



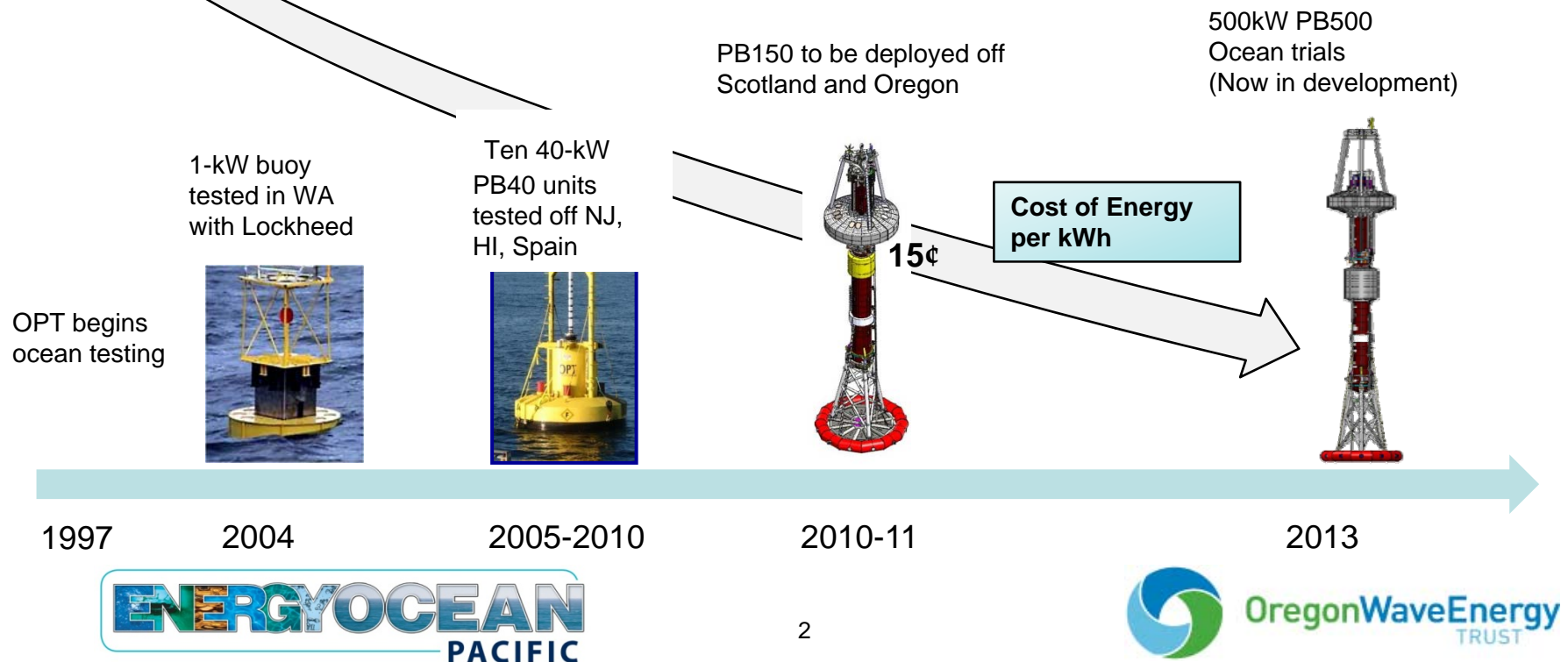
OPT's Grid Connection - Strategy and Experience

George W. Taylor and Mark P. Holveck



OPT Path to Commercial Success

- Ocean-tested, proprietary technology – 42 US patents issued
- Experienced management team with strong track record – 55 employees
- Over \$80 million spent to date to develop its PowerBuoy® technology
- The only exchange-listed US wave power company (NASDAQ: OPTT)
- Market capitalization of \$60 million



OPT's Grid Connection Strategy and Experience

Basic Decisions:

1. Method of Transfer of Energy to Shore --- Electrical or Water

Selected Electrical Method

2. Where and how to combine electrical power from individual PowerBuoys

Solution Underwater Sub Station located on sea floor adjacent to PowerBuoy array

3. Where best to make electrical power grid synchronous

Optimum Solution Within each PowerBuoy

4. AC or DC Transmission on the Underwater Transmission Cable

Conclusion AC – Not economic to switch to DC until 100 MW or greater

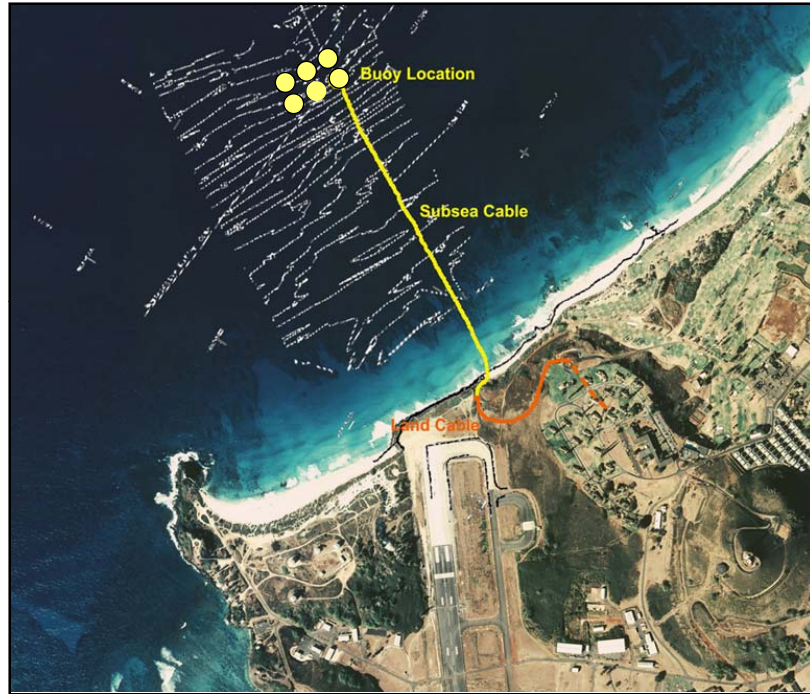


Australia

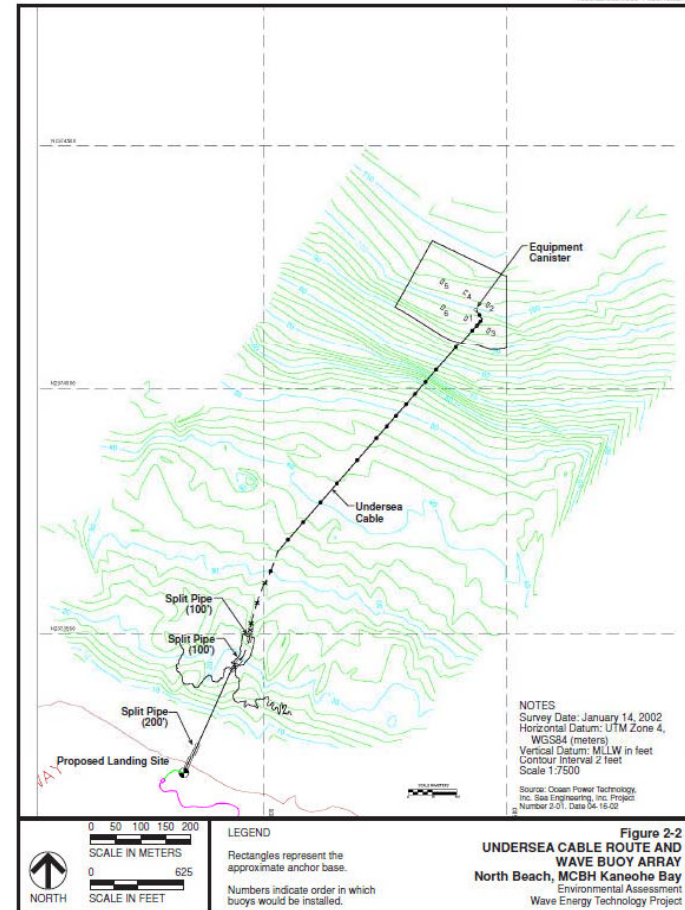
Cable Laying at Portland, Victoria



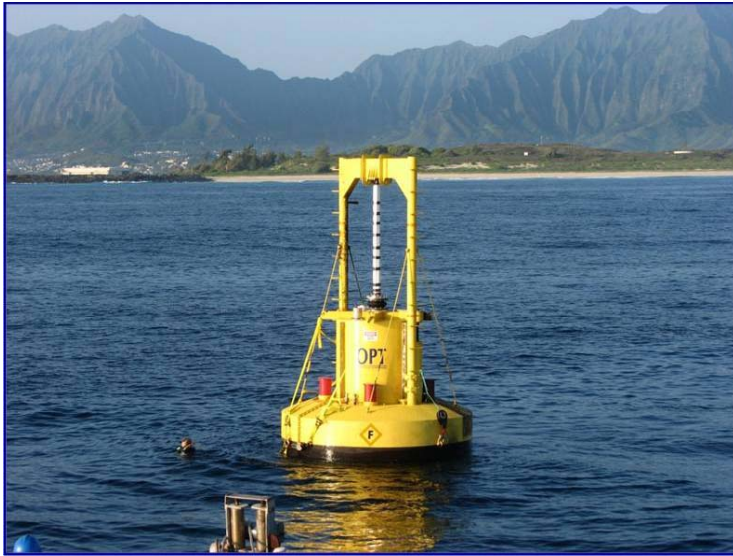
Marine Corps Base, Hawaii



Location of PowerBuoys



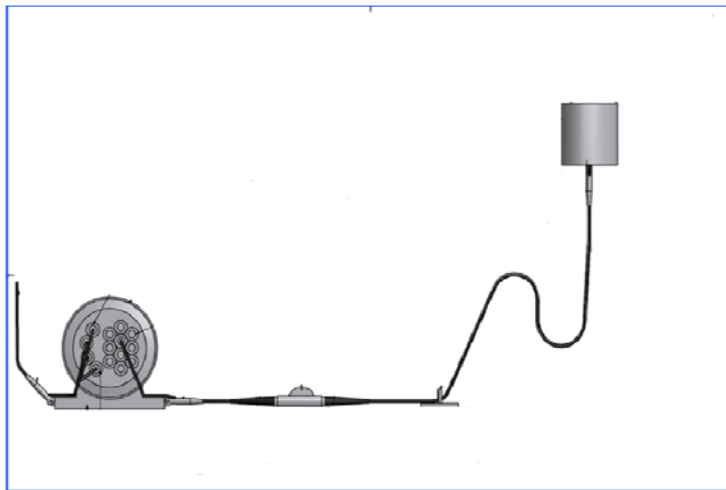
Undersea Cable Route to Shore



Hawaii PowerBuoy 3

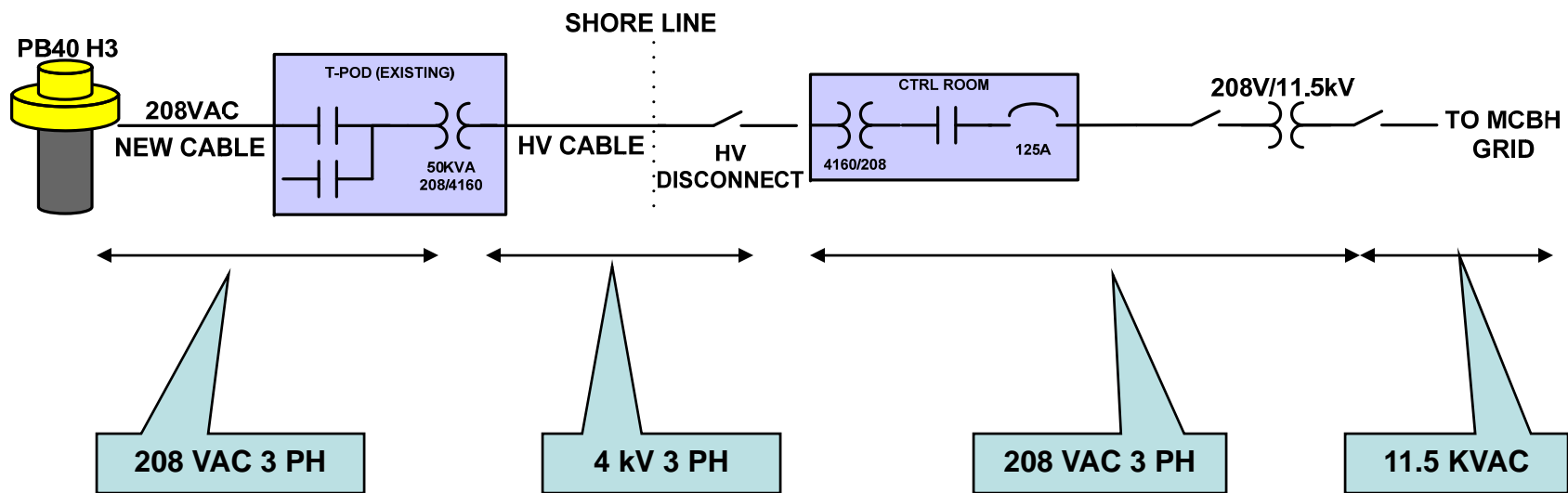


Laying Submarine Cable



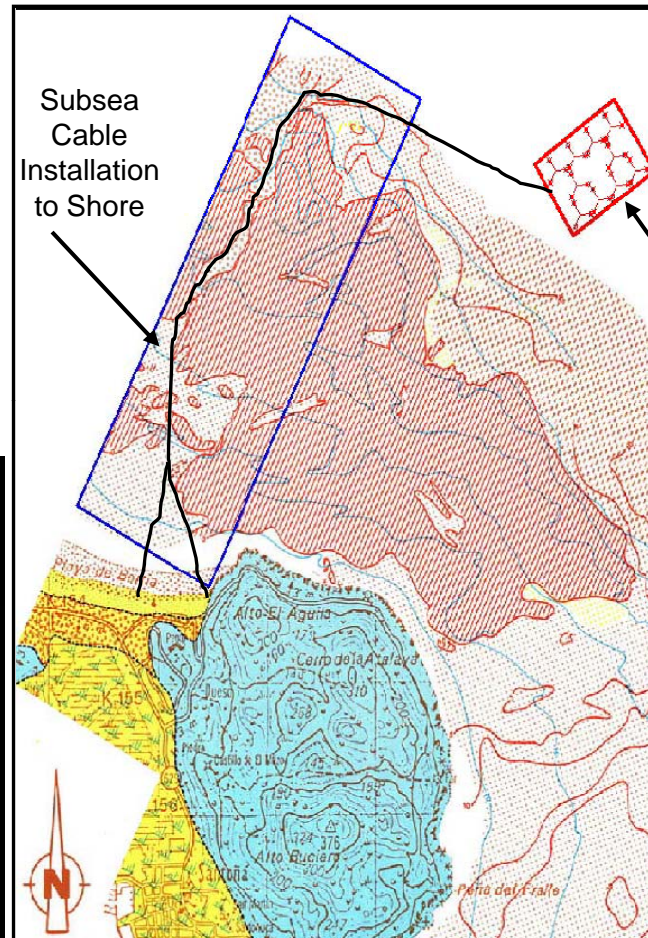
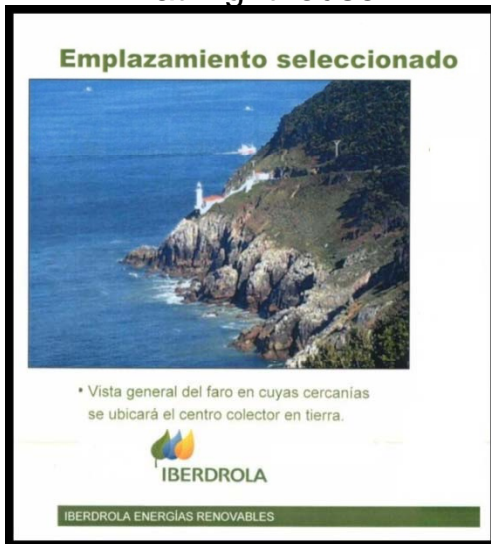
Landing Cable at Beach

Hawaii Buoy 3 – Connection to MCBH Grid



Spain

Grid Connection at Lighthouse



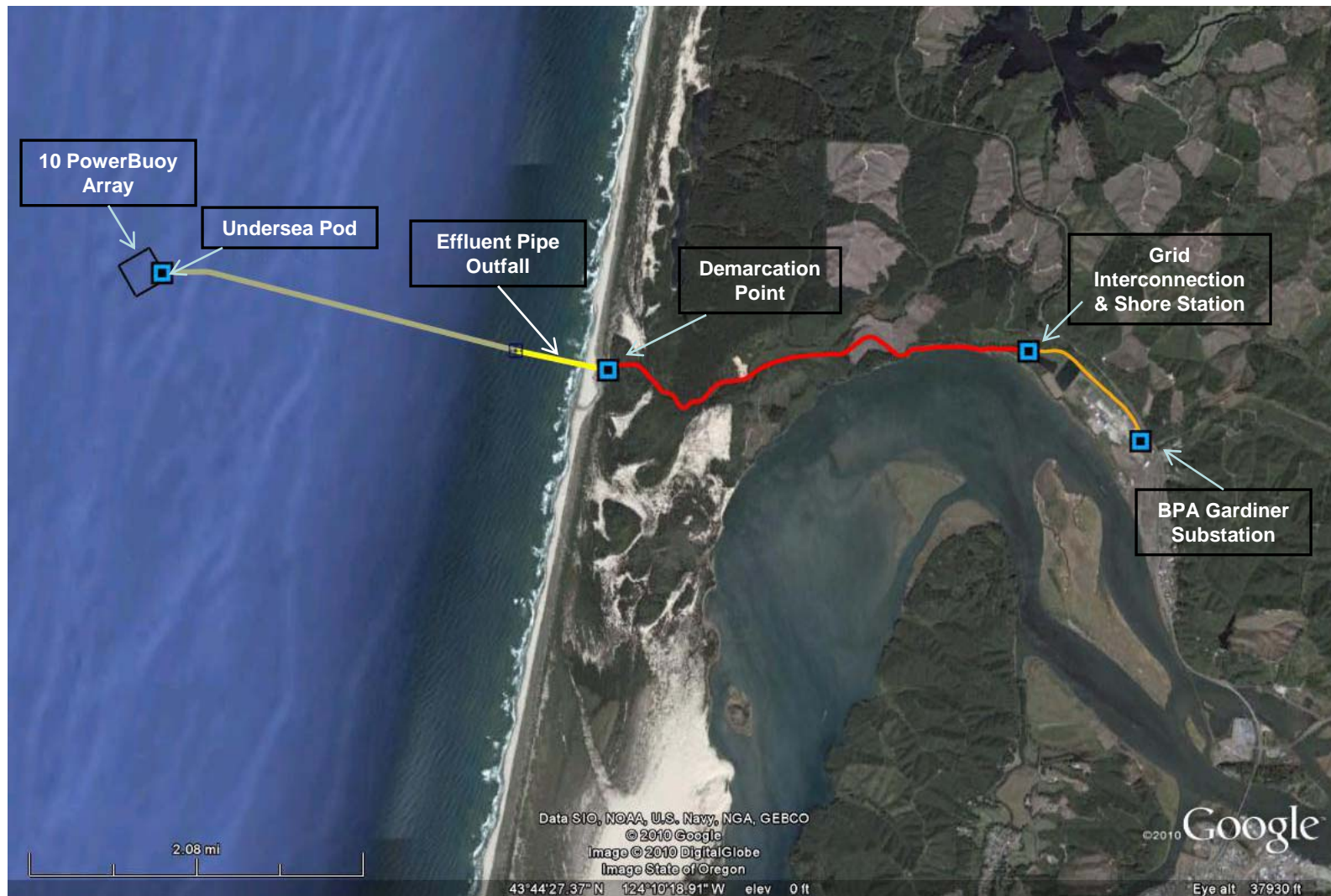
Santoña
Wave
Energy
Farm, Spain



Reedsport, Oregon 1.5 MW Wave Farm

- First commercial wave power station in US:
 - Commercial scale equipment
 - Multiple PowerBuoys, grid connected
 - Full FERC license (pending)
- Phase 1: First PB150 150-kW PowerBuoy
 - Construction at Oregon Iron Works to be completed by end of 2010
 - Deployment off the Oregon coast late Spring 2011
- Phase 2: Grid connect to PNGC Power Gardiner substation
Build and deploy 9 additional PB150 PowerBuoys
- Subsequent phases: Up to 50 MW total

Reedsport



OPT's Underwater Substation Pod (USP)

USP – 1 **Prototype** - Used in Hawaii. Connects two PB40's to grid

- 4160 VAC transmission, 208VAC distribution
- Electrical diagnostics
- 2-port independent protection and control
- Fiber communication pass-through to PowerBuoys

USP – 2 **Commercial** – Designed, built and ocean tested in Spain will be used at Reedsport, Oregon. Connects up to ten PB150's to grid

- 11kV transmission, 575VAC distribution
- 10-port independent diagnostics, protection, and control

USP – 3 **Next Generation** – Up to ten PB500's connect to grid

- Up to 50kV transmission, 480VAC distribution
- Option to deploy as sub-component of PB500 PowerBuoy

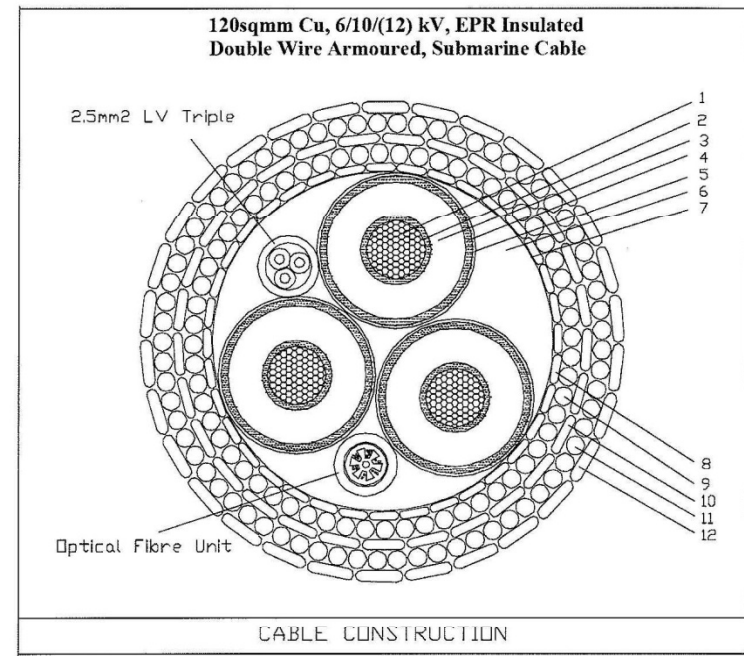
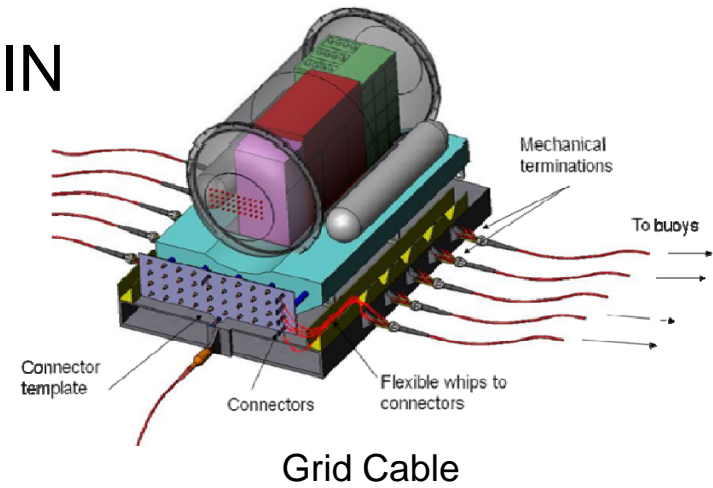
USP 2 - SPAIN



Ocean Testing Spain



Internals

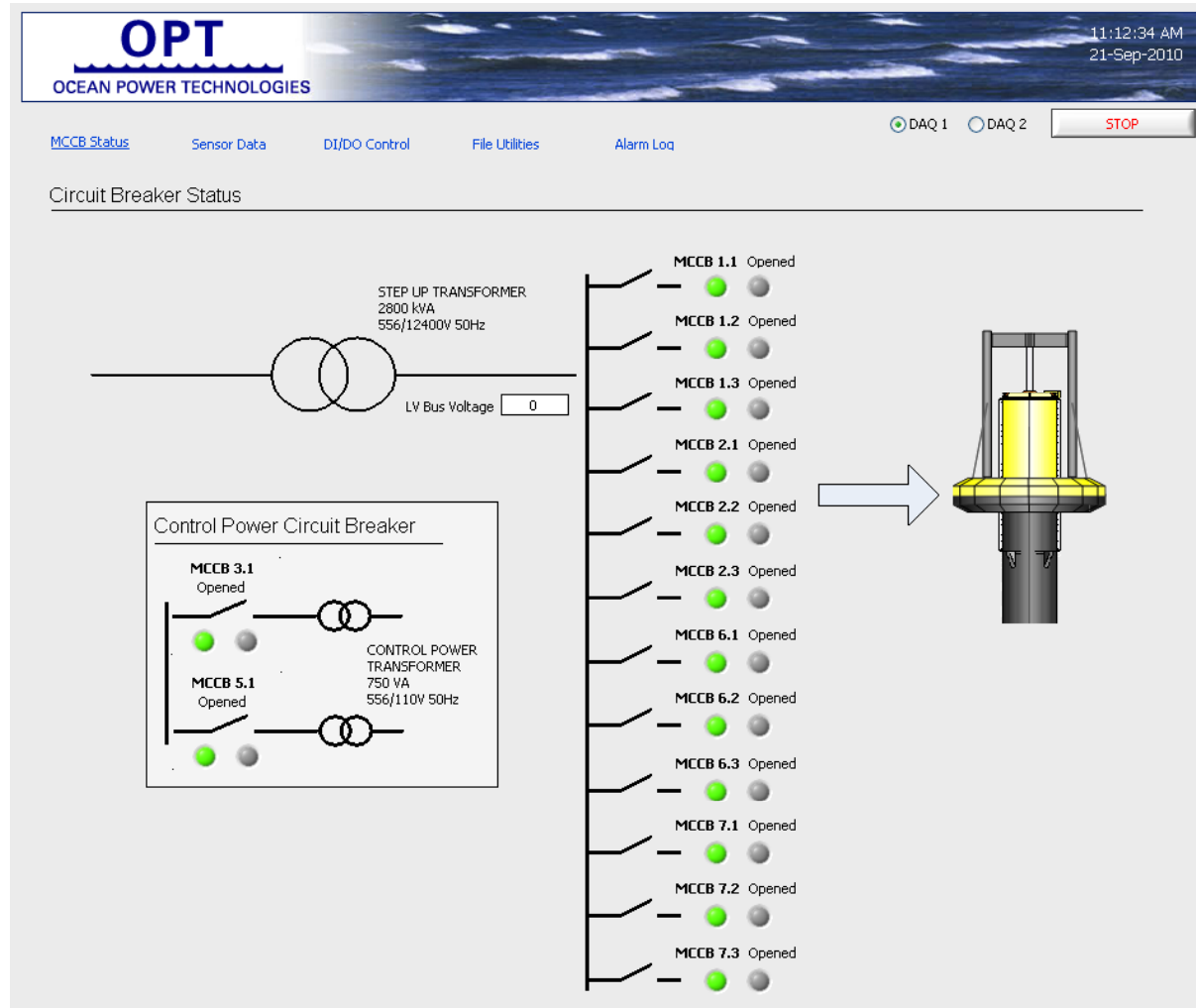


USP 2 Commercial System Specifications

- 30 year design life, 10 year scheduled maintenance
- Contains switch gear for
 1. Fault protection of marine energy generator modules and undersea cable to grid
 2. Allows disconnection and reconnection of Marine Energy Modules
 3. Built-in diagnostics for each power port
- Fiber optic communication, distributed to 10 Marine Energy Modules
- Simple deployment and installation on sea bed
- Connections and disconnections to marine energy modules are done at ocean surface with small workboat
- Dry Weight: 72 tons assembled with ballast blocks (32 tons)
- Dimensions: 10.5m x 5.5m x 4m



USP 2 Commercial System Operator Interface



USP System Applications

- Economical system for collection of power from modular systems to shore
- Also transmits data to or from shore
- Uses:
 - Wave Power System
 - Tidal Power System
 - Ocean Current Power System