



**Ocean Thermal Energy Conversion:
Assessing Potential Physical, Chemical and Biological Impacts and Risks**

June 22 – 24, 2010

National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management

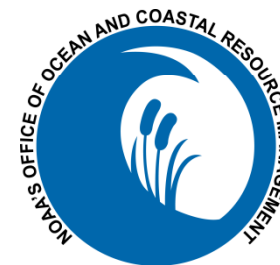
Coastal Response Research Center
University of New Hampshire



Renewable Ocean Energy and the Marine Environment Conference

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Whitney Blanchard
NOAA Office of Ocean
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Acknowledgements



- NOAA NOS and NMFS
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- OTEC International
- UNH CRRC
- University of Hawaii
- Florida Atlantic University
- ORNL
- Cascadia Research
- MBARI
- Marine Acoustics
- Tenera Environmental
- Alden Lab

Workshop Scope

- Development of baseline data for permitting
 - How to assess potential physical, chemical & biological impacts & risks
 - Methods
 - Mitigate &/or avoid impacts

Regulatory Considerations

- *Ocean Thermal Energy Conversion Act (OTECA)*
 - Authorizations from NOAA & USCG
 - Other federal license/permit requirements through NOAA OTECA license
 - State approval
- Clean Water Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Endangered Species Act
- Marine Mammal Protection Act
- Migratory Bird Treaty Act
- National Environmental Policy Act

Characteristics/Assumptions

5 MWe Demonstration

100 MWe Commercial

Warm Water Intake (**WW_i**)

20 m Depth, 25 °C

Velocity, $v = 0.15$ m/s

Flow, $Q = 25 - 500$ m³/s

Cold Water Intake (**CW_i**)

800 – 1000 m Depth, 5 °C

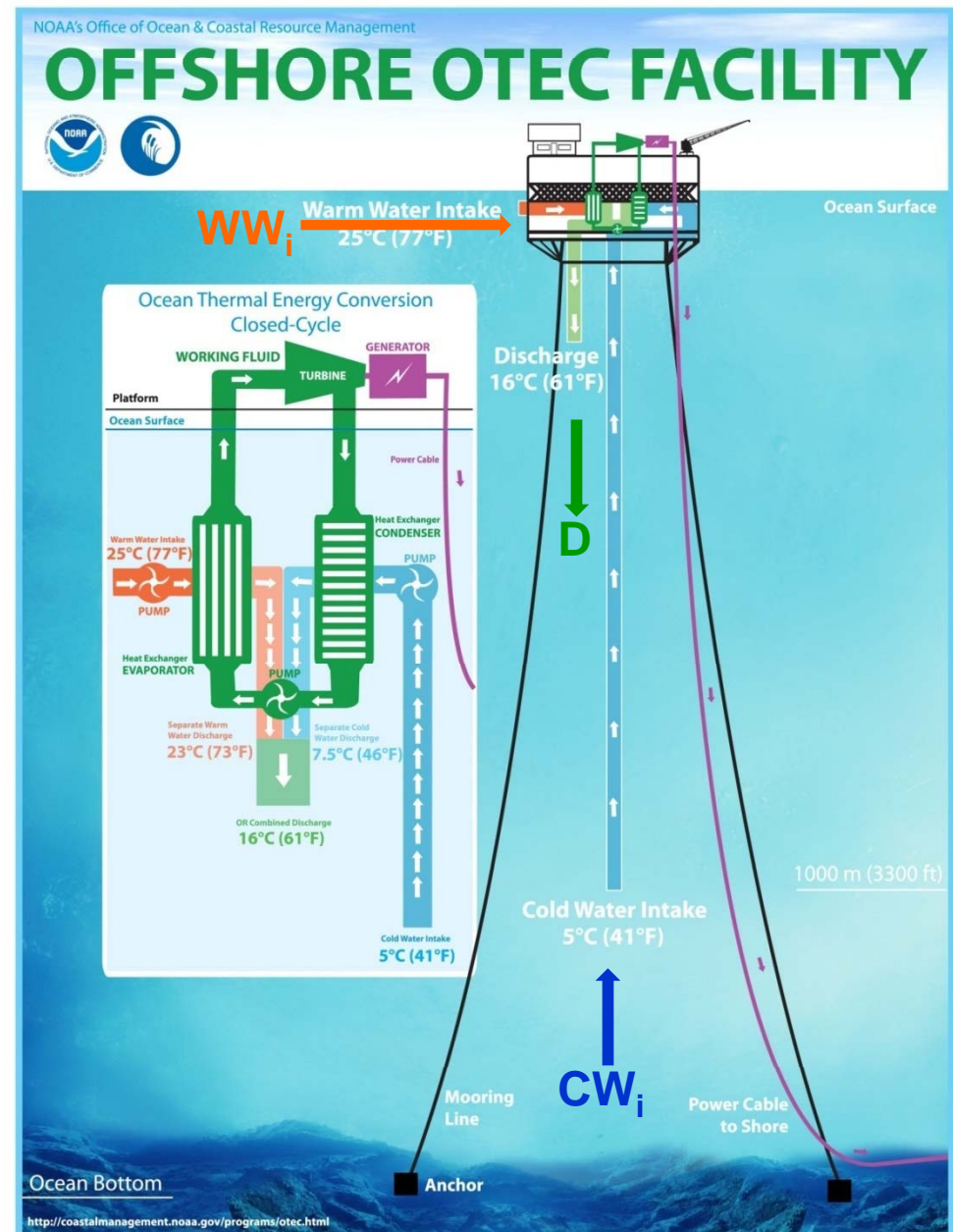
$v = 2.5$ m/s, $Q = 25 - 500$ m³/s

Pipe diameter = 2 – 10 m

Discharge (**D**)

Combined or separate

Depth and velocity TBD



Day 1 & 2 Breakout Groups

- Warm water intake
- Cold water intake
- Discharge (including biocides and working fluid leaks)
- Physical presence, construction, and accidents
- Noise and electromagnetic fields
- ID Potential Impacts
- Baseline, monitoring, modeling
- Best available technology
- Additional research

Day 3 Breakout Groups

- Fisheries and corals
 - Marine mammals and turtles
 - Oceanography
 - Plankton
1. Baseline data
 2. Monitoring
 3. Modeling

General Observations

- 25+ years of knowledge/experience
- Existing data & models available
- Lack of appropriate data
- Workshop
 - Not an exhaustive analysis
 - Information gathering for licensing process
 - Findings are not determinative

<http://coastalmanagement.noaa.gov/programs/otec.html>

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Ocean Thermal Energy Conversion

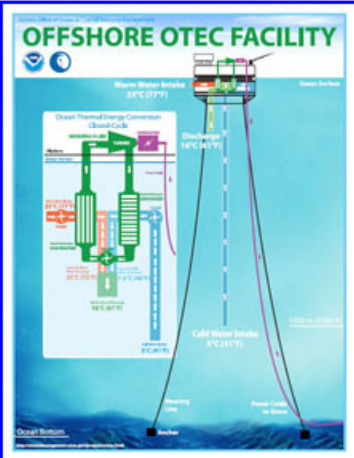


Diagram of Offshore OTEC Facility
(Click to Enlarge Image)

Ocean thermal energy conversion (OTEC) is a renewable energy technology that uses the temperature gradients in the ocean to generate a baseload, or constant, source of electricity. Other renewable energy sources such as wind and wave energy, are intermittent sources of electricity, meaning that the amount of electricity they generate may be variable due to weather conditions.

OTEC technology uses the temperature differential between the deep cold and relatively warmer surface waters of the ocean to generate electricity. The technology is potentially viable in tropical areas where the year-round temperature differential between the deep cold and warm surface waters is greater than 20 degrees Celsius (36 degrees Fahrenheit). In addition to generating electricity, OTEC has the potential to produce other products such as potable water, hydrogen, and ammonia. The cold water can also be used for other commercial

More Information

- [OTEC Act of 1980](#)
- [OTEC Research, Development, and Demonstration Act](#)
- [OTEC Workshops and Meetings](#)
- [Resources](#)



Thank you.

whitney.blanchard@noaa.gov

301-563-7203

kerry.kehoe@noaa.gov

301-563-1151

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