

Project Development in Wave Energy

Pacific Islands and Indian Ocean Studies

PECC – Auckland December 2009

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Contents

- Who we are
- Wave Energy Feasibility studies
- Pelamis technology
- Project development case studies
- Hurdles to overcome





Who we are...

- Created in 2005
- Specialised in Marine energy, Energy Efficiency and climate change services
- 5 engineers and a team assistant
- Both public and private customers



**Energy and Climate
Change consultant**

Our services



ENERGY

- Renewable Energy – in particular wave energy
- Energy efficiency
 - Energy Audits,
 - Building design
- Project management for energy efficiency implementation
- In situ measuring campaigns
- Consultancy -Training

CLIMATE

- Carbon foot print assessments
- French Agency for Energy management and environment
Partnership with CITEPA
- Carbon consultancy
Partnership with South Pole Carbon

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Wave energy feasibility studies

Project management skills and good technical knowledge in various areas

- Wave resource assessment
- Bathymetry
- Sea bed Survey
- Environmental impact assessment
- Cable dimensioning / cable route
- Grid connection
- Power Purchase agreements
- Permitting for sea and land usage
- Installation
- Operations and maintenance
- Business plan



Wave Energy Technology

- Various technologies being developed
- Distribution and Feasibility studies agreement with Pelamis Wave Power



- PWP – 70 staffs
Created in 98



Leith-Edinburgh-Scotland –
PWP plant and offices



Pelamis Technology development

1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Concept development

Primary R&D & modelling



7th-Scale prototype

Full-scale R&D & design

Full-scale joint test



Production prototype

Cost reduction & performance enhancement

First commercial sale

'Hands free' mooring system

P-2 Development

Second commercial sale



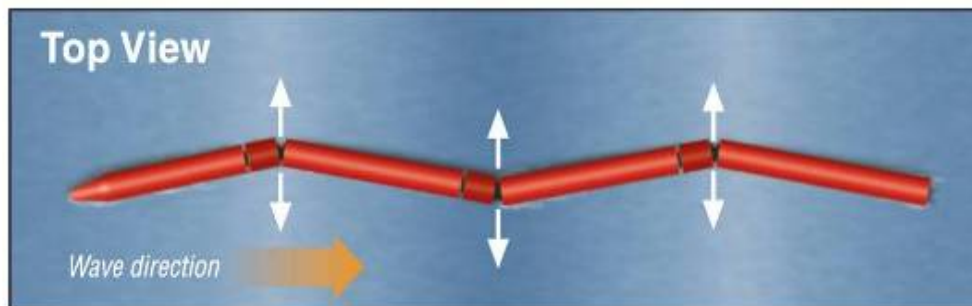
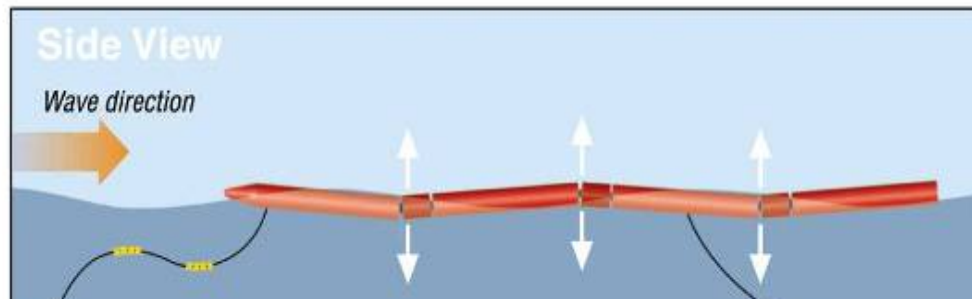
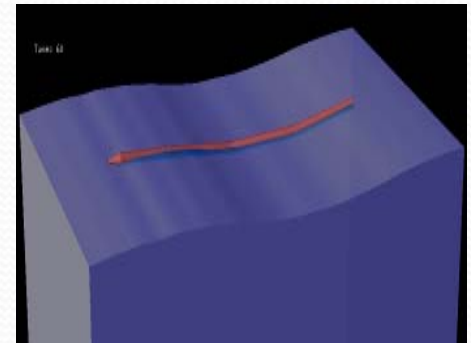
PWP Investors

- To date: ~£45m of private sector investment and contracts
- Source of funds: UK, USA, Switzerland, Italy, Norway and Portugal
- ~£3m of UK government DTI development contracts since 2001



Pelamis WEC Technology : P1

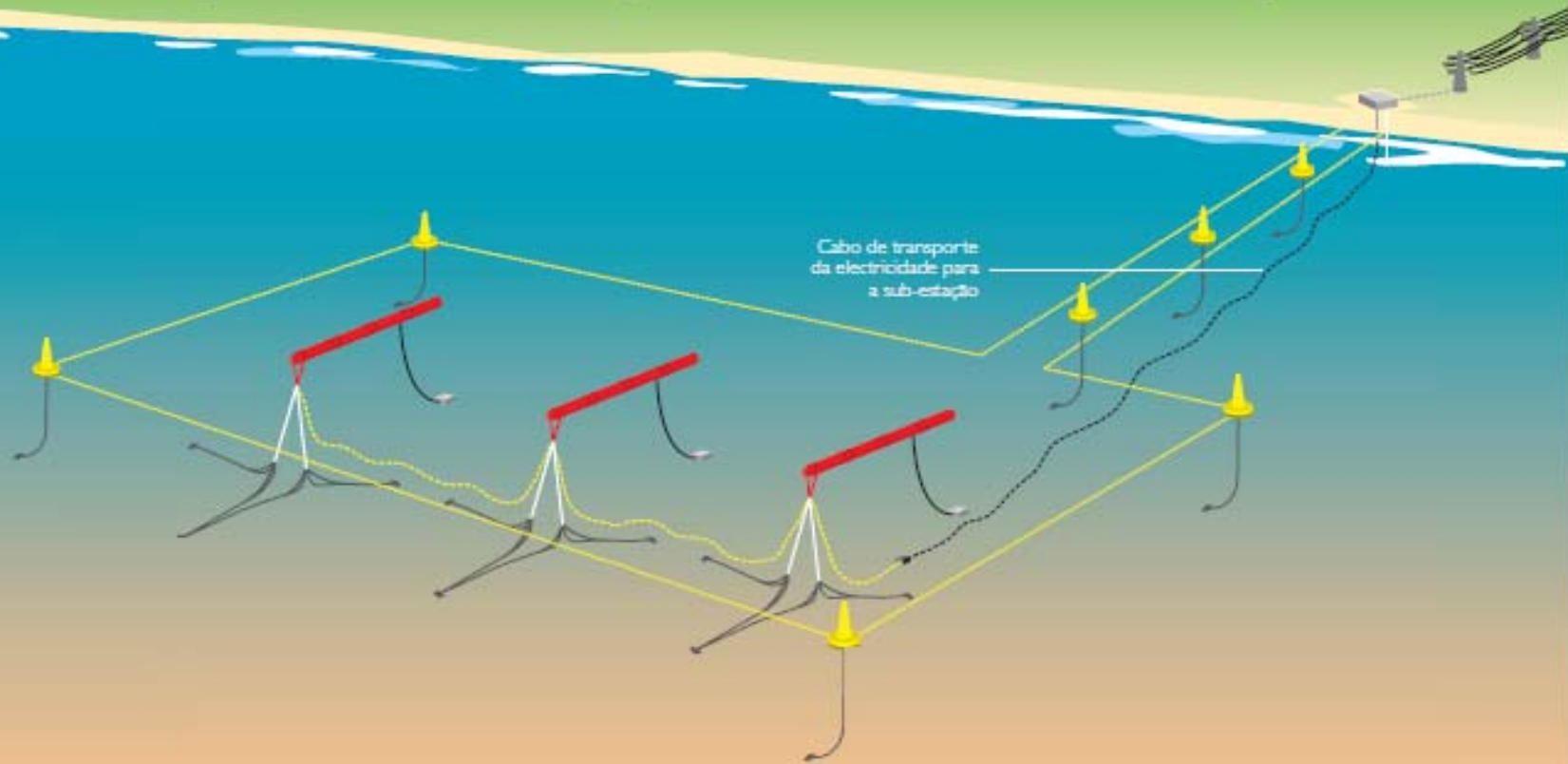
- Articulated cylinder via hydraulic rams
- Swings head-on to incident waves
- 4 x main segments, 3 x joints
- Wave induced joint motion resisted to absorb power



- 140m long, 3.5m diameter
- 750kW rated power
- Capacity factor 0.25-0.4

First commercial wave farm

ESQUEMA DO PARQUE DE ONDAS DA AGUÇADOURA



- July 08 to November 08

Portugal



2nd Commercial Order

- Announced 9th February 2009
- E.on – world leading utility
- Next generation machine – the P-2
- Significant improvements to energy capture, manufacturability and cost effectiveness
- Machine construction commenced
- Will be put through its paces and operated at EMEC, Orkney in Easter 2010

The E.ON logo is displayed in a bold, red, lowercase, sans-serif font. The letters are slightly italicized, giving it a dynamic feel. The logo is centered within a white rectangular box.

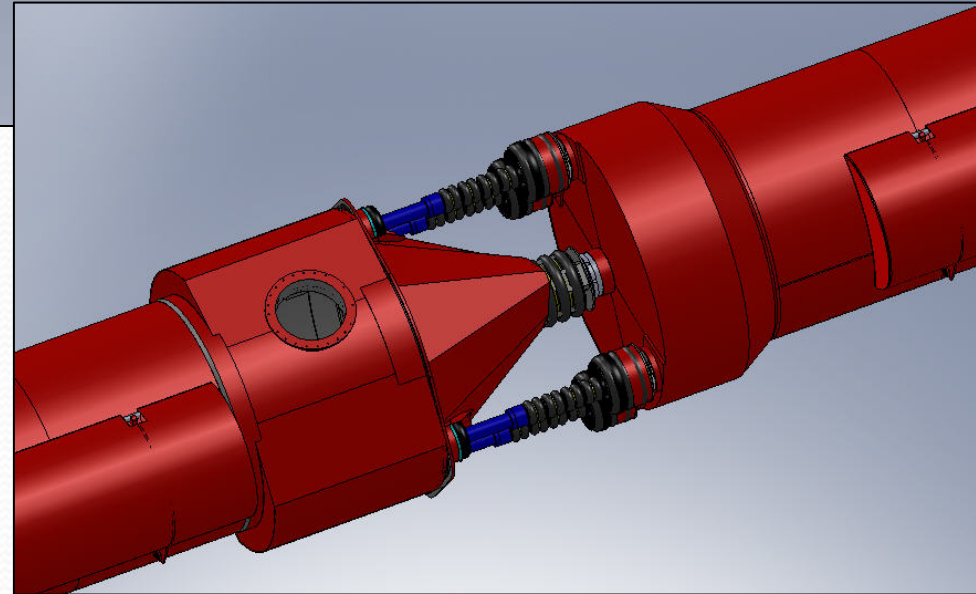
Pelamis WEC Technology : P2



2nd generation machine :

- Built on Portuguese experience
- Increased power output – up to 45% power factor
- Easier and cheaper fabrication

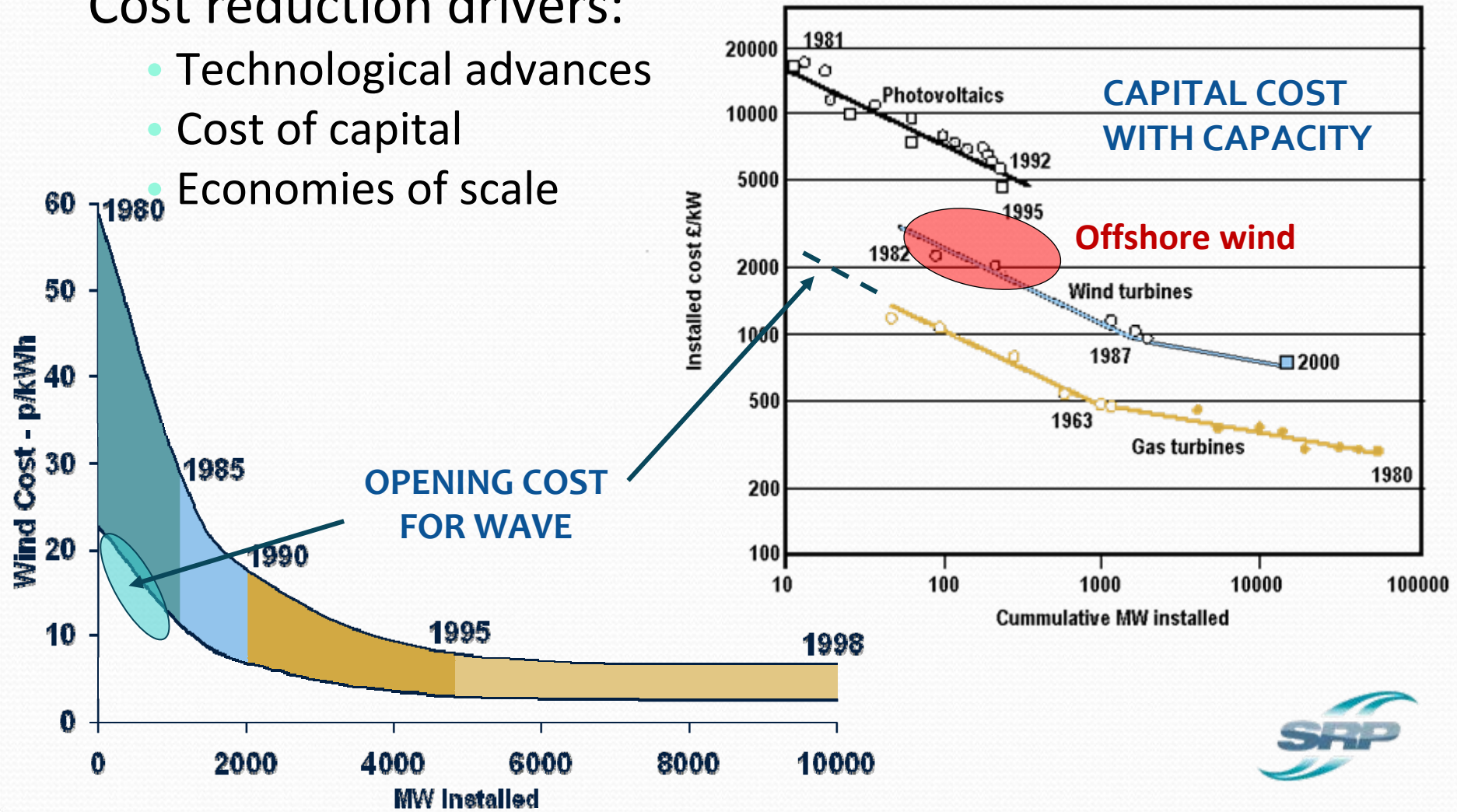
180m – 4m diameter – 750kW



Cost effectiveness

Cost reduction drivers:

- Technological advances
- Cost of capital
- Economies of scale



Project development through case studies

- SRP as Pelamis Wave Power consultant to Pelamis Project development in Pacific and Indian Ocean

Since early 2006 involved in :

- Project Development for Maré – New Caledonia
- ◆ Project Development in Wallis
- ◆ Project Development in La Reunion



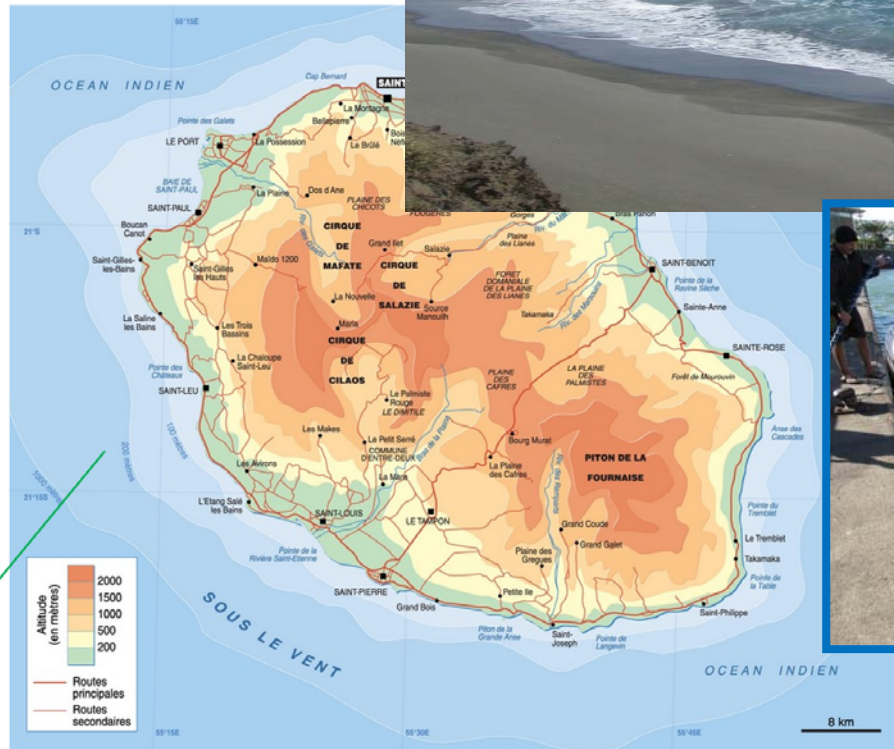
Maré in NC and St Pierre in La Reunion





Seawatt project – La Reunion

Saint Pierre – South of the island



SEAWATT

Project Development

Studies	Maré in New Cal	Wallis	La Reunion
Wave ressource	Complete	Desktop modelling	On its way
Bathymetry	Available	NOT AVAILABLE	Available
Sea bed survey	NOT AVAILABLE	NOT AVAILABLE	Completed
Cable route	80% complete	To be defined	Currently being looked at
Grid connection	20% complete	To be defined	Currently being looked at
PPA	To be negotiated	Regulation TBA	Still to be reviewed
Authorisation	80% complete	Long customary approach	EIA on its way
Operations Infrast.	80% complete	To be defined	Looked at

Project Development :

Cost and time to business

1.5 to 2 million Euros - 1 to 3 years

(not related to the size of final project)

Origin of fundings so far :

- Maré – private funds
- Wallis – 80% Private and support for Fonds Pacifique, France for 20%
- La Réunion – 30% ADEME, Region, City – 70% Private

Project development : Hurdles to overcome

Length and cost of studies involved :

Database to be developed by Countries on bathymetry, wave resource assessment, sea bed surveys...

- Publicly available
- Can be done in anticipation
- Can serve multipurpose (geoscience, security, other technologies or marine usage...)



Hurdles to overcome

- **Acceptation by local communities**
 - Weight of Customary aspects in Wallis, in New Caledonia
 - The lobby of the fishermen ex in La Reunion
 - The lobby of the surfers ex of Cornwall project
- **Ensure early communication with all potential stakeholders**
- **Government to set up the rules**

Hurdles to overcome

Lack of regulation

- To be thought of in anticipation of the first project
- To facilitate negotiations with stakeholders
- To ensure the best outcome for the Country versus private interest
 - In terms of use of space
 - In terms of environment....
- To facilitate time to market
- To guarantee revenue to Project developers and stability

Hurdles to overcome

Finance

- Funding available to RE projects implementation showing valid business plans
- But no fund available for getting at this business plan stage
- Critical to develop these new technologies not only the devices themselves but also the first projects

Thank you for your attention.

