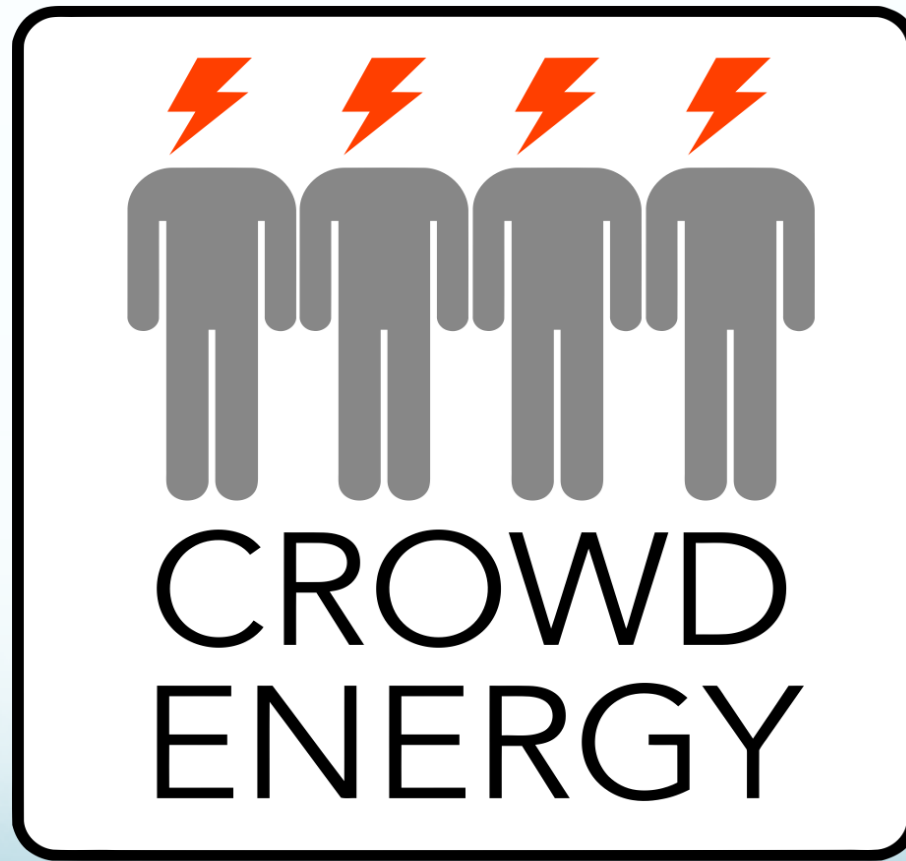


# Ocean Energy Turbine Development



[www.crowdenergy.com](http://www.crowdenergy.com)

# ***Technology Overview***

## ***Existing Industry Approach***

- ***Waves*** (not predictable)
- ***Tides*** (extremely predictable)
- ***Surface Currents*** (fairly predictable)
- ***OTEC*** (Ocean Thermal Energy Conversion) (geographically limited)
- ***Offshore Wind Farms*** (not predictable)
- ***Offshore Solar Farms*** (not predictable)
- ***Deep Currents*** (just evolving; but deep ocean currents are a constant source of energy)

# ***Pelamis Wave Power***

*pelamis platura (yellow bellied sea snake)*

*The Firth of Forth*



An adaptation of “Salters Duck”...seen here off the coast of Scotland

# *Tidal & Surface Current Power*

A very predictable source of energy...but they seldom survive storms unless they are installed at depths below the 100 year storm zone...tides usually don't go that deep

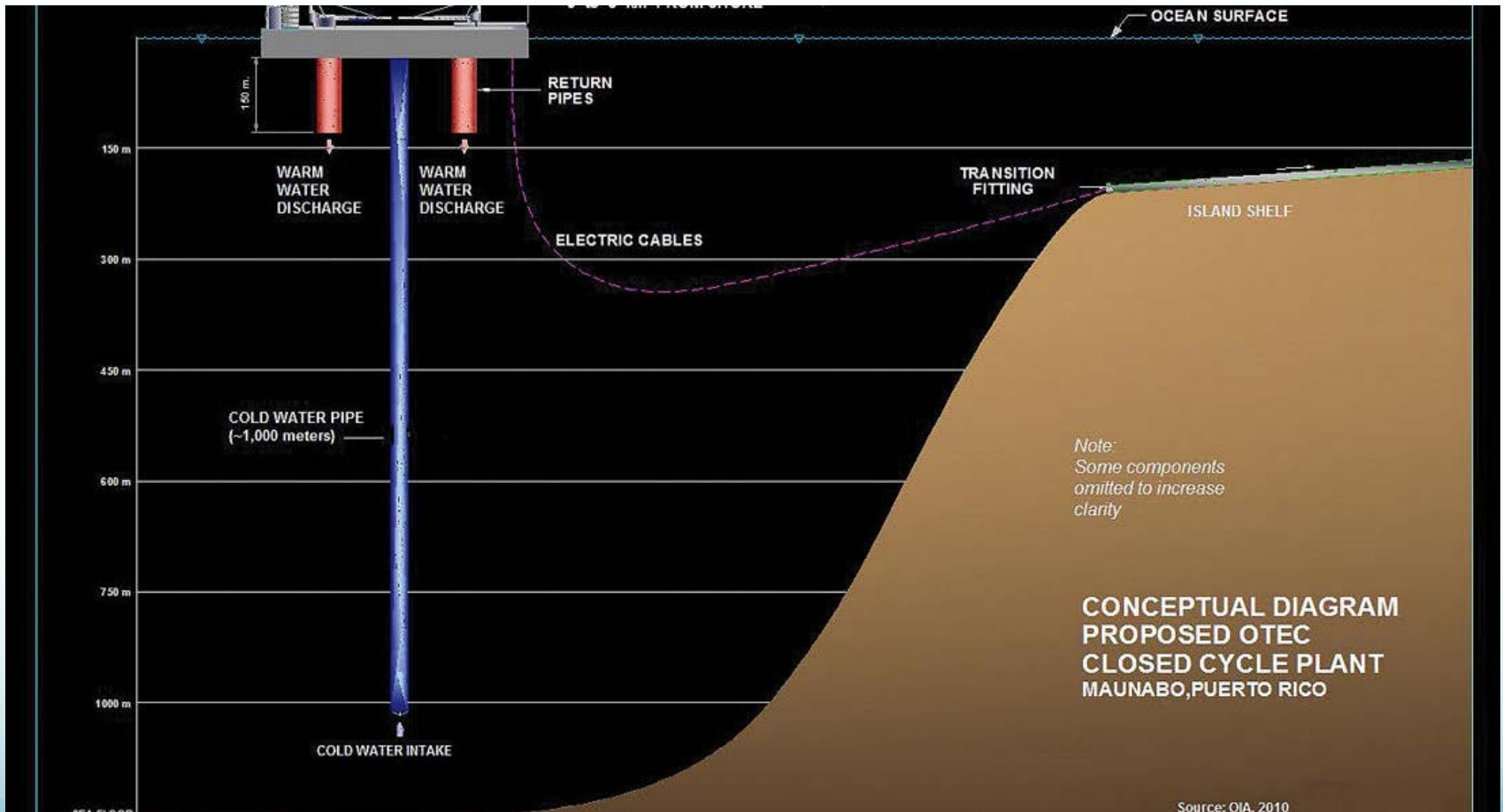


We can safely link these two technologies together for illustration purposes



# OTEC

Members of our team have spent hundreds of hours conducting bathymetric surveys on the North Coast of Jamaica and Puerto Rico for potential OTEC sites



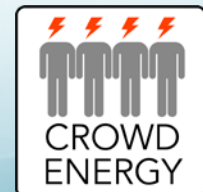
OTEC has not been proven to be viable due to the geographical limitations

# *OTEC Surface Station*

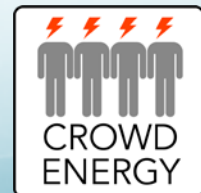


# CROWD ENERGY

***harnessing the natural flow of  
ocean currents to generate clean,  
renewable, utility scale energy, to power  
our homes, vehicles, and industry.....  
with zero environmental impact***



*The CROWD ENERGY  
Ocean Energy Turbine  
redefines  
"disruptive technology"*



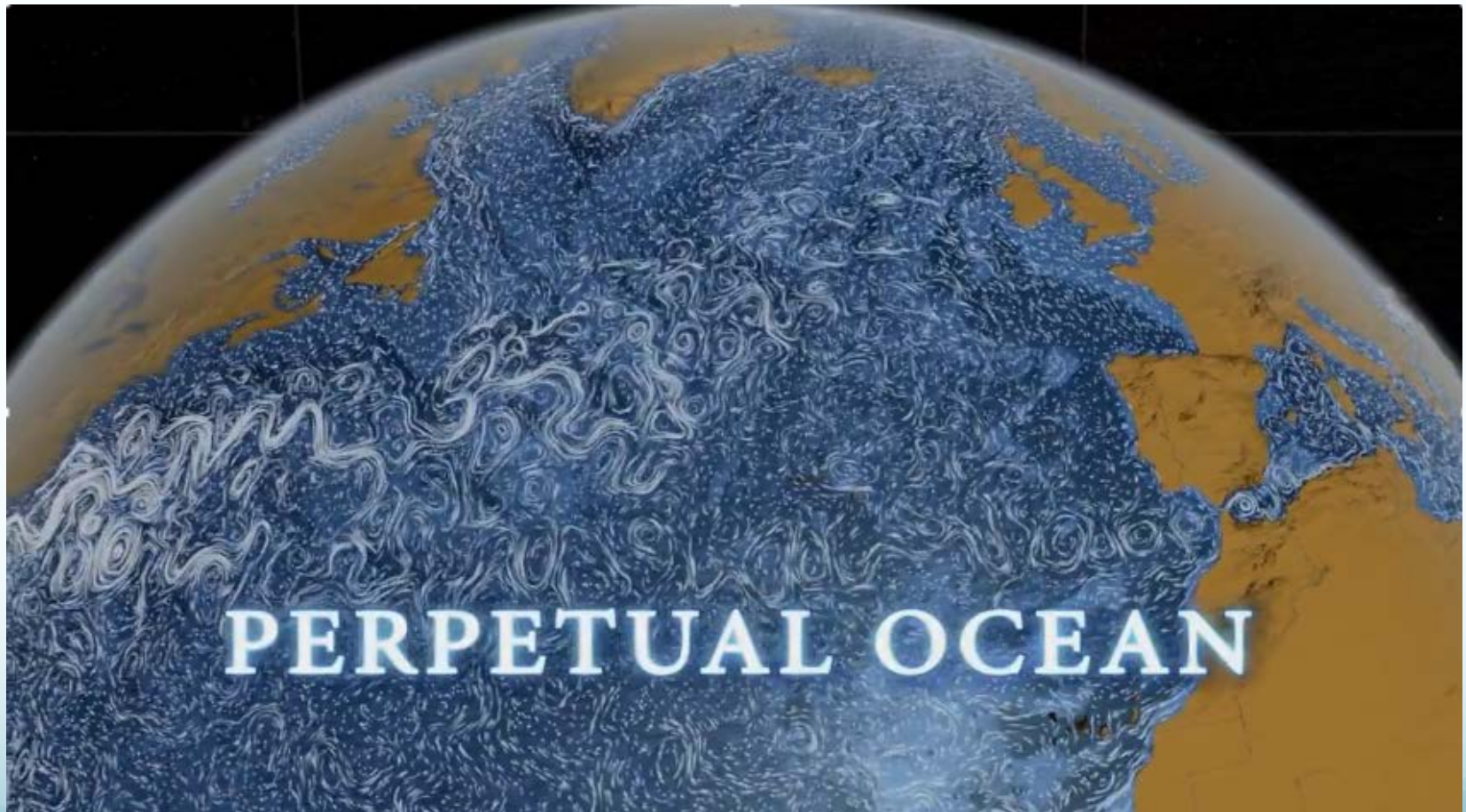


# ***Our biggest obstacle?***

***Educating everyone that  
deep ocean currents are the  
only known source of  
uninterruptable 24/365 utility  
scale renewable energy***



# NASA Ocean Currents

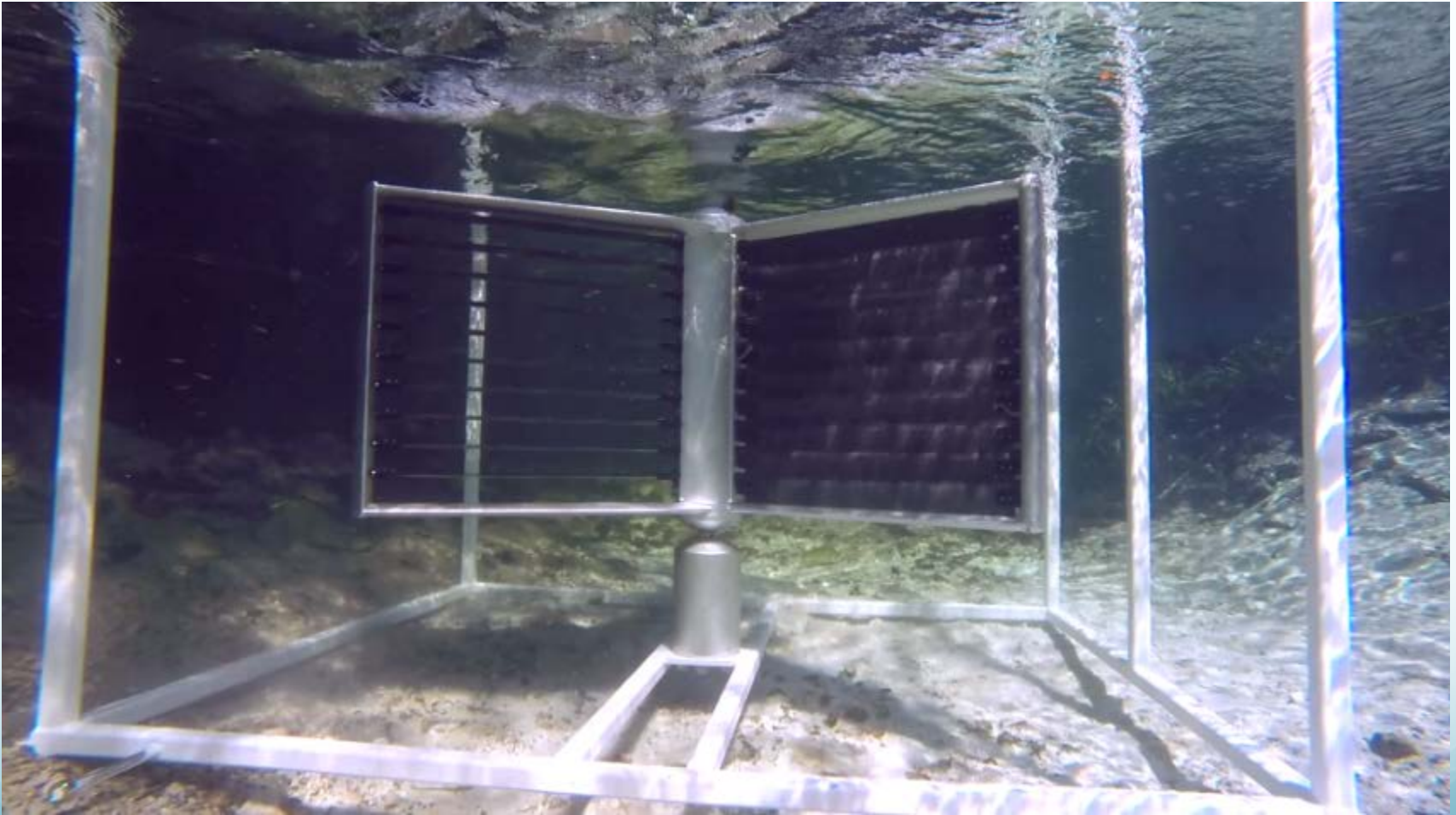


This is not a concept...  
...it is a reality





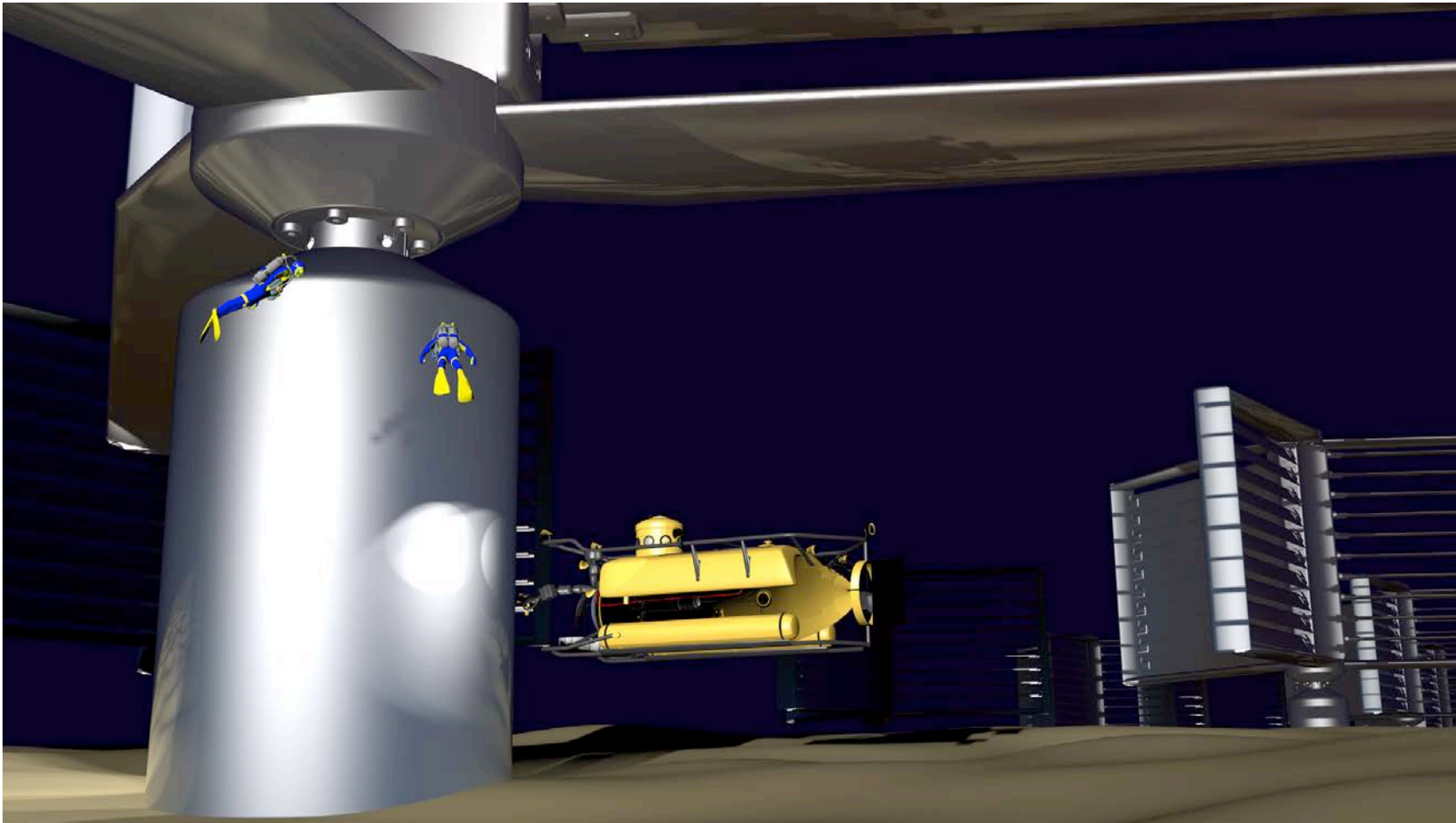
# *Our first generation working prototype*



# CROWD ENERGY

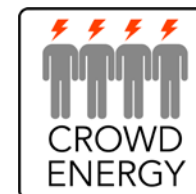
## Design Objectives

*“design, build, implement, and operate, utility scale, sub sea power stations”*





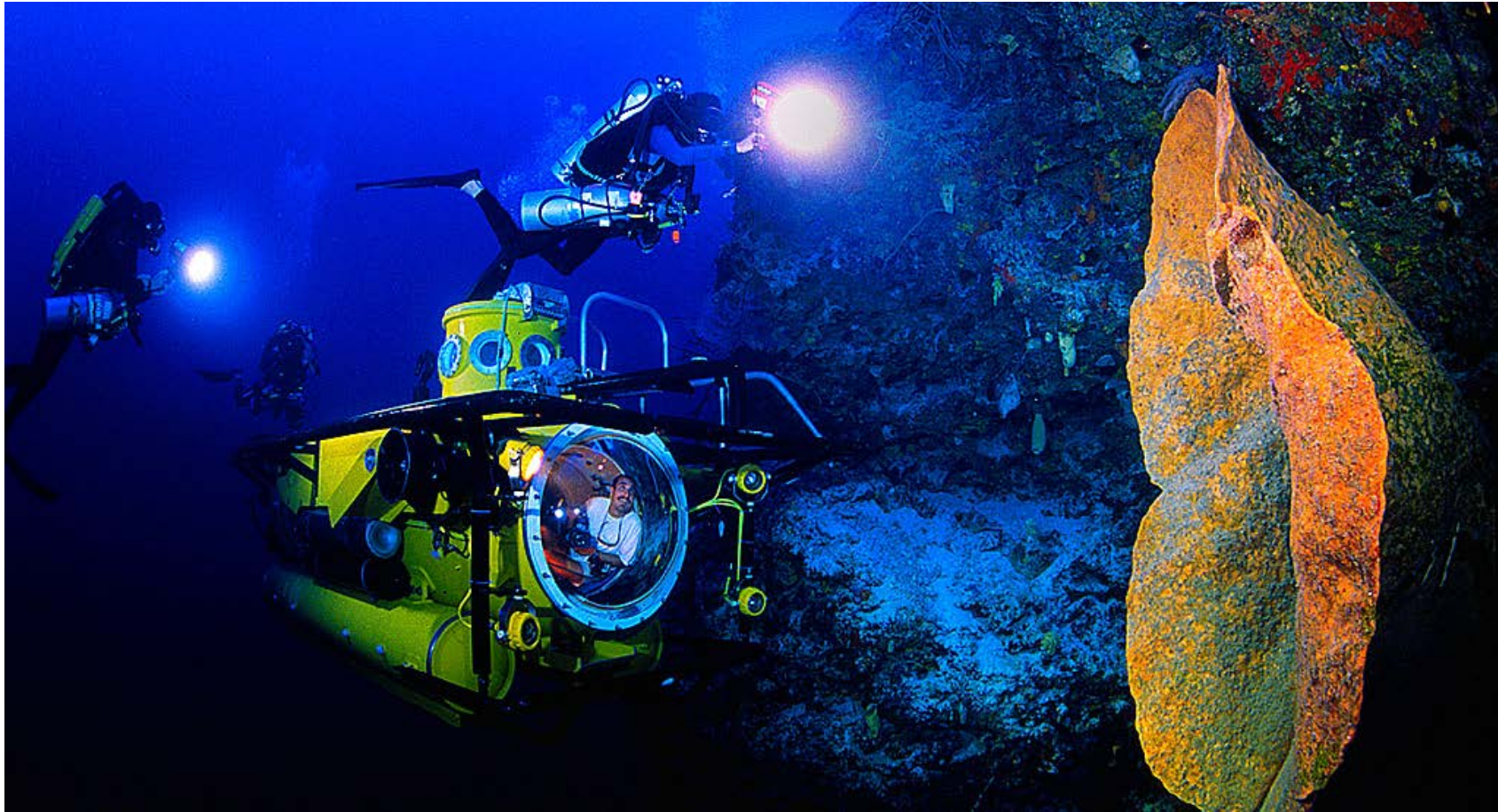
***Why are we focused on harvesting the energy of deep ocean currents ?***



# ***We are deep diving manned submersible pilots.***

We have spent thousands of hours trying to overcome extremely powerful sub sea currents.

We have witnessed, first hand, the incredible power of ocean currents.

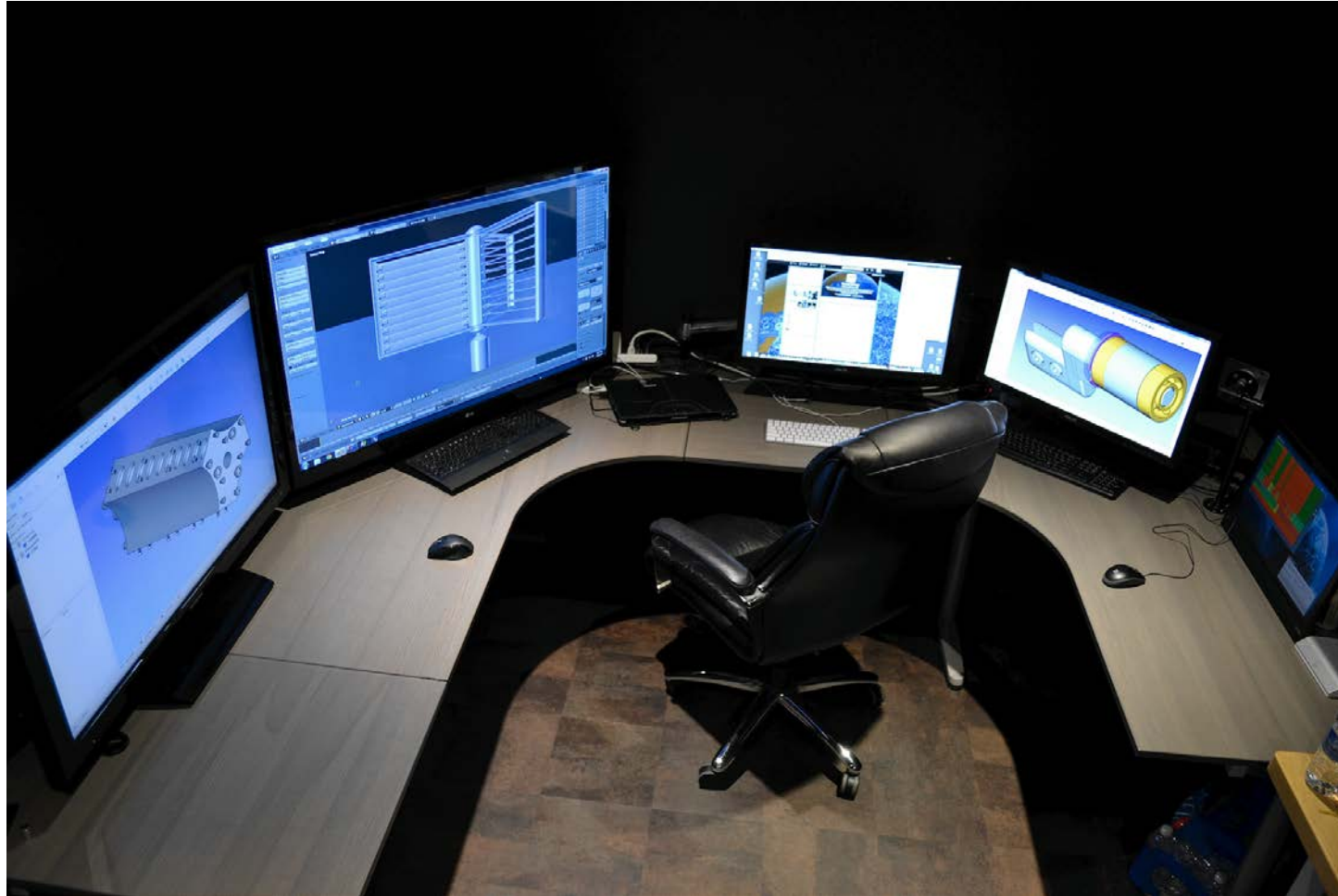


# ***What are our capabilities?***

- Members of our team have a proven track record of designing, building, and operating deep diving manned submersibles
- Members of our team have worked in the North Sea as saturation divers
- Members of our team developed proprietary technology for repairing critical level nuclear reactors using the cooling water as a radiation shield
- Members of our team owned a sub sea engineering firm in Aberdeen Scotland in the 70's
- Our team can design, build, test, operate, and maintain, complex sub sea structures



*we have a powerful in-house SOLIDWORKS design and FEA capability*





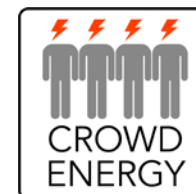
*we have a 24/365 access to a well  
equipped fabrication shop*





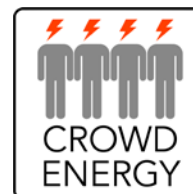
## ***Design Considerations***

- ***Deep ocean CURRENTS flow continuously***
- ***Two massive currents exist: The Gulfstream & The Kuroshio***
- ***The Kuroshio has been compared to “6000 large rivers”***
- ***Capturing 1/10<sup>th</sup> of 1% of the energy of the Gulfstream could power 35% of: the electrical needs of Florida, Georgia, South and North Carolina***
- ***We will generate electricity on a utility (power plant) scale***
- ***We will generate power at high DC voltage to facilitate transmission***
- ***In addition to electricity, we can generate and export potable water to the surface***



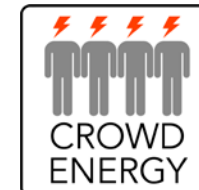
## *Design Considerations*

- OTEC, wind, wave, and shallow current projects, were considered to be impractical
- We wanted to generate power constantly without any significant variation in output
- Our system had to survive a 100 year storm
- The sub sea power station had to present zero hazards to surface shipping
- Fish, marine mammals, and macro/micro organisms had to be protected
- All components had to be repairable or replaceable on site
- The system had to be classed for implementation anywhere in the world
- Potable water production was absolutely necessary
- The cost of construction and operation had to be viable



## *The genius of our design*

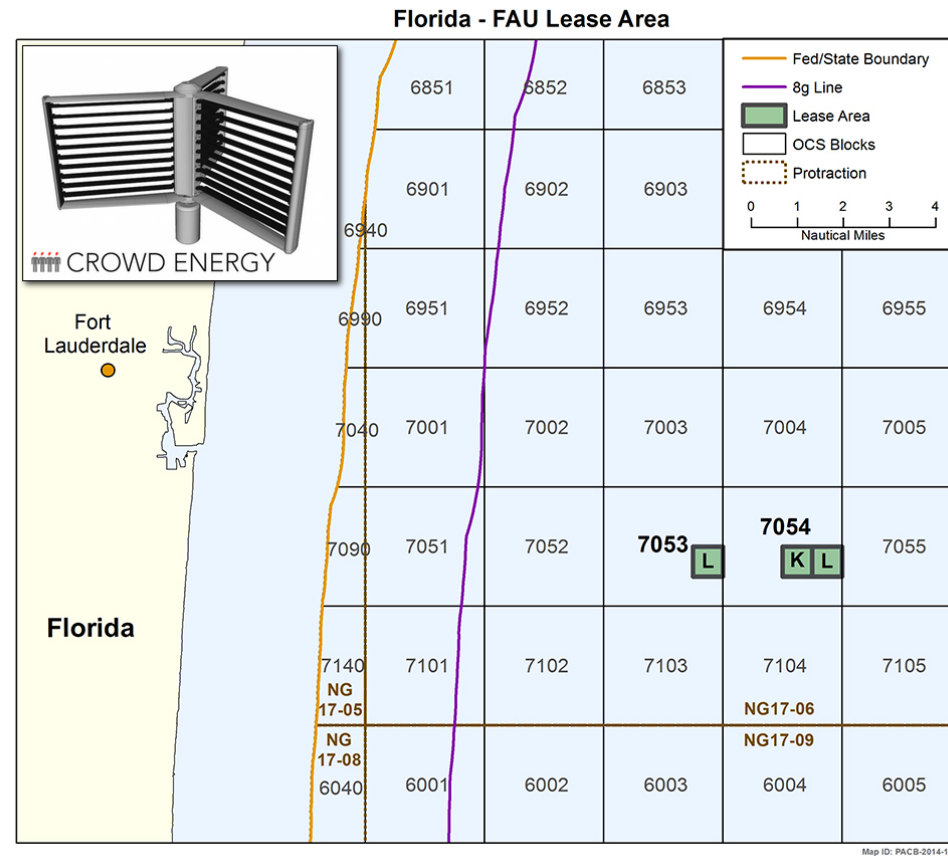
- The current can come from any direction
- Our turbines rotate at extremely slow speeds
- They are designed to reduce harmonics
- Our design includes magnetic shielding to protect sensitive marine organisms
- The ocean current closes the correct set of blades..... and opens the others
- Blade opening and closing is not mechanized
- Our turbines have scalability
- Our turbines can be made to be site specific





***In 2014 we executed a MOU with the Florida Atlantic University Board of Trustees. This MOU outlines a way forward for CROWD ENERGY to utilize the SNMREC test platform for oceanic deployment of our second generation, “proof of concept”, ocean energy turbine***

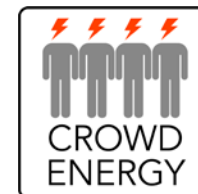
# ***FAU's concept is visionary***





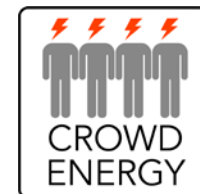
## *Why have we been focused on ocean currents since 1998?*

- Deep ocean currents are constant
- As long as the Earth rotates on it's axis, deep ocean currents will exist
- Even the most massive storm event will not impact sub sea power stations situated on the continental shelf
- Sub sea power stations are more secure when compared to surface power stations

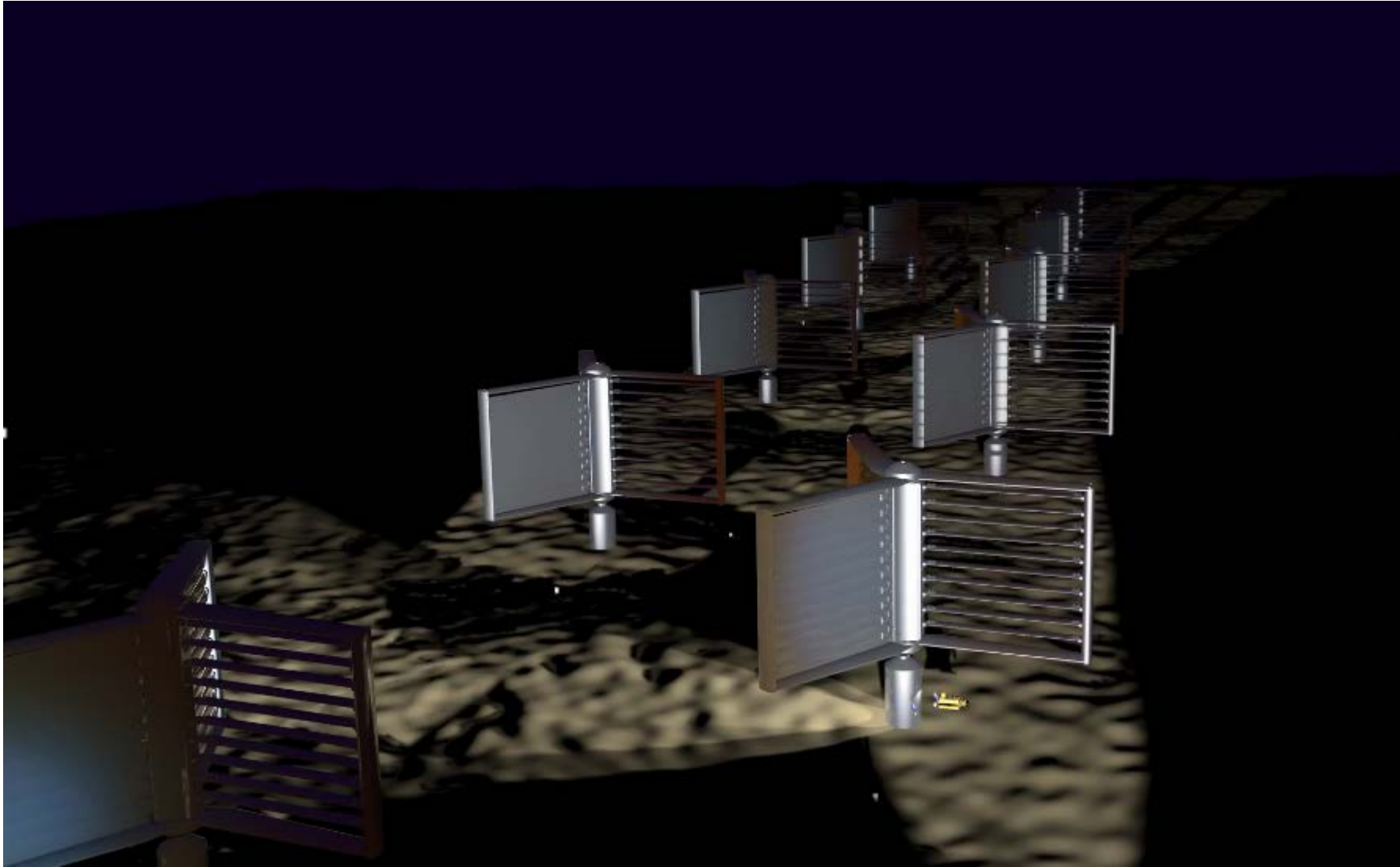


## *Why have we been focused on ocean currents since 1998?*

- Sub Sea Power Stations are not “visually offensive”
- Prime seafront real estate can be for recreation or commercial utilization as opposed to industrial applications



# THE FUTURE

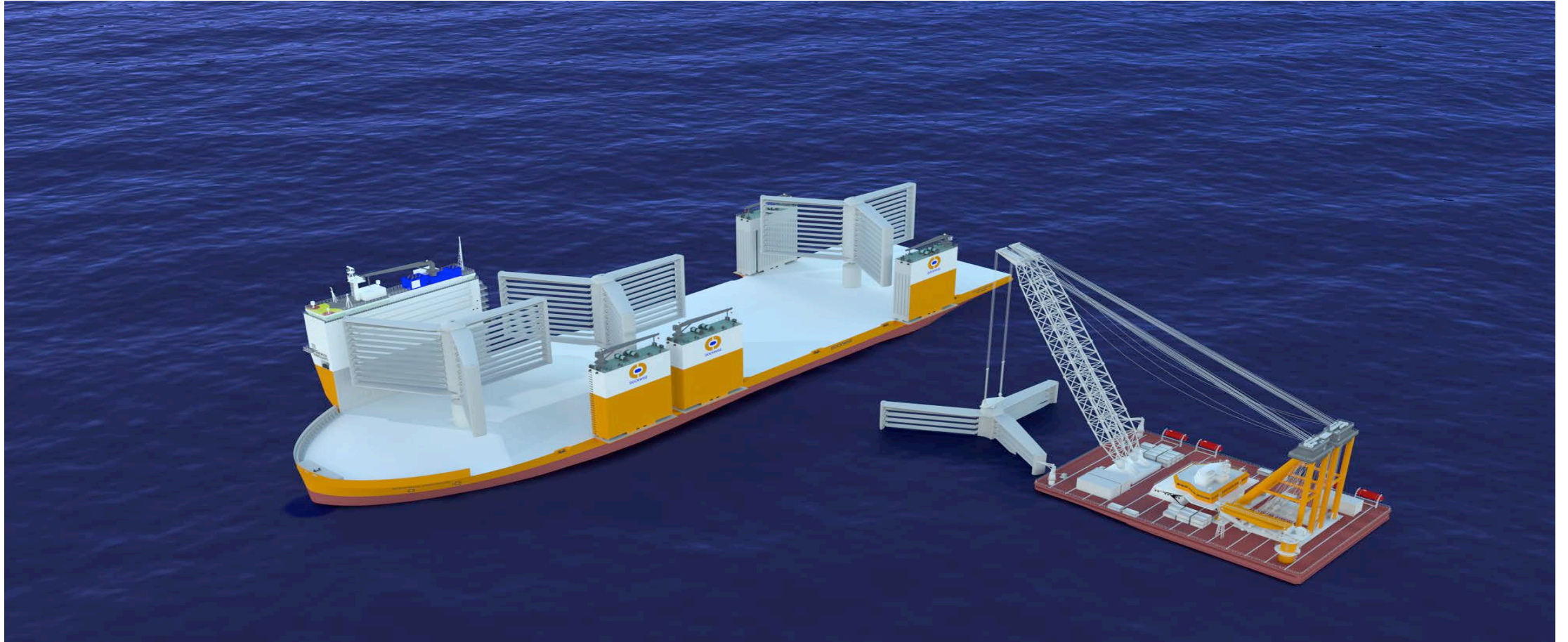


# ***Large Scale Implementation***





# ***Large Scale Implementation***





# Engineering and Scientific Team

***“we are all dedicated to reversing climate change”***



TODD JANCA  
Founder/Patent Holder

Skilled in designing and  
operating Sub Sea  
Systems

Todd holds numerous  
world wide patents and  
has been a deep diving  
manned submersible  
pilot for 22 years.... and  
a diver since he was 5  
years old



# Phillip Janca

Founder/Sub Sea Technology Officer

North Sea Saturation Diver

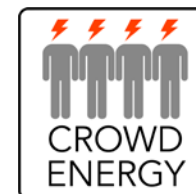
SCUBA Instructor

Research Diving Officer University of the West Indies

Deep Diving Manned Submersible Pilot

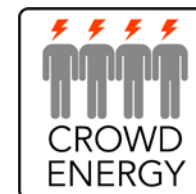


Dr. Bjorn Kjerfve World renowned Oceanographer  
Dr. Kjerfve is the Chancellor of a major University in the UAE  
and former Dean of Geosciences at Texas A&M University



Dr. Murray Itzkowitz  
Chair of Marine Biology Lehigh University

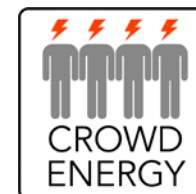
Dr. Itzkowitz is a diver, conservationist, and a well known  
marine animal behavior expert





# Dr. Ilko Shtirkov

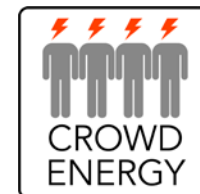
Bulgarian Academy of Science  
Marine Engineering & Manned Submersible Pilot



## Recap

- We will generate power 24/365
- Our power generation will be “utility scale”
- We will be positioned well below the storm zone
- The current direction doesn’t need to be vector specific
- Fish, marine mammals, and macro/micro organisms will be protected
- We won’t harm the environment
- In fact, we offer a solution to save the environment!
- We can develop site specific energy and potable water solutions
- We have designed, built, and operated, complex sub sea equipment with unparalleled safety and reliability

“and finally, we have a burning desire  
to implement our technology”



We sincerely appreciate the opportunity  
to present our technology  
for your consideration



CROWD ENERGY

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