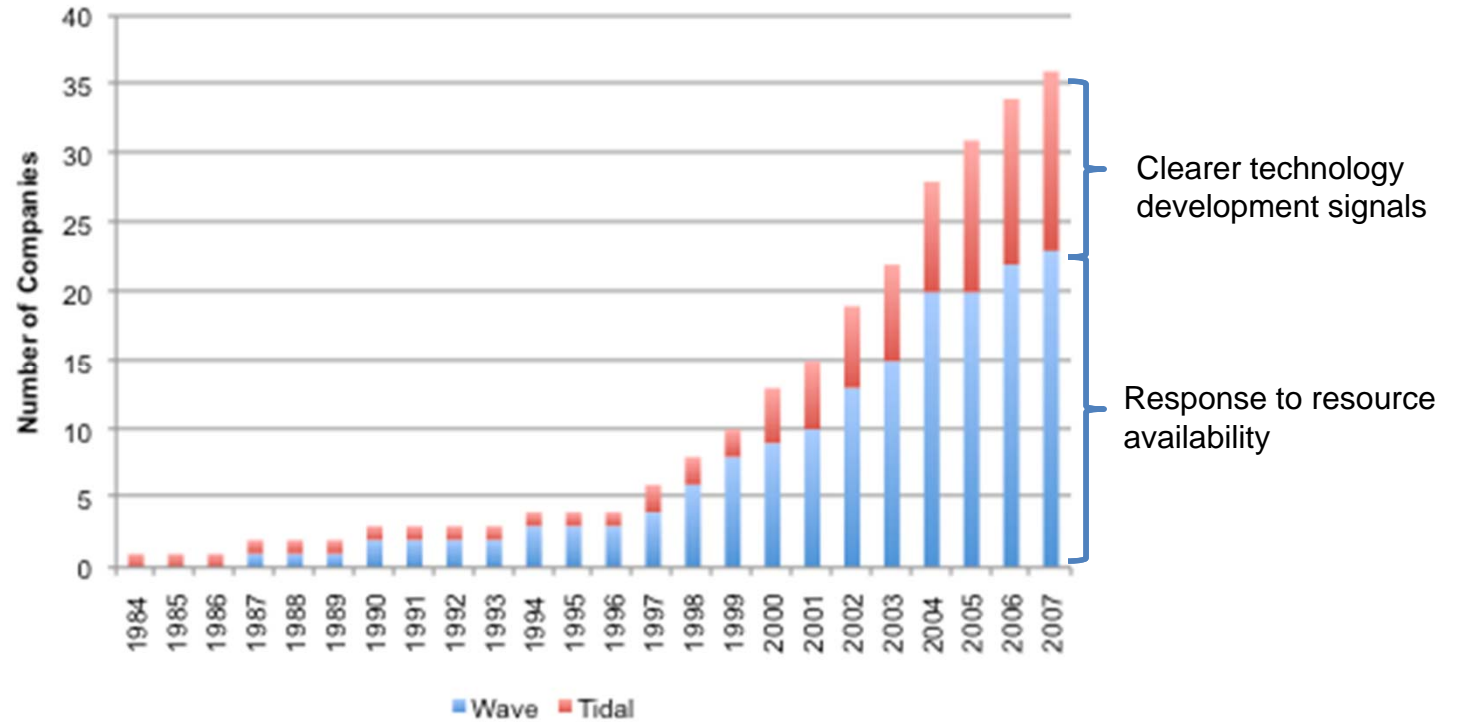


State of the Ocean Power Industry

Marine Renewable Energy Center – UMass Dartmouth
Monday, October 6, 2008

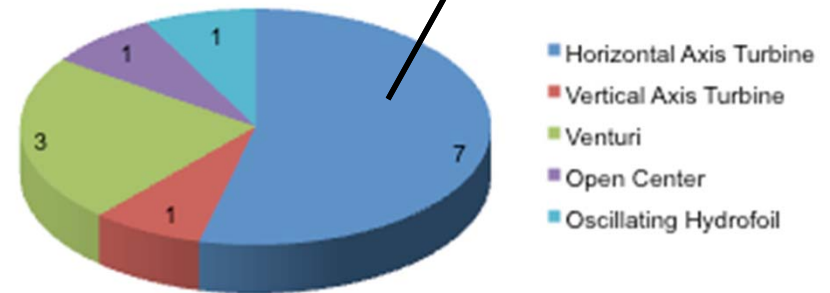
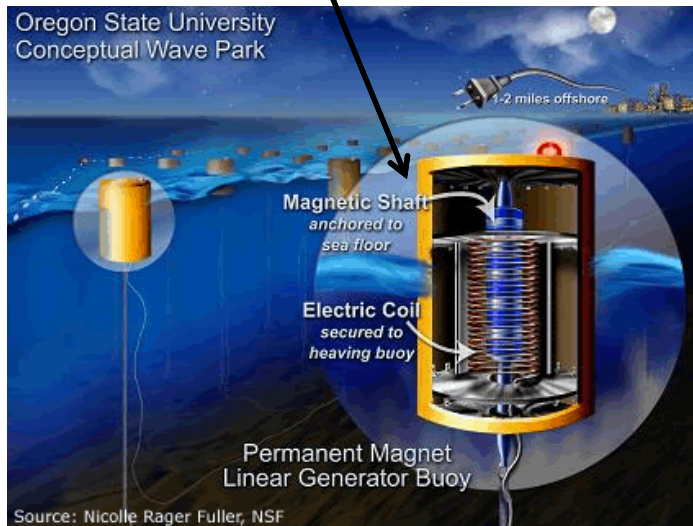
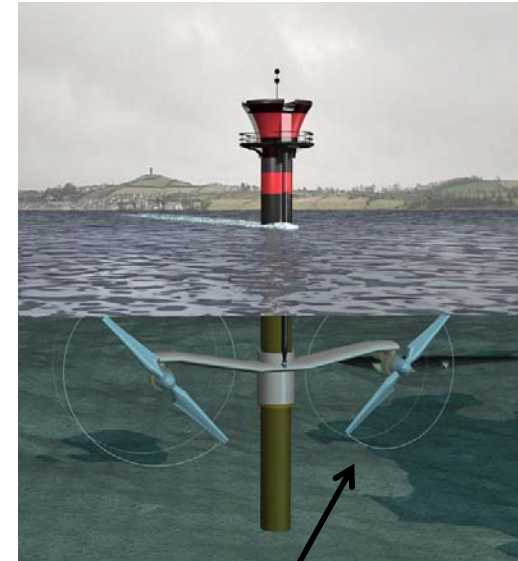
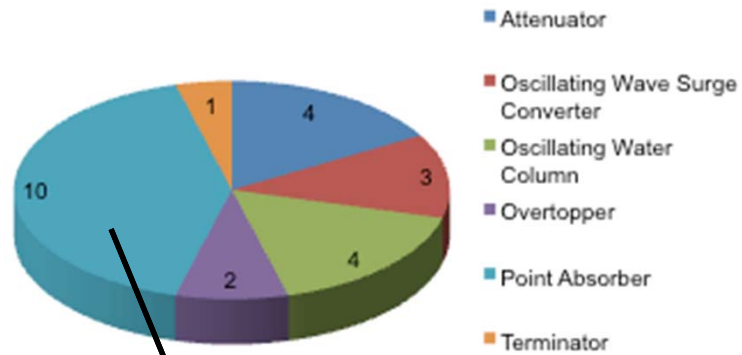
Daniel Englander
Analyst
Greentech Media

- 35 Companies + Strong New Entrants
- 11 Technologies
- 9 Countries
- \$500 Million Invested (2001 – 2008)
- 650 MW of Installed Capacity Announced by 2015

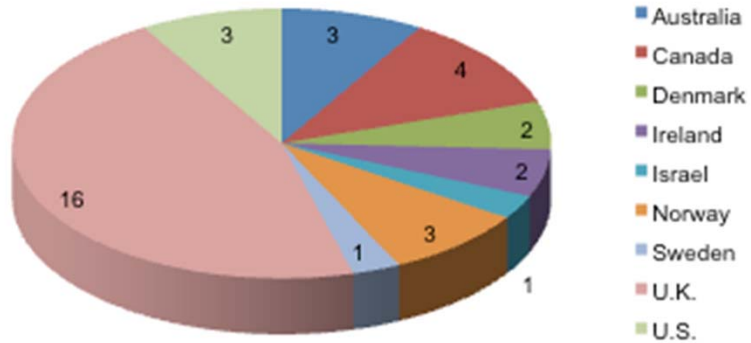


International Energy Agency estimates an additional 50 private, government, and university-backed research programs

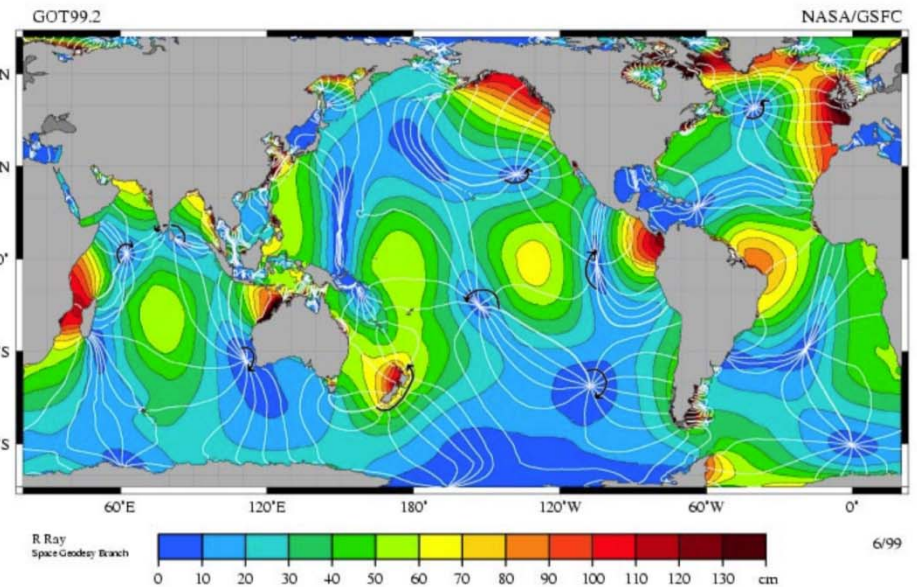
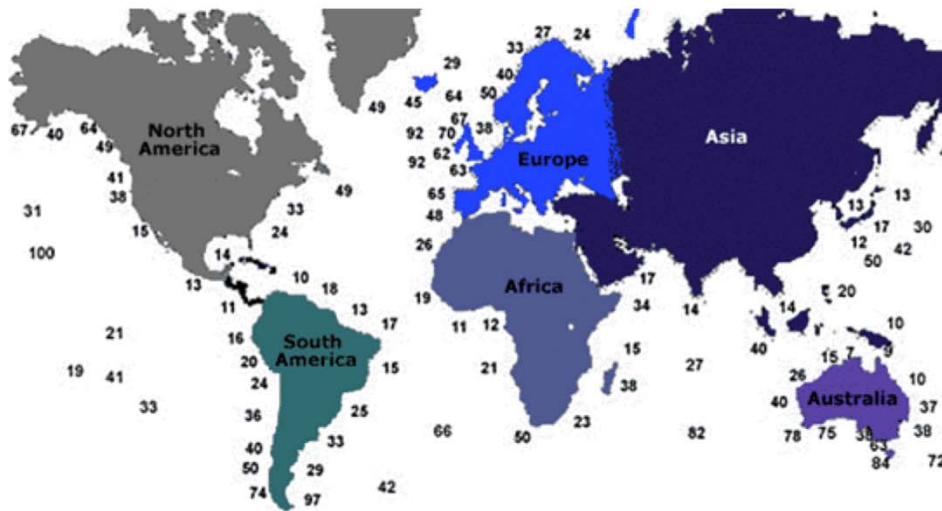
Distribution of technology types among companies



Global distribution of ocean power companies

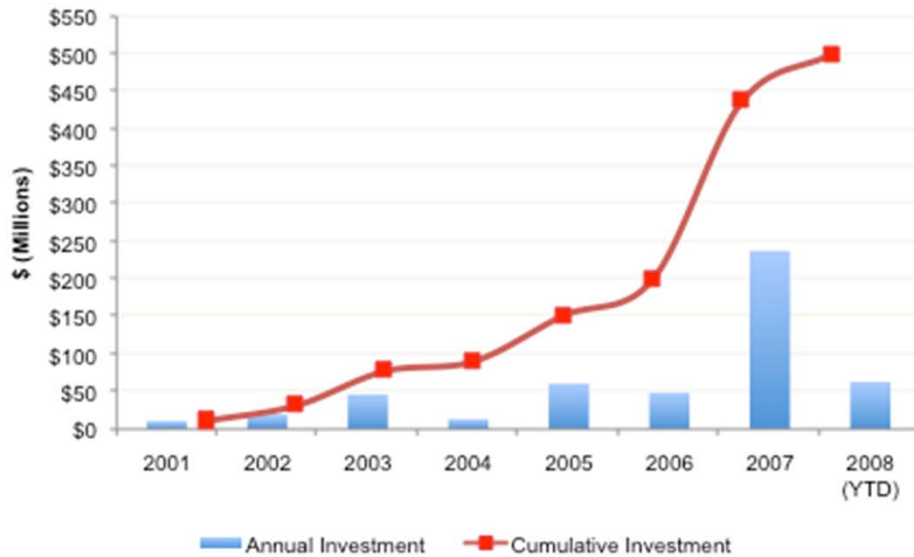


Significant correlation between market development and resource density





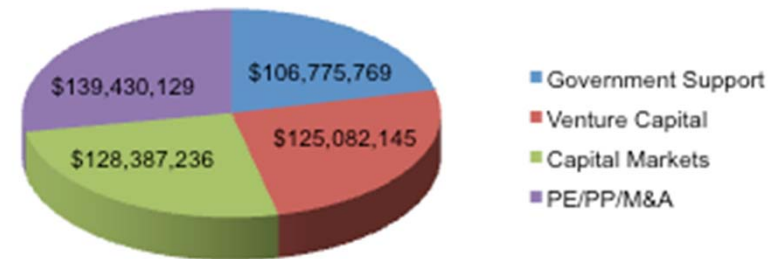
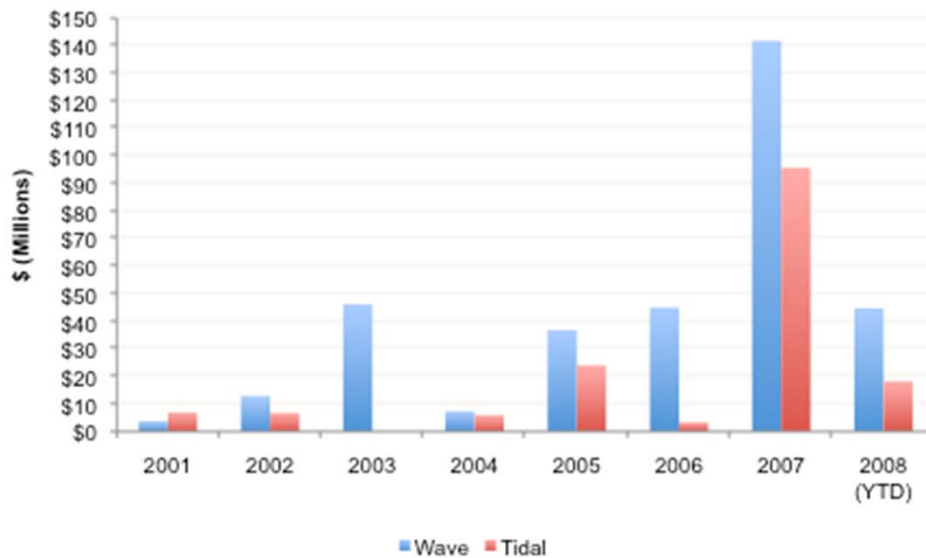
- 33 Announced Commercial Projects
- 9 Companies
- 650 MW of Planned Installed Capacity

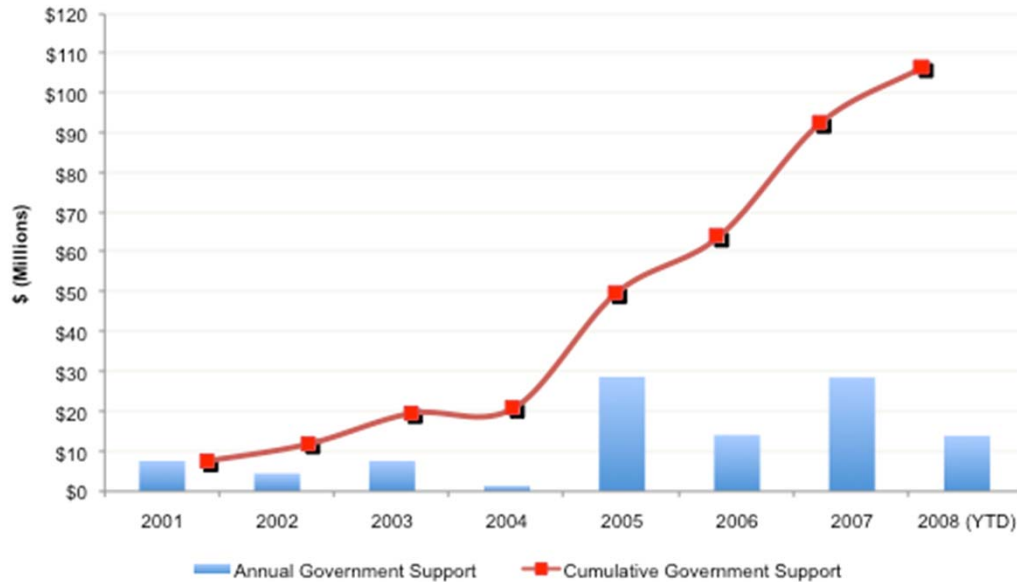


Investment inflow is currently the best way to track industry size, growth potential, and technology trends

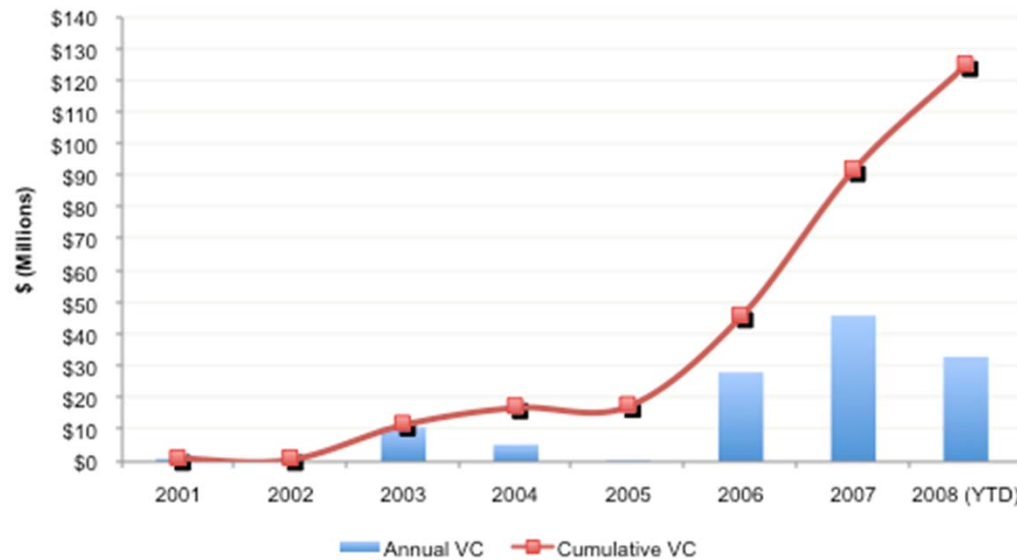
Investment is most active for early-stage companies and industry leaders

Supply chain financing partnerships reflect the need for innovative, integrated investment plans





Government support is targeted toward early-stage research and supporting commercialization and deployment



VC investment has picked up as the industry has started to shed its 'risky' image and commercial opportunities have started to become apparent

A scenario-based model for forecasting costs and capacity

- **Current Scenario:**

- Current average \$/kW installed system cost
- VC begins to supplant government support as primary investment driver
- Installed capacity continues apace

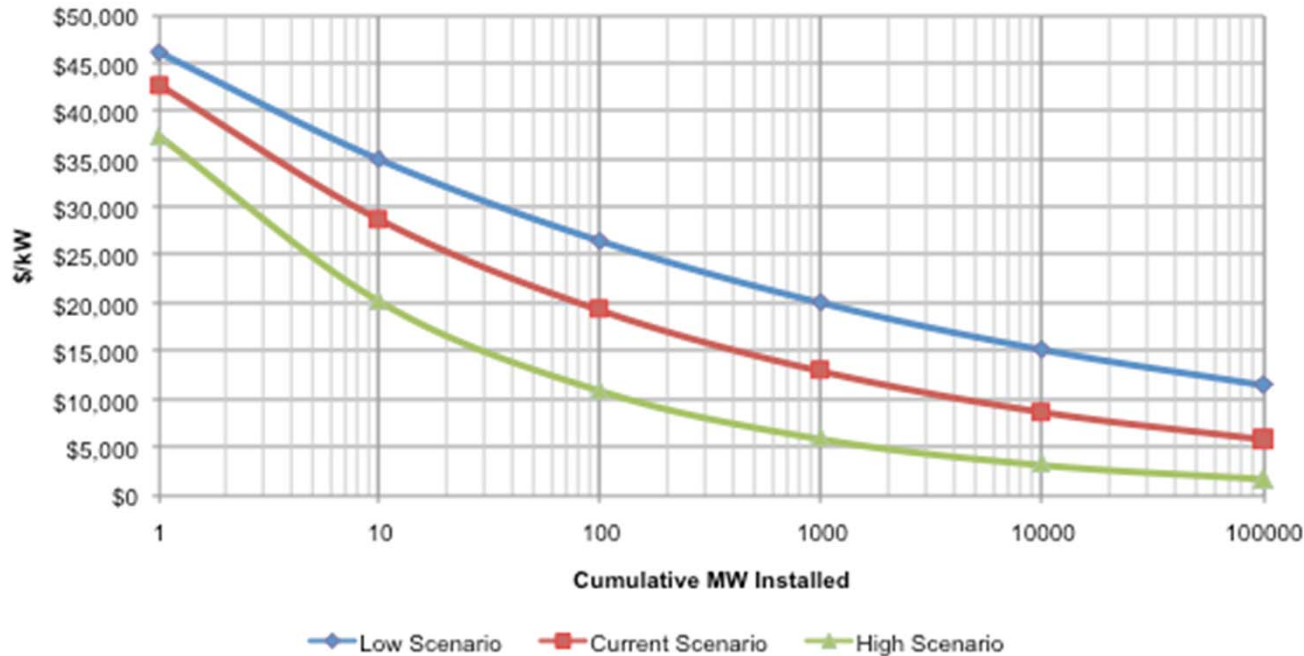
- **High Scenario:**

- Economies of scale drive \$/kW lower faster
- Quick convergence toward proven technology types
- Power sector buy-in and pressing RPS targets support rapid deployment

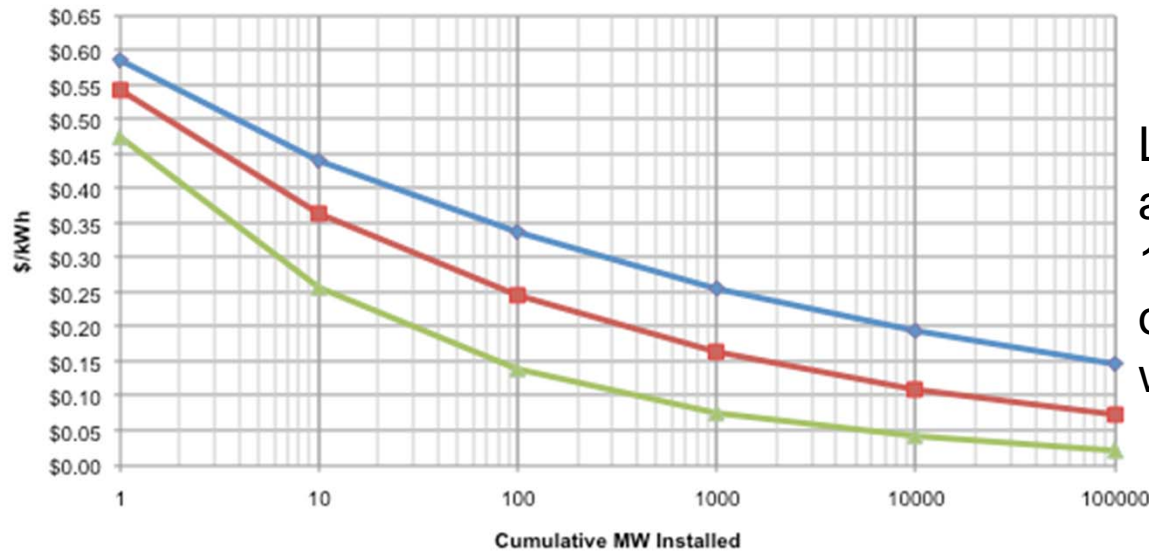
- **Low Scenario:**

- Marine and offshore industry sticks with shipbuilding, offshore rigs, wind (?)
- Innovation slows as VCs back off and government support for early-stage companies dries up
- Early commercial projects have modest success, onerous permitting continues, and government support fails to target significant deployment barriers

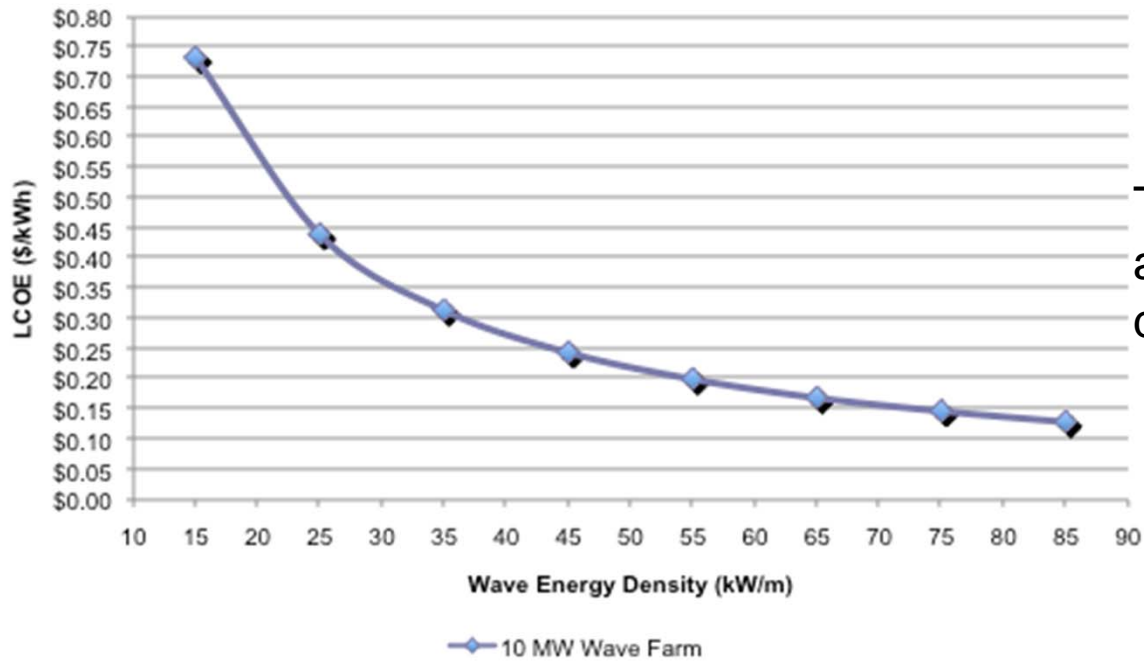
Experience/Cost curves for 10 MW Wave Farm



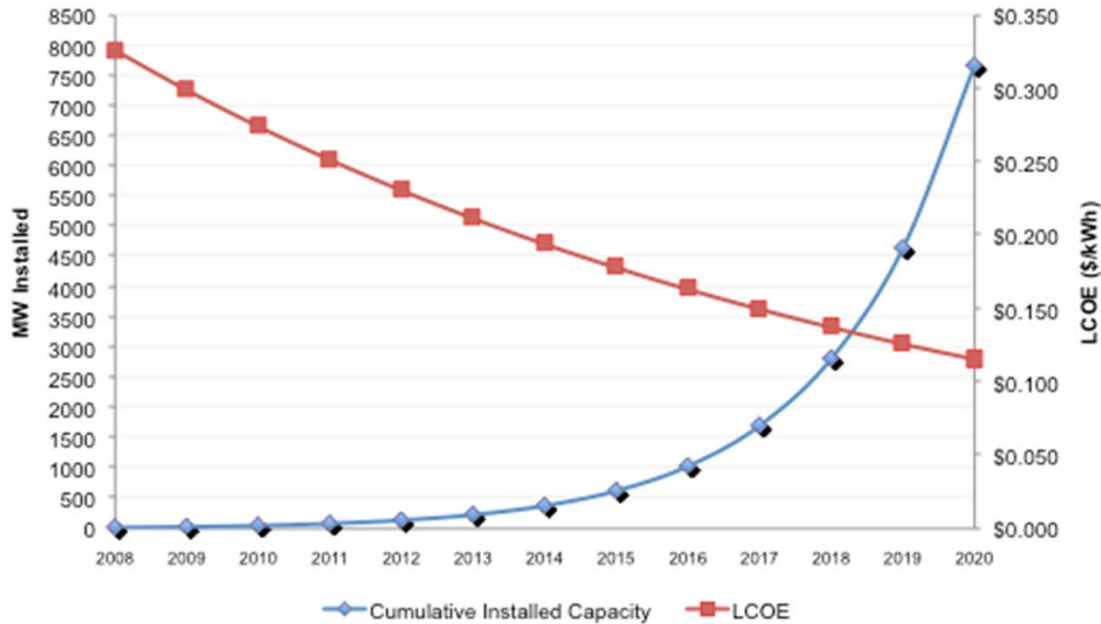
- Reflects argument that unit density will beat out area density in device sizing
- 1 MW is minimum economic size for repeatable unit
- 10 MW is minimum economic unit for array
 - Amortizes fixed costs (sub sea cabling, installation, shore-based distribution)
 - Scheduled O&M is cheaper than emergency O&M



LCOE analysis demonstrates absolute competitive potential at 1 GW installed capacity based on current scenario at 45 kW/m wave energy density



Though this could be earlier in areas with higher wave energy density



At 65% CAGR, \$0.15/kWh is possible by 2015 – 2016 in current growth scenario

Leads to \$500+ million per year market size by 2015, \$1.5 billion per year by 2018

This will come sooner in areas with higher electricity rates and greater resource density

But some challenges exist...

1. Availability of wave farms and testing facilities to mitigate technology risk
2. Early government support for grid extension, certification, accreditation
3. Removal of onerous permitting processes for testing, deployment, power sales

Thank You.

Questions?

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