

STUDY TITLE: Oil and Gas Infrastructure in the Mid-Atlantic

REPORT TITLE: Onshore Oil and Gas Infrastructure to Support Development in the Mid-Atlantic OCS Region

CONTRACT NUMBER: M09PC00007

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Mid-Atlantic

FISCAL YEARS OF PROJECT FUNDING: 2009-2013

COMPLETION DATE OF REPORT: July 2014

COSTS: FY 2009: \$121,125.13; FY 2010: 90,730.80; FY 2011: 99,686.48; FY 2012: 49,841.43; **CUMULATIVE PROJECT COST:** \$361,383.84

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KEY WORDS: Atlantic; outer continental shelf; offshore structures; platform fabrication; shipyards; port facilities; support facilities; heliports; oil spill response; oil field waste disposal; pipelines, pipe-coating; natural gas processing; natural gas storage; liquefied natural gas (LNG); refineries; electric power.

BACKGROUND: Coastal infrastructure is the backbone of offshore oil and gas activities. The development of offshore oil and gas resources in the Mid-Atlantic region will unquestionably impact coastal communities. Before this development takes place, it is necessary to identify the types of infrastructure currently available to support offshore development. Potentially even more important will be to identify what infrastructure is lacking and potential changes to any existing infrastructure needed for new development. Because of its statutory responsibilities, BOEM has an ongoing need to understand the roles each type of infrastructure.

OBJECTIVES: This report examines the wide range of energy infrastructure assets that would be required if the Outer Continental Shelf (OCS) of the Mid-Atlantic OCS region were opened to oil and gas production. The report does not explore any testable hypotheses or other complex research questions, but describes, examines, and outlines the nature of a variety of different, yet important, energy infrastructure assets

and their current status within the Mid-Atlantic OCS Region. The report examines these infrastructure assets' recent development trends, and gives an outlook given ongoing and expected offshore oil and natural gas exploration and production (E&P) activities.

This report examines 11 major energy infrastructure categories significant to development in the Mid-Atlantic OCS region, including platform fabrication and shipyards; port facilities; support and heliport facilities; oil spill response; oil field waste disposal; pipelines, pipe-coating yards; natural gas processing and storage; liquefied natural gas (LNG) facilities; refineries; and electric power infrastructure.

The report identifies and describes each type of onshore infrastructure that would potentially support OCS oil and gas projects in the Mid-Atlantic region. This includes an examination of the infrastructure, unique features and how it is related to the oil and gas industry. In addition, each type of infrastructure is inventoried and analyzed. A summary of the infrastructure type locations, operations, and capacities is provided; and a list of existing facilities with descriptive statistics is provided in an accompanying project database. A discussion of potential infrastructure responses is included in each chapter, including a review of changes or additions to existing infrastructure to adapt to new development trends.

For purposes of this study, the Mid-Atlantic impact region is defined as the states along the East Coast of the U.S. from New Jersey south to Georgia. The states included are New Jersey, Delaware, Maryland, Pennsylvania, Virginia, North Carolina, South Carolina, and Georgia.

SIGNIFICANT CONCLUSIONS: Energy infrastructure is a necessary component of the overall value chain of North American energy production, refining, transportation, and distribution. If the OCS of the Mid-Atlantic region were opened to oil and gas production, a significant amount of investment would be needed to provide the support facilities and processing capacity needed to support such development and production.

STUDY RESULTS: No platform fabrication yards are located in the Mid-Atlantic region. Development of these facilities is likely to depend on the degree to which offshore energy production progresses. Under a limited or moderate development scenario, it is likely that platforms and associated structures would originate in the Gulf of Mexico (GOM) region or from international sites.

There are eight shipyards in the Mid-Atlantic OCS region, ranging from those that construct small vessels for coastal or inland use to those that focus on large oceangoing naval and commercial ships. In addition, there are 20 facilities that offer repair services. The repair facilities also vary in size, from those with topside capability only, to those that have dry-docking capability for small ships, boats and barges, and those that have dry-docking capability for large ocean-going vessels. The medium-sized shipyards located in Virginia, Maryland and North Carolina would be likely candidates for offering support capabilities to the Mid-Atlantic OCS region. Shipyards

dedicated to medium-sized vessels would be likely candidates for offering support capabilities in this region. Most of the medium-sized yards are centrally located in Virginia, Maryland, and North Carolina. To the extent that new ships and the facilities to construct and service these vessels are needed, the central Mid-Atlantic region would represent a good opportunity for expansion. It is unlikely that any new facilities would be constructed in support of anticipated offshore lease activities.

The shipbuilding industry is highly competitive and existing GOM yards may consider expanding existing operations to compete for these new markets. Existing yards along the GOM would have a number of important advantages over both Mid-Atlantic OCS greenfield developments and expansions, such as existing yards with adequate capacity; sizable skilled workforce; engineering and design experience; decades of construction experience across a range of offshore service vessels and crafts; relationships with input vendors; and relationships with service and production companies.

Many ports along the eastern seaboard, particularly in the upper Mid-Atlantic region, are already highly developed and in locations that have expensive or limited expansion possibilities. Development at these ports will likely compete with alternative uses for waterfront and port surface space. Because of the cost and physical restrictions, smaller to medium sized ports may have a competitive edge in the pursuit of oil and gas support activities. A number of moderately-sized ports located in the Chesapeake Bay region could be likely support bases for offshore oil and gas activities. These central Mid-Atlantic OCS ports are the closest to anticipated regional offshore development.

No support and transport facilities have been identified on the Atlantic coast (with the exception of heliports). Although general offshore support and transportation is tied directly to ports, our research does not suggest that the development of private (company-owned) service facilities will arise. Like ports, development in response to offshore activity will be influenced by the specific location of offshore activity. In addition, the capital cost of development of such types of facilities by an individual offshore operator may be too expensive for one company alone. Support facility development is likely to track port development.

There are a number of oil spill response companies located in the Mid-Atlantic region, including companies that respond to marine situations. The Mid-Atlantic region has a number of refineries that receive cargo from water-borne suppliers and spills from these cargoes and engage in other industrial activities, are likely to be greater than those associated with OCS development. While oil spill response uses capital-related equipment, this is mostly a knowledge-based industry that is highly mobile and assets from other producing areas could be used if a catastrophic accident were to occur. It is unlikely that new oil spill response investments will be needed in the region.

There are a small number of oil field waste disposal facilities located in the Mid-Atlantic states; most have been developed to support Appalachian drilling activities. Development in the Mid-Atlantic OCS will likely require expanded oilfield waste disposal

capacity. The amount of capacity will be a direct function of the level of drilling and production activity anticipated in the Mid-Atlantic OCS as more drilling or production, or both, will result in expanded capacity requirements.

The interstate natural gas transportation system in the Mid-Atlantic region has been developed to facilitate the movement of natural gas from its primary producing area (GOM) to market areas along the East Coast. A great number of the existing interstate natural gas lines run along the Appalachian Mountain range and then northwards to New York. Currently, no natural gas interstate pipelines run along the Atlantic coast. However, Columbia Gas has a segment that runs through Virginia to the coast and Transco has a segment that runs from Mid-Virginia down close to the North Carolina coast. Future pipeline development along the Mid-Atlantic OCS is likely to be based on a series of line segment extensions from future coastal producing areas to the existing major trunk lines running along the Appalachian range. The overall investment level needed to link this production will be a function of the ability of the asset to facilitate the movement of the expected volumes of natural gas in a safe and reliable manner, taking into account future commercial considerations and opportunities.

The pipe coating business is highly dependent on the cyclical nature of oil and natural gas markets. Currently, all existing pipe coating facilities in the Mid-Atlantic states are in the Appalachian region. The degree to which these existing facilities would be used to support offshore OCS activities is undetermined at this point. Under a limited or moderate development scenario, it is likely that coated pipe would come from existing facilities in the Appalachian region or the GOM region. At this point, it is unlikely that any new pipeline coating or fabricating facility will be developed along the Mid-Atlantic. It is probable that existing regional facilities will expand given the increases in regional shale and Marcellus production and new pipeline projects bringing gas from the Rockies into the Midwest-Appalachian area.

There are eight natural gas processing plants in the Mid-Atlantic region; all in western Pennsylvania and support Appalachian production. The need for gas processing along the Mid-Atlantic OCS will be a function of the degree to which wet or sour gas volumes, or both, are anticipated to be produced from offshore areas. Assuming gas processing is needed, many of the same factors influencing gas transportation will be important, including location, volumes and commercial factors (the ability to store, transport and market natural gas liquids processed from the gas stream will be important in determining facility configuration).

A number of natural gas storage facilities have been identified in the Mid-Atlantic states. These facilities are associated with Appalachian production or intermediate storage requirements for New England LDCs. It is likely that gas storage will be developed along the Mid-Atlantic OCS to accommodate new production volumes.

Large marine-based onshore LNG terminals have been proposed across different areas of the coastal US, and have received increased media and public attention in recent years. In 2011, five LNG import facilities were located in the Atlantic and GOM coast

regions. Four of these facilities are original “legacy” assets that were developed during the energy crisis of the 1970s and early 1980s. These four facilities are all onshore facilities that have been expanded in recent years and each have a peak sendout of one Bcf per day or more. There has also been a considerable number of announcements and applications for new regasification or export facilities, or both, throughout the coastal U.S. Nine facilities have requested authorization to export LNG. Two of the Mid-Atlantic facilities, Cove Point and Elba Island, have requested this authorization.

Of the 11 refineries in the Mid-Atlantic region, two are currently idle. The remaining nine active refineries are relatively large by East Coast standards. All have the ability to handle light, sweet and certain grades of heavier, sour crude oil. Most produce a wide range of refined products from the high to lower end of the barrel. Further, most if not all, of these facilities get their crude oil input supplies from imports and not from other producing basins in the US. None of these refineries are currently connected to a major interstate crude oil pipeline and obtain most of their supplies by tankers.

Existing refinery capacity would likely be used to process Atlantic OCS crude oil production. It is highly unlikely, given expected overall market conditions over the next several years, that any East Coast refinery would expand its current capacity without some exceptional type of guarantee. It would be nearly impossible to site a new greenfield refinery along the Atlantic OCS and this potential scenario should be eliminated from consideration.

Power generation in the Mid-Atlantic region is heavily dependent on natural gas as a fuel source. Thus, the price and availability of natural gas can have important implications for power generation supply and price. According to the EIA, over the next 25 years, total electricity sales are projected to increase significantly, including sales in the US and Mid-Atlantic region. The largest increase will be seen in the residential and commercial sectors, but industrial demand is projected to decrease.

STUDY PRODUCT: Dismukes, D.E. 2014. Onshore oil and gas infrastructure to support development in the Mid-Atlantic OCS Region, US Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region New Orleans, LA. OCS Study BOEM 2014-657. 358 pp.