



Feasibility of OTEC Development for U.S. Islands

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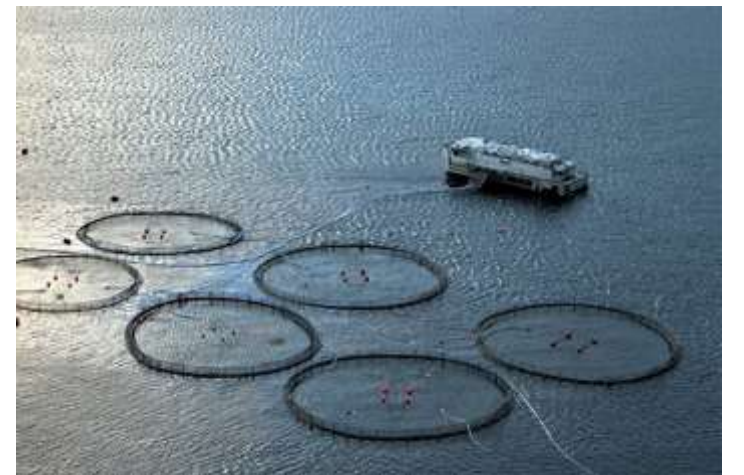


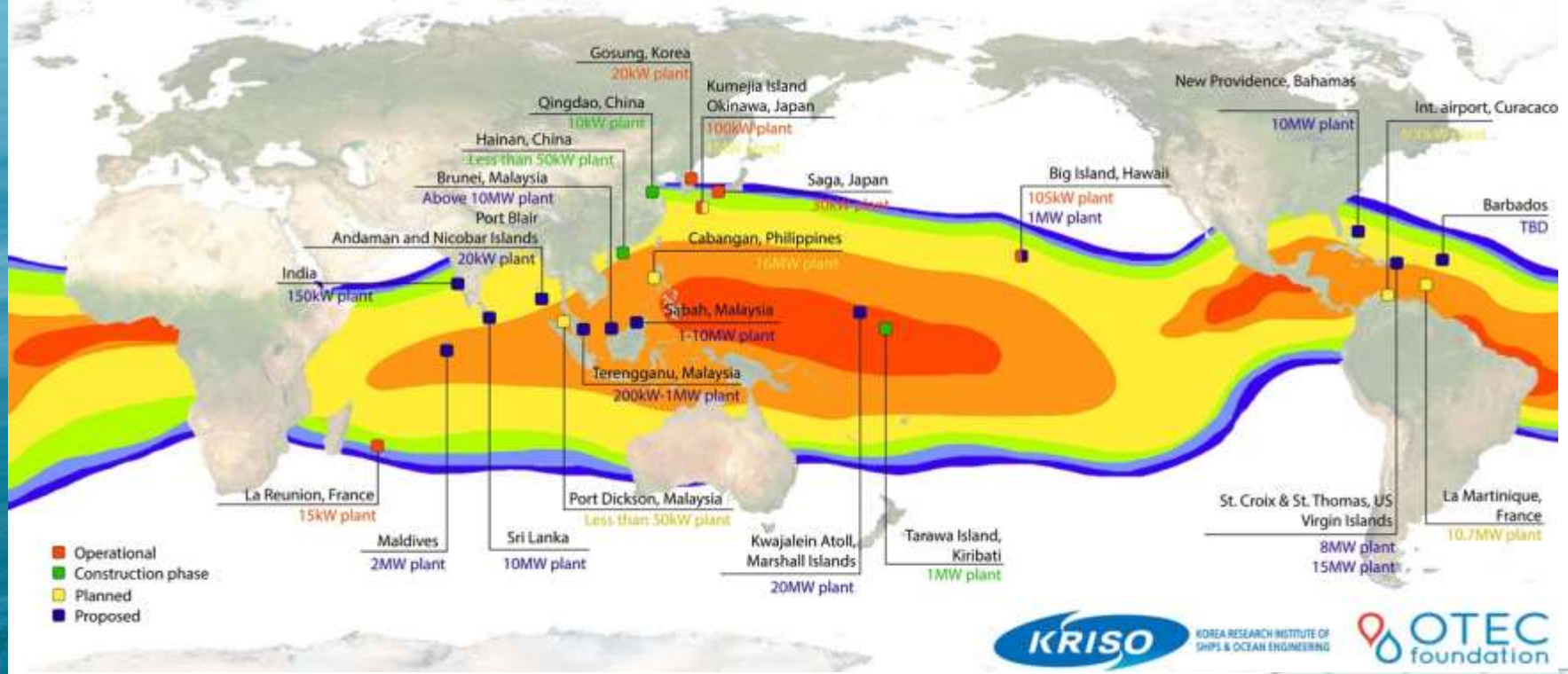
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Examining feasibility of OTEC in US waters

- Purpose is to understand feasibility for OTEC in a range of US islands
- Reached out to experts around the world
- Examining barriers to development: technical, environmental, hazards, societal acceptance
- 4 use cases to examine feasibility: Puerto Rico, St. Croix, Hawaii, & Guam
- OTEC end uses: power, disaster recovery, seawater air conditioning, freshwater
- Multi-use OTEC platform feasibility in Hawaii





Potential environmental effects

- Discharge of cold water at surface
- Entrainment of water with biota
- Discharge of chemicals
- Interference with migration routes
- Entanglement in mooring lines
- Reef effect on fish
- Settling of benthic organisms, potential non-native species introduction
- Changes in nearshore waters due to temperature, circulation changes

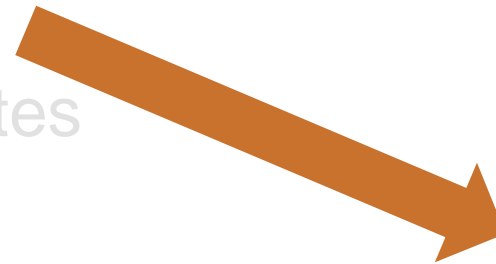
Each effect will depend on the scale and location of the OTEC plant

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- Temperature shock of biota
- Model plume
- Diffuse at depth



- Release of ammonia for shore-based closed cycle
- Lubricants, chemicals at sea
- Hazardous waste plan

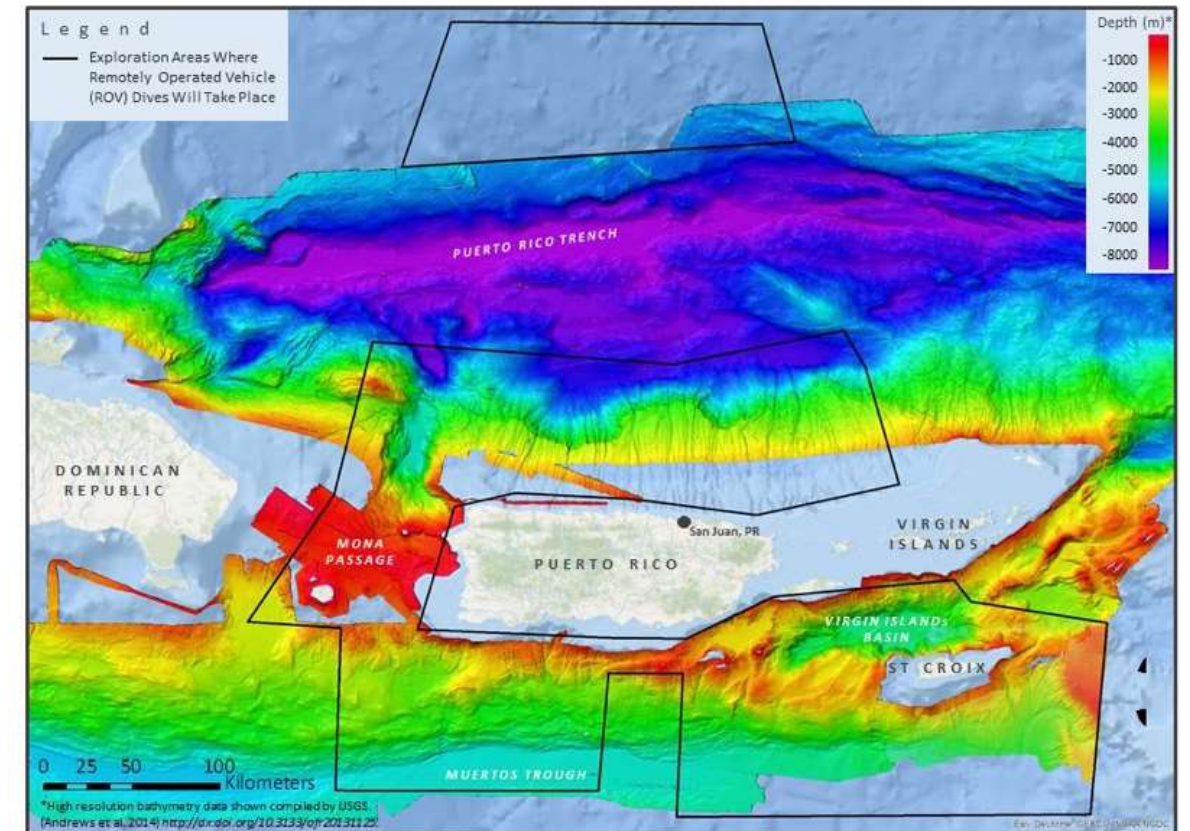
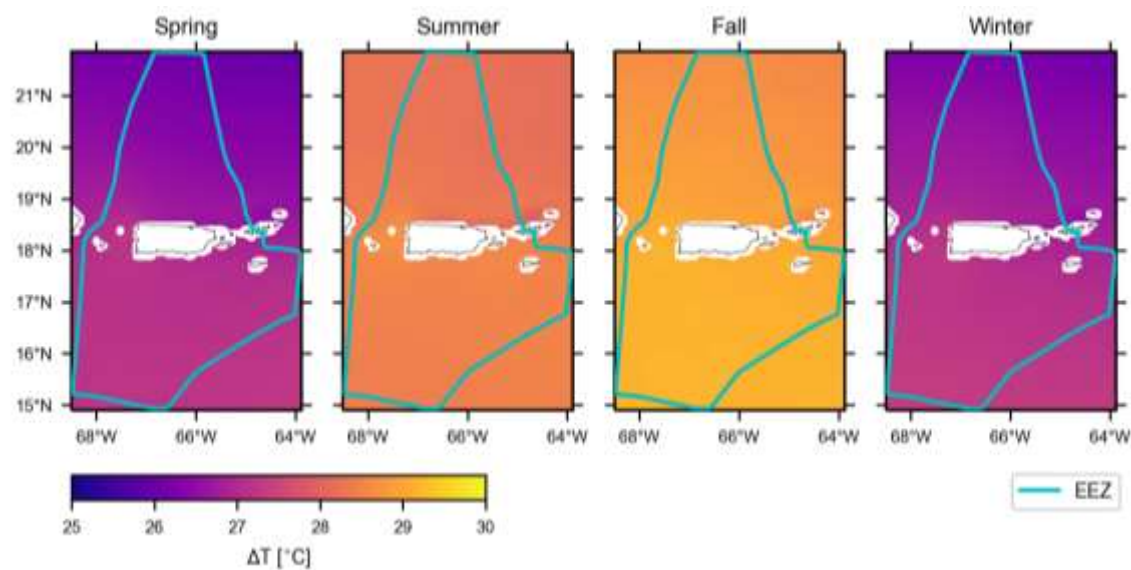
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Potential effects to examine for large scale OTEC development at sea

Puerto Rico and US Virgin Islands

- Islands in eastern Caribbean Sea
- Close to Puerto Rico trench = deep ocean water close to islands
- Adequate temperature differential year round



Puerto Rico Case Study

- 10 MW offshore OTEC plant
- Backup power grid, disaster recovery, emergency services, aquaculture
- Puerto Yabucoa nearest port
- 4.7km cable run to shore
- Hazards
- Environmental effects
- Community support



St Croix, USVI, Case Study

- 3 MW OTEC plant cycle
- Desalination
- Seawater air conditioning
- Power for aquaculture
- Small port nearby, larger port on other side of island
- 2km long cold water pipe
- Hazards
- Environmental effects
- Community support





Kona, Hawaii, Case Study

- Existing plant at NELHA on Hawaii
- 10MW floating OTEC plant
- Power for nearby installations, SWAC
- Port of Kawaihae 37 km north
- Hazards
- Environmental
- Community support



Guam Case Study

- Micronesia, North Pacific, near Marianas Trench
- 5MW - up to 10MW OTEC plant
- Best potential location:
 - Tanguisson for aquaculture power and deep water aquaculture enhancement
- Hazards
- Environmental effects
- Community support



Engaging Stakeholders

- Key to ensuring social license
- Need to reflect values of communities
- Train locals for maintenance
- Little information or research on attitudes,
- OTEC is little known among the public, government officials, financial markets
- Led to developing education program



Same messages, different formats for audiences

	Broad Public Audiences	Local Communities	Policy Makers & Financial Markets	Government officials
Fundamentals of OTEC	X	X		X
Potential benefits and concerns	X	X	X	X
Contribution to climate change needs	X			
Costs of systems and power		X		
Siting		X		
Regulatory regimes				X
Employment and financial effects		X		
Supply chain issues			X	
Economics of OTEC			X	

Ocean Thermal Energy Conversion

1. [What is OTEC?](#)
2. [History of OTEC](#)
3. [Environmental Effects](#)
4. [Potential Benefits & Concerns](#)
5. [Remaining Challenges](#)

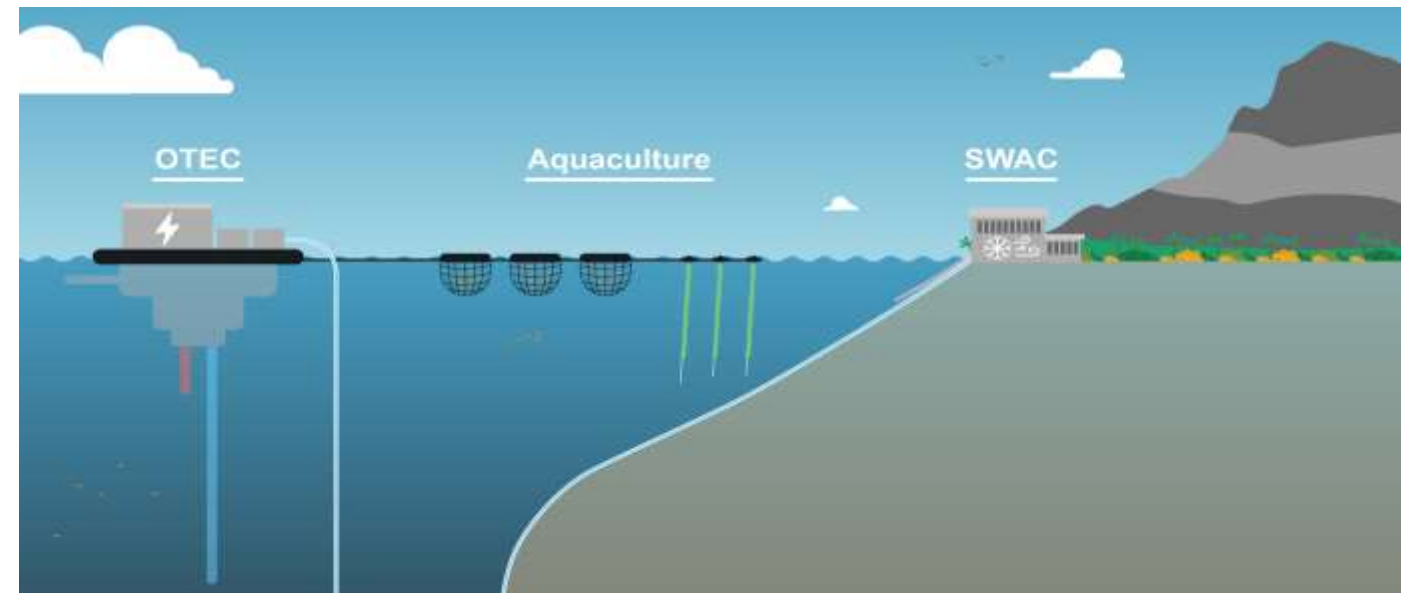
Materials developed by Pacific Northwest National Laboratory for the U.S. Department of Energy.



Education Program

Multi-Use OTEC Platform

- PNNL, Makai Engineering, & Ocean ERA
- Located off Kona, Hawaii at NELHA
- Technical feasibility of OTEC platform to provide:
 - Power
 - SWAC and district cooling
 - Desalination
 - Deep water for aquaculture
 - Critical mineral extraction
 - Efuels (ammonia/hydrogen)
- Tradeoffs for multiple uses
- Specific environmental effects
 - New plume model
- Community needs/values





Thank You!

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