

# OFFSHORE RESEARCH



# NETL

## NATIONAL ENERGY TECHNOLOGY LABORATORY

Natural gas and crude oil provide approximately two-thirds of our nation's primary energy supply. We expect that will continue as the nation responsibly transitions to a more sustainable energy future with the further development of renewable energy resources. Current operations in the offshore have unique challenges associated with safe and efficient exploration and production in harsh, and sometimes unpredictable, environments. These challenges include:

- High pressure and high-temperature (HPHT) conditions.
- Unique geohazards.
- Flow assurance issues in deep water pipelines.
- Reliable operation of subsea production equipment under extreme conditions.
- Increasingly sophisticated seismic imaging requirements to visualize deep and complex reservoirs.

Albany, OR • Anchorage, AK • Morgantown, WV • Pittsburgh, PA • Houston, TX



U.S. DEPARTMENT OF  
**ENERGY**



NETL implements this effort as part of DOE's Resource Sustainability Program.

Program 090, April 2023

Within the Resource Sustainability portfolio of programs, research in the offshore area is addressing the unique challenges posed by conducting operations under subsea conditions. This area focuses on innovative research and development that helps minimize environmental impacts, prevents human and engineered systems risks, identifies and avoids geohazards, and supports offshore energy sustainability and transitions.

Advancing the creation of sophisticated tools, equipment and imaging technologies will accomplish the following goals: delivering the information needed to provide a robust foundation for the characterization of offshore reservoirs; improving the performance, reliability and integrity of surface and subsea equipment and infrastructure; and developing the data needed to identify, assess, and mitigate risks to inform future research direction decisions.

**WELLBORE INTEGRITY** — Incidents related to the loss of oil/gas well control may occur when the primary barriers (casing and cement) fail, requiring the secondary barrier (closing of the blowout preventers) to engage in order stop the breach from becoming a well-control incident. Research continues to support safe, economic offshore resource development by ensuring the integrity of the wellbore in both deepwater and ultra-deepwater environments.

**RISK REDUCTION** — Developing risk assessment tools to quantify and mitigate knowledge gaps in offshore systems, including the assessment of geohazard potential, equipment failure, and casing deformation.

**RAPID DETECTION AND IN-SITU CHARACTERIZATION** — Improving the safety of offshore operations through early kick detection at the drill bit and in-situ characterization of subsurface processes during drilling.

## OFFSHORE TECHNOLOGIES WILL EXTRACT THE FULL ECONOMIC VALUE FROM OUR NATION'S FINITE OIL AND GAS RESOURCES BY:

- Mitigating the risk of incidents that could result in the loss of life and damage to the environment.
- Improving safety through research and development areas such as wellbore integrity, spill risk mitigation, cementing alternatives, advanced riser technology and subsea inspection of seafloor facilities and equipment.

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The National Energy Technology Laboratory is a U.S. Department of Energy national laboratory that drives innovation and delivers technological solutions for an environmentally sustainable and prosperous energy future. Through its world-class scientists, engineers and research facilities, NETL is ensuring affordable, abundant and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle, enabling environmental sustainability for all Americans, advancing environmental justice and revitalizing the economies of disadvantaged communities.

NETL lends its expertise toward achieving a carbon-free power sector by 2035 and a net-zero economy by 2050 while catalyzing economic revitalization, creating good-paying jobs and supporting workers in energy communities, especially hard-hit coal, oil and gas, and power plant communities across the country.

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