

Analyzing the Feasibility of Ocean Wave Energy

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Abstract

The search for clean, cheap, and efficient renewable energy resources has been a main concern for researchers in recent years. Offshore wave energy technology provides reliable base load power without emissions or significant visual/environmental impacts. While the technology has the potential to alleviate the energy crisis, the young, expensive technology needs more time to develop.

Project Goals and Objectives

- Understand the technology that drives each type of wave energy converter
- To evaluate the immediate feasibility of offshore wave energy by analyzing:
 - Cost
 - Environmental impact
 - Level of development

General attitude toward wave energy development off Oregon: statewide and coast samples



Environmental Impact

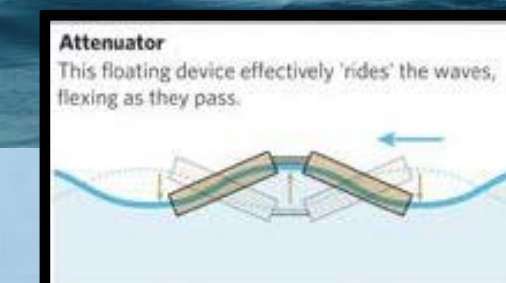
Aspects of tidal energy will effect the environment:

- Cables: electromagnetic animals
- Tide: sedimentation along the coast and seabed microorganisms
- Physical: will act as an artificial reef
- Noise: noise sensitive marine animals

Pelamis Wave Snake



Picture from www.fc3arch.wordpress.com

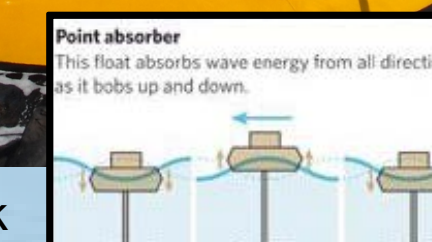


Picture from www.nature.com

PowerBuoy®



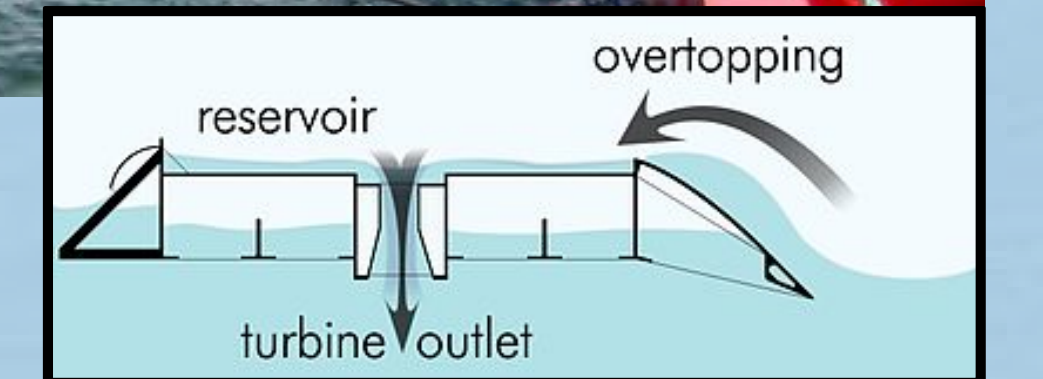
Picture from www.regensw.co.uk



Wave Dragon



Picture from www.marineenergypembrokeshire.co.uk
Picture from www.nature.com



Picture from www.postmanpatel.blogspot.com

Company	Pelamis Wave Power	Ocean Power Technologies	Wave Dragon ApS
Type	Attenuator	Point Absorber	Overtopper (single device)
Cost per unit	\$8 million	\$1.5 million	N/A
Power Rating	750 kW	150 kW	7 MW
Capacity Factor	20%	30%	33%
Area	2 sq. km per 10MW	0.125 sq. km per 10 MW	0.0255 sq. km per 7 MW
Payback Period	20 years	20 years	N/A

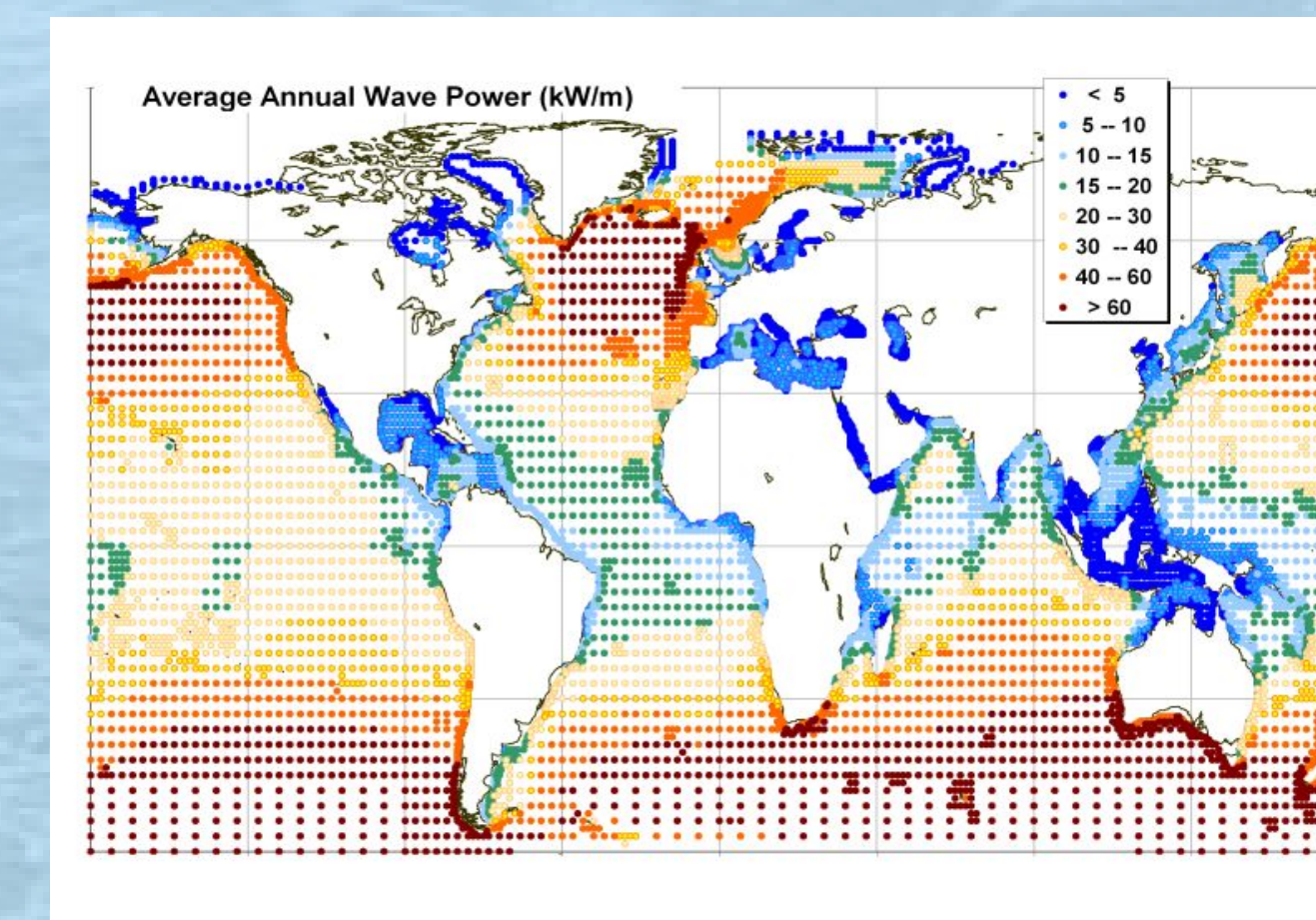
Visual Impact



Picture from www.oceanpowertechnologies.com

Ten 13m tall PowerBuoys as seen from 4km away

Energy Potential



Picture from Professor S.R. Lawrence, Springer 2008.

World Map Displaying Average Annual Wave Power (kW/m)

Conclusions

- The reliable, energy dense oceans show great potential as a base load power
- The environmental effects of the technology is almost nonexistent. To continue to prevent impact on the environment specific research should be done on new wave energy devices.
- Companies still require time to research the following so that they can establish full-scale wave parks:
 - Further research to increase energy absorption and conversion efficiencies and to minimize costs
 - Experience with government organizations in order to establish a regulatory process

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