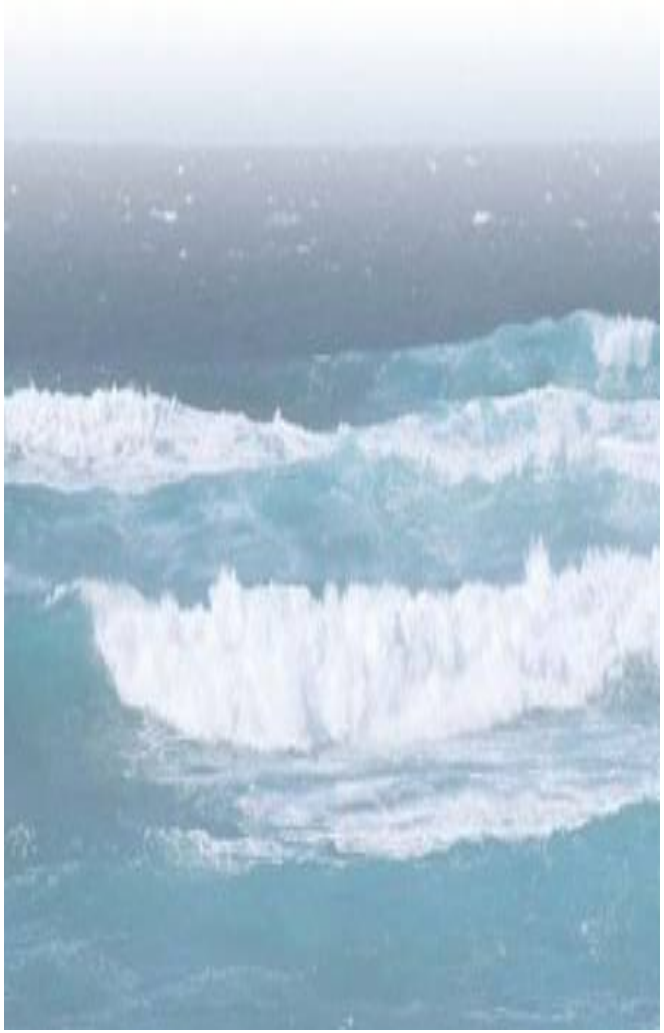

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A Unique Santa Barbara Opportunity: Wave Energy Leveraging Off Shore Platforms

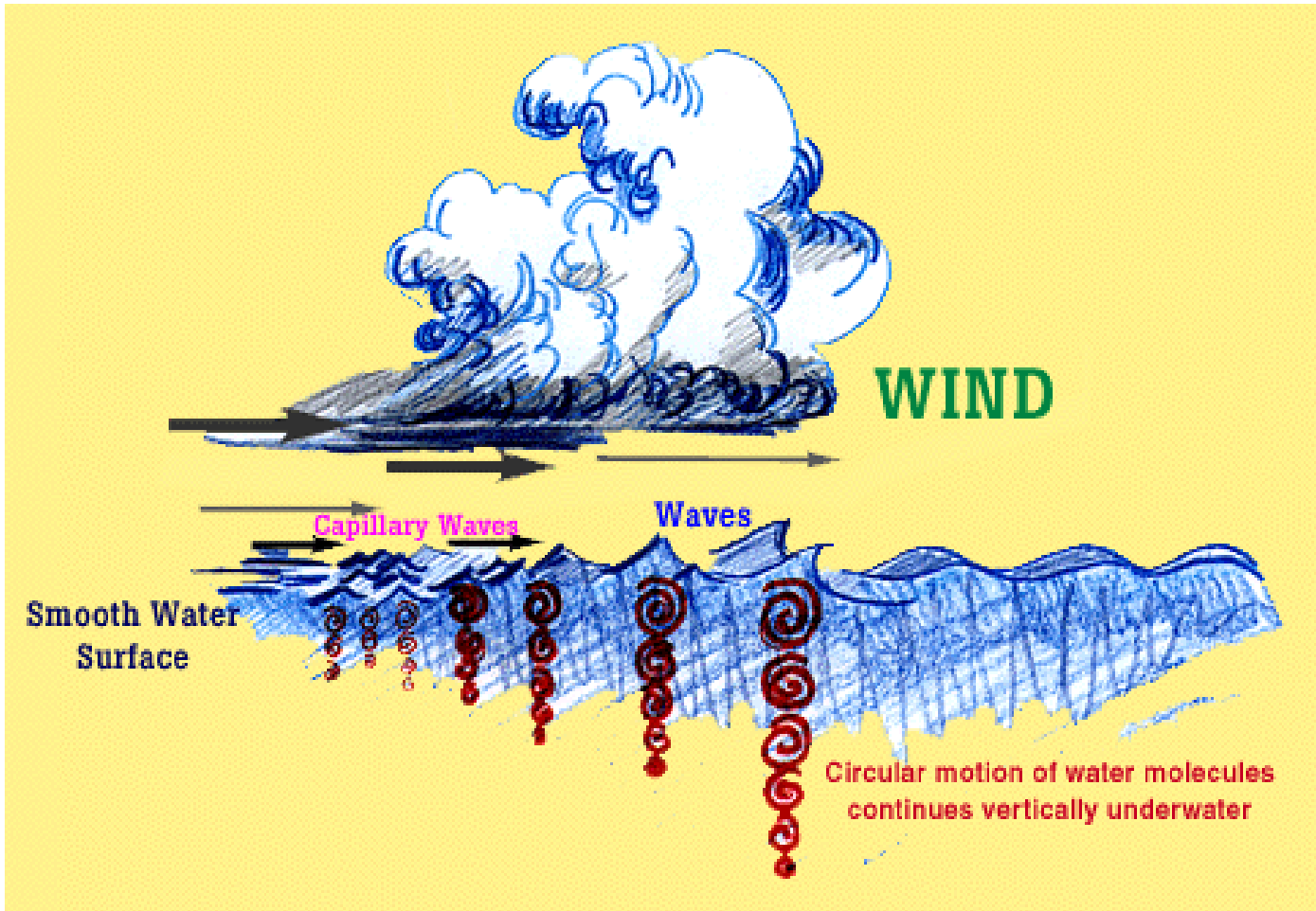
Resource, Technology, Environmental and Business Issues

June 19, 2007

Roger Bedard

Ocean Energy Leader

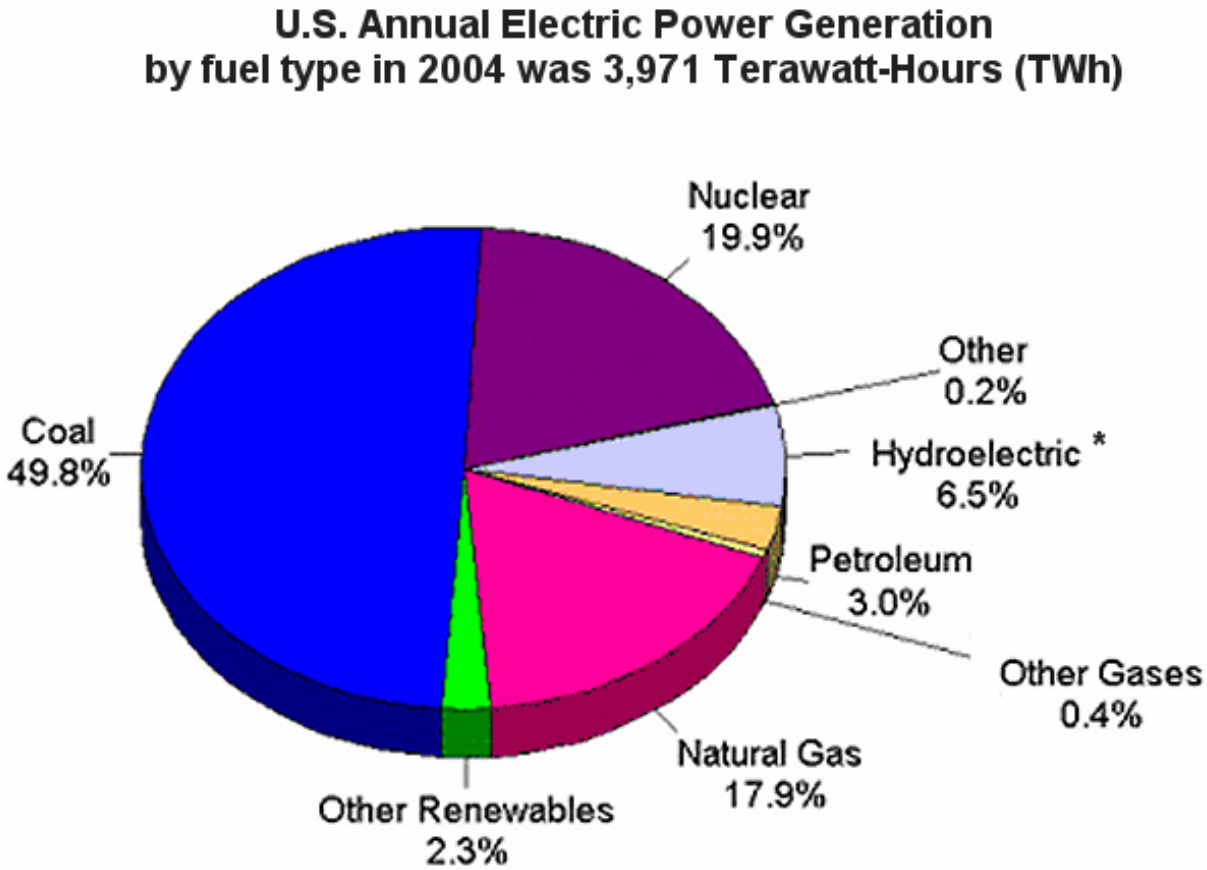
Waves Governed by Wind Over Water



California Wave Energy Resource

- California, North of Point Conception, is the sweet spot in the US for the first development of wave energy
  - Excellent wave energy; slightly less energy but less variability in wave heights than Oregon, Washington and Alaska and a couple of good ports, coastal grid
  - Higher Electricity Costs and a larger coastal demand than Oregon, Washington and Alaska
- Oregon – Excellent wave energy, many ports, good coastal grid infrastructure, decreasing coastal demand, low electricity prices
- Washington – Excellent wave energy, no coastal grid infrastructure and no way to transit power to Seattle loads
- Alaska – Excellent wave energy but few people

U.S. Wave Energy Potential



U.S. conventional hydro-electric generation in 2004 was ~260 TWh/y or 6.5%

Wave generation potential - offshore wave 250-260 TWh/yr if 15% utilized. Credible potential to meet nearly 6.5% of national demand

Advantages of Wave Energy

The same as any renewable energy plus some in addition

Power density as compared to most renewable resources – translates to lower installed cost

With proper siting, installation, O&M and decommissioning, could be one of the more environmentally benign of electricity generation technologies

Minimizes NIMBY – submerged or barely visible

No emissions – including CO_2

Job creation and economic development for maritime communities

Decrease national dependence on foreign fuel suppliers and risk of future fuel price volatility

Assimilates well into grid load balancing because of predictability

Increases diversity and robustness of electricity energy supply portfolio

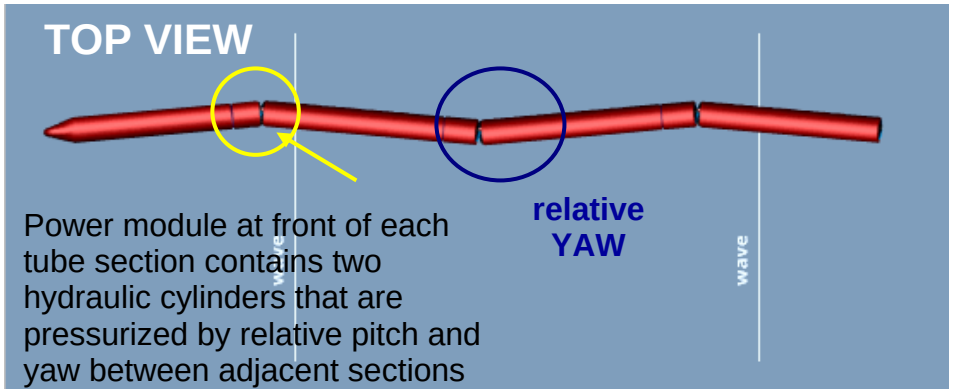
A Few US Wave Energy Conversion Milestones

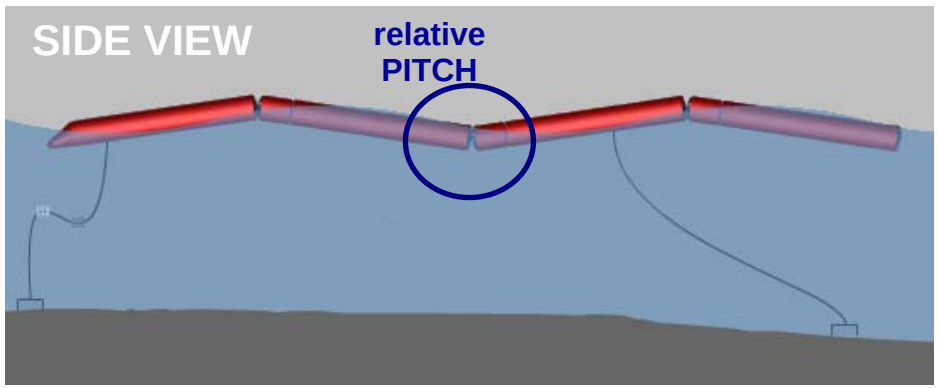
- First Wave Device Installed in Navy Waters in Hawaii in 2004
- Investors filed 10 FERC applications for ocean energy preliminary permits
- June 2006, OPT filed for the 1st US commercial wave plant; a 50 MW plant at Reedsport OR, the site we selected in 2004
- In December 2006, a private investor filed a preliminary permit application for the first California Wave Plant - Trinidad
- February, 2007, PG&E filed two preliminary permit applications for Northern California Wave Plants
- In March, 2007 another private investor filed a preliminary permit application for a California Wave Plant - Eureka

Wave Energy Conversion Devices

- Able Technologies - Electricity Generation Wave Pump
- AquaEnergy Group, Finevera - AquaBuOY
- AWS Energy - Archimedes Wave Swing
- Ecofys - Wave Rotor
- OceanLinx (Energetech) - Uiscebeathe
- Fred Olsen - FO Research Rig “Buldra”
- Independent Natural Resources Inc - SeaDog™
- **Ocean Power Delivery - Pelamis**
- Ocean Power Technologies - PowerBuoy®
- Renewable Energy Holdings - Cylindrical Energy Transfer Oscillator (CETO)
- Wavebob Ltd - Wavebob WEC
- Wave Dragon Ltd - Wave Dragon
- Wave Energy - Sea Wave Slot-Cone Generator
- Wave Star Energy - Wave Star

UK Based Ocean Power Delivery Pelamis





Pelamis 750 kW prototype installed in August of 2004 in 50 m water depth, 2 km offshore the European Marine Energy Centre, Orkney, UK

Pelamis 1st commercial sale occurred 2005 – OPD Pelamis in Portugal – contains an early 3 unit qualification

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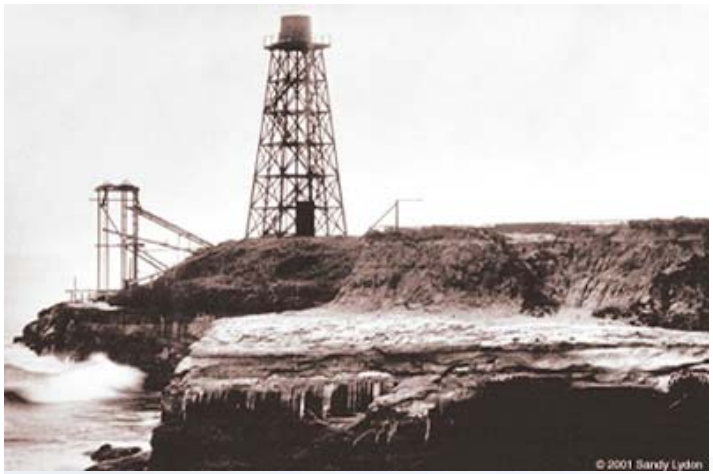
Santa Cruz Wave Pump - 1898



Operated 1898 – 1910
Solved a need – how to water local wagon roads to keep dust down
A ‘new 1910” technology put the Armstrong Brothers out of business

Will these devices affect the environment?

Ocean power may be one of the more environmentally benign of the known electricity generation technologies.

The Environmental Issues

- Withdrawal of wave and tidal flow energy on the ecology
- Interactions with marine life (fish and mammals)
- Atmospheric and oceanic emissions
- Visual appearances
- Conflicts with other uses of sea space (fishing, boating, shipping, clamming, crabbing, etc)
- Installation and decommissioning

Wave Energy Environmental Impact Statements (EIS)

- Belt Collins EIS for Navy Hawaii WEC Project - FONSI#
- Devine Tarbell EIS for AquaEnergy Makah Bay WA Project – FONSI#
- Many European EIS - FONSI#

- Finding of No Significant Impact

The Unique Santa Barbara Opportunity

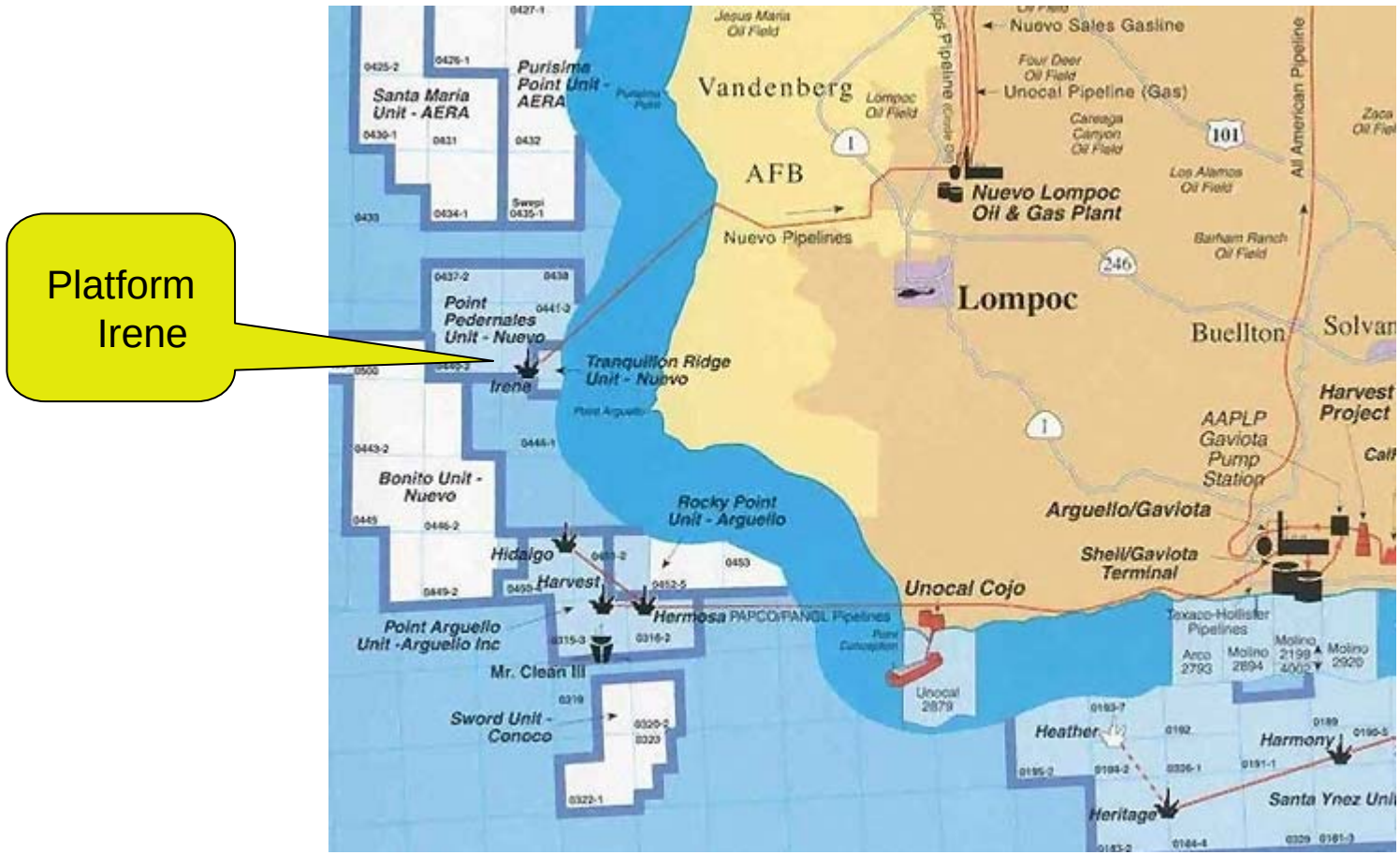
- Leverage Existing Off Shore Platform for a California or National Wave Energy RD&D Test Facility

- Distance to Land: 4.7 miles

- Water Depth: 242'

- Current Owner: PXP Energy

Platform Irene Location



Platform Irene from the Shore

View from the Shore

Substation on the Shore (PG&E Surf Station)

A California Wave Energy Test Facility Could:

- Develop and test existing ocean energy extraction technologies,
- Research and develop advanced technologies,
- Investigate efficient and reliable integration with the utility grid and intermittency issues,
- Advance wave forecasting technologies,
- Advance experimental and numerical modeling,
- Explore device and wave park array optimization,
- Evaluate potential environmental and ecosystem impacts of wave energy,
- Develop wave energy power measurement standards,
- Define wave energy device identification/navigation standards etc.

Position California as a leader in the exploration of whether our nation should add ocean wave energy to our portfolio of electricity supply options

Benefits of Leveraging Existing Platform

- Offshore infrastructure in place
  - Platform for control and instrumentation station (10 X 20 ft shed) and test staff
  - Offshore electrical interconnection
  - Submerged transmission cable
  - Easements
- Onshore infrastructure in place
  - Cable landing
  - Substation
  - Other

Does Santa Barbara Want to Pursue the Opportunity of Hosting a California or National Wave Test Facility?

Proposed Next Step: Jointly go to CEC and determine if they are willing to fund the establishment and operation of this facility (and determine if SB County is a cofunder before going)

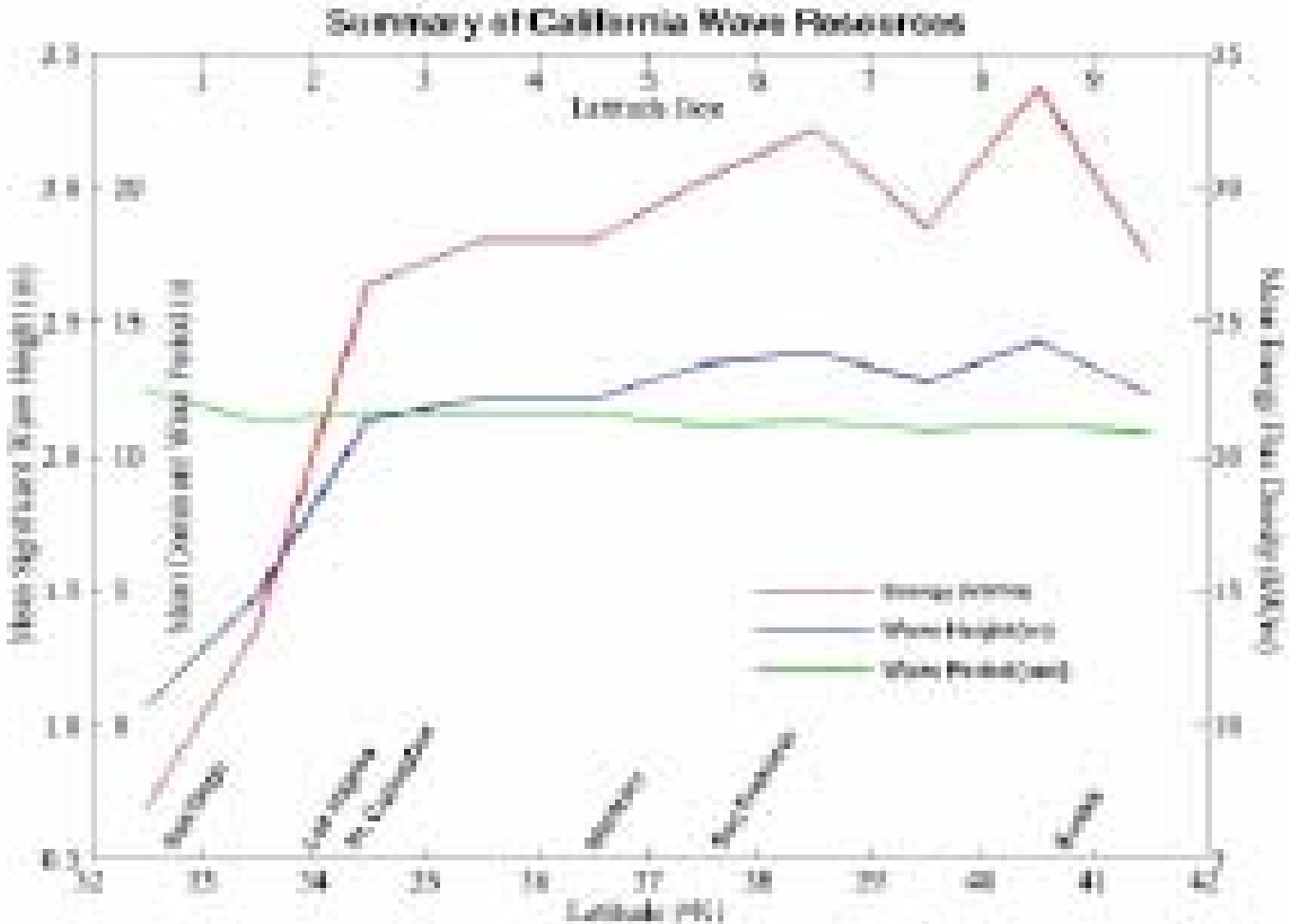
Any questions?

EPRI Reports available at: www.epri.com/oceanenergy

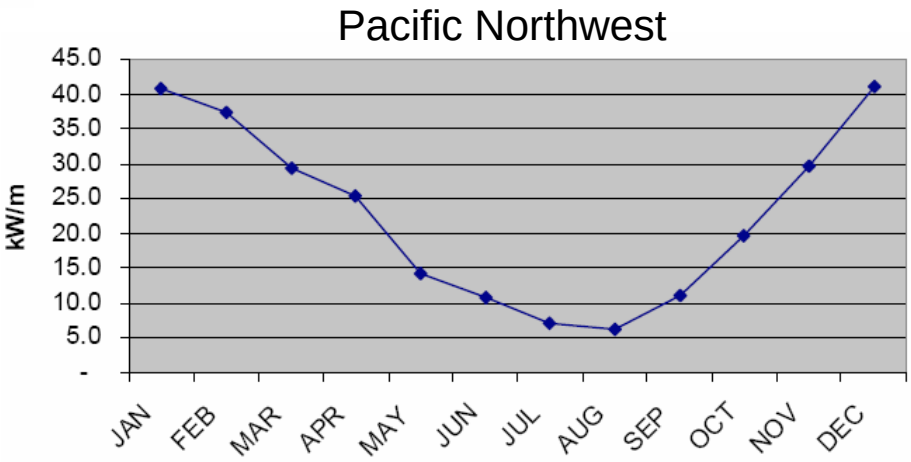
Email: rbedard@epri.com

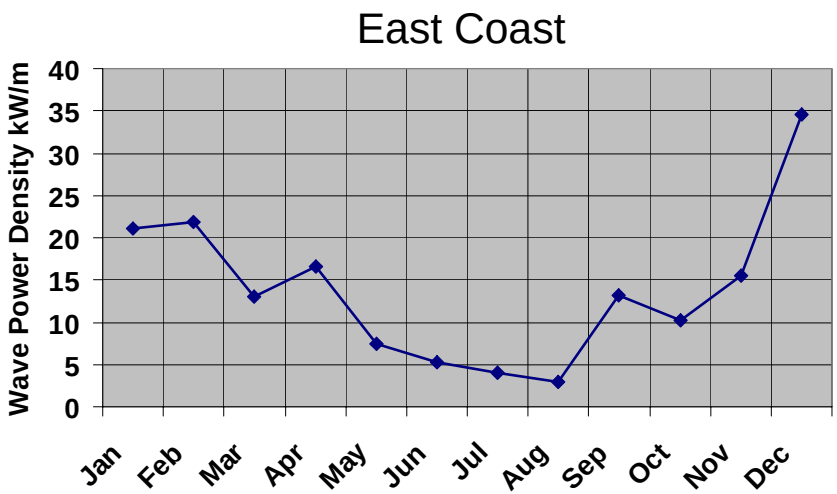
Back Up Slides

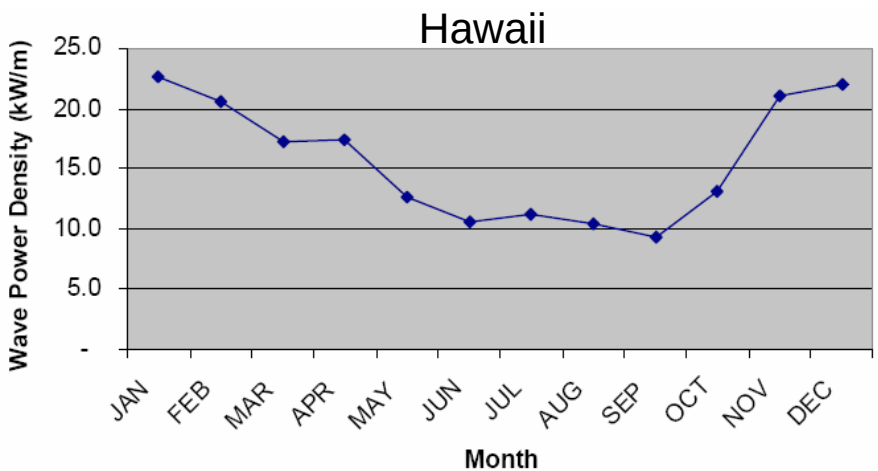
California Wave Resources



US Wave Climates







Monthly average variations

Pacific NW = 8:1

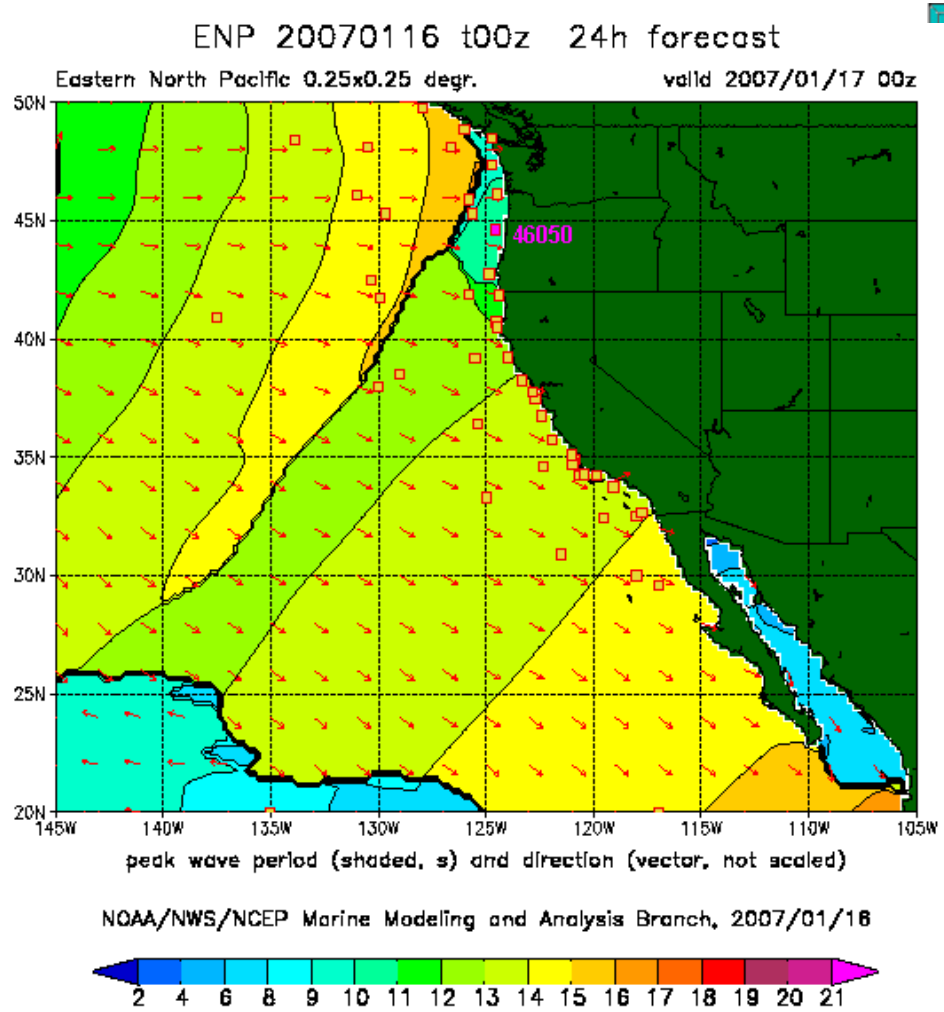
East Coast = 8:1

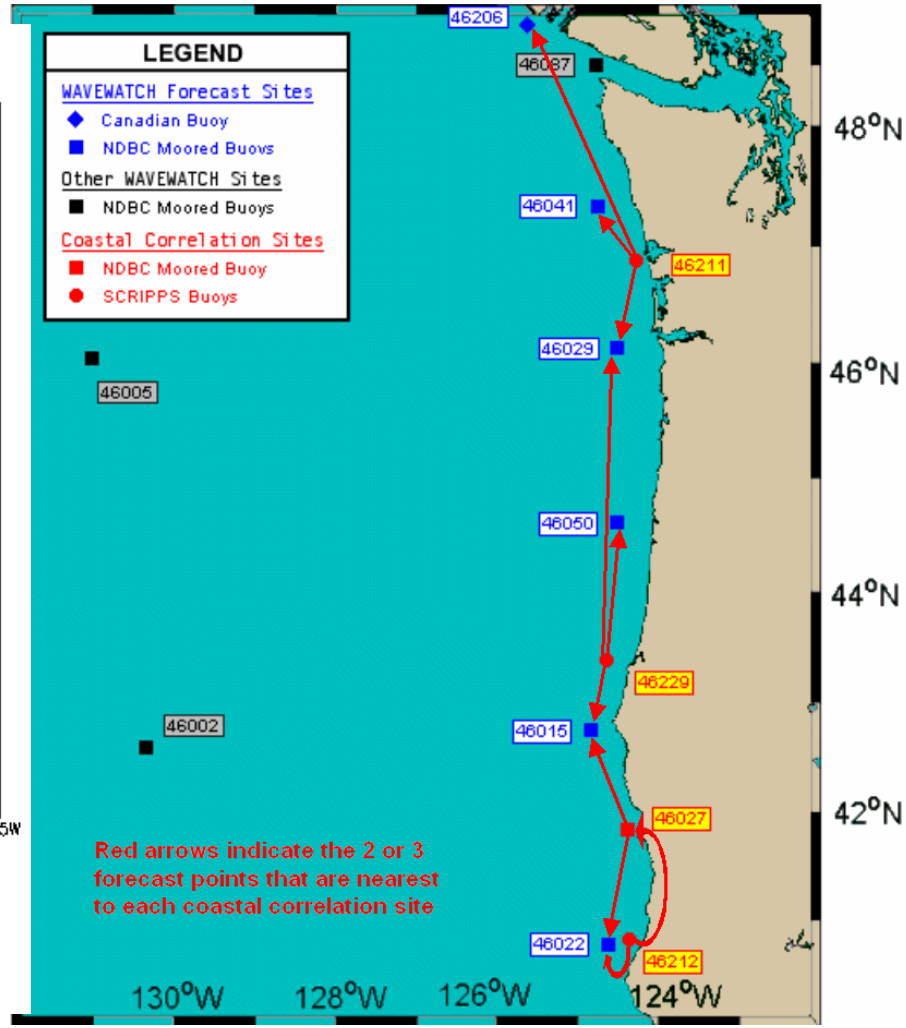
Hawaii = 2.2:1

Key Points and Concerns

- Basic oceanography and hydrology are well understood, but “extractable” resource (percent utilization) is not
- Energy conversion technology is well understood and continues to evolve; cost reductions are necessary
- Environmental effects of commercial projects uncertain – commercial-scale units must be deployed in “pilot” arrays before full build-out and adaptively managed

Wave Forecasting





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Wave Energy Devices Highly Diverse

- Fixed Oscillating Water Column Terminator (Energetech)

- Floating Attenuator (*Pelamis*)

- Floating Overtopping Terminator (Wave Dragon)

- Floating Point Absorber (*AquaBuOY*)

Energetech

Port Kembla Prototype

Size: 25 x 35 m

Average power: 500 kW @ avg wave resource of 35 kW/m

Max rated power: 1.5 MW

Structural Steel Wt: 150 ton

Deployed Water Depth: 9 m

Milestones

2005 - Completed installation of a 500 kW prototype at Port Kembla Australia

2006 - Energetech begins development of a slack moored floating version of the PK prototype with an expected completion of the first project using the floating technology in Q1 2008.

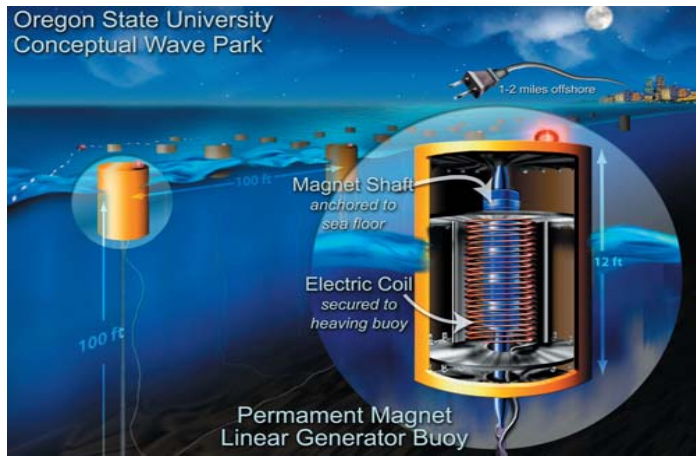
More Examples of WECs

Point Absorber TeamWork Archimedes Wave Swing Before Deployment

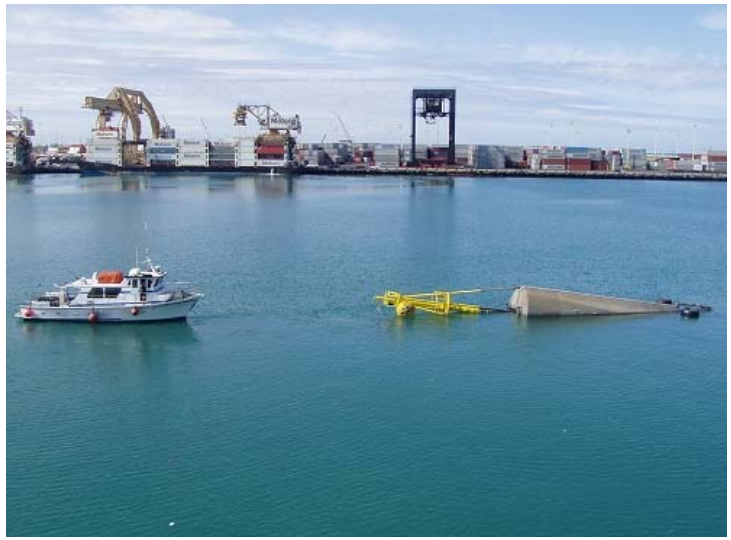
After Deployment

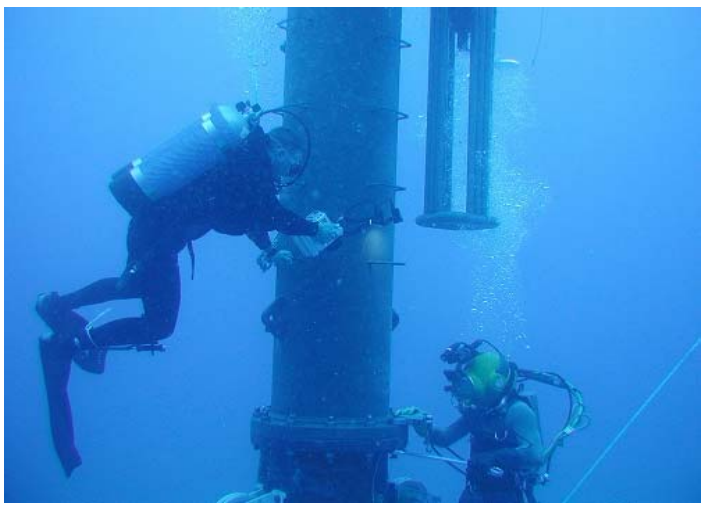
Point Absorber Wavebob

Point Absorber OSU PM Direct Drive

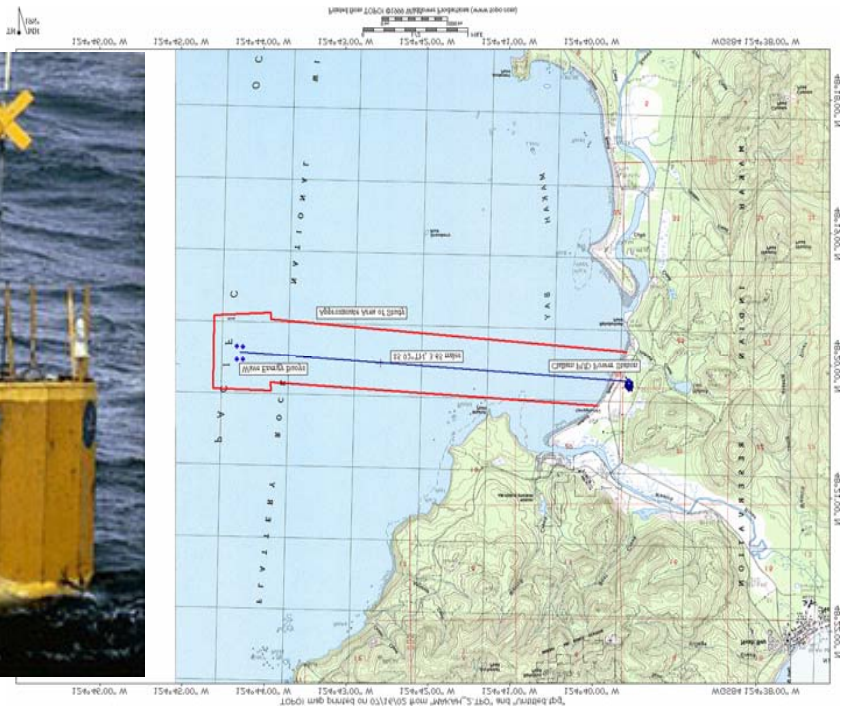


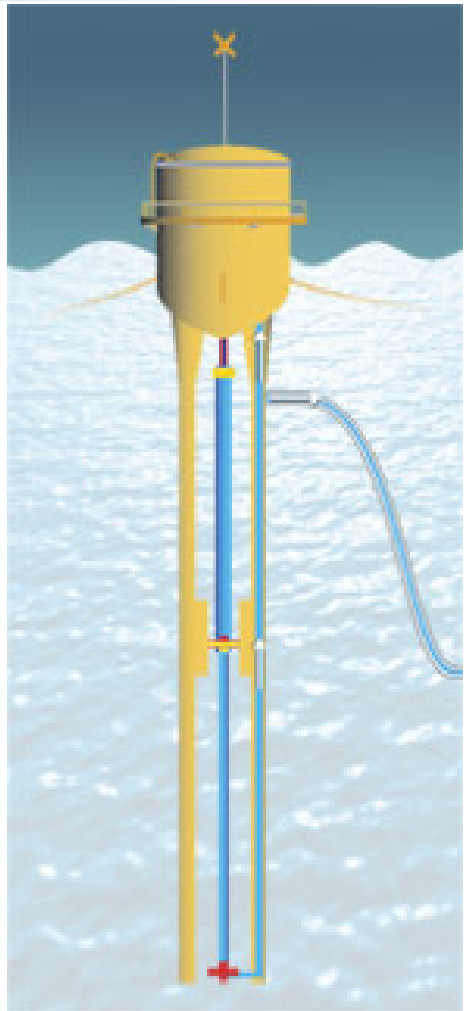
North America Wave Energy Projects
Kaneohe HI – OPT PowerBuoy





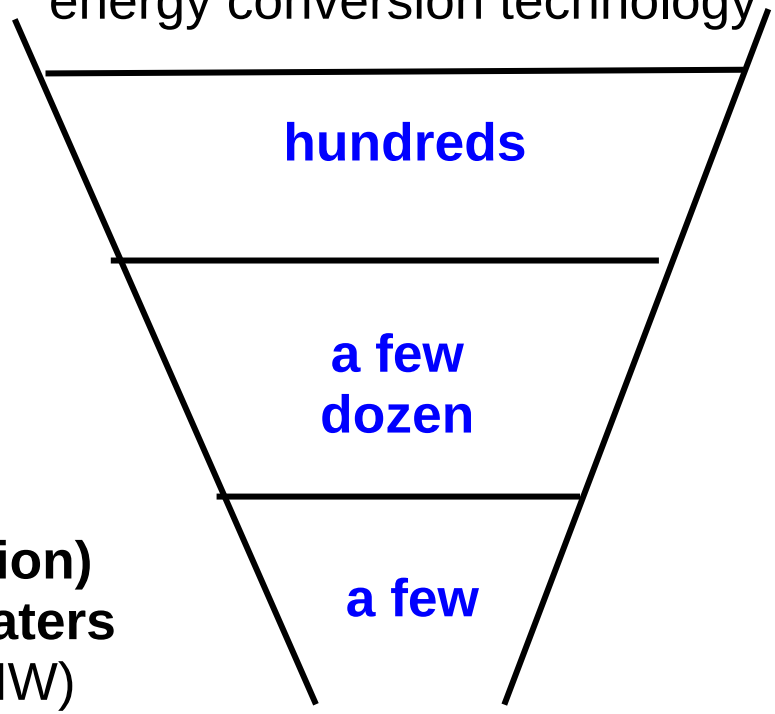
North America Wave Energy Projects
Makah Bay, WA – AquaEnergy AquaBuOY





Technology Development Status

Thousand of concepts and patents on ocean energy conversion technology



Rigorous laboratory tow- or wave-tank physical model tests
(1/50- to 1/5-scale)

Short-term (days to months) tests in natural waters
(typically 10 kW to 100 kW)

Long-term (>1 yr duration) prototypes in natural waters
(typically 100 kW to 2 MW)

It typically takes 5 to 10 years for a technology to progress from concept-only to deployment of a long-term prototype