BOEM OCEAN SCIENCE

THE SCIENCE & TECHNOLOGY JOURNAL OF THE BUREAU OF OCEAN ENERGY MANAGEMENT

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Economics Issue

Tradeoffs: Evaluating Costs and Benefits at BOEM

Predicting the Pattern of Oil & Gas Development in the Gulf of Mexico

Sharing Outer Continental Shelf Revenues

The Economic Impacts of Outer Continental Shelf Oil & Gas Activities

Oil & Gas and Renewable Wind Energy: Leasing Processes and Auction Formats

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Frequently Used Abbreviations

BSEE	Bureau of Safety and Environmental Enforcement
FY	Fiscal Year
GDP	Gross Domestic Product
GOM	Gulf of Mexico
GOMESA	Gulf of Mexico Energy Security Act
LWCF	Land and Water Conservation Fund
OECM	Offshore Environmental Cost Model
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
RIA	Regulatory Impact Analysis
WEA	Wind Energy Area

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Check out the Bureau of Ocean Energy Management website at https://www.boem.gov/

The Acting Director's Message

When you think of BOEM, what's the first thing that comes to mind? Do you picture the ocean? Offshore oil and gas platforms or wind turbines? Maybe sandy beaches? Perhaps marine mammals and sea turtles? Whatever you envision, I doubt that economics would be on the top of your list.

Yet, economics is a critical component of BOEM's work. It's so vital that it is mentioned in our mission: "…to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way." This issue of *Ocean Science* illustrates how we use energy economics to inform our decision-making.

Outer Continental Shelf (OCS) resources belong to all U.S. citizens, and OCS activities generate substantial revenues from lease sales, royalties on production, and rental fees. This share of revenue is intended to benefit the American public. We explain how these funds are distributed in our article on page 8.

As stewards of the Nation's OCS resources, we are also responsible for ensuring that the public receives fair market value for the rights to produce offshore energy and mineral resources. Learn more about how we accomplish this important objective on page 12. BOEM's analysis of offshore energy projects' total economic impact helps keep policymakers and the public informed on the economic activity associated with OCS energy development. We discuss the direct, indirect, and induced economic impacts that form these analyses on page 10.

As we explain in our lead article on how BOEM evaluates costs and benefits (page 4), economics is a study of choices – choices about how to allocate resources among competing uses or alternatives. People evaluate tradeoffs—the costs and benefits of activities—every day in their personal lives, especially when it comes to time and money.

Federal agencies must make these choices as well. At BOEM, we continuously evaluate the tradeoffs among different policy options for OCS resources. Our economic analyses are critical components of this process. I hope this issue provides some insight into the important role that economic analysis plays in informing our policy and decision-making processes.

— Walter D. Cruickshank

Economics is the study of choices – how people choose to allocate their resources (e.g., time and money) among competing uses or alternatives. Just as individuals consider options and their tradeoffs, federal agencies are required to consider them as well. At BOEM, economic analyses help formalize this analytical process and provide both quantitative and qualitative information about the underlying tradeoffs associated with different policy options.

Tradeoffs: Evaluating Costs and Benefits at BOEM

Economics, at its core, is the study of choices. Our everyday lives are filled with decisions where we must choose how to allocate our scarce resources (e.g., time and money) among competing uses or alternatives.

BOEM's mission is to manage the development of energy and mineral resources on the U.S. Outer Continental Shelf (OCS) in an environmentally and economically responsible way. To do this, BOEM applies economic principles to evaluate the tradeoffs – or costs and benefits – of different policy options. Economic analyses are a fundamental component of the overall set of information that the Secretary of the Interior and BOEM decision-makers use to evaluate policy options. These analyses also help the public better understand how those decisions are made. Economists have many techniques to quantify and monetize different costs and benefits. However, some remain difficult to quantify or monetize at all – these costs and benefits are considered qualitatively. This article explains how BOEM uses economics to consider costs, benefits, and tradeoffs in several key policy areas.

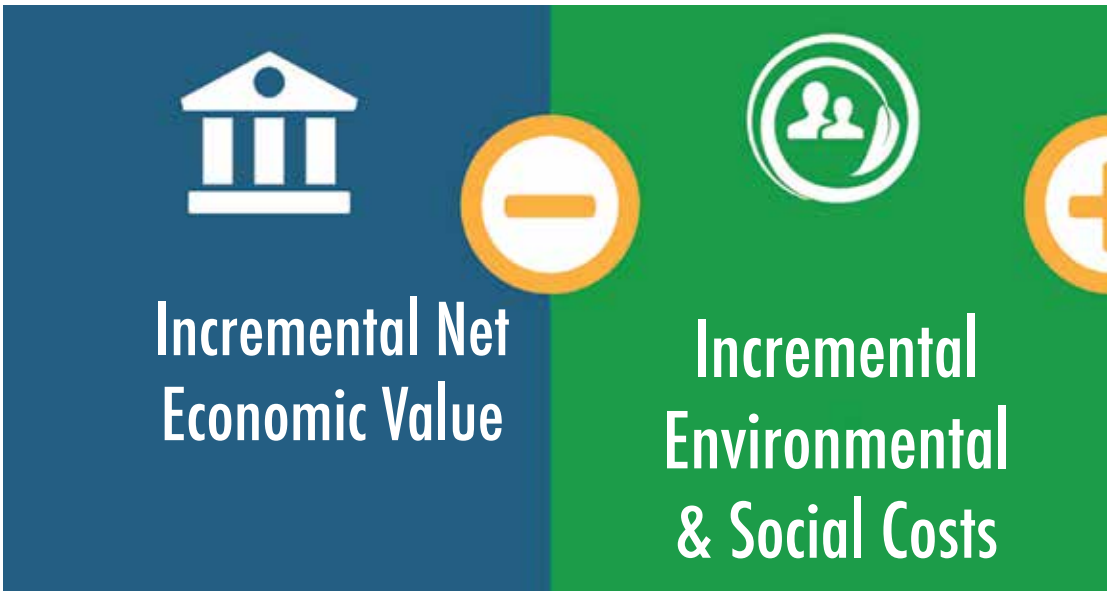


Figure 1. BOEM's net benefits analysis considers the value of the OCS resources after subtracting the private, environmental, and social costs of finding, producing, and accounting for the net domestic

National OCS Program Development

One of BOEM's core responsibilities is to develop the National OCS Oil and Gas Leasing Program, in which the Secretary selects areas to make available for oil and gas development subject to principles and criteria outlined in the OCS Lands Act. One of the ways the Secretary balances this information is through a cost-benefit type analysis called a "net benefits analysis." BOEM conducts this analysis to inform leasing decisions by examining the societal benefits and costs associated with the anticipated OCS exploration, development, production, and decommissioning activities.

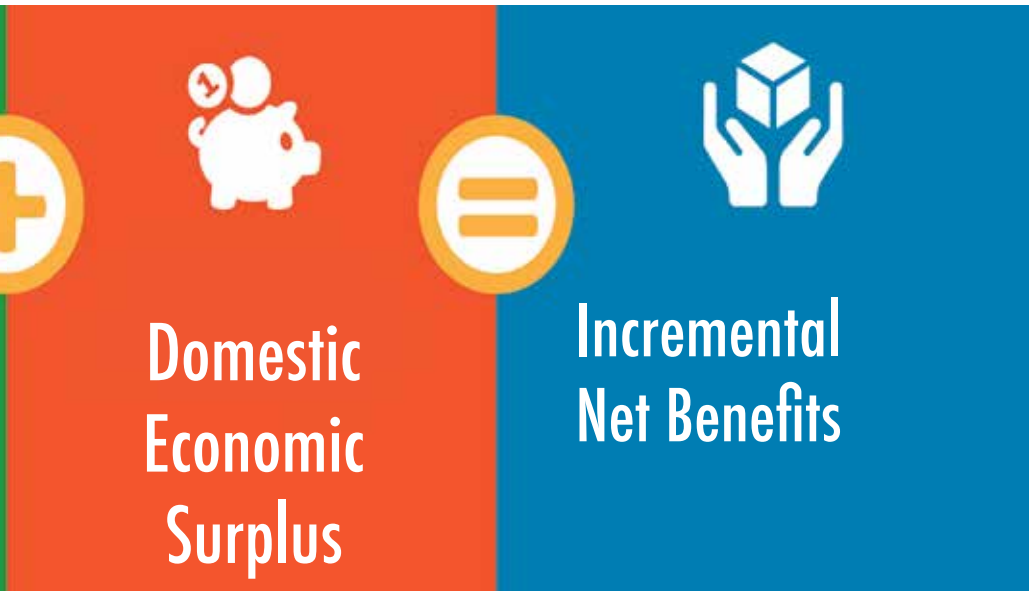
One of the net benefit analysis components examines the environmental and social externalities of OCS oil and gas activities. Externalities are the external costs that companies do not generally pay for but that OCS oil and gas activities still impose on society. BOEM created and periodically updates the Offshore Environmental Cost Model (OECM), which monetizes the external costs associated with OCS oil and gas development. The model uses the expected production and activity levels to estimate external costs from these OCS activities related to recreation, air quality, property values, subsistence harvests, commercial fishing, and ecology.

The net benefits analysis recognizes there are tradeoffs in the Nation's selection of energy sources. In the absence of OCS leasing, the Nation would use substitute energy sources that have their own environmental and social costs. Although the absence of OCS leasing would lead to some reduced U.S. consumption, there would be increased domestic onshore production and oil and gas imports, as well as increased production of fuel substitutes.

The OECM also estimates the environmental and social costs associated with these energy sources and nets the estimate of those costs from the environmental and social costs attributable to the National OCS Program. The result is an estimate of incremental environmental and social costs. These costs are included in the net benefits analysis along with an estimate of the value of the OCS resources minus finding and production costs (Incremental Net Economic Value) and an estimate of the benefits to U.S. consumers and loss to domestic producers from the reduced energy prices resulting from OCS production (Domestic Economic Surplus. Figure 1 summarizes the net benefits analysis).

Regulatory Impact Analysis

When BOEM considers new or amended regulations, it must evaluate the benefits and costs (or savings) of the proposal. A Regulatory Impact Analysis (RIA) is a required part of the rulemaking process and is published alongside the regulatory changes. The analysis is important because it demonstrates to the public and the regulated industry that, prior to issuing regulations, the Bureau has made an earnest effort to understand and estimate not just the intended benefits of the rule but any associated costs and negative or unintended effects. An RIA examines various regulatory alternatives to be transparent about what was



economic surplus change given the reduced energy prices resulting from OCS production. Source: BOEM

considered, how the benefits and costs compare, and why the selected alternative is preferred. Like rules, RIAs are available for public comment so that stakeholders may provide support, criticism, or additional information the Bureau may consider to improve the analysis.

BOEM and its sister agency, the Bureau of Safety and Environmental Enforcement (BSEE), often collaborate on rulemaking efforts because the regulations are often related or dependent upon each other for consistency. The rules BOEM and BSEE issue – both separately and conjointly – cover topics such as renewable energy design, pollution monitoring and controls, oil well integrity and control, and worker safety. It is important for BOEM to strike a balance between regulations that effectively protect the public and its resources and those that are unnecessarily burdensome. Economics provides decision-makers the analyses they need to consider these tradeoffs and as they craft regulatory policy.

Fiscal Term Analysis

Economics is also a factor in designing fiscal and lease terms for oil and gas and renewable energy lease sales. For oil and gas lease sales, the OCS Lands Act specifically states that leasing "assure receipt of fair market value" (Section 18(a)(4)) and that the OCS should be "made available for expeditious and orderly development" (43 U.S.C. §1332 (3)). Economic analysis helps decision-makers ensure receipt of fair market value and facilitate orderly development when designing fiscal terms by highlighting the trade-offs associated with different policy options under consideration.

Renewable Energy Leasing Suitability and Tradeoffs

The ocean is already a very busy place. The Bureau's renewable energy planning and engagement efforts seek to minimize potential conflicts with other ocean users while providing opportunities for renewable energy development. The Office of Renewable Energy Programs analyzes alternate uses such as commercial and recreational fishing, shipping vessel traffic, military mission needs, and other environmental considerations. This process is informed by stakeholder feedback as well as research to understand the potential for environmental and socio-economic impacts. Considering all the tradeoffs, BOEM strives to make informed renewable energy leasing and development decisions with the best available information.

— Sarah Coffman, Hunter Jonsson, and Kristen Strellec, BOEM

For More Information

Forecasting Environmental and Social Externalities Associated with Outer Continental Shelf (OCS) Oil and Gas Development, Volume 1: 2018 Revised Offshore Environmental Cost Model (OECM)
https://espis.boem.gov/final%20reports/BOEM_2018-066.pdf

Forecasting Environmental and Social Externalities Associated with Outer Continental Shelf (OCS) Oil and Gas Development, Volume 2: Supplemental Information to the 2018 Revised Offshore Environmental Cost Model (OECM)
https://espis.boem.gov/final%20reports/BOEM_2018-067.pdf

Economic Analysis Methodology for the 2017-2022 Outer Continental Shelf Oil and Gas Leasing Program
https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2017-2022/Economic-Analysis-Methodology.pdf

BOEM Fact Sheet: Wind Energy Commercial Leasing Process
https://www.boem.gov/sites/default/files/boem-newsroom/Wind-Energy-Comm-Leasing-Process-FS-01242017-%281%29.pdf

Predicting the Pattern of Oil & Gas Development in the Gulf of Mexico

Most people have heard the terms "petroleum resources" and "petroleum reserves," but many may not understand the distinctions between them. As shown in Figure 1, the resource base of hydrocarbons (oil and gas) is the entire quantity that exists in the Earth's crust—both what has been discovered and what remains undiscovered. We can think of the total quantity of resources as fixed or constant, whereas the discovered resources will change as new finds are identified. At any given time, only a portion of the discovered petroleum resources will be classified as reserves. Reserves must both have a higher level of known geological information (or certainty) and be economic to produce. Whereas the resource base may be fixed, reserves are dynamic in that they are constantly influenced by other factors, including technological changes that increase geological certainty or lower extraction cost, as well as changes in the resource price.

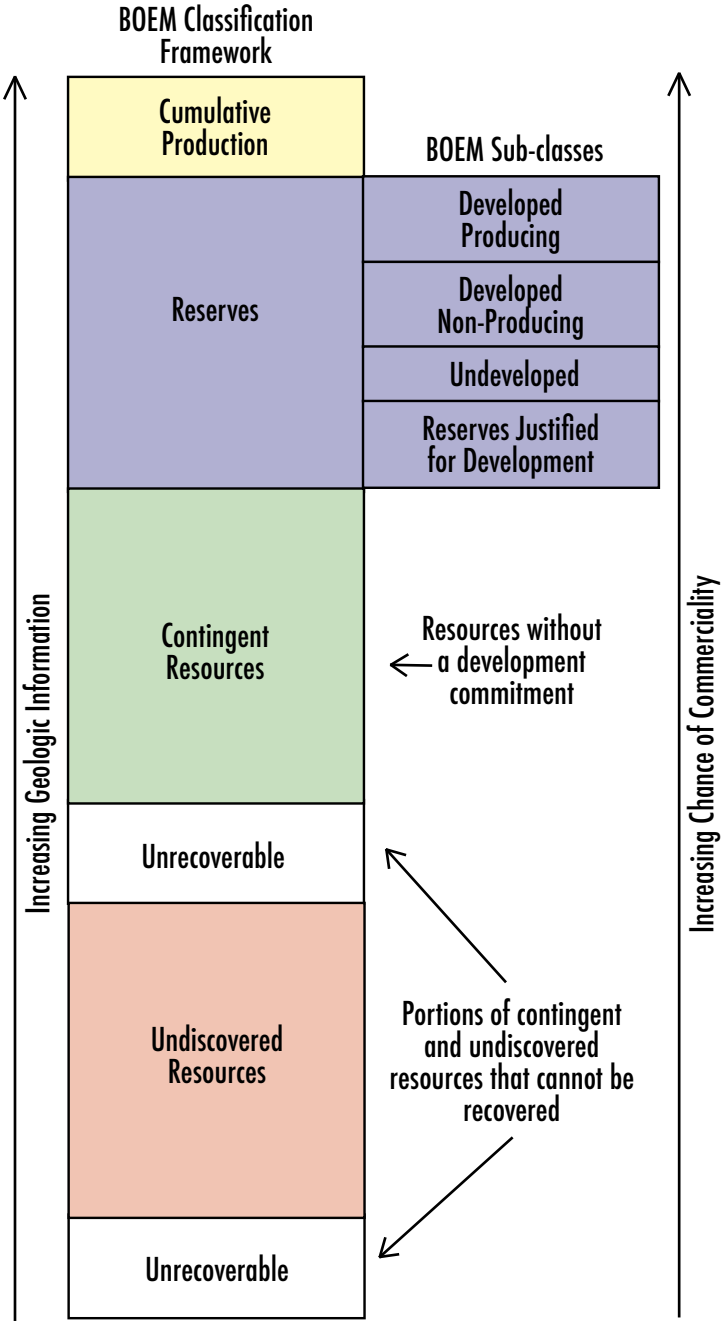


Figure 1. BOEM's oil and gas resource classification framework. Source: BOEM.

Which reserves will the oil and gas industry develop first? If your gut tells you companies will approach the most profitable or low-cost reserves first, your instinct is correct. Initially, as the economic theory of exhaustible resources demonstrates, industry will develop the highest quality reserves that are relatively easy and cheap to find and produce. As a basin matures and existing reserves are depleted, companies must invest in the development of new technologies to increase geological information (i.e., find resources that were harder to locate) and lower extraction costs for contingent resources at more complex projects.

The Gulf of Mexico (GOM) perfectly illustrates this theory. GOM production began in 1937. Since then, there have been multiple periods where many believed that GOM production had peaked. For example, if you had looked at the estimated GOM oil and gas reserves in 1982 and then divided by annual production, you would have determined that the reserves would only last 10 years for oil and 8 years for natural gas. However, the GOM has continued to contribute to U.S. energy production with more than 55 billion barrels of oil equivalent of oil and gas over the past 70 years and seen record levels of oil production in recent years. BOEM's most recent 2019 reserve assessment estimates that oil and natural gas reserves will last for six years. Meanwhile, GOM production continues as new technologies are developed to enable reserves from harder to locate, more challenging resources.

Gulf of Mexico Milestone Projects

In 1937, the first offshore GOM well was drilled from a fixed wooden platform (named: Creole) in 4 meters of water, less than a mile from land. At that time, drilling was conducted only during the day, with crews returning to shore every evening. In 1947, the first "out of sight of land" well was completed approximately 11 miles off the coast of Louisiana in 5 meters of water. The towable drilling platform Kermac Rig 16 cut construction costs significantly and contained living quarters, enabling the first round-the-clock drilling operations.

As drilling projects moved farther offshore, industry developed submersible and jackup drilling designs suitable to the harsher conditions. By the mid-1950s, piled jacket platforms dominated the GOM shelf. These large metal structures were constructed onshore, transported by barges, and then pinned to the ocean floor by piles driven down through the jacket. Once the piles were installed,

prefabricated decks were attached to the jacket. Fixed platform depths reached 60 meters by the early 1960s and 300 meters by the late 1970s.

Built in 1988, Bullwinkle is the world's tallest offshore fixed steel platform, measuring 529 meters from the seafloor to the flare tip. It is still processing deepwater oil and gas after 32 years. In addition to the two leases that were part of the original Bullwinkle project, the facility has processed oil and natural gas from an additional 11 leases through subsea tie-backs.

Auger (1994) was the world's first deepwater floating production facility. It is a tension leg platform anchored 900 meters below the ocean's surface. Like Bullwinkle, multiple fields have been tied-back to Auger, extending its life.

Thunderhorse (2008) remains the largest moored semi-submersible production platform in the world. It can process 250,000 barrels of oil along with 200 million metric cubic feet of gas a day and includes living quarters for 300 workers.

The Lower Tertiary trend in the GOM is the Gulf's deepest, most challenging and most promising play, estimated to hold up to 15 billion barrels of oil. Several of the groundbreaking Lower Tertiary projects include Perdido (2011), Cascade-Chinook (2012), and Stones (2016). Perdido is the world's deepest spar and set a world water depth record with a subsea well producing from 2,934 meters of water. The latest project, Anchor will be the first deepwater field to use 20,000 psi equipment.

Bullwinkle platform.
Source: https://www.flickr.com/photos/boemgov/12001091995/in/album-72157639867451446/

Conclusion

The Gulf of Mexico continues to be an important source of U.S. oil and gas production as new reserves are added to its inventory. Using innovative techniques, the oil and gas industry continues to unearth new areas and resources, including the ultra-high-pressure discoveries in ultra-deepwater such as Tiber, North Platte, and Shenandoah. These Lower Tertiary fields could be commercially viable if the early high-pressure equipment is proven successful and cost-effective. It's unclear when GOM resources will be considered economically unviable, but the theory of exhaustible resources suggests the GOM basin may have a long life ahead.

— Martin Heinze and Kristen Strellec, BOEM

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History of the Offshore Oil and Gas Industry in Southern Louisiana, Volume I
https://espis.boem.gov/final%20reports/4530.pdf

History of the Offshore Oil and Gas Industry in Southern Louisiana, Volume II
https://espis.boem.gov/final%20reports/4531.pdf

Sharing Outer Continental Shelf Revenues

Resources on the Outer Continental Shelf (OCS) in U.S. waters belong to all U.S. citizens. OCS activities generate substantial revenues from lease sales, royalties on production, and rental fees. These funds are distributed to the U.S. Treasury and several different programs through various revenue sharing laws. Revenue sharing benefits the American public through the conservation and restoration of, as well as recreation within, our Nation's natural resources. Whether supporting coastal restoration in Gulf of Mexico Energy Security Act (GOMESA) states, funding monuments to honor civil rights networks, or supporting preservation and recreation sites in all 50 states and territories, OCS revenues improve the lives of American citizens.

Revenue Sharing

Over the past 10 years, OCS oil and gas development has generated, on average, well over $5 billion in revenues per year. As shown in Figure 1, the vast majority of OCS revenues go to the U.S. Treasury general fund, which benefits U.S. citizens through defense, healthcare, education, and other federal programs. Currently, two programs provide OCS oil and gas revenues to coastal producing states and coastal counties or parishes: Section 8(g) of the OCS Lands Act (OCSLA) and GOMESA. In addition to the 8(g) and GOMESA sharing, OCS revenues go to projects supported by the Land and Water Conservation Fund (LWCF) and the Historic Preservation Fund (HPF).

Gulf of Mexico Energy Security Act

Signed into law in December 2006, GOMESA mandates revenue sharing with four Gulf of Mexico (GOM) oil and gas producing states: Alabama, Louisiana, Mississippi, and Texas (and their coastal political subdivisions). There are two categories of GOMESA funds allocated to these states: the first is direct GOMESA funds; and the second is GOMESA LWCF funds. Some direct GOMESA funds are allocated to the four GOM states, while other direct GOMESA funds are allocated to certain counties/parishes within those states. The law requires direct GOMESA funds be used for coastal wetland loss protection; mitigation of damage to fish, wildlife, or natural resources; federally approved marine, coastal, or comprehensive conservation management plans; or funding of onshore infrastructure projects to mitigate the impacts from OCS activities. Inside these restrictions, states and counties/parishes have discretion over how their funds are used. For example, Louisiana has committed to spending all its general GOMESA revenue on coastal restoration projects. GOMESA LWCF funds must be spent on LWCF projects within the four states.

Section 8(g)

Section 8(g) is a reference to the section of OCSLA that applies to all coastal states adjacent to current or potential areas of OCS development. It requires coastal states and the federal government to share revenues earned from OCS leases within the first 3 miles of federal waters beyond state waters. This 3-mile-wide area is known as the 8(g) zone. States are entitled to 27 percent of the bonus, rent, and royalty revenues within this zone. The 8(g) funds are intended to compensate states for any drainage of resources in their waters by federal lessees. There are no restrictions on how those states spend 8(g) funds.

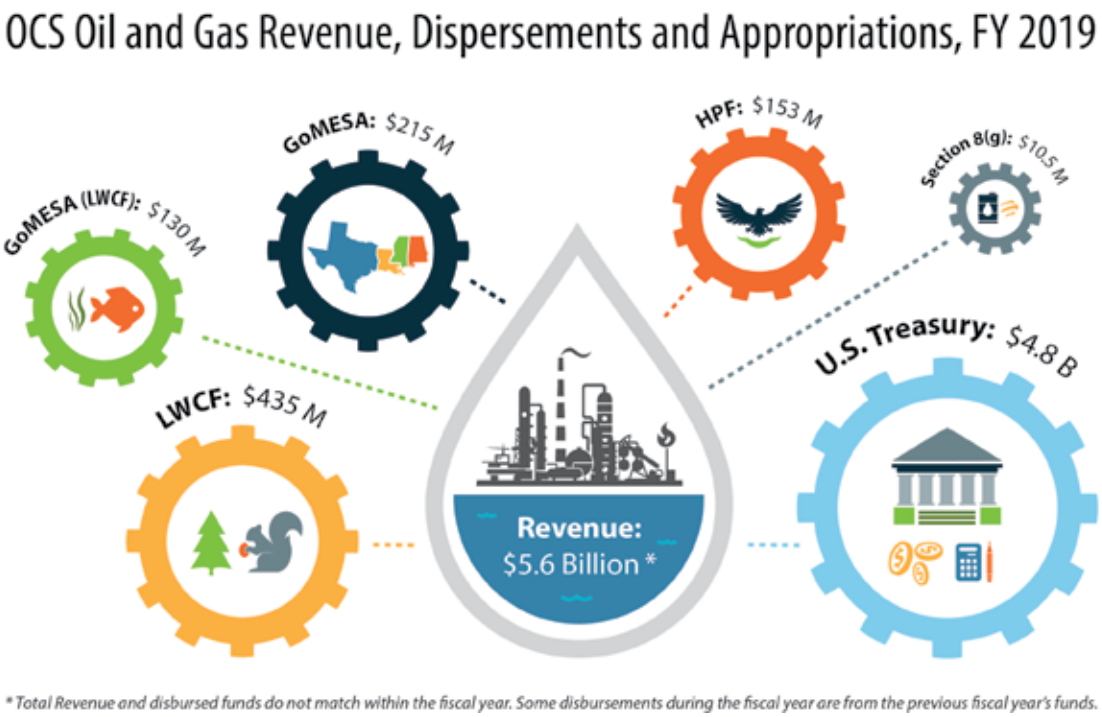

Figure 1. OCS Oil and Gas Revenue, Dispersements and Appropriations FY 2019. Source: BOEM and www.onrr.gov

Historic Preservation Fund

The HPF has played a significant role in funding for federal preservation grants to local governments and organizations since 1976. The HPF is solely funded by OCS revenues. According to a Congressional Research Service report, in 2019 the HPF funded state ($49.7 million) and Tribal ($11.7 million) Historic Preservation Offices, African American Civil Rights projects ($14.5 million), Historically Black Colleges and

Figure 2. Juanita J. Craft Civil Rights House in Texas. Source: Public Domain

Universities ($8 million), Historic Revitalization ($5 million), Save America's Treasures ($13 million), Underrepresented Communities ($800 thousand), and supplemental funding for hurricane recovery ($50 million). The Juanita J. Craft Civil Rights House and Memorial Gardens in Dallas, Texas (shown in Figure 2) is just one of the many projects supported by the HPF around the Nation. In 2019, $500,000 from the HPF was committed to the rehabilitation of the Juanita J. Craft Civil Rights House and Memorial Gardens. Ms. Craft, pictured in Figure 3, was a prominent civil rights leader. Both Dr. Martin Luther King, Jr. and President Lyndon B. Johnson visited her here, her home of 50 years, to discuss the civil rights movement.

Figure 3. Juanita J. Craft. Source: Public Domain.

Land and Water Conservation Fund

Since its creation in 1965, the LWCF has had a tremendous impact on our country's wild spaces and natural places. Projects in all 50 states and territories have received a total of $18.9 billion, including $435 million in 2019 (Figure 4). These funds support federal land purchases for various federal agencies; state grants for planning, purchasing land, and developing land for recreation areas and facilities; and other related activities. The implementation of numerous large LWCF projects is spread out over several years. For instance, a 10-year project to protect salmon migration at the Smith River National Recreation Area in the Six Rivers National Forest in California (which was completed in 2016) protected 5,400 acres from development pressure, which provides numerous recreational and watershed benefits. The Smith River National Recreation Area is just one LWCF project; many of the trails and public spaces the public enjoys have benefitted from LWCF funds as a result of revenues collected from OCS oil and gas revenues.

On August 4, 2020, the President signed the Great American Outdoors Act, which guarantees full funding for the LWCF whereas previously funding had been subject to annual Congressional appropriations. Full funding of the LWCF with revenue from OCS oil and gas operations will help accomplish the fund's goals of conserving our natural areas and providing recreational opportunities for all Americans.

— Chris Bay and Charles Paris, BOEM

Figure 4. Source: Land and Water Conservation Fund.

For More Information

Department of the Interior Revenue and Disbursement Data
https://revenuedata.doi.gov/

Gulf of Mexico Energy Security Act
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Historic Preservation Fund
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https://www.doi.gov/lwcf

Great American Outdoors Act
https://www.doi.gov/blog/president-trump-signs-most-historic-conservation-funding-legislation-us-history

The Economic Impacts of Outer Continental Shelf Oil & Gas Activities

Policymakers and the public are often interested in knowing the amount of economic activity associated with Outer Continental Shelf (OCS) energy development, such as the number of jobs and/or the amount of Gross Domestic Product (GDP) that these activities support. BOEM has developed extensive methods to estimate the economic impacts resulting from OCS oil and gas projects. BOEM's renewable energy and marine minerals programs also generate economic impacts, and BOEM is working on methods to estimate these impacts. In addition, the renewable energy program has many projects in the planning stages, so the resulting economic impacts will depend on if, when, and how these projects are developed.

BOEM typically analyzes the impacts of aggregations of offshore oil and gas leases. The most immediate impact of an oil and gas lease is that the company awarded the lease pays the government an initial lump sum (a bonus bid) for the exclusive rights to develop the lease block's oil and gas resources. The company also pays the government rental fees and royalties while the lease is active. These revenues support federal, state, and local government spending.

Oil and gas leases also generate spending on various goods and services. A lease operator typically drills exploratory and development wells, builds a production platform and/or subsea facilities, and hires various staff to operate production facilities. As shown in Figure 1, this "direct" spending also generates ripple effects caused by spending on goods and services further down the supply chain, which are referred to as "indirect" effects. For example, direct offshore oil and gas spending supports indirect GDP and jobs in the steel industry when steel products are purchased to construct facilities. Direct and indirect spending also support "induced" spending by workers' households throughout the supply chain (e.g., grocery purchases).

The economic impacts of the offshore oil and gas industry are generated by various types of activities and workers. Many skilled workers in the oil and gas industry – such as engineers, pipe-fitters, welders, and electricians – earn above-average wages, giving these employees more purchasing power to consume goods and services. Construction and maintenance of an extensive network of pipelines and onshore support infrastructure – such as port, fabrication, oil and gas processing, and waste management facilities – require additional workers to build and maintain these networks. The transportation, lodging, food service, and other hospitality industries also need employees to provide services to offshore workers. Eastern Research Group (2011) provides more information regarding various industries that support offshore oil and gas activities. (See sidebar on page 11 for more information.)

In addition to the various activities and jobs associated with oil and gas development, BOEM considers differences among regions when calculating economic impacts and the locations of those impacts. For example, the Gulf of Mexico (GOM) has an extensive offshore oil and gas industry, and new oil and gas development can utilize the existing companies, workers, and infrastructure (e.g., pipelines). Economic activity in the Southern California Planning Area

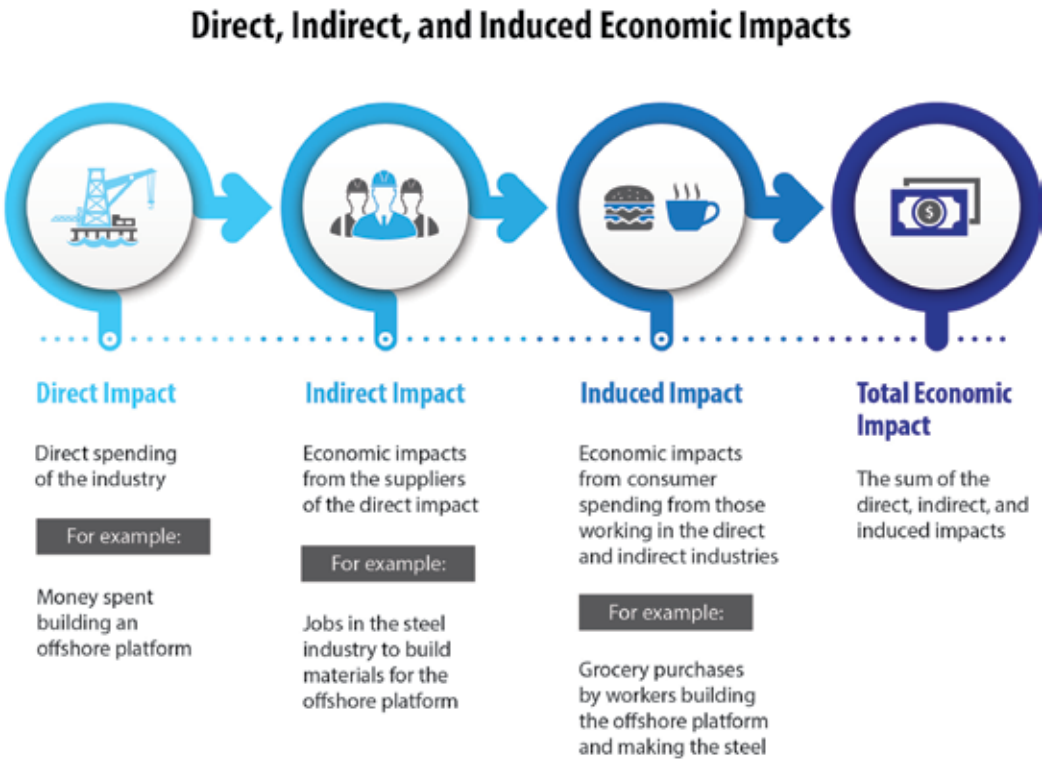

Figure 1. Direct, Indirect, and Induced Economic Impacts. Source: BOEM

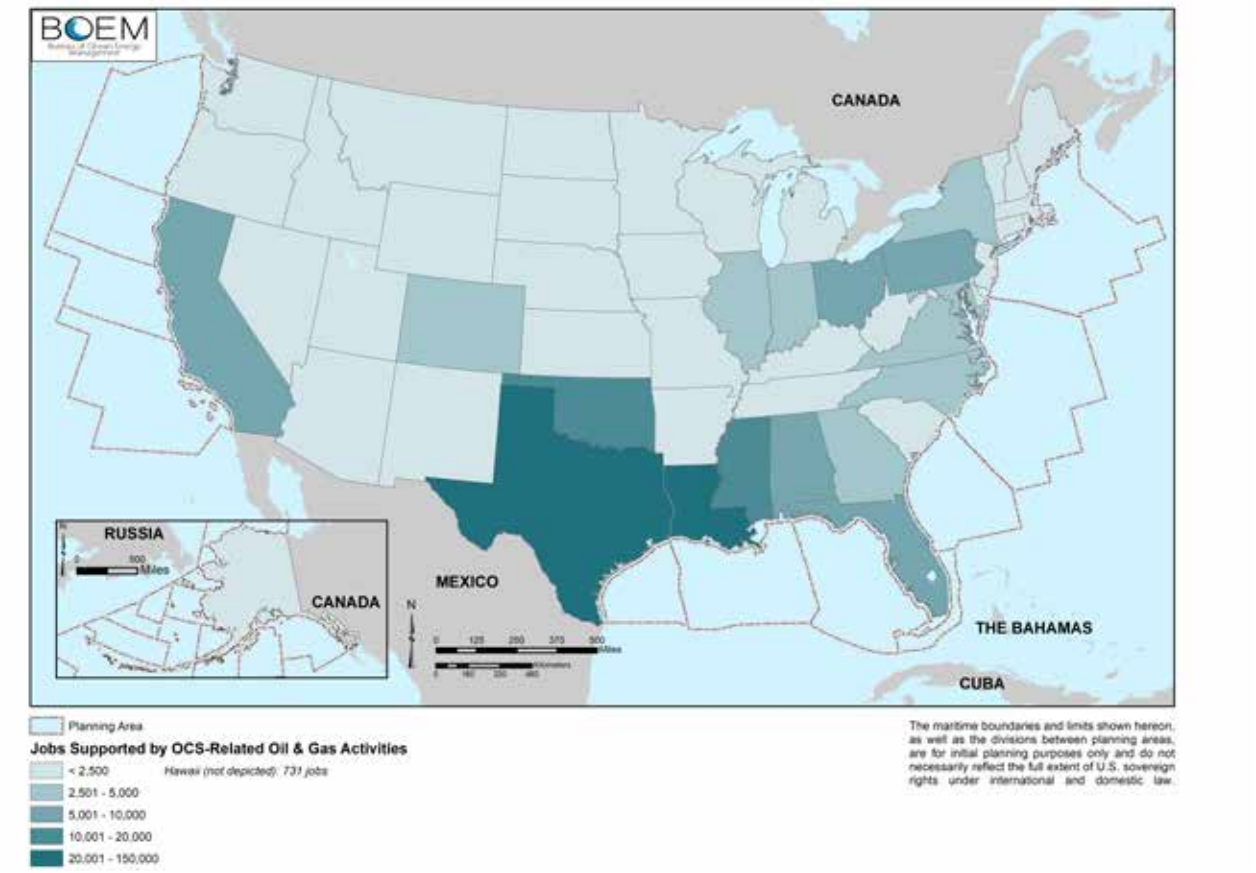

Figure 2. Offshore Oil and Gas Employment during FY 2019. Source: BOEM

is geared toward maintaining the operations of existing offshore production facilities. Offshore oil and gas activities in Alaska must cope with the area's remoteness and extreme weather conditions. There are no existing offshore oil and gas activities in the Atlantic Ocean, so any future Atlantic activities would primarily draw people and equipment from the GOM, at least initially. Dismukes (2011 and 2014) provides information on the existing onshore infrastructure in the coastal areas adjacent to the GOM and Atlantic Ocean. (See sidebar for more information.)

BOEM develops economic impact estimates for various purposes. For example, BOEM typically estimates the economic impacts of a particular lease sale in the National Environmental Policy Act (NEPA) document written for that sale. BOEM also provides input to the annual Department of the Interior Economic Report; this report estimates the total (direct, indirect, and induced) impacts of all offshore oil and gas activities in the most recently completed fiscal year (FY). For the FY 2019 report, BOEM estimated that the offshore oil and gas industry supported approximately 277,100 jobs, $18.8 billion in labor income, $32.3 billion in value added, and $59.1 billion in output. Figure 2 indicates the locations of offshore oil and gas jobs during FY 2019. Texas had the highest number of jobs (approximately 100,000), followed by Louisiana with almost 50,000 jobs. Substantial employment also exists in the other GOM states (Mississippi, Alabama, and Florida) and in California, Oklahoma, Pennsylvania, and Ohio.

— Mark Jensen and Kim Coffman, BOEM

BOEM estimates the following measures of economic impacts. These measures can apply to direct, indirect, and/or induced impacts.

- Output: The total value of the production of goods and services.
- Value Added: Output minus the cost of intermediate inputs. Value added represents the contribution to GDP.
- Labor Income: Total income by workers (includes salaries, wages, and benefits).
- Employment: Total number of jobs supported (includes full-time and part-time jobs).

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Oil & Gas and Renewable Wind Energy: Leasing Processes and Auction Formats

The Bureau of Ocean Energy Management (BOEM) uses competitive auction processes to award leases for oil and gas energy and renewable wind energy. However, there are differences in the leasing processes and auction formats due to the unique characteristics, differing industry participants, and levels of maturity between renewable wind and oil and gas energy.

How does the leasing process work?

Oil/Gas Energy: Per the Outer Continental Shelf Lands Act (OCSLA), BOEM prepares and maintains a schedule of proposed Outer Continental Shelf (OCS) oil and gas lease sales via the National OCS Oil and Gas Leasing Program (National OCS Program). A National OCS Program is created every five years and establishes the schedule of lease sales, specifying the size, timing, and location of each sale. The National OCS Program development process considers exploration and development of oil and gas resources in the four OCS regions and 26 planning areas (see Figure 1 below).

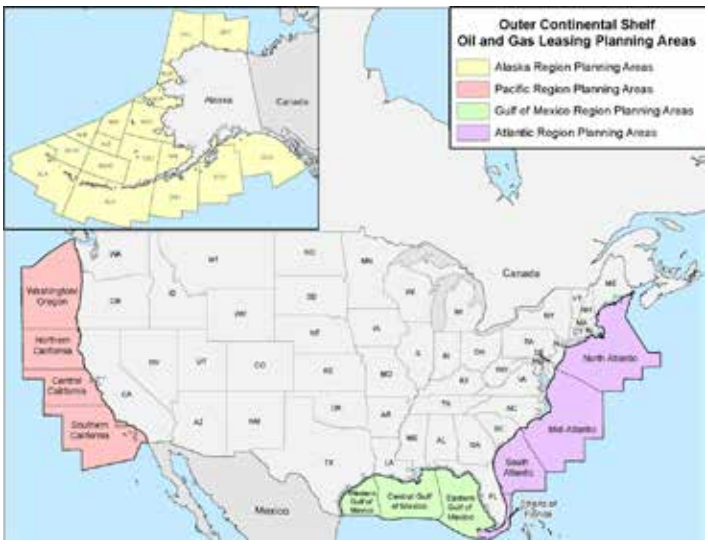

Figure 1. BOEM OCS Regions and Planning Areas. Source: BOEM

Renewable Energy: The OCSLA requires BOEM to issue leases competitively, unless it is determined that there is no competitive interest. Unlike oil and gas, there is no National Program development or specific sale schedule.

As the first step in the renewable energy planning and leasing process, BOEM consults with adjacent state(s) and stakeholders from federal, local, and tribal governments to identify areas that appear appropriate for development. BOEM then publishes a Call for Information and Nominations – a notice that requests industry interest and solicits comments on site conditions, resources, and alternate uses of the area. BOEM uses this stakeholder engagement, as well as internal research, in the Area Identification process to delineate an area that appears most suitable for commercial wind development while presenting the fewest environmental and user conflicts. The resulting area for potential leasing is referred to as a Wind Energy Area (WEA). Figure 2 shows the WEAs in the Atlantic Ocean.

Figure 2. Atlantic Wind Energy Areas. Source: BOEM

How does the auction process work?

Oil/Gas Energy: Conventional energy leases are awarded through a competitive sealed bidding auction and leases are issued to the highest qualified bidder. After completion of the auction, bids undergo a separate evaluation process by BOEM to ensure receipt of fair market value.

Renewable Energy: Lease sales are conducted using a secure online bidding system by a third-party contractor. In most lease sales, BOEM uses the simultaneous ascending clock auction format. This format provides an opportunity for price discovery.

BOEM sets an initial asking price, which incrementally increases throughout the auction based on the number of active bidders in each round. A bidder remains active in the auction so long as BOEM's asking price is met in each round.

If a bidder chooses not to bid the full price of the next round, they can submit an exit bid at some price between the two rounds. This represents their final bid in the auction. When only one bidder is willing to pay that round's price, that bidder wins the auction. The winning bid is the highest bid, which could be a live bid or an exit bid. In the event of a tie, the winning bidder is chosen by a random draw.

— Aditi Mirani and Christina O'Brien, BOEM

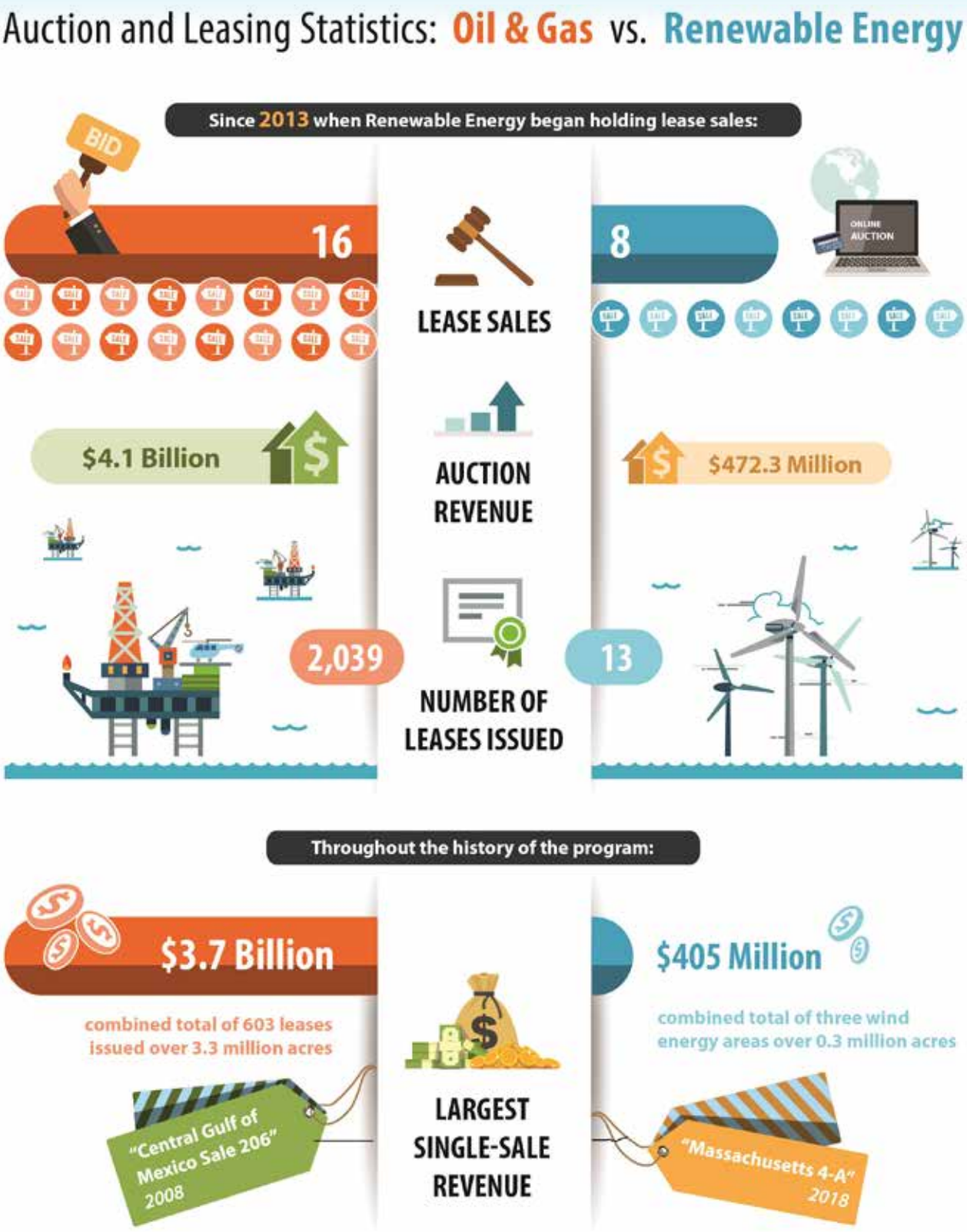

Figure 3. This figure shows data as of August 2020. Source: BOEM

For More Information

https://www.boem.gov/renewable-energy/lease-and-grant-information

https://www.boem.gov/oil-gas-energy/leasing

The Role of the Outer Continental Shelf in Domestic Oil & Gas Markets

The U.S. position as an energy producer has drastically changed over the past decade. The U.S. became a net exporter of petroleum products in 2011 and of natural gas in 2017, primarily due to large increases in domestic oil and natural gas production. Although domestic crude oil consumption continues to exceed domestic crude oil production, overall exports of petroleum (crude oil and petroleum products) exceeded imports in late 2019. While much of the increase in domestic energy production has been driven by onshore production, mostly from shale formations, Outer Continental Shelf (OCS) energy still plays an important role in America's domestic energy portfolio. Indeed, OCS crude oil production reached a record high in 2019 (Figure 1). In addition, OCS oil and natural gas production complements onshore and global production in various ways, leading to greater stability in energy markets.

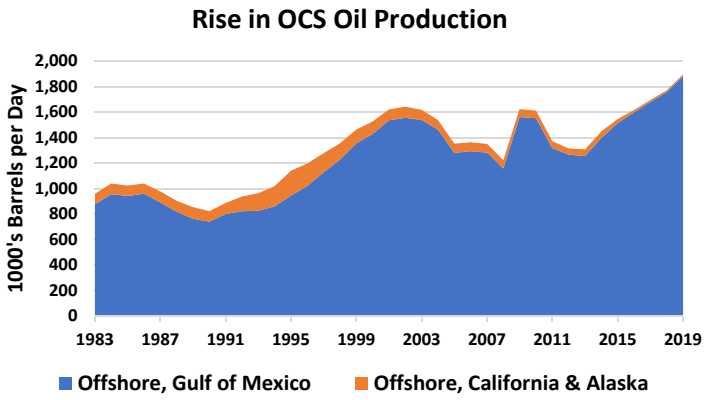

Figure 1. Rise in OCS Oil Production. Source: www.eia.gov

Long-Cycle versus Short-Cycle Production

Oil and natural gas projects can be considered short-cycle or long-cycle projects. Short-cycle projects, such as those that produce oil and gas from "tight" rock formations (like shale) onshore, require only a short time to drill and bring resources to production; this production can often be ramped up or down quickly. Long-cycle projects require significant up-front investments with long lead times, and often produce for longer periods of time. Many OCS projects are long-cycle projects that provide stable sources of oil and gas that are less susceptible to changes in markets or forecasting assumptions. This stability allows for longer-term planning for infrastructure and complements short-cycle production.

Differences in Crude Oil Markets

Hydrocarbon basins produce different types of crude oil. Refineries are designed to process oil within certain ranges of density and sulfur content. As shown in Figure 2, crude oil ranges from light to heavy based on API gravity (density) and from sweet to sour based on sulfur content. The OCS generally produces medium-to-heavy sour crudes. Refineries in the Gulf of Mexico (GOM) area are primarily equipped for medium and heavy crude rather than the light, sweet crude being produced onshore in such abundance in recent years. There is also an existing network of pipelines from GOM projects to nearby refineries. It can cost billions of dollars for a refinery to reconfigure units to handle different grades of crude. This means that much of the onshore oil is exported to countries with refinery capacity to handle that type of oil, while almost all OCS production is refined in the U.S., where the refineries are close by and have a competitive advantage in refining this type of crude. Thus, OCS production continues to play an important role in U.S. energy markets.

Note: This article is written with a long-term perspective on the role of the OCS within domestic U.S. energy markets. The combination of a large decrease in demand related to the COVID-19 pandemic and increased production by OPEC+ countries led to a sudden supply glut. However, OPEC+ has since reduced output and markets have been recovering. While early forecasts of exploration and development were revised downward, and many companies have struggled to maintain operations in the low-price environment, it is too early to know the extent to which any pandemic-related changes in consumption and production patterns will endure.

— Charles Paris and Kim Coffman, BOEM

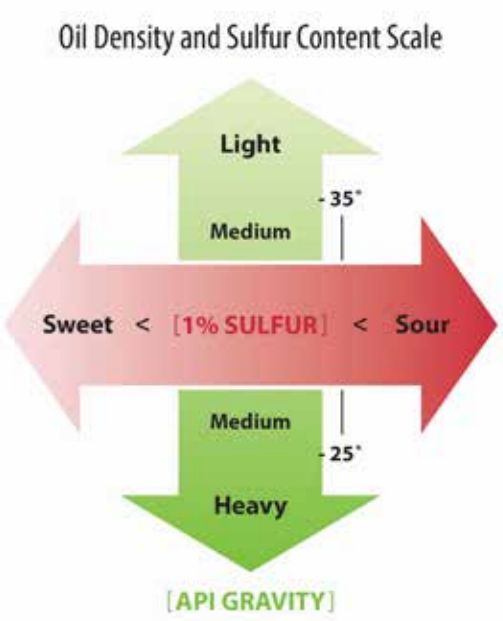

Figure 2. Oil Density and Sulfur Content Scale. Source: Bureau of Ocean Energy Management

For More Information

U.S. Energy Information Administration: Annual Energy Outlook
https://www.eia.gov/outlooks/aeo/

National OCS Oil and Gas Leasing Program
https://www.boem.gov/regions/gulf-mexico-ocs-region/leasing-and-plans/national-ocs-oil-and-gas-leasing-program

Spotlight on an Economist: Renee Orr

1. What was your job at BOEM?
Before retiring in November 2019 I had served as the Acting Deputy Director since April 2019. Previously, I was the Chief of the Office of Strategic Resources since 2011.

2. Why did you decide to work for BOEM?
After graduating from college in 1988 with a double major in economics and in history, I was hired as an Industry Economist with BOEM's predecessor agency, the Minerals Management Service, in Denver, Colorado. I was very lucky to be hired into an organization that ultimately became my home for my entire career. I worked on issues related to the royalties companies pay for the production of offshore oil and gas and then moved to Washington, D.C., and began working more directly on offshore oil and gas policy development and assessment.

3. What role did you play as Chief of BOEM's Office of Strategic Resources, and later as Acting BOEM Deputy Director?
I was responsible for overseeing the development and implementation of the National Outer Continental Shelf (OCS) Oil and Gas Leasing Program; the conveyance of marine minerals for beach renourishment and coastal restoration projects; the assessment and inventory of oil, gas, and other mineral resources on the OCS; economic evaluations to ensure the receipt of fair market value for the use of OCS resources; comprehensive mapping and boundary efforts; and the identification and mitigation of financial risks associated with OCS oil and gas activities. As Acting Deputy Director, I focused on broader agency issues—helping to forge strategic direction and laying the groundwork to help identify the resources we'll need to accomplish the critically important work we do. I was able to get more directly involved in our Renewable Energy Program and apply my leasing experience to a new arena.

4. How did your educational background in economics prepared you for the work you do?
Economics is at the heart of BOEM's mandate—to make the Nation's OCS energy and mineral resources available for expeditious and orderly development, while assuring protection of the environment and making sure the Nation's taxpayers receive a fair return for the use of our resources.

5. What are some key economics-related issues/questions BOEM has faced?
How should we balance the Nation's need for affordable energy resources and associated contribution to the economy with the potential for environmental impacts, changing energy needs, and other critically important ocean uses? As in all things, there are tradeoffs and pluses and minuses to consider and constituencies to engage.

When is government intervention or encouragement necessary or helpful? We've used fiscal incentives to encourage development of new technologies for emerging resources. Asking whether there is a current need is one of the more interesting analyses we've worked on.

6. What were some key areas where economics will have a high profile in the future for BOEM?
Marine Minerals. There is no doubt that we'll need significantly more sand for coastal protection and restoration than we have. We'll have to make very tough decisions and examine the economic costs and benefits about allocating this critically important resource among different uses. Providing sand to restore one beach may mean it isn't available to protect other beaches, wetlands, or perhaps a defense facility. Commercial interest in critical minerals is also growing.


Renee Orr

One of the proudest accomplishments of my career is having a direct role in the growth and evolution of BOEM's Marine Minerals Program, which has gone from running on a shoe-string to one of the three cornerstones of BOEM's mission. One thing I didn't accomplish, but still believe in, is changing our name from Bureau of Ocean Energy Management to Bureau of Ocean Energy and Minerals.

7. What lessons have you learned during your career?
The things that I've found the most challenging are where I've had my most significant professional and personal growth: the importance of speaking up, not being afraid to voice the dissenting or unpopular perspective. Transparent, honest, and open communication with staff and colleagues at every level. Be open to new challenges, don't be afraid to ask the tough questions, or explore opportunities beyond your professional comfort zone.

8. What do you find most exciting or rewarding about your work?
Offshore oil and gas, renewable energy, and offshore mineral development is a fascinating intersection of science, policy, politics, energy, environment, and economics. Even after over 30 years, I'm learning something new every day. I get to work with all the ocean 'ologies' and 'ologists' — geology, geophysics, oceanography, meteorology, biologists — economists, as well as with the always evolving technologies necessary to find, assess, and produce ocean energy and minerals.

9. What's your closing message?
BOEM is an amazing place to work — the very essence of public service. These are critically important issues that impact every person in this country. It has been an honor to work with the incredibly smart, talented, and dedicated staff who are committed to providing the best science and best analysis to inform these nationally important resource management decisions.

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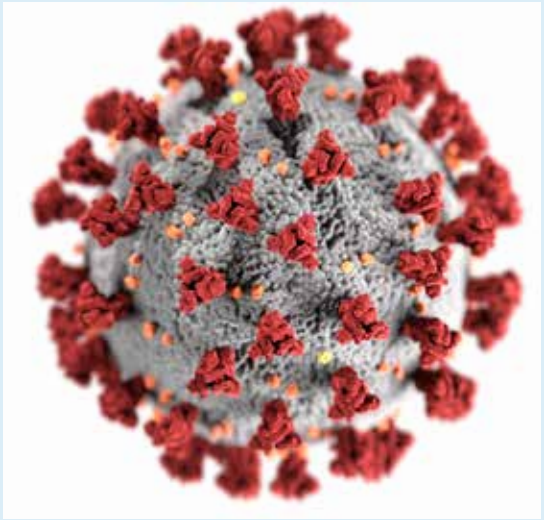
New Waves

Late-Breaking News & Information

Working Through the Coronavirus Pandemic

By the time you read this issue, we will have been living with the coronavirus pandemic for approximately 8 months. We hope that you and your loved ones are, and continue to be, safe and healthy.

The coronavirus has completely changed the way we interact, the way we work, and even the world we live in. Thanks to technology, many of our activities were able to continue as scheduled, allowing us to accomplish many important priorities for the nation during these trying times.



Source: CDC

Prior to the pandemic, BOEM had already been utilizing technology to conduct oil and gas lease sales online. As a result, we were able to hold a Gulf-wide lease sale in March during the pandemic. These livestreamed lease sales allow people around the country, and around the world, to watch in real-time, ensuring transparency. We were also able to complete and announce the final rule to update air quality regulations in the Gulf of Mexico and Alaska—the first update in four decades—and seamlessly continue other important work for the nation.

While the coronavirus has canceled many in-person meetings and conferences, we have adapted our stakeholder engagement process. Expanding our use of online and livestream meeting platforms, we have held multiple virtual public meetings across the country. These effective meeting alternatives have not only adhered to necessary social distancing guidance, they have garnered even larger audiences than our traditional in-person gatherings.

These are times unlike any we have experienced before. Here at BOEM, we are committed to fulfilling our responsibilities to the American taxpayer – managing the responsible development of the nation's offshore energy resources and minerals – in an open, transparent way, no matter what challenges we may face.