

Zero-Emission Hydrogen Ferry Demonstration Project

The Bay Area Air Quality Management District, in partnership with Golden Gate Zero Emission Marine, was awarded a \$3 million grant by the California Air Resources Board to build the first hydrogen fuel cell passenger ferry in the United States. The vessel, named the *Water-Go-Round* will demonstrate a pathway to commercialization for zero-emission hydrogen fuel cell marine technologies. Applications of this technology go beyond passenger ferry service, including industrial freight transportation, government operations, marine research, and more. In Fall 2020, the *Water-Go-Round* is planned to perform demonstrations of passenger and freight service between Port of San Francisco, Oakland, Redwood City, and the City of Martinez, and sightseeing trips in the San Francisco Bay and to the Farallon Islands.



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The *Water-Go-Round* is a 70-foot aluminum catamaran, designed by Incat Crowther, and will have a top speed of 22-knots and a capacity to transport up to 84 passengers. The vessel is being built in Alameda, CA by Bay Ship & Yacht. The fuel cell electric propulsion system is being provided by BAE Systems and will be powered by three independent 120 kW fuel cells built by Hydrogenics, which was recently acquired by Cummins, Inc. The *Water-Go-Round* will have enough on-board hydrogen storage capacity for up to two days of normal operation. Golden Gate Zero Emission Marine is providing project coordination, technical management and expertise for the project and Sandia National Laboratories will analyze data collected from the project and conduct hydrogen safety training.

Dates: 05/25/2018 – 6/30/2021

Grantee: Bay Area Air Quality Management District

Partners: Golden Gate Zero Emission Marine, Switch E-Maritime, Bay Ship & Yacht, BAE Systems, Cummins, Red and White Fleet, Port of San Francisco, Sandia National Laboratories

Grant Amount:

CARB Contribution: \$3,000,000

Matching Funds: \$2,465,000

Project Total: \$5,465,000



Key Project Phases

The *Water-Go-Round* is a first-of-its-kind vessel, the development of which relies on the innovative vision of Golden Gate Zero Emission Marine and careful coordination between project partners, who are leaders in their fields. Project milestones were carefully developed to monitor the project schedule and to identify potential problems as early as possible. Key milestones include:

- Design of vessel and powertrain, including hydrogen storage and fueling procedures
- Procurement of powertrain hardware and fuel cells
- Ferry build and sea trials
- Demonstration of vessel operations and fueling
- Data collection and analysis
- Commercialization feasibility assessment

Lessons Learned

- Building adequate room into the timeline and budget to allow for adjustments may help address unforeseen issues.
- Having partners with industry specific expertise as well as those with knowledge in advanced fuel technologies is critical in successfully building a product that meets industry needs.
- A project's success is contingent on each of the project partners' ability to follow-through on their initial commitment.

Status Updates

- The powertrain system and fuel cells were factory tested both individually and as a system.
- The vessel structure is expected to be completed in the next few months, with operations to begin in late 2020.
- The project has positively influenced commercialization efforts of zero emission marine technologies around the world.



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