

OTEC

THE PROMISE AND THE PROBLEM

R. KERRY KEHOE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

2013 International OTEC Symposium
Asia Pacific Clean Energy Summit and Expo

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



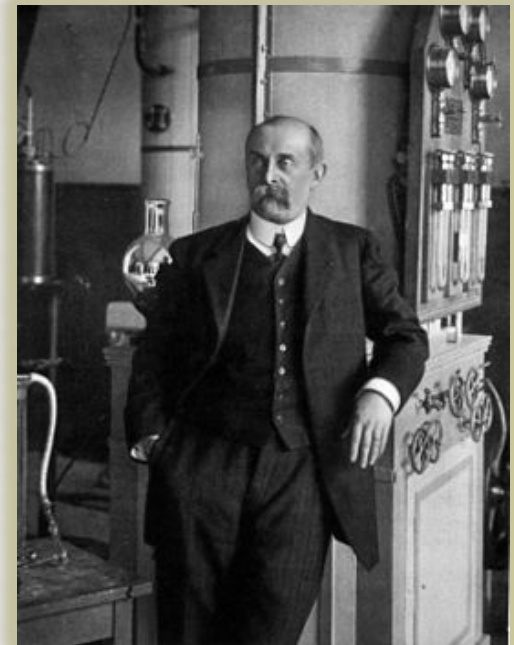
THE “PROMISE”

The promise of ocean thermal energy conversion has all of the Appeal as when it was first proposed in 1881

- OTEC provides
 - A renewable source of energy
 - Readily available in certain regions
 - Continuous throughout the day and year

In the tropical latitudes, OTEC power could

- Meet baseload energy needs
- Produce potable water
- Support energy intensive manufacturing bases



Arsen d'Arsonval
Inventor of OTEC

THE PROBLEM

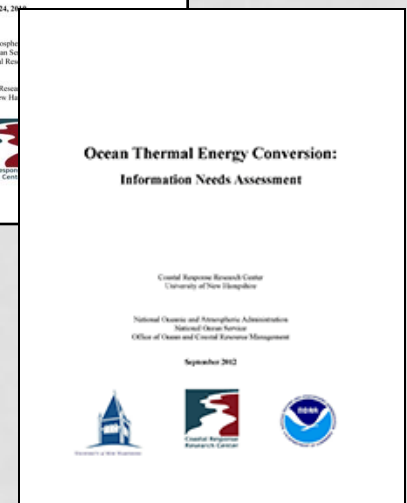
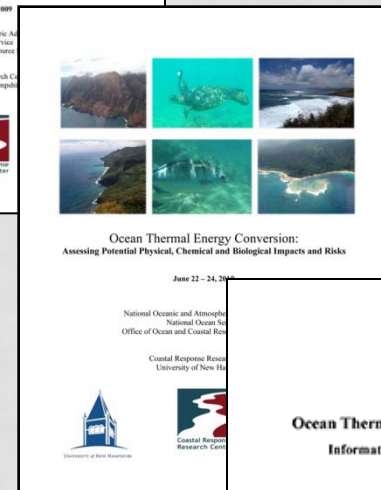
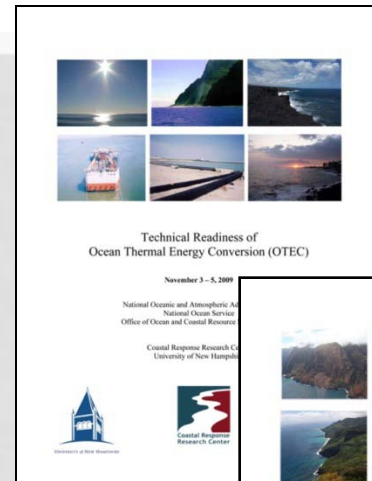
The challenges to OTEC have several dimensions

- Engineering
- Financial
- Regulatory uncertainty

- Along with competition from other renewable energy sources which are less technologically challenging and easier to deploy

RECENT NOAA REPORTS: FINDING ANSWERS

- Technical Readiness Workshop & Report
- Potential Environmental Impacts Workshop & Report
- Information Needs Assessment Project/Report



THE TECHNICAL READINESS OF OTEC WORKSHOP AND REPORT

Is the OTEC technology ready?

- Cold water pipe*
- Pumps and turbine
- Heat exchanger
- Platform
- Platform/pipe interface*
- Platform mooring
- Power cable*

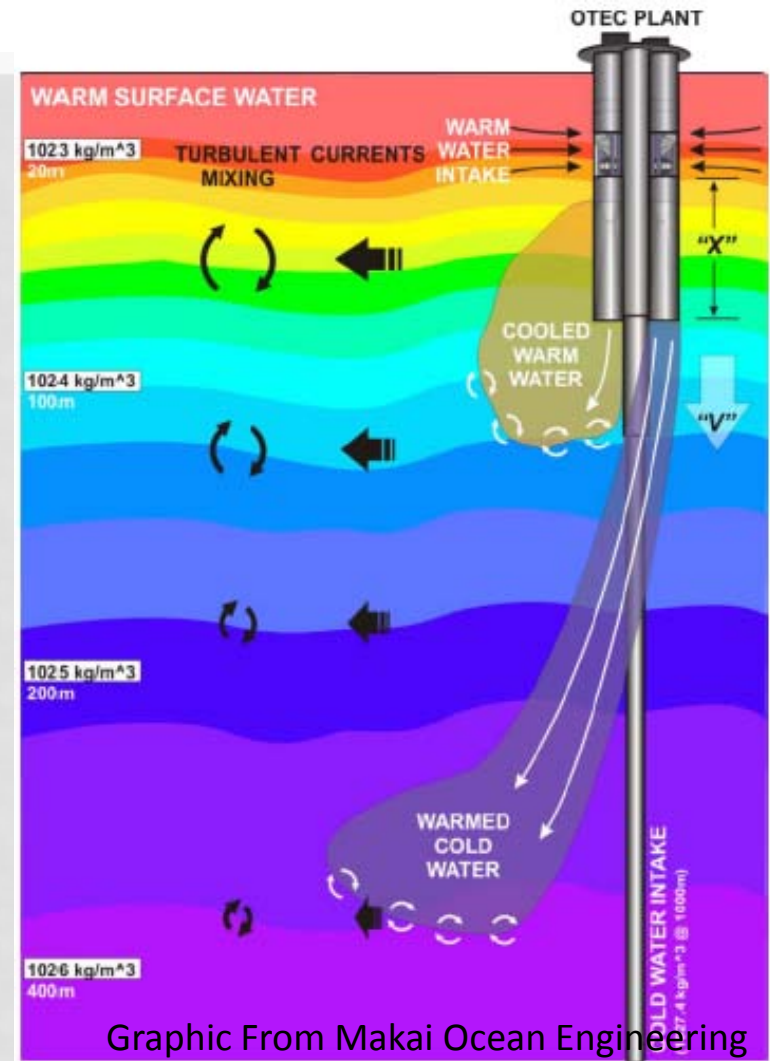
Yes at the scale of ≤ 10 MW

****Fabrication and deployment challenges remain for scale > 10 MW***

ENVIRONMENTAL CONSIDERATIONS

- Discharge water – Thermal/nutrient plume
- Water intakes – Impingement/entrainment
- Platform presence, noise, & electromagnetic field – Biota attraction & interference
- Biocide/ammonia release – Biota toxic response
- Installation of moorings, cables, & pipes – habitat destruction

Need: Baseline information, predictive models, expertise



INFORMATION NEEDS ASSESSMENT: CONCLUSIONS

- The degree of impact of an OTEC facility will depend on location and design
- Minor design changes can dramatically alter environmental impacts and economic feasibility
- The environmental impacts of redistribution of bathypelagic water to the surface are uncertain
- Of particular importance is determining the spatial and temporal extent of discharge plumes and intake zones
- The mortality rates of entrained organisms and the potential cascade of ecological effects need to be better assessed

THE NEED FOR AN OTEC ROADMAP

A multi-national vision, strategy and collaboration is needed to—

- Conduct fundamental and applied OTEC research
- Develop a stable market structure for OTEC
- Identify areas suitable for development
- Perform in situ environmental studies
- Build a trained OTEC workforce, contracting services and infrastructure
- Improve performance and reduce costs
- Resolve grid integration issues