



OCEAN RENEWABLE
ENERGY COALITION

The National Trade Association for Hydrokinetic and Marine Renewables



REAL NewEnergy

OCEAN RENEWABLE ENERGY

Partner in the **ECOFYS** Network™

Overview



- Introduction OREC & Real NewEnergy
- Introduction Ocean Renewable Energy
- Role of Ports in Renewable Energy
- Opportunity for Ports
- Federal Developments

Ocean Renewable Energy Coalition

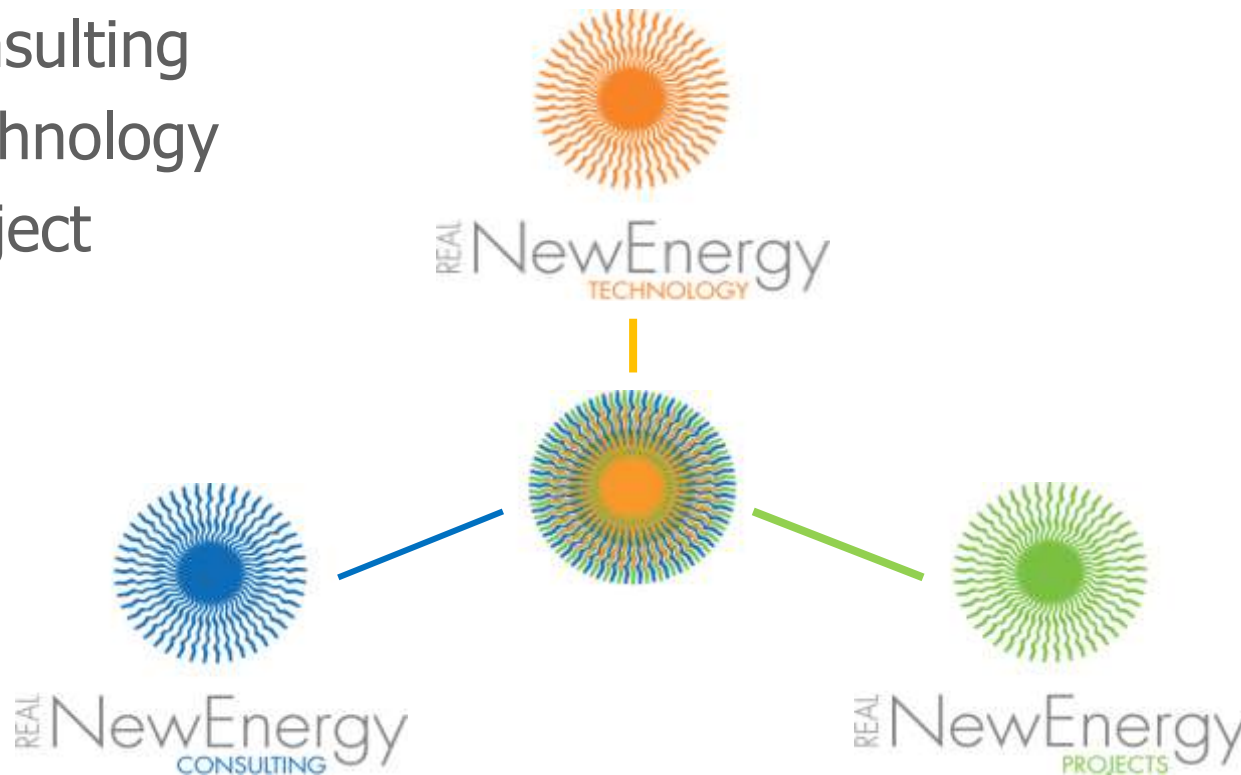


- National trade association dedicated to promoting marine and hydrokinetic energy technologies from clean, renewable ocean resources.
- OREC embraces a wide range of renewable technologies, including wave, tidal, current, offshore wind, ocean thermal, marine biomass , etc.
- Founded in April of 2005, OREC has grown to over 40 members including technology developers, consultants, law firms, investor-owned utilities, publicly owned utilities, universities, and scientific and engineering firms

Real NewEnergy Company

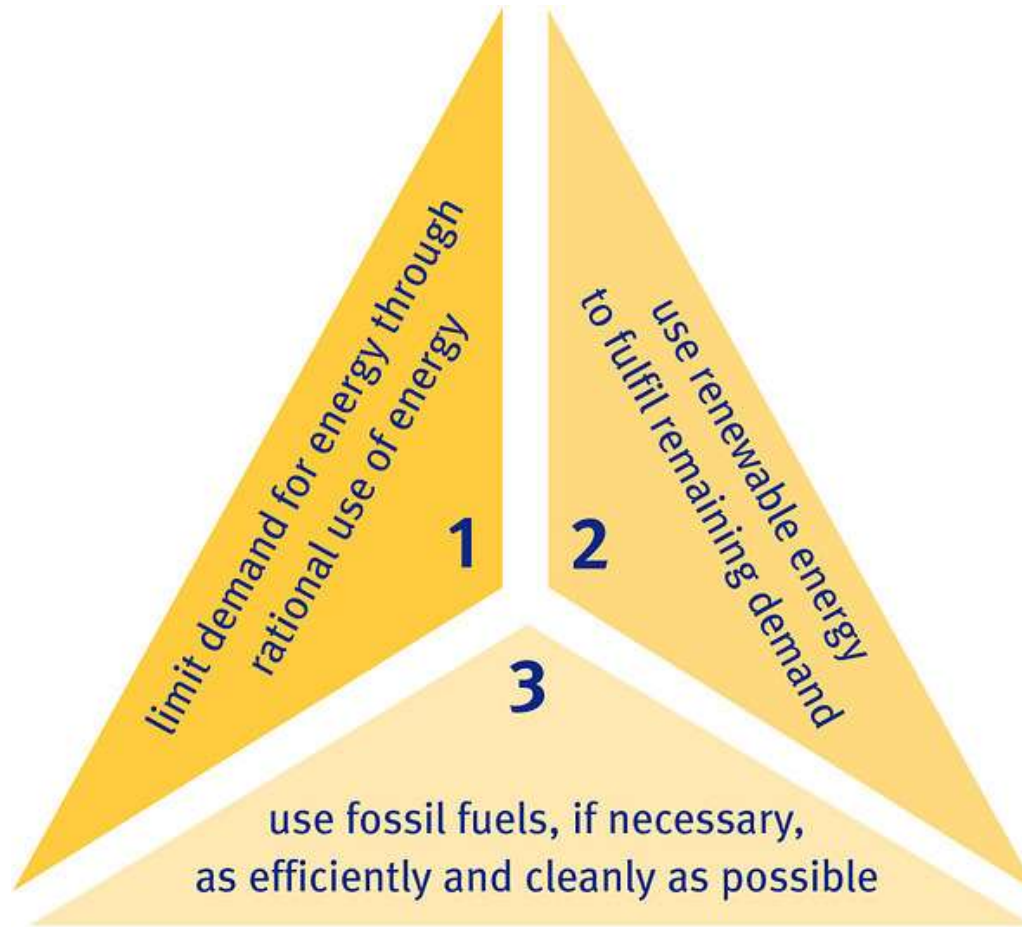


- Real NewEnergy is an integrated sustainable energy company, built on 3 major offerings:
 - Consulting
 - Technology
 - Project

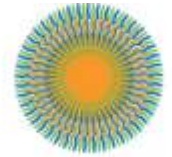


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Guiding Principle Real NewEnergy



Current Portfolio of Real NewEnergy



- Consulting Activities:



- Renewable Energy Technologies:



- Project Development:



Ocean Renewable Energy



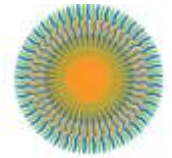
- A wide range of renewable technologies
 - Offshore Wind
 - Marine Hydrokinetic
 - Marine Biomass (algae)
- Technologies that utilize renewable resources from oceans, tidal areas and other unimpounded water bodies to produce electricity, desalinized water, hydrogen, mariculture and other by products.



US Offshore Wind Developments

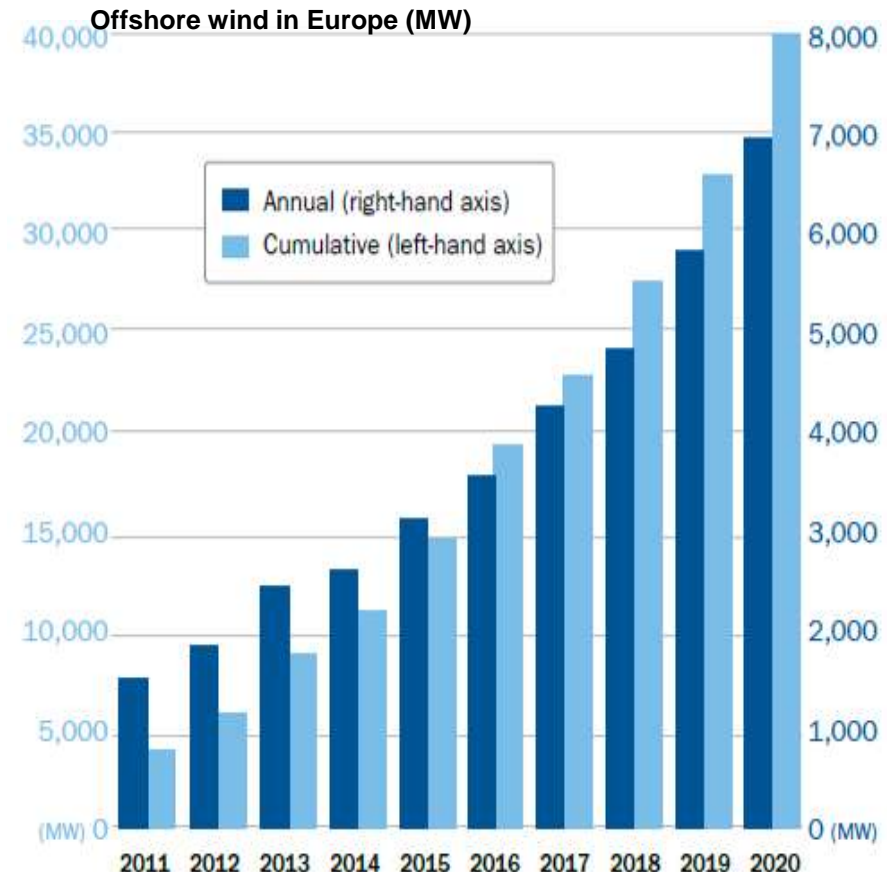
- DOE Targets:
 - 54 GW at 7-9 cents/kWh by 2030
 - Interim target, 10 GW at 13 cents per kWh by 2020
- Costs today: 20-30 cents/kWh. Reduction through DOE coordinated programs:
 - Technology Development
 - Market Barrier Removal
 - Advanced Technology Demonstration Projects
- Targets can be met but DoE effort alone is not enough

Developments in (Offshore) Wind Energy

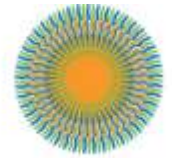


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- Since 2008, global renewable power Capex > traditional power plants Capex: \$240B in 2010
- Offshore wind is the biggest source of renewable energy for North West Europe
- 30% CAGR from 2010 to 2020



Marine Hydrokinetic Technologies



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- **Wave Energy** can be captured from offshore, near shore, and shore based locations. It is driven by wind blowing over water creating waves from which energy is captured.
- **Tidal Energy** can be captured from the ebb and flow of tides, thus the tidal devices change orientation with the tide. It is driven by the gravity of the moon and sun and can be predicted efficiently.
- **Current Energy** can capture the energy from moving ocean, tidal or river currents.
- **Ocean Thermal Energy Conversion (OTEC)** uses the ocean's natural thermal gradient to drive a power-producing cycle.

Wave Energy



COURTESY: OCEAN POWER TECHNOLOGIES

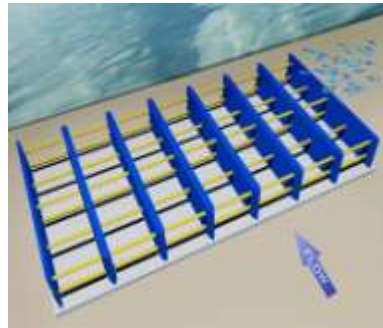
Ocean Power Technologies
PowerBuoy

Tidal Energy



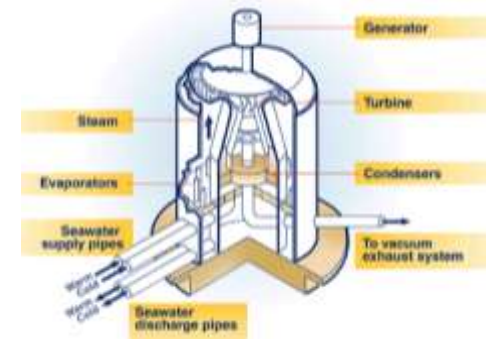
Tocardo
Free Flow System Turbines

Current Energy



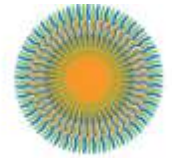
Vortex Hydro Energy
The VIVACE

OTEC



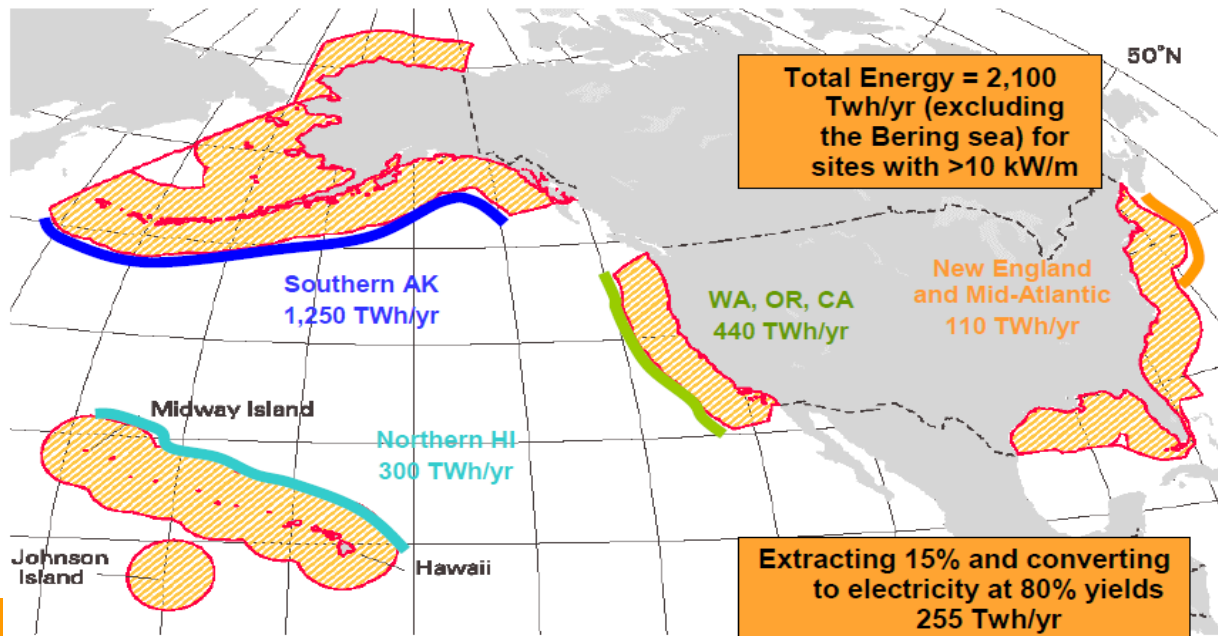
OTEC Design Model

US MHK Energy Potential



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- EPRI estimates U.S. wave energy resource to be about 2,100 TWh/year.
- Tidal energy resource evaluated by EPRI is estimated at 115 TWh/yr with 6 TWh/yr at sites in the continental U.S. and the remaining 109 TWh/yr in Alaska.
- EPRI research suggests that ocean wave and in-stream tidal hydrokinetic energy resource energy production potential is equal to about **10% of present U.S. electricity consumption** (about 400 TWh/yr).



Role of Ports in Renewable Energy



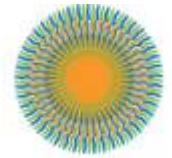
- Roles of ports related to (ocean) renewable energy can be one or a mix of:
 - User
 - Producer
 - Storage, Distribution & Enabler

Role of Ports - User

- Energy scans, Benchmarking, picking low hanging fruit
- Example: Hutchison Ports (HPUK) has engaged AECOM to assist in embedding carbon management within its corporate strategy and to identify opportunities for reducing its carbon emissions by energy efficiency measures combined with renewable generation



Role of Ports – Producer I

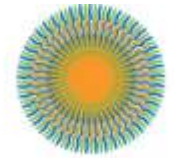


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- Example: wind energy project 'Afrika Haven' 9 times 3 MW in Port Amsterdam

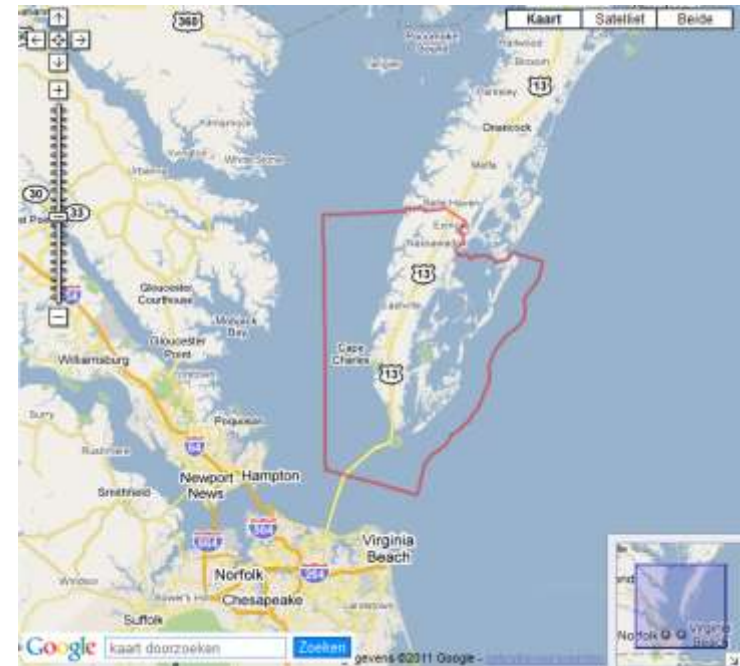


Role of Ports – Producer II



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- Example: Poseidon Atlantic on & near-shore wind turbine test & certification lab, Virginia Port Authority



Role of Ports – Storage, Distribution & Enabling (I)



- Example: Shore power and PV installations. Replace diesel gen sets on ships with renewables and good power connections (the Netherlands).
- Benefits: local clean air and CO2 emission reduction and cost reduction for port and customers.



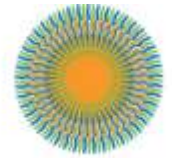
Role of Ports – Storage, Distribution & Enabling (II)



- Example: Rotterdam is the European Energy Port. The Port of Rotterdam Authority is now also opening the way for sustainable energy-intensive industry.
- Besides existing sources of energy (coal and oil), the Port Authority is also tapping into new forms of energy.
- LNG, biomass and wind are already finding their way to Rotterdam Energy Port.
- Rotterdam is also taking the lead in encouraging companies to be energy-efficient and to limit CO2 emissions.



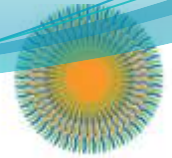
Opportunity Ports – Moving BIG things





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We seek a legislative and regulatory regime in the United States that fosters the development of ocean renewable technologies, their commercial development, and support in the race to capture the rich energy potential of our oceans. While other countries have already deployed viable, operating, power generating projects using the emission-free power of ocean waves, currents, and tidal forces, the U.S. is only beginning to acknowledge the importance these technologies.

12909 Scarlet Oak Drive Darnestown, Maryland 20878

(301) 869-3790

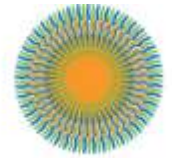


www.oceanrenewable.com

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paul@realnewenergy.com

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