

Deep Water

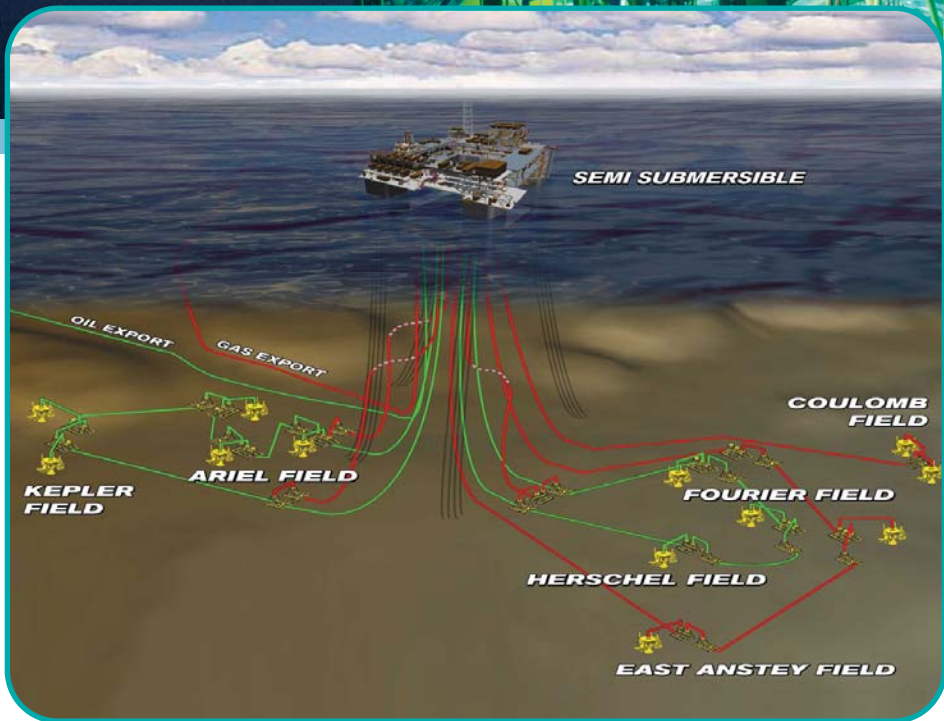
Where the Energy Is

Energy is fundamental to America's quality of life and our economic security. High prices at the gas pump and on home heating bills hit Americans where it hurts - in the wallet - and remind us of the importance of energy in our everyday lives. Increased energy costs also remind us of our continued dependence on foreign nations for much of our oil, and the impact our rapidly expanding demand for natural gas will have on our domestic supplies.

The focus of our National Energy Policy has been to diversify our supply of energy so that we are not overly dependent on one country or one source of energy. Although renewable energy will play an important role in our energy supply - including wind and wave energy from the Outer Continental Shelf (OCS) - for the next



In the Gulf of Mexico, MMS gathers scientific information that has greatly expanded knowledge of chemosynthetic communities, which use chemicals rather than light to produce food. One example of a chemosynthetic organism is an iceworm (left), which feeds on gas hydrates, a potentially important source of energy. Tube worms (right) form bushes on the seafloor near locations of natural oil seeps and create the structure for chemosynthetic communities. Scientists (right), funded through the MMS Environmental Studies Program, have studied these communities for over 20 years, since their initial discovery. The MMS has developed rules that require the oil and gas industry to protect these communities, while allowing for energy development. *(Photo credit: Gregory S. Boland, MMS)* ■



ABOVE: An offshore platform at night provides a dramatic picture of the technology involved in producing energy from the deep waters of the Gulf.

deep water oil and gas exploration and production in the world. The Department of the Interior's Minerals Management Service estimates that the deep water regions of the Gulf of Mexico may contain 56 billion barrels of oil equivalent, or enough to meet U.S. demand for 7-1/2 years at current rates.

ABOVE: The Na Kika Complex, tying six fields to a host facility.

25-50 years America will continue to rely on fossil fuel to supply upwards of 80-90% of our energy demand. America has been producing oil and natural gas for more than a century. However, experts believe that we have tapped the most easily developed of our domestic oil and gas resources. Now, our best source of new domestic energy resources lies in the deep water Gulf of Mexico and other frontier

areas. Future development of these resources will be both more challenging and more costly.

The Gulf of Mexico has been a major supplier of oil and gas to America for nearly half a century. With declining production from its near-shore, shallow waters, energy companies have focused their attention on oil and gas resources in water depths of 1,000 feet and beyond. Their progress in developing these resources has made the Gulf of Mexico the focal point of

Drilling in the deep water Gulf is not easy. To be sure, it presents challenges far beyond those experienced by energy companies in shallower waters. For example, because of the extreme water depths, drilling platforms with rigid frames attached to the seafloor are cost prohibitive. Deep water operations must accommodate extremely high pressures in the cold and dark recesses of the ocean bottom. Risers, the pipes which connect the drilling platform to the well, are exposed over

considerable length (now exceeding 10,000 feet, or 2 miles) to the straining pressures of multiple ocean currents.

To counter these challenges, energy companies have made large investments in new technologies. Deep water operations depend on 3- and 4-D seismic information and advanced computer interpretations to better define drilling targets and thereby reduce the need to drill costly and unnecessary wells. Massive blowout preventers, some 45 feet high and

BELOW: Energy companies are drilling to depths of as much as 25,000 feet – equal to more than 165 “Statues of Liberty” to provide energy for America.

weighing 320 tons, are installed on the ocean floor to protect the environment from the threat of an accidental deep water oil release. Remotely controlled robots operate effectively in the high pressure, cold and dark environment of the ocean bottom to construct, maintain and repair costly drilling equipment. New drill ships capable of carrying the tons of necessary pipe and other drilling equipment have been constructed to support deep water operations. These ships are specially equipped with thrusters controlled by computers and geospatial positioning systems to maintain their position and reduce tension on their riser systems.

For all these reasons, the cost of developing a single deep water field can exceed \$1 billion, with costs likely to increase as operations are conducted in even deeper waters. Compare this to the cost of a typical shallow Gulf development (100 feet of water, 10,000 foot wells) at \$100 million, and you can appreciate the cost of addressing the challenges of deep water.

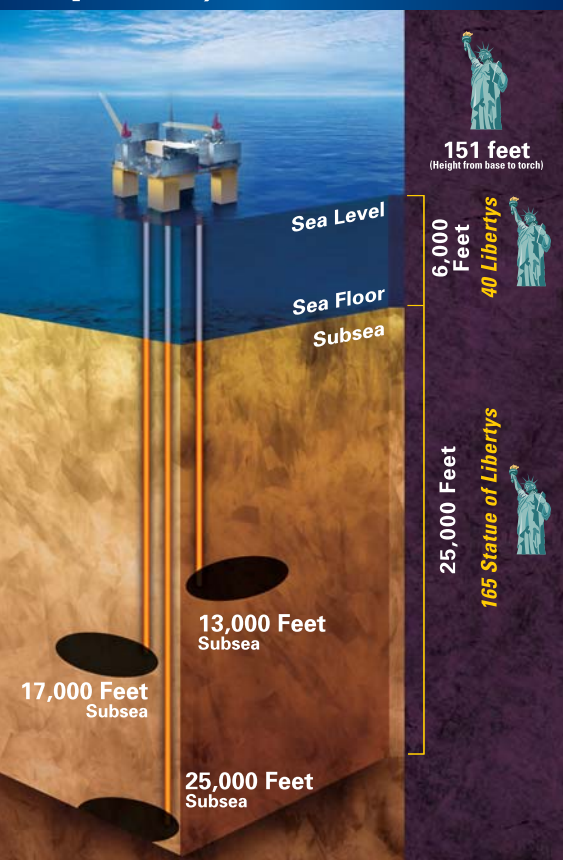
Even with these costs and challenges, energy companies today are successfully exploring oil and gas prospects in water depths greater than 5,000 feet (about one mile). Energy companies announced five discoveries in water depths of more than one mile in 2001, three in 2002, and six in 2003. In the first half of 2004, energy companies made eight new deep water discoveries. Since 2001, energy companies have announced eleven discoveries in water depths greater than 7,000 feet. In 2004, Shell

Facts and Figures at a Glance

Deep Water Gulf of Mexico Outer Continental Shelf

- ◆ Seven of the top 20 oil fields in the U.S. (ranked by liquids proved reserves) are now located in federal deep water areas.
- ◆ In the deep water Gulf of Mexico, more than 90 hydrocarbon production projects are on line. Production from the deep water Gulf grew to an estimated 959 thousand barrels of oil per day and 3.6 billion cubic feet of natural gas per day by the end of 2002. This was an increase of 535 percent and 620 percent for oil and gas, respectively, since 1995.
- ◆ At least 100 deep water discoveries have been announced since 1995. Significantly, in the last three years, there have been 11 industry-announced discoveries in water depths greater than 7,000 feet (2,134 meters). These ultra-deep water discoveries hold the promise of opening up entirely new geologic frontiers.
- ◆ Deep water development projects are now producing in water depths greater than 7,500 feet.
- ◆ The first exploratory well in over 10,000 feet of water has been drilled (world water-depth record).
- ◆ The first deep water well below 30,000 feet true vertical depth has been drilled (a U.S. offshore depth record).
- ◆ The number of producing deep water projects in the Gulf has increased by 51 percent in the past two years.
- ◆ Deep water oil and gas reservoirs may occur at depths of 13,000 to 25,000 feet - or greater - below the seafloor.

Deep Water, the Next Frontier



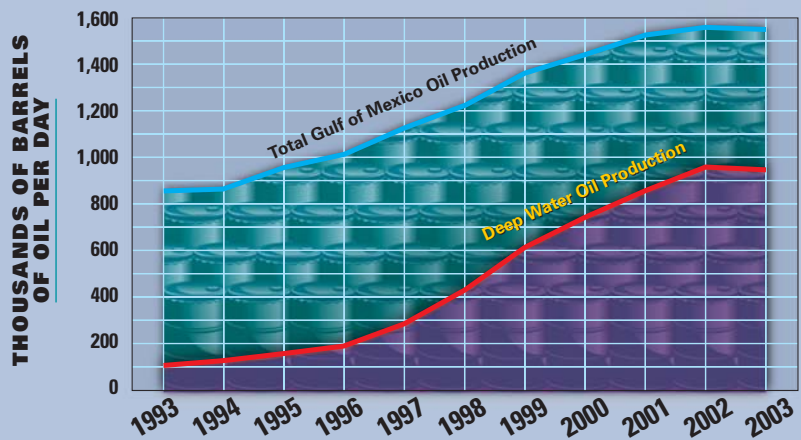
RIGHT: In the Gulf of Mexico, deep water oil production dramatically outpaces total oil production.

Exploration and Production Company set a world record for the deepest producing field at 7,570 feet. In 2003, ChevronTexaco, using a Transocean drill ship, set a world record for exploration by drilling in 10,011 feet of water.

About 30 percent of the oil and 23 percent of the gas produced in the United States comes from the federal Outer Continental Shelf, and most of that production is from the Gulf of Mexico. The U.S. has seen a period of sustained expansion of oil and gas activity in the deep water areas of the Gulf. In 1990, about four percent of the oil and less than one percent of the natural gas produced in the Gulf originated in the deep water areas. By 2003, more than sixty percent of the oil and 29 percent of the natural gas was produced from deep water areas. In the next two years, four new major deep water projects will begin production with a combined production capacity of more than 580,000 barrels of oil and 510 million cubic feet of gas each day.

With deep water production expected to almost double over the next decade, Gulf oil production will rise to 2.25 million barrels per day, or nearly 80% of total Gulf production, by 2011. ■

Gulf and Deep Water Oil Production



In addition to the energy benefits for America, experts predict that deep water oil and gas development in the Gulf of Mexico may sustain between 80,000 and 100,000 jobs by 2010. Between 50,000 and 70,000 of these jobs will be retained well into the following decade as exploration and development proceed. ■

MMS: Securing Ocean Energy and Economic Value for America



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