



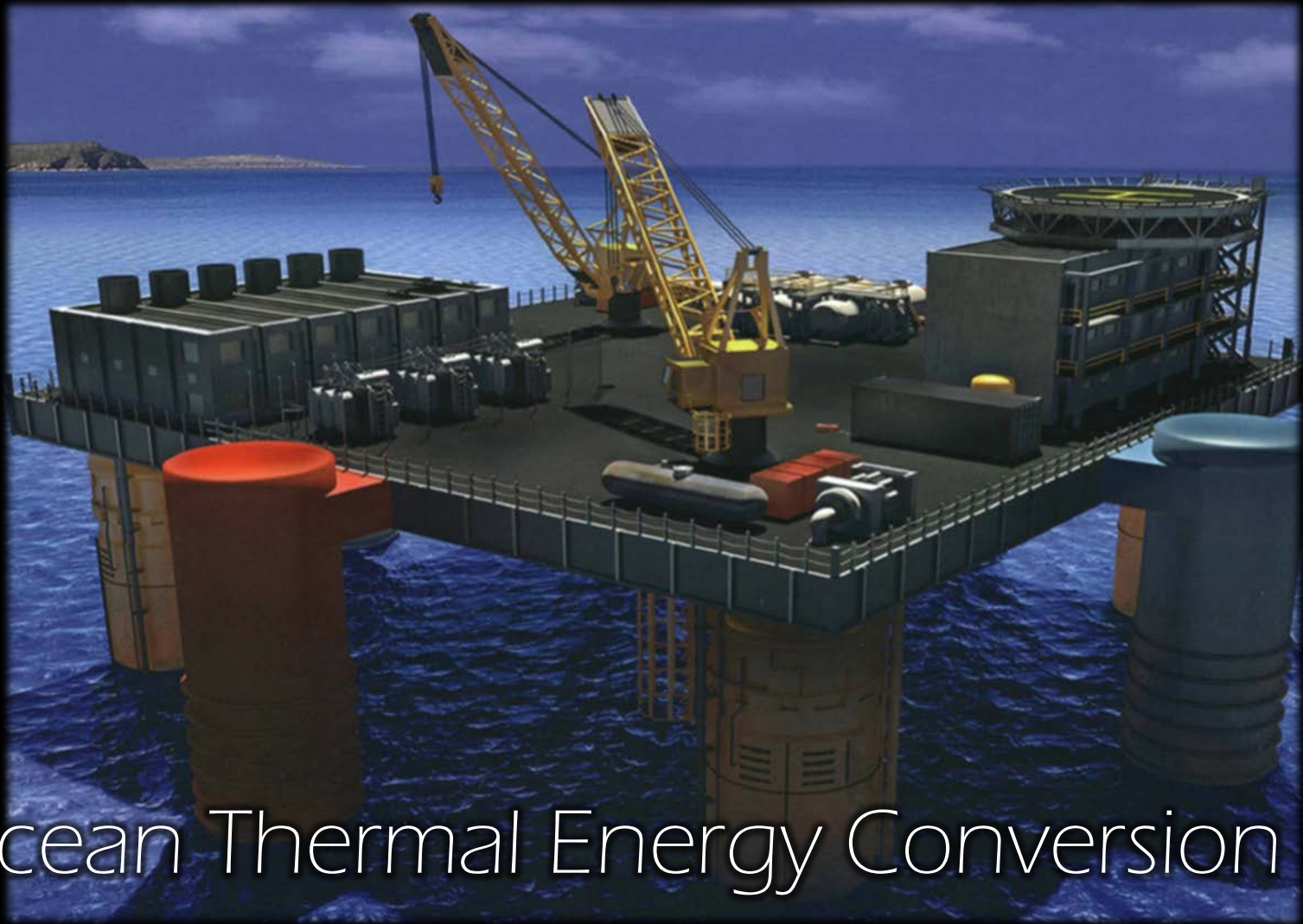
FAU

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SOUTHEAST NATIONAL MARINE  
RENEWABLE ENERGY CENTER

# Overview of the MHK industry and MHK research in Florida

Florida Intergovernmental Renewable Energy Task Force  
December 11, 2014



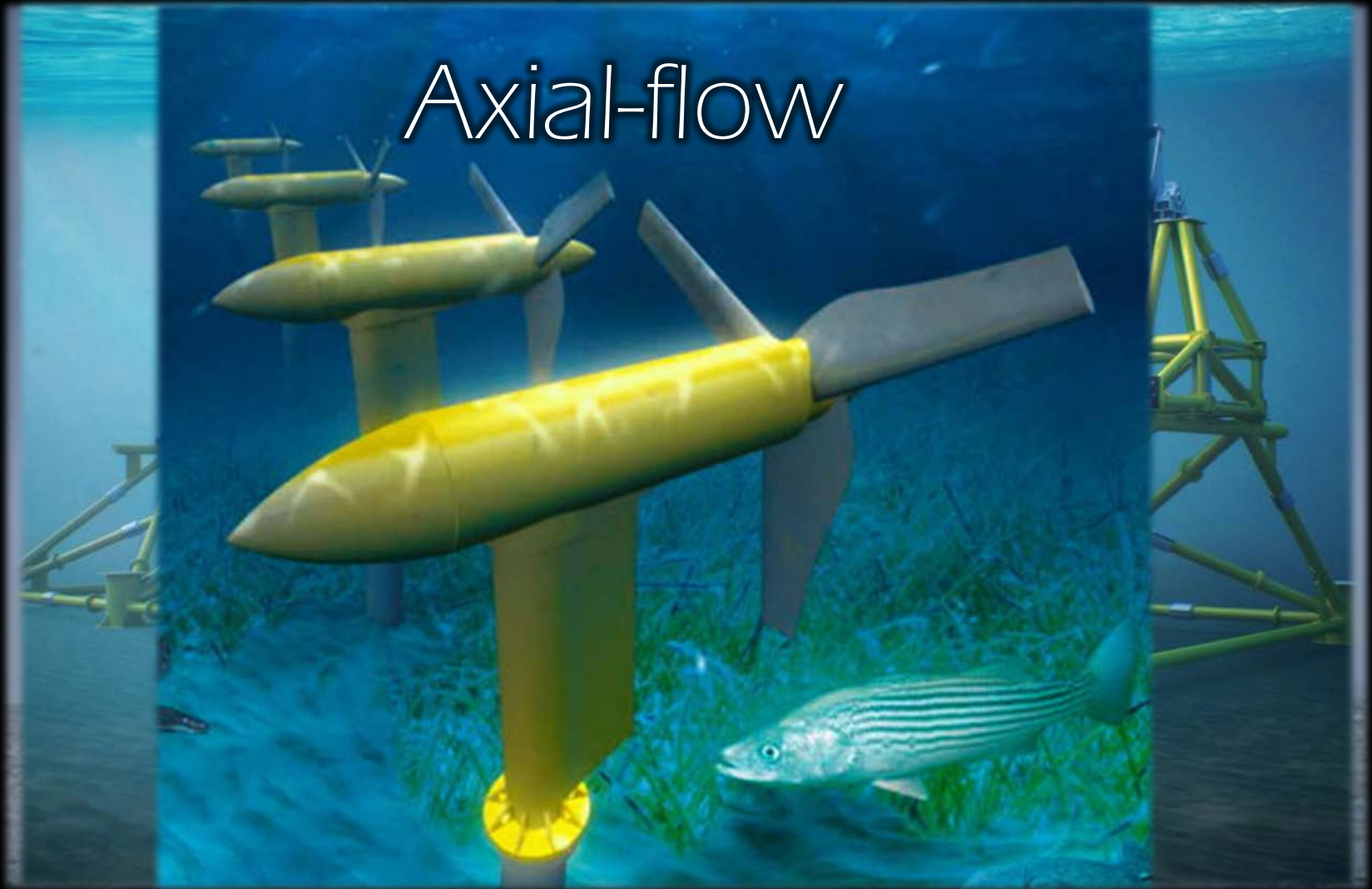
Ocean Thermal Energy Conversion

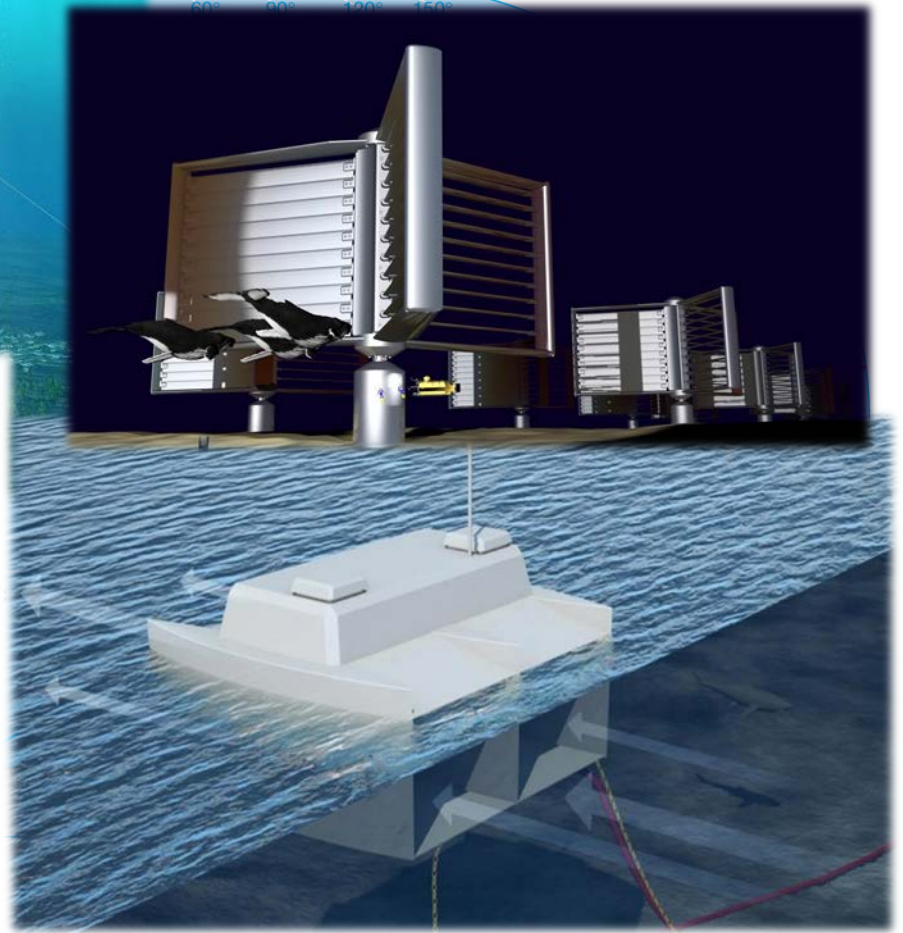
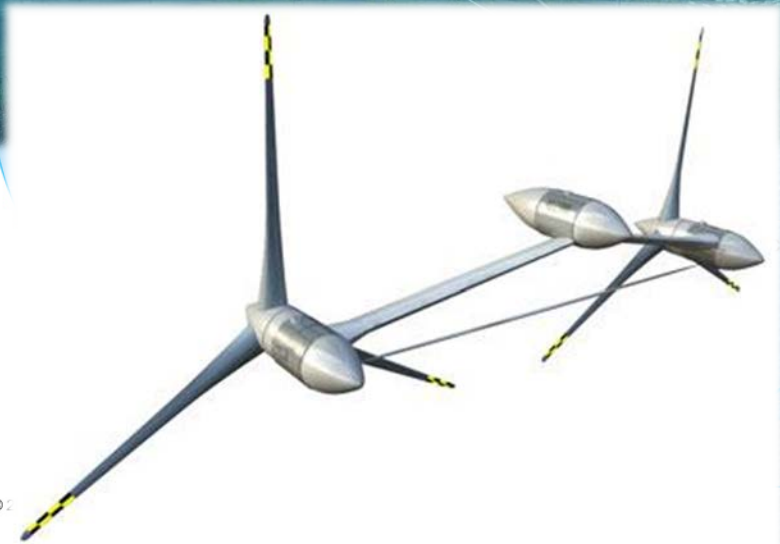
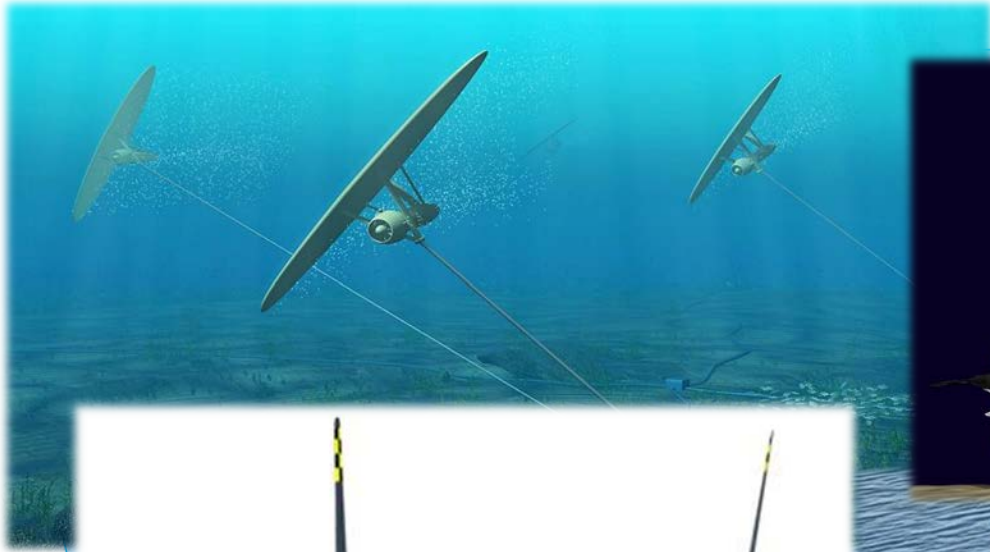
# Point Absorbers



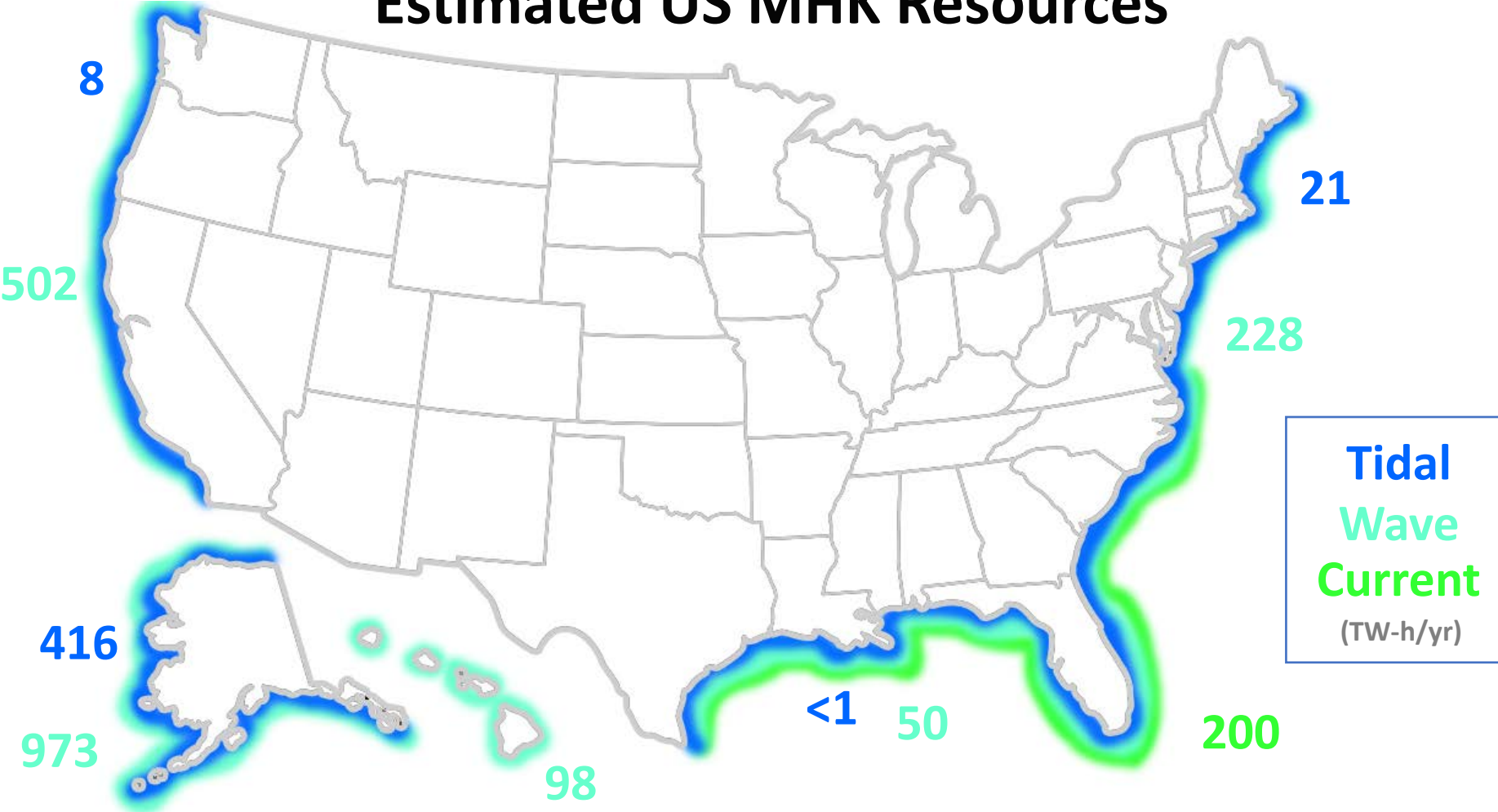


# Axial-flow





# Estimated US MHK Resources



# Power from OCEAN CURRENTS



could supply **4%** of annual  
**U.S. energy demand** or

**27%** of power consumed  
in coastal Southeast  
U.S. during 2012

could power

**15 Million**  
American Homes



or more than all of the  
households in **Florida, South  
Carolina, and North Carolina**

and represents a

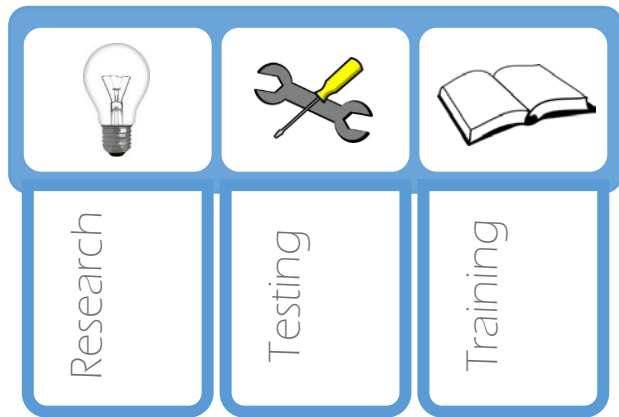
**\$15 Billion**

annual market opportunity

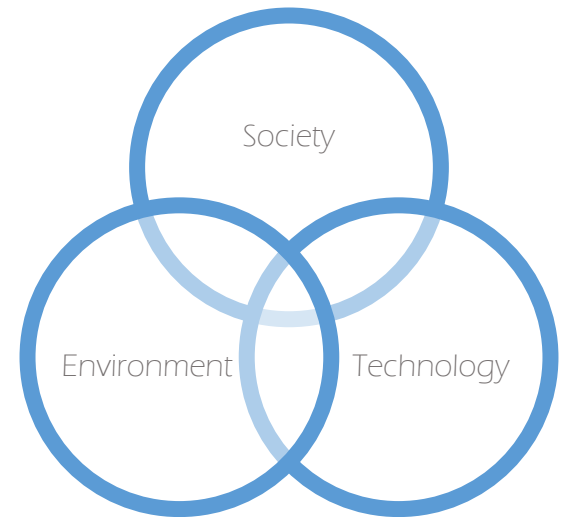


# SNMREC Approach

Enable the *safe and responsible commercialization* of marine renewables around the world.



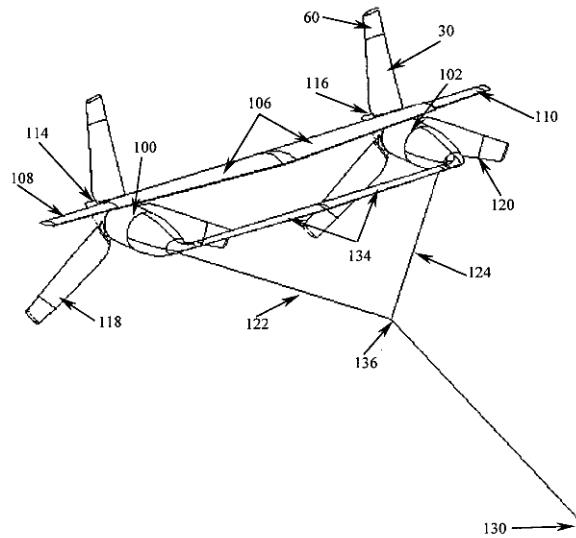
University Tools



Marine Renewables Sector



Figure 1a



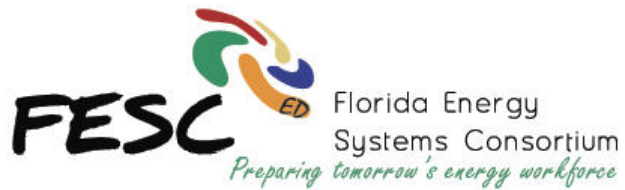
# 2007

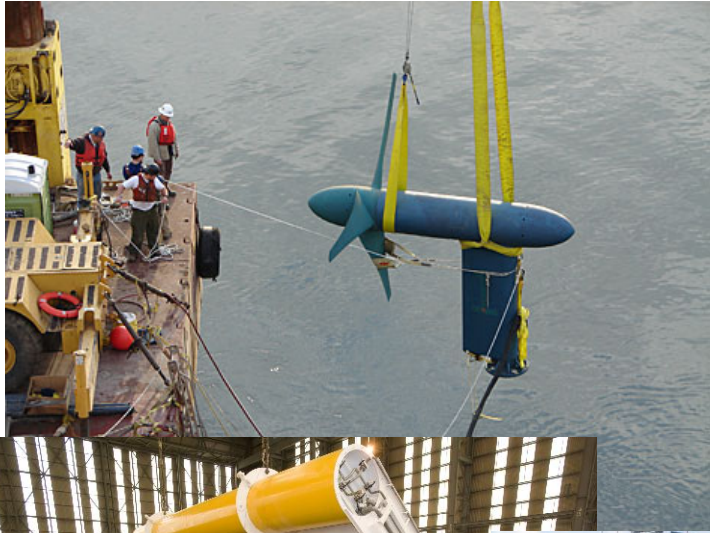
- FAU receives \$5M Centers of Excellence award to establish new center
- Some engineering research initiated and preliminary infrastructure set up
- Center management recruited and cross-disciplinary team assigned to advisory group



# 2008

- FAU through membership in Florida Energy Systems Consortium (FESC) is awarded \$8.75M
- FAU brings together USACE, Coast Guard, NOAA, and MMS together for first time RE MHK projects
- MHK research projects at FAU selected and initiated





## ENERGY FROM THE OCEAN: THE NEW RENEWABLE



Ocean Energy Technology Curriculum  
Created by Florida Atlantic University's  
Southeast National Marine Renewable Energy Center  
and Center for Environmental Studies  
March 2011



# 2009

- FAU awarded 1<sup>st</sup> MHK federal CDP (\$1.2M)
- Long term ocean measurement program initiated
- MHK high school curriculum prepared
- FAU MHK research portfolio filled and theme areas organized
- Center signs 22<sup>nd</sup> industry partnership agreement



# SOUTHEAST NATIONAL MARINE RENEWABLE ENERGY CENTER

# 2010

**WELCOME!**



Offshore Ocean Energy:

A University-Industry-Government Dialog



March 3-5, 2010  
Seaca Raton, Florida



- U.S. DOE awards FAU with SNMREC designation
- FAU awarded 2<sup>nd</sup> federal MHK CDP (\$2M)
- FAU hosts 1<sup>st</sup> U.S. academia, industry, and government dialog and international environmental conference
- FAU submits 1<sup>st</sup> lease application to BOEMRE
- Curriculum training in 5 SE Florida counties begun

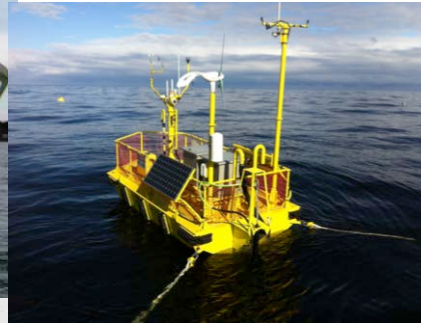


# 2011

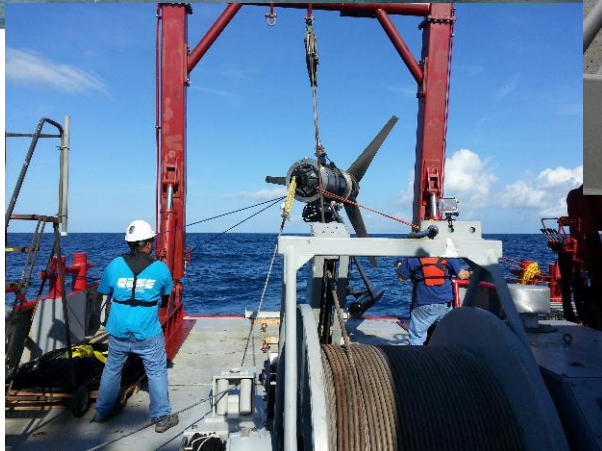


- SNMREC conducts 1<sup>st</sup> MTB sea trials
- Baseline sea turtle aerial surveys begin
- EA for SNMREC lease application initiated by BOEMRE
- Second year of high school curriculum training

# 2012



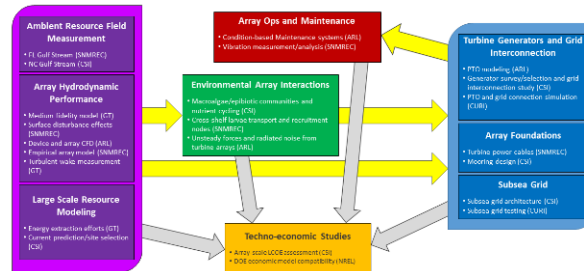
- BOEMRE issues Draft EA for SNMREC IP lease activities
- 40<sup>th</sup> FAU graduate student supported
- Second year of aerial sea turtle surveys conducted
- Major testing infrastructure and research platforms in fabrication and assembly
- A series of 7 regional public forums conducted



# 2013

- SNMREC awarded its 1<sup>st</sup> MHK NSF grant
- BOEM EA with FONSI released, DOE FONSI released, State of FL Consistency Determination issued
- SNMREC attracts 1<sup>st</sup> international industry-supported research project
- Final MTB sea trial
- Research turbine 1<sup>st</sup> tow test conducted



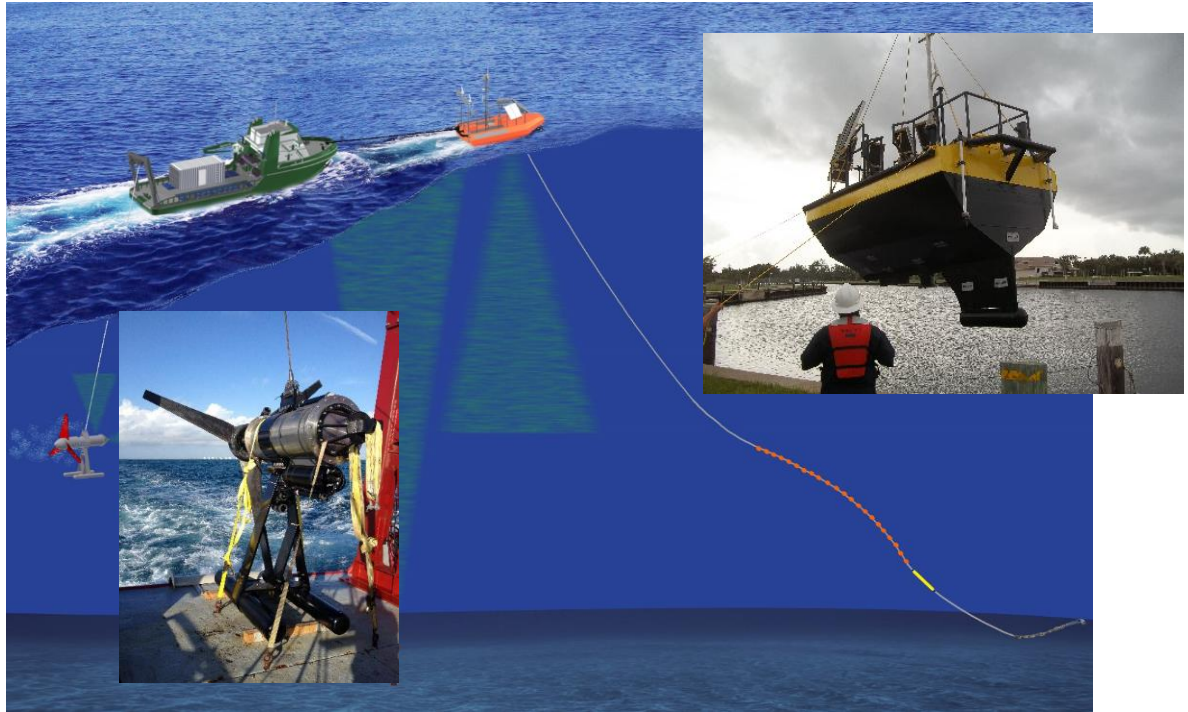


- SNMREC signs first U.S. MHK lease on the outer continental shelf
- Natural turbulence measurement program begun
- Southeast US university consortium organized
- 6<sup>th</sup> consecutive year of current measurements completed
- Began expansion of industry support offerings
- Founding member of new international technical standards and certification body for marine renewables

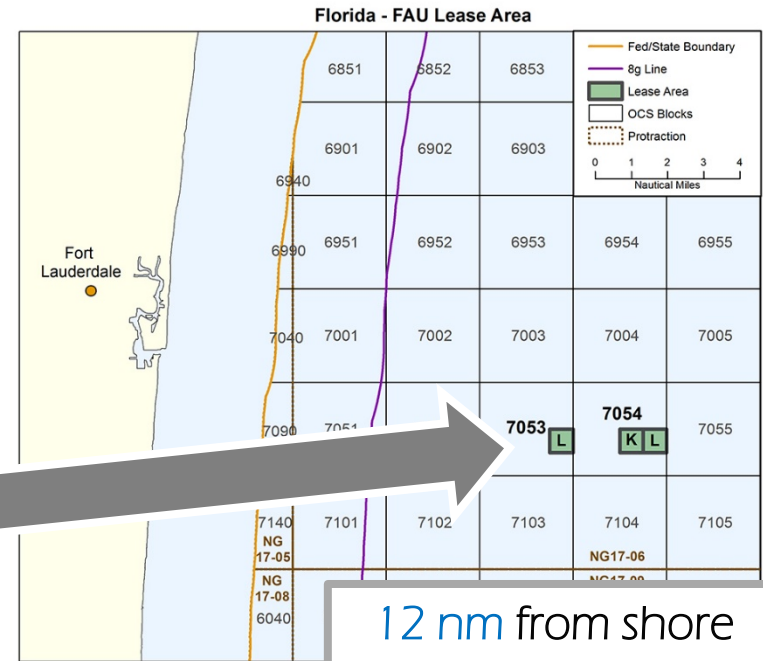


# Small-Scale Offshore Testing

- ISO 17025 Compliant
- Application of ISO/IEC TC 114 MHK standards
- Partnerships with 3rd party Conformity Assessment Bodies
- Develop and refine offshore testing protocols
- User fee revenue model
- Full suite of support capabilities for test/equipment setup and analysis
- Regulatory support services



# Offshore Testing Location



12 nm from shore  
264 m depth

# Ocean Current Energy Industry

Less than **10** openly active companies

More than **10** unique concepts proposed

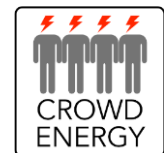
From at least **5** countries

With less than **5** lab scale tests performed and

Less than **4** field demonstrations  $\frac{1}{4}$  scale or larger

**0** production-scale prototypes

**0** commercial leases



## Significant Opportunities