of this report the directly affected states along the Gulf of Mexico are defined as: Texas, Louisiana, Mississippi, Alabama, and Florida.

## **1.3 About Calash**

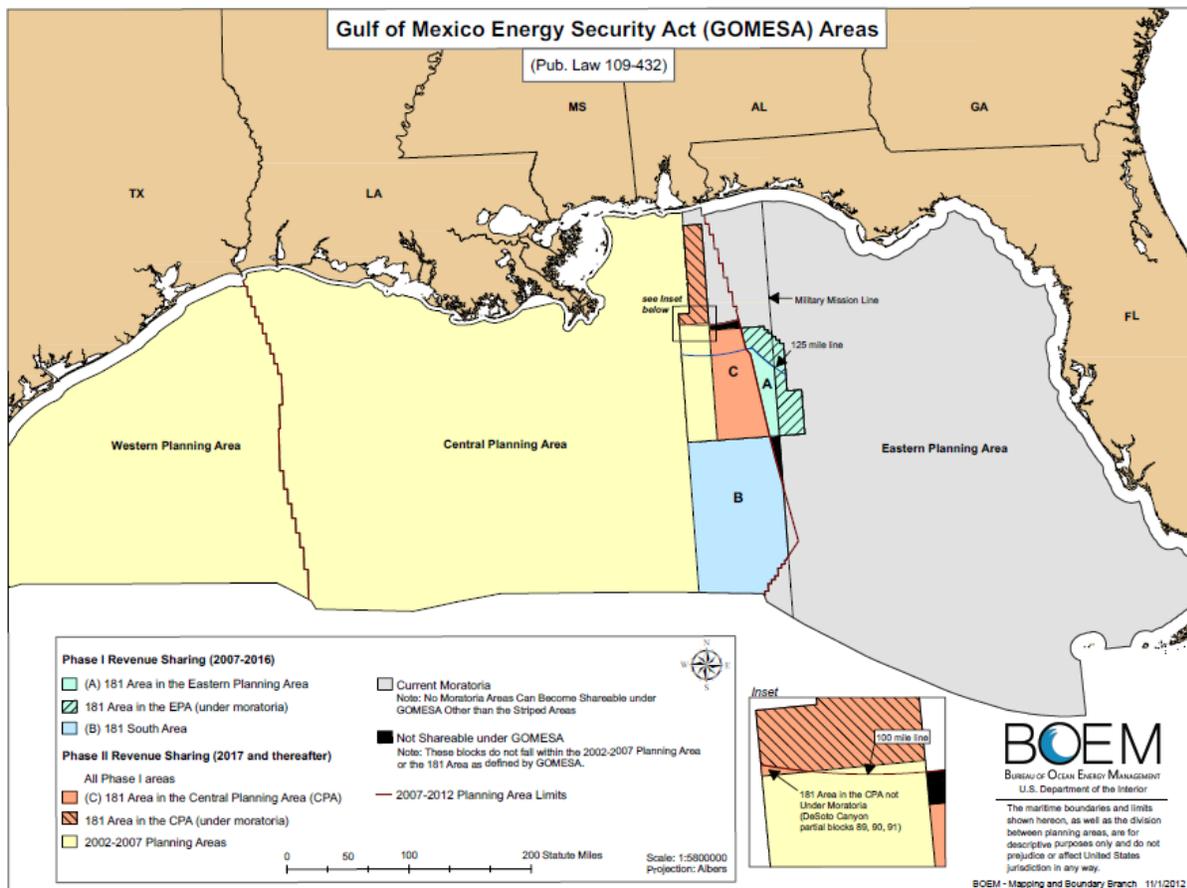
Since Calash's creation it has evolved from an oil and natural gas commercial and operational due diligence provider into an award-winning energy advisory firm providing strategy, business advisory, economic analysis, and mergers and acquisitions support services. As a function of Calash's core business, the company is engaged daily in the collection and analysis of data as it relates to the oil and natural gas industry. Calash serves the global community of

operating oil and natural gas companies, their suppliers, financial firms, and many others by providing detailed analysis on projects, investments, capital investment and operational spending undertaken by the onshore and offshore industries. Calash analyzes market data from a variety of sources at the project level for projects throughout the world.

### 1.4 The Eastern Gulf

The Eastern Gulf is the second largest OCS area within the US Gulf of Mexico comprising 64.5 million acres of federal waters stretching southeast of the Florida and Alabama border. Currently 98% of the acreage, as well as the majority of potential oil and gas reserves, remains inaccessible under the most recent 5-year leasing plan. Within the unoffered acreage, the vast majority is subject to a moratorium under GOMESA until 2022. Since 2001 approximately 1.3 million acres or 233 lease blocks have been offered under the following lease sales. The most recent lease sale which took place in 2016, offered only 657,905 acres across 175 blocks. (Figure 1)

**Figure 1: Eastern Gulf Planning Area Map**



Source: Bureau of Ocean Energy Management

## 1.5 2006 GOMESA Moratorium

Eastern Gulf oil and gas development is prohibited under the 2006 Gulf of Mexico Energy Security Act (GOMESA). The GOMESA Moratorium covers a portion of the Central Gulf of Mexico Planning Area (CPA), and, until 2022, nearly all the Eastern Planning Area (EPA). The specific locations restricted from leasing activities include that portion of the Eastern Planning Area within 125 miles of Florida, all areas in the Gulf of Mexico east of the Military Mission Line (86 ° 41' west longitude), and the area within the Central Planning Area that is within 100 miles of Florida.

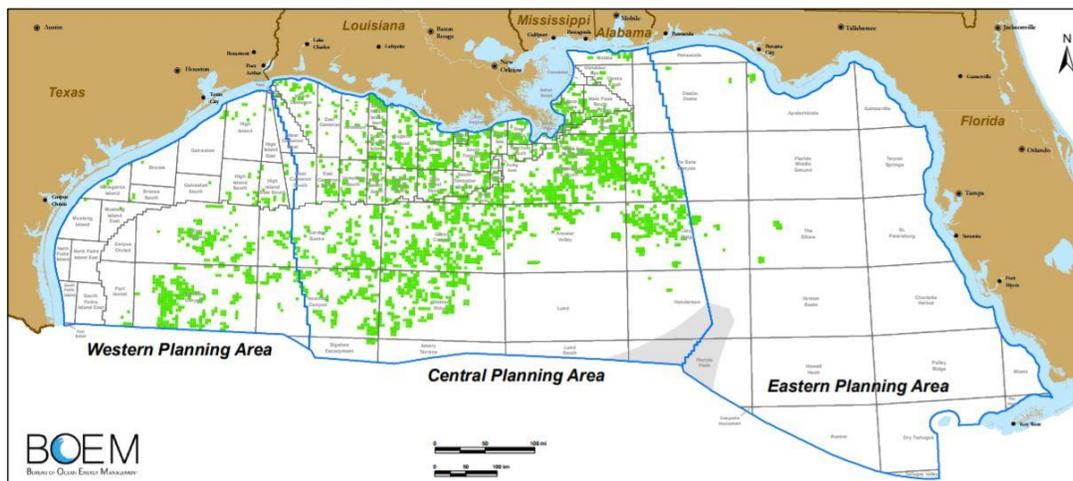
## 1.6 Lease History

Federal lease sales within the Eastern Gulf took place between the years of 1959-2016, with the most recent sales taking place in a selected portion along the Central and Eastern Gulf border. Overall, ten lease sales have been completed within federal waters: 1959, 1973, 1984, 1985, 1988, 2001, 2003, 2005, 2008, 2014 and 2016.

Historically, sales in the area stretch back to the 1950's when the first lease comprising 80 blocks was offered in 1959. While federal lease sales were limited in the following years, offshore drilling continued through the period in shallow water areas upon the Florida shelf culminating in the late 1970's when additional lease sales in state waters were halted.

In the late 1980's, Florida and the Department of the Interior (DOI) began to outline a proposed ban on lease sales as well as drilling in the Eastern Gulf, including placing a 100-mile buffer zone along the Florida coast. These actions led to the repurchasing of leases from lessees throughout the period though several lessees have been permitted to hold leases for future exploration if the moratorium was lifted within the region.

In 2001, small concentrated lease sales returned to the Eastern Gulf under lease sale 181 which offered 233 lease blocks in a portioned section directly east of the Central Gulf of Mexico planning area border - incorporating sections of De Soto Canyon and Lloyd Ridge. Limited lease sales continued in recent years with five additional lease sales, the most recent in 2016, which has included an ever-decreasing number of acres and blocks on offer to operators as the leases on offer in the limited area along the western edge of the Eastern Gulf are leased. (Figure 2)

**Figure 2: Eastern Gulf Active Leases**

Source: Bureau of Ocean Energy Management

## 1.7 Seismic

Recent seismic studies have taken place throughout the Eastern Gulf, although in limited capacities depending on the location. Given the open leasing structure upon a portion of the Central and Eastern Gulf divide, this area has seen the most active 2D and 3D seismic in recent years. In the areas that are currently off-limits, 2D seismic studies have focused on the area west of the Florida escarpment in anticipation of increased lease offerings within the area, while shallow water seismic has been the most limited given the anticipated higher regulatory hurdles.

## 1.8 Drilling & Production

The history of offshore drilling in the Eastern Gulf has mainly been focused on a select number of historical opportunities in shallow water. Developed prospects include Alabama's Mobile Bay, Florida's Charlotte Harbor, Key West, as well as several prospects within the currently available deepwater region.

Throughout the 1960's and 1970's, exploration was limited but mainly focused on the Destin Dome region along the Alabama and Florida border. These exploration wells, while dry holes, helped delineate and define the sandstone and reservoir possibilities within the Norphlet play. Further exploration within deeper portions of the area led to discoveries and projects within Alabama state waters, particularly the Mobile Bay region, as well the Destin Dome project in block 56. Additional drilling has taken place in the majority of areas upon the Florida shelf as well as the southern Key West region, though the wells are dated and limited in number.

More recently, deepwater drilling has taken place within the available region within De Soto Canyon and Lloyd Ridge along the Central Gulf border. These wells have led to several discoveries within the Eastern Gulf, while additional resources and wells have been completed in

the nearby Central Gulf of Mexico. In particular, wells in the Norphlet play, which overlaps into the Eastern Gulf, have been successful in recent years. Projects such as Appomattox and Vicksburg are currently under development and represent some of the larger Gulf of Mexico discoveries in recent years. Additional discoveries in this trend continue to be made, including Chevron's Ballymore discovery of early 2017 which is located in Mississippi Canyon block 607.

Recent production from the Eastern Gulf began in February 1999 with production growing from as little as 1,000 BOED until peaking in 2009, when it contributed 108,000 BOED to Gulf of Mexico production. Given the largely gaseous reservoirs within De Soto Canyon, economics for such projects have receded in the near-term due to lower natural gas prices. Since early 2014, the Eastern Gulf has ceased to produce any oil or gas as operators have delayed projects along with declining economics for Gulf of Mexico natural gas projects.

## **1.9 Eastern Gulf Resources**

Numerous studies have estimated the oil and gas resources in the Gulf of Mexico including DOI's assessment on all OCS regions (Lore et.al, 1995), the Eastern Gulf and Florida's shelf (Gohrbandt, 2001), the conceptual Mesozoic Ultra-Deep plays (Post and Hunt, 2001), and the Assessment of Technically Recoverable Hydrocarbon Resources of the Gulf of Mexico OCS (Crawford et. al, 2008). While these studies provide a general framework and consistent estimation of recoverable resources within the Eastern Gulf, there is more ambiguity around defining plays within the sparsely explored area. For this analysis, Calash has assumed the amount and general location of oil and natural gas resources based on the BOEM's Assessment of Technically Recoverable Hydrocarbon Resources of the Gulf of Mexico Outer Continental Shelf as of January 1, 2009.

The report identified possible oil and gas bearing geologies throughout the Gulf of Mexico including the Eastern Gulf. The report projects that the northern portion of the Eastern Gulf is likely to be a little more gas rich, while oil reserves increase as you move south along the coastline as well as into the deepwater Buried Hill plays. In many places, the various plays overlap throughout different depths.

The play by play reserve assessments presented in the study by the BOEM are the basis for both the resource and production models used to formulate this study as discussed in the data development section and resource appendix.

## **1.10 Excluded from This Study**

This paper has been limited in scope to the assessment of the development of oil and natural gas resources from known Eastern Gulf formations in Federal waters identified in BOEM reports. Any potential benefits from the development of onshore midstream and downstream

infrastructure are not included. In addition, the calculated government revenue potential does not include personal income taxes, corporate income taxes or local property taxes. The development of additional oil and natural gas resources not identified in the BOEM report are not included even though new formations will likely be found as the area is developed.

## Section 2 – Data Development

### 2.1 Data Development

Calash’s data development scenario focused on constructing a tiered “bottom-up” model that separates the complete life cycle of offshore operations and subsequent effects into three main categories and five sub categories. The three main categories are as follows: an “Activity” model assessing potential reserve information under the expectation of estimating the possible number of projects based on the resources within the Eastern Gulf, a “Spending” model based on the requirements to develop projects within the “Activity Forecast”, and an “Economic” model focused on the economic impact on employment and government revenue from the “Spending” model. Individual subsections of each of the three major models were further examined under six additional criteria that create an individual “Project” model. These categories include: reserves, seismic, leasing activity, drilling, infrastructure & project development, and production & operation. (Table 2)

**Table 2: Oil and Gas Project Development Model**

	Activity Forecast	Spending Model	Economic Model
Reserves	<ul style="list-style-type: none"> <li>• Total Eastern Gulf Reserves</li> <li>• Reserves by Play</li> <li>• Reserves by Field</li> <li>• Fields into Projects</li> </ul>	N/A	N/A
Seismic	<ul style="list-style-type: none"> <li>• Pre-Lease Seismic</li> <li>• Leased Block Seismic</li> <li>• Shoot Type</li> </ul>	<ul style="list-style-type: none"> <li>• Cost per Acre</li> </ul>	<ul style="list-style-type: none"> <li>• Economic Activity due to Seismic Spending within States</li> </ul>
Leasing	<ul style="list-style-type: none"> <li>• Yearly Lease Sales</li> </ul>	<ul style="list-style-type: none"> <li>• Bonus Bid Prices</li> <li>• Rental Rates</li> </ul>	<ul style="list-style-type: none"> <li>• Federal and State Revenues Created through Lease Sales</li> <li>• Economic Activity due to Increased State/Personal Spending</li> </ul>
Exploration Drilling	<ul style="list-style-type: none"> <li>• Number of Wells Drilled</li> <li>• Water Depth of Wells Drilled</li> <li>• Number of Drilling Rigs Required</li> </ul>	<ul style="list-style-type: none"> <li>• Cost per Well</li> </ul>	<ul style="list-style-type: none"> <li>• Economic Activity due to Exploration Drilling within States</li> </ul>
Project Development & Operation	<ul style="list-style-type: none"> <li>• Project Size</li> <li>• Project Development Timeline</li> </ul>	<ul style="list-style-type: none"> <li>• Spending per Project</li> <li>• Per Project Spending Timeline</li> </ul>	<ul style="list-style-type: none"> <li>• Division of State Spending</li> <li>• Economic Activity due to Project Development within States Vicinity</li> </ul>
Production	<ul style="list-style-type: none"> <li>• Production Type and Amount</li> </ul>	<ul style="list-style-type: none"> <li>• Oil and Gas Price Forecast</li> </ul>	<ul style="list-style-type: none"> <li>• Federal and State Revenues Created through Royalty Sharing</li> <li>• Economic Activity due to Increased State/Personal Spending</li> </ul>

Source: Calash

### 2.2 Resources

Methodology used in the calculation of resources was derived from previous reports of the Bureau of Ocean Energy Management (BOEM) and its predecessor agencies on estimated resources in place. Given the predictive nature of these reports, Calash deemed it reasonable to extrapolate from BOEM estimates to closer reflect undiscovered technically recoverable reserves (UTRR) growth patterns within developed regions. This important step was principally modeled

through analysis on historical reserve assessment growth within the developed areas of the Gulf of Mexico, Alaska, and the North Sea. A resulting multiplier of 2.07 and UTRR alternative case of 15.95 MMboe were calculated using this methodology.

After recalculating UTRR play resources, further subdivision was assigned based on USGS field size distributions within similar geological plays. The combination of field sizing and number of fields allows for the distribution estimation of possible discoveries within each play, while the potential reserves within each discovery were then further discounted based on a recovery factor of similar geological plays. Calash's assessments of potential field developments led to the creation of multiple project development scenarios dependent on the field sizing, with the assumption that large fields are more likely to be discovered first. Through the allocation of field discoveries into project categories based on individual play reserve expectations, Calash concluded a forecast of the number of projects expected within each play. It is important to note the uncertainty around the location of fields and projects within each play, and thereby placing them within the associated vicinity of states becomes a challenge. In order to account for this, Calash drew a 200-mile buffer around each individual state's border, reweighting reserves and spending for each project based on the reserves in proximity to a state's border.

Projects were developed under two major criteria that allowed for six development scenarios. These criteria were separated between deepwater and shallow water projects and furthermore between small, medium, and large projects. This allowed for further delineation between projections, as each individual scenario has defined characteristics behind timing, spending, and production that drive later modeling. These delineations allowed for smaller projects to be developed under a shorter time-frame, require less hardware and engineering, as well as produce lower volumes for fewer years, while the opposites holds true for larger projects.

Project timing was developed based on offshore sector data, as each project was given an individual timeline representing the required time for a generic project of that size and scope. Assumptions were made for different development scenarios given the infrastructure currently in place within the Eastern Gulf. Timelines and infrastructure requirements were adjusted as infrastructure grew within certain areas, allowing for increased subsea tie-backs for deepwater projects and increased project numbers given decreasing infrastructure requirements and increasing project economics. Once in place, projects are expected to produce based on a set production curve based on historical ramp-up and peak production data for existing fields, while declines were expected to follow an Arps equation.<sup>8</sup>

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<sup>8</sup> Arps represents the hyperbolic shaped decline curve of an oil and gas field after peak production. Arps, J.J. "Analysis of Decline Curves" Trans. AIME (1944) 160, 228-47.

## 2.3 Project Spending

This spending analysis accounts for all capital investment and operational spending through the entire “life cycle” of operations. Every offshore oil or natural gas project must go through a series of steps in order to be developed. Initial expenditures necessary to identify targets and estimate the potential recoverable resources in place include seismic surveys (G&G) and the drilling and evaluation of exploration & appraisal (E&A) wells. For projects that are commercially viable, the full range of above surface and below water (subsea) equipment must be designed and purchased. Offshore equipment includes production platforms and potentially on-site processing facilities as well as below water equipment generally referred to as SURF (Subsea, Umbilicals, Risers and Flowlines). Finally, the equipment must be installed and additional development wells must be drilled. Once under production, further operational expenditures (OPEX) are required to perform ongoing maintenance, production operations and other life extension activities as necessary for continued field production and optimization.

Spending for individual projects was subdivided into sixteen categories covering the complete life cycle of a single offshore project, excluding decommissioning, as well as two additional groups for natural gas processing and operation. Timing and cost for individual categories were assigned based on the previously mentioned project types where prices scale given the complexity and size of the project. (Table 3)

**Table 3: Oil and Gas Project Spending Model**

	Activity Model	Spending Model	Economic Model
Seismic (G&G)	<ul style="list-style-type: none"> <li>Number of Leases</li> <li>2D vs. 3D</li> </ul>	<ul style="list-style-type: none"> <li>Cost per Acre</li> </ul>	<ul style="list-style-type: none"> <li>Operation Requirements</li> </ul>
SURF	<ul style="list-style-type: none"> <li>Trees, Manifolds, and Other Subsea Equipment</li> <li>Umbilicals</li> <li>Pipelines, Flowlines, and Risers</li> </ul>	<ul style="list-style-type: none"> <li>Cost per Item</li> <li>Cost per Mile</li> </ul>	<ul style="list-style-type: none"> <li>Fabrication Locations</li> </ul>
Platforms	<ul style="list-style-type: none"> <li>Fixed Platforms</li> <li>Floating Production Systems</li> </ul>	<ul style="list-style-type: none"> <li>Unit Size</li> </ul>	<ul style="list-style-type: none"> <li>Fabrication Locations</li> </ul>
Installation	<ul style="list-style-type: none"> <li>Surf Installation</li> <li>Platform Installation</li> </ul>	<ul style="list-style-type: none"> <li>Number of Vessels</li> <li>Type of Vessels</li> <li>Vessel Dayrate</li> </ul>	<ul style="list-style-type: none"> <li>Operation Requirements</li> <li>Shorebase Locations</li> </ul>
Drilling	<ul style="list-style-type: none"> <li>Exploration Drilling</li> <li>Development Drilling</li> </ul>	<ul style="list-style-type: none"> <li>Rig Type</li> <li>Rig Dayrate</li> </ul>	<ul style="list-style-type: none"> <li>Operating Requirements</li> <li>Shorebase Locations</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>FEED</li> </ul>	<ul style="list-style-type: none"> <li>CAPEX</li> <li>OPEX</li> </ul>	<ul style="list-style-type: none"> <li>Technological Centers</li> </ul>
Operating Expenditures (OPEX)	<ul style="list-style-type: none"> <li>Supply and Personnel Requirements</li> <li>Project Maintenance</li> <li>Project Reconfiguration</li> </ul>	<ul style="list-style-type: none"> <li>Type of Project</li> </ul>	<ul style="list-style-type: none"> <li>Shorebase Locations</li> </ul>

Source: Calash

Upon compiling the scenario of overall spending estimates, Calash deconstructed the “local content” of oil and gas operations within the studied region. Individual tasks were analyzed on a component by component basis to provide an estimate of the percentage of regional, national, and international construction required by offshore operations. Once compiled, further

modeling was prepared to forecast changing distributions as oil and gas development activity increases within new regions of the Gulf of Mexico. Additionally, delineations were made at the regional level in order to project spending for individual states. Considerations were based on the proximity to reserves and production, strategic locations such as shore bases and ports, as well as Bureau of Economic Analysis (BEA) data pertaining to each state's present economic distribution.

## 2.4 Economic Data Development

Development of GDP and job data were calculated using the BEA's RIMs II Model providing an input-output multiplier on spending at the industry and state levels for each defined category. Model outputs considered from spending effects include number of jobs and GDP multiplier effects. Further delineation is presented in the form of direct and indirect and induced job numbers, which encompass the number of jobs relating to the spending in that category versus indirect and induced jobs that are created from pass-through spending.

RIMs Categories used:

- Architectural, Engineering, and Related Services
- Construction
- Drilling Oil and Gas Wells
- Fabricated Metal Product Manufacturing
- Mining and Oil and Gas Field Machinery Manufacturing
- Natural Gas Distribution
- Oil and Gas Extraction
- Steel Product Manufacturing from Purchased Steel
- Support Activities for Oil and Gas Operations

## 2.5 Governmental Revenue Development

Governmental revenue data is presented in three categories: bonus bids from lease sales, rents from purchased but not yet developed leases, and royalty payments from producing leases. The projected revenue was calculated assuming the current operating structure of the Gulf of Mexico where applicable. Lease sales and rental rates were calculated through the simulation of lease sales within each individual area, while the number of leases acquired has been modeled on historical rates and based on the estimated amount of reserves in the region. Given the uncertainty around the form of lease sales that may be presented within the Eastern Gulf, Calash has modeled yearly area wide sales within each region - thus contrasting the current sales which have included a sale approximately every two to three years.

The federal / state government revenue split of leases, rents and royalties were modeled assuming a similar percentage split as in GOMESA (Gulf of Mexico Energy Security Act). Under GOMESA 37.5 percent of OCS bonus bid, rent, and royalty income is distributed to the appropriate states. GOMESA has an annual revenue cap per state. No such cap was assumed in this analysis.

Currently there is no legislated federal / state revenue sharing agreement applicable to Florida under GOMESA. Calculations in this report were made to distinguish the potential State government revenue impacts among all Gulf Coast states. These revenue estimates will need to be adjusted based on future legislated sharing arrangements if and when they occur.

Production pricing was calculated using the EIA estimates for both Brent crude spot and Henry Hub natural gas prices from the 2017 Annual Energy Outlook with 2018 prices used for the first year of leasing. Due to the steadily increasing trend in the near to medium term of the EIA price forecast, delaying the beginning of leasing likely could lead to higher realized prices for oil and natural gas. Additional governmental revenues such as income and corporate taxes were considered outside of the scope of this study, and are likely to provide additional government revenues throughout the studied period.

## Section 3 – National Results

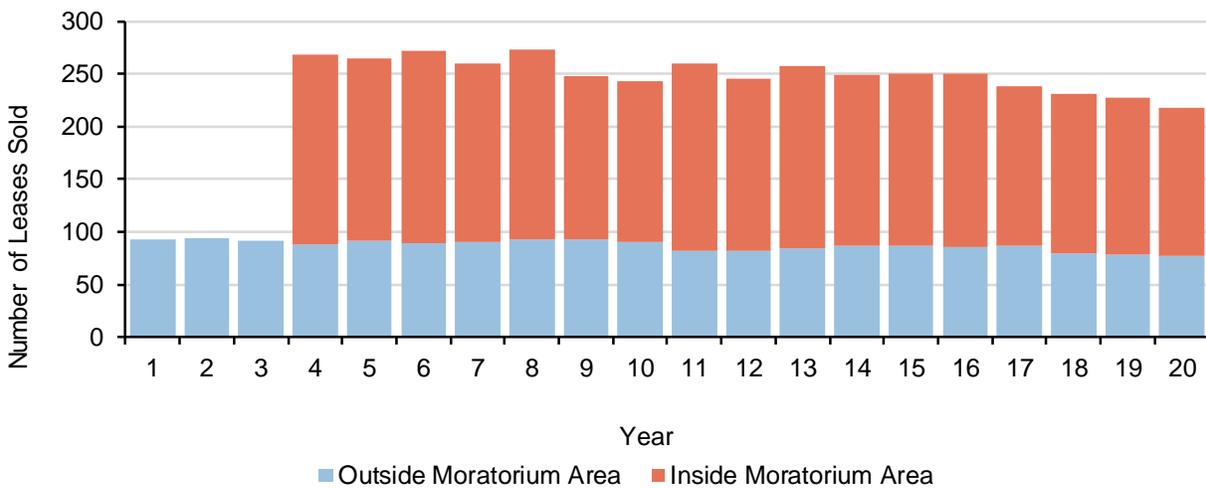
Allowing access to the Eastern Gulf for oil and natural gas production would likely provide large contributions to employment, gross domestic product, and state and federal government revenues. These benefits as projected would be felt throughout the Gulf Coast region as well as the US as a whole.

Offshore oil and natural gas exploration and production would require diverse activities such as: seismic imaging of reservoirs, drilling of wells, manufacturing equipment, and installing specialized equipment. The development of Eastern Gulf oil and natural gas reserves would require capital and operational expenditures associated with these activities, as well as increase government revenues, which as projected would combine to lead to increased employment and economic activity.

### 3.1 Seismic and Leasing Activity

Given that seismic activity is normally the first step required for offshore exploration, both to enable oil and natural gas companies to make bids on lease blocks and to identify drilling targets after leasing, some pre-leasing seismic activity is expected. Upon the beginning of wide spread sustained leasing in the Eastern Gulf, seismic and leasing activity would be expected to increase in relationship to present and historic levels. This study assumes that leasing outside the moratorium area begins in Year One, potentially coinciding with 2020 in the current Draft Proposed Program. Leasing within the moratorium area is assumed to begin in Year 4, potentially coinciding with 2023 in the current draft proposed program. New seismic activity is expected to begin within the first year of initial lease sales.

Additionally, despite some geologic differences to other parts of the Gulf, the level of understanding of the Eastern Gulf's geology is greater than other areas not currently subject to leasing - such as the Atlantic Coast. This is due in part to the significant development in the neighboring Central Gulf Region. The area's geology coupled with the accessibility of the area to existing exploration infrastructure should see lease sales draw significant interest from oil and gas operators. The number of leases sold each year in the study's scenario is the estimated amount necessary to develop the projected number of projects, given historical leasing trends in other areas. Across the forecast period the number of leases sold is expected to range from around 90 to around 275 per year. (Figure 3)

**Figure 3: Projected Leases Sold Eastern Gulf<sup>9</sup>**

Source: Calash

### 3.2 Projects

Offshore project development is the key determinant of oil and natural gas production, industry spending, and economic impacts. Developing offshore projects is a complex process, requiring time, detailed engineering and large amounts of capital. An offshore oil and natural gas project is typically based on one or more discoveries of oil and natural gas fields. Although seismic and other surveys can identify possible oil and natural gas deposits, only drilling can confirm the existence of oil and natural gas in a given location. After confirmation of a viable oil and natural gas field that meets the operators' technical and economic constraints, project development may begin.

Although no two offshore oil and natural gas projects are exactly alike, for the purposes of this study, offshore project developments were generalized into six generic project types based on project size and water depth. Water depth range is one of the key determinants of project development, as field development scenarios vary greatly from shallow to deepwater fields. In shallow water fields so called "fixed" infrastructure is most often used with drilling, processing, and production taking place from one or more platform or platforms that are fixed directly to the seafloor (fixed platforms).

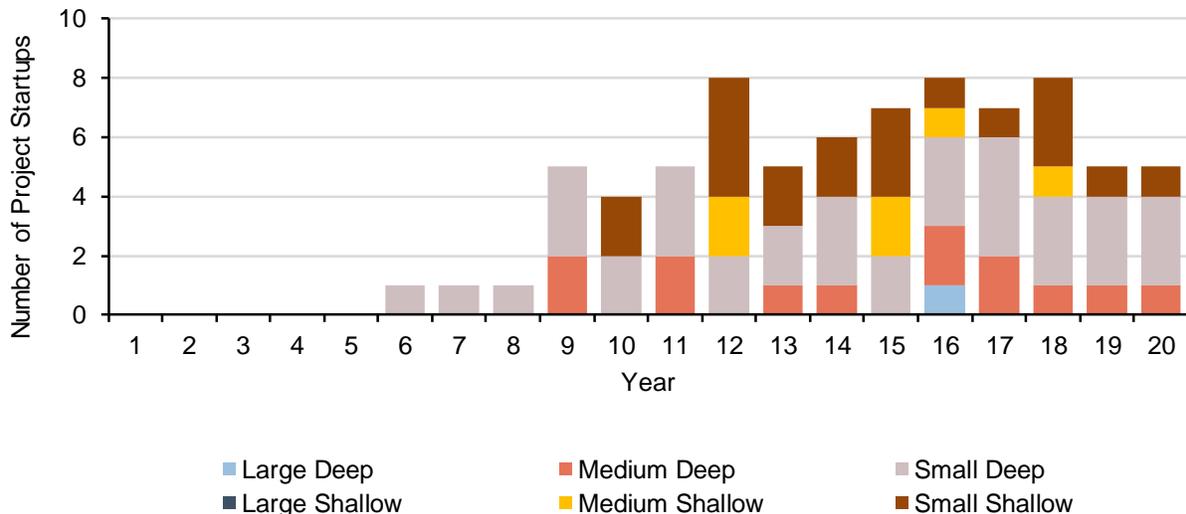
Deepwater projects are typically more complex and thus more capital intensive. Most deepwater projects utilize floating production units and subsea oil production infrastructure. Due to their increased complexity, deep water projects typically have longer development timeframes, as well as larger capital requirements.

<sup>9</sup> Lease sales begin in Year 1.

Apart from water depth, project size is typically defined by reservoir characteristics, hydrocarbon volumes, and most importantly expected production, all which define the timeline and capital investment required to develop the project. Larger projects typically require more wells, longer development periods, and larger upfront capital requirements. Smaller projects, on the other hand, often rely on larger projects for infrastructure such as pipelines or processing facilities. Thus, smaller projects are normally delayed, especially in undeveloped areas such as the Eastern Gulf until larger projects are in place or processing is available - though in the Eastern Gulf areas projects could tie into existing infrastructure such as platforms and pipelines in the central Gulf to speed development.

During the 20-year forecast period the study projects that around 20 major projects could begin oil and natural gas production in the Eastern Gulf planning area. Given the location of the resource potential, most of these projects would be expected to be deepwater projects, with around 14 major deepwater projects and 6 major shallow water projects projected. (Figure 4)

**Figure 4: Projected Number of Projects by Start-Up Year, Size and Water Depth**



Source: Calash

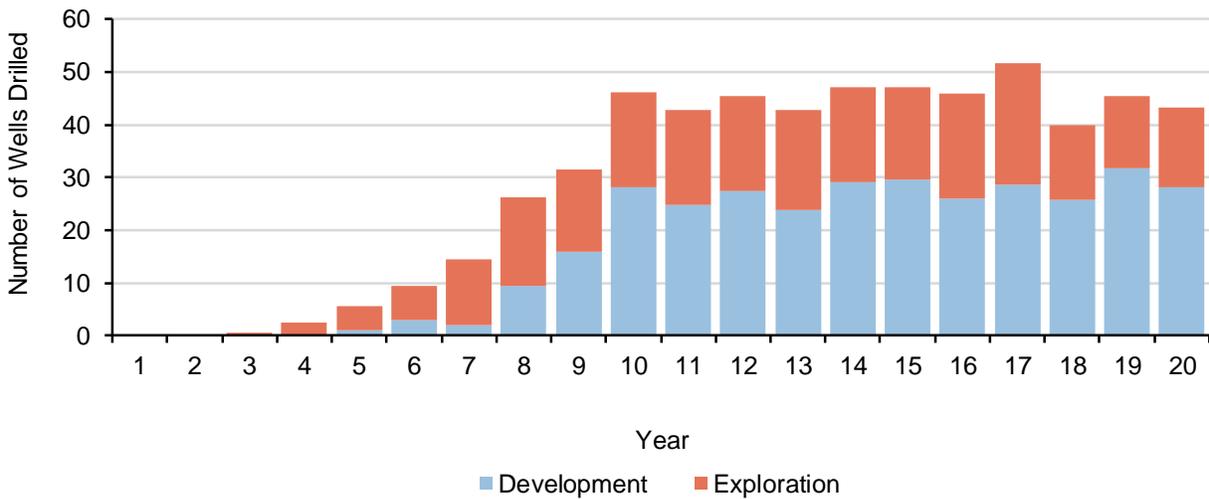
Projects could begin producing oil and natural gas as soon as five years after leasing begins in the Eastern Gulf.

### 3.3 Drilling Activity

Exploration and development drilling are used to identify, confirm, delineate, and produce oil and natural gas, making drilling one of the most important offshore oil and natural gas activities. Drilling is a very capital-intensive process employing drilling rigs that require large crews as well as significant quantities of consumables ranging from food and fuel to drill pipe and drilling fluids. Drilling rigs (mobile offshore drilling units – MODU's) must constantly be resupplied and crewed, and thus lead to high levels of activity in the areas and ports that support offshore drilling rigs.

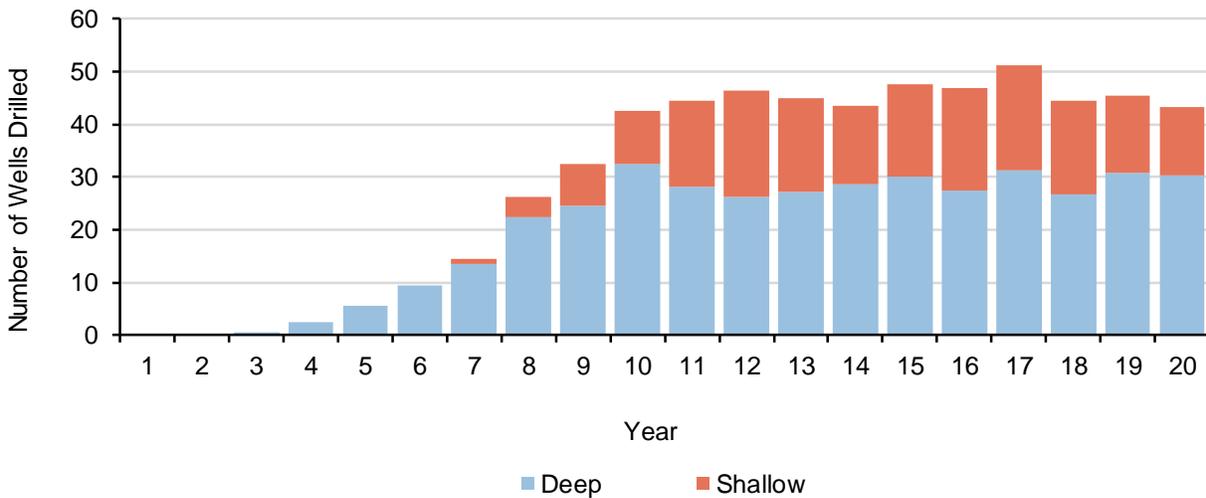
Drilling activity in the Eastern Gulf is expected to be highly robust upon the commencement of offshore oil and natural gas activity. Exploratory drilling is projected to begin within two years after the first lease sales. Only exploratory drilling is expected to take place for the first four years of potential Eastern Gulf development. In the fifth year, development drilling is expected to begin and continue to accelerate. Total drilling activity is projected to level off at around 45-50 wells per year starting 11 years after initial lease sales. During this time, the proportion between development and exploratory wells is expected to shift to around 60 and 40 percent respectively, which is in line with other mature provinces. (Figure 5)

**Figure 5: Projected Number of Wells Drilled by Well Type**



Source: Calash

Due to the interconnected nature of exploration, drilling, and development, Eastern Gulf drilling is projected to follow a trend similar to project development regarding water depths of wells. As the basin matures, drilling is projected to trend to a 65 to 35 ratio of deepwater to shallow water wells. A total of around 565 wells are projected to be drilled across the forecast period. (Figure 6)

**Figure 6: Projected Number of Wells Drilled by Water Depth and Year**

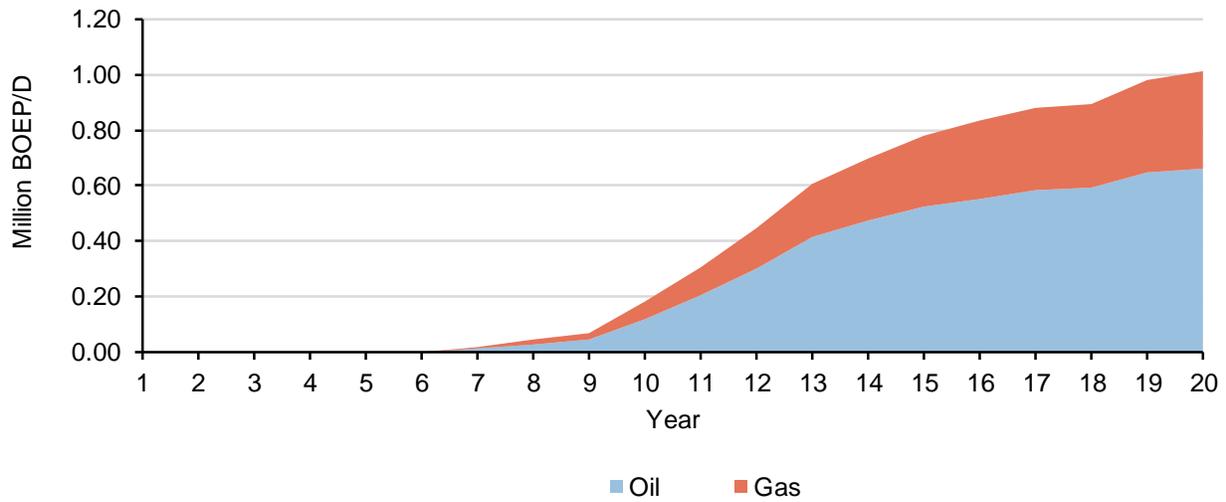
Source: Calash

### 3.4 Production Activity

The number of projects developed, coupled with reservoir size and reservoir productivity, is the main determinant of oil and natural gas production levels. Most oil and natural gas reservoirs contain a combination of oil, natural gas, water, and many other substances. Some reservoirs may contain nearly all oil or all natural gas. Most reservoirs possess both oil and natural gas in varying ratios with oil sometimes expressed as condensate. All of the resource plays defined by BOEM studies are constructed under the expectation that both oil and natural gas are present, with the relative ratios defined on a play by play basis. Oil and gas ratios for individual fields across plays are likely to vary, though for the purpose of this study they were modeled as consistent within each play. Production for each project was modeled based on standard production curves taking into account the start-up, ramp-up, peak, and decline timing, as well as the expected hydrocarbon mix.

This study projects that first oil and natural gas production in the Eastern Gulf would take place five years after the beginning of leasing in the area. Initial production is expected to be in the deepwater, likely tying into existing oil and gas infrastructure in the Central Gulf. Due to the delay in leasing in areas under moratorium, annual production would be expected to reach only 45 thousand BOED by the third year of production. Production is projected to reach just over one million BOED by the end of the forecast period, with approximately 66 percent of production oil (650 thousand BOED), and 34 percent of the production natural gas (330 thousand BOED or 1.9 billion cubic feet per day). (Figure 7)

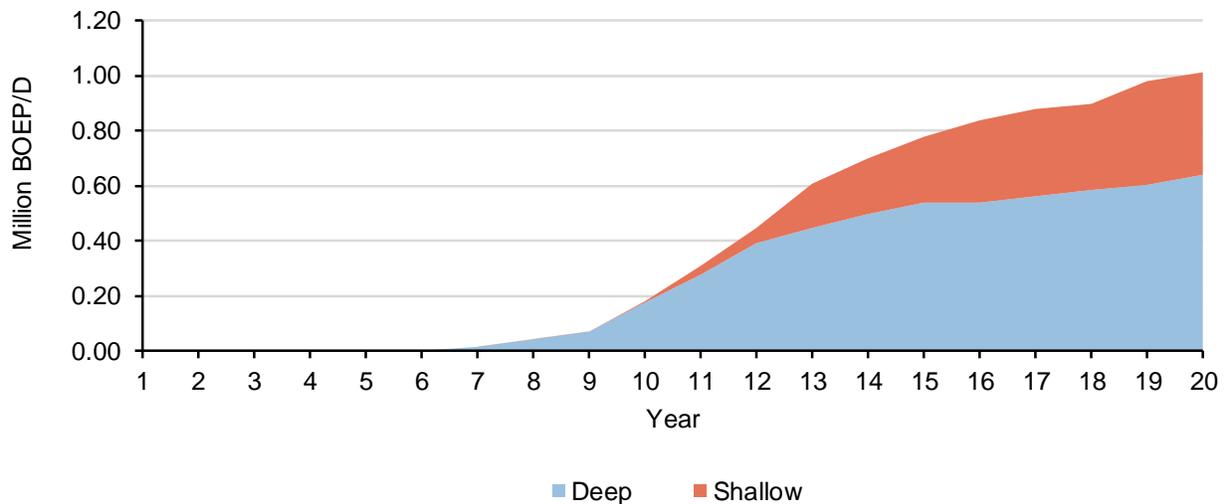
**Figure 7: Projected Production by Type and Year**



Source: Calash

Since project development and drilling is expected to be concentrated in deepwater, production is expected to outweigh shallow water production by a large margin. Deepwater production is expected to account for 63 percent of production by the end of the forecast period, compared to 37 percent of production from shallow water fields. (Figure 8)

**Figure 8: Projected Production by Water Depth**



Source: Calash

### 3.5 Spending Activity

Offshore oil and natural gas development is capital intensive. Offshore projects require exploratory seismic surveys and drilling, production equipment, services such as engineering, operational expenditures including the ongoing supply of consumables, and maintenance. The combined effects of one individual project flow through the entire economy driving employment

and economic growth. Total cumulative spending for the 20 year forecast period on Eastern Gulf offshore oil and natural gas development is projected to be over \$117 billion. Total spending in the first five years is projected to be around \$315 million per year; spending per year is expected to increase as projects are built and development drilling begins. Total drilling spending is projected to steadily increase throughout the forecast period, reaching over \$2.5 billion by the end of the forecast period. Total spending is projected to remain relatively constant at about \$10-\$11 billion per year for the last five years of the forecast period.

For the purposes of this report, spending is divided into eight main categories, with each category encompassing a major type of exploration and production activity. For example, geological and geophysical (G&G) spending is normally associated with imaging of possible reservoirs prior to exploration drilling and thus takes place primarily at the early stages of a project's lifecycle.

Although critically important, G&G spending including seismic is a relatively low percentage of overall spending at an average of nearly \$250 million per year or less than four percent of overall spending across the forecast period. Seismic spending is one of first categories of spending expected in the region, accounting for nearly 80 percent of spending in the first five years of the forecast period, as offshore prospects require a significant amount of time to identify.

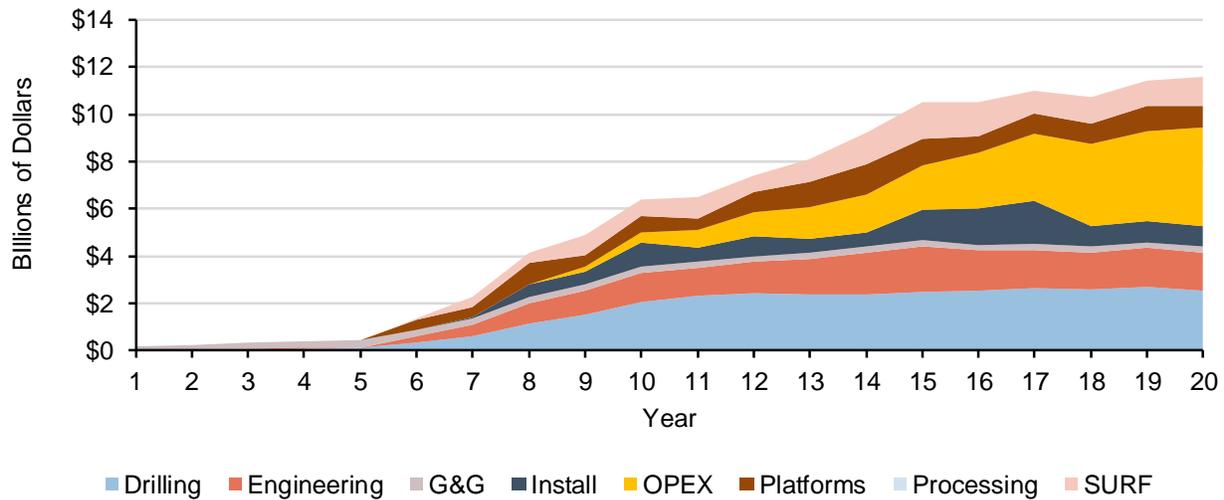
Given the expense and logistics requirements of offshore drilling, where rigs command large day rates in conjunction with high operational supply costs, drilling expenditures represent one of the largest sources of spending for any offshore project. Drilling expenditures across the forecast period, including both exploration and development drilling, are projected to average nearly \$1.6 billion per year. Drilling expenditures are projected to increase throughout the forecast to over \$2.5 billion per year for the last six years of the forecast period.

Engineering spending takes place at all stages of an offshore projects lifecycle, from exploration to project development as well as during a projects operational phase. Engineering activities vary from overall project-focused engineering to the engineering of very specific equipment and components. Engineering spending is projected to average nearly \$990 million per year across the forecast period, increasing steadily as the Eastern Gulf is developed.

Most of the equipment utilized in developing offshore oil and natural gas fields falls into either the platform (both fixed and floating) or SURF (subsea equipment, umbilicals, risers and flowlines) categories. This equipment is traditionally purchased and constructed prior to production of oil and natural gas. The types of equipment include complicated structures like floating platforms that weigh tens of thousands of tons, complex subsea trees that control wells at the ocean floor, and miles of pipeline that transport production back to shore. Some of the equipment required is less complex, such as offshore accommodation modules as wells as

equipment such as mats, which are metal frames placed on the seafloor to hold other equipment. Due to the varying timelines for procurement of equipment, spending for platforms and SURF equipment is more variable year to year than most other offshore exploration and development spending. Platform spending is expected to average around \$600 million per year across the forecast period. SURF spending is projected to average around \$700 million per year. (Figure 9)

**Figure 9: Projected Overall Spending by Category (\$ Billions per Year)**



Source: Calash

Installation of platforms and SURF equipment is normally carried out by multiple vessels, each with specialized functions such as pipe-lay or heavy-lift. Some vessels might lay large diameter pipelines (14 inch+), while other vessels lay smaller diameter infield pipelines (2-10 inches), or lift equipment and install hardware. Additional specialized vessels supply drill-pipe, fuel and other fluids, and food. Nearly everything installed offshore must first be prepared onshore at specialized bases in the region prior to execution. Equipment is sometimes transported to the field on the installation vessels themselves, and at other times is transferred to the field in specialized barges or transportation vessels. Installing offshore equipment often requires complex connection or integration operations and uses vessels that can command day rates of over \$1 million. Overall, these variables are expected to drive annual installation spending of over \$610 million per year across the forecast period.

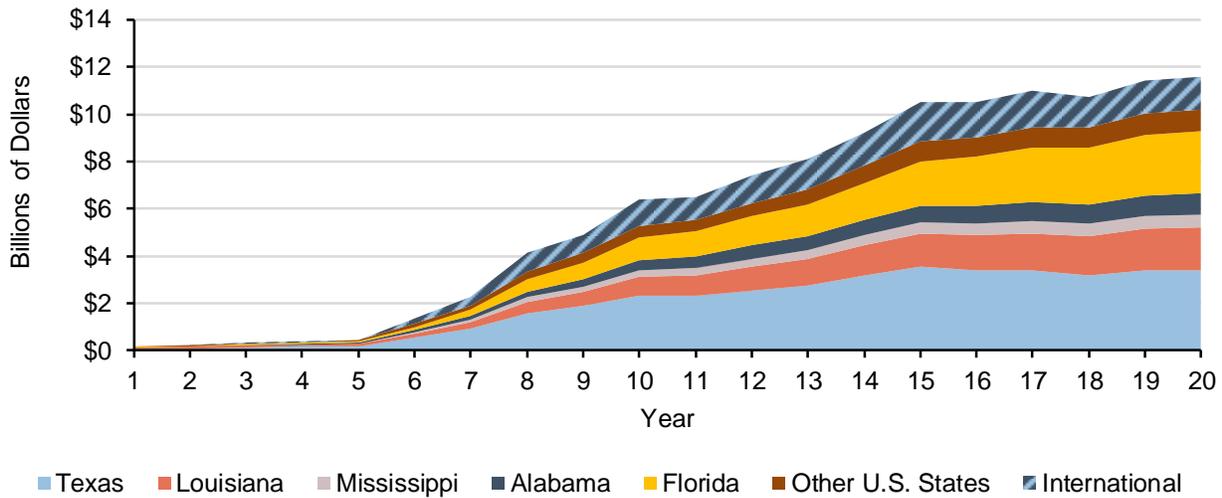
Once the initial wells have been drilled and the necessary equipment installed, a field can enter the operational phase. The operational phase requires manning and operating facilities and equipment, continuously supplying essential fluids, and constant general maintenance. These operational expenditures (OPEX) are a significant source of ongoing spending by oil and gas companies within the region. Once production has been underway for five years, operational expenditures are expected to be around \$730 million per year and continue to climb to over \$4.1 billion per year by the end of the forecast period.

### 3.6 Spending Trends

The location of spending for Eastern Gulf oil and natural gas development will be dependent on a variety of factors, including the type of equipment and services, the location of the projects being developed, and the time period in which the spending takes place. Developing an offshore oil and gas project requires a complex supply chain with suppliers located all over the country and often the world. Depending on the activity type, some spending can take place far from the activity area while other spending must be undertaken geographically close to projects. For instance, activity such as G&G seismic or drilling must take place in the waters of the affected region, with support required from nearby shorebases and ports to supply items such as fuel, food, and other consumables. Specialized equipment may be manufactured in far off states or even foreign countries with more developed oil and natural gas supply chains, especially in the early years of a basin's development. In contrast to most other undeveloped oil and natural gas areas in the United States, the Eastern Gulf has ready access to the Gulf regions' existing offshore oil and natural gas supply chain and infrastructure, which could lead to relatively faster development in the area.

During the initial five year seismic and exploratory drilling phase an average of 88 percent of total Eastern Gulf oil and natural gas spending is projected to take place in the Gulf Coast states. However, as projects begin to be developed and spending on platforms and SURF equipment begins, the Gulf Coast's share of spending is projected to dip to 73 percent across the forecast period, with some high value SURF equipment and platforms to be supplied by other countries. By the end of the forecast period around 80 percent of total spending is projected to take place in the Gulf Coast States. (Figure 10)

**Figure 10: Projected Overall Spending Gulf Coast States vs. Other U.S. States vs. International (\$ Billions per Year)**



Source: Calash

Spending among the Gulf Coast states is projected to vary based on the location of offshore oil and natural gas reserves, projects, and production as well as the makeup of the individual state’s economies. The large existing offshore oil and gas supply chains in Texas and Louisiana are expected to result in these states capturing large shares of spending despite their relative distance from exploration and production in the Eastern Gulf. Initially, it is assumed that much of the Eastern Gulf development will be directly supplied through ports of Louisiana and Texas. However, as the region develops, suppliers of offshore oil and natural gas equipment are expected to take advantage of the high-tech manufacturing capabilities, as well the extensive port infrastructure in states such as Florida, Alabama, and Mississippi. This shift would therefore distribute spending from Texas and Louisiana towards the more eastern states in the Gulf. By the end of the forecast period, 40 percent of development expenditures are projected to be spent in Florida, Alabama, and Mississippi versus an average of only 20 percent in the first five years. In this scenario, total Gulf Coast spending from Eastern Gulf exploration and development activity is expected to reach over \$9.2 billion per year by the end of the forecast period, of which over \$4 billion is projected to be received by the three eastern most Gulf States. (Table 4).

**Table 4: Projected Spending Gulf Coast States and Other U.S. States (\$Millions per Year)**

State	1	2	3	4	5	6	7	8	9	10
Florida	\$13	\$18	\$29	\$36	\$48	\$139	\$271	\$523	\$699	\$954
Texas	\$76	\$101	\$138	\$158	\$189	\$535	\$925	\$1,602	\$1,881	\$2,322
Louisiana	\$52	\$64	\$86	\$91	\$99	\$200	\$292	\$480	\$595	\$789
Mississippi	\$6	\$8	\$12	\$15	\$19	\$54	\$95	\$167	\$211	\$273
Alabama	\$14	\$19	\$27	\$32	\$38	\$83	\$149	\$260	\$355	\$457
Gulf Coast	\$160	\$210	\$291	\$332	\$393	\$1,011	\$1,731	\$3,031	\$3,741	\$4,795
Other U.S. States	\$14	\$18	\$25	\$28	\$34	\$115	\$194	\$332	\$385	\$475
<b>Total</b>	<b>\$174</b>	<b>\$228</b>	<b>\$316</b>	<b>\$360</b>	<b>\$427</b>	<b>\$1,126</b>	<b>\$1,925</b>	<b>\$3,363</b>	<b>\$4,126</b>	<b>\$5,270</b>

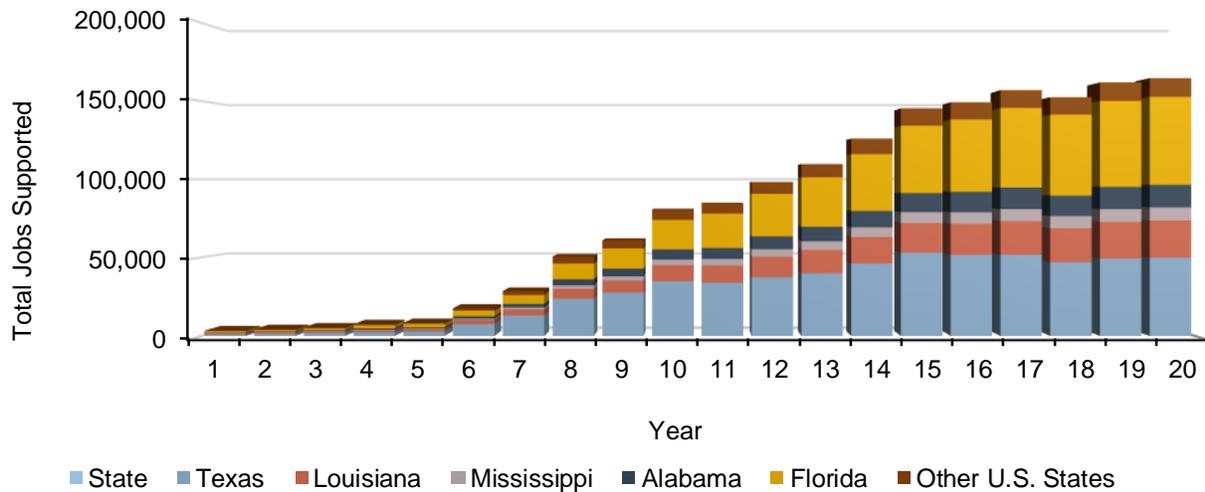
State	11	12	13	14	15	16	17	18	19	20
Florida	\$1,054	\$1,221	\$1,348	\$1,568	\$1,880	\$2,051	\$2,298	\$2,413	\$2,566	\$2,628
Texas	\$2,329	\$2,538	\$2,744	\$3,176	\$3,536	\$3,413	\$3,397	\$3,208	\$3,379	\$3,405
Louisiana	\$861	\$1,012	\$1,146	\$1,283	\$1,410	\$1,470	\$1,581	\$1,650	\$1,769	\$1,803
Mississippi	\$319	\$352	\$376	\$421	\$464	\$476	\$502	\$508	\$541	\$549
Alabama	\$491	\$566	\$590	\$654	\$737	\$791	\$829	\$827	\$873	\$887
Gulf Coast	\$5,055	\$5,688	\$6,205	\$7,102	\$8,027	\$8,200	\$8,606	\$8,606	\$9,128	\$9,272
Other U.S. States	\$492	\$562	\$637	\$751	\$830	\$811	\$833	\$844	\$899	\$908
<b>Total</b>	<b>\$5,547</b>	<b>\$6,250</b>	<b>\$6,842</b>	<b>\$7,853</b>	<b>\$8,857</b>	<b>\$9,012</b>	<b>\$9,439</b>	<b>\$9,449</b>	<b>\$10,027</b>	<b>\$10,180</b>

Source: Calash

### 3.7 Employment

Spending on goods and services to develop oil and natural gas in the Eastern Gulf is projected to provide large employment gains both nationally and regionally. Employment generally follows spending patterns. Employment effects are expected to steadily grow throughout the forecast period, reaching nearly 165 thousand jobs supported in the US 20 years after initial leasing begins. Total Gulf Coast employment is projected to reach over 152 thousand jobs by the end of the forecast period. U.S. states outside the Gulf Coast region are projected to see additional employment of nearly 12 thousand jobs by the end of the forecast period. (Figure 11)

**Figure 11: Projected Employment by State**



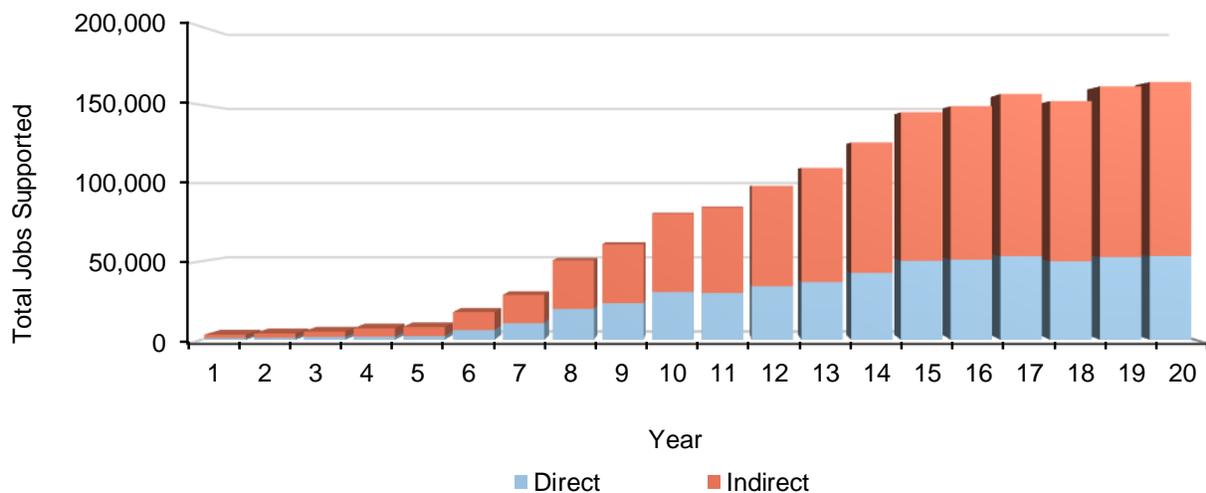
Source: Calash

The largest impact on employment by number of jobs is expected to be seen in the traditional offshore oil and natural gas production states of Texas and Louisiana as well as in

Florida. Total employment supported in Florida could reach over 56 thousand jobs by the end of the forecast period. Eastern Gulf of Mexico oil and natural gas development is projected to support employment gains of approximately 50 thousand and 24 thousand jobs in Texas and Louisiana respectively by the end of the forecast period. Alabama and Mississippi are also projected to see employment gains of over 14 thousand jobs and over 8 thousand jobs respectively by the end of the forecast period

The opening of the Eastern Gulf to offshore oil and natural gas production is expected to increase employment not only through direct employment in the industry, but also indirectly. Indirect employment occurs through the purchases of needed goods and services and the induced employment impact of greater income in the economy. Direct employment by oil and natural gas companies and their direct suppliers are projected to reach over 53 thousand jobs by the end of the forecast period. Jobs generated through the secondary purchase of goods and services coupled with the income effects of increased employment are expected to contribute a further 111 thousand jobs. (Figure 12)

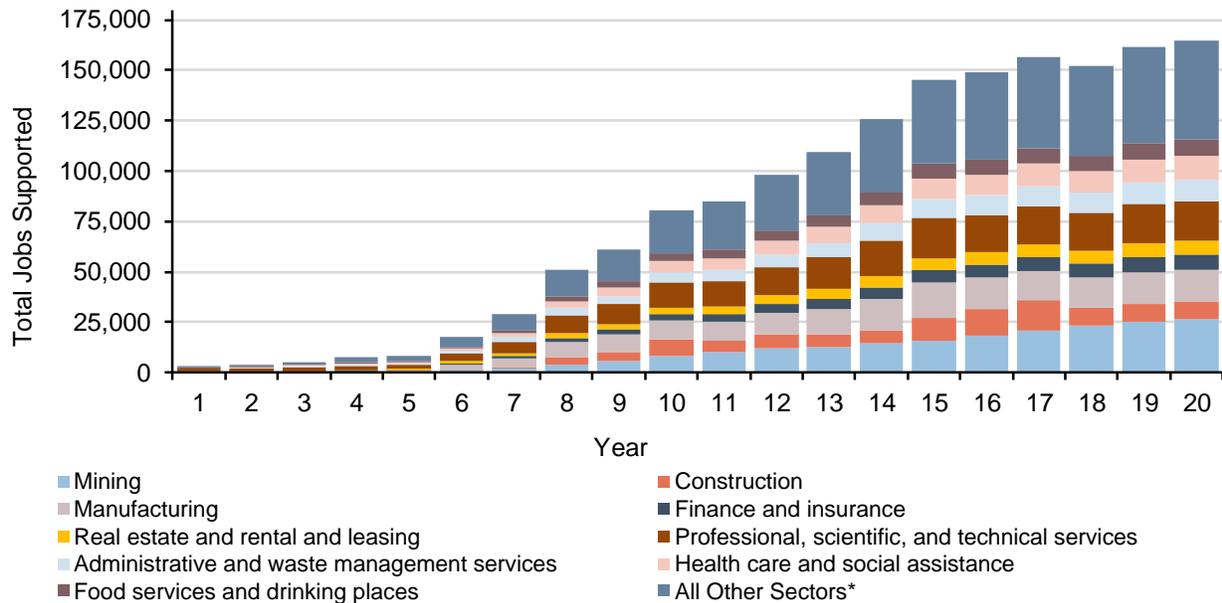
**Figure 12: Projected Employment Direct vs. Indirect and Induced**



Source: Calash

Offshore oil and natural gas development in the Eastern Gulf is expected to support a diverse spectrum of industries both nationally and along the Gulf Coast. Industry sectors which are directly involved in oil and natural gas activities such as mining, which includes the oil and gas industry, manufacturing, professional, scientific, and technical Services (engineering), and Construction (installation) are expected to see the largest employment impacts with a combined 70 thousand jobs created by the end of the forecast period. Additionally, employment impacts are expected to be significant for a variety of other industries outside oil and gas, with over 94 thousand jobs projected outside of these four categories by the end of the forecast period. (Figure 13)

**Figure 13: Projected Employment by Industry Sector**



Many employment sectors of the economy outside oil and gas development or the direct supply chain will also be impacted, mainly due to greater income in the economy. The summary table of projected total employment supported at the state level is provided below. (Table 5)

**Table 5: Projected Employment Gulf Coast States and Other U.S. States**

State	1	2	3	4	5	6	7	8	9	10
Texas	1,168	1,518	2,057	2,308	2,734	7,575	13,149	23,779	27,776	34,892
Louisiana	742	898	1,184	1,386	1,477	2,660	3,718	6,208	7,502	10,200
Mississippi	100	131	173	367	420	834	1,313	2,267	2,776	3,656
Alabama	255	318	419	827	901	1,478	2,273	3,894	4,956	6,513
Florida	851	965	1,140	2,061	2,266	3,650	5,682	10,097	12,804	18,832
Gulf Coast	3,117	3,829	4,974	6,950	7,799	16,196	26,135	46,246	55,814	74,094
Other U.S. States	203	257	350	382	454	1,500	2,522	4,485	5,147	6,467
<b>Total</b>	<b>6,437</b>	<b>7,915</b>	<b>10,297</b>	<b>14,282</b>	<b>16,052</b>	<b>33,893</b>	<b>54,792</b>	<b>96,977</b>	<b>116,775</b>	<b>154,656</b>

State	11	12	13	14	15	16	17	18	19	20
Texas	33,920	37,397	39,927	46,218	53,069	51,706	51,793	47,068	49,388	49,840
Louisiana	11,009	13,146	15,050	16,889	18,971	19,917	21,440	21,754	23,343	23,824
Mississippi	4,207	4,790	5,440	6,156	6,974	7,279	7,722	7,617	8,220	8,415
Alabama	6,967	8,240	9,252	10,419	12,091	13,037	13,689	13,123	14,105	14,418
Florida	22,033	27,165	31,620	36,377	43,013	46,163	50,801	51,670	54,865	56,044
Gulf Coast	78,137	90,738	101,288	116,060	134,119	138,102	145,445	141,232	149,921	152,540
Other U.S. States	6,476	7,457	8,347	9,848	11,153	10,996	11,335	11,084	11,778	11,908
<b>Total</b>	<b>162,750</b>	<b>188,934</b>	<b>210,924</b>	<b>241,967</b>	<b>279,391</b>	<b>287,201</b>	<b>302,225</b>	<b>293,549</b>	<b>311,621</b>	<b>316,989</b>

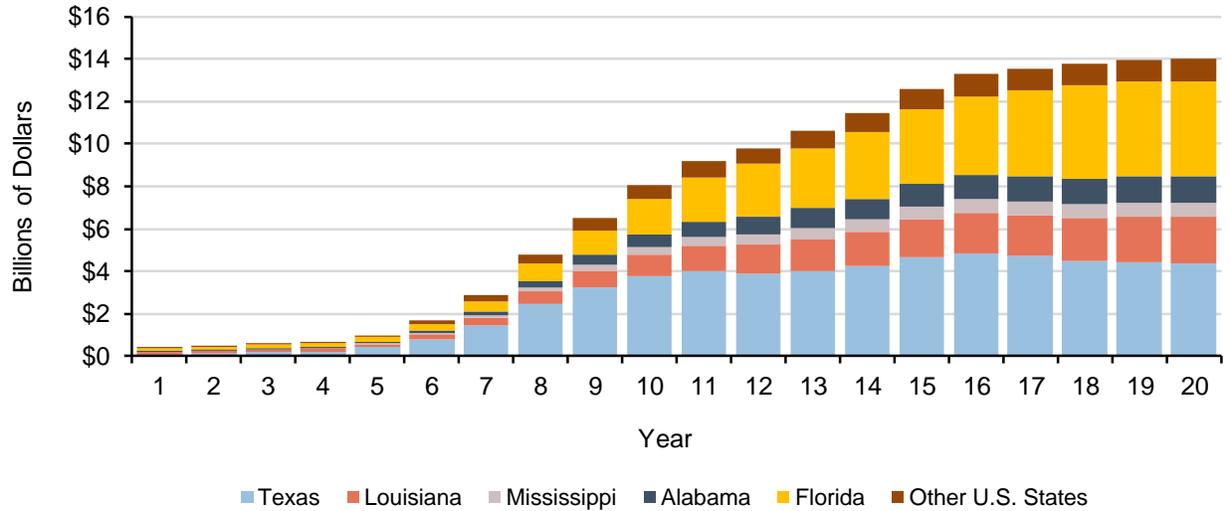
Source: Calash

### 3.8 State Income Impacts

Along with employment benefits, significant contributions to state and national gross domestic product are also expected due to Eastern Gulf of Mexico oil and natural gas development. Total contributions to state economies are projected at over \$14 billion per year by

the end of the forecast period, with around 93 percent expected to occur in Gulf Coast states and seven percent in the rest of the U.S. (Figure 14)

**Figure 14: Projected Contributions to State Economies Gulf Coast vs. Other U.S. States – Total (\$ Billions per Year)**



Source: Calash

Presented below are the projected economic effects of Eastern Gulf exploration and production. The largest contributions are expected to mimic spending at the state level. Under this projection, the states of Florida, Texas, and Louisiana receive the majority of contributions to their states' economies. (Table 6)

**Table 6: Projected Contributions to State Economies Gulf Coast States and Other U.S. States (\$ Millions per Year)**

State	1	2	3	4	5	6	7	8	9	10
Texas	\$105	\$141	\$193	\$224	\$409	\$809	\$1,454	\$2,459	\$3,230	\$3,749
Louisiana	\$74	\$89	\$116	\$122	\$164	\$238	\$360	\$587	\$801	\$1,021
Mississippi	\$16	\$19	\$23	\$26	\$40	\$65	\$109	\$185	\$265	\$344
Alabama	\$38	\$45	\$55	\$61	\$77	\$114	\$183	\$307	\$459	\$616
Florida	\$141	\$151	\$174	\$180	\$226	\$301	\$484	\$803	\$1,166	\$1,659
Gulf Coast	\$374	\$444	\$561	\$614	\$915	\$1,527	\$2,589	\$4,340	\$5,922	\$7,390
Other U.S. States	\$18	\$23	\$31	\$35	\$75	\$155	\$272	\$466	\$605	\$694
<b>Total</b>	<b>\$766</b>	<b>\$911</b>	<b>\$1,153</b>	<b>\$1,264</b>	<b>\$1,905</b>	<b>\$3,209</b>	<b>\$5,451</b>	<b>\$9,147</b>	<b>\$12,449</b>	<b>\$15,474</b>

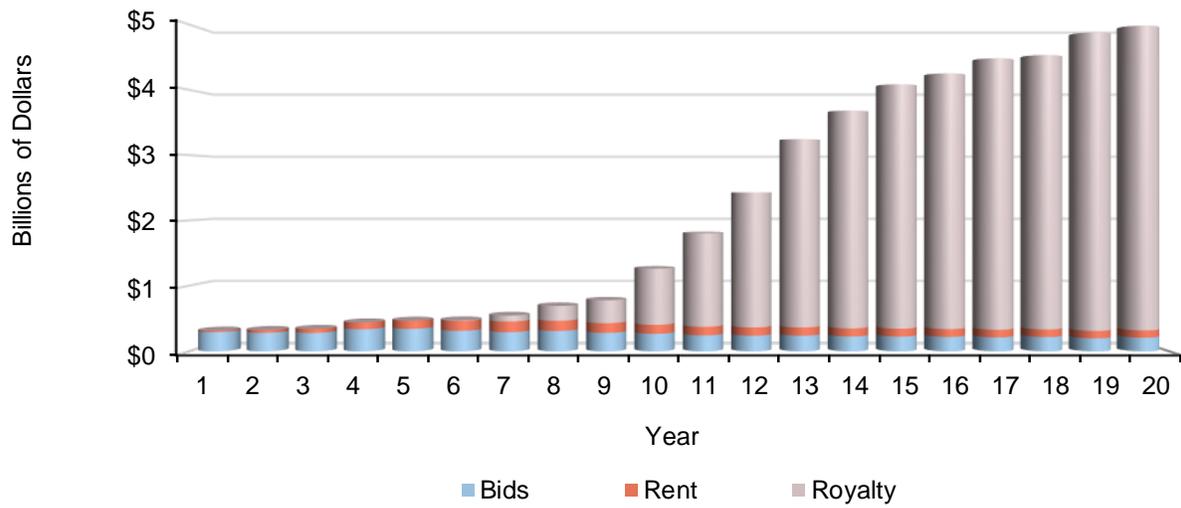
State	11	12	13	14	15	16	17	18	19	20
Texas	\$3,995	\$3,920	\$4,008	\$4,223	\$4,657	\$4,840	\$4,715	\$4,461	\$4,421	\$4,363
Louisiana	\$1,177	\$1,339	\$1,519	\$1,663	\$1,808	\$1,932	\$1,934	\$2,031	\$2,126	\$2,183
Mississippi	\$421	\$463	\$511	\$553	\$590	\$616	\$633	\$652	\$670	\$683
Alabama	\$740	\$848	\$930	\$987	\$1,050	\$1,131	\$1,189	\$1,229	\$1,248	\$1,262
Florida	\$2,112	\$2,476	\$2,849	\$3,145	\$3,508	\$3,716	\$4,051	\$4,379	\$4,455	\$4,484
Gulf Coast	\$8,444	\$9,046	\$9,817	\$10,571	\$11,613	\$12,235	\$12,522	\$12,751	\$12,921	\$12,975
Other U.S. States	\$728	\$744	\$790	\$876	\$979	\$1,043	\$1,014	\$1,012	\$1,030	\$1,042
<b>Total</b>	<b>\$17,617</b>	<b>\$18,836</b>	<b>\$20,423</b>	<b>\$22,018</b>	<b>\$24,205</b>	<b>\$25,513</b>	<b>\$26,058</b>	<b>\$26,513</b>	<b>\$26,872</b>	<b>\$26,991</b>

Source: Calash

### 3.9 Government Revenue Impacts

In addition to economic and employment growth, expanding current oil and gas production in the Eastern Gulf would increase government revenue. Extrapolating from the current Gulf of Mexico regulatory environment, total government revenues are projected to reach nearly \$4.9 billion dollars per year by the end of the forecast period, with the majority of revenues from royalties on produced oil and natural gas at nearly \$4.6 billion. At the end of the forecast period, leasing bonus bids are projected to account for nearly \$205 million per year in government revenue, while rental income from offshore blocks is expected to account for nearly \$110 million. Across the forecast period, cumulative government revenues are projected to total over \$41 billion. (Figure 15)

**Figure 15: Projected Government Revenues – Rentals, Royalties, and Bonus Bid (\$ Billions per Year)<sup>10</sup>**

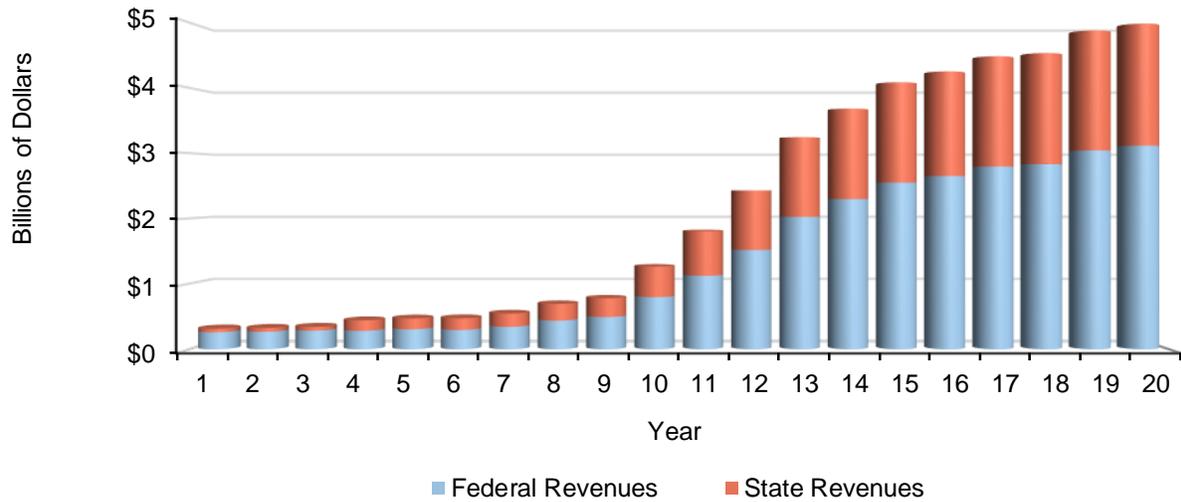


Source: Calash

There is a possibility that revenue generated from Eastern Gulf oil and natural gas revenues will be shared between the Federal government and the affected state governments, although there currently is no revenue sharing agreement in place that covers all of the Gulf of Mexico. However, an assumption that government revenues would be split on the basis of 62.5 percent for the Federal government and 37.5 percent for state governments was assumed for this analysis to compare potential revenue streams among the Gulf Coast states. This is in-line with the percentage split currently in place with states in the Gulf of Mexico covered by GOMESA, but with no annual revenue cap and the addition of Florida. Such projected state government revenue streams will need to be adjusted proportionally when or if agreements are legislated. Given the assumed 37.5 percent revenue share to the Gulf of Mexico states, federal government revenues from Eastern Gulf offshore oil and natural gas production are projected to reach over \$3.1 billion per year at the end of the forecast period. Combined state revenues for the Gulf Coast states are projected at about \$1.8 billion per year by the end of the forecast period. (Figure 16)

<sup>10</sup> Assumes 37.5 percent revenue sharing with state governments.

**Figure 16: Projected Government Revenues from Rentals, Royalties, and Bonus Bids, State and Federal (\$ Billions per Year)<sup>11</sup>**



Source: Calash

Due to the projected location of the potential oil and natural gas production based on the play data, Florida and Alabama are most likely to receive significant returns from any revenue sharing agreement. At a 37.5 percent share for state governments, these states are projected to receive a cumulative \$11.7 billion and \$2.2 billion across the forecast period. Most Gulf Coast states, with the exception of Texas, would receive at least \$120 million per year by the end of the forecast period. At the end of the forecast period Florida is projected to receive the highest revenues, with revenues projected at over \$1.6 billion in the final year of the forecast. (Table 7)

<sup>11</sup> Assumes 37.5 percent revenue sharing with state governments.

**Table 7: Projected Government Revenues from Rentals, Royalties, and Bonus Bids by State and Federal (\$ Millions per Year)<sup>12</sup>**

State	1	2	3	4	5	6	7
Texas	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Louisiana	\$4	\$5	\$5	\$15	\$15	\$17	\$18
Mississippi	\$2	\$2	\$2	\$13	\$13	\$14	\$15
Alabama	\$4	\$4	\$4	\$29	\$29	\$32	\$33
Florida	\$44	\$46	\$47	\$104	\$108	\$116	\$136
Gulf Coast	\$53	\$56	\$57	\$161	\$166	\$179	\$203
Federal	\$261	\$268	\$285	\$281	\$305	\$295	\$344
<b>Total</b>	<b>\$314</b>	<b>\$324</b>	<b>\$342</b>	<b>\$442</b>	<b>\$471</b>	<b>\$474</b>	<b>\$547</b>

State	8	9	10	11	12	13	14
Texas	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Louisiana	\$23	\$25	\$40	\$58	\$77	\$106	\$121
Mississippi	\$17	\$18	\$24	\$35	\$45	\$70	\$81
Alabama	\$39	\$39	\$53	\$78	\$101	\$157	\$181
Florida	\$177	\$206	\$352	\$512	\$687	\$885	\$1,001
Gulf Coast	\$256	\$288	\$469	\$684	\$911	\$1,219	\$1,383
Federal	\$438	\$493	\$798	\$1,124	\$1,517	\$2,024	\$2,295
<b>Total</b>	<b>\$694</b>	<b>\$781</b>	<b>\$1,267</b>	<b>\$1,808</b>	<b>\$2,428</b>	<b>\$3,242</b>	<b>\$3,679</b>

State	15	16	17	18	19	20
Texas	\$0	\$0	\$0	\$0	\$0	\$0
Louisiana	\$134	\$141	\$148	\$149	\$162	\$166
Mississippi	\$91	\$98	\$104	\$103	\$118	\$122
Alabama	\$202	\$219	\$231	\$230	\$262	\$270
Florida	\$1,109	\$1,142	\$1,202	\$1,217	\$1,291	\$1,308
Gulf Coast	\$1,535	\$1,600	\$1,685	\$1,699	\$1,833	\$1,866
Federal	\$2,547	\$2,649	\$2,795	\$2,830	\$3,039	\$3,113
<b>Total</b>	<b>\$4,082</b>	<b>\$4,248</b>	<b>\$4,479</b>	<b>\$4,528</b>	<b>\$4,872</b>	<b>\$4,979</b>

Source: Calash

<sup>12</sup> Assumes 37.5 percent revenue sharing with state governments.

## Section 4 – Conclusions

The offshore U.S. oil and natural gas industry is a key component of the nation's energy supply, as well a significant source of employment, economic activity, and government revenue throughout the nation. However, large portions of the nations' federal waters are currently inaccessible to oil and gas operators, including around 98 percent of the Eastern Gulf. Allowing oil and gas operators increased access to the Eastern Gulf and its resources would be expected to benefit oil and natural gas production, employment, the national economy, and government revenue.

- If leasing in the Eastern Gulf began, annual capital investment and other spending due to offshore oil and natural gas development could grow to over \$11.5 billion per year within 20 years after initial lease sales. Cumulative capital investments and other spending over the 20-year forecast period are projected at nearly \$120 billion.
- Eastern Gulf oil and gas activities could create nearly 85 thousand jobs within ten years of the beginning of leasing activity, the vast majority of which likely would be in the Gulf Coast states.
- By the end of the forecast period, total national employment due to Eastern Gulf oil and gas exploration and production could reach nearly 165 thousand jobs, with over 150 thousand of these jobs in Gulf Coast states.
- Development of the Eastern Gulf's offshore oil and natural gas resources could lead to production of approximately one million barrels of oil equivalent per day within 20 years after initial lease sales.
- Eastern Gulf activity could contribute over \$10.5 billion per year to the national economy within ten years of leasing activity, with Gulf Coast states receiving contributions of nearly \$9.5 billion per year.
- At the end of the forecast period total national contributions to the economy could reach nearly \$14 billion per year, with Gulf Coast states receiving combined contributions of nearly \$13 billion per year.
- Combined state and federal revenues from bonuses, rents and royalties are projected to reach over \$1.8 billion per year within ten years of leasing activity, with these revenues projected to grow to nearly \$5 billion per year by the end of the 20-year forecast period.
- If a legislated state / federal revenue sharing agreement is enacted, the Eastern Gulf coast states could see significant gains to their state budgets. With a 37.5 percent sharing agreement, state revenues are projected to be nearly \$685 million per year within ten years of leasing activity, with revenues expected to grow to over

\$1.8 billion per year by the end of the forecast period, leading to further increases in economic activity and employment. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

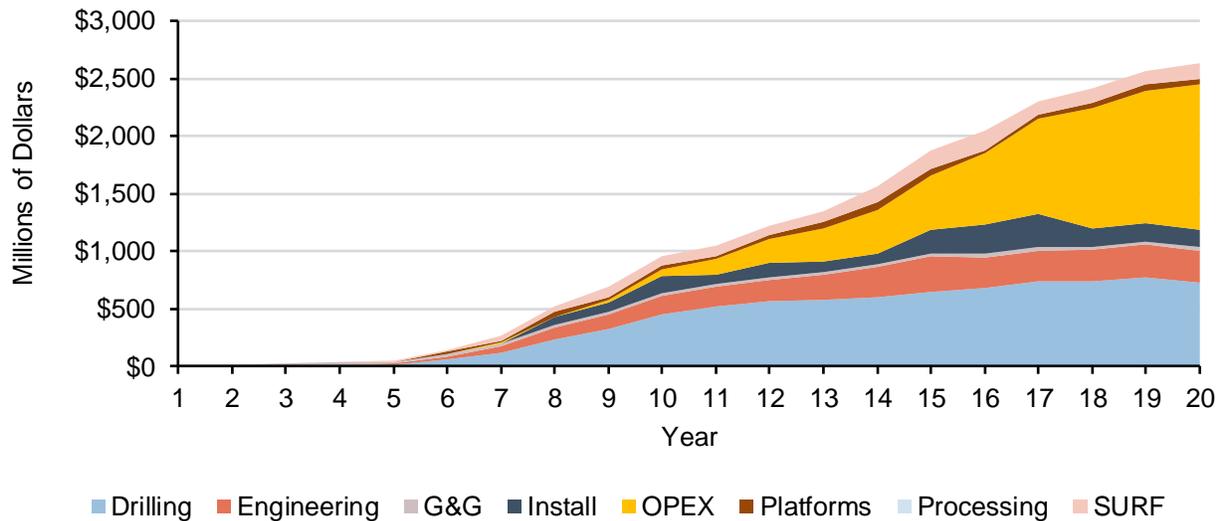
Under the development scenario put forth in this report, it is clear that the Eastern Gulf displays significant potential to grow the American economy across numerous industries and areas. Allowing access to the entire Eastern Gulf for oil and gas exploration and production activities is likely to lead to large capital investments and operational spending by oil and gas operators to develop key resource areas. This spending would likely lead to large increases in employment and economic activity both in Gulf Coast states and nationally. Additionally, this activity is projected to lead to a large increase in domestic energy production and the royalties plus other revenues received are expected to lead to healthy increases in revenues to state and federal governments.

## Section 5 – State Results Appendix

### 5.1 Florida

Florida is expected to be one of the states to experience the largest benefit due to the opening of the Eastern Gulf to offshore oil and natural gas exploration and production activity. Annual spending at the end of the forecast period in the state is projected at around \$2.6 billion per year, with spending primarily focused on drilling, operational expenditures, and engineering. (Figure 17)

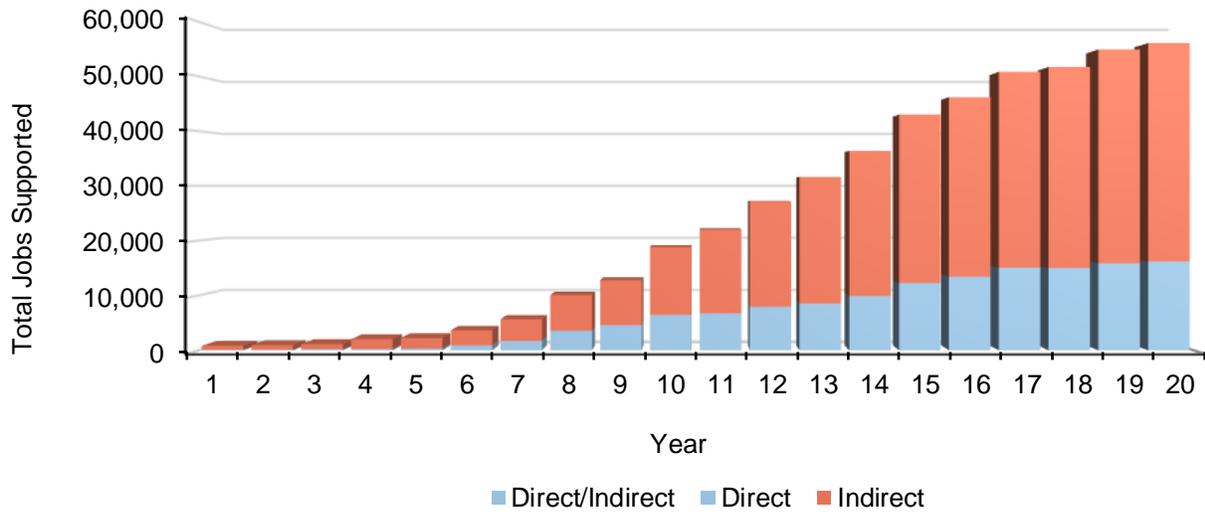
**Figure 17: Projected Florida Spending by Sector (\$ Millions per Year)**



Source: Calash

Employment in Florida due to spending on Eastern Gulf oil and natural gas activity is projected to reach over 56 thousand jobs. Direct employment due to offshore oil and natural gas exploration and production is expected to reach over 16 thousand jobs by the end of the forecast period, with indirect and induced employment of nearly 40 thousand jobs projected in the same year. (Figure 18)

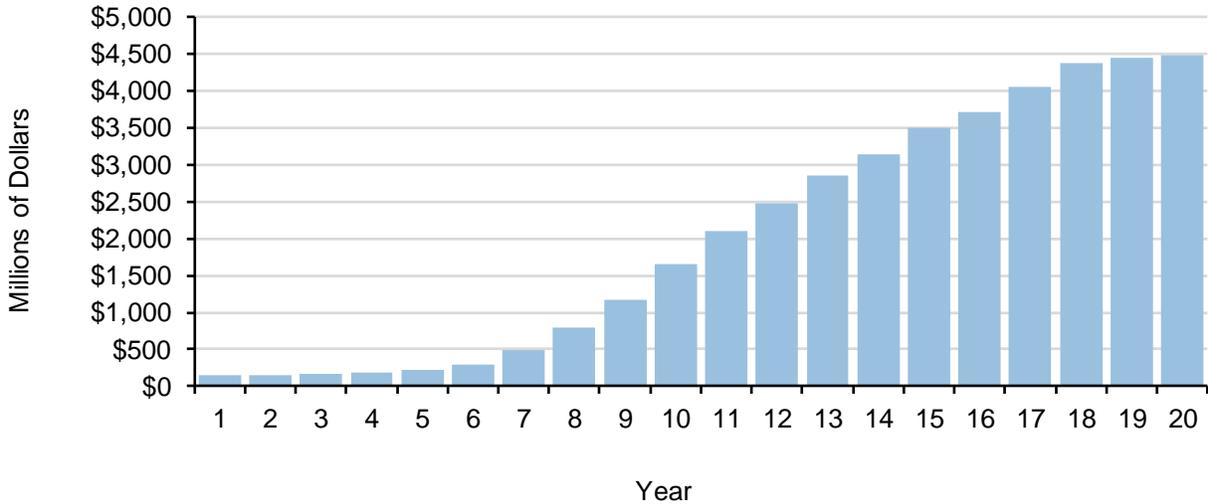
**Figure 18: Projected Florida Employment Direct vs. Indirect and Induced**



Source: Calash

Contributions to Florida’s state economy due to spending by the Eastern Gulf oil and natural gas industry are projected to be nearly \$4.5 billion per year by the end of the forecast period. (Figure 19)

**Figure 19: Projected Florida Contributions to the State Economy (\$ Millions per Year)**



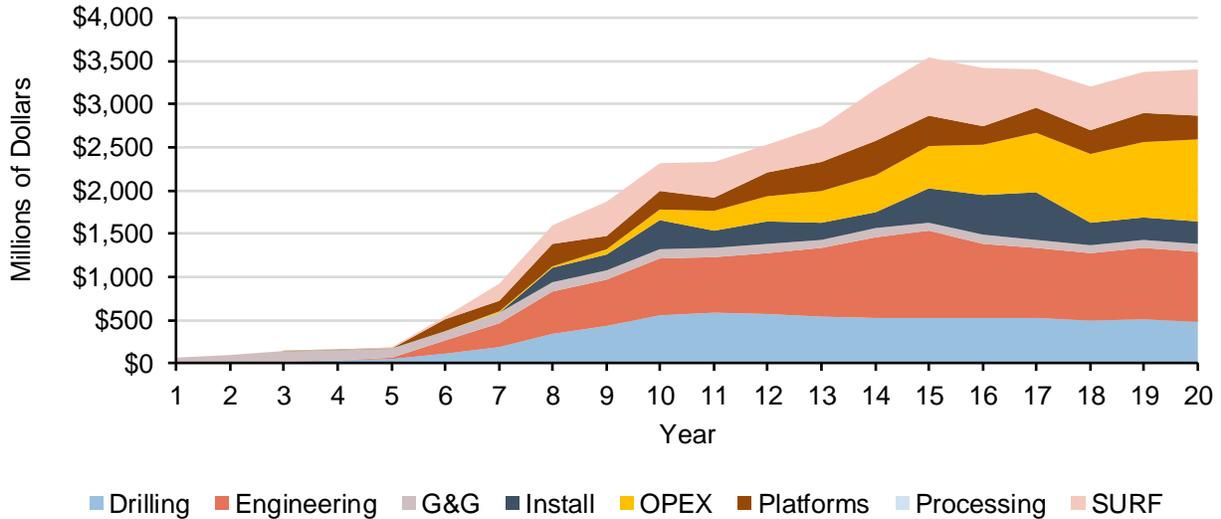
Source: Calash

With an assumed 37.5 percent revenue sharing agreement in place, Eastern Gulf oil and natural gas activities are projected to contribute over \$1.3 billion per year to Florida’s budget by the end of the forecast period; cumulative contributions across the forecast period are projected to be over \$11.7 billion. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

## 5.2 Texas

Texas is expected to be one of the states which will receive the greatest benefits from the opening of the Eastern Gulf to offshore oil and natural gas exploration and production activity. Annual spending at the end of the forecast period in the state is projected to be around \$3.4 billion per year. Spending is expected to be strongest from the OPEX, engineering, SURF equipment, and platform construction segments. (Figure 20)

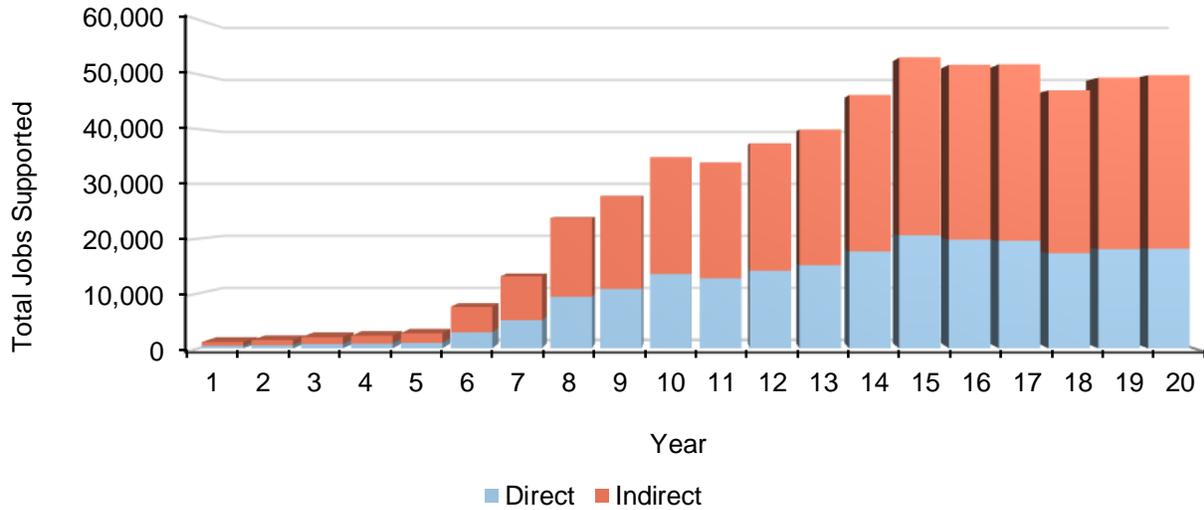
**Figure 20: Projected Texas Spending by Sector (\$ Millions per Year)**



Source: Calash

Employment in Texas due to spending on Eastern Gulf offshore oil and natural gas development is projected to reach nearly 50 thousand jobs at the end of the forecast period. Direct employment due to offshore oil and natural gas exploration and production is expected to reach over 18 thousand jobs at the end of the forecast period, with indirect and induced employment of nearly 32 thousand jobs expected in the same year. (Figure 21)

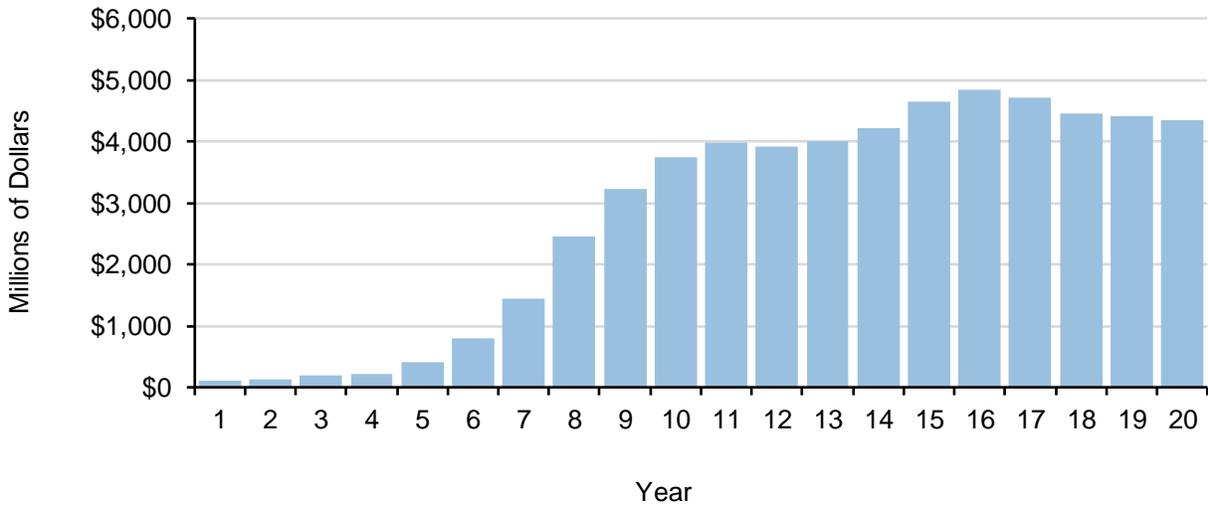
**Figure 21: Projected Texas Employment Direct vs. Indirect and Induced**



Source: Calash

Contributions to Texas’ state economy due to spending on Eastern Gulf oil and natural gas exploration and development are projected to be nearly \$4.4 billion per year at the end of the forecast period. (Figure 22)

**Figure 22: Projected Texas Contributions to the State Economy (\$ Millions per Year)**



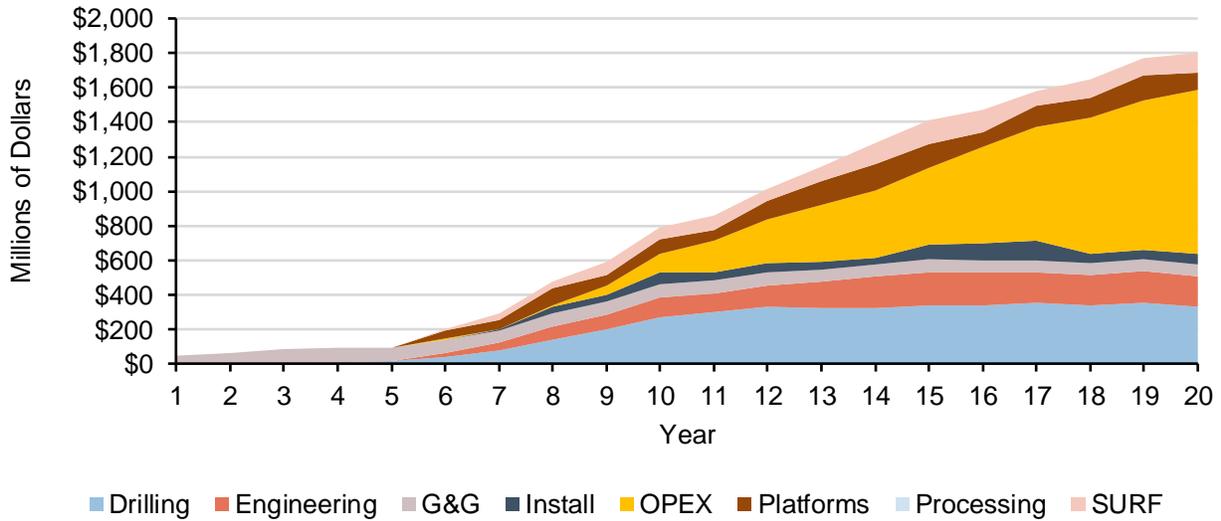
Source: Calash

Due to the distance of Texas from Eastern Gulf oil and natural gas exploration and production, under the scenario used in this report, Texas is not expected to see additional government revenues from Eastern Gulf activity.

### 5.3 Louisiana

Louisiana is expected to receive the third highest levels of spending, employment and gross domestic product due to offshore oil and natural gas activity in the Eastern Gulf. Spending in the state is projected to reach just over \$1.8 billion per year at the end of the forecast period. Spending is expected to primarily be focused on drilling and operational expenditures. (Figure 23)

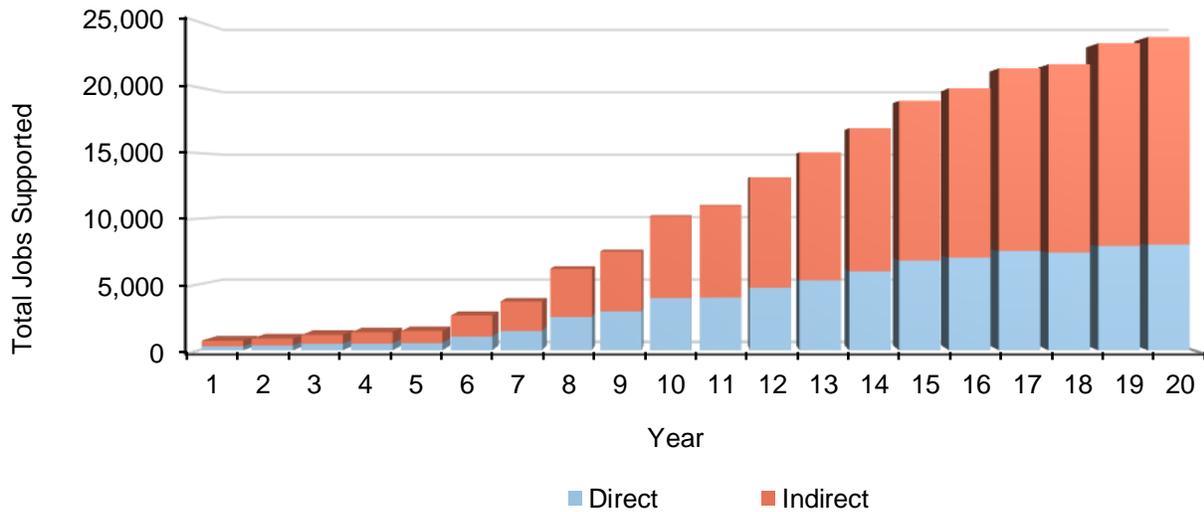
**Figure 23: Projected Louisiana Spending by Sector (\$ Millions per Year)**



Source: Calash

Employment in Louisiana due to Eastern Gulf coast offshore oil and gas production is projected to reach nearly 24 thousand jobs at the end of the forecast period, with direct employment expected to reach over eight thousand jobs, and indirect and induced employment of nearly 16 thousand jobs expected in the same year. (Figure 24)

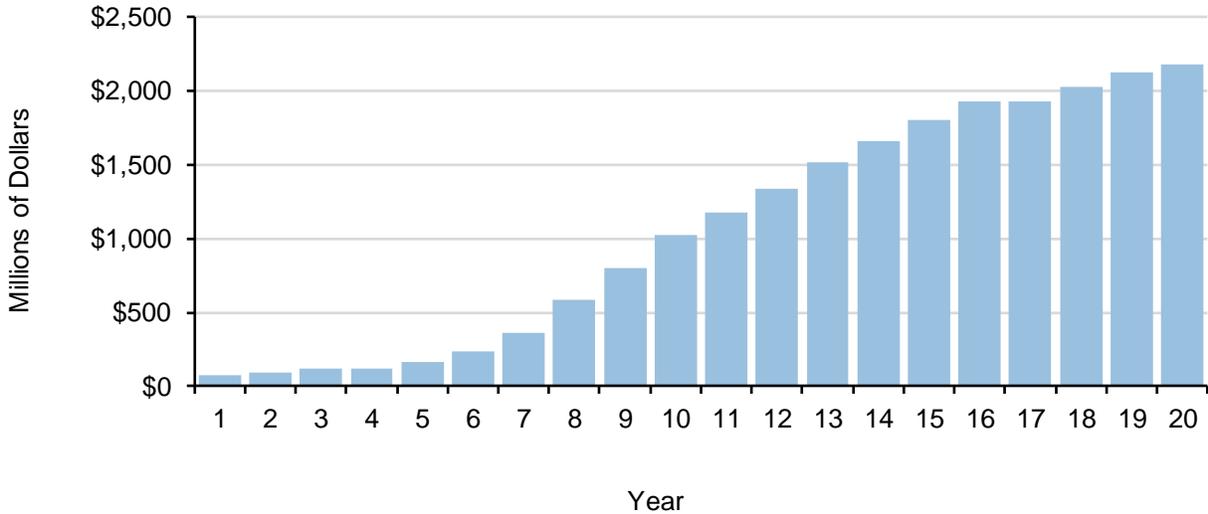
**Figure 24: Projected Louisiana Employment Direct vs. Indirect and Induced**



Source: Calash

At the end of the forecast period, contributions to the state economy from Eastern Gulf offshore oil and natural gas exploration and production in Louisiana are projected to reach nearly \$2.2 billion per year. (Figure 25)

**Figure 25: Projected Louisiana Contributions to the State Economy (\$ Millions per Year)**



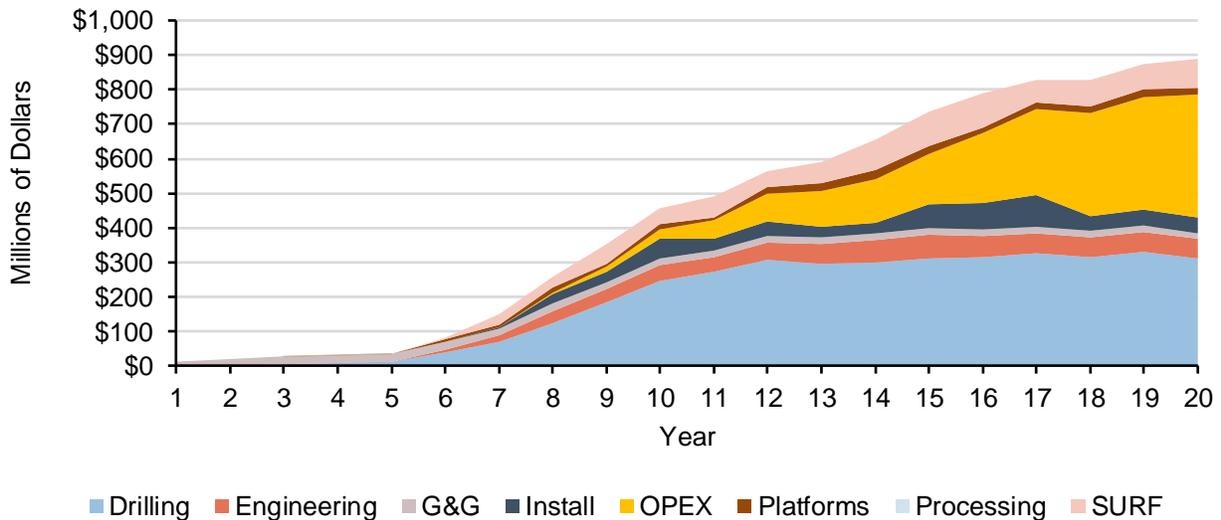
Source: Calash

Governmental revenues collected under a 37.5 percent state/federal revenue sharing agreement would be expected to create over \$165 million per year in new revenues for the state of Louisiana at the end of the forecast period, with cumulative revenues across the forecast period projected to be over \$1.4 billion. If a different revenue percentage were enacted, projected state revenues should be adjusted proportionally.

## 5.4 Alabama

Alabama is expected to receive the fourth highest levels of spending, employment, and contributions to its economy due to offshore oil and natural gas activity in the Eastern Gulf. Eastern Gulf oil and natural gas activity is estimated to lead to spending of around \$890 million per year at the end of the forecast period. (Figure 26)

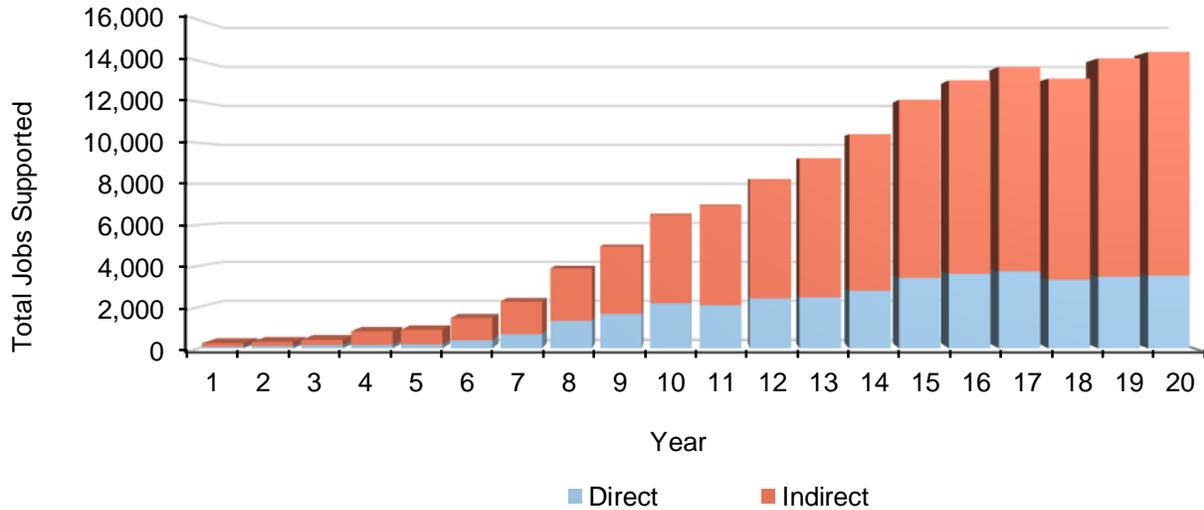
**Figure 26: Projected Alabama Spending by Sector (\$ Millions per Year)**



Source: Calash

Employment in Alabama due to spending on Eastern Gulf offshore oil and natural gas development is projected to reach over 14 thousand jobs at the end of the forecast period. Direct employment due to offshore oil and natural gas exploration and production is expected to reach nearly four thousand jobs at the end of the forecast period, with indirect and induced employment of over 10 thousand jobs expected in the same year. (Figure 27)

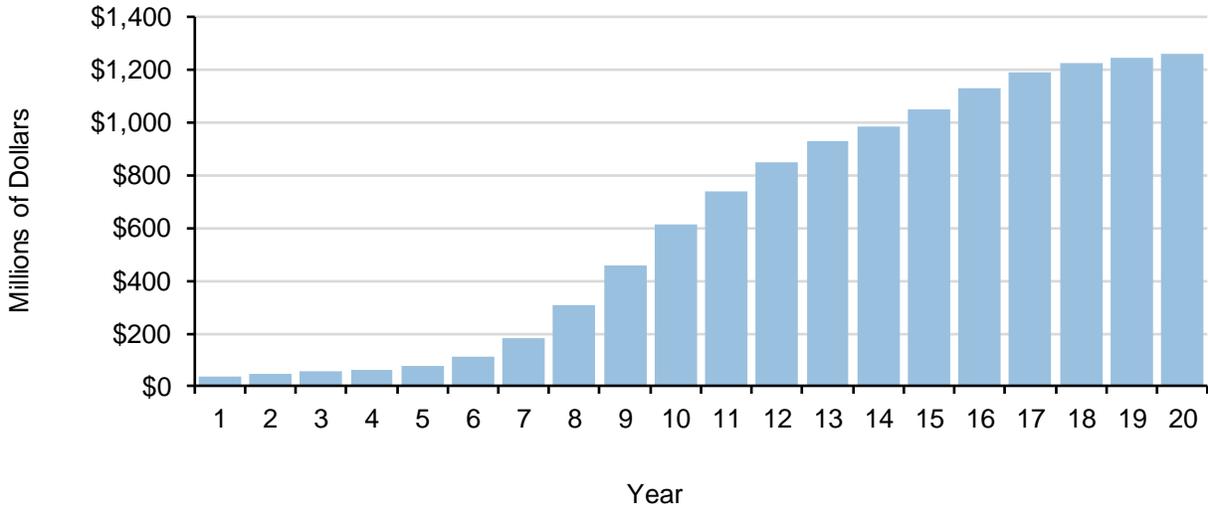
**Figure 27: Projected Alabama Employment Direct vs. Indirect and Induced**



Source: Calash

Contributions to Alabama’s state economy due to spending by the Eastern Gulf oil and natural gas industry are projected to be over \$1.2 billion per year at the end of the forecast period. (Figure 28)

**Figure 28: Projected Alabama Contributions to the State Economy (\$ Millions per Year)**



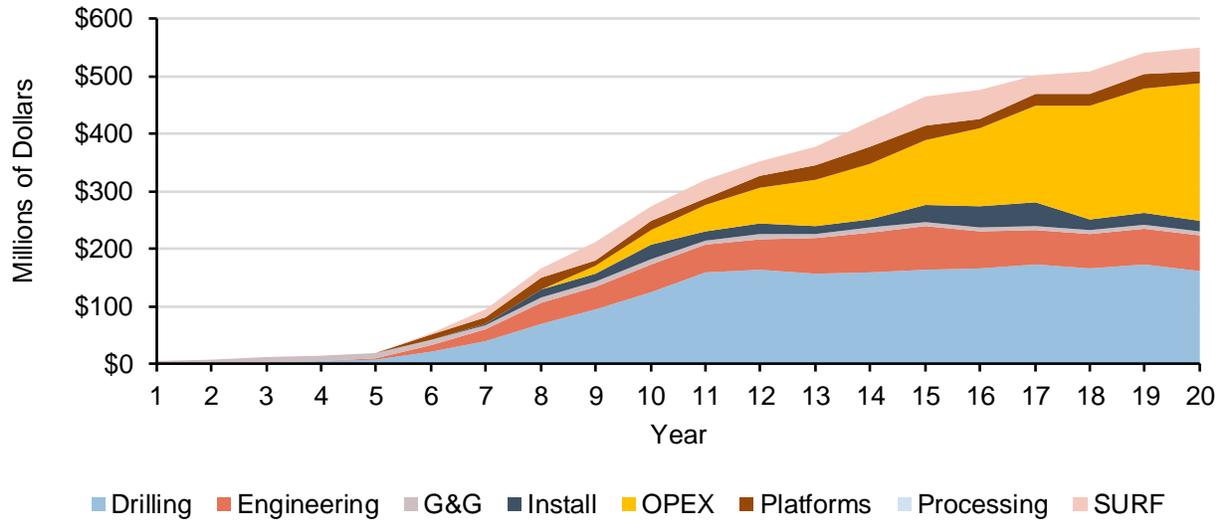
Source: Calash

With an assumed 37.5 percent revenue sharing agreement in place, Eastern Gulf oil and natural gas activities are projected to contribute over \$270 million per year, and over \$22.2 billion cumulatively to Alabama’s budget at the end of the forecast period. If a different revenue percentage were enacted, projected state revenues would be adjusted proportionally.

## 5.5 Mississippi

Mississippi is expected to receive the fifth highest levels of spending, employment and gross domestic product due to offshore oil and natural gas activity in the Eastern Gulf. Spending in the state is projected to reach just around \$550 million per year at the end of the forecast period. (Figure 29)

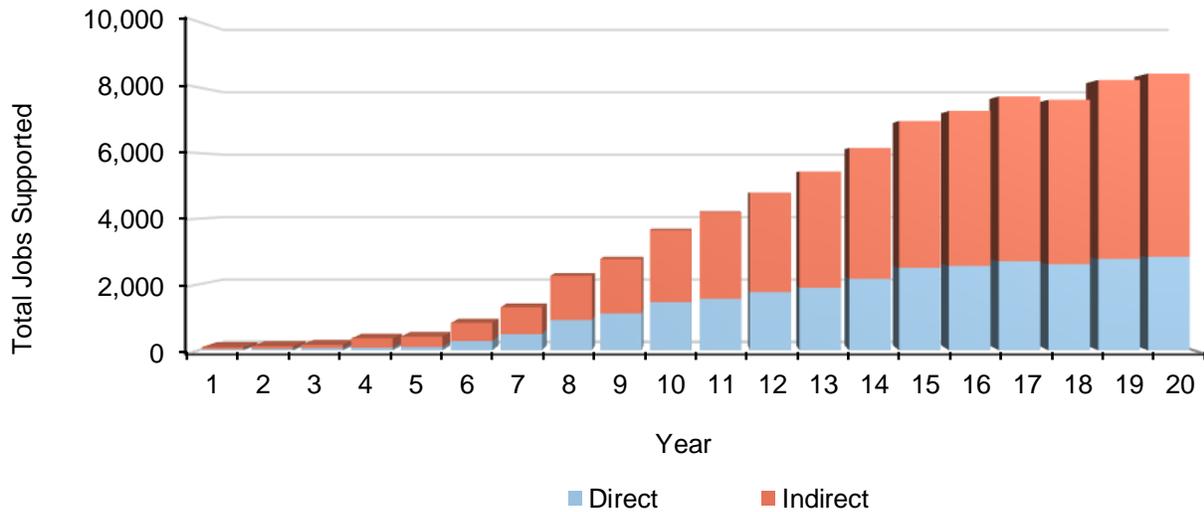
**Figure 29: Projected Mississippi Spending by Sector (\$ Millions per Year)**



Source: Calash

Employment in Mississippi due to Eastern Gulf coast offshore oil and gas production is projected to reach over eight thousand jobs at the end of the forecast period, with direct employment due to offshore oil and natural gas exploration and production expected to reach nearly three thousand jobs at the end of the forecast period, and indirect and induced employment levels of over five thousand jobs expected in the same year. (Figure 30)

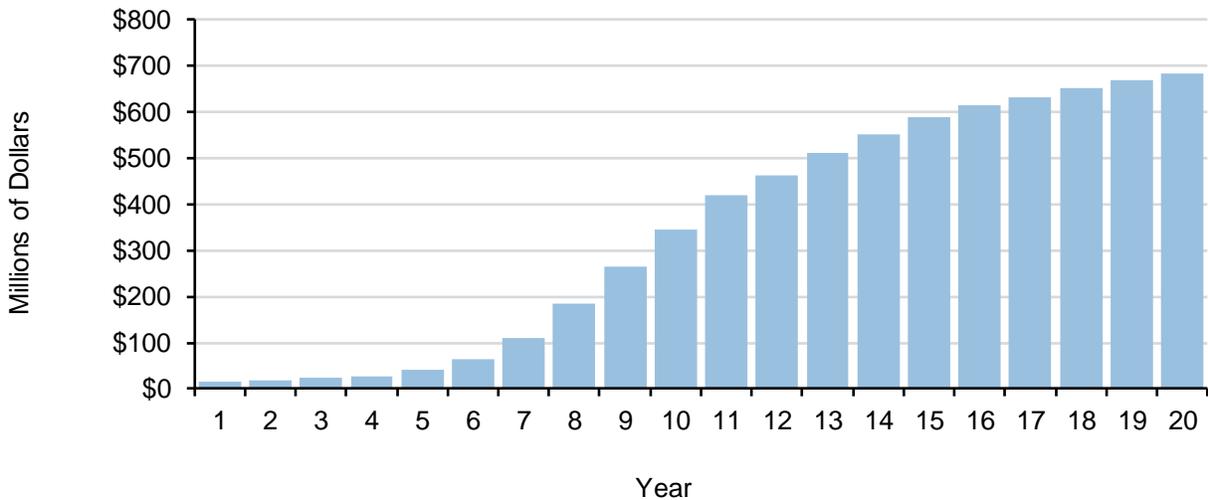
**Figure 30: Projected Mississippi Employment Direct vs. Indirect and Induced**



Source: Calash

Contributions to Mississippi’s state economy due to spending on Eastern Gulf oil and natural gas exploration and development are projected to be over \$680 million per year at the end of the forecast period. (Figure 31)

**Figure 31: Projected Mississippi Contributions to the State the State Economy (\$ Millions per Year)**



Source: Calash

Governmental revenues collected under a 37.5 percent state/federal revenue sharing agreement would be expected to create over \$120 million per year in new revenues for the state of Mississippi at the end of the forecast period, with cumulative revenues across the forecast period projected to be over \$985 million.



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