Perspectives of the Wave Energy Centre (WavEC):

“small is beautiful…”

(Prof. em. Johannes Falnes, NTNU)
Once there was an idea...

2001...2003

Research institutions

Product and service suppliers

Project developers

Utilities

A not-for-profit association

Ambition to support launch of marine renewables

Industrial involvement sought... since ~year 2000 increased industrial interest

Founded 2003 without detailed mission statement

No direct public financing (only competitive calls)

100% private, quasi-self-sustaining

Frank Neumann (Associate Director WavEC)
2006...2008

WavEC has found its reality

15 staff (2-3 admin); Director “externo”

Main activities of the Wave Energy Centre (WavEC):

- Monitoring
- Due Diligences and Strategic studies
- Numerical Modelling
- Training & Dissemination
- Environmental Impacts
- Public Policies and Economics


Frank Neumann (Associate Director WavEC)

“2 MW’’ AWS prototype, offshore Portugal
Wave Energy Centre involvement:
• Monitoring and evaluation of device performance

2004 – 2006...

400 kW pilot plant, Azores, Pico island
Wave Energy Centre involvement:
• Submission and coordination of a project financed by the Portuguese DEMTEC/PRIME program to refurbish the plant with support of EDP, EDA, EFACEC, Kymaner, IST, Irmãos Cavaco and INETI
• Monitoring and evaluation of device performance

Since 2007

Real-sea monitoring as strategic priority
• Marginal participation in public-funded part of 3-Pelamis-farm
• FP7-TREN: SURGE & Waveport projects: monitoring of prototypes
The Pico OWC: from FROG to PRINCESS?

Milestone 2009 | Problem of vibrations of the turbo-generator group solved
Milestone 2010 | Autonomous operation of the plant → full yield of objectives
Perspectives | European testing infrastructure within the new Offshore Energy Institute

Dia 20 de Maio: Seminário e Demonstração no Faial/Pico !!!
Wave energy and the unXpected-factor

- Straight-forward transfer of technology from Offshore sector unlikely  
  (Wave energy needs to be “where it hurts” → adjacent to water surface)

- Offshore technology (and expertise?) yield different cost levels

- Near-term objectives often not realistic compared to former experience

- Contingency funding absolutely vital for successful early-stage deployments (investor’s responsibility... Why no provision with public funds?)

- Know-how often too concentrated in small, ‘unstable’ companies  
  (Acquisition of O&M know-how of independent institutions is vital for progress)

- Wave energy (and other MRE?) is a LONG-TERM investment!!  
  (VC an appropriate solution??)

- There is at least one certainty: Overconfidence doesn’t pay!

- “Semi-controlled” fully exposed test centres can fill important gaps  
  (Developers can concentrate on demonstrate and further develop technology)
The need for **independent** test centres: example Europe

<table>
<thead>
<tr>
<th>Location</th>
<th>Name</th>
<th>Year</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Orkney, Scotland</td>
<td>EMEC - European Maritime Energy Centre</td>
<td>2003</td>
<td></td>
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<tr>
<td>Orkney, Scotland</td>
<td>Bimullet Real Scale Test Site</td>
<td>2009</td>
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<tr>
<td>Ireland</td>
<td>Galway Bay Wave Energy Test Site</td>
<td>2004</td>
<td></td>
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<tr>
<td>South West of Cornwall</td>
<td>Wave Hub</td>
<td>Approved in 2007</td>
<td>planned for 2010</td>
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<tr>
<td>Spain</td>
<td>Bimep - Biscay Marine Energy Platform</td>
<td>2008</td>
<td>2010</td>
</tr>
<tr>
<td>North western corner of Denmark</td>
<td>Nissum Bredning Wave Energy Test Site</td>
<td>2003</td>
<td></td>
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<tr>
<td>Portugal São Pedro de Moel</td>
<td>Portuguese Pilot Zone</td>
<td>2008</td>
<td>2010</td>
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<thead>
<tr>
<th>Site</th>
<th>Investment levels</th>
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<tr>
<td>Wave Hub</td>
<td>10~20+ M€</td>
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*SEM-REV - Site d’expérimentation en mer pour la récupération de l’énergie des vagues, Le Croisic | 2008 - 2010*
Most vital capacity for ongoing development phase: **REALISM.**

- 1885: First motor car
- 1908: First car in serie
- 1888, 12 kW
- 1941, 1.25 MW
- 70’s/80’s, 30 kW
- 2007, 5 MW

...should we not expect some difficulties??

Frank Neumann (Associate Director WavEC)
Strategic Priority: Floating Offshore Wind

- Offshore wind traditionally not considered viable in Portugal (steep coast)
- Floating offshore wind (FOW) has been undergoing considerable advances
- WavEC study for EDP (2007/08) indicates FOW as promising option in PT

Hywind Statoil Hydro (NO)
WindFloat Principle Power (USA)
Wave energy economic potential could cover around 10-20%.

Offshore wind economic potential similar to actual electricity demand.
The financial truth of WavEC... Vision?

- Strong focus on human resources (key to continuity)...
- Need of infrastructures to build/maintain critical mass

- Strong dependency on (EC) public funding
- Associates’ role ???

- NOT EXACTLY BUILT ON ROCK!

Evolution towards Offshore Energy Institute

Frank Neumann (Associate Director WavEC)
Conclusions

• WavEC can be considered as an entity with a proven international track record.

• Evolution towards infrastructure and professional management is vital.

• Competence network is vital (IST, INEGI, UA, LNEG, specialised companies, ...).

• Wave Energy and Floating offshore wind will be focal points of activity.

• Monitoring of field testing is a vital component for the regional future in the sector.

→ INVESTMENTS HAVE TO BE MADE / NO short-term profitability expected.

→ Commitment of private sector and government have to be substantial.

Unsolved Problem or Promising Future?

Thank you.

Frank Neumann (Associate Director WavEC)

http://www.pico-owc.net ➔ livecam Pico OWC & online production graphs

http://www.climaat.angra.uac.pt/ ➔ online wave buoy data Pico/Faial & wave predictions