The Promise of Wave Power

OSU Ocean Wave Energy Extraction Research and Plans

Lead Professors:
Annette von Jouanne, Ph.D., P.E., Alan Wallace, Ph.D.
School of Electrical Engineering and Computer Science
Oregon State University

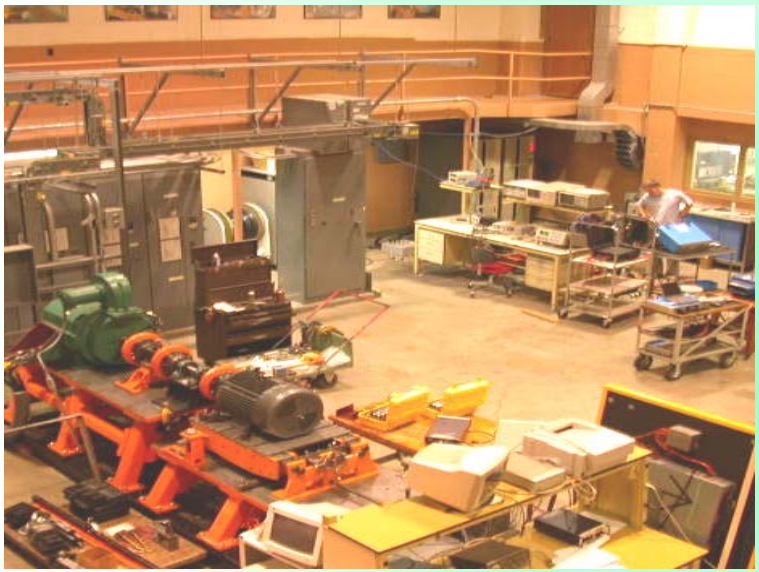
Current Graduate Students:
Emmanuel Agamloh, Dave Eveland,
Javier Moncada, Ken Rhinefrank

Current Undergraduates: Andrew Metzcus, Elisha Juve
Mike Langliers, Jason Haberkorn, Tan Ho, Tim Smith,
Adrian Aditya, Dan Wittmer, Mike Slevcove

Former Undergraduates: Joe Prudell, Kelly Kimble, Jess Aills,
Eric Schmidt, Palvin Chan, Brian Sweeney

OSU Strategic Facilities to Advance Wave Energy

OSU Facilities



Motor Systems Resource Facility (MSRF)

O.H. Hinsdale Wave Research Lab (HWRL)

OSU – Key Location for Ocean Wave Energy Research

Motor Systems Resource Facility (MSRF)

- **750 KVA Adjustable Power Supply**
  - •Variable Voltage input(0-600Vac), 600A
  - •3-phase adjustable (while loaded) for balanced and unbalanced testing
- **Highest Power University Lab in the Nation**
  - •Enables Multi-Scale energy research
- **Four Quadrant Dynamometer**
  - •Programmable torque/speed
  - •Dynamic Vector Controls 0-4000 rpm
- **Bidirectional Grid Interface**
  - •Regeneration back to the utility grid
- **Flexible, 300 hp, Motor/Generator test-bed**
- **120KVA programmable source**
  - •Transient V_{Lrms}=680V
  - •Steady State V_{Lrms}= 530V
  - •Frequency range: 45Hz to 2KHz
- **Planning and pursuing funding sources for a large scale linear Test Bed**

OSU – Key Location for Ocean Wave Energy Research

O.H. Hinsdale Wave Research Lab (HWRL)

- **Dimensions:342ft long,12ft wide, 15ft deep**
- **Wave period range: 0.5 to 10 seconds**
- **Max. Wave: 1.6 m (5.2 ft) @ 3.5 sec**

Oregon Ocean Wave Energy Stakeholder Collaboration

-First Meeting: Feb, 2nd, 2005

-OSU, ODOE, EPRI, BPA, Central Lincoln County PUD, NREL, PGE, Pacific Power (PacifiCorp), OR Dept. of Land Conservation and Dev. (including Marine Affairs), Army Core of Engineers (including environmental protection), Dept. of Fish and Wildlife, OR Dept. of State Lands, OR Economic and Community Dev., Energy Trust, Energy NW, Hatfield Marine Science Center

-Executing and developing a work plan and roadmap for implementation of responsible wave energy extraction.

-Outreach Presentations: Coastal Caucus Feb. 23rd, Florence City Club May 20th, Reedsport Aug. 19th, etc.

Port Liaison Project (PLP) Partnership

OSU is working with Oregon Sea Grant and the PLP to initially:

-Identify optimum Wave Park sites

-Provide technical expertise on buoy tethers, bottom anchors, mooring, maintenance of equipment etc.

OSU's Wave Energy Goals and Ongoing Efforts

- Establish US Ocean Wave Energy Research, Dev. & Demonstration Center
  - R&D Headquarters at Oregon State University
  - Electromechanical R&D and optimization including modeling, PTO etc., at Motor Systems Resource Facility (MSRF)
  - Wave Testing at O. H. Hinsdale Wave Research Laboratory
  - Wave Park for Research, Demonstration and Power Generation off Reedsport, OR

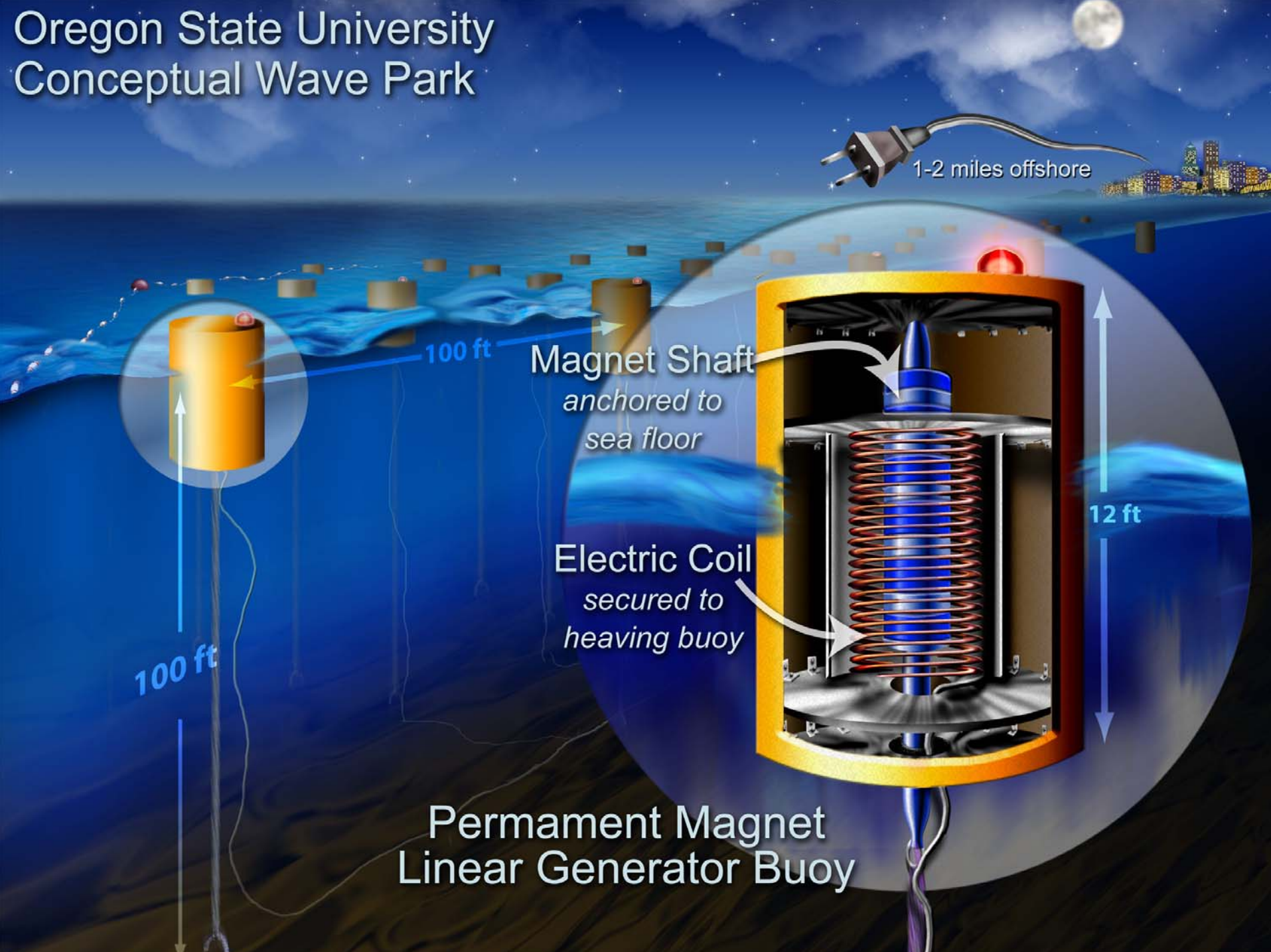
- Enable streamlined research to pursue optimum topologies (e.g. as occurred with wind turbine R&D), Collaborating with European Center (EMEC)

- Aid industry and government in comparing competing technologies

- Accelerate scaling devices to larger, and smaller applications
(ship and personal craft power, self powering of monitoring/sensor buoys etc.)

- Pursuing a Wide-Range of Funding Opportunities

Reedsport/Gardiner Site


Oregon State University
Conceptual Wave Park
1-2 miles offshore
100 ft
Magnet Shaft
anchored to
sea floor
12 ft
Electric Coil
secured to
heaving buoy
100 ft
Permament Magnet
Linear Generator Buoy