

**Ocean Technologies &
Product Development:
*The Offshore Energy Sector***

**Gloucester's New Maritime Port Economy
Summit
November 15, 2011**

**Stephen Barrett
Harris Miller Miller & Hanson Inc.**

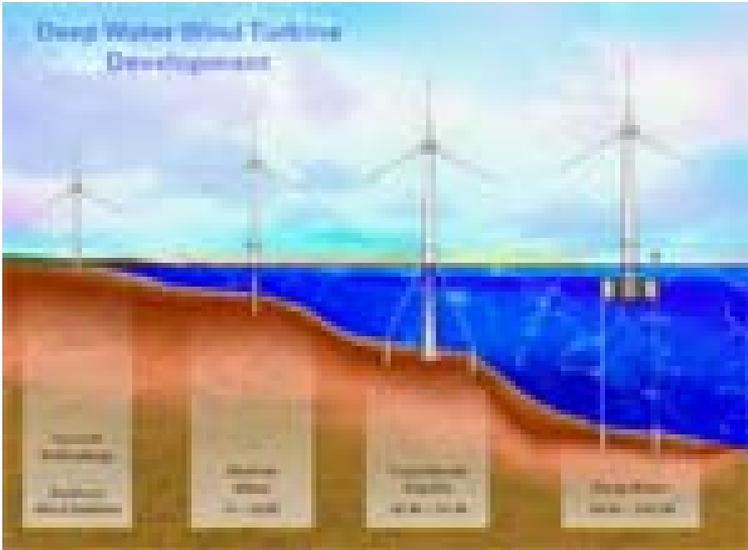
Ocean Energy

www.hmmh.com

- **Offshore Wind**
- **Tidal**
- **Wave**
- **Ocean Thermal**
- **Traditional Fuels**



Offshore Wind



Tidal

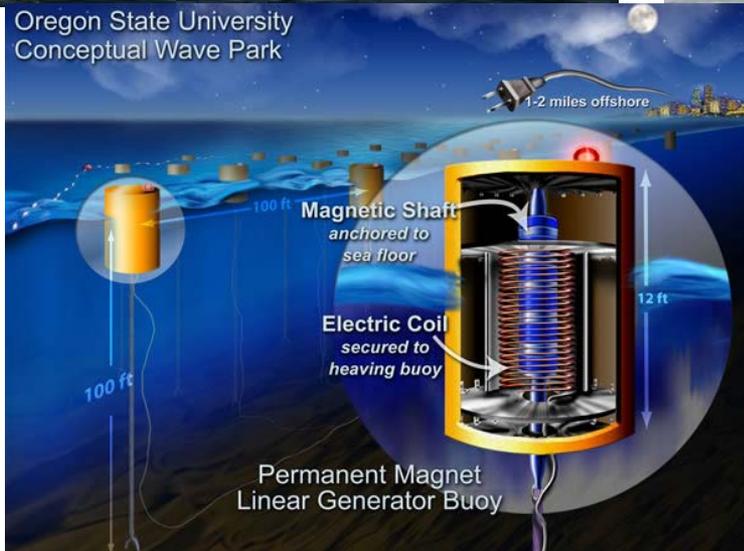
www.hmmh.com



Wave



Oregon State University
Conceptual Wave Park



Ocean Grid

www.hmmh.com



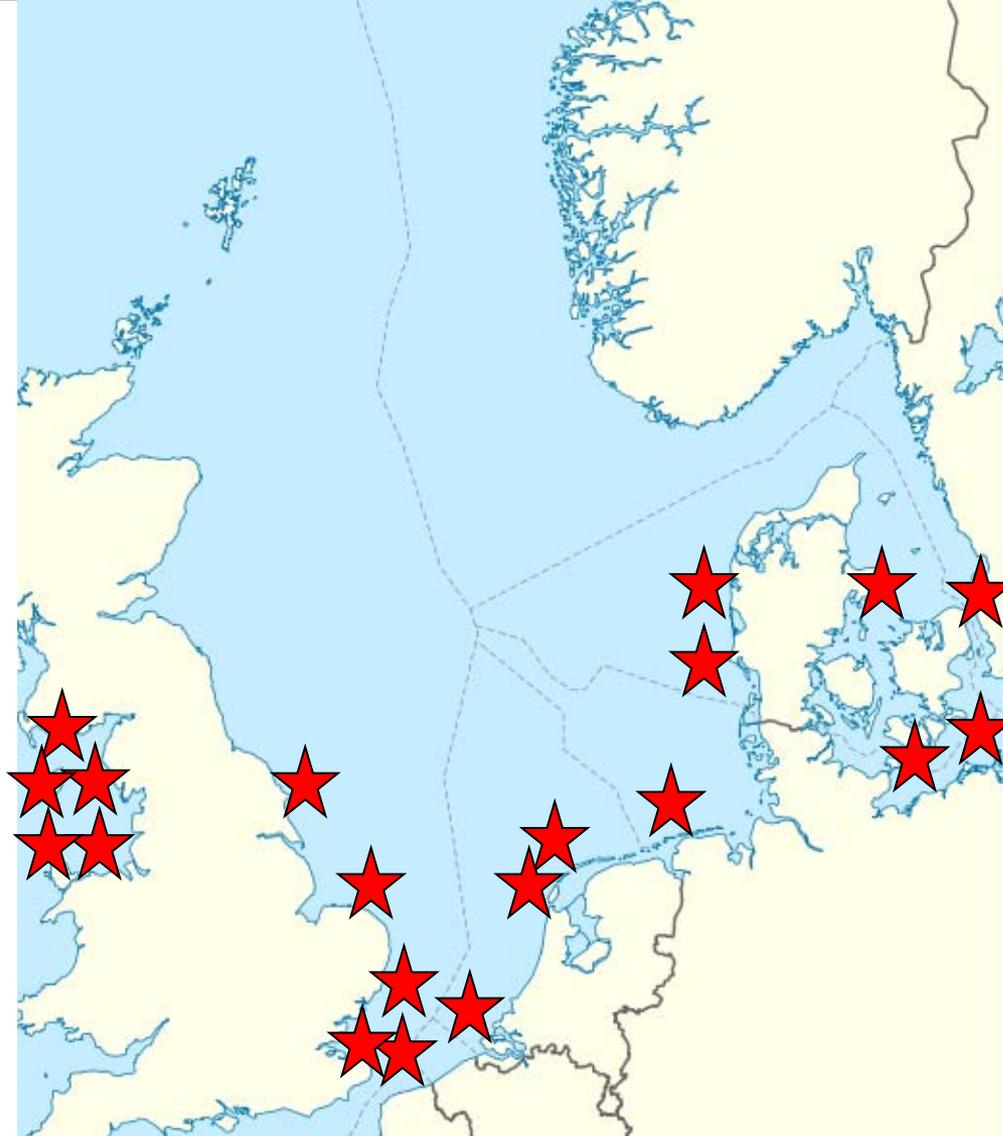
State of Development

www.hmmh.com

Technology	Europe	US
Offshore Wind	1247 turbines	0 Turbines
Tidal	1 commercial 1 test center 1 8 MW project in France (2012) 1 10 MW project Scotland (2013)	1 demonstration Several pilots in permitting
Wave	2.25 MW installed in Portugal 2008	40 kW OPT Marine Base in Hawaii 1.5 MW OPT in Oregon in permitting

Europe's Offshore Wind Farms

www.hmmh.com



Sea Gen – Strangford Lough, Northern Ireland

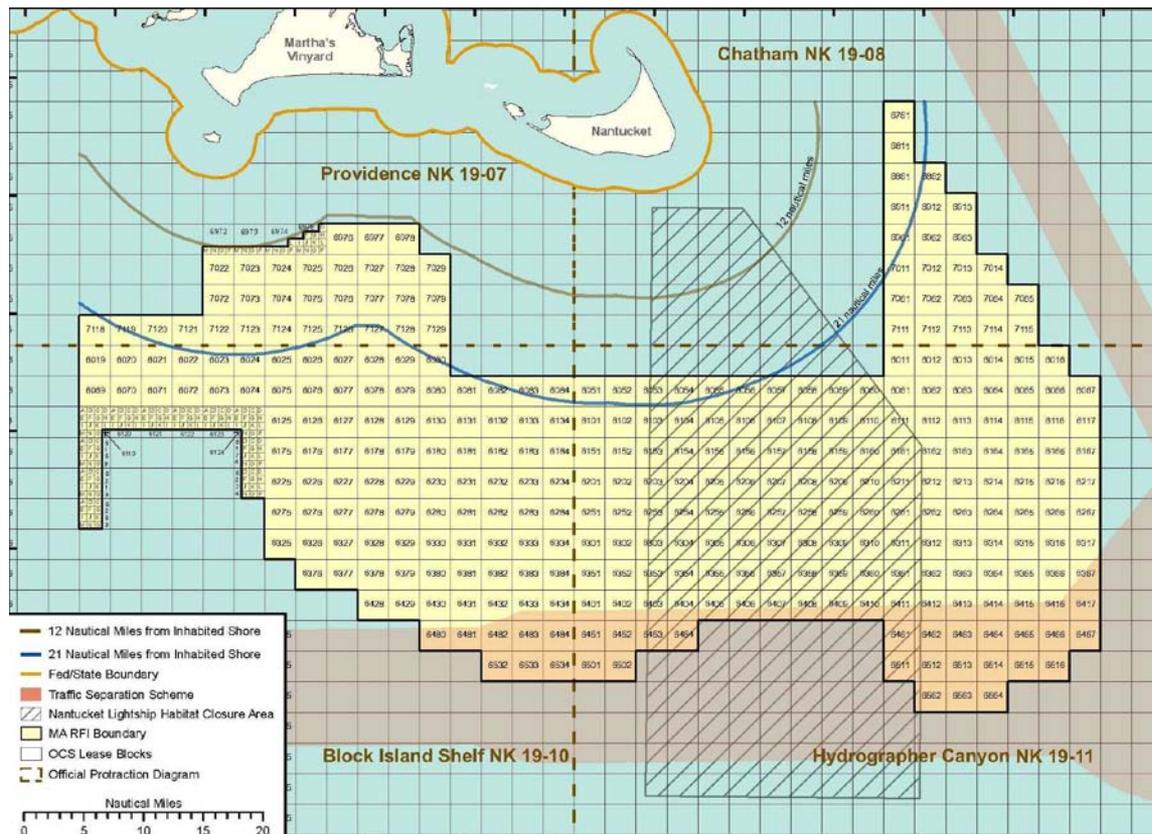
www.hmmh.com



20 Year Development Horizon

www.hmmh.com

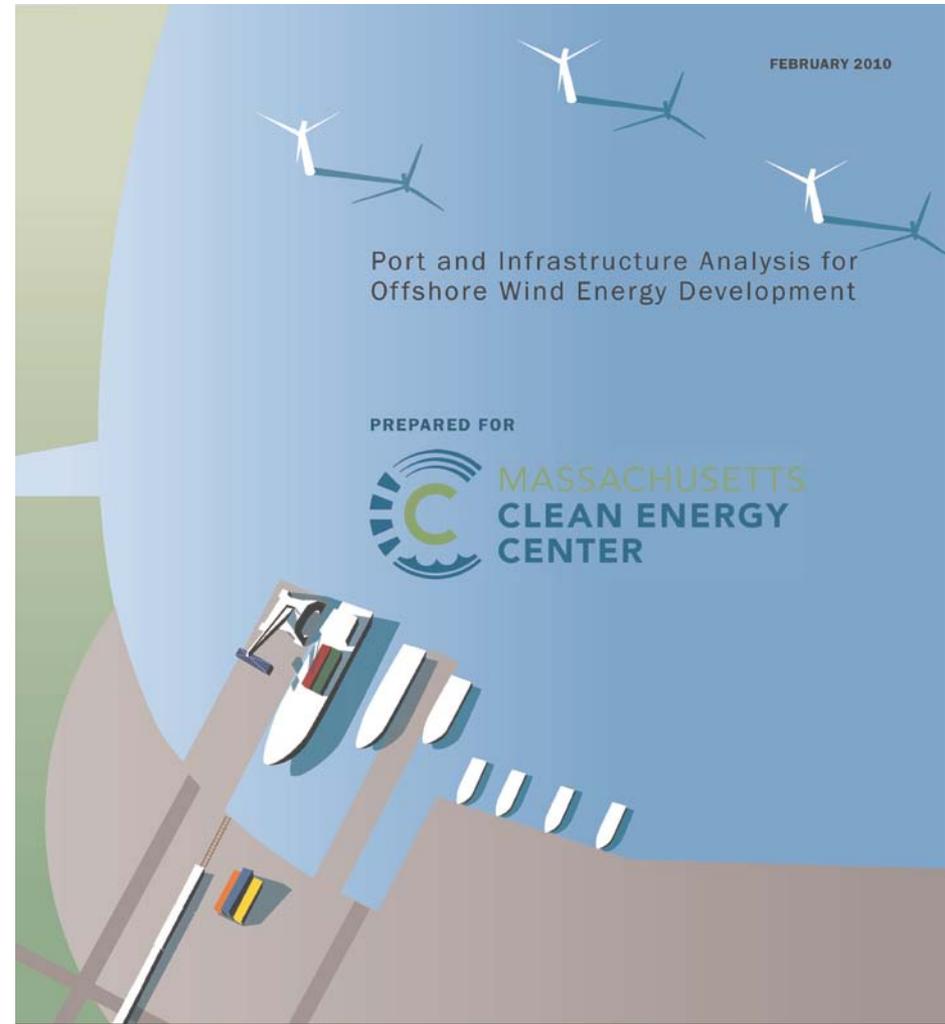
- Offshore Wind – 54 GW in US (~ 11,000 turbines)
- Tidal / Wave – 15 GW in US (30,000 – 60,000 buoys)



Implications for Ports

- Infrastructure
- New Brain Power
- Institutional Brain Power

www.hmmh.com



TETRA TECH EC, INC.

133 Federal Street, Boston, Massachusetts 02110

www.hmmh.com

Thank you