

**SAB Response to Inquiry from NOAA to Conduct a Study on
Achieving a Net Zero Emissions (NZE) NOAA Fleet by 2050
November 2022**

At the last SAB meeting on 30 – 31 August, the SAB discussed an inquiry from NOAA about conducting a study on Achieving a Net Zero Emissions (NZE) NOAA Fleet by 2050. The following SAB response has four sections:

1. Summary/Bottom Line Up Front
2. Introduction/Background
3. Study Leadership
4. Initial SAB Recommendations to NOAA

• **Summary/Bottom Line Up Front (BLUF)**

The SAB believes the issue of achieving an NZE NOAA Fleet by 2050 is a very worthwhile topic to pursue. However, the SAB believes it should be led by NOAA, and not originate with the SAB. A few comments on an NZE Fleet Study:

- The study should not be a science/research study. Given maturity of ideas, technology, and experience for reducing emissions, it should instead focus on applications, engineering, and a Strategic Plan for NZE NOAA Fleet 2050.
- SAB believes critical aspects of the study include:
 - Success of implementation requires NOAA/OMAO ownership
 - Urgency of action – actions taken before 2030 are critical to achieve NZE Fleet by 2050
 - Role of CONOPS and use of associated technology (e.g., AUVs) has a large potential impact and requires input from overall NOAA strategy and their timeline for implementing associated technology
- SAB recommends dividing a program into phases to achieve the 2050 NZE goal
- SAB is willing to help NOAA, including:
 - Developing by 12/31/22 a recommended outline for an initial study by NOAA
 - Assemble a team to review progress and make recommendations
 - Assist with NOAA study as it progresses to enable quick feedback/course changes

• **Introduction/Background**

NOAA asked the SAB to consider conducting a study of creating an NZE NOAA Fleet by 2050. Proposed study scope, as outlined in the last SAB meeting, was as follows:

- Quick study – obtain study results by spring 2023
- Comprehensive study – consider not just emissions during sailing. As a related note to this aspect of scope, “comprehensive” needs further definition as to what is in and what is out of scope (discussed further below).
- Catalyst for how to do things differently in the fleet (i.e., not buy offsets)
- Ignore small boats – focus on current fleet plus what is in fleet plan
- Focus on viability, types of technology, changes in CONOPS

In general, the SAB agrees with these bullets for inclusion in study scope.

- **Study Leadership**

First and foremost, NOAA/OMAO must own study results and the resulting implementation plan. Ownership is critical for successful execution of study recommendations. If SAB performs the study, develops strategy, and makes recommendations, NOAA/OMAO has no ownership in the resulting plan.

Second, the study topic is not in SAB expertise wheelhouse. The study should not be a science/research study. Given maturity of ideas, technology, and experience for reducing emissions, it should instead focus on applications, engineering, and a Strategic Plan for NZE NOAA Fleet 2050.

Finally, the issue is complex, requiring significant expertise and substantial effort. As evidenced by multiple studies by a variety of organizations, experience required to develop an effective and executable plan is primarily marine, applied engineering, and operations. Issues and alternatives are complex, so significant study effort is required to address issues in depth required. Many good sources of information are available. We have listed a few examples at the end of this document. Please note the list provides a few examples and is not intended to be comprehensive.

- **Initial SAB Recommendations to NOAA**

As stated above, the SAB believes such a study for the NOAA fleet is very valuable and timely. There should be urgency to start and to complete the study. Actions between the present and 2030 will be key to enable reaching the 2050 goal. As a result, the NOAA's goal of obtaining study results by spring 2023 for input to the 2025 NOAA budget is critical. The study should be based on a practical, engineering approach, not a scientific research study. Many entities are currently doing this for their fleets, so there are many sources of information and lessons learned.

NOAA and OMAO leadership are critical. It is the only way to ensure ownership. In addition, it enables concurrent implementation while the study proceeds. If NOAA is unable to conduct the study, an alternative would be to contract knowledgeable consultants to perform the work under NOAA leadership.

In developing a NOAA Strategic Plan, NOAA should investigate plans developed by other organizations. Multiple plans exist, and it may be possible to quickly review/select/adapt one for the NOAA fleet rather than starting with a blank sheet of paper.

It is important to define scope of the study. Up front decisions about what is in-scope and what is out-of-scope are critical. For example, what is to be included in "emissions" – will scope be carbon only or will it also include other pollutants? What will be the breadth of consideration – for example, well-to-scrap or ship operations and maintenance only?

An initial task should be NOAA gathering baseline data, such as:

- Vessel data
 - Current inventory + expected launch dates of new vessels
 - Age, expected service life, dates of planned overhauls (upgrade opportunities)
 - Current propulsion systems and fuels
- Historical emissions data per vessel per year (note COVID impact), e.g.:
 - Days at sea
 - Miles logged
 - Fuel burned
 - Emissions (as defined in study scope)

The study should develop a Strategic Plan for NZE NOAA Fleet 2050. It should identify phases to get to 2050 goal and actions in each phase, for example:

- Phase 1 – 2023 to 2030
- Phase 2 – 2030 to 2040
- Phase 3 – 2040 to 2050

Defining phases and progress in each phase is essential to reach the stated goal of an NZE NOAA Fleet by 2050. For each phase, identify KPIs to measure progress. In addition, Phase 1 should have a Plan of Action & Milestones (POA&M) to ensure a quick but effective start.

A variety of opportunities based on existing technology are available to provide near-term reductions in fleet emissions. For example, it is reported WHOI achieved a 50% reduction in carbon emissions for *R/V Atlantis* during a midlife upgrade by pulling original power equipment and repowering the ship using current Tier 3 technology. Of particular interest is that *R/V Atlantis* is a sister ship of *R/V Ronald H. Brown*.

CONOPS is extremely important. Identifying enabling technologies for later phases is critical to the end result. For example, can NOAA make extensive use of AUVS in the decades after 2030? Certainly, the technology will be sufficiently mature to augment or replace current vessel tasks. Use of eDNA is another example of technology which may significantly reduce required ship time.

Finally, the SAB is willing and able to assist NOAA. Our first action would be to develop a recommended outline for a proposed initial study. We would complete the outline by 31 December 2022. Expected study scope would be such that NOAA could complete the initial study in 6 months or less, providing input to the 2025 budget.

During this time, the SAB would assemble a review team consisting of selected SAB members and outside experts to review the resulting report and make recommendations for subsequent work. The NRC Marine Board also provides a potential source of expertise which could be engaged.

The review team could stay engaged and participate in milestone reviews with NOAA. This team could assist with the NOAA study as it progresses to enable quick feedback and timely course changes. Such an SAB review team could participate whether NOAA does the study internally or elects to contract consultants.

- **Example Sources of Information**

- Studies/reports

- *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

- 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

- Fleets

- UNOLS – University National Oceanographic Laboratory System
- Foreign fleets
- USN & USCG & MSC
- Cruise ships
- Fugro
- Maersk