

MID-ATLANTIC BLUE OCEAN ECONOMY 2030

Exploring the prospects and challenges for emerging ocean industries to 2030

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Powering Our Future and the Responsible Use of the Nation's Resources: The Role of Offshore Energy & Minerals in the Blue Ocean Economy

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DISCUSSION PAPER

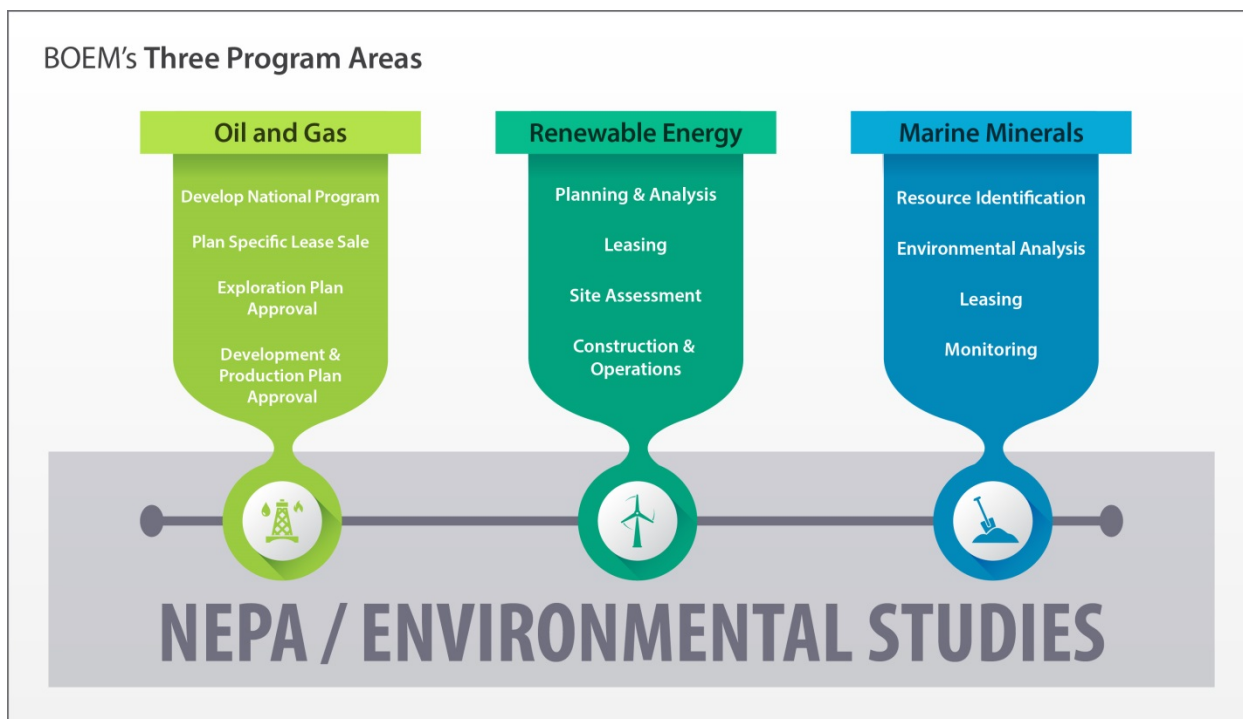
Jim Bennett is the Chief of the Office of Renewable Energy Programs in the Bureau of Ocean Energy Management (BOEM), U.S. Department of the Interior. Jim has over 35 years of experience in the environmental and energy arenas serving in a variety of capacities in the department and other federal agencies. Prior to becoming the program manager for renewables, Jim led the Division of Environmental Assessment, overseeing BOEM's compliance with the NEPA and other environmental laws focusing on Federal OCS programs, including oil and gas, sand and gravel, and renewable energy. His experience encompasses events such as the Exxon Valdez and the Deepwater Horizon oil spills, the Cape Wind energy project, and offshore renewable energy activities particularly in the Atlantic.

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Through early planning, thoughtful mitigation, and the application of sound science, the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) works to ensure that our national comprehensive energy strategy is applied in a manner that fosters environmentally responsible development of offshore energy and mineral resources, while seeking ways to improve efficiency through the use of innovative technology and best practices. As the steward of the U.S. offshore energy and minerals resources on the Outer Continental Shelf (OCS), BOEM oversees three program areas: oil and gas, marine minerals, and renewable energy. The programs contribute to our economy through jobs, tax revenue, and leasing revenue for the Federal government, and provide resources that are critical to multiple economic sectors.



Although each program differs slightly in implementation, all include processes for stakeholder engagement, identification of suitable lease areas, and leasing processes to guide exploration and development activities. All three programs are also tied to the core value of responsible stewardship and protection of the environment. The resources BOEM manages belong to current and future generations of American people; management is focused on the wise use of these resources while ensuring a fair return for the taxpayers.

Oil & Gas—Meeting National Energy Needs

BOEM manages approximately 3,000 active oil and gas leases almost entirely in the Gulf of Mexico. In 2016, OCS leases provided 592 million barrels of oil and 1.254 trillion cubic feet of natural gas comprising 18% of domestic oil production and 4% of domestic natural gas production. While BOEM does not currently have any leases in the Mid-Atlantic, resource potential exists in the region and the agency is in the process of preparing a new National OCS Oil and Gas Leasing Program (i.e., five-year schedule of lease sales for 2019-2024).

The OCS oil and gas program provides significant economic benefits to the nation including employment, revenue to the U.S. treasury, local tax revenue, and revenue sharing with the coastal states. Some of these economic benefits accrue to the regions adjacent to the OCS oil and gas activity, whereas other benefits accrue nationally. For example, in fiscal year (FY) 2016 BOEM estimated that the OCS oil and gas industry contributed over 315,000 jobs. The OCS also contributes significantly to the national treasury through bonus, rental, and royalty payments. In FY 2016 OCS oil and gas leasing provided approximately \$2.8 billion in leasing revenues, second only to tax collections by the Internal Revenue Service.

History and Current Milestones

The Department of Interior held 10 lease sales offshore the Atlantic, the most recent of which was in 1983. Five sales were in the Mid-Atlantic planning area resulting in 238 awarded leases and 34 exploratory wells drilled in the region. The last remaining Atlantic leases were relinquished in 2000.

In 2009, BOEM (then the Minerals Management Service) began conducting a Programmatic Environmental Impact Statement as part of a National Environmental Policy Act (NEPA) analysis to evaluate the potential environmental impacts of Atlantic geological and geophysical (G&G) activities, which is an initial step to assess potential resources prior to leasing and exploration. BOEM completed the Record of Decision for the EIS in 2014 which established the highest practicable level of mitigation and safeguards to reduce or eliminate impacts on marine life. Currently, BOEM has accepted seven G&G permits for various areas along the Atlantic coast. Before permits can be issued, careful environmental analysis is done to ensure the safety of the marine ecosystem.

BOEM's 2016 National Assessment estimates the Mid-Atlantic planning area contains 2.4 billion barrels and 24.6 trillion cubic feet of mean undiscovered technically recoverable oil and natural gas resources (UTRR). Given that these geologic plays have never been drilled, they include a level of risk. If this risk were not included, BOEM's reported UTRR estimates could increase by as much as 300% which translates to a very significant upside oil and gas resource potential on the Atlantic.

On the demand side, the Energy Information Administration's (EIA's) 2017 Annual Energy Outlook estimates that the United States will be a net importer of crude oil in 2030. The EIA estimates that U.S. oil and gas production as well as U.S. gas consumption will increase between 2017 and 2030. Though the EIA estimates the U.S. to consume less oil in 2030 than today, given

that the U.S. will still be a net importer of crude oil, the Mid-Atlantic oil and gas production could play an important role in the U.S. energy portfolio in 2030.

Milestones to Be Achieved

Executive Order 13795 directed the Secretary of the Interior to begin the process of developing a new National OCS Oil and Gas Leasing Program and to specifically consider leasing in the Mid-Atlantic planning area.¹ While a new offshore oil and gas industry in the Mid-Atlantic would not traditionally be considered a contribution to the Blue Economy, it is important to recognize that Mid-Atlantic oil production would largely replace energy produced by other means (e.g., imports of crude oil, domestic onshore production), rather than simply increase production. BOEM's analysis of potential Atlantic oil and gas production suggests that 58% would replace imports of oil transported to Atlantic ports (20%) and Gulf Coast ports (38%). Reducing oil imports can reduce environmental and social costs and greenhouse gas emissions from overseas production of oil and reduce the need for tankers to transport resources long distances. Further, the revenues received from oil and gas production can be allocated to local communities and used for coastal restoration and protection initiatives.² If the new National OCS Oil and Gas Program includes Mid-Atlantic leasing, it has the potential to bring jobs and increased tax revenue to the region and diversify the regional Blue Economy.³

The development of the National Program includes several opportunities for public comment. Along with the economic, social, and environmental value analysis required by the OCS Lands Act, BOEM will also conduct a Programmatic EIS to consider environmental impacts associated with oil and gas development. For the National Program and the Programmatic EIS, BOEM engages stakeholders early in the process to proactively determine, in advance of deciding whether to include any particular area in the Program, which specific areas offer the greatest resource potential while minimizing potential conflicts with environmental, subsistence, and multiple-use considerations such as commercial fishing and recreation.

BOEM also conducts a multi-stage, multi-year process to plan each lease sale within the program. This process also includes economic, social and environmental analysis and multiple opportunities for stakeholder engagement. Following lease award, companies must submit comprehensive exploration and production plans for approval by BOEM and go through a permitting process with the Bureau of Safety and Environmental Enforcement (BSEE) before receiving approval to drill any wells. With strong regulatory oversight and appropriate measures to protect human safety and the environment, offshore oil and gas development can be conducted safely and responsibly.

Marine Minerals—Preserving and Restoring the Nation's Beaches and Coastal Habitats

BOEM has jurisdiction over non-energy marine minerals on the OCS including sand and gravel as well as hard minerals such as gold, manganese, and phosphate. To date, BOEM has provided

¹ BOEM's Mid-Atlantic planning area includes offshore Delaware, Maryland, Virginia and North Carolina.

² Revenue sharing programs or allocation of OCS revenues to specific funds would have to be done by Congress.

³ Employment benefits would be slight unless and until exploration led to commercial discoveries of oil and gas. Because the Atlantic states do not currently support an offshore drilling employee base, drilling crews would likely come from outside the region. However, there still would be increased activity for some local business, especially those providing goods and services, such as port services, transportation, food, and accommodations. Major discoveries of oil and gas resource would likely lead to greater local sourcing and resulting employment benefits as local businesses expanded and new support industries evolved.

sediment, primarily sand, from Federal waters for beach nourishment and coastal restoration projects. OCS sand for these projects provides significant contributions economically, socially, and ecologically to the Mid-Atlantic region. OCS sand is used for projects that protect and reduce storm damage to public infrastructure, Federal land holdings and facilities, and coastal businesses and homes. In addition, the projects provide direct and indirect benefits to the regional and local economies. By law, BOEM does not charge Federal, state and local government agencies for the sand. The projects result in millions of dollars of economic benefits and return on investment from storm damage reduction, recreation, tourism, as well as supporting jobs. Through August 2017, OCS sand has been used for projects in New Jersey, Virginia, and Maryland in the Mid-Atlantic region.

Every dollar spent by the federal government on beach nourishment produces several hundreds of dollars annually in tax revenues from beach tourists.⁴ In addition, restored beaches provide billions of dollars in public and private property and infrastructure protection or storm damage reduction. For example, in 2011 and 2013 BOEM executed an agreement and amendment, respectively, for a total of 4.2 million cubic yards (MCY) of OCS sand to restore approximately 4 miles of shoreline at NASA's Wallops Island facility in Virginia. The restored shoreline reduces potential storm damage to nearly \$1 billion of Federal and state assets including rocket launch facilities and assembly infrastructure. Similarly, in 2015 the Navy dredged and used approximately 700,000 cubic yards of OCS sand to protect approximately \$135 million in assets at its Dam Neck facility in Virginia. In 2016, nearly 7 MCY of OCS was dredged and used to restore beaches and dunes along approximately 12 miles of heavily developed and used shoreline at Long Beach Island, New Jersey.

Although offshore dredging projects are often costly, in the tens of millions of dollars, they result in positive economic benefits for coastal communities. The U.S. Army Corps of Engineers (USACE) reports that after Hurricane Sandy communities in New York and New Jersey with constructed dunes and nourished beaches experienced less damage than adjacent communities without these features. Post-Sandy analysis showed that USACE beach nourishment projects in New York and New Jersey saved an estimated \$1.3 billion in avoided damages.

OCS sand used to nourish beaches and restore habitats also provides numerous ecological benefits. Through August 2017, sand from BOEM issued agreements has been used to restore over 307 miles of shoreline. Reconstructed shorelines provide important habitat for nesting sea turtles, shorebirds, and invertebrates as well as forage habitat for shorebirds. Reconstructed dunes also provide habitat for vegetation and invertebrates. In addition to protecting public infrastructure, nourished barrier island shorelines protect sensitive back bay habitats located landward of barrier islands such as salt marshes. These habitats are important nursery areas for numerous fish and invertebrate species as well as habitat for birds.

⁴ Houston, J.R. (2013). The economic value of beaches – a 2013 update. *Shore & Beach*, 81(1): 3–10.

Current Trends

Demand and interest for OCS sand has been increasing in recent years. BOEM's Marine Minerals Program (MMP) anticipates continued interest from New Jersey and Virginia and new interest from New York and Delaware for sand to restore beaches and dunes.

Offshore sand that is compatible with the native beach sand is a finite resource and sources in state waters are being depleted. As responsible managers, BOEM needs to know where potential sand resources are and how much material may be available for projects. This information is needed not only for long-term planning for anticipated projects with recurring renourishment cycles but for emergency needs as a result of erosion from hurricanes and nor'easters. In response to this need, the MMP is undertaking a National Offshore Sand Inventory effort to identify potential sand resource areas in Federal waters. As part of this effort BOEM is partnering with coastal states along the Atlantic through cooperative agreements. Furthermore, the information and data generated is being incorporated into a centralized Marine Minerals Information System (MMIS). The MMP will eventually provide geophysical and geological data to the public through data portals such as MarineCadastre.gov and Mid-Atlantic Ocean Data Portal.

There are emerging trends in the dredging industry as demand for offshore sand increases and project volumes become larger. Currently, offshore dredging in the U.S. is limited by technology to water depths less than 100 feet. In general, sand borrow areas in Federal waters are within 10 miles of the coast in the Mid-Atlantic. Future demands and technology may extend the dredging depths. In addition, the capacity of trailer suction hopper dredges that are typically used to dredge sand in Federal waters is increasing and expected to continue to grow. For example, in the fall of 2016 Great Lakes Dredge & Dock, a major provider of dredging services along the Atlantic, launched a new dredger, the Ellis Island, which has a hopper capacity of nearly 15,000 cubic yards. The capacity more than doubles that of other current existing dredges.

Milestones to Be Achieved

Major milestones to maximize economic benefit include BOEM's continuing development of the National Offshore Sand Inventory and identification of potential resources that are available for projects, now and in the future. BOEM's development of the MMIS and its information sharing will provide authoritative data to coastal planners and engineers so that they can more efficiently plan projects. The inventory will assist local communities and their economies in recovering more quickly after a hurricane or nor'easter when offshore sand is needed for emergency coastal restoration projects. By identifying significant sand resource areas, BOEM can avoid conflicts with other potential uses that may preclude dredging, such as submarine fiber optic, electric transmission lines, and pipelines. In addition, identification of sand resources and early coordination can avoid or minimize potential adverse impacts to other economic sectors such as fisheries and recreation.

Renewable Energy—Offshore Wind Industry About to Take Off

With the first operational project in the state waters of Rhode Island, the nascent U.S. offshore wind energy industry is poised to join its European counterparts in providing clean, renewable energy. Within 50 nautical miles (nm) of the shores of Mid-Atlantic states, the U.S. Department of

Energy National Renewable Energy Laboratory (NREL) estimates there is more than 155 gigawatts (GW) of technically feasible wind energy potential (Table 1).⁵ Much of that area has a gently sloping, shallow continental shelf, which is ideal for initial offshore wind energy development, and steady, strong offshore winds. Locating projects off high-demand coastal population centers provides electricity to known energy-constrained areas. Some projects may be able to use existing transmission infrastructure from retired fossil fuel powered plants. Offshore wind can help the United States move toward more energy diversification and provide significant economic and environmental benefits.

Table 1. NREL Estimate of Technically Feasible Offshore Wind Potential

	Potential Gigawatt (GW)			
	<3 nautical miles (nm) - state waters	3 to 50 nm - federal waters	Total within 50 nm	Leased from BOEM
Delaware	1.8	4.0	5.8	1.17
Maryland	3.8	14.9	18.6	0.75
New Jersey	3.9	40.0	43.9	4.17
New York	10.1	37.9	48.1	0.96
Virginia	8.9	29.9	38.8	1.40
TOTAL	28.5	126.7	155.2	8.45

Source: Musial et al., *2016 Offshore Wind Market Technologies Report*

BOEM has diligently worked to support renewable energy development spurred by the goals of coastal states—issuing leases off each Mid-Atlantic state. NREL estimates that developers can claim over 8.45 GW of potential generation capacity. These leases represent only slightly more than 5 percent of NREL’s estimated total offshore wind energy potential in the region.

As required by the Energy Policy Act of 2005, BOEM

established payment terms to ensure fair return to the U.S. Treasury for the rights conveyed to federal renewable energy resources. BOEM estimates annual rental payments of more than \$4.1 million in FY 2017 from all its commercial leases, along with the right-of-way grant for the Block Island transmission cable. BOEM has generated over \$67.2 million from competitive renewable energy lease auctions. Once a project is operational, BOEM will require an operating fee based on the installed capacity of the project. BOEM estimates that a typical 500 megawatt (MW) wind farm will generate an operating fee of approximately \$1.2 million per year.

Offshore wind energy provides very strong opportunities for job creation. NREL estimates that 12 to 30 jobs are created per MW during the construction phase depending upon the amount of local content that can be used, while 1.2 full time equivalent jobs are created long term.⁶ Their analysis includes both direct jobs from the wind farm and indirect employment generated from money spent in the region. In its approval of renewable energy credits for offshore wind farms off its coast, Maryland regulators cited the expected creation of almost 9,700 jobs and \$1.8 billion in new in-state spending as a deciding factor in their support.

Current Trends

⁵ In 2016, EIA estimated the United States had 1,064 GW of electricity generation capacity.

⁶ Tegen, S. et al., *Offshore Wind Jobs and Economic Development Impacts in the United States: Four Regional Scenarios*, National Renewable Energy Laboratory, NREL/TP-5000-61315, February 2015.

NREL projects that turbine sizes will continue to grow with the average turbine size reaching close to 7.0 MW by 2020. Increased turbine size will contribute to lowering the cost of wind energy, a trend that has been well-documented in Europe. Installation of fixed foundations in deeper waters and the potential for floating technology to become commercially viable could also be game changers in the next two decades. Optimism for offshore wind is high in the United States, with BOEM's recent auctions yielding higher auction prices. The lease off of New York received a record \$42 million, highest to date for an offshore wind auction.

The greatest challenge for offshore wind energy development continues to be the ability of developers to secure power purchase agreements. States that have implemented supportive policies that reflect the benefits not otherwise captured in electricity prices (e.g., clean power; job creation; reduction of transmission congestion) are where BOEM expects its next round of leasing to begin. For example, New York has proposed 2.4 GW of offshore wind development by 2030 to support its clean energy goals. The European market started in a similar pattern with stable policies that supported the growth and job creation of the industry. A recent German offshore wind electricity price bid did not require any subsidy (though transmission is subsidized), with the developer betting that traditionally generated electricity prices will increase by the time the project becomes operational.

Milestones to Be Achieved

By the end of 2017, BOEM could receive its first construction and operation plan for a commercial offshore wind project development since Cape Wind, with a potential of at least three projects under permitting by spring 2018. With a host of federal and state agencies involved in permitting, BOEM is working with other government entities to clarify the roles and requirements of each, along with identifying ways to standardize and synchronize various reviews. BOEM hosts a Federal Interagency Offshore Wind Permitting Subgroup to identify ways to streamline and improve federal coordination to avoid delays in permitting. Successful construction of commercial-scale projects is needed to demonstrate the viability of the industry.

Together with a stable pipeline of power purchase agreements, additional BOEM leasing can provide the necessary capacity to justify the large investments in a domestic supply chain, which is needed to fully realize the economic benefits of offshore wind. In turn, a mature U.S. supply chain will assist in reducing the costs of offshore wind energy, a process borne out in Europe.

Challenges & Ways to Resolve

Offshore energy and minerals leasing, exploration, and development face unique challenges and impediments. BOEM relies heavily on the use of cutting edge scientific information and environmental assessment tools to address such challenges. Some of these challenges and approaches to address them are discussed here:

Providing Sufficient Opportunities for Stakeholder Engagement

Stakeholder and public engagement is central to all three BOEM programs. BOEM maintains a communication network with a broad range of stakeholders. It has established resource management partnerships with Federal, State, and local government agencies, non-governmental

organizations, and private industry partners to communicate and negotiate research needs and priorities, improve coordination and cooperative understanding on issues of shared responsibilities, negotiate controversial and sensitive issues, and build cooperative endeavors to further the environmental protection and energy independence goals of the Nation.

Avoiding Space Use Conflicts

Managing OCS energy and mineral resources in a responsible manner requires BOEM to actively identify and address potential space-use conflicts with existing and future ocean uses. To this end, BOEM extensively uses mapping and informational tools such as MarineCadastre.gov and stakeholder engagement frameworks, such as public meetings, as part of environmental impact assessment exercises guided by NEPA. BOEM's engagement with the Regional Planning Bodies (RPBs) under the National Ocean Policy provides another important venue to assess data on ocean resources and uses. In addition, BOEM's Environmental Studies Program provides scientific information covering a broad range of disciplines that is utilized to understand, assess and avoid conflicts. For example, a 2012 BOEM funded study provides a comprehensive overview of renewable energy space-use conflicts and potential mitigation measures.

Ensuring Safety and Avoiding Catastrophic Incidents

In response to the Deepwater Horizon oil spill, the Department of Interior initiated comprehensive reforms to ensure safety and enforce regulatory oversight. BOEM works closely with the Bureau of Safety and Environmental Enforcement to achieve these goals. BOEM has initiated a number of efforts to enhance environmental safeguards including (1) strengthening of the environmental review process to ensure environmental risks are thoroughly analyzed, appropriate protective measures are implemented, and that environmental analyses are transparent and easily understood; (2) focusing on science based decision-making through the creation of the Office of Environmental Programs to improve integration of science into decision-making; and (3) reviewing exploration and development plans to ensure compliance to rigorous operational and environmental standards. This more forward-thinking approach helps maintain a robust safety culture with a strong focus on offshore risk reduction. Safety, environmental stewardship, and resource conservation are linked attributes.

Ensuring Decisions Based on the Best Available Science and Data

BOEM is mandated to conduct scientific studies to assess and manage impacts of energy and mineral resource use on human, marine, and coastal environments. This research is managed by BOEM's Environmental Studies Program. Since its inception in 1973, the program has funded more than \$1 billion in research covering a range of disciplines, including physical oceanography, atmospheric sciences, biology, protected species, social sciences, economics, submerged cultural resources, and environmental impacts of energy development. BOEM incorporates findings from the studies program into its consultation process, environmental review, and NEPA documents, which are used to assess and/or mitigate the impacts of energy and mineral development on the OCS.

Implementing Environmental Monitoring and Mitigation Strategies

BOEM is focused on long-term environmental monitoring of energy and mineral activities. An environmental studies project initiated in 2015 is focusing on real-time monitoring of construction and operation of the first U.S. offshore wind facility. This data will allow for more accurate assessment of actual disturbances and result in more realistic mitigation measures to reduce or eliminate impacts. In another initiative, BOEM is focusing on long-term monitoring, recovery, and renewal of Gulf of Mexico in the aftermath of the Deepwater Horizon oil spill by conducting studies with federal, university, and industry partners to investigate impacts of oil and dispersants on marine resources, develop start-of-the-art tools for modeling oil spill transport, and analyze social and economic recovery from oil spill impacts.

Conclusions

BOEM makes available critical energy and mineral resources needed for a strong and vibrant economy. Its programs include safe and responsible offshore oil and gas development—a cornerstone of a domestic energy portfolio; mineral resources to make U.S. coastlines resilient and support important economic sectors like tourism and recreation; along with harnessing offshore renewable energy as part of an all of the above domestic energy strategy. BOEM helps to meet the nation's energy needs, create jobs, support energy security for today and beyond, while also maintaining high standards of environmental stewardship.