United States Department of Transportation
Annual Modal Research Plans FY 2023
Program Outlook FY 2024

Cover Page

MARITIME ADMINISTRATION
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Executive Summary

The Maritime Administration (MARAD) does not have an RD&T program or budget. However, since 2010 MARAD has an established program, the Maritime Environmental and Technical Assistance (META) program that supports projects in the nature of RD&T through the provision of technical assistance to maritime transportation stakeholders. MARAD nevertheless has participated in and supported the development of the AMRP in an effort to ensure that the Department is aware of MARAD activities that support the Department's RD&T goals and initiates, and to encourage opportunities for collaboration and collaborative projects. (The Maritime Environmental and Technical Assistance (META) program operates by authority of 46 USC 5037.)

META Program Overview -- the Program was established by Congress to engage in the environmental study, research, development, assessment, and deployment of emerging marine technologies and practices related to the marine transportation system through the use of public vessels under the control of the Maritime Administration or private vessels under United States registry, and through partnerships and cooperative efforts with academic, public, private, and nongovernmental entities and facilities. 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 not only industry but provide data for development of national and international maritime environmental policy mechanisms and assess potential economically achievable regulatory and permitting reforms. META also supports US maritime innovation.

The Program generally supports all, or nearly all, of the Department strategic goals but does not divide neatly into any one goal. Since its inception, META's primary focus areas can be divided into three broad categories: 1) vessel and port emissions reductions; 2) the use of alternative fuels, technologies, and energy efficiency applications for maritime platforms; and 3) the control of non-indigenous aquatic species transported by vessels. These areas present significant continuing challenges for ship owners and operators, the regulatory community, and the public. Through the National Defense Authorization Act (NDAA), META program language was expanded to include efficiency and safety of domestic maritime industries as well as ship-generated underwater noise.

META has broad authority to coordinate and carry out projects. MARAD works with industry stakeholders, other government agencies, and academia to design and develop projects based on pressing domestic and international environmental issues and challenges. To disseminate information and data relevant for stakeholders, most META project results are made publicly available through media outlets such as the META website, trade publications, peer reviewed journal articles, and other public platforms.

For the past several years, collaborations with the Department of Energy, Environmental Protection Agency, US Coast Guard and Department of Defense have increased the expertise being brought to bare on key maritime environmental issues. Those collaborations as well as partnerships with several key academic institutions and private sector stakeholders have

successfully focused resources on emerging issues.

Table 1 - FY 2023 RD&T Program Funding Details

RD&T Program Name	FY 2023 President's Budget Request* ($000)	Applied ($000)	Technology Transfer ($000)	Facilities ($000)	Experimental Development ($000)	Major Equipment, R&D Equipment ($000)
META	10M	*	*	*	*	*
Totals	10M					

** Given the nature of the META program, many of the projects and activities fall into multiple categories that cannot be ascertained in advance.*

The AMRP reflects funding as found in the FY 2023 President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The FY 2023 enacted numbers will be posted as part of the FY2024 President's budget request.

Table 2 - FY 2023 RD&T Program Budget Request by DOT Strategic Goal

RD&T Program Name	FY 2023 President's Budget Request* ($000)	Safety ($000)	Economic Strength and Economic Competitiveness ($000)	Equity ($000)	Climate and Sustainability ($000)	Transformation ($000)	Organizational Excellence ($000)
META	10M	*	*	*	*	*	*
Totals	**10M**						

** Given the nature of the META program, many of the projects and activities cross- cut the Departmental goals. For example, reducing maritime port and vessel air emissions seeks to address climate change, equity (and environmental justice), economic strength and competitiveness (supporting US innovation and manufacturing in new markets) and safety (ensuring that low carbon fuels can be stored and used safely aboard ships).*

The AMRP reflects funding as found in the FY 2023 President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The FY 2023 enacted numbers will be posted as part of the FY2024 President's budget request.

Chapter 1 – FY 2023 RD&T Programs

Maritime Environmental and Technical Assistance Program ($10,000)

Program Description:

Major Program Objectives:
The objective of the META program is to provide assistance to maritime stakeholders in an effort to address environmental challenges and that address the safety and efficiency of the U.S. maritime transportation system. Most of projects funded under the program result in knowledge sharing, needed data to support efficacy for maritime applications, and support for industry stakeholders to transition to more environmentally friendly solutions.

Anticipated Program Activities:
In FY 2023, META will seek to establish one or more consortia to conduct research and demonstration projects focused on a single issue (e.g., getting to zero emissions for vessels or strategies for port electrification) or regional environmental issues. The consortia will be comprised of industry, government agencies, and academia and will be designed to look at issues such as decarbonization, aquatic invasive species, ship-generated underwater noise, and other maritime environmental challenges.

- **Maritime Decarbonization, Alternative Energy Technology, and Energy Efficiency.** This includes demonstration projects and testing to analyze maritime use of domestically produced alternative fuels and energy conservation technologies/methods with a goal of advancing zero-emission operations and decarbonization in the maritime sector.

  Funding in FY 2023 will enable MARAD to pursue innovation and the evaluation of cost effective and environmentally sound alternative and renewable energy, and to advance energy efficiency improvements for the maritime industry. MARAD will seek to emphasize work with high-powered batteries and other alternative technologies, further explore the use of alternative fuels for maritime applications and explore further sustainable microgrid applications at ports. Use of these alternatives in the maritime sector expands the market demand for these types of fuels and technologies and may provide economical alternatives to industry for achieving compliance with environmental standards. META projects that support the advancement and development of alternative energies for maritime applications also help to support American job growth in clean energy, such as manufacturing jobs and technology development. MARAD will also look at additional opportunities to adapt and scale technologies from other transportation modes and landside industries.

  This effort will be coordinated with the DOE and potential other federal agencies.

- **Aquatic Invasive Species Mitigation:** META funding will also support advancement of ballast water treatment technology and discharge compliance monitoring tools, as well as

methods for managing/mitigating hull fouling. AIS can cause significant infrastructure damage and can degrade the value of waterbodies and ecosystems for various beneficial uses. In FY 2023, META will continue to build upon and implement a key MARAD initiative by measuring the effectiveness of multiple commercial Ballast Water Management Systems (BWMS). Such systems are critical to preventing the spread of non-native aquatic species in rivers, lakes, and coastal waters. Funding will be used to maintain the two MARAD-supported BWMS facilities necessary for U.S. Coast Guard certification and International Maritime Organization compliance testing and associated scientific teams involved with the testing. Funding will also support ongoing innovation and demonstration of technologies and methods to monitor installed ballast water treatment systems' operational effectiveness, and to examine technology that could be used to remove and capture bio-fouling on underwater hulls as well as pollutants associated with anti-fouling coatings.

- **Ship-Generated Underwater Noise:** META program language was expanded to include investigation into ship-generated underwater noise. For FY 2023, META will work with NOAA, other government agencies, industry, and academia to support efforts focused on differentiating ship generated noise effects between shallow and deepwater environments, gathering vessel-specific noise data, and determining the efficacy of ship-based noise mitigation technologies for commercial vessels.

Potential Program Outputs, Outcomes and Impacts:

META projects are designed to advance knowledge, inform decision-making, and support solutions to assist the U.S. Maritime industry with addressing environmental 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 the need to be addressed. For example, demonstration projects are designed to determine "what works" in real-world situations and often the output is focused on lessons learned to be used by industry for decision making or by other agencies to assist with policy mechanisms.

An important aspect of the META program is to make project data and results available to the public, industry stakeholders, and other government agencies to advance knowledge. Most META output are made publicly available through media outlets such as the META website, trade publications, peer reviewed journal articles, and other public platforms.

Statutory Requirements:

The Maritime Environmental and Technical Assistance (META) program operates by authority of 46 USC 5037. META funding is a line item in MARAD's Operations and Training budget; this funding is not provided under a designated Research and Development (R&D) account.

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 the reduction of environmental impacts to improve the safety and efficiency of the U.S. maritime transportation system. These environmental impacts are

centered on mitigating clean air and water issues in and near port communities. Solutions for these impacts tangentially improve environmental justice issues and mitigate human health impacts.

Potential Progress Made Toward Achieving Strategic Goals:
The Program generally supports all, or nearly all, of the Department strategic goals but does not divide neatly into any one goal. Specifically, strategic goals supported by the program include: climate and sustainability, economic strength and global competitiveness, equity, and safety.

Collaboration Partners:
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.

In addition, MARAD supports broader DOT research coordination and collaboration efforts such as the Center for Climate Change, Environmental Stewardship working group, and others.

Chapter 2 – FY 2024 RD&T Programs

The AMRP FY 2024 outlook year chapter in the annual plan is not developed in alignment with the President's budget request of the same year due to the AMRP development schedule per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning.

Program Name

Maritime Environmental and Technical Assistance Program ($10,000)

Program Description:
The META program is designed to provide financial and technical assistance to maritime stakeholders for purposes that include identifying, studying, evaluating, testing, demonstrating or improving emerging marine technologies and practices that are likely to achieve maritime environmental, safety, and transportation system efficiency improvements. As such, most of the program's efforts support directly or tangentially recent DOT priorities such as climate and resilience, safety, economic strength, and future

Major Program Objectives:
The objective of the META program is to provide assistance to maritime stakeholders in an effort to address environmental challenges and that address the safety and efficiency of the U.S. maritime transportation system. Most of projects funded under the program result in knowledge sharing, needed data to support efficacy for maritime applications, and support for industry stakeholders to transition to more environmental friendly solutions.

Anticipated Program Activities:

Through regional consortia and other partnerships, META will continue to support RD&T projects focused on the major maritime environmental challenges such as decarbonization, aquatic nuisance species, and ship-generated underwater noise.

Maritime Decarbonization, Alternative Energy Technology, and Energy Efficiency

Funding in FY 2024 will enable MARAD to pursue innovation and evaluation of cost effective and environmentally sound alternative and renewable energy and to advance decarbonization and support energy efficiency improvements for the maritime industry. Specifically, META will focus on:

- Investigating and demonstrating the use of technologies to get to zero emissions for vessels and port applications;
- Supporting efforts to identify, test, and implement the use of low carbon fuels; and
- Investigating and demonstrating alternative energy applications at ports and terminals.

Aquatic Invasive Species Mitigation

FY 2024 activity will build upon research that supports reduction of aquatic invasive species in maritime operations. Specifically, META will focus efforts on:

- Monitoring in discharged ballast water and efficacy testing of ballast water management systems
- Supporting efficacy evaluations of technologies that clean and capture hull bio-fouling; and
- Developing domestic and international standards for control of aquatic nuisance species.

Ship-Generated Underwater Noise

META program language was expanded to include investigation into ship-generated underwater noise. For FY 2024, META will work with NOAA and other government agencies as well as the industry and academia to support associated efforts that include:

- Gathering ship-generated noise data on a variety of ship types and platforms;
- Gathering ship-generated noise data in deep and shallow water environments; and
- Assessing the relationship between alternative or non-conventional fuels/technologies and vessel-generated noise
- Testing noise reduction technologies applicable to commercial vessels

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For More Information on DOT's Research see https://researchhub.bts.gov/search