U.S. DEPARTMENT OF ENERGY

United States' Initial Commitment to the Zero-Emission Shipping Mission

The mission of the U.S. Department of Energy (DOE) is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. DOE prioritizes combating the climate crisis, creating clean energy jobs, and promoting energy justice so that all benefit from the clean energy revolution. The objectives of the Zero-Emission Shipping Mission are aligned with this Agency mission and DOE is committed to serve as a co-lead.

Ambition

The U.S. will bring a government-wide approach to the Mission by working with partner agencies across the federal government, including DOE (lead), the U.S. Maritime Administration (MARAD), the Environmental Protection Agency (EPA), and the U.S. Department of State. We are dedicated to ensuring a successful outcome of the Mission by working with other Mission co-leads and partners to address research, development, and demonstration (RD&D) challenges needed to accelerate the adoption of zero-emission fuels for ocean going vessels and ultimately achieving net-zero emissions from maritime transport. We will work towards achieving the dual goals of the Mission, which are:

- By 2030, at least 5% of the global deep-sea fleet measured by fuel consumption consists of ships capable of running on well-to-wake zero-emission fuels—such as clean hydrogen, ammonia, methanol, and advanced biofuels.
- By 2030, at least 200 of these ships to primarily use these fuels across the main deep sea shipping routes. This will lay the foundation for increasing numbers in the following years towards a zero-emission shipping future.

Critical to achieving these goals is to ensure that all industry stakeholders, including ports and terminal operators, continue to integrate new technologies and fuels that will result in long-term pollution and greenhouse gas reductions. Reducing air emissions from maritime activities in and around ports is likely to have significant benefits not only for the environment, but also for the health outcomes of those communities that reside near port complexes.

2030 Mission Goals:

- **At least 5% of the global deep-sea fleet running on well-to-wake zero-emission fuels**
- **At least 200 of these ships to primarily use well-to-wake zero-emission fuels across the main deep sea shipping routes**

Reducing air emissions from maritime activities is likely to have significant benefits not only for the environment, but also to those communities that reside near port complexes.

The U.S. Department of Energy will contribute to the Mission:

- Dedicating a full-time equivalent employee to staff the Mission Secretariat and a delegate to the Steering Committee.
- Leading Mission activities within the fuels pillar and contributing to the others as needed.
- Hosting and contributing to workshops, report writing, and monitoring Mission progress.
- Supporting research, development and demonstration (RD&D) activities that support Mission objectives and desired outcomes.
- Leveraging subject matter expertise across the federal government from other agencies and DOE national laboratories for technical and economic analysis.

Maritime Research, Development, and Demonstration

DOE invests in RD&D of breakthrough technologies that will improve the environmental sustainability of shipping transportation and associated supply chains. DOE, often in partnership with the U.S. Maritime Administration, invests millions of dollars in RD&D for numerous maritime decarbonization projects that focus on sustainable biofuels, hydrogen fuel, electrification of vessels and port cargo handling equipment and many other maritime fuels and technologies.

For example, DOE Hydrogen and Fuel Cell Technologies Office (HFTO) is supporting the engineering modeling, design, and validation of hydrogen storage vessels and refueling systems to help with the commercial adoption of clean hydrogen. Launched on June 7, 2021, Hydrogen Shot, the first Energy Earthshot, will play a valuable role in accomplishing the Mission by reducing the cost of clean hydrogen by 80% to $1 per kilogram in the next decade. DOE is also co-leading the Clean Hydrogen Mission, which is being closely coordinated with the Zero-emission Shipping Mission. The Bioenergy Technologies Office (BETO) strategically invests with private industry, academia, and DOE national laboratories in RD&D projects to accelerate the feasibility, long-term sustainability, and economics of using various feedstocks that can be converted into energy-dense biofuels (such as biocrude, bio-oil, and biofuel blends) for maritime applications. These ongoing activities will be leveraged to support the Mission.

Hydrogen Shot, launched June 7, 2021, seeks to reduce the cost of clean hydrogen by 80% to $1 per kilogram in the next decade and will play a valuable role in accomplishing the Mission.

In addition to DOE, there are many other agencies supporting maritime emissions reduction. For example, MARAD's Maritime Environmental and Technical Assistance (META) Program and the EPA's Ports Initiative provides funding and technical resources, provides funding and technical resources for emerging technologies, practices, and processes that lead to emissions reductions in the maritime industry. These agencies and others will work together with DOE in accomplishing Mission goals.

U.S. Maritime International Policy

In April 2021, the Special Presidential Envoy for Climate John Kerry announced that the United States is committing to work with countries in the International Maritime Organization to adopt a goal of achieving zero emissions from international shipping by 2050, and to adopt ambitious measures that will place the entire sector on a pathway to achieve this goal. The U.S. Maritime Administration, EPA, U.S. Coast Guard, DOE, and others are working together with our international partners to help achieve this ambitious goal. ■

U.S. DEPARTMENT OF ENERGY

For more information, visit:
mission-innovation.net/missions/shipping

DOE/EE-2498 · October 2021