



The case for OTEC – Ocean Thermal Energy

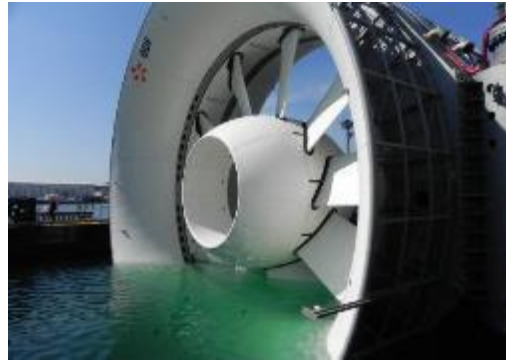
Rémi Gruet, CEO, Ocean Energy Europe

Ocean Energy Europe Lead Partners



Ocean Energy Europe

5 Resources – 5 technologies – 5 opportunities



Tidal stream



Ocean Thermal Energy Conversion



Wave



Salinity gradient



Tidal range

OTEC – 24/7 energy from the sea

- Exploits the temperature difference between
 - 25 °C surface water
 - 5 °C deep water (1,000+m)
- Heat-exchangers enable energy extraction
- Produces cold or electricity
- A range of solutions
 - 30MW+ Offshore Plant
 - Small 5/7 MW OTEC / SWAC

DCNS OTEC offshore 30MW+ power plant



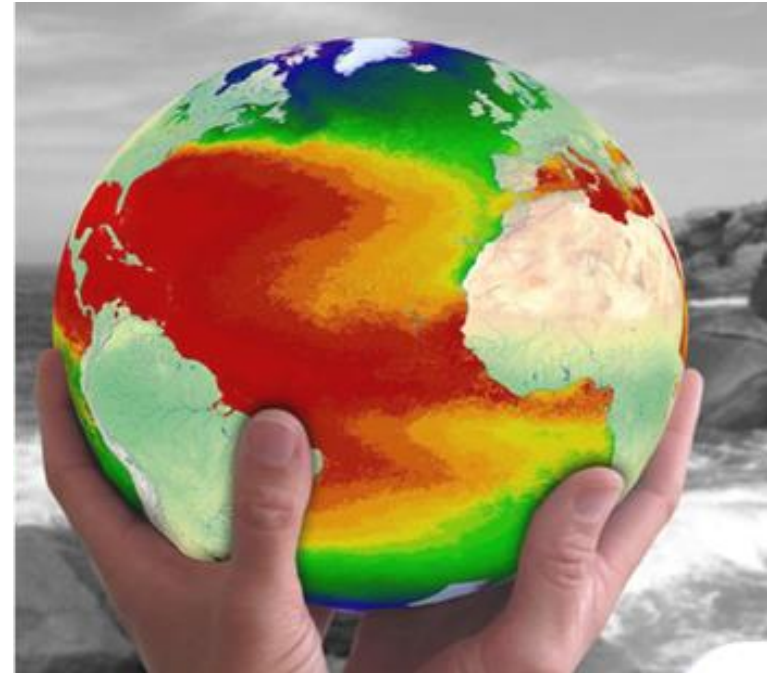
Energie Thermique des Mers **DCNS**

DCNS OTEC onshore landbased 5-7MW power plant



OTEC – Main Benefits

- New renewable energy source
- 24/7 energy - baseload electricity
- Potential co-products: air-conditioning, fresh water, fish farming, irrigation.
- Turnkey technology with constructor guarantee
=> easier to finance
- LCOE range €0.25 to €0.45 depending on site – cheaper than diesel already today



OTEC – technology tailored for islands markets



- Focus on island because of their specificities:
 - Closed & non-interconnected power grid
 - Highly dependant on fossil fuels, esp diesel
 - High cost of energy
 - Tropical storms areas
 - Need for industrial local content - jobs
 - Land pressure on island
 - Renewable potential already highly harvested

- Marketplace
 - 100+ countries with appropriate Δ temperatures

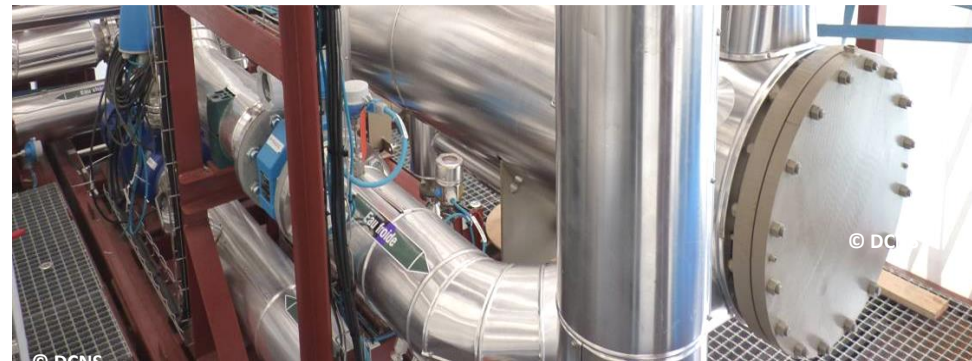
- Potential partners
 - Public authorities/territories, utilities, venture capital funds, resorts

OTEC competition has started

Several projects in the world



- 2010-2011 – Onshore prototype, La Réunion
 - Test key components
 - Prove numerical models
 - Train DCNS staff
- Other projects around the worlds
 - Japan – 50kW OTEC plant
 - Hawaii – 100kW OTEC
 - Bahamas – SWAC for resort
 - China – 10MW project (Lockheed Martin)
- Other DCNS projects
 - US Virgin Islands
 - Marshall islands





NEMO – flagship project in La Martinique

- Fully tilable offshore structure
 - 4x4MW generators
- Awarded €78M support under the EU NER300
- Timeline
 - 2011 - feasibility studies
 - 2014 - Development of key OTEC components
 - 2018 - planned delivery
- Program partners:
 - Region Martinique
 - DCNS - AKUO Energy
 - STX shipyard

The case for OTEC - Conclusions



- A new renewable technology
- Fit for island markets
- 24/7 generation
- Possible by-products: fresh water, Air Con...
- Same cost or cheaper than diesel today
- Guarantees for a leading naval constructor: DCNS

- Global competition, but Europe is in the lead with the Martinique Nemo project



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