

**Achieving Net Zero Emissions (NZE) NOAA Fleet by 2050**  
**Outline for Phase 1 Study**  
**January 2023**

**1. Executive Summary**

**2. Introduction & Background**

- a. Purpose (why)
- b. Background
- c. Summary of Programs by Others

**3. Scope of Study**

- a. Goals & Objectives
  - i. SMART – Specific, Measurable, Actionable, Relevant, Time-Bound
- b. Measures of Value
- c. Prioritization
  - i. e.g., safety, ops schedule, mission results, capital costs, operating costs, ROIC, meeting standards, risk tolerance & management
  - ii. Ranking: process (e.g., Kepner-Tregoe) and criteria
  - iii. Results of Prioritization
- d. Boundaries
  - i. Carbon only or GHG emissions?
  - ii. Size of vessels
  - iii. Marine fuel (well to bunker?)
    - 1. Exploration, transportation, processing, consumption
  - iv. Shipbuilding (build to reuse?)
    - 1. Design, procurement of materials, assembly, maintenance, refit, recycle
    - 2. Sanctity of existing build schedule, scope, and requirements
      - a. Schedule
      - b. Design (e.g., requirements, hull & hydrodynamics)
      - c. Materials
      - d. Power systems – multifuels, other (e.g., batteries, fuel cells)
      - e. Control systems
  - v. Marine operations
    - 1. Fueling/provisioning, loading, voyaging, unloading, refueling
    - 2. Mission requirements
  - vi. Technology to be considered (e.g., TRL and allowable risks)

#### **4. Related Impacts and Considerations**

- a. Personnel
  - i. Training/retraining and recruiting
  - ii. Union implications
- b. Regulatory, Legal, Administrative Requirements (State, Federal, International)
  - i. Constraints/Limits
  - ii. Mandates and desired compliance with standards
- c. Port Infrastructures
- d. Impact of Alternative CONOPS Strategies
  - i. UXVs
  - ii. Impact of other technology developments (e.g., use of eDNA and/or passive acoustics as alternative to dragging nets)

#### **5. NOAA Fleet Baseline Data**

- a. Vessel Data
  - i. Current inventory
  - ii. Existing vessels – age, expected life, planned overhauls
  - iii. Expected launch dates of new vessels
- b. Historical Emissions Data
  - i. Days at Sea
  - ii. Miles
  - iii. Fuel burned
  - iv. Emissions

#### **6. Strategic Plan for NZE NOAA Fleet**

- a. Phases & Gates
  - i. Timing
  - ii. Objectives
  - iii. Actions
  - iv. Gate Decision Makers
- b. KPIs
- c. Phase 1
  - i. Team design & organization
  - ii. POA&M
  - iii. Task Descriptions & Level of Effort
  - iv. RACI Matrix – Responsible, Accountable, Consulted, Informed

#### **7. Potential Partners**

- a. Related Efforts by Others
  - i. Studies/reports
  - ii. R&D
  - iii. Operational Tests & Results
- b. Potential Partners & Beneficiaries
  - i. Federal agencies
  - ii. Industry organizations
  - iii. Fleets
  - iv. Companies

- **Example Sources of Information**

- Studies/reports/articles

- [Maritime Forecast to 2050 – Energy Transition Outlook 2022](#), DNV
- [Green Boats & Ports for Blue Waters IV, 2018 Workshop](#), UNOLS
- [Fourth IMO GHG Study 2020](#), IMO
- [Feasibility of the Zero-V: A Zero Emission Hydrogen Fuel Cell](#), Coastal Research Vessel, Sandia Report SAND2018-4664, 2018
- [A Zero Emission Blueprint for Shipping](#), International Chamber of Shipping, November 2021
- [Industry Roadmap for Zero Emission Shipping](#), Zero Emission Shipping Mission, April 2022
- [Clean technology and the decarbonisation challenge– a Houlder navigator whitepaper](#) – Dec 2022
- [Maritime Decarbonization Strategy 2022](#) – December 8, 2022 Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping
- [Practical Playbook for Maritime Decarbonisation](#) and [Four Steps Towards Maritime Decarbonizing Actions: Playbook Part 5](#)
- [The Maritime Decarbonization Conundrum](#) – December 2022 US Navy, USCG)
- [Navy 30-Year Shipbuilding Plan Shows 355 Ships in 2030s, Growing Numbers of Unmanned Vessels](#) – December 2020
- [Report on Navy Large Unmanned Surface and Undersea Vehicles](#) – August 2022
- [UK Domestic Shipping: Mobilising Investment in Net Zero](#) – November 2022

- Organizations

- IMO – International Maritime Organization
  - EEDI (Energy Efficiency Design Index)
  - SEEMP (Ship Energy efficiency Plan) – how to improve efficiency
- BIMCO – Baltic and International Maritime Council
- ABS – American Bureau of Shipping
- DNV – Det Norske Veritas
- MARAD – Maritime Administration
- SNAME – Society Naval Architects and Marine Engineers

- OMSA – Offshore Marine Service Association
  - NOIA – National Ocean Industries Association
  - [GCMD – Global Centre for Maritime Decarbonization/Singapore](#)
  - [Sea Zero project](#) (Norway) – includes Hurtigruten, SINTEF, Norwegian Maritime Authority
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- Fleets
    - UNOLS – University National Oceanographic Laboratory System
    - Foreign fleets
    - USN & USCG & MSC
    - Cruise ships
    - Fugro
    - Maersk