U.S. House Natural Resources Committee
Subcommittee on Energy and Mineral Resources
Hearing on Impacts of Abandoned Offshore Oil and Gas Infrastructure and the Need for Stronger Federal Oversight, October 13, 2021

Statement by
Donald F. Boesch, University of Maryland Center for Environmental Science

Chairman Lowenthal, Ranking Member Stauber, and members of the Subcommittee, I am Donald Boesch, Professor Emeritus at the University of Maryland Center for Environmental Science. During several periods of my nearly 50-year career I have been engaged in scientific analyses related to offshore oil and gas. I wrote a 1974 book on oil spills after the Santa Barbara spill, edited another in 1987 on the long-term environmental effects of offshore oil and gas development, and served as a member of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling in 2010. I am presently engaged as a Senior Scholar at the National Academies of Sciences, Engineering and Medicine working with its Gulf Research Program to address human and environmental safety issues related to offshore oil and gas. However, my testimony represents my own views and not necessarily those of the National Academies.

Shifts in OCS Hydrocarbon Production and Transportation

To fully comprehend issues related to the Outer Continental Shelf oil and gas infrastructure that is aging and no longer in use, one has to understand how offshore production and transportation of hydrocarbons greatly shifted over the past 30 years. For me, I put this in the context of the periods when I was actively conducting research in the Gulf of Mexico during the 1980s, when I returned in 2010 to investigate the root causes of the Deepwater Horizon blowout, and now since 2020 when I began working with the National Academies' Gulf Research Program.

The shifts are apparent in Figure 1 from the Bureau of Ocean Energy Management's (BOEM) recent report estimating oil and gas production and reserves in the Gulf of Mexico OCS through 2019.[1] A major transition occurred from the 1980s, when natural gas and oil was produced from the continental shelf in water depths less than 1,000 feet, to the last decade of predominantly oil production from the deepwater Gulf extending into over 7,500 feet of water. Shallow water oil production in the Gulf fell by 91% over this time. During the mid-1980s shallow production accounted more than 90% of Gulf oil produced. It fell to 19% by the time of the BP blowout, and in 2019 was less than 8%. Nearly all of the natural gas produced during the 1980s came from shallow water, but shallow water gas production has since fallen by 94%. Natural gas production in the Gulf as a whole declined by about 80%. Over the past decade exploratory drilling has all but ceased in water shallower that 1,000 feet (Figure 2)

[1] Burgess, G.L., K.K. Cross and E.G. Kazanis. 2021. *Estimated Oil and Gas Reserves Gulf of Mexico OCS Region, December 31, 2019*. Bureau of Ocean Energy Management, New Orleans, LA.

The trend toward declining oil production on the continental shelf itself is also true for the U.S. OCS as a whole. The last OCS leases off California were granted in 1984. In 2019, crude oil production from tracts leased off Southern California was only 15% of what it was during the mid-1980s. Last year it comprised less than 1% of the total OCS production. Despite these declines, total OCS crude oil production reached an all-time high in 2019 because of the rapid increase in deepwater Gulf production, which even grew by 38% in the decade after the BP blowout disaster.

Despite the record Gulf OCS oil production, crude oil exports grew much more rapidly since the 1975 ban on crude oil exports was lifted in 2016. Crude oil exported from Gulf terminals comes primarily from the Permian Basin and other inland fields where hydrofracturing has greatly increased oil production. In 2020, 78% more crude oil was actually exported via the Gulf than was produced in the OCS. To put oil spill risks in full context, even when one takes into account the decline of oil imports, 30% more petroleum is transported by ship and pipelines through the U.S. Gulf of Mexico today than prior to Deepwater Horizon. Liquified natural gas exports, also emanating from inland fracking, were three times the amount of natural gas produced offshore in the Gulf.

The depletion of oil and gas reservoirs that were discovered and began production thirty or more years ago — both on the continental shelf of the Gulf of Mexico and off Southern California — present challenges of aging, obsolete, and unused oil and gas infrastructure. In another decade or two, safe operation and removal of deepwater infrastructure will also likely produce similar challenges. However, because of how and when oil fields were developed there are far more extensive platforms and pipelines remaining from shallow water oil and gas production.

Platform Decommissioning

According to the Bureau of Safety and Environmental Enforcement (BSEE), there were 1,862 platforms used for oil and gas production and processing in the Gulf of Mexico OCS as of April 2019. Regulations for decommissioning a platform require removal of the platform and its substructure and clearance of the seabed of all obstacles. The substructure must be severed 15 feet below the mudline, then removed and brought to shore to sell as scrap for recycling or refurbished for installation at another location. Recent years have seen record rates of decommissioning due to depleted shallow water fields, low oil and gas prices, and greater regulatory oversight (Figure 3). Nearly 1,000 existing platforms and other structures may need to be removed by 2027.[2]

[2] Kaiser, M.J. and S. Narra. 2018. A hybrid scenario-based decommissioning forecast for the shallow water U.S. Gulf of Mexico, 2018–2038. *Energy* 163: 1150–1177.

Because they attract fish and provide hard-surface habitat, platform substructures are popular fishing sites.[3] Consequently, BSEE may allow toppling of the substructure in place, towing it to a designated site, or removing the substructure down to at least 85 feet below the water line so that it does not interfere with surface navigation. Allowing the platform substructures to remain in the ocean is managed under a "rigs-to-reef" program by the National Oceanic and Atmospheric Administration in coordination with the states. By April 2016 there have been approximately 532 offshore platform substructures that have been repurposed as artificial reefs, mainly off Louisiana and Texas. Decisions appear to be made on a case-by-case basis without an apparent strategy that takes into account the full scale of ultimate decommissioning, broader considerations of the ecosystems and living resources of the northern Gulf, and the long-term fate and effects of the materials left on the seabed.

Of the 23 platforms in federal waters off Southern California, eight are to be decommissioned in the coming years. The Department of the Interior has issued a Draft Environmental Impact Statement with the complete removal of these platforms as the preferred alternative. Some fisherman and even some scientists support leaving at least some portion of platform substructures in place because of the productivity and biodiversity associated with these structures.

Abandoned Wells

Regulations also require that oil and gas wells are plugged and sealed with cement or similar material once they are no longer economically viable. Through 2020 more than 55,000 wells had been drilled in federal waters, 97% of those in the Gulf of Mexico.[4] Of those Gulf wells, 59% have been permanently or temporarily abandoned and the number of decommissioned wells will only continue to grow. While the sealing of abandoned wells is meant to be permanent there are no monitoring requirements. While leakage of oil may be possible, especially resulting from hurricane disruption, concerns have mainly focused on leaking of gases, including methane (the primary component of natural gas), benzene, nitrous oxide (like methane a potent greenhouse gas), and carbon dioxide.

Recent observations indicate that some Gulf offshore wells, whether active or abandoned, are leaking methane, just as wells on land are. Measurements of atmospheric concentrations of methane in the vicinity of platforms were used to estimate emissions rates that are twice as high as EPA had estimated.[5] The overall loss rate was estimated to be 2.9% of production, comparable to loss rates of onshore oil producing basins, as well as to the average U.S. loss rate

[3] van Elden, S., J.J. Meeuwig, R.J. Hobbs and J.M. Hemmi. 2019. Offshore oil and gas platforms as novel ecosystems: A global perspective. *Frontiers of Marine Science* https://doi.org/10.3389/fmars.2019.00548

[4] Seo, H. 2020. Unplugged: Abandoned oil and gas wells leave the ocean floor spewing methane. *Environmental Health News*

[5] Gorchov Negron, A.M, E.A. Kort, S.A. Conley and M.L. Smith. 2020. Assessment of methane emissions from offshore platforms in the U.S. Gulf of Mexico. *Environmental Science and Technology 5: 5112–5120.*

throughout the entire natural gas supply chain. Estimated emissions rates are particularly high for older, shallow-water facilities than for the more modern, deepwater facilities.[6]

Pipelines

There are approximately 8,600 miles of active offshore oil and gas pipelines on the seabed of the Gulf of Mexico. As the Subcommittee is aware from a General Accountability Office report earlier this year, while regulations require removal of pipelines when no longer in use, BSEE and its predecessor agencies have routinely allowed the industry to leave 97% of them in place. GAO estimated there might be 18,000 miles of pipelines and we do not know where all of them are or the companies that put them in place. Approval of decommissioning-in-place has become the rule, rather than the exception it was intended to be. The GAO found that the Bureau did not have a robust process to: address environmental and safety risks posed by leaving pipelines in place; assure that standards from cleaning and burial are met; nor monitor the condition or movement of retired pipelines. If pipelines later pose safety or environmental risks there is no funding source for their removal as there is no surety or bonding for this contingency.

It is prescient, given this month's Beta Offshore pipeline leak off Orange County, California, that the GAO also found that BSEE does not generally conduct or require any subsea inspections of active pipelines, but relies on monthly surface observations and pressure sensors to detect leaks. It now seems to have been some 15 hours from when the pressure drop indicating a leak was observed before the spill was reported. Furthermore, inspections revealed that the concrete encasing the pipeline had been damaged some months earlier.

According to the GAO report, the Department of the Interior has long recognized the need to improve its pipeline regulations, and issued a proposed rule in 2007 that addressed pipeline integrity, including requiring new inspection and leak detection technologies. However, the promulgation of the rule was stalled, as were the reformed drilling safety rules proposed around the same time that the Oil Spill Commission found had been blocked by industry opposition prior to the BP Deepwater Horizon blowout.

The long-term environmental consequences of leaving decommissioned pipelines in place, or alternately of removing them, have received very little assessment, either by the Department of the Interior or by independent research scientists. Evidence suggests that oil remaining in at least one decommissioned pipeline was released by the erosive forces of Hurricane Ida when it came ashore nearby at Port Fourchon, Louisiana. Even if properly cleaned, abandoned pipelines can contain residues that include elevated concentrations of mercury and other trace metals, as well as naturally occurring radioactive materials from the hydrocarbon bearing formations. Pipelines can be moved under extreme wave and current conditions — one

[6] Yakovitch, T.I., C. Daube and S.C. Herndon. 2020. Methane emissions from offshore oil and gas platforms in the Gulf of Mexico. *Environmental Science and Technology*. 54: 3530–3538.

pipeline was three-fourths of a mile during Hurricane Katrina — and by underwater mudslides or shifting sands. Exposed pipelines can pose hazards to navigation and fishing activities.

As Members know, extensive efforts are underway to restore the barrier islands and coastal wetlands of the Gulf Coast that are deteriorating, in part due to oil and gas extraction activities. Much of this restoration is supported by funds derived from penalties and natural resource damage payments from the BP Deepwater Horizon oil spill and by the Gulf of Mexico Energy Security Act. The myriad pipelines underlying East Timbalier Island, Louisiana, have precluded most restoration options for this barrier island (Figure 4).[7] The numerous pipelines underlying Ship Shoal on the inner continental shelf off Louisiana are also restricting the dredging of its sand resources for use in barrier island restoration.

Liabilities

In 2015 the Government Accountability Office reported that of the estimated $38.2 billion in decommissioning liabilities only $5.2 billion of these liabilities were backed by financial assurances or bonds.[8] Pursuant to President Trump's Executive Order on America-First Offshore Energy Strategy, in 2020 BSEE and BOEM proposed to remove provisions for third-party guarantees and bond accounts for decommissioning, which would have exacerbated the liability deficiency.

The decommissioning of shallow water platforms, wells and pipelines raises particular concerns regarding the public liability. Most of the relevant tracts are not held by the original lessees, generally now parts of major corporations, but by smaller companies who bought them from those companies or from other companies that bought them from the majors. Present lessees typically have substantially more modest technical and financial resources to ensure operational safety and meet decommissioning costs. In fact, some companies have filed for bankruptcy, including Amplify Energy, the operator of the Beta Pipeline in Southern California, and Fieldwood Energy, a major holder of shallow water leases which is seeking to return operational and decommissioning responsibilities to the original lessees.[9]

The predicament of holding corporations rather than taxpayers responsible for the costs of decommissioning is not unique to the U.S. There have been similar sell-offs of leases of depleted offshore oil and gas fields to parties that then became insolvent in the North Sea, Australia, and New Zealand. In August of this year, the Australian Parliament passed legislation

---

[7] Baurick T. 2017. Tangle of oil pipelines adds to cost of barrier island restoration project. *Times Picayune / New Orleans Advocate*. https://www.nola.com/news/environment/article_e5eafc9b-98c7-55c8-a6b6-70f2841d32d5.html

[8] Government Accountability Office. 2015. *Offshore Oil and Gas Resources: Actions Needed to Better Protect against Billions of Dollars of Exposure to Decommissioning Liabilities*. GAO-16-40.

[9] Mosbrucker, K. 2020. In Fieldwood bankruptcy, judge 'freezes time' on 1,700 Gulf of Mexico oil wells. *Times Picayune / New Orleans Advocate*. https://www.nola.com/news/business/article_83914880-e0db-11eb-ba38-6777b63e9143.html

tightening decommissioning liabilities and imposing a levy on all offshore oil and gas producers to cover the cost of decommissioning abandoned facilities operated by companies that liquidated.[10] New Zealand is considering legislation that would similarly hold the industry liable.

End-Game Strategy for Offshore Oil and Gas

The Bureau of Ocean Energy Management has estimated that, at the end of 2019, 91% of the oil and gas energy discovered in the Gulf of Mexico had been extracted. BOEM's estimate of 4.65 billion barrels in proved or probable oil reserves at the end of 2019 of increased by 35% over the previous year, largely as a result of additions and revisions to large, deepwater fields. At the 2019 rate of production, the Gulf's crude oil reserves, both shallow and deep, would be exhausted in only six or seven years.

More oil is, of course, being discovered from presently active lease tracts regardless of whether additional leases are granted in the central and eastern Gulf, or in any other OCS areas for that matter. Earlier this year, BOEM estimated a mean of 17 billion barrels of additional, undiscovered recoverable oil that could be economically produced in the central and western Gulf at a market price of $60 per barrel.[11] This would increase to 20 billion barrels at $100 per barrel. In any case, the oil resources of the Gulf are finite and, based on BOEM's estimates of reserves and undiscovered recoverable resources, would be largely extracted by around the middle of this century, assuming present rates of production. Natural gas resources would be depleted even sooner. This will create a very substantial challenge for the safe disposition of a very substantial amount of oil and gas infrastructure during a period of declining production and profitability.

Addressing climate change at the same time makes it very problematic to continue oil production at present or increased rates. Science makes it clear that global society must find a pathway to reduce greenhouse gas emissions to net zero by 2050 to ensure a livable planet.[12] Most advanced countries and many major oil and gas companies have committed to achieve this goal. Some industry proponents argue, however, that we can continue to produce oil and gas indefinitely because innovation will allow us to capture, use and store carbon emissions. Most scientists are doubtful that is achievable at the scale and in the timeframe required. Earlier this year the International Energy Agency (IEA), widely trusted by the industry, developed a roadmap for achieving the net-zero goal that included a substantial role for carbon

[10] Gilbert + Tobin. 2021. Australia's new offshore oil and gas decommissioning framework. *Lexology* https://www.lexology.com/library/detail.aspx?g=b33779b9-62cc-4053-9fb4-168288e1c8f6

[11] BOEM. 2021. *Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf, 2021*. Bureau of Ocean Energy Management, Herndon, Virginia. https://www.boem.gov/2021-assessment-undiscovered-oil-and-gas-resources-nations-outer

[12] IPCC. 2021. Summary for policymakers. In: *Climate Change 2021: The Physical Science Basis*. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

capture, use and storage, but also relies on a huge contraction of oil and gas production.[13] Beyond projects already committed as of 2021, there are no new oil and gas fields approved for development in the IAE pathway. Just this month, the IEA released another report that emphasized the urgency of securing a 75% reduction in methane emissions from fossil fuel operations by 2030 as one of the best near-term opportunities for limiting the worse effects of climate change.[14]

The era of oil and gas extraction from the Gulf of Mexico will probably not last more than a century. The greenhouse-gas emissions pathway we follow and how we deal with the legacy of the remaining infrastructure will play out over the next decade or two. The nation sorely needs a smart strategy for this end game, one that both limits climate change and minimizes the deleterious impacts and risks of the residual infrastructure. In my opinion, this strategy must be environmentally sustainable, socially and economically effective for the people of the region, and protect taxpayers from bearing the costs of remediation.

The National Academies

The National Academies of Sciences, Engineering and Medicine have a long-history of independent analyses and advice concerning oil in the sea and the safety of offshore oil and gas operations. Its Gulf Research Program focuses on human health and environmental protection including issues related to hydrocarbon production and transportation in the Gulf of Mexico. The Program seeks to carry out studies, projects and other activities not otherwise adequately supported by government or industry. The Gulf Research Program has identified the challenge of legacy oil and gas infrastructure as an important focal area and is planning a program of consultations and targeted assessments and research to address this important transition. It stands ready to work with Congress, federal agencies, the states, industry and civil society toward this end.

Thank you for the invitation to testify and for your attention. I am will certainly do my best to answer any questions the Members of the Subcommittee may have.

---

[13] IEA. 2021. *Net Zero by 2050: A Roadmap for the Global Energy Sector*. International Energy Agency, Paris. https://iea.blob.core.windows.net/assets/beceb956-0dcf-4d73-89fe-1310e3046d68/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf

[14] IEA. 2021. *Curtailing Methane Emissions from Fossil Fuel Operations: Pathways to a 75% cut by 2030*. International Energy Agency, Paris. https://iea.blob.core.windows.net/assets/585b901a-e7d2-4bca-b477-e1baa14dde5c/CurtailingMethaneEmissionsfromFossilFuelOperations.pdf

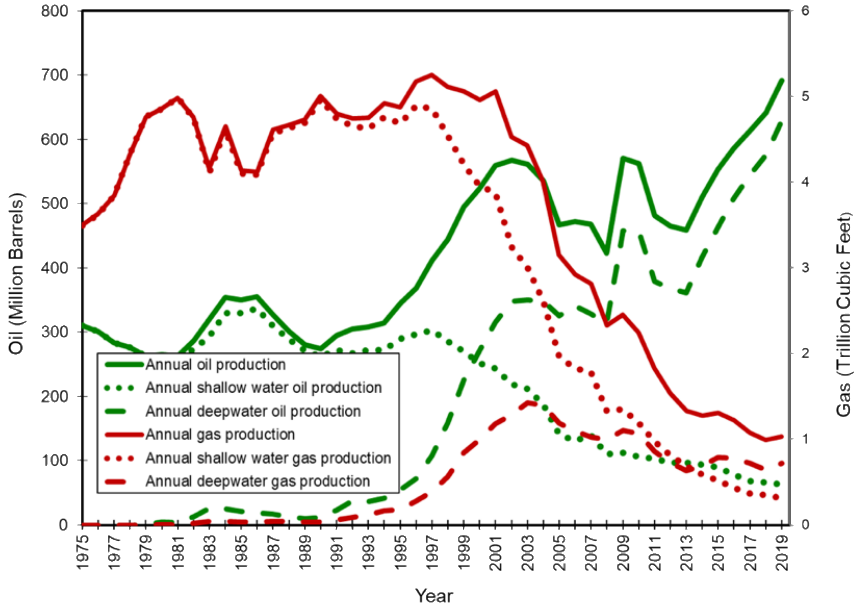

Figure 1. Annual oil and natural gas production in the Gulf of Mexico from shallow (less than 1,000 feet) and deepwater fields.[1]

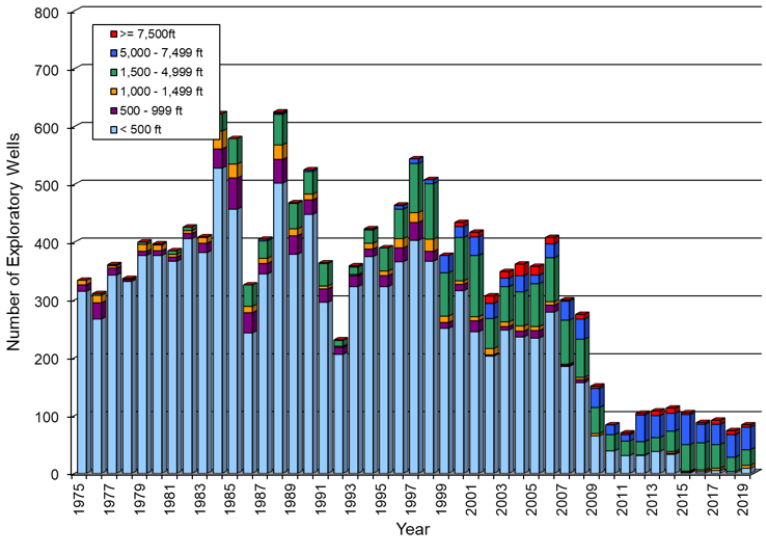

Figure 2. Number of exploratory wells drilled in the Gulf of Mexico OCS by year and water depth.[1]

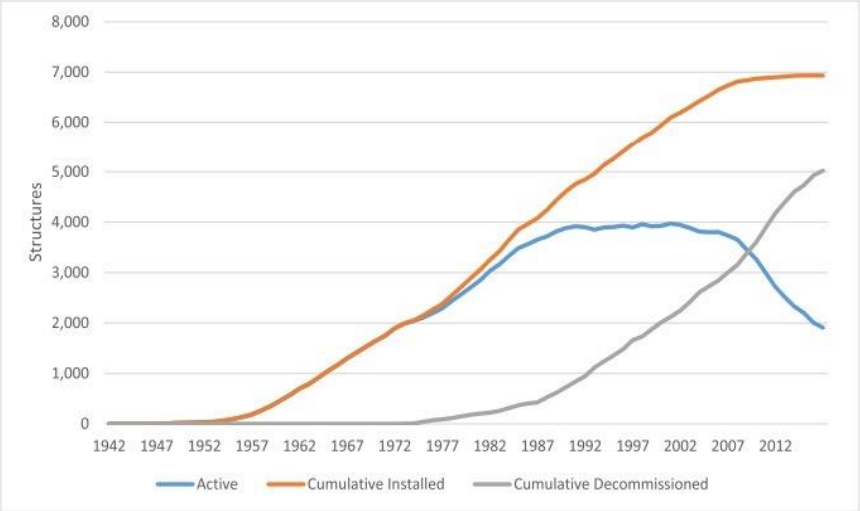

Figure 3. Number of offshore structures installed and decommissioned in the Gulf of Mexico since 1942.[2]

Figure 4. Oil and gas pipelines in, under and around East Timbalier Island, Louisiana.[7]