



Hung "Tom" Pham  
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# Maritime PROGRAMS



- 1,600 student populations
- 7 undergraduate programs
- 2 graduate master programs
- Varieties of continuing educational certificate programs











• Winds



• Solar



• Tidal

# UNDERGRADUATE PROGRAMS





## GREEN CAMPUS INITIATIVES



- Co-generation Power Station generates electricity and heat for cadets dormitories.



- 660 KW Wind Turbine
- 27% Energy Saving



- 450 solar panels
- Producing 95,000 kWh



- 50 kWh Tidal Turbine (2017)

## WHY MMA?

Massachusetts Maritime Academy is uniquely located on a tidal waterway that provides a constant high velocity tidal exchange at an academic institution with a marine operations focus.





# Tidal Power



- ❑ MMA has experience in all aspects of hydrokinetic deployment and operations.
- ❑ MMA maintains a fleet of support vessels and fully secured dockside facilities.
- ❑ Marine Operations staff dedicated to safe and successful deployments.
- ❑ Faculty and students fully engaged in MMA MHK mission.

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# Cape Cod Canal

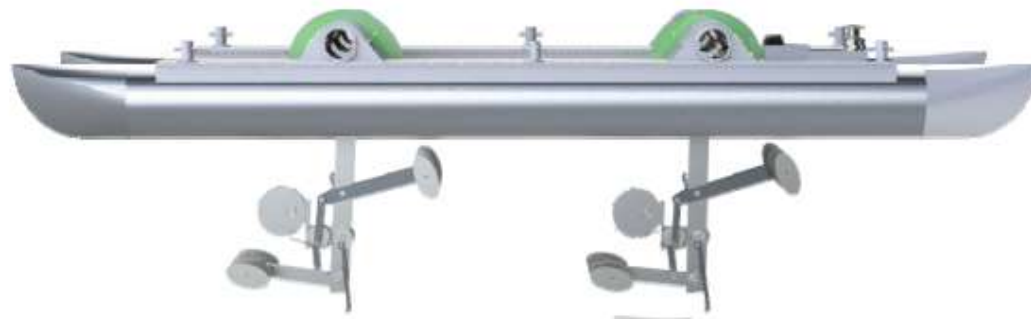
2 billion gallons west and 1 billion gallons east on every tidal cycle.





## Leading Edge 2kW Pontoon Vessel Overview

- Catamaran configuration: 35 ft x 11ft x 30 in diameter pontoons
- Hulls made from 3/16" 5052 aluminum plate
- Each hull has 7 watertight compartments for safety and ballasting
- Crosstubes are 12 in ID Schedule 40 aluminum pipe (expandable beam)
- Oscillating foils generators can retract in either direction
- 360 degree "Quadrant" provides constant moment retraction
- Umbilical cable to shore-based control house



## 2kW Pontoon Vessel: Profile

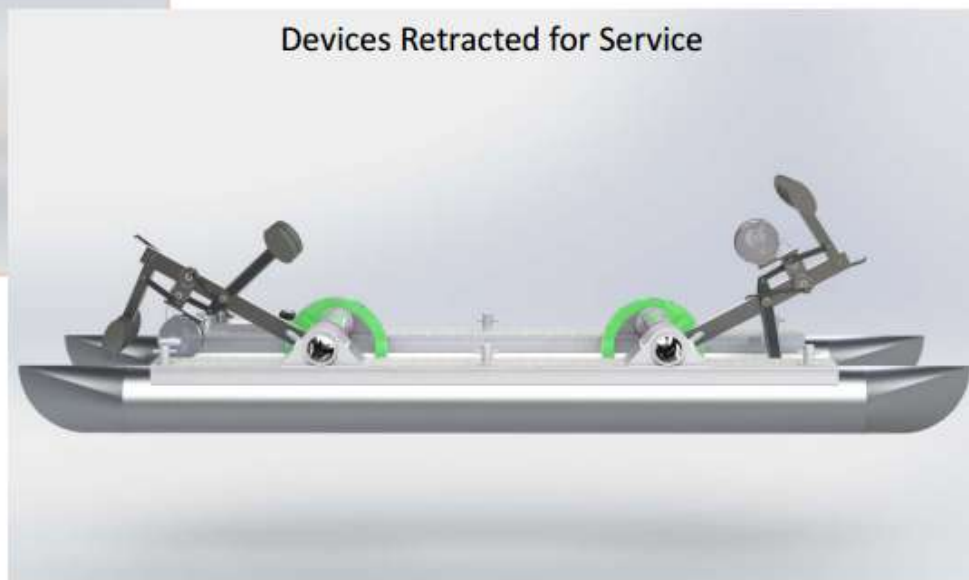
Devices Deployed



July 2016

- Brown University
- BluSource Inc
- Mass. Maritime Academy
- Volpe Center

Devices Retracted for Service





## The major benefits of the Leading Edge design are:

- Low flow speed energy harvesting (self-starts under 2 knots without optimization)
- Maximizes swept area while maintaining a low profile
- Low speed operation under 1 Hz (= 1 cycle per second)
- Damage tolerant (foils are robust, low cost, and easily replaceable)
- Environmentally safe; will not harm fish.













- The MMA Marine Safety and Environmental Protection Department particular expertise in ecological impact assessment.
- The MMA Energy System Engineering Department was particular adept to assist with deployment, maintenance, and operation
- High definition video monitoring will allow assessment of impingement impacts on migrating fisheries, sea turtles and marine mammals.
- Different technologies will be monitored for acoustic effects on sensitive species.
- If anchored systems are deployed - MMA has strong benthic expertise and can evaluate electromagnetic levels from transmission cables.

Leading Edge  
Oscillating Hydrokinetic  
Turbine 2016 Launch





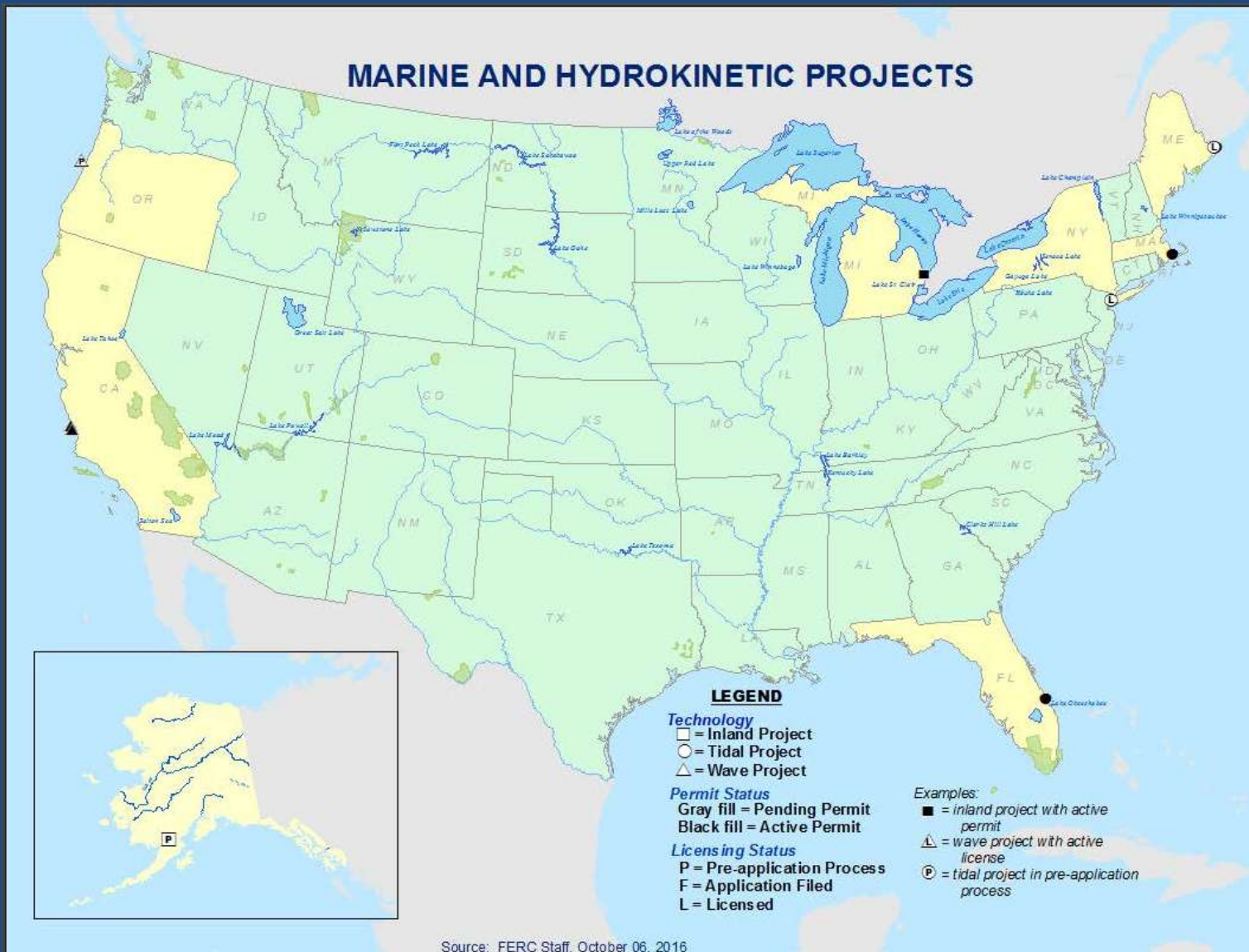
## What Next?

- 2017 – MMA will acquire a permanent tidal turbine from Schottel for research, training, and power production
- Small, compact bi-directional tidal instream turbine for easy deployment and recovery
- Weight – 1.5 ton
- Length – 6.5 feet long
- Diameter – 13.1 foot
- Power production capacity – 50 kWh

## Hydrokinetic Test Barge







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