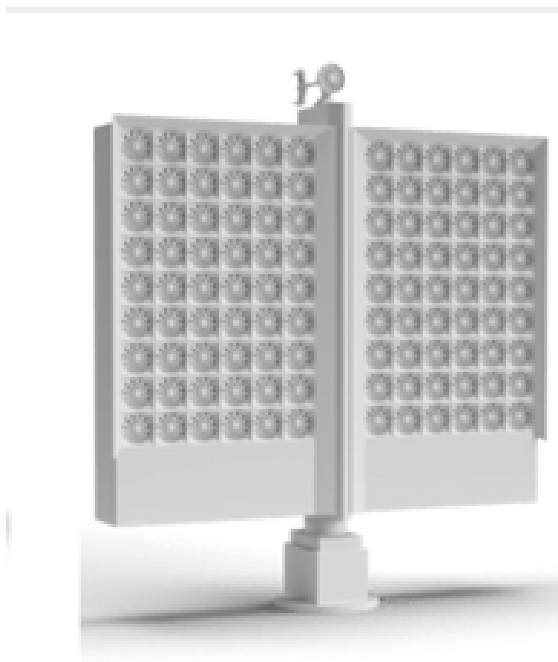




**A Proposed Innovative Concept
Utilize Wind Energy**



American Wind Micro Cube Wind Wall



A Proposed Innovative Concept

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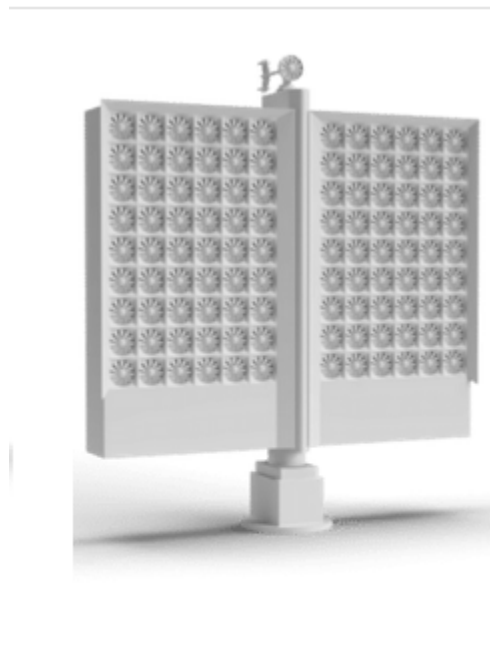
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A. Contact Information

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B. Description of Innovative Concept

Pasha Hawaii Holdings LLC (Pasha Hawaii) proposes an Innovative Concepts Project to achieve emissions reductions in and around the ports of Oakland and Long Beach to meet the amended CARB at-berth regulation. Pasha Hawaii's innovative solution is to utilize new Micro Cube wind technology to generate green emission free power for most of the energy required for each port visit. The Micro Cube technology has been tested and proven in shore-side applications. It has never been installed on a ship. The advantage of the Micro Cube technology is that the size of the Micro Cube only requires a small space compared to other existing wind technologies. The Micro Cube's compact size will allow wind power to be utilized in applications previously non compatible, in this case on a ship. Below is a picture and description of a typical 100kW Micro Cube.



100kW

- Max Output - 100kW @ 17mph
- Voltage - 220/440v
- L | W | H - 96in x 120in x 24in
- Weight - 4000lbs
- Cut In Speed - 1.5mph
- Maximum Operational Speed - 140mph+



This picture shows the different sizes of the Micro Cube technology compared to the traditional wind turbines.

Pasha Hawaii is currently working with Sujen International LLC, an authorized distributor for American Wind Micro Cubes, to design a configuration for installation above the bridge and bridge wings of the vessels which are over 100 ft above the water line. This puts the Micro Cubes in favorable wind conditions. Our ships will be calling at Oakland, CA and Long Beach, CA Terminals. Installed at this height, the Micro Cubes are anticipated to be exposed to very favorable wind speeds for their operation

We anticipate installing at least 200kW of Micro Cubes on the ship. The Micro Cubes' output will be 450VAC 60 Hz and will tie directly into the ship's main switchboard through a controller.

The advantage with implementing this innovative concept is that it will be producing green zero emissions 100% of the time, not just when at a port. This will result in more emission reductions as the vessel transits up and down the California coast.

In conjunction with utilizing this new technology, Pasha Hawaii will incorporate energy management onboard to further reduce the in-port loads. The below are methods that Pasha Hawaii is currently exploring to be utilized with the Micro Cubes:

- 1: Design and build new nozzles for ultra-low operation on the load propulsion boiler while burning ultra-low sulfur fuel optimized for reduced emissions.
- 2: Utilization of Variable Frequency Drive for the force draft boiler control for reduced energy consumption and better control of combustion air for burning the fuel.
- 3: Utilization of Variable Frequency Drive for the main condenser cooling pump for reduced energy consumption



- 4: Perform an energy audit onboard the vessel focusing on in port operations and equipment upgrades for in port energy reduction.
- 5: Install solar panels where space allows.
- 6: Incorporate a battery storage system to provide energy during low wind conditions.

C. Vessel Emission Reduction

The emissions generated from this type of propulsion boiler, which power the steam turbine generators in port, is unknown. Pasha Hawaii reached out to CARB in the fall of 2021 to see if staff had any data on emissions from propulsion boilers operating at low loads on ultra-low sulfur fuel, but they were not able to provide this data

Pasha Hawaii will begin this innovative concept project by measuring the boiler emissions to develop a baseline on the steam ship's propulsion boiler in port at various low loads. Once we have developed this baseline, we shall be able to calculate current emissions with the boiler operating at current loads. We can then calculate emission reductions after the Micro Cubes are installed. Pasha Hawaii will also be able to estimate emissions reductions from other energy reduction initiatives described above.

In addition to their collaboration on a configuration to install Micro Cubes above the vessels' bridge and bridge wings to obtain favorable wind conditions, Pasha Hawaii is also currently working with Sujen International to determine the performance of the wind turbines on a ship. This will be accomplished via weather station installed on top of the bridge. The weather station will monitor the wind during port stays and transits up and down the coast of California.

This proposed innovative concept will provide constant emissions reduction while in all California waters, not just at berth. We believe that these overall emission reductions will exceed the emission reductions as required in section 93130.17a since we are proposing an alternative energy source that has zero emissions. If the proposed innovative concept proves to be successful and implemented on other ships transiting the California coast and at berth in California Terminals, the overall emissions reduction will be significant.

D. Proposed recordkeeping, reporting, monitoring

Pasha Hawaii will utilize three phase energy meters to monitor the actual kWh production of the installed Micro Cube during transits and in port. The data will also be sent electronically to Pasha Hawaii's shore-side management. The emission reduction will be calculated based on the total kWh produced by the Micro Cubes and energy not being produced by the boilers. This calculation will be based on the emissions measurements of the boilers as described above in section A.

This data will be compiled in a report on a per ship basis broken down into port stays by port, transits within 3 nm, and transit beyond 3 nm.



Additional records shall be collected and maintained as required by the Executive Officer and 93130.17(a)(13) of the regulation.

E. Memorandum of understanding or similar agreement

There are no funding partners required. Pasha Hawaii will purchase/lease the micro turbines and install on selected ship(s) operated by Pasha Hawaii.

F. Time Duration

Pasha Hawaii intends to utilize this innovative concept until the ships are upgraded with shore power capability. The ships, however, will still utilize the Micro Cube to produce emission free energy to the vessels after the upgrades for shorepower have occurred. This will further reduce the emission profile from each of the ships outfitted with this technology both at sea in California waters and in port.

G. Government Approvals

The United States Coast Guard (USCG) and American Bureau of Shipping (ABS) must approve the installation and connection of the Micro Cubes on the ship(s). Pasha Hawaii will utilize the Naval Architecture Firm Marine Design & Operations LLC (MDO) to design the structural and electrical integration to the ship. MDO will produce drawings and submit them to ABS and USCG to obtain the approvals as required.

Pasha Hawaii will also seek CARB approval for compliance with the At Berth Regulation.

H. Environmental Reviews

Environmental reviews will be conducted as required by the Executive Officer.

I. Conclusion

Since the innovative concept, Micro Cubes wind energy, produces zero emission, there is no doubt that the energy produced from the Micro Cubes will meet the requirements of the At Berth Regulations. Pasha Hawaii is excited to bring this innovative concept forward and to work to develop use of this technology to achieve reductions in NOx, PM 2.5 and ROG emissions equivalent to or greater than the level that would have been achieved by the Control Measure.

Amy Manning
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