



---

---

---

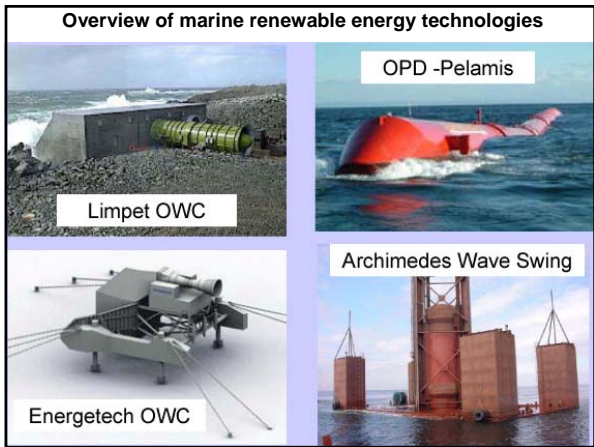
---

---

---

---

---



---

---

---

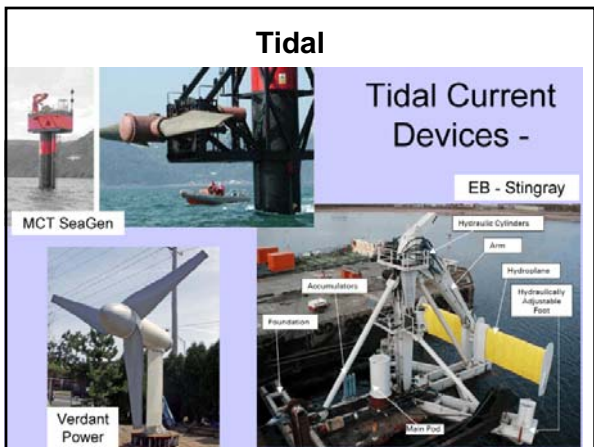
---

---

---

---

---



---

---

---

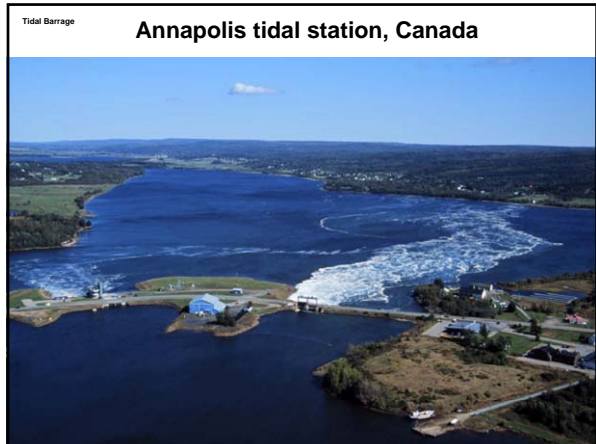
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

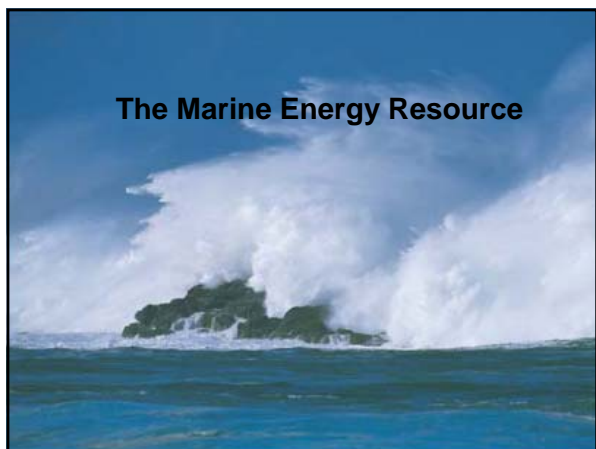
---

---

---

---

---



---

---

---

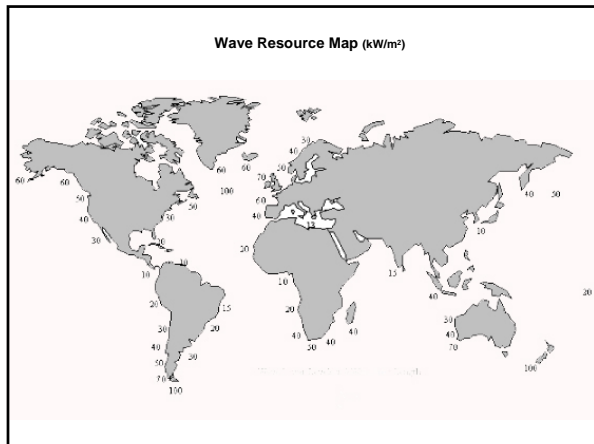
---

---

---

---

---




---

---

---

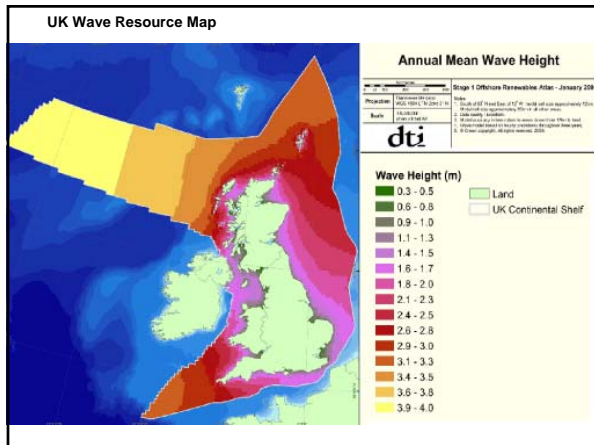
---

---

---

---

---




---

---

---

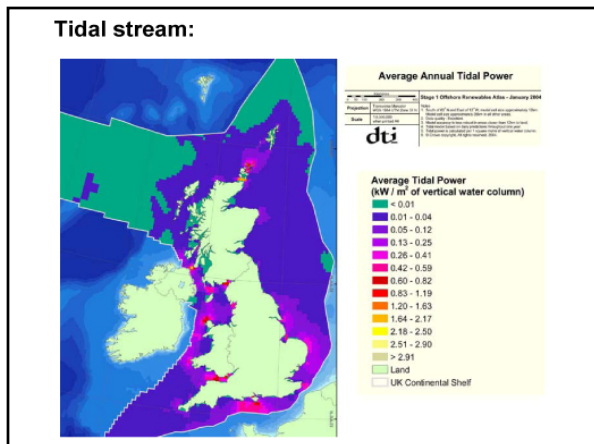
---

---

---

---

---




---

---

---

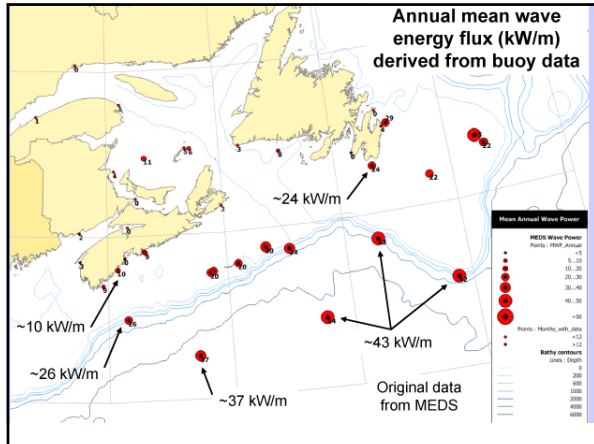
---

---

---

---

---



Future of the Wave Energy Industry?




---

---

---

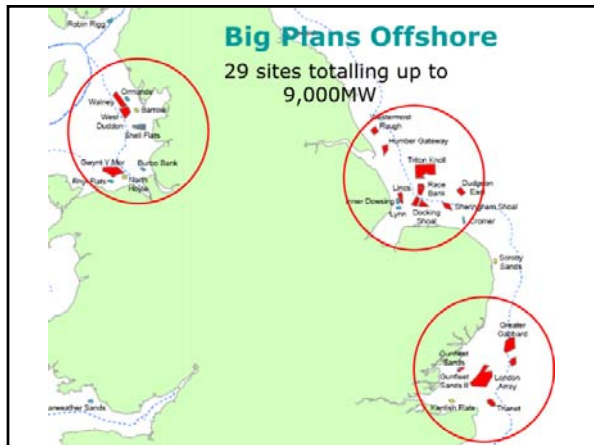
---

---

---

---

---




---

---

---

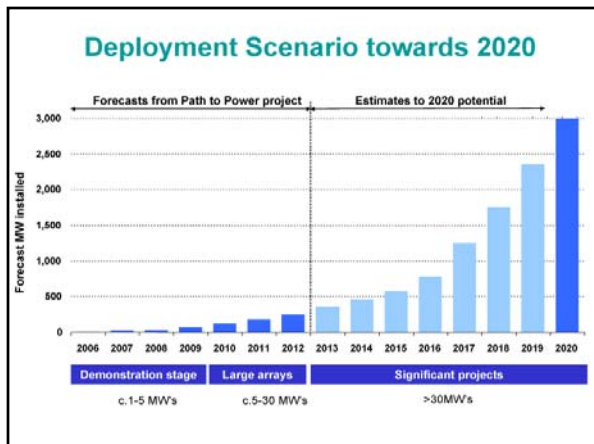
---

---

---

---

---




---

---

---

---

---

---

---

---

	Solar	Wind	Wave	Tidal Stream
<b>Development Status</b>	Early Commercial	Mature Commercial	Pre-Commercial	Pre-Commercial
<b>Source</b>	Sun	Uneven solar heating	Wind blowing over water	Gravity of moon & sun
<b>Annual Average Power Density</b>	0.175 - 0.2 kW/m <sup>2</sup> (fixed tilt at latitude Winnipeg - Calgary - Edmonton)	0.6 - 1 kW/m <sup>2</sup> (Rocky Mountains, offshore BC)	30 - 45 kW/m (Pacific Coast) 10 - 25 kW/m (Atlantic Coast)	4 - 9 kW/m <sup>2</sup> (Minas Basin) 0.5 - 2 kW/m <sup>2</sup> (other Fundy sites)
<b>Intermittency</b>	Day-night, clouds, haze, and humidity	Atmospheric fronts and storms (local winds only)	Sea (local winds) and swell (from distant storms)	Semi-diurnal (four daily peaks, flood & ebb, advancing ~50 min./day)
<b>Predictability</b>	Minutes	Hours	Days	Centuries

---

---

---

---

---

---

---

---

---

---

---

---



Clean & reliable power solutions  
utilizing ocean wave energy

---

---

---

---

---

---

---

---

---

---

---

---



### Introduction

- Long-term objective: sell to utility-scale wave energy projects
- Sister company of OWECO LLC
  - 2 patents (public domain) + 1 patent pending + trademarks
  - USCG contract (SBIR 1985) to develop ocean power systems
  - Prior affiliation w/URI & MIT
  - 25 years of R&D related to wave energy and OWEC devices
- Currently based in Watertown, MA & Bristol, RI
  - Regional center of excellence for marine industry
- Foerd Ames (founder)
  - Widely-known, well-respected industry leader
- Bill Staby (co-founder)
  - Successful entrepreneur/corporate development
- Presented @ "2<sup>nd</sup> Annual Conference on Clean Energy" 11/2006
- Short-term objective: "move ver. 4.0 from lab to salt water"

---

---

---

---

---

---

---

---

---

---

---

---



## Wave Energy

- Relatively unexploited clean energy source
  - Energy density highest of all renewable energy sources
  - Potential conversion factors highest of all renewable energy sources
  - Very stable & predictable energy source
  - Vast areas suitable for commercial development
  - Carbon-free
- Attractive Market (source: Carbon Trust report 2006)
  - Already cost competitive for off-grid consumers
  - Expected growth rates comparable to wind in 1980's
  - 3-4 gigawatts installed capacity expected in Europe by 2020
  - Worldwide revenue potential >\$50B/year
- Corporate investment
  - GE, Lockheed Martin, Siemens
- Significant advantages vs. other RE solutions
  - Continuous generation
  - Relatively low tech
  - No "NIMBY"
  - Minimal environmental impact
- Potential for US leadership role?

---

---

---

---

---

---

---

---

---

---



## OWEC® Advantages

- Designed for offshore deployment
  - 3x-5x wave energy vs. coastal
  - Relatively constant wave activity
  - Sufficient area to develop @ scale
  - Lowest environmental impact
  - Fewer siting & permitting issues
  - Co-locate with wind projects
- Conversion efficiency
- Manufacturability
- Deployment
- Operation & Maintenance

---

---

---

---

---

---

---

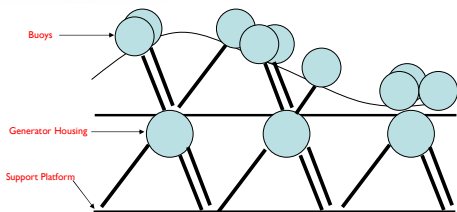
---

---

---



## OWEC® Efficiency



- Direct-drive, bi-directional generators (patent pending)
- Minimal interference with wave motion
- Effective in multi-directional wave patterns

---

---

---

---

---

---

---

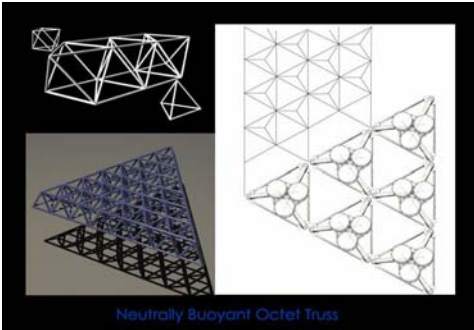
---

---

---



Supporting Framework



Neutrally Buoyant Octet Truss

---

---

---

---

---

---

---

---



Test Model



---

---

---

---

---

---

---

---



Test Model



---

---

---

---

---

---

---

---



### OWEC® Manufacturability

- High % of COTS components
- Conventional manufacturing
- Light final-assembly sections

---

---

---

---

---

---

---

---



### OWEC® Deployment

- Light, close-pack components
- Special purpose vessels not needed
- Simple on-site assembly/disassembly
- Slack mooring (low mooring cost/kWh)

---

---

---

---

---

---

---

---



### OWEC® Operation & Maintenance

- Modular design (“plug & play”)
- Scalable: micro to utility
- Controllable sub-surface support structure
  - Survivable
  - Tunable
- Easy access for maintenance & repair
- High array density – no risk of tangling
- No hazardous materials e.g. hydraulic fluid
- Low visual profile & quiet operation

---

---

---

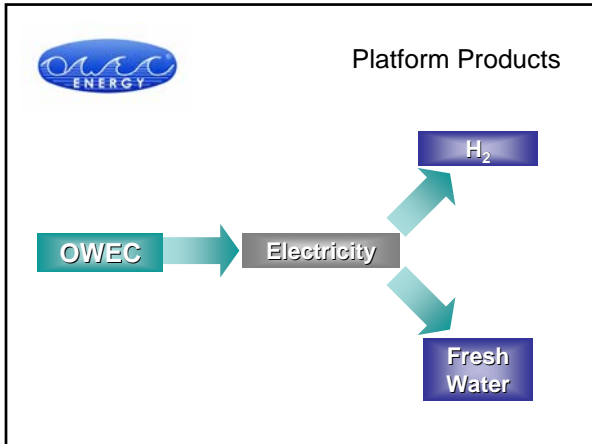
---

---

---

---

---




---

---

---

---

---

---

---

---

- 
- Markets**
- Small-scale deployment
    - Offshore sensing devices and navigation buoys
  - Medium-scale deployment
    - Offshore industry e.g. aquaculture, mineral exploration
    - Off-grid communities
  - Utility-scale deployment
    - Grid-connected electricity
    - Electrolysis (Hydrogen)
    - Desalination (Fresh water)

---

---

---

---

---

---

---

---

- 
- Intellectual Property**
- New patent application pending
  - "OWEC" trademark

---

---

---

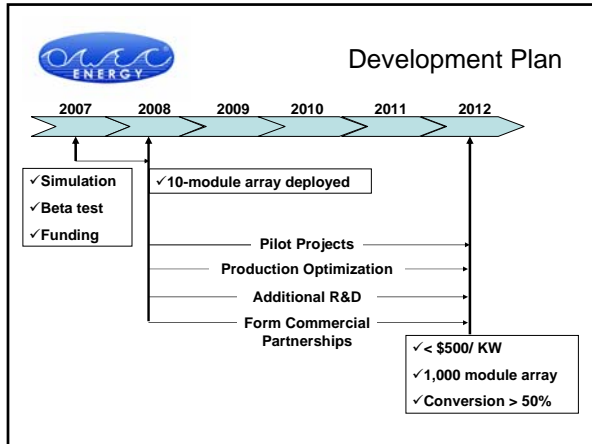
---

---

---

---

---




---

---

---

---

---

---

---

---




---

---

---

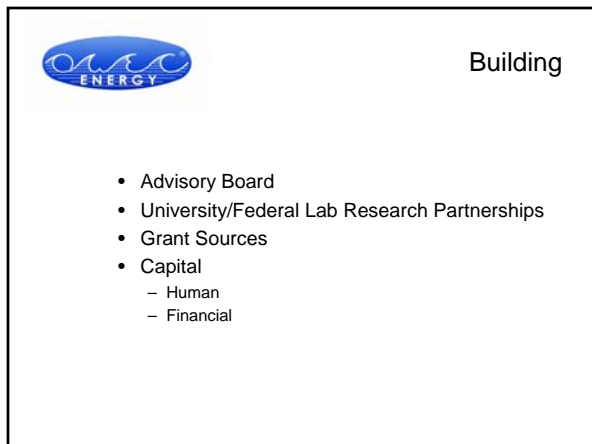
---

---

---

---

---




---

---

---

---

---

---

---

---



126 Summer Street  
Watertown, MA 02472  
(617) 393-0271  
wstaby@owec-energy.com  
www.owec-energy.com

---

---

---

---

---

---

---

---