Statement of

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on

Practical Steps Toward a Carbon-Free Maritime Industry: Updates on Fuels, Ports, and Technology

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Introduction

Thank you, Chairman Carbajal, Ranking Member Gibbs, and subcommittee members for the opportunity to speak to you today. It is my honor to share my perspective on how our nation can be a leader in the challenge to decarbonize marine transportation.

Creating a carbon-free maritime industry is an unprecedented challenge that creates a unique opportunity for US technology developers. If this is our goal, time is of the essence. We will soon lose to foreign competition that is better funded and better prepared to lead the maritime industry toward decarbonization.

As a US-based naval architecture firm, Glosten has been working to decarbonize the marine industry because we believe this is one of the most important and impactful marine industry transformations of our time.

The US domestic fleet as one of the world's largest, which in 2020 was comprised of 3,652[1] self-propelled vessels of more than 100 gross tons. This is a highly varied fleet that includes

[1] Data search on UNCTAD STAT (12 April 2021) (https://unctadstat.unctad.org). Exported into a US report.

passenger ferries operating in population centers such as New York City and San Francisco Bay, offshore supply vessels in the US Gulf, tug and barge operations plying our inland waterway system, near-coastal tankers, containerships, and dredges keeping our shipping channels open.

The US is a major maritime trading center with an opportunity to define and supply the necessary infrastructure to support a decarbonized fleet.

We believe the US has the necessary academic, industrial, engineering, and marine operator resources necessary to meet the challenge facing our domestic fleet. We are at a point where we can either be late and adopt foreign technologies, or we can move quickly and lead the world.

Meeting the global maritime carbon reduction goals requires an aggressive shift from burning fossil fuels to low or zero-carbon fuels and the electrification of certain short-run vessels. Today, these non-fossil fuels do not exist at commercial scale, port infrastructure cannot handle future demands, and regulations applying to these future technologies do not exist.

STEPS TOWARD DECARBONIZATION

To reduce total greenhouse gas emissions from shipping by 50% by the year 2050, we will need to employ public-private partnerships. The immediate step is to develop a national strategic initiative with a clear vision, timeline, achievable metrics, and proper accountability.

The Maritime Administration (MARAD) and the Department of Energy (DOE) are the government agencies ready to lead these efforts by developing this strategic initiative plan and executing projects aimed at reaching our goals of decarbonization. These agencies need

to lead this initiative by increasing targeted funding for research and development, infrastructure improvements, and design and demonstration projects.

The strategic initiative plan should include the following three actions to accelerate US progress toward decarbonization:

1. The DOE should increase funding for port and terminal infrastructure projects targeting electric vessel charging and bunkering of zero carbon alternative fuel sources. Vessel electrification already comes at a premium; therefore, adding costs for shoreside infrastructure will be very difficult for private operators to fully bear without government assistance. The benefits of electric harbor vessels cannot be realized without this infrastructure, much like the electric car industry cannot thrive without roadside charging stations. Likewise, bunkering alternative fuels can require specialized fueling infrastructure that will be difficult to scale without government support.
2. MARAD should accelerate the path to commercialization for marine vessel decarbonization. Academia, government, and commercial entities must work together in close coordination to achieve successful pilot projects. Not only will this approach demonstrate the effectiveness of new innovations, but it will showcase the United States as a global leader in decarbonization and support the export, rather than import, of future maritime technology. These groups include:
    a. **Universities and National Labs** for fundamental research into alternative fuels. Advanced battery technology is already available for all-electric propulsion on coastal vessels, but this technology is restricted to vessels operating on short routes or in other coastal water operations. To

decarbonize vessels on longer duration routes, power systems will need to be fueled by hydrogen, ammonia, or other zero carbon and renewable fuels.

b. **Industry partners** that can convert research into practical technologies that are ready for demonstration and commercialization. This conversion will require marine equipment suppliers, naval architects, and marine vessel operators.

c. **Maritime academies** to leverage the new fleet of training vessels now under construction as platforms for testing and proving emerging technologies, such as hybrid and zero carbon fuel propulsion, and solar and wind capture, while also preparing cadets for the future.

3. Support and encourage the streamlining of the regulatory review and approval process for maritime decarbonization projects from design through construction. A streamlined regulatory process will help reduce costs to government and industry funded innovation projects without compromising safety or the environment.

WHAT GLOSTEN IS DOING

The following project examples require support to advance US competitiveness in marine vessel decarbonization:

FOIL FERRY

Figure 1 Foil Ferry Rendering

Glosten has partnered with Bieker Boats to form Foil Ferry, LLC. This new company's vision is to design and bring to market a modern, composite hydrofoil passenger ferry. This ferry requires less than half of the installed power of a typical, high-speed passenger catamaran and could utilize all-electric propulsion on applicable routes.

As part of the public-private Washington Maritime Blue Partnership, we were recently awarded a $372,910 USD Federal Transportation Administration grant to further this design. Once the design is complete, we will look for future grant funding to build a prototype vessel to showcase the technology with the aim of building vessels for future ferry system routes.

By comparison, a UK-based developer of a competing design was awarded a $45M USD government grant to complete and build their design[2].

ZERO-V

As part of a MARAD funded project, Glosten worked with partners Sandia National Laboratories and Scripps Institution of Oceanography to design a

Figure 2 *Zero-V* Research Vessel

[2] https://www.artemistechnologies.co.uk/en/technologies/news/23_Artemis-Technologies-to-build-zero-emissions-ferries-following-60M-funding

hydrogen fueled coastal research vessel that addressed the technical, regulatory, and economic feasibility challenges. This project assessed the benefits and determined the prospects for refueling such a vessel at expected points of call. The team determined it was feasible to design, build and operate a coastal research vessel powered solely by hydrogen fuel cells[3][4].

This is an example of a shovel-ready project requiring federal funding to help demonstrate the effectiveness of alternative fuel technology, not only for research vessels, but other longer-range coastal vessels.

As one of several comparison examples, the European Union's Horizon 2020 program granted the Norwegian hydrogen cargo vessel *Topeka* $25M USD with an expected launch in 2024[5].

SKAGIT COUNTY'S GUEMES ISLAND REPLACEMENT FERRY

Washington State's Skagit County Public Works hired Glosten to develop a ferry design to replace their current 41-year-old diesel-powered vessel. An initial propulsion system selection showed favorable operational costs savings and a reduced life cycle cost with a battery electric propulsion system. With the Commissioners' decision to proceed with an electric ferry, Glosten developed the vessel design.

Figure 3 Skagit County All-Electric Ferry

[3] https://energy.sandia.gov/wp-content/uploads/SAND2018-4664_Zero-V_Feasibility_Report_8.5x11_Spreads_FINALDRAFT_compress.pdf
[4] https://www.sciencedirect.com/science/article/abs/pii/S036031992032156X
[5] https://www.greencarcongress.com/2020/12/20201219-topeka.html

The County Road Administration Board awarded Skagit County $7.5 million for the electric ferry project. An additional $1.5 million from Washington State Capital Fund has been awarded for shore charging infrastructure. The entire project is estimated to cost approximately $19.5 million. The County continues to seek funding through state and federal avenues to close the financial gap. Successful completion of this project with construction of this ferry will demonstrate the advances in technology for other ferry systems where routes could be served by battery-powered vessels.

CONCLUSION

In summary, the global maritime industry has not faced a more daunting challenge since vessels moved from sail power to steam. Action must be taken now to tackle the amount of scientific and engineering work required to move the industry to carbon-free in the next 25-30 years. We have the key resources ready to meet this challenge, but if we delay, we will watch as foreign countries develop future technologies in equipment, fuels, and infrastructure.

We have a great opportunity to showcase American leadership and ingenuity, but similar to so many of our nation's historic challenges, no single entity can get us to our goals. We need government to partner with academia and private industry to develop, deploy, and demonstrate decarbonization technologies to achieve emission targets and position the United States as the global maritime leader.