



Item: SP: I-2

Strategic Planning

Wednesday, December 18, 2006

SUBJECT: CENTER OF EXCELLENCE IN OCEAN ENERGY TECHNOLOGY

PROPOSED BOARD ACTION

N/A. For informational purposes only.

BACKGROUND INFORMATION

Mission

The Florida Center of Excellence in Ocean Energy Technology will be a synergistic partnership among academic, industry, navy, and government experts that will foster the research, design, development, implementation, testing, and commercialization of cutting-edge ocean energy technology that is cost competitive with existing fossil fuel-based power generation.

Vision

The Florida Center of Excellence in Ocean Energy Technology will establish a nucleus of core capabilities not currently available in Florida or the nation that is needed to propel the research, development, and commercialization of ocean energy technologies. The Academia/Industry/Government partnership will drive the science, research, and engineering needed to discover, investigate, and refine enabling technologies. Simultaneously, the strong academic environment and substantial hands-on testing facility provides the backbone to develop the workforce necessary to establish and grow an ocean energy industry. The science, research, and engineering will drive technology development and create viable new energy technologies and products. Working with industry partners and utilizing FAU's established technology transfer program, the technology and products will be transferred to the seed industry, thereby establishing and growing a Florida based ocean energy industry.

Expected Outcomes

- A world-renowned center for ocean energy technologies with an instrumented ocean test facility
- A new, vibrant Florida industry in ocean energy technology creating 26,000 new jobs for a highly- skilled workforce
- Technologies to harness the world's ocean current and thermal power

- An affordable, sustainable, and renewable energy supply for Florida that enables energy independence
- Cold Water A/C technology for Florida within 3-4 years
- Revenue streams within 2-4 years
- Changing Florida from an energy importer to a leader in energy exports
- Ten year projection - \$3 billion/year in energy sales, \$4 billion in technology sales
- Ocean Hydrogen Technologies within 5-8 years

IMPLEMENTATION PLAN/DATE

N/A

FISCAL IMPLICATIONS

- \$4 billion in cumulative local technology sales
- Over three million Florida homes powered by the ocean
- Over 26,500 new Florida based jobs
 - 6,300 direct jobs
 - 2,000 hi-tech (white collar)
 - 4,300 manufacturing and maintenance jobs (blue collar)
 - 6,600 indirect jobs
 - 14,000 induced jobs
- Hydrogen generation and storage technologies will yield unlimited international potential within the next several decades for power sales, technology sales and creation of a new main industry for Florida

Supporting Documentation:

COEOET Technical Proposal

Presented by: Mr. R. Frederick Driscoll

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Powering the World with the Ocean

The Florida Center of Excellence in Ocean Energy Technology

November 13, 2006

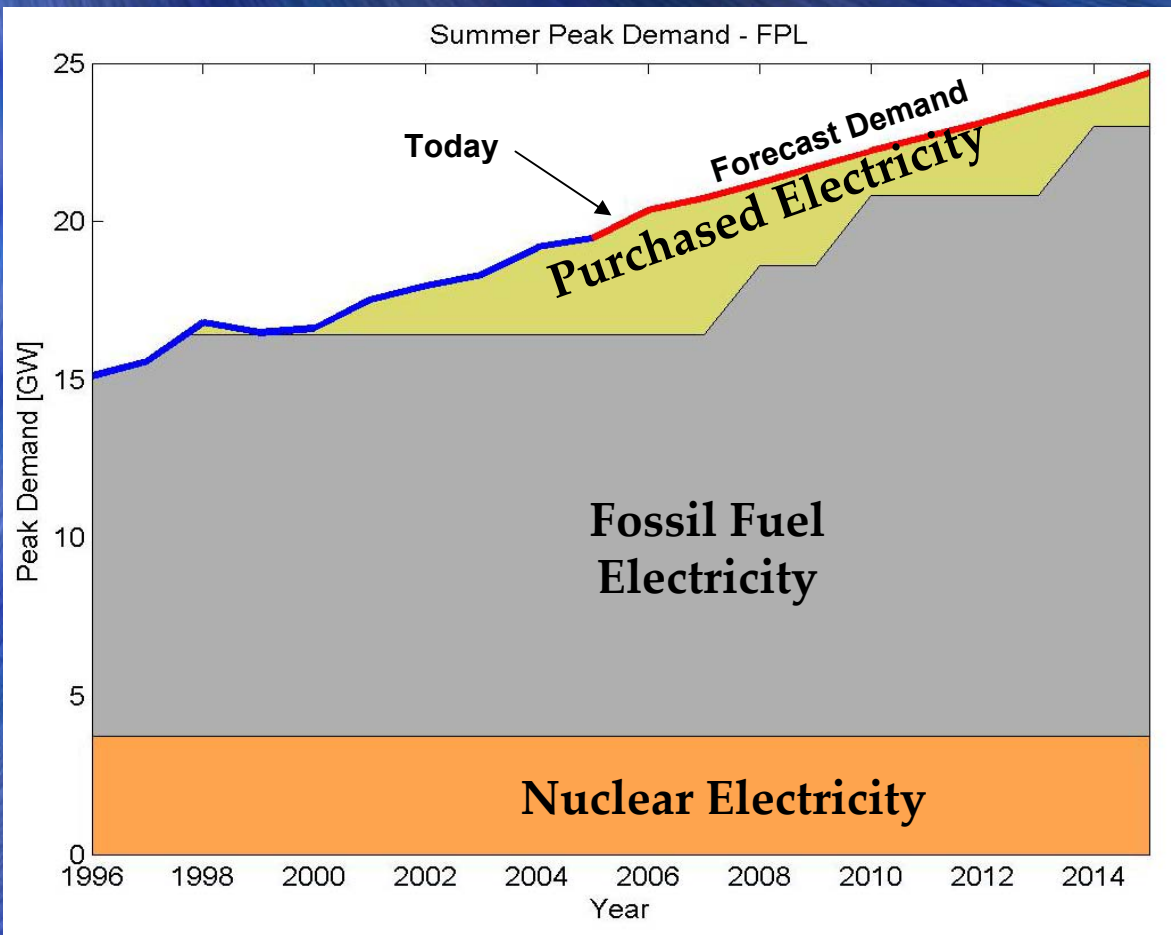
Florida Technology, Research and Scholarship Board
Orlando, Florida

Florida Atlantic University and Partners



Florida's Energy Crisis

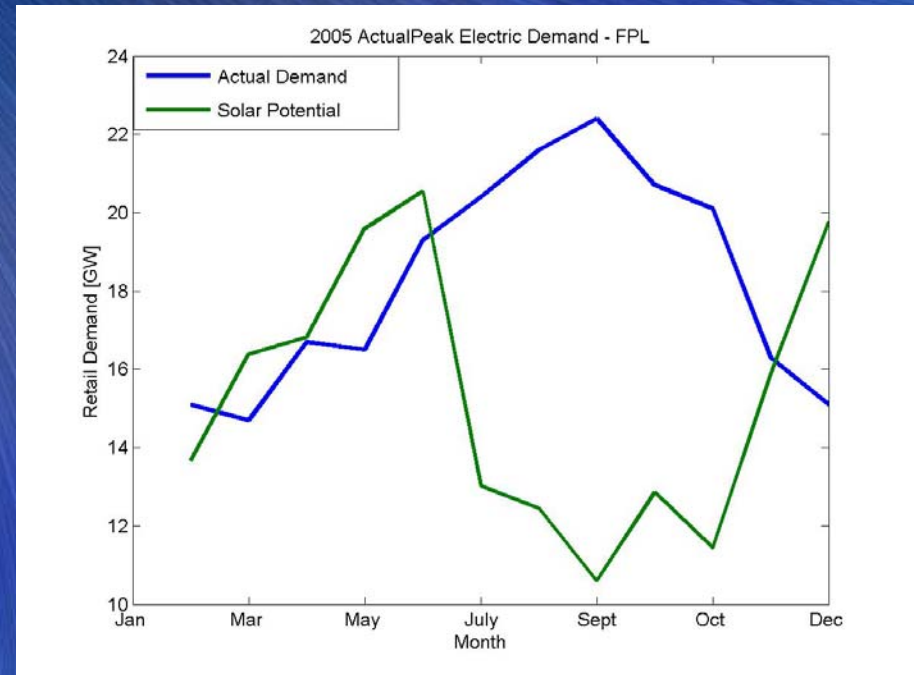
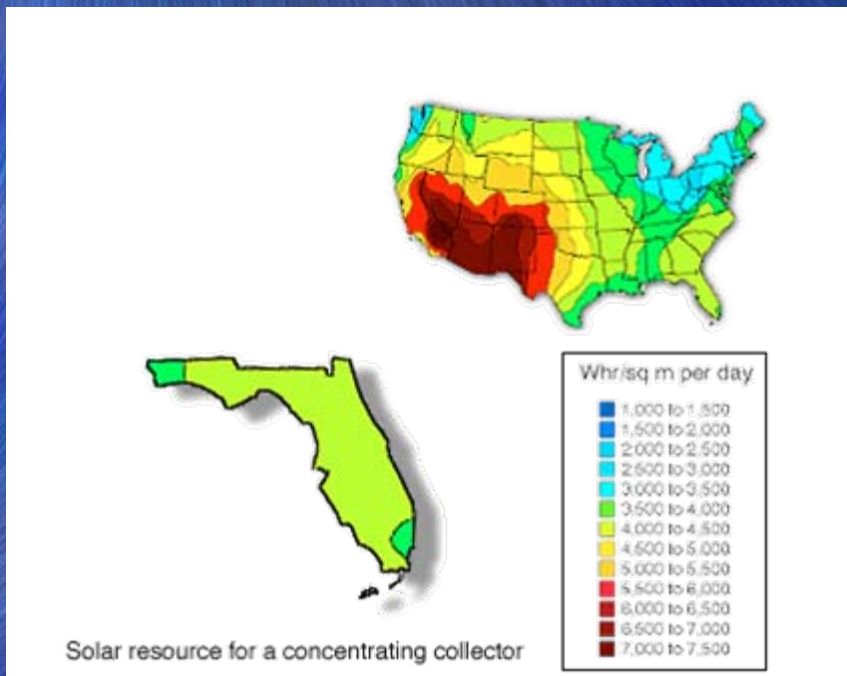
- Florida is in an energy crisis – Demand Exceeds Capacity
- Up to 80% of Florida's electricity generation is fossil fuel based – Costs are directly tied to the cost of fuel



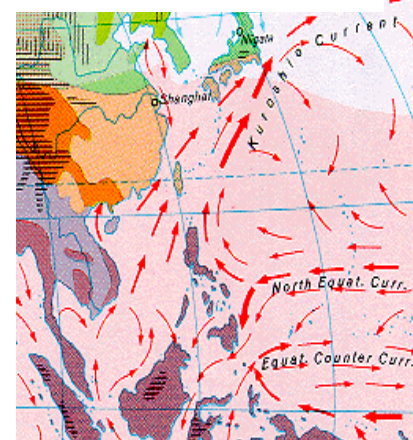
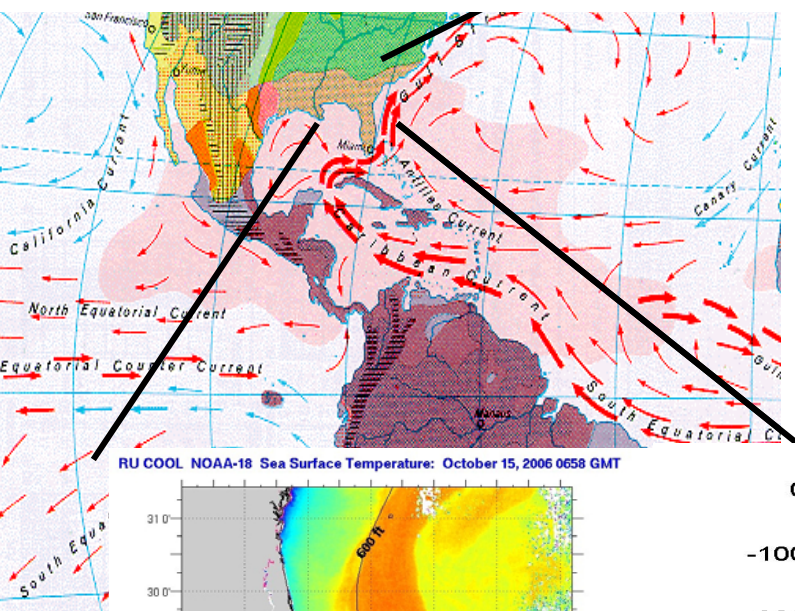
- Future capacity is planned to be 100% hydrocarbon based
- Florida is 99% reliant on outside energy sources
- Renewable energy is needed for a sustainable solution

Florida's Conventional Renewable Energy Potential

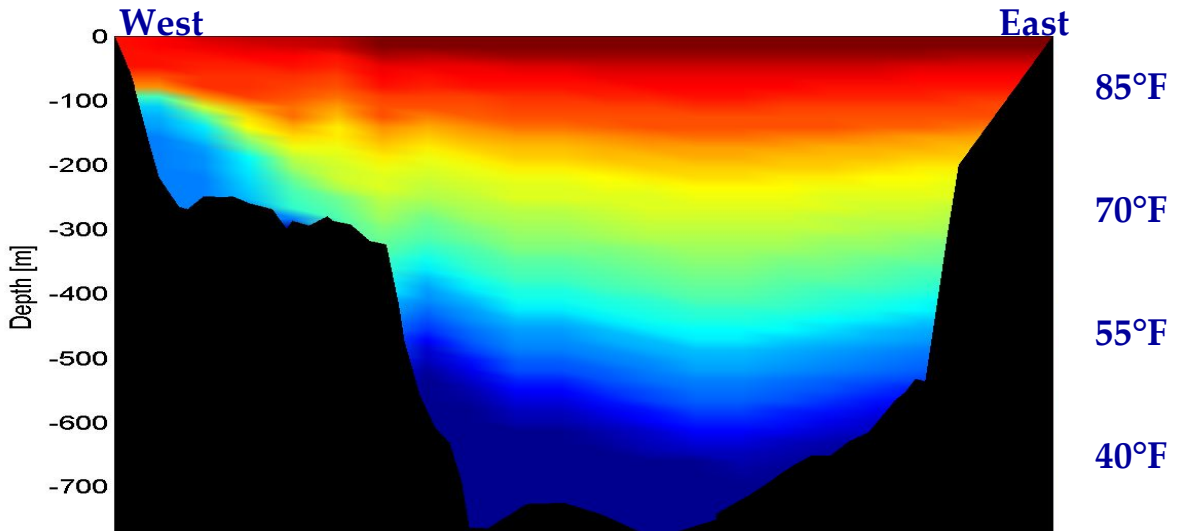
- No potential for wind or hydro power
- Marginally favorable solar potential
- Solar power potential does not match demand
- Intermittent



- Ocean thermal energy is the most abundant renewable energy source
- Unlimited truly green hydrogen production potential
- Can provide cold water for near shore A/C

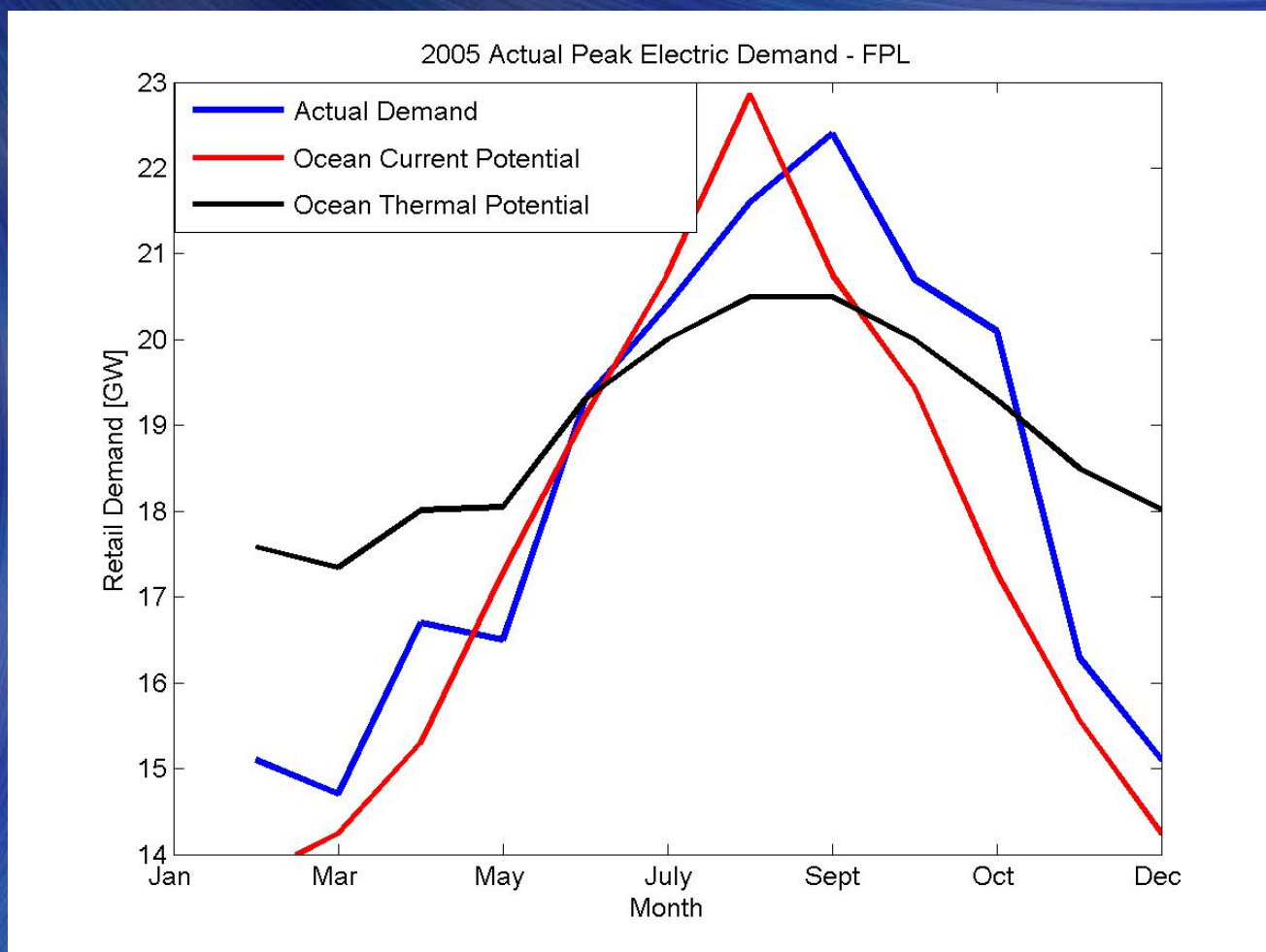


- Ocean currents are
- Power is generated to wind turbines
- South Florida is the large ocean current



Temperature Profile Between Ft. Lauderdale and the Bahamas

- Ocean energy potential matches demand
- Ocean energy can meet the world's power needs
- Both current and thermal will yield continuous energy production (100% capacity factor)



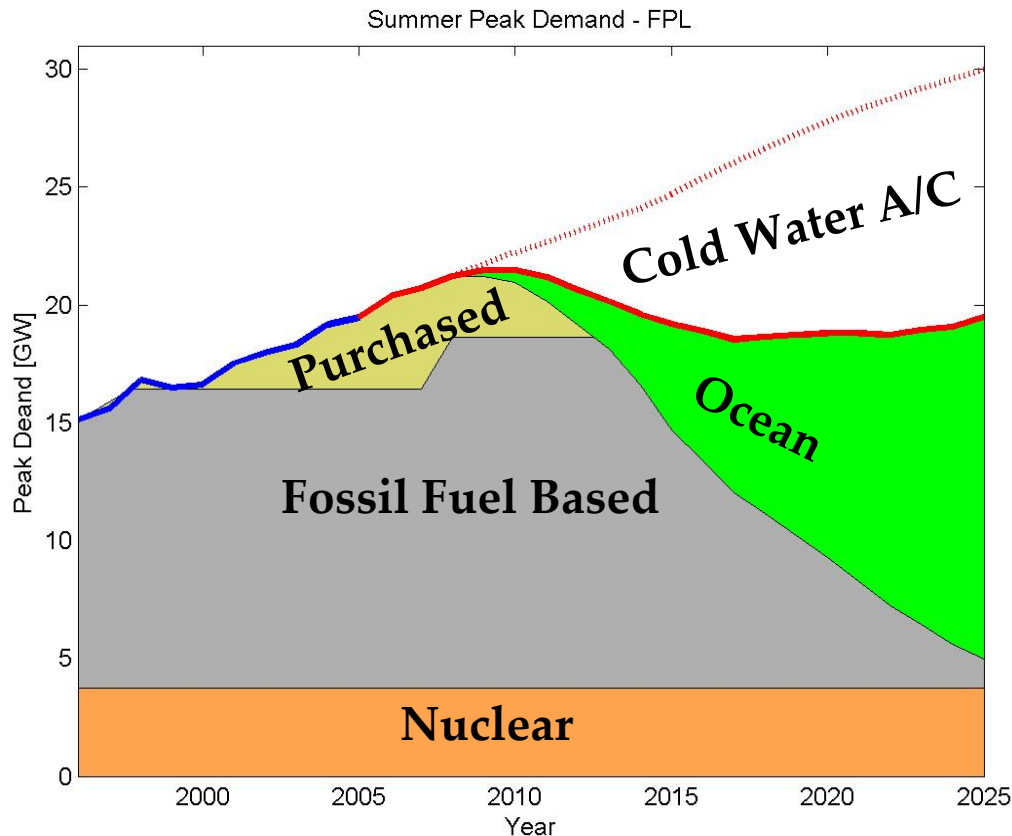
Floiribrid@sefamegyngyndsnape



Florida's Ocean Energy Future

Within 10 years:

- Cold water based A/C could reduce demand by more than 20%
- Ocean generated electricity could account for more than 25% of generating capacity



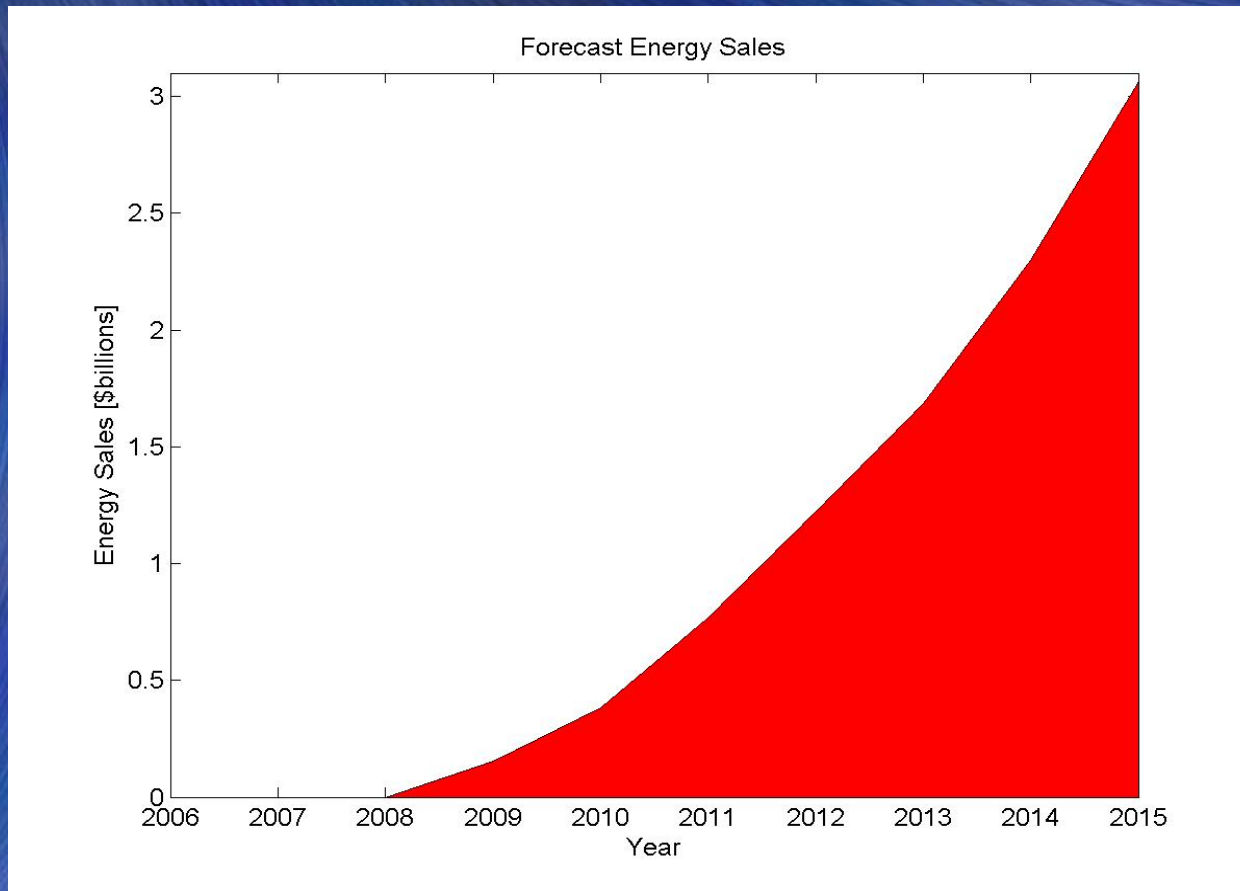
Within 20 years:

- Ocean generated electricity could account for up to 75% of generating capacity
- Dependence on hydrocarbons could be eliminated
- Energy independence

Economic Impact for Florida

A new, vibrant industry in ocean energy system and energy production

- \$3 billion/year in local wholesale electricity revenues within 10 years – This money stays in Florida!



Economic Impact for Florida

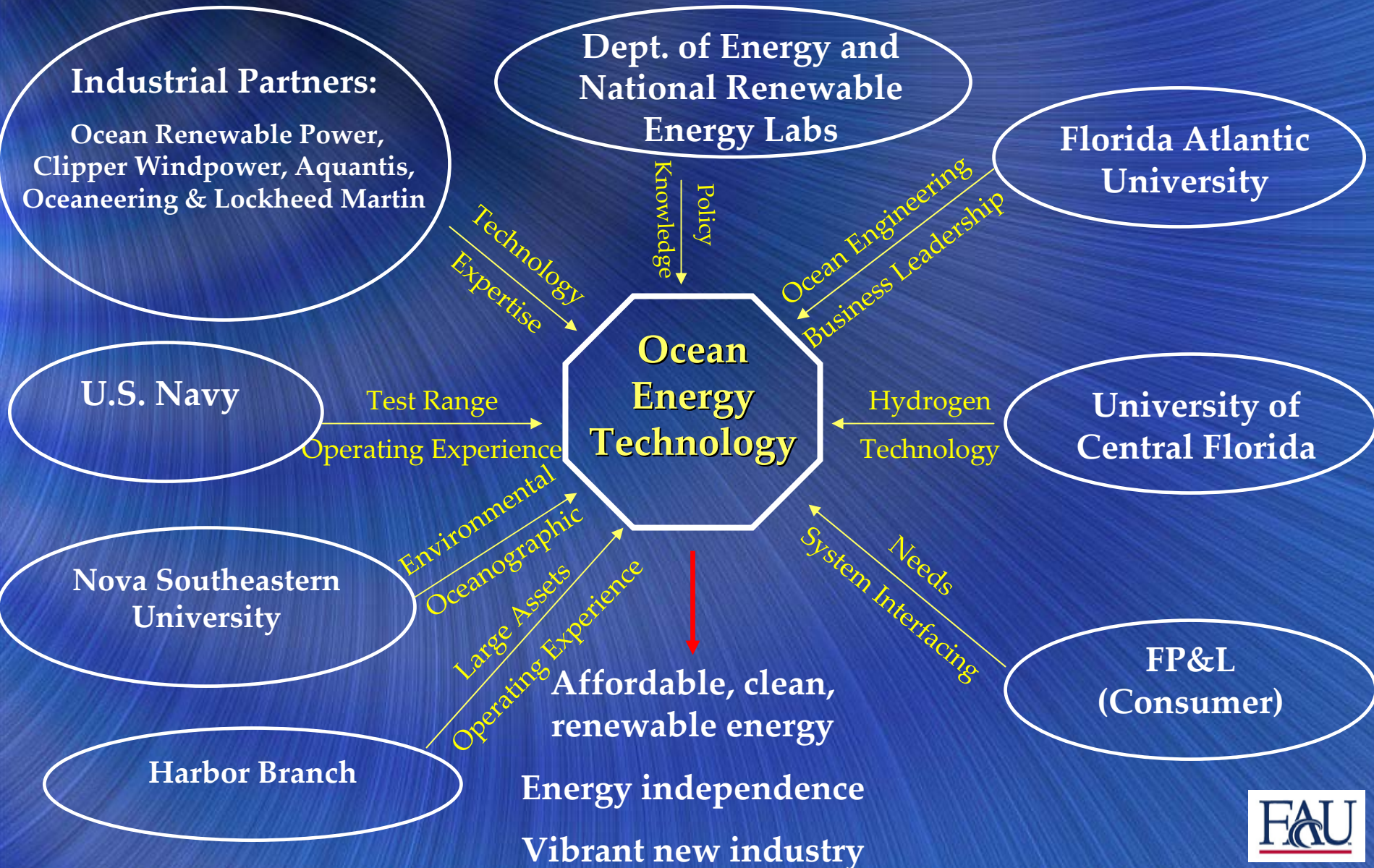
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Hydrogen generation and storage technologies will yield unlimited international potential within the next several decades for:

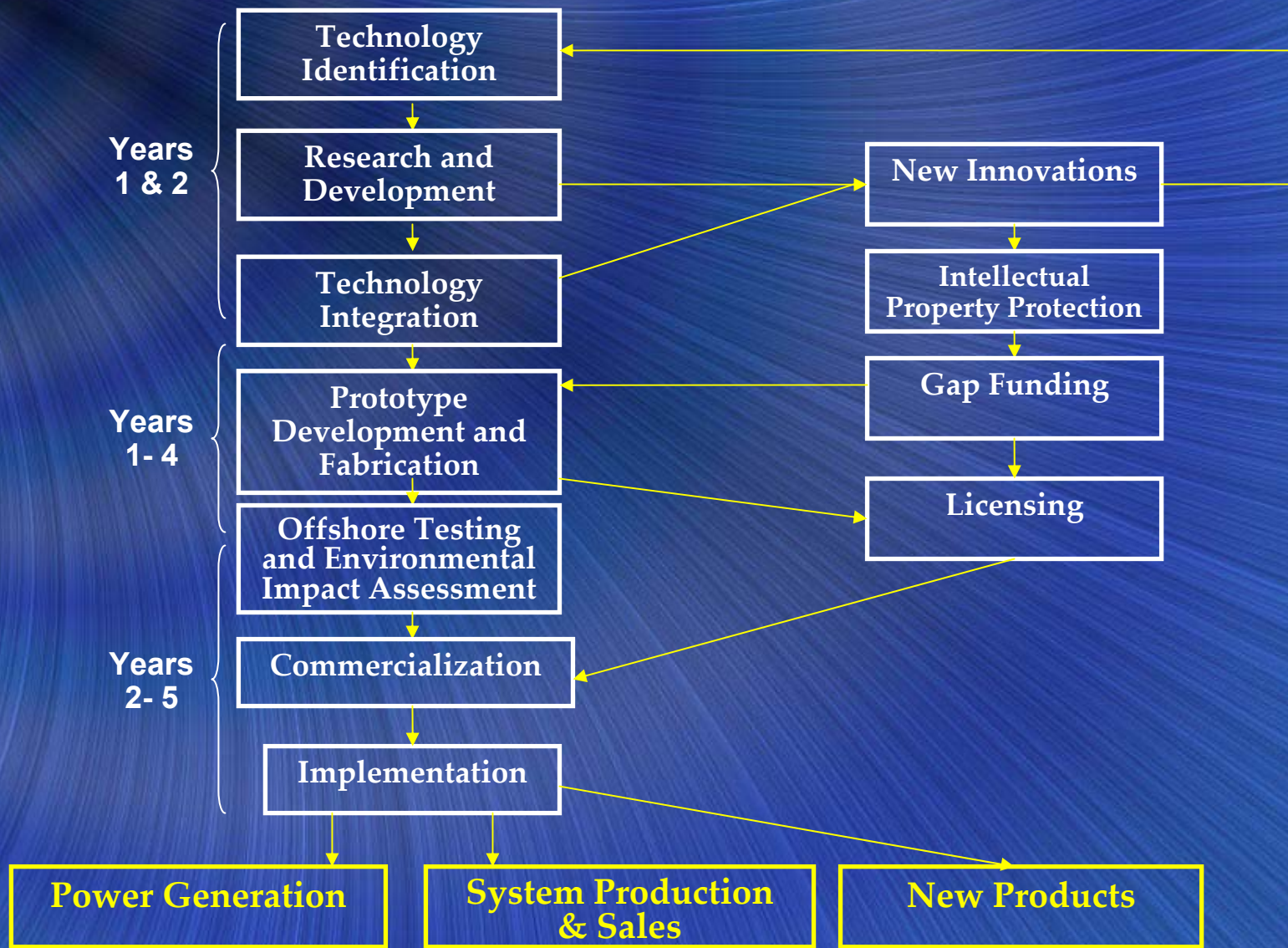
- Power sales
- Technology sales
- Creation of a new main industry for Florida



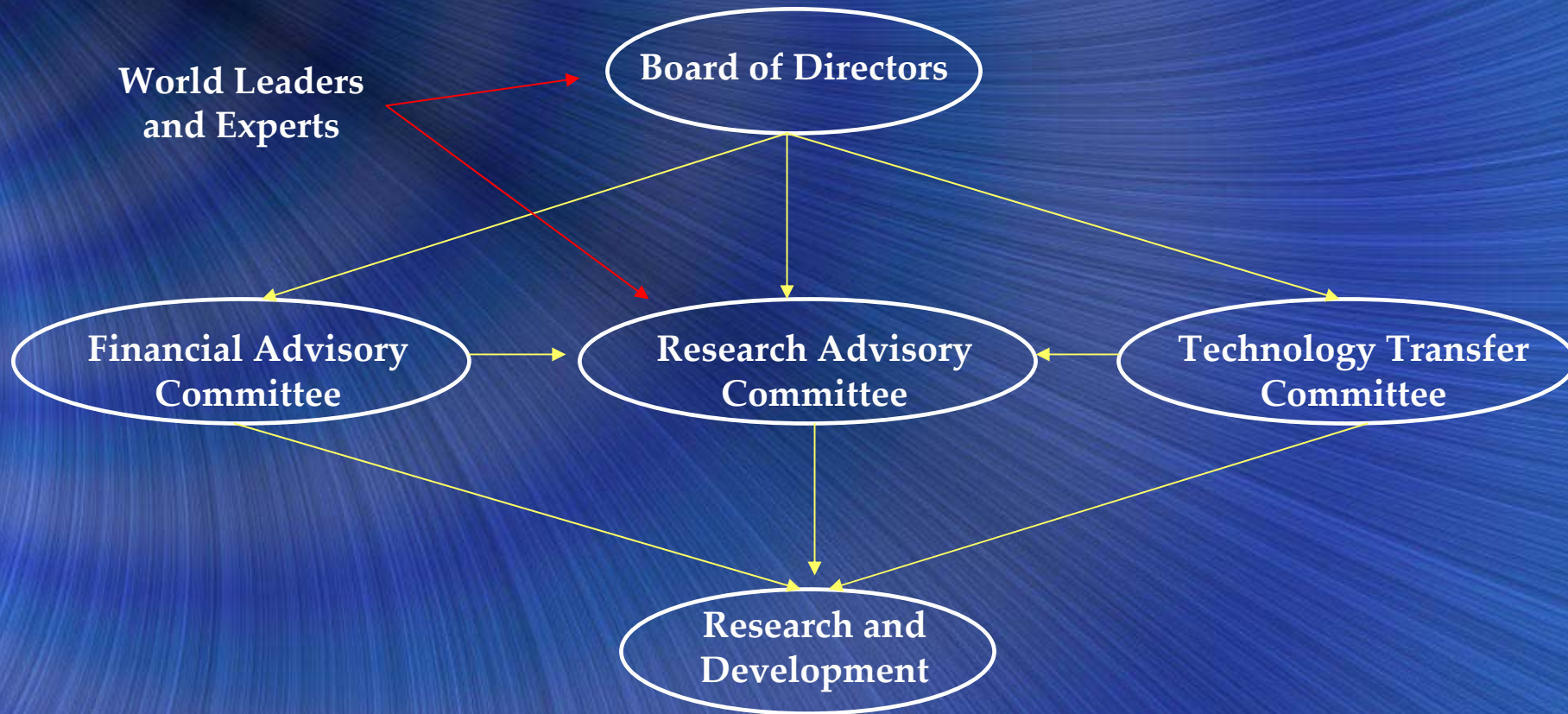
A Strong Partnership for a Unique and Feasible Solution to Florida's Energy Future



Three Economic Drivers from an Integrated Path to Market



Leadership and Managing for Success



- Monthly Reports
- Monthly Meetings
- Monthly Newsletter and Website

- Quarterly Center-wide Technical Exchange Meetings
- Annual Conference
- Community and Educational Outreach

Resources Leveraged

Existing Strengths/investments of partners that will be leveraged:

- World-renowned ocean engineering and science expertise
- FAU SeaTech – a \$2M/year state funded research institute (over \$55M in research funding since inception in 1999, and over \$20M in infrastructure)
- Navy Permitted Range (\$500+M in infrastructure)
- NSU – National Coral Reef Inst. and Guy Harvey Research Inst.
- UCF – Hydrogen R&D
- HBOI – extensive ocean assets and large fabrication facilities
- Significant resources committed by FAU and partners



Resources Leveraged

The Center will fund future R&D and infrastructure through:

- A National Science Foundation, Science and Technology Center will be established
- Revenue streams within one year from testing range use
- Revenue streams within 2-4 years for royalties on energy and technology sales
- DOE/NREL sponsorship and participation
- Industry sponsored research projects
- Florida Department of Environmental Protection Renewable Energy Technology Grants
- Other Federal Grants
- **Expected center-wide funding within 2-4 years - \$30M/year**

Workforce Development

- Education advisory council
- Establish engineering and technical curricula at FAU and partner community colleges
- Ocean energy focused design projects
- Graduate student training and post doctoral researcher support
- Student internships and career placement
- Direct industrial workforce development program
- Visitor programs for worldwide experts

Outcomes

- A world-renowned center for ocean energy technologies with an instrumented ocean test facility
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Industry, Government & Academic Partners



National Renewable Energy Laboratory

U.S. Navy

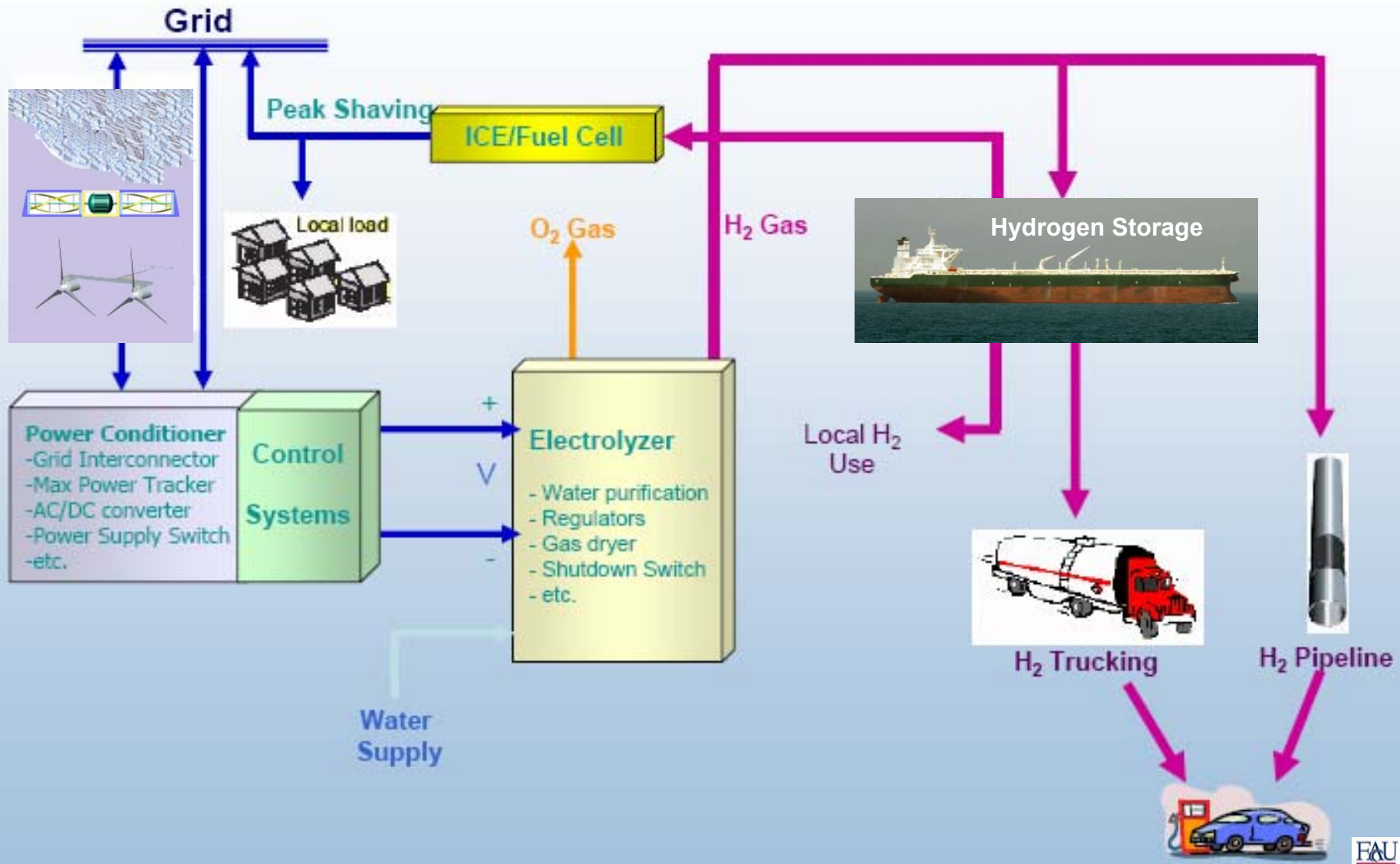


Backup Slides

Renewable Forms of Energy

Source	Potential for Florida	Major National Effort/Competition
Wind	Poor	CA, CO, WY
Solar	Marginal	CA, AZ, NM
Ocean:		
Wave	Marginal	WA, OR, RI
Tidal	Marginal	NY
Current	High	None
Thermal - OTEC	High	HI (old project)
Cold Water A/C	High	None

Overall Current-Hydrogen System Concept



Proposed 10 M Budget

Infrastructure:	\$2,821,082
Research and Training:	\$3,981,891
Competitive Grant Funding:	\$3,068,027
Outreach:	\$129,000
Total:	\$10,000,000

Proposed 5 M Budget

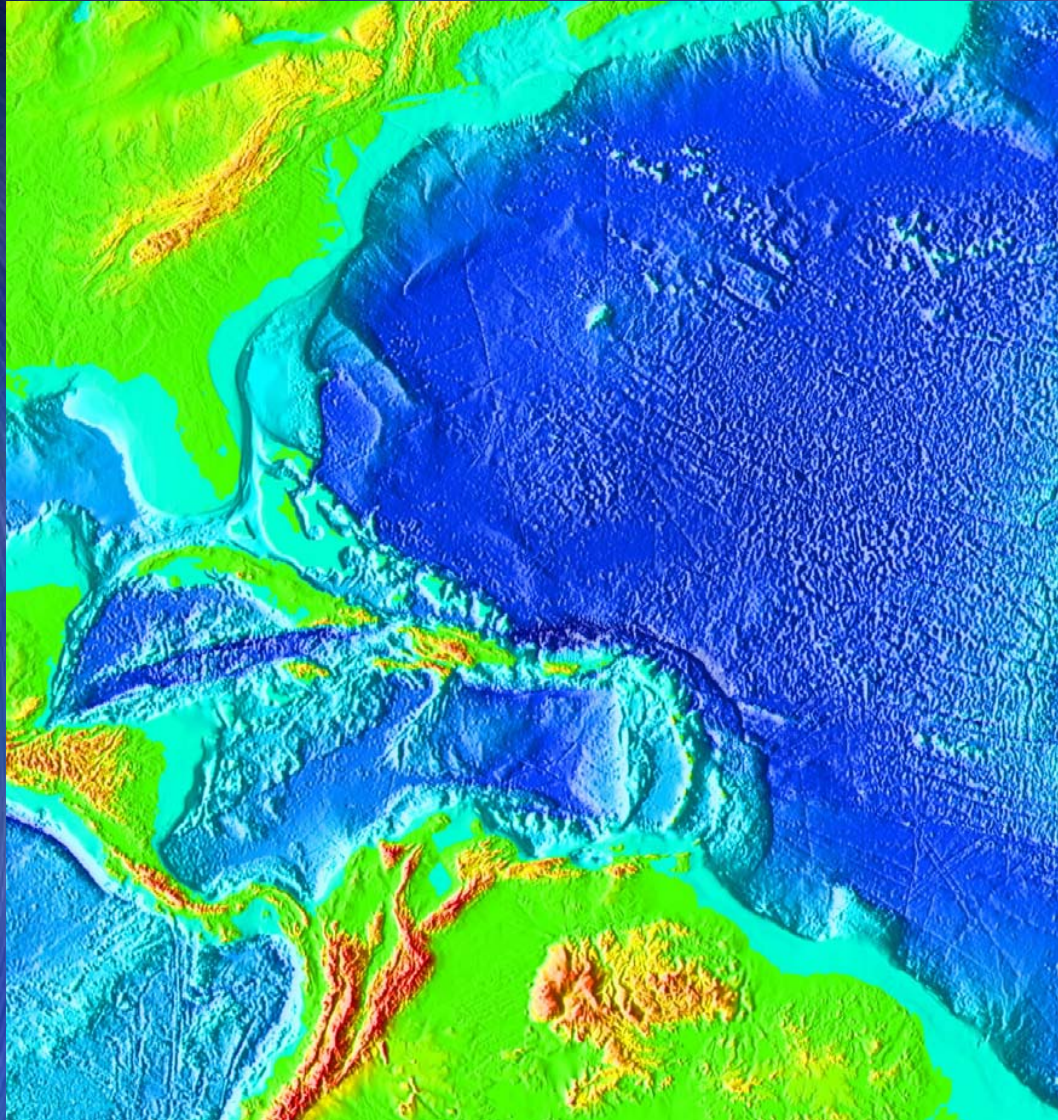
Infrastructure:	\$1,787,500
Research and Training:	\$3,108,500
Outreach:	\$104,000
Total:	\$5,000,000

The Center's Measures of Success

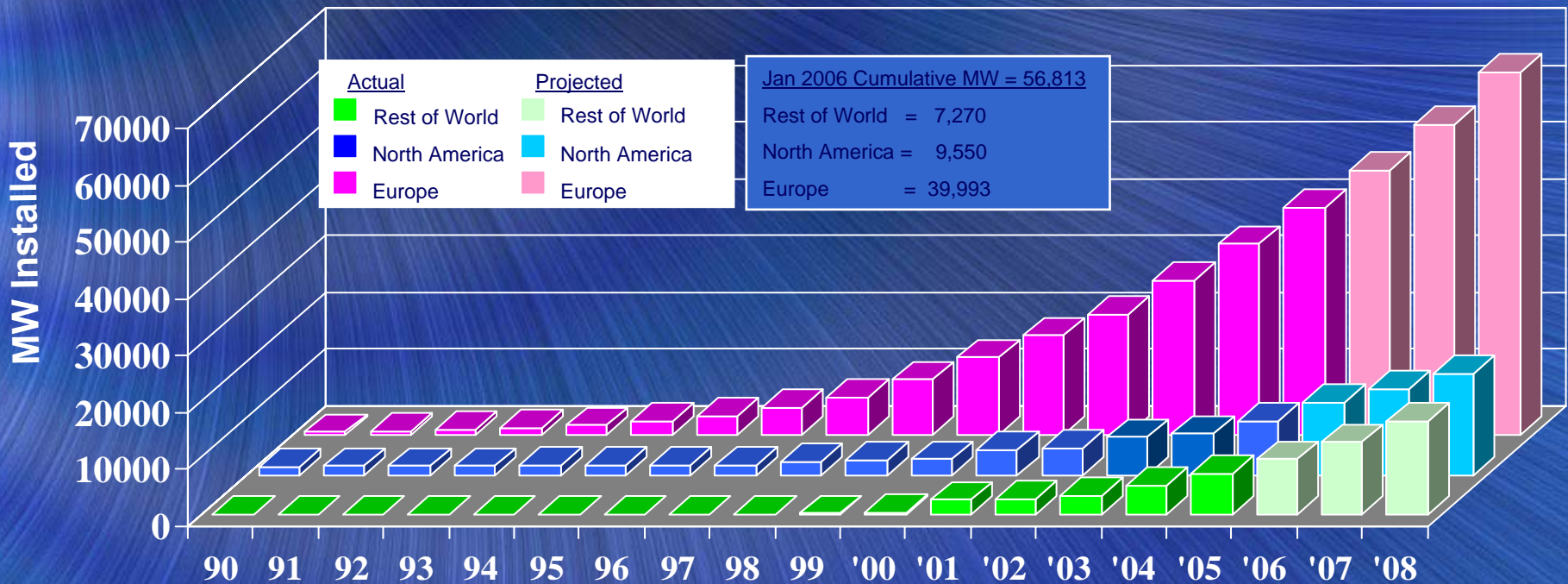
Measures of Success

	YEAR	1	2	3	4	5	6	7	8	9	10
Center Establishment		●	●	●	●	●	●	●	●	●	●
Feasible Technology			●	●	●	●	●	●	●	●	●
Installed Capacity				●	●	●	●	●	●	●	●
COEOET Self Sustainability					●	●	●	●	●	●	●
Trained Skilled Workforce		●	●	●	●	●	●	●	●	●	●
Licensing New Technologies					●	●	●	●	●	●	●
Testing Range Developed			●	●	●	●	●	●	●	●	●
Publications		●	●	●	●	●	●	●	●	●	●
New Faculty and Researchers		●	●	●	●	●	●	●	●	●	●

Path of the Gulf Stream Past Florida



Growth of Wind Energy Capacity Worldwide



Sources: BTM Consult Aps, Sept 2005
Windpower Monthly, January 2006

Cost of Energy Trend

1981: 40 cents/kWh

Decreasing Cost Due to:

- Increased Turbine Size
- R&D Advances
- Manufacturing improvements



NSP 107 MW Lake Benton, MN wind farm

2006: 5-8 cents/kWh with no PTC

Cost Increases due to:

- Price increases in steel & copper
- Turbines sold out for two Years

2012 Goal :
3.6 cents/kWh
with no PTC