

United States Department of Transportation
Annual Modal Research Plan FY 2026
Program Outlook FY 2027

Maritime Administration

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Executive Summary

MARAD has two technical assistance programs, the Maritime Environmental and Technical Assistance (META) program and the U.S. Center for Maritime Innovation (USCMI), that receive appropriations that do not fall under the AMRP. However, MARAD has participated in and supported the development of the AMRP to ensure that the Department is aware of MARAD activities that support the Department's RD&T goals and initiatives, and to encourage opportunities for collaboration.

The Maritime Environmental and Technical Assistance (META) program was established by Congress in 2010 and requires MARAD to "engage in or support the study, research, development, assessment, and deployment of emerging marine technologies and practices related to the marine transportation system" with a focus on vessel technologies that address environmental performance. 46 U.S.C. § 50307(2)(A). META is executed through collaboration among the private and public sectors to identify, evaluate, and demonstrate promising new technologies and practices that are likely to result in enhanced system performance. META's achievements inform and support the maritime industry as well as provide data for development of national and international maritime policy mechanisms.

The U.S. Center for Maritime Innovation (USCMI) was established by the James M. Inhofe National Defense Authorization Act (NDAA) for Fiscal Year 2023. Appropriations are also funded via 46 U.S.C. § 50307. The USCMI expands MARAD's capabilities for broader public/private partnerships to monitor and assess emerging technologies; identify significant gaps in marine technology research; conduct research testing and evaluation of marine equipment; provide guidance on best available technologies and best practices; and workforce development. 46 § U.S.C. 50307(e)(4). Primary areas of focus include Maritime Operations, Maritime Energy, Maritime Competitiveness, and Maritime Resilience, in alignment with Administration priorities to restore America's maritime dominance, and the Ships for America Act. The USCMI is operated by a private sector Secretariat and has organized numerous topical working groups comprised of industry, government, non-governmental organizations, and academia that identify research needs of the marine transportation system.

STRATEGIC GOAL

STRATEGIC OBJECTIVE

SAFETY

Reaffirm that safety is the Department's top priority.

- 1.1 Improve aviation safety
- 1.2 Reduce surface transportation-related fatalities and serious injuries
- 1.3 Improve transportation worker safety
- 1.4 Develop improved safety management systems across transportation modes

INFRASTRUCTURE

Invest in high-quality transportation infrastructure capacity to unlock American prosperity.

- 2.1 Accelerate project delivery
- 2.2 Construct projects to expand system capacity
- 2.3 Improve system condition and reliability
- 2.4 Position the U.S. transportation sector for economic competitiveness at home and abroad

INNOVATION

Lead the world by bringing the best of American ingenuity to transportation.

- 3.1 Reduce regulatory burden
- 3.2 Enable transportation technology development and adoption
- 3.3 Invest in transformative technologies

EFFICIENCY

Improve efficiency and accountability across the Department.

- 4.1 Modernize DOT operations

Both META and the USCMI broadly support the Departmental strategic goals of Safety, Infrastructure, and Efficiency and directly support the Innovation strategic goal to identify and enable maritime technology development and adoption. For example, META and USCMI programs support innovation and efficiency through research on maritime-specific emerging technologies and applications. Similarly, the USCMI may address mariner safety and infrastructure needs through application and best practices of innovative technologies.

For FY 2026, the President's budget zeroed out funding for META and the USCMI, which are funded under the same authority. Activities undertaken in FY26 will focus on spending remaining FY 2025 funds consistent with Administration priorities.

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Chapter 1 – FY 2026 RD&T Programs

Maritime Environmental and Technical Assistance (META) (\$000)

Program Description:

The Maritime Environmental and Technical Assistance (META) program was established by Congress and codified under 46 U.S.C.50307. The statutory language requires META to support the “...study, research, development, assessment, and deployment of emerging marine technologies and practices related to the maritime transportation system through eligible entities.” META is executed through collaboration among the private and public sectors to identify, evaluate, and demonstrate promising new technologies and practices that are likely to result in enhanced system performance. META’s stakeholders include various sector components such as vessel owners/operators, ports, and terminals. Results of META projects are made publicly available to inform the industry of “what works” for various maritime technologies and practices. META fully supports a safe, efficient, and competitive U.S. Maritime Transportation System and U.S. maritime innovation through technology development and applications.

Major Program Objectives:

The objective of the META program is to provide assistance to maritime stakeholders in an effort to address marine technological challenges and the safety and efficiency of the U.S. maritime transportation system with a focus on vessel technologies that address environmental performance. 46 U.S.C. 50307 (a)(2)(A). Each META project carefully considers both the benefit to industry as well as the relevance and benefit to the U.S. government for access to and collection and dissemination of data and results that will help inform U.S. industry investment and business decisions. These data keep U.S. owners and operators up to date on emerging technologies from across the globe so that they can be implemented in the U.S. fleet in a timely and cost-competitive manner.

The objectives for FY26 are consistent with the META statutory mission and will directly benefit the maritime industry by providing insight into future vessel and infrastructure options and the direct application of technology on U.S vessels, increasing efficiency and competitiveness of their operations in support of U.S. maritime dominance and resilience. Anticipated activities were crafted in response to industry requests for additional information on future availability of strategic infrastructure, fuels, ballast water management, and implementation of energy efficiency technologies – in particular, information on availability and return on investment of technologies and improving competitiveness.

Anticipated Program Activities:

The President’s budget request zeroed out the META program for FY 2026. In FY 2026, META will continue to expend FY 2025 funds to focus on the major maritime technological challenges, emphasizing innovative solutions and ways to accelerate U.S. competitiveness. META will

continue to engage industry throughout the study, design, and implementation of projects. Until congressionally appropriated funding for the U.S. Center for Maritime Innovation (USCMI) is established, MARAD will continue to allot a portion of META funds to the USCMI.

META projects will continue to:

- Advance proposals and technologies to increase fuel economy and alternative energy uptake in the U.S. fleet including new hull coatings, hybrid engine arrangements and design, and strategic fuels such as methane and hydrogen in partnership with the maritime industry, incubators, and other government partners. With an emphasis on maritime dominance, understanding opportunities for efficiency and strategic fuel implementation will enhance the future U.S. fleet and opportunities to expand U.S.-made fuels to supply the fleet. These goals also support Administration priorities for advancing U.S. energy dominance.
- Address opportunities to quantify the benefits of innovative technology integration into the design phase for application on new vessels. Advanced fluid dynamic modeling enables comparison among hull, engine, and propeller design and arrangement, providing valuable, but currently unavailable, information to the industry about the ROI for various technology and design optimizations at the planning phase. Individual technologies claim to provide efficiency and noise reduction benefits, but the additive cost-savings have not been quantified for applying technologies in series and demonstrating increased efficiencies across multiple areas.
- Expand on model development and data analytic capabilities to assess and predict vessel activity within the U.S. EEZ and identify technology and operational strategies to increase the cost competitiveness of the U.S. fleet both for domestic and international operations.
- Address related safety issues that may include advanced fuel handling, bunkering, operations; SafeMTS; and position, navigation, and timing.

Potential Program Outputs, Outcomes, and Impacts on Technologies and Practices:

META projects are designed to advance knowledge, inform decision-making, and support solutions to assist the U.S. Maritime industry with addressing technical and innovation challenges. META supports a variety of output including research studies, real-world demonstration and pilot projects, industry guides, and multimodal modeling tools. Program output varies and is dependent upon requirements to be addressed. For example, demonstration projects are designed to determine technical and cost efficacy under real-world situations and often the output is focused on lessons learned for industry decision-making or by other agencies to better understand the nuances of technology applications. Key to the demonstration projects is the ability to de-risk technology applications and remove uncertainty around technology performance.

Consistent with the Administration's priority for transparency, MARAD makes project data and results available to the public, industry stakeholders, and other government agencies to advance knowledge. MARAD makes most META project results publicly available through media outlets

such as the META website¹, trade publications, peer reviewed journal articles, and other public platforms.

Potential Economic or Societal Impacts:

The META program has a long track record of addressing societal and economic impacts. A major premise of the Program is to reduce impacts and improve the safety and efficiency of the U.S. maritime transportation system which keeps mariners safe on the job and provides benefits to the U.S. economy. Demonstrating successful implementation of U.S. designed and built technology also enhances the U.S. maritime industrial base and its position in the global market.

Collaboration Partners:

MARAD works with industry stakeholders, other government agencies, and academia to design and develop META projects based on pressing domestic and international maritime issues and challenges. Most META projects have been developed because of an expressed need from the maritime industry.

The META program is built on the premise of public-private partnerships and collaboration with Federal, state and local government, academia, maritime industry, and non-governmental organizations. Many META projects provide for substantial cost sharing with other governmental, academic, and private industry partners.

Further, collaborations with the Department of Energy, Environmental Protection Agency, U.S. Coast Guard, National Oceanic and Atmospheric Administration, and Department of War have increased the expertise being brought to bear on key maritime issues. Those collaborations as well as partnerships with several key academic institutions as well as private sector stakeholders and nongovernmental organizations have successfully focused resources on emerging issues.

The U.S. Center for Maritime Innovation (\$000)

Program Description:

The U.S. Center for Maritime Innovation (USCMI) was established by the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (NDAA). Appropriations are also funded via 46 U.S.C. 50307. The USCMI expands MARAD's capabilities for broader public/private partnerships to monitor and assess emerging technologies; identify significant gaps in marine technology research; conduct research testing and evaluation of marine equipment; provide guidance on best available technologies and best practices; and workforce development. 46 U.S.C. 50307(e)(4). The USCMI is operated by a private sector Secretariat and has organized numerous topical working groups comprised of industry, government, non-

¹ <https://www.maritime.dot.gov/innovation/meta/maritime-environmental-and-technical-assistance-meta-program>

governmental organizations, and academia that identify needs of the marine transportation system.

Major Program Objectives:

Primary areas of focus include Maritime Operations, Maritime Energy, Maritime Competitiveness, and Maritime Resilience, in alignment with Administration priorities to restore America's maritime dominance, and the Ships for America Act.

The objectives for FY 2026 are consistent with the USCMCI's statutory mission and will directly benefit the maritime industry by providing insight into future vessel and infrastructure options and the direct application of technology on U.S. vessels, increasing efficiency and competitiveness of their operations in support of U.S. maritime dominance and resilience. Anticipated activities will be crafted following a call for projects within the four areas of focus.

Anticipated Program Activities:

The President's budget request zeroed out the META program for FY 2026. In FY 2026, MARAD will continue to expend FY 2025 funds to focus on the major maritime technological challenges, emphasizing innovative solutions and ways to accelerate U.S. competitiveness. The USCMCI will continue to engage industry throughout the study, design, and implementation of projects. Until congressionally appropriated funding for the USCMCI is established, MARAD will continue to allot a portion of META funds to the USCMCI.

The scope of the USCMCI is broad, supporting a wide range of maritime innovation critical to a safe, efficient, and competitive marine transportation system. As directed by Congress, the authorization and direction for the USCMCI may evolve with future legislation and executive branch policy imperatives.

Based on the funding the USCMCI had been allocated through the META program in FY 2025, projects will likely investigate:

- Maritime Energy – advanced nuclear applications, operational optimization, integrated port energy, maritime fuels and technologies.
- Maritime Operations – transportation corridors and freight flow optimization, remote and autonomous functions, and digitalization of maritime operations.
- Maritime Competitiveness – ship construction and sustainment, education and workforce development, and U.S. maritime strategies.
- Maritime Resilience – risks and safety to marine transportation system.

Potential Program Outputs, Outcomes, and Impacts on Technologies and Practices:

The USCMCI is designed to advance knowledge, inform decision-making, and support solutions to assist the U.S. maritime industry with addressing technical and innovation challenges. In

addition, the USCMI will also serve as clearinghouse for emerging maritime technology data, information, and best practices.

Consistent with the Administration’s priority for transparency, MARAD makes project data and results available to the public, industry stakeholders, and other government agencies to advance knowledge. No projects have been conducted by the USCMI yet, but future work will be shared via the USCMI’s website.²

Potential Economic or Societal Impacts:

The USCMI aims to produce guidance on best available technologies, technical analysis, assistance with understanding complex regulatory requirements; and documentation of best practices in the maritime industry, including training and informational webinars on solutions for the maritime industry. Further research will support development of maritime strategies applicable to various segments of the United States maritime industry, including the inland, deep water, and coastal fleets.

Collaboration Partners:

The USCMI currently has 15 active technical working groups that are comprised of industry, academia, national laboratories, non-governmental organizations, and other government agencies. On average, there over 135 technical working group members and 85 regional working group members.

Chapter 2 – FY 2027 RD&T Programs

Maritime Environmental and Technical Assistance (META) Program

Program Description:

The Maritime Environmental and Technical Assistance (META) program was established by Congress and codified under 46 U.S.C. 50307. The statutory language requires META to support the “...study, research, development, assessment, and deployment of emerging marine technologies and practices related to the maritime transportation system through eligible entities.” META is executed through collaboration among the private and public sectors to identify, evaluate, and demonstrate promising new technologies and practices that are likely to result in enhanced system performance. META’s stakeholders include various sector components such as vessel owners/operators, ports, and terminals. Results of META projects are made publicly available to inform the industry of “what works” for various maritime technologies and practices. META fully supports a safe, efficient, and competitive U.S. Maritime Transportation System and U.S. maritime innovation through technology development and applications.

² <https://www.uscml.org/>

Major Program Objectives:

The objective of the META program is to provide assistance to maritime stakeholders in an effort to address marine technological challenges and the safety and efficiency of the U.S. maritime transportation system. Each META project carefully considers both the benefit to industry as well as the relevance and benefit to the U.S. government for access to and collection and dissemination of data and results that will help inform U.S. industry investment and business decisions. These data keep U.S. owners and operators up to date on emerging technologies from across the globe so that they can be implemented in the U.S. fleet in a timely and cost-competitive manner.

The objectives for FY27 are consistent with the META statutory mission and will directly benefit the maritime industry by providing insight into future vessel and infrastructure options and the direct application of technology on U.S. vessels, increasing efficiency and competitiveness of their operations in support of U.S. maritime dominance and resilience. Anticipated activities were crafted in response to industry requests for additional information on future availability of strategic infrastructure, fuels, ballast water management, and implementation of energy efficiency technologies – in particular, information on availability and return on investment of technologies and improving competitiveness.

Anticipated Program Activities:

In FY 2027, META will continue to focus on the major maritime technological challenges, emphasizing innovative solutions and ways to accelerate U.S. competitiveness. META will continue to engage industry throughout the study, design, and implementation of projects. Until congressionally appropriated funding for the U.S. Center for Maritime Innovation (USCMI) is established, MARAD will continue to allot a portion of META funds to the USCMI.

META projects will continue to:

- Advance proposals and technologies to increase fuel economy and alternative energy uptake in the U.S. fleet including new hull coatings, hybrid engine arrangements and design, and strategic fuels such as methane and hydrogen in partnership with the maritime industry, incubators, and other government partners. With an emphasis on maritime dominance, understanding opportunities for efficiency and strategic fuel implementation will enhance the future U.S. fleet and opportunities to expand U.S.-made fuels to supply the fleet. These goals also support Administration priorities for advancing U.S. energy dominance.
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Program Description:

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Major Program Objectives:

Primary areas of focus include Maritime Operations, Maritime Energy, Maritime Competitiveness, and Maritime Resilience, in alignment with Administration priorities to restore America's maritime dominance, and the Ships for America Act. The objectives are consistent with the USCMI's statutory mission and will directly benefit the maritime industry by providing insight into future vessel and infrastructure options and the direct application of technology on U.S. vessels, increasing efficiency and competitiveness of their operations in support of U.S. maritime dominance and resilience. Anticipated activities will be crafted following a call for projects within the four areas of focus.

Anticipated Program Activities:

In FY 2027, The USCMI will continue to monitor and assess emerging technologies; identify significant gaps in marine technology research; conduct research testing and evaluation of marine equipment; provide guidance on best available technologies and best practices; and workforce development. USCMI projects will continue to investigate:

- Maritime Energy – advanced nuclear applications, operational optimization, integrated port energy, maritime fuels and technologies.
- Maritime Operations – transportation corridors and freight flow optimization, remote and autonomous functions, and digitalization of maritime operations.

- Maritime Operations – ship construction and sustainment, education and workforce development, and U.S. maritime strategies.
- Maritime Resilience – risks and safety to marine transportation system.

“Additional information about DOT Research can be found at <https://researchhub.bts.gov/search>”]