

WAVE CAVE

Oscillating Water Column

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Abstract

- Many different technologies are currently being tested to effectively harness hydro-kinetic energy; however, most of these are in the research and development stage. One of the technologies used to extract energy from waves is an oscillating water column (OWC) in conjunction with a Wells turbine, however the only OWC's currently being tested are large scale commercial projects. These projects have proved to successfully harness energy in geographical locations with consistently large swells. Our project aims to implement this existing technology on a smaller residential scale. Placing small OWC's on docks and seawalls that are exposed to moderate ocean swells can harness hydro-kinetic energy and bring more renewable energy to our power grid.

Proposal

- Provide small scale hydro-kinetic energy utilizing the technologies of a wells turbine and oscillating water column.
- Find and test suitable locations for implementation of WAVE CAVE.

Wells Turbine

- A turbine designed to turn the same way despite the direction of air flow.
- The blade is reflected on each side in order to achieve this behavior.

Depiction of Wells Turbine

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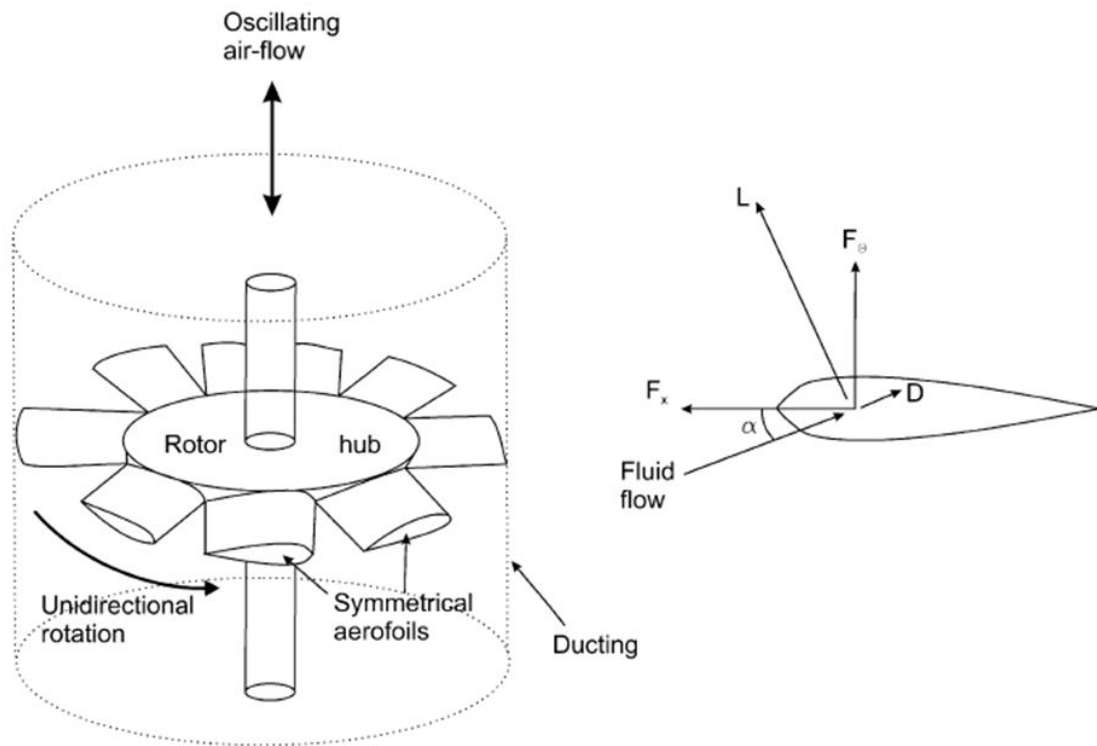


Fig. 2. The Wells turbine.

Dock Application

- The wave cave can be attached underneath the end of an existing dock abiding by all government regulations
- It can be customized for a given residential or commercial dock
- Fiber glass and/or stainless steel are potential component materials but cost analysis and durability need to be tested.
- Aesthetics, noise reduction, mobility and ease of use are important factors.
- Oscillating water column will be customized to individual docks while turbine and generator will be standard sizes for easy installation.

Other Application's

- Bridge (piling) Application
- Sea Wall Application
- Jetty Application
- Water bed

Existing Technology

- Oscillating water columns are currently used only in large scale commercial projects.
- They are made out of robust materials such as concrete and use large wells turbines.

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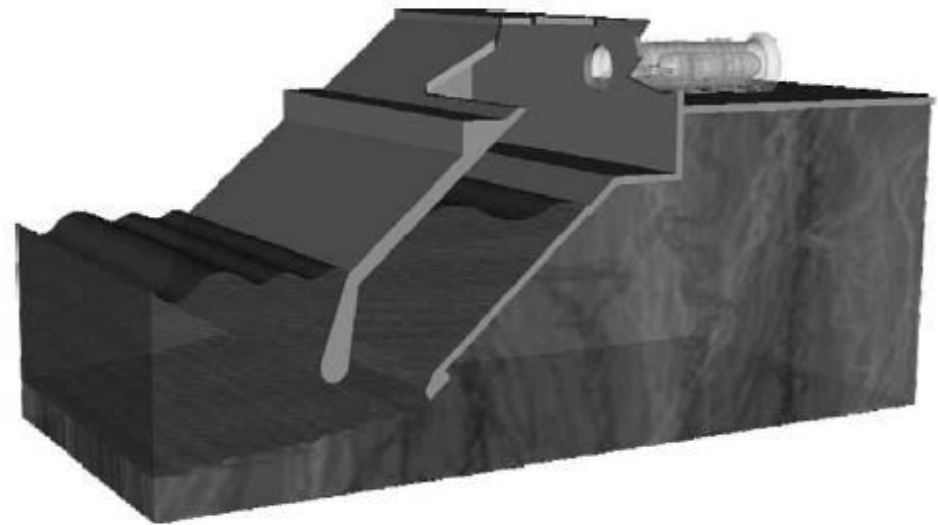


Fig. 1. The LIMPET wave power station.

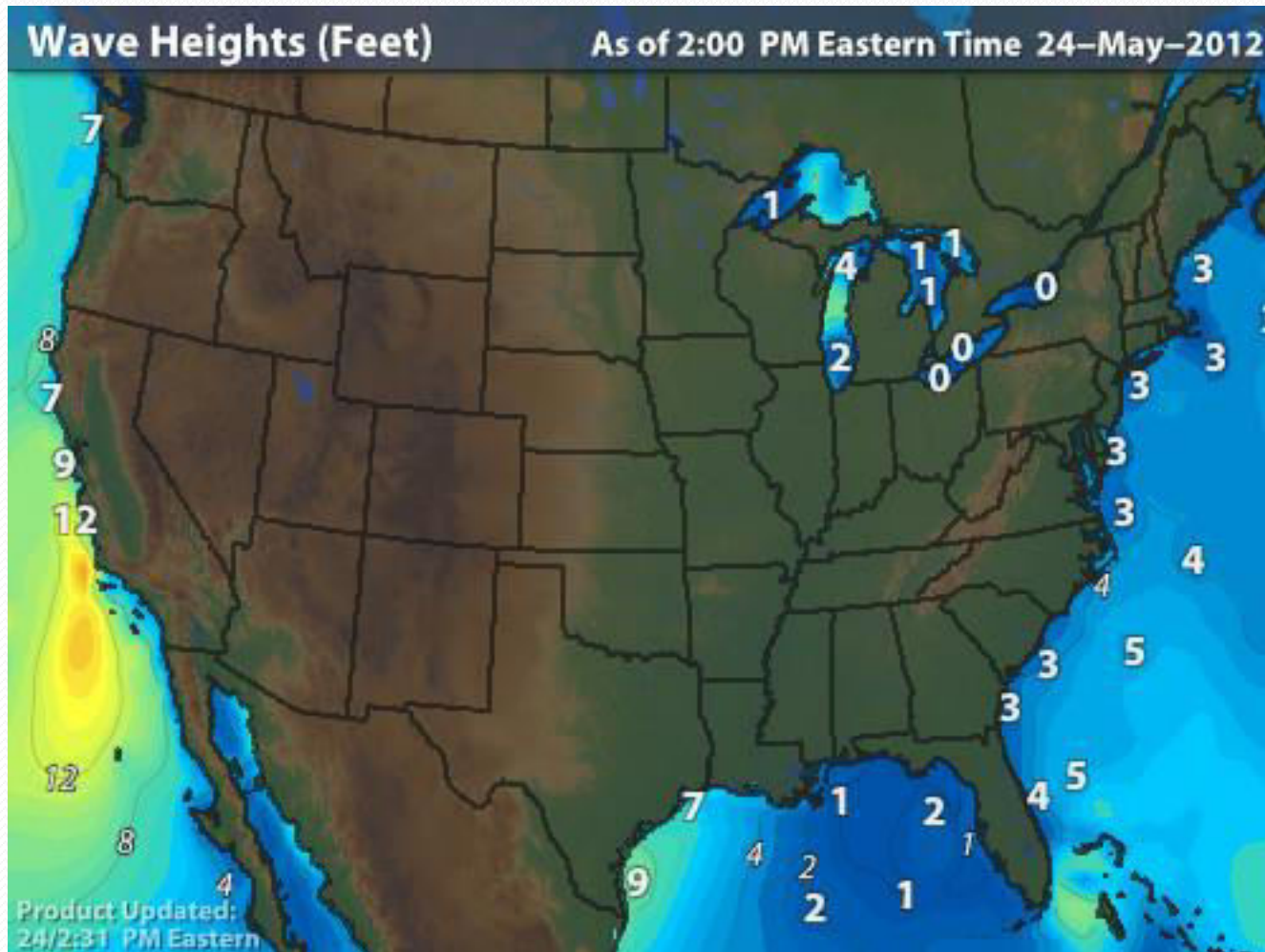
The Limpet Project

- 3.6m x 6m x 21m
- With an incline of 40°
- Single 2.6m diameter wells turbine
- 250kW
- 700-1400 rpm
- Acoustic chamber

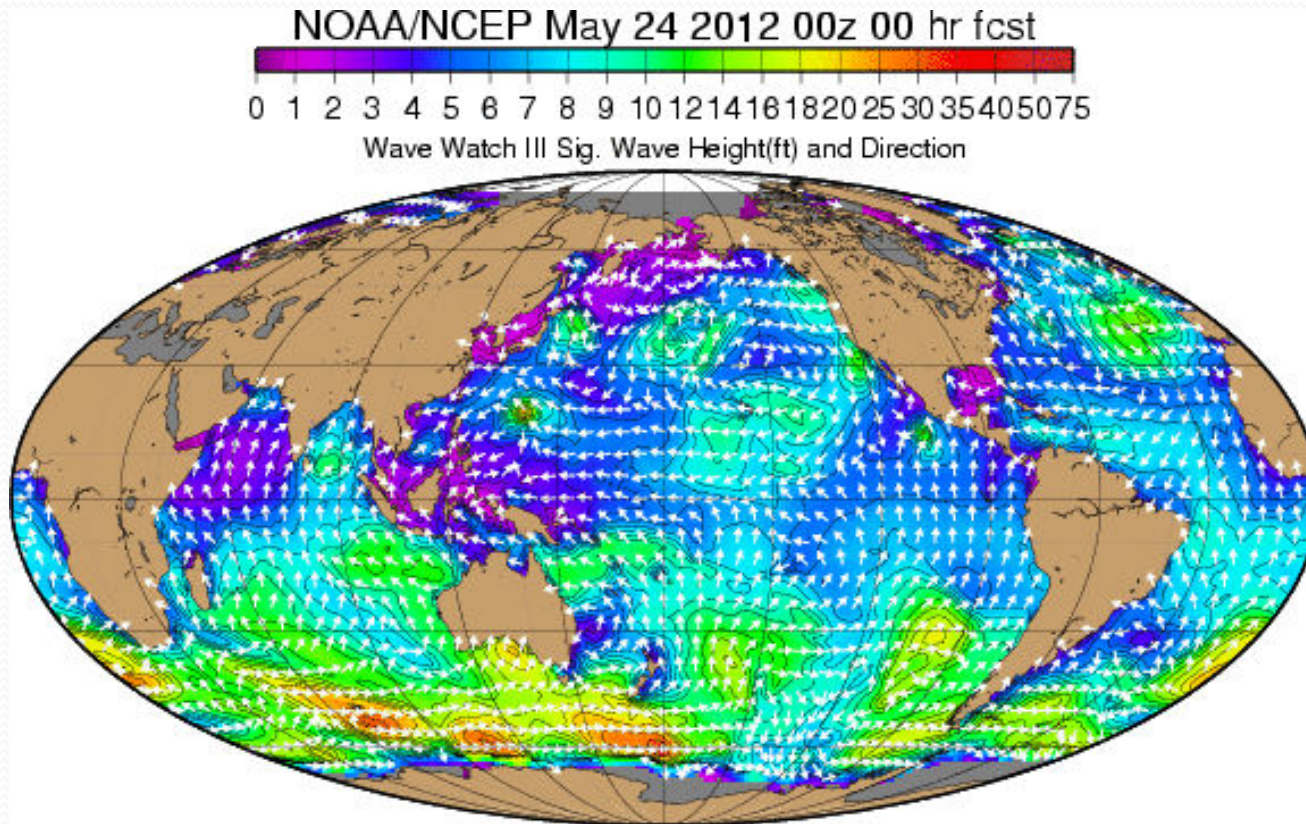


Reference Slides

US Current Swell Height



Global Average Swell Height





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