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Additional submitted attachment is included below.

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California Energy Commission
Docket #: 21-ALT-01
Project Title: 2021-2023 Investment Plan Update for the Clean Transportation Program

Name of organization: UC San Diego / Scripps Institution of Oceanography

COMMENT: UC SAN DIEGO SCRIPPS INSTITUTION OF OCEANOGRAPHY - ENABLING ZERO-EMISSION SHIPS USING GREEN HYDROGEN

The California Energy Commission (CEC) 2021-2023 Investment Plan Update for the Clean Transportation Program advances California's climate and environmental goals by prioritizing historic investments in zero-emission vehicles and hydrogen fueling infrastructure. The proposed investments to expand the availability of hydrogen for medium- and heavy-duty vehicles are critical to supporting industrial decarbonization efforts.

Previous Clean Transportation Program investments in hydrogen fuel cell demonstrations for marine applications have helped validate this technology in smaller vessel classes. Please consider within the CEC 2021-2023 Investment Plan Update for the Clean Transportation Program hydrogen fuel cell demonstration projects for Marine Harbor Craft, particularly for oceanographic research vessels engaged in coastal research, where feasible.

Oceangoing vessels operating nearshore and in port areas constitute a visible pollution source in close proximity to dense population areas where emissions have a disproportionate and adverse effect on human health. Bold and transformational action is urgently needed to improve the health of the Portside Community by reducing and eliminating emissions from port-related activities. The Port of San Diego's *Maritime Clean Air Strategy: Health Equity for All* sets ambitious clean air standards in support of healthy communities, a sustainable environment, and a thriving seaport.

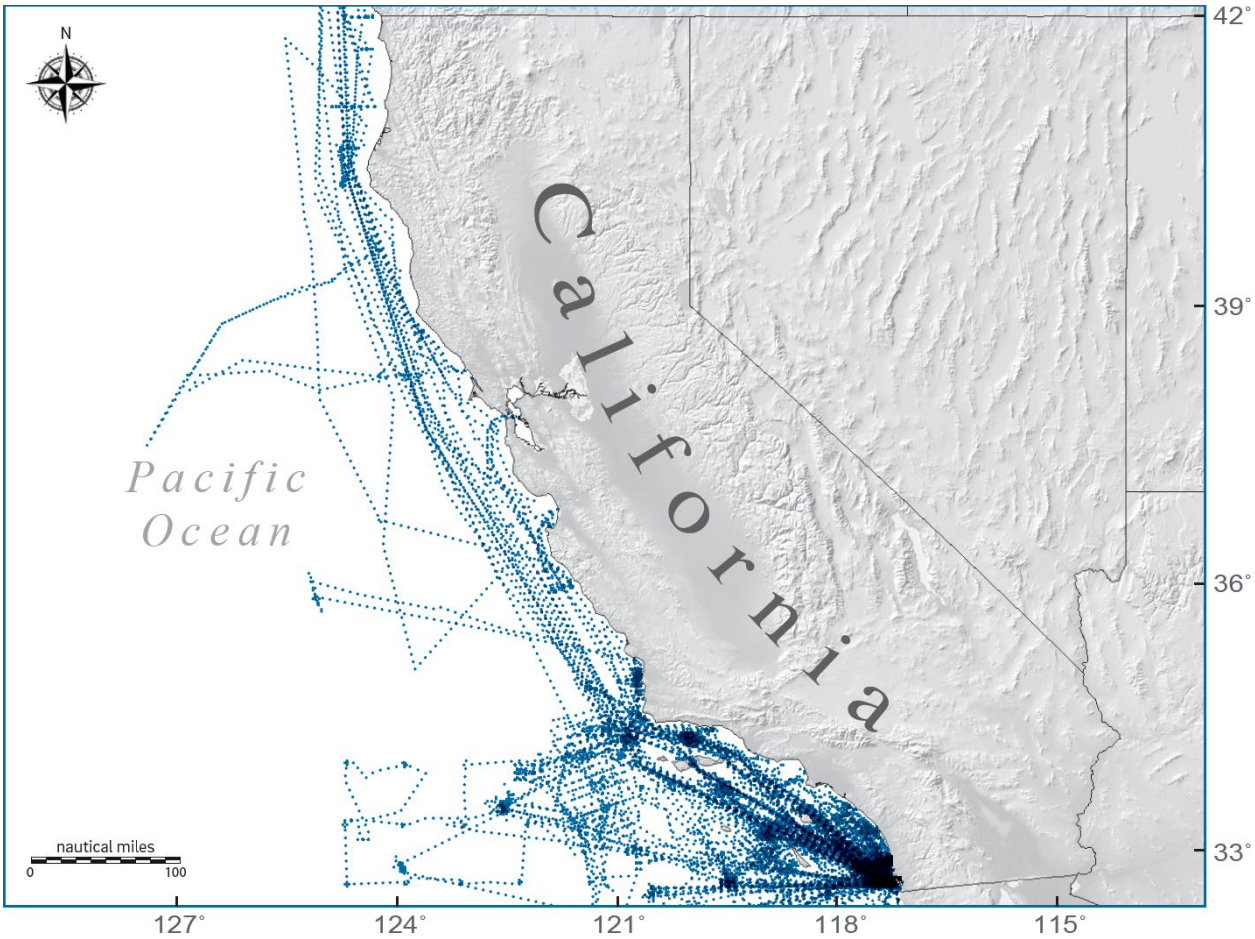
Eliminating emissions and transitioning away from fossil fuels aboard oceangoing vessels is particularly challenging, because strategies that work well on land (battery electric vehicles) cannot provide the range or duration required for most vessels [Klebanoff et al., 2021], including coastal oceanographic research vessels.

Green hydrogen (produced using renewable energy sources such as wind or solar power, rather than from fossil fuels) enables a zero-CO2 and zero-criteria pollutant energy pathway for oceangoing vessels. Propulsion systems powered by hydrogen fuel cells have been shown to be feasible using existing technology, and using green hydrogen can achieve emissions reductions

that enable a zero-CO2 and zero-criteria pollutant energy pathway for oceangoing vessels [Madsen et al, 2020; Klebanoff et al, 2018].

Oceanographic research vessels (as defined under 46 CFR Subchapter U) are ideal for hydrogen demonstration projects, and often work in nearshore areas and marine protected areas that would significantly benefit from zero-emission operations. They are also highly visible platforms due to their work carrying hundreds of scientists and students to sea annually from institutions all across California, and would serve as a powerful and enduring expression of the state's commitment to reducing pollution and greenhouse gas emissions.

We request the CEC support technology demonstrations of maritime hydrogen power, including synergistic efforts with planned new construction and refits of Subchapter U vessels. New construction especially provides an ideal opportunity to optimize vessel power systems for zero-emission operations, and will provide a powerful incentive to use hydrogen rather than diesel power from the outset of a new vessel's service life. We request that size limits not be placed on eligible Subchapter U vessels, so that hydrogen fuel cell technology may be accessed, deployed, and validated across a broad size range of oceanographic research vessels.



Oceanographic research vessels have enabled research and education programs vital to California's economy and quality of life. The tracklines shown here represent efforts during the period 2011-2018 aboard the R/V Robert Gordon Sproul and R/V New Horizon, involving more than 4,400 researchers, students and instructors aboard 298 separate missions that used 1,123 operational days at sea along the length of California's coast [Scripps Institution of Oceanography data]. Emissions from these vessels have impacts on port and coastal communities, and reach far inland as well [Dabdub et al., 2008].

As the CEC seeks to expand California's hydrogen fuel infrastructure, we request the CEC establish ways to defray the cost of green hydrogen used in maritime hydrogen power systems. This is necessary so that the cost of operations of clean hydrogen vessels can be comparable with lower-cost diesel until the cost of green hydrogen comes down. Access to affordable green hydrogen now will incentivize the expanded use of hydrogen fuel technology to the maritime industry, supporting California's carbon reduction goals and enabling a zero-carbon well-to-wake energy pathway.

This project is responsive with the San Diego Community Emissions Reduction Plan (CERP) which contains detailed information and strategies intended to reduce both air pollution emissions and community exposure to air pollution in the Community of Portside Environmental Justice Neighborhoods (Portside Community) surrounding San Diego Harbor. The recently approved plan noted that in the Portside Community, NOx emissions, a component of smog, are driven by off-road mobile sources, with the major contributors being ocean going vessels and harbor craft.

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