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# Presentation on Wavebob to CleanTuesday

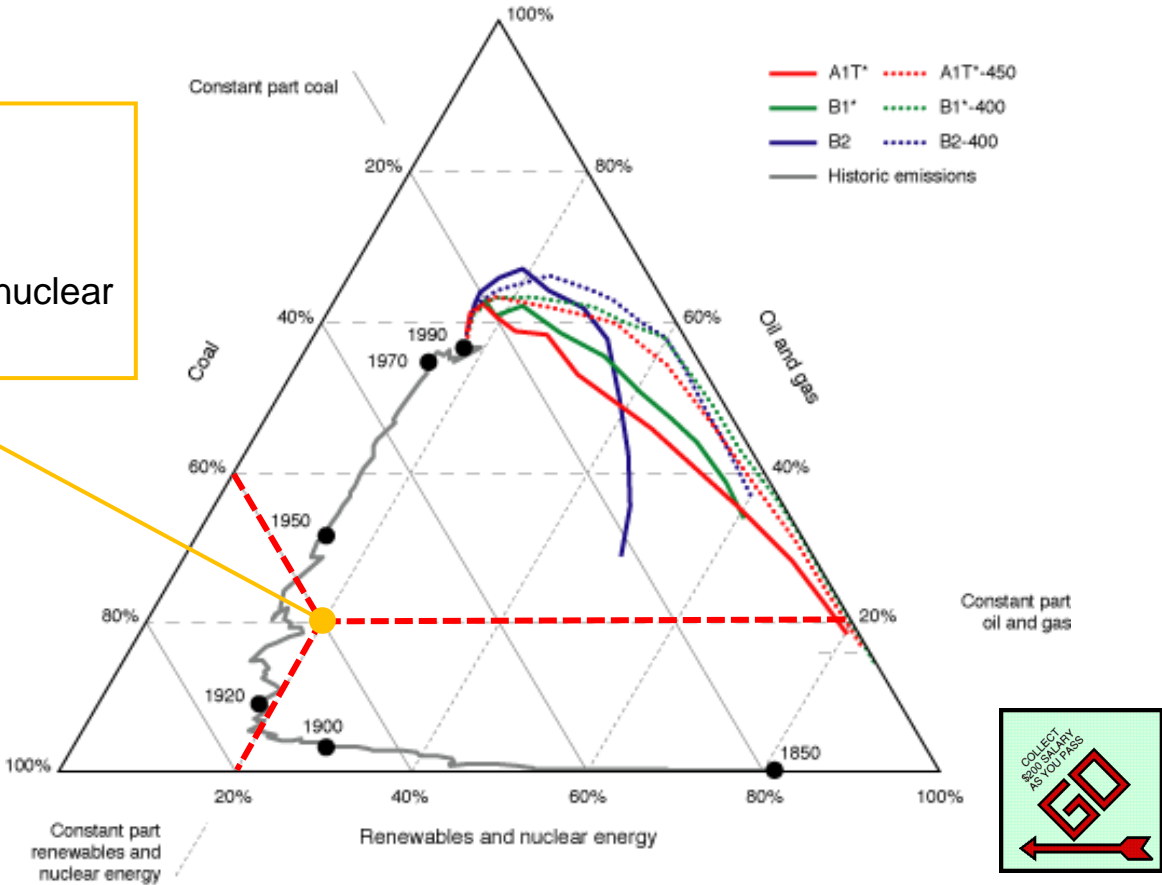
16 June 2009

Franc Mouwen – COO Wavebob



# “Advance to Go”: future energy mix scenarios indicate a development towards reduction of carbon output

**Reading guide:**  
 60% coal  
 20% oil and gas  
 20% renewables + nuclear  
 100%

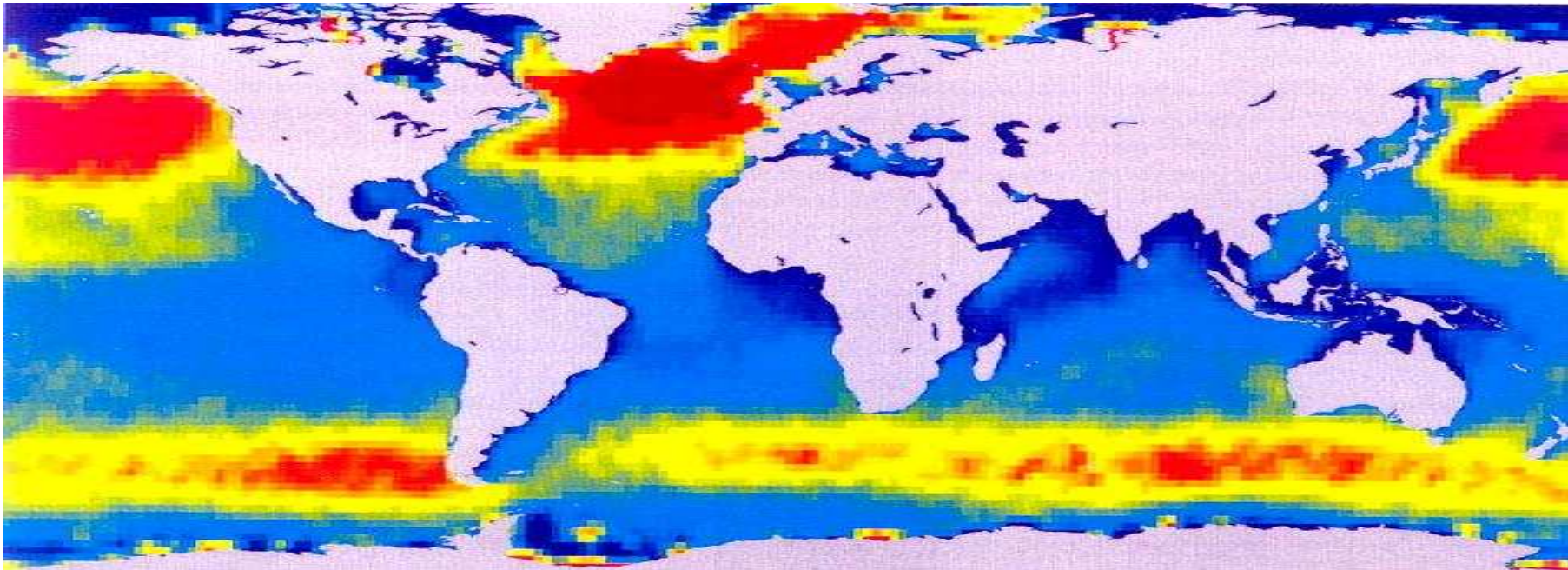


Source: *Climate Protection Strategies for the 21st Century: Kyoto and Beyond*, WBGU, Berlin, 2003



The current and future global demand for vast resources of renewable energy is unquestionable...

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Source: SAR imagery . Global mean significant wave height (metres) in January

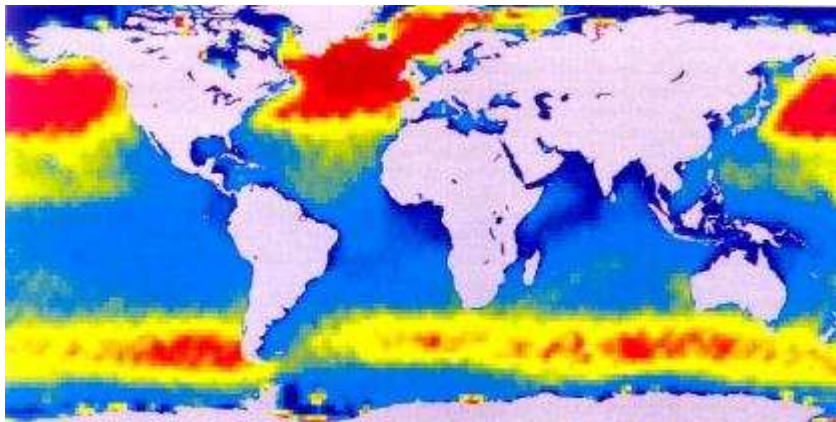
... and ocean wave energy forms an immense and yet un-tapped resource of renewable energy...



# Both nations and companies have set ambitious targets to harvest the immense wave energy resource

Estimated accessible global wave energy resource:

- ▶ 2000 TWh per year
- ▶ €650bn in technology sales
- ▶ Equivalent to global nuclear or hydroelectric generation



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Targets (installed WEC capacity) by 2020:



500 MWe ▶ €1.75bn in sales



1360 MWe ▶ €4.76bn in sales

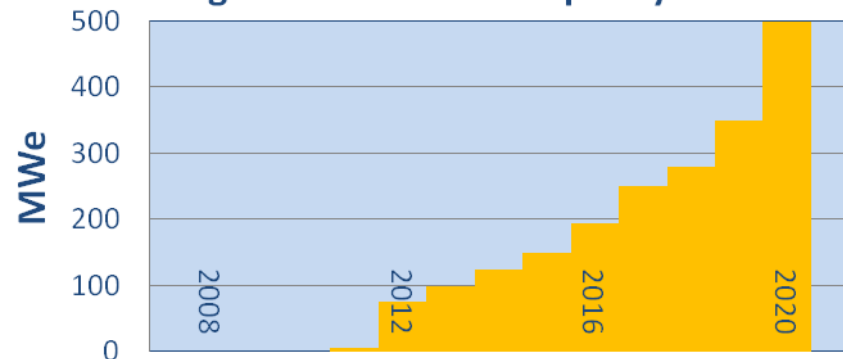


1500 MWe ▶ €5.25bn in sales



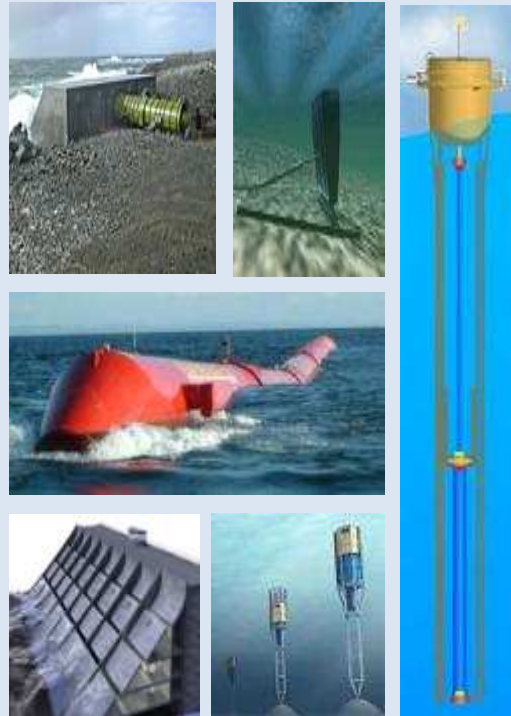
500 MWe ▶ €1.75bn in sales

Target installed WEC capacity Ireland



# Out of many varieties, the self reacting point absorber emerges as the most promising wave energy converter

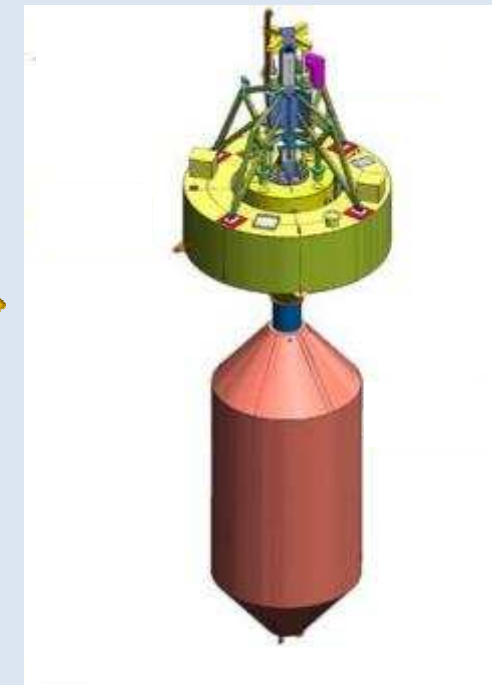
## The innovation funnel



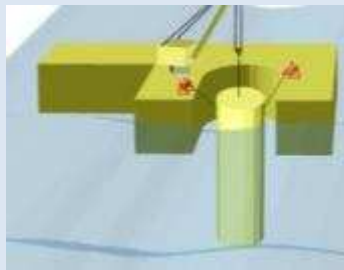
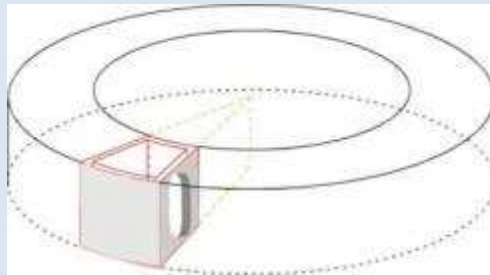
## Key success factors to low cost / kWh

- Offshore deep water
- Floating, self-reacting
- Oscillating system
- Accessible
- 25+ years lifetime
- Survivability
- Tuneable
- Large installed power
- Scale: arrays
- Smart fabrication
- Health and safety

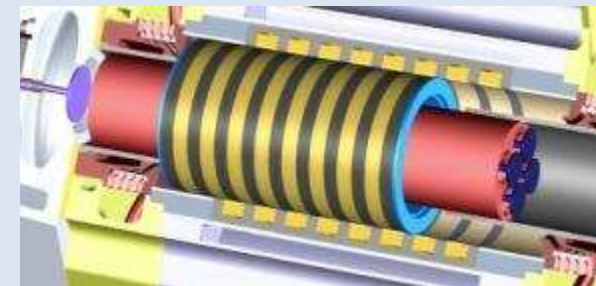
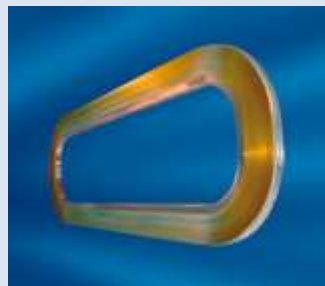
## Wavebob



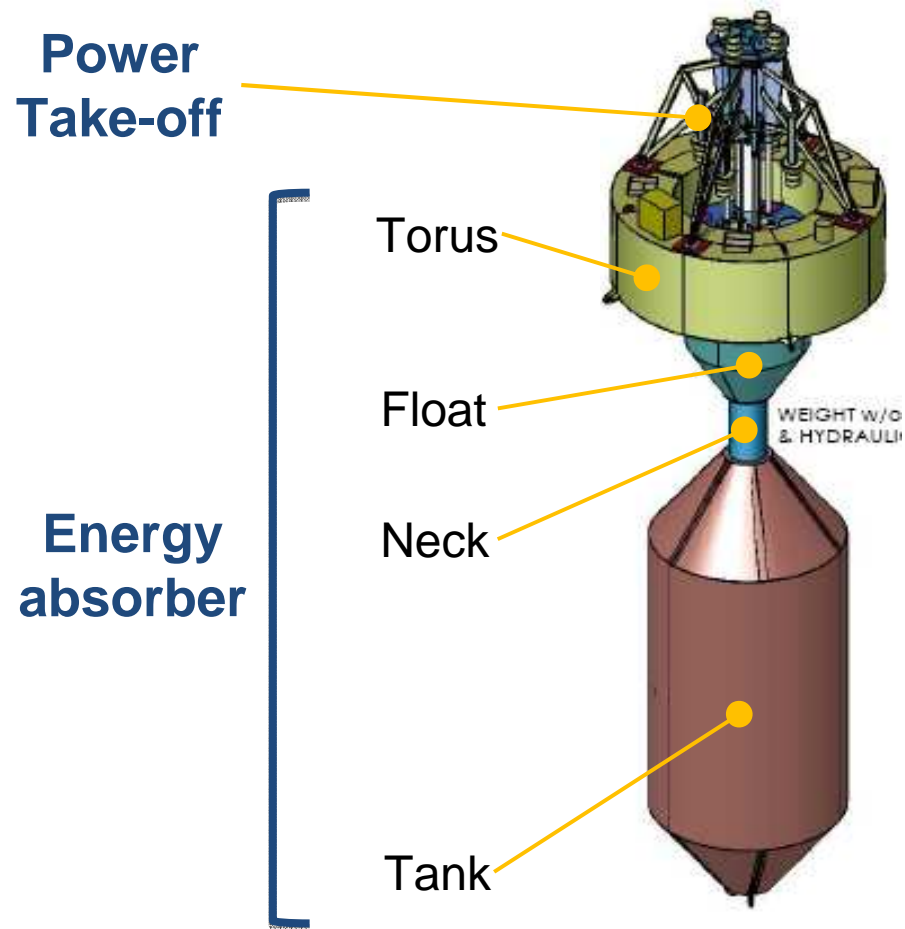
# Differentiating innovations and systematic engineering minimize cost whilst maximizing generated power



$$\text{Cost / kWh} = \frac{\text{Cost of (capital + operations + maintenance)}}{\text{Electrical power output}}$$



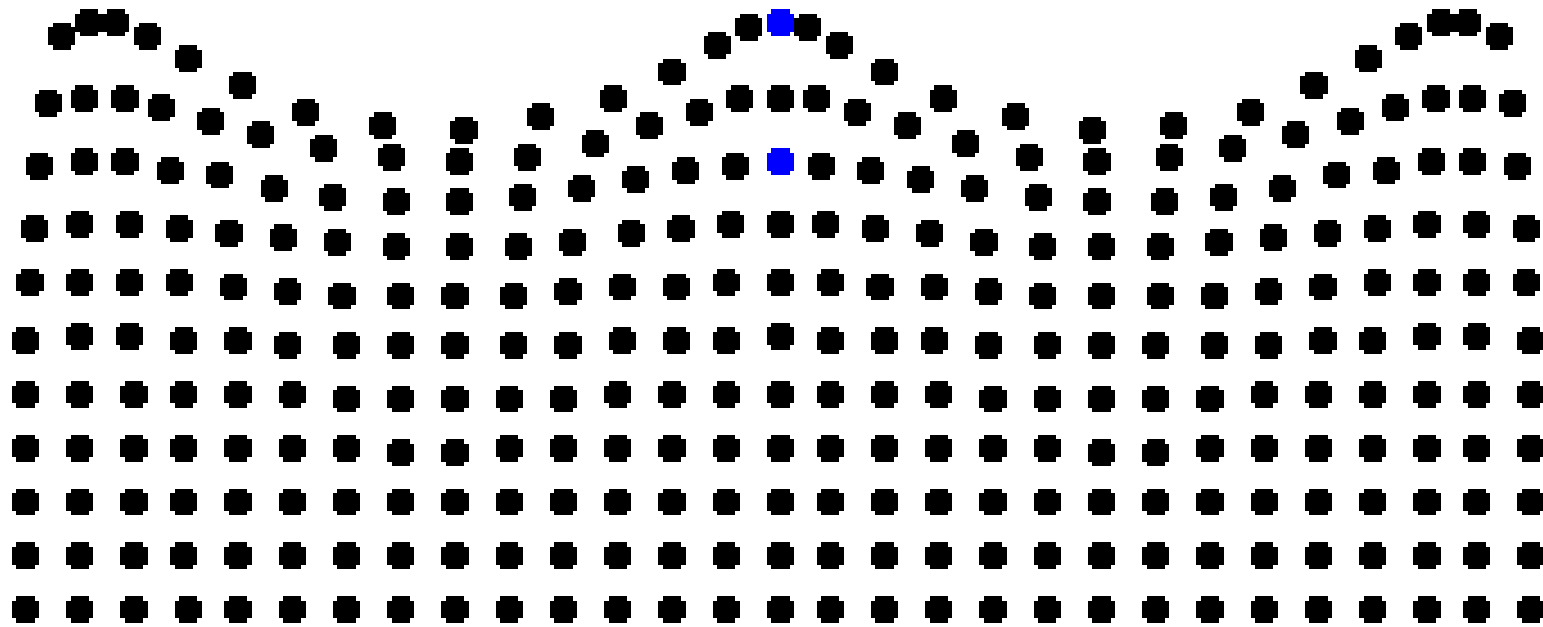
# Key components of a Wavebob are torus, float, tank, neck and power-take-off





# Elements of wave theory and hydromechanics

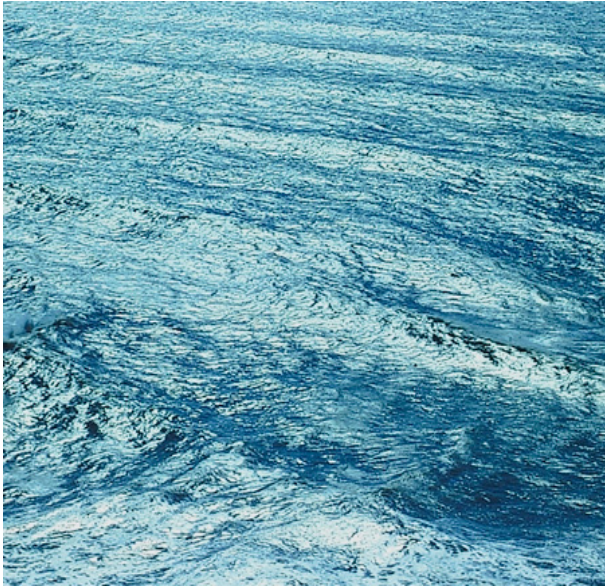
Water particles in waves make circular trajectories



©1999, Daniel A. Russell

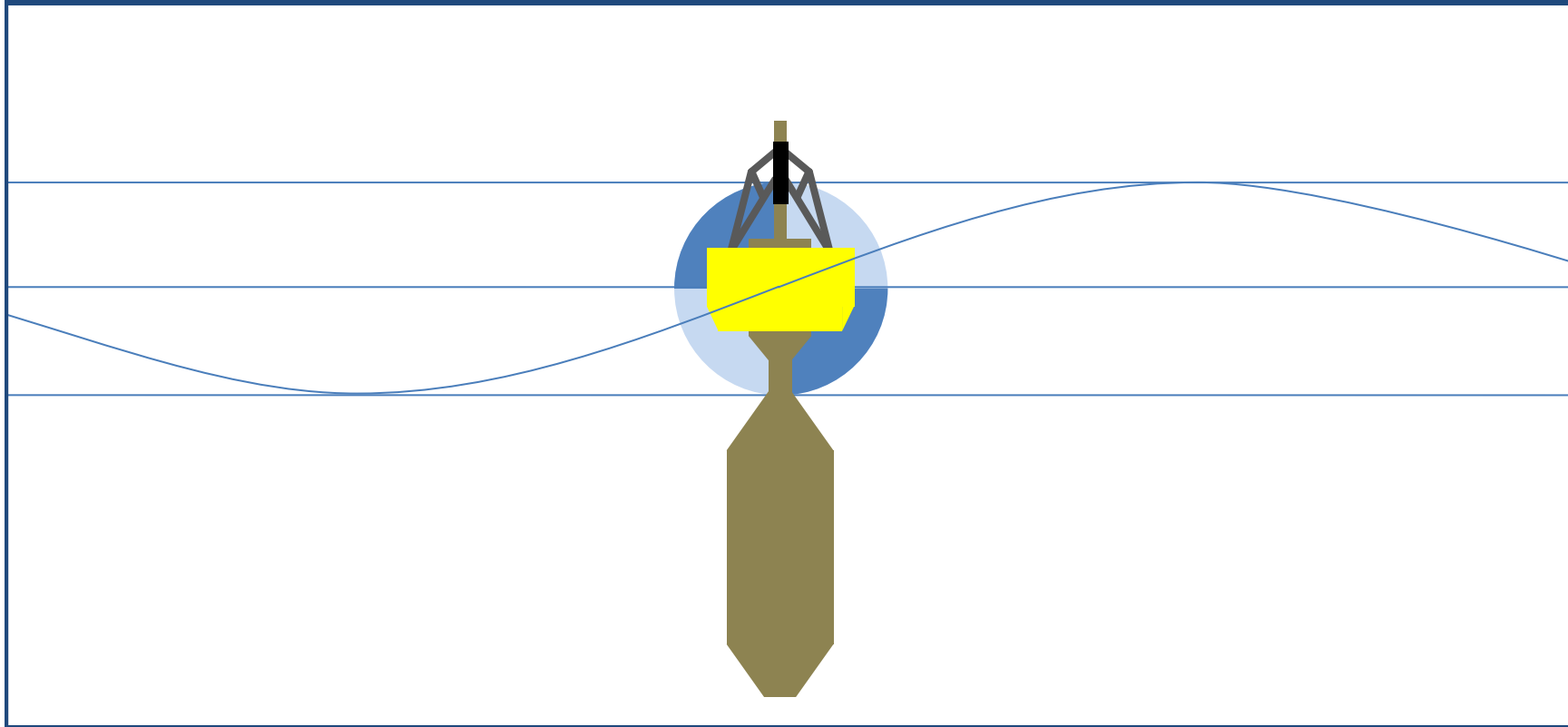


... and reality!



From the circular motion within a wave, Wavebob captures the power contained in heave direction...

Two floating bodies respond differently to a wave creating a powerful stroke reacting against each other



... a concept testes extensively in wave tanks and the ocean.

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Wavebob technology is unique and protected by patents covering our global key markets.



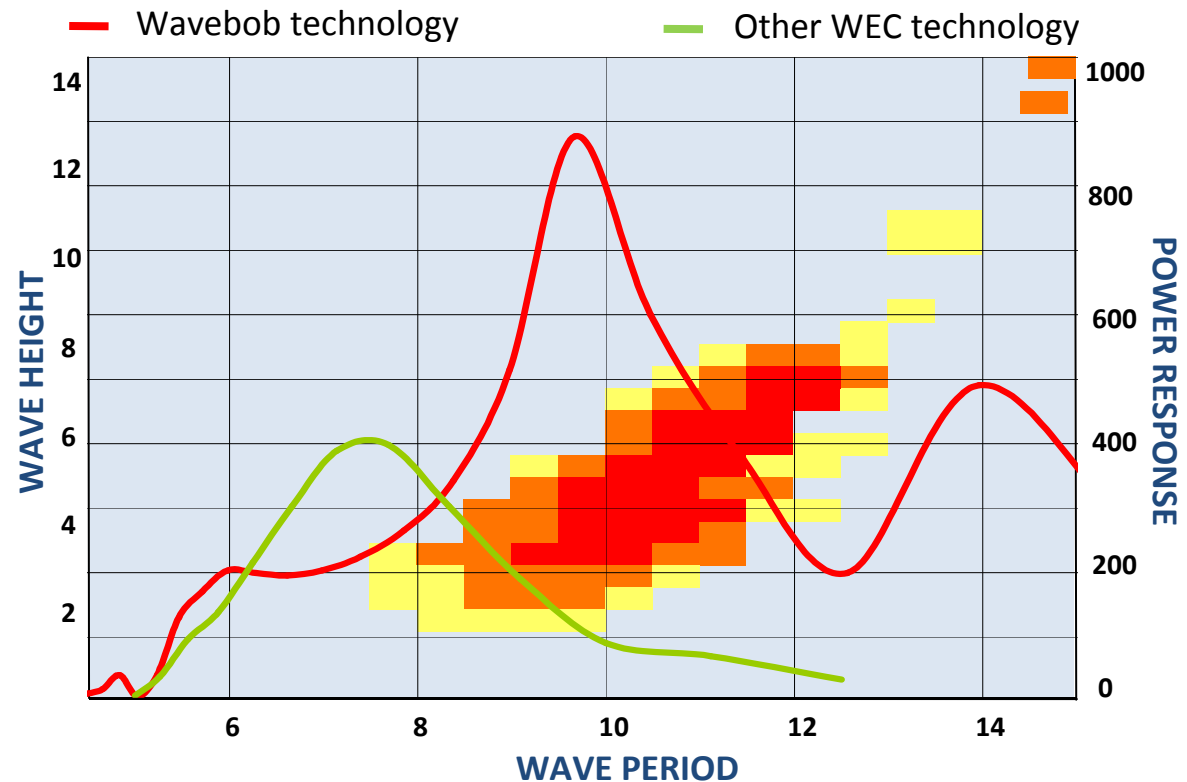
# The Wavebob offers unique features like adjustable bandwidth and excellent energy absorption capability

- 1 De-tune for survival
- 2 Tune to wave climate
- 3 Tune for maximum power absorption

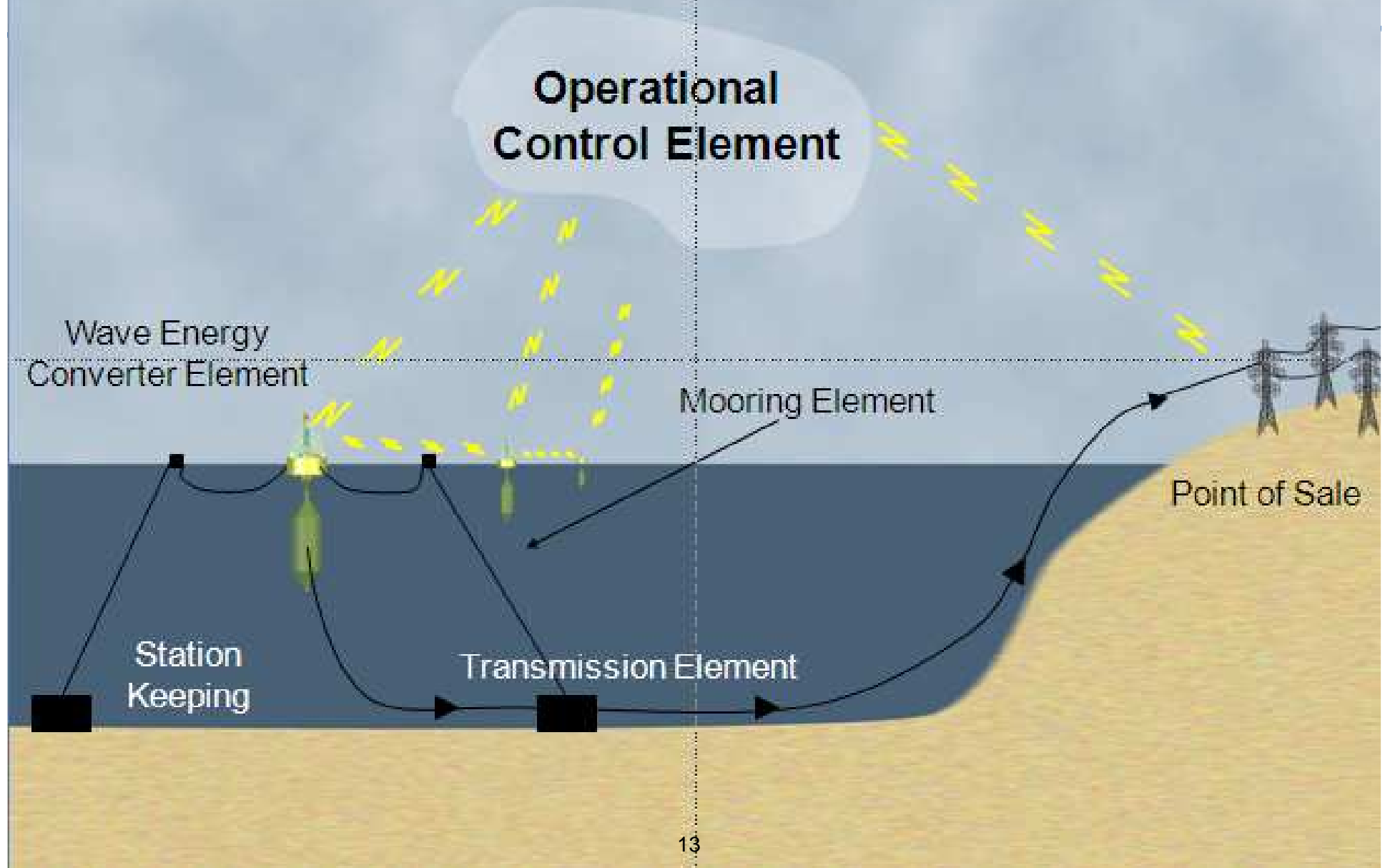


Safe, effective, efficient.

## POWER DISTRIBUTION

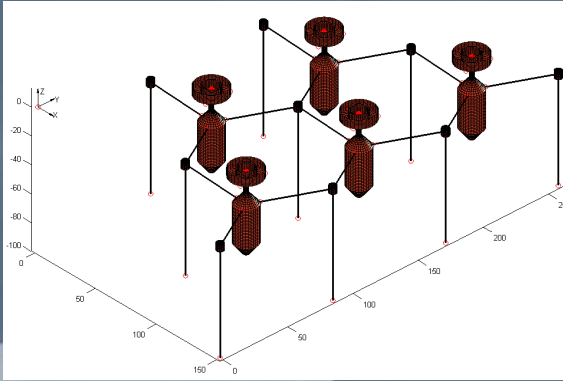


# System Description

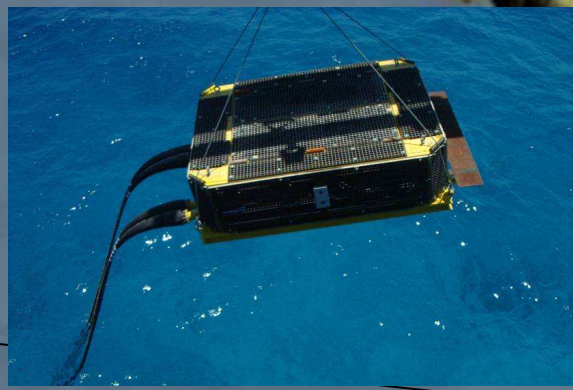
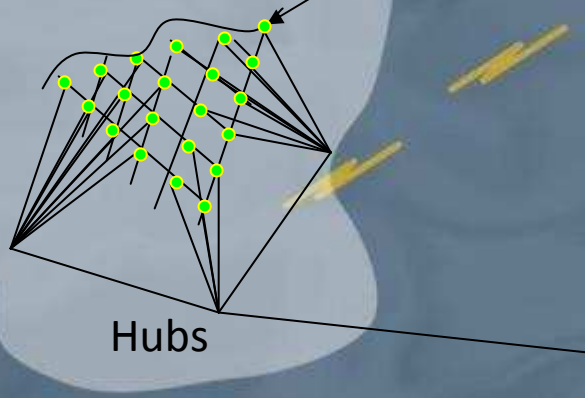


# High demand on-grid applications will comprise multiple Wavebobs in a wavefarm configuration

Operation Center



Wave Farm



Transmission Line  
≈ 20 km

Transmission Grid

Point of Sale

An aerial photograph showing a coastal town with numerous buildings and palm trees along the shore. The foreground is dominated by a vast expanse of deep blue water. In the center of the water, there is a line of yellow buoys or markers. A small white boat is visible near the buoys, leaving a white wake. The sky is clear and blue.

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