

*Presentation to
Rhode Island Wind Energy Stakeholders*

STAKEHOLDER ISSUES

Presented by:

Daniel Mendelsohn

Deborah Crowley

Dennis Loria

Applied Technology & Management

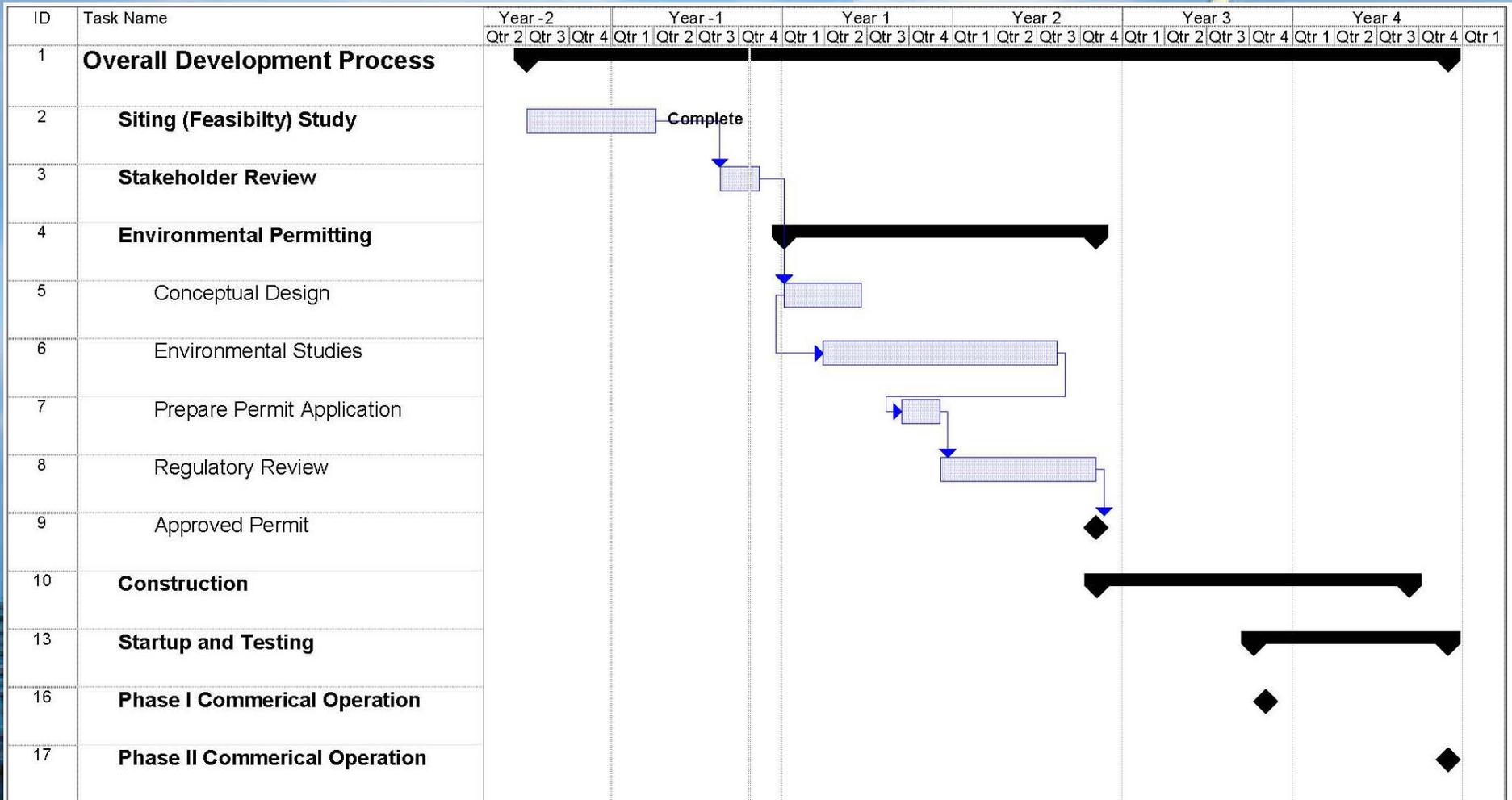
October 24, 2007



PRESENTATION OUTLINE

- **Development Process and Timeline**
- **Issues and Discussion**

DEVELOPMENT PROCESS TIMELINE



ENVIRONMENTAL PERMITTING

- **Conceptual design**
 - *Planning, layout, engineering, electrical*
- **Environmental studies**
 - *On site data collection*
 - *E.g. wind, natural resources, geology, wildlife, habitat*
 - *Environmental Impact Statement*
 - *Environmental studies will begin at inception of permitting process and continue through review if additional studies are needed*

ENVIRONMENTAL PERMITTING

- **Permit applications and regulatory review**

- *Permitting and review process is expected to take several years*

- *Example permitting applications*

- CRMC

- USACOE

- MMS

- FAA

- USCG

- RIDEM

- Rhode Island Energy Facility Siting Board

- Local zoning

- EPA

ISSUES AND DISCUSSION

- **Focus**
 - *How issues affect one area vs. another*
 - *Differentiators*

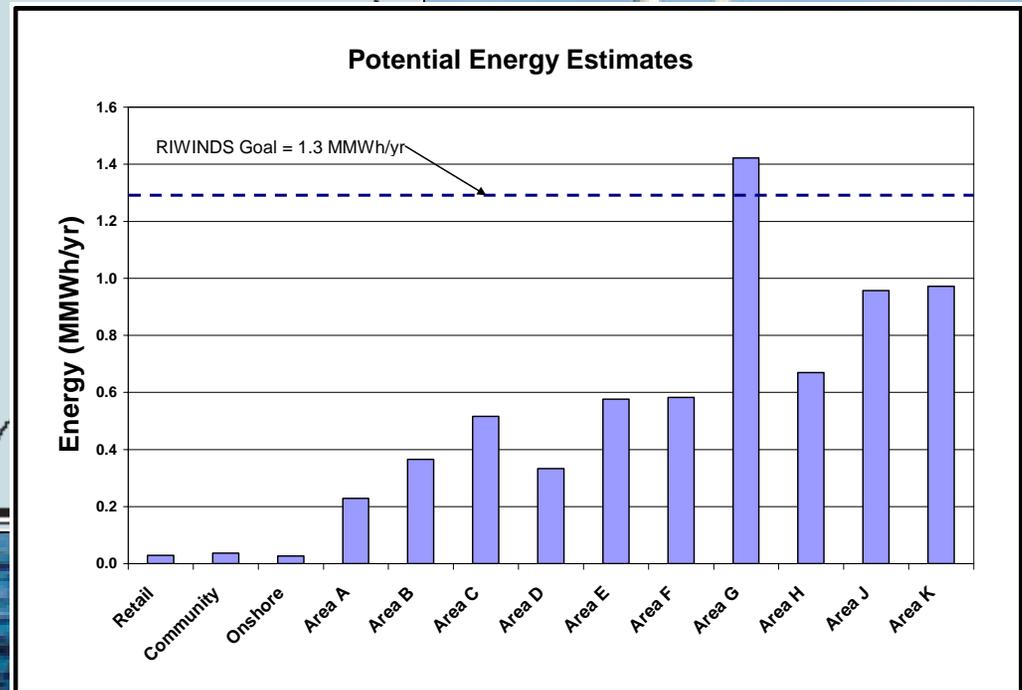
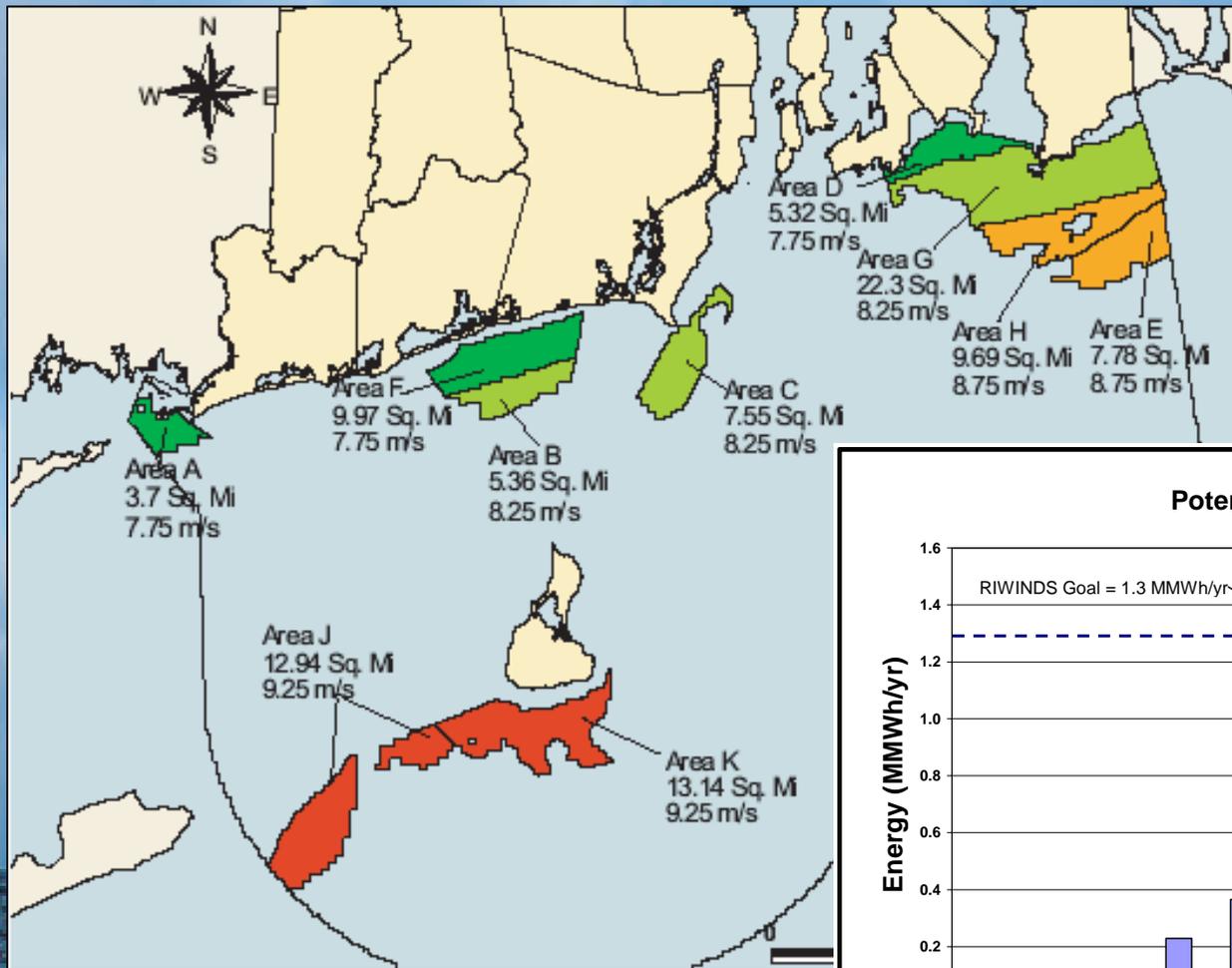
CONFLICTS WITH EXISTING USE 1.1

Scale of the projects proposed (how many, layout, physical size, conceivable maximum height)

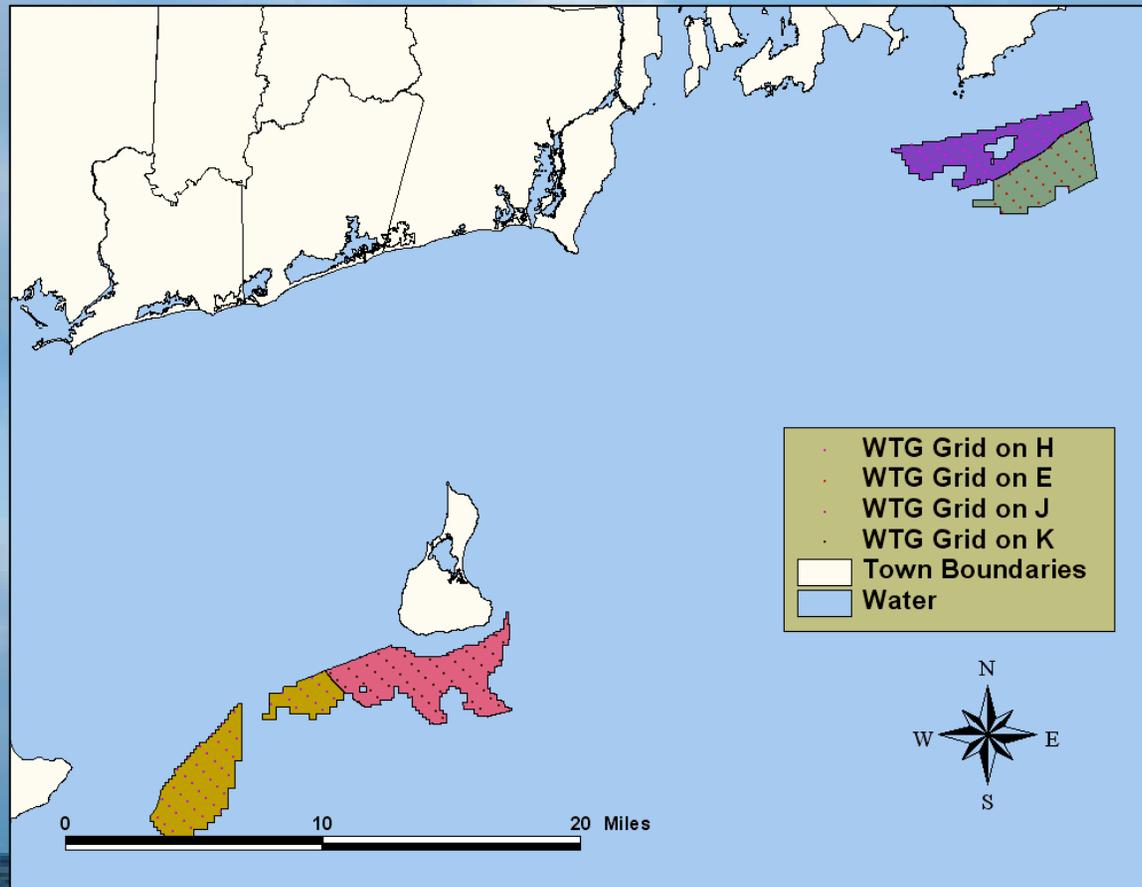
- *1.3 MMWh/year supply requires approximately 106 WTGs*
- *Layout of grid (approximately)*
 - *1000m southwest/northeast spacing*
 - *630m southeast/northwest spacing*
- *Size of WTG*
 - *16ft. diameter steel monopoles foundations*
 - *WTG hub height was assumed at 80m*
 - *Overall blade diameter of 111m*
 - *Maximum overall height of 135.5m (444.5 ft).*

CONFLICTS WITH EXISTING USE 1.1

*Project Results
– Potential
Energy by
Area*



CONFLICTS WITH EXISTING USE 1.1



Scale of the projects proposed (how many, layout, physical size, conceivable maximum height)

Size of "dot" representing WTG not representative of actual size of Foundation Footprint

CONFLICTS WITH EXISTING USE 1.1

Scale of the projects proposed (how many, layout, physical size, conceivable maximum height)

- **Area J –**
 - *Total Area ~13 sq. miles (360 million ft.²)*
 - *Assumed Population – 53 WTGs*
 - *Total Area occupied Foundations:
10,700 ft.² ≈ .003% of Total Area J*
- **Area K**
 - *Total Area ~13 sq. miles (366 million ft.²)*
 - *Assumed Population – 53 WTGs*
 - *Total Area occupied by Foundations :
10,700 ft.² ≈ .003% of Total Area K*
- **Total Area occupied by 106 Foundations**
 - *21,400 ft.² (=0.00077 sq. miles)*

CONFLICTS WITH EXISTING USE 1.2

Commercial shipping (impacts of marine accidents and turbine interference with clean up)

- *Will likely be assessed in the EIS*
- *Turbine areas are outside of shipping lanes*
- *Removed as potential sites.*
- *Spill containment and cleanup offshore is extremely difficult*
- *Towers could help booming effort for oil spill cleanup*

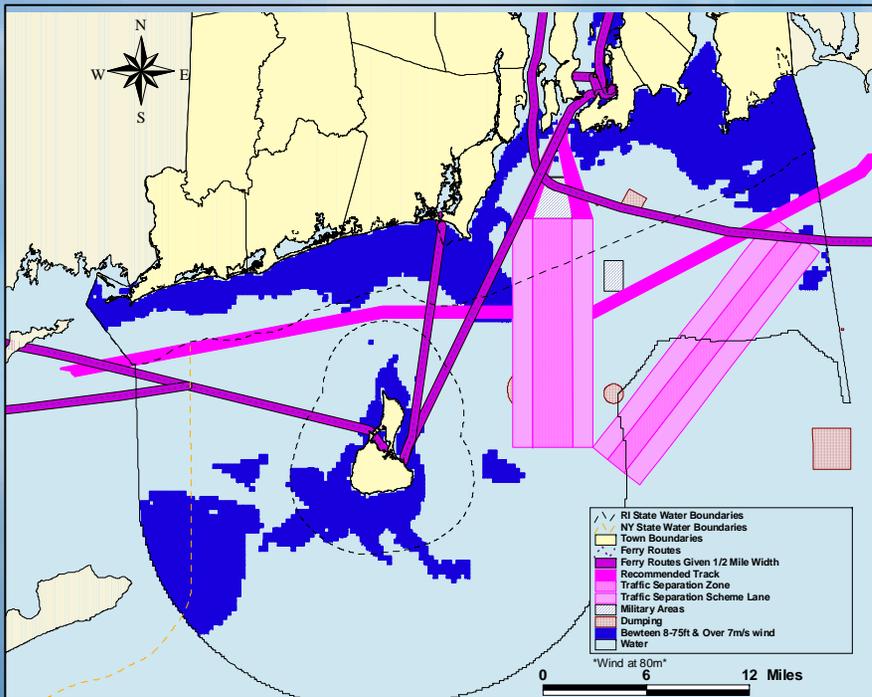
CONFLICTS WITH EXISTING USE 1.3

Cruise Ship Routes

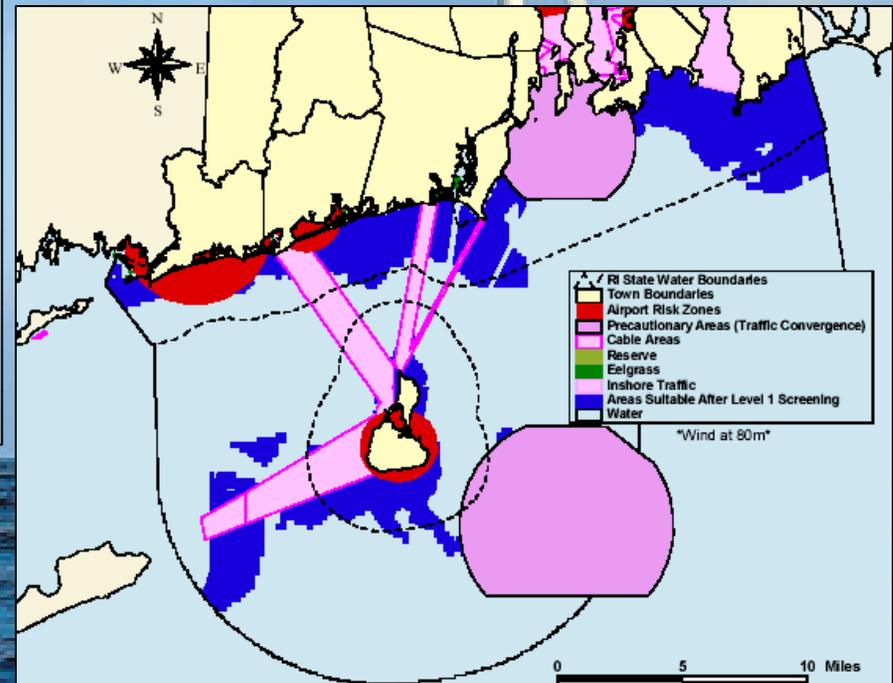
- *Turbine areas are outside of shipping lanes*
- *Cruise ships travel within the shipping lanes, ferry routes and high traffic areas*
- *Removed as potential sites.*

CONFLICTS WITH EXISTING USE 1.3

Cruise Ship Routes



← Screening Level 1 Criteria Removed



→ Screening Level 2 Criteria Removed

CONFLICTS WITH EXISTING USE 1.4

Sailing regattas (e.g. Block Island Race Week, Newport – Bermuda Race); also loss of wind resource

- *Identifying regatta and race areas*
- *Impact to recreational boating will be addressed in the EIS*
- *Wind resource substantially recovered within 10 rotor diameters (~1/2 mile)*

CONFLICTS WITH EXISTING USE 1.5

Recreational fishing and boating

- *Feedback from local groups (RI Saltwater Anglers) has been received*
 - *Recreational boaters prefer placement furthest from Southwest ledge – this has been identified as prime fishing real estate*
 - *Areas of highest concern are K and J*
 - *Concerns regarding*
 - *Destruction of habitat*
 - *Physical displacement of species*
 - *Obstruction to trolling paths*
 - *Impact to chartering business*

CONFLICTS WITH EXISTING USE 1.6

Commercial Fishing (with authorized trap sites)

- *Feedback is coming from the RI Commercial Fishermen's Association*
- *RI Shellfishermen's Association does not see offshore areas affecting their fisheries*
 - *Shellfishing areas of concern are primarily inside Narragansett Bay*

CONFLICTS WITH EXISTING USE 1.7

Operations of Military Air Traffic and Submarine

- *Readily available data has not yet been located, however attempts to gain input from knowledgeable parties has begun*

CONFLICTS WITH EXISTING USE

1.8 & 1.9

Local and Area Tourism

- *Will be addressed in EIA*

Impacts on Property Values

- *Will be addressed in EIA*

- *Information on 2 case studies can be found in:*

Danish Off shore Wind

– Key Environmental Issues

*Published by DONG Energy, Vattenfall, The Danish Energy Authority
and The Danish Forest and Nature Agency*

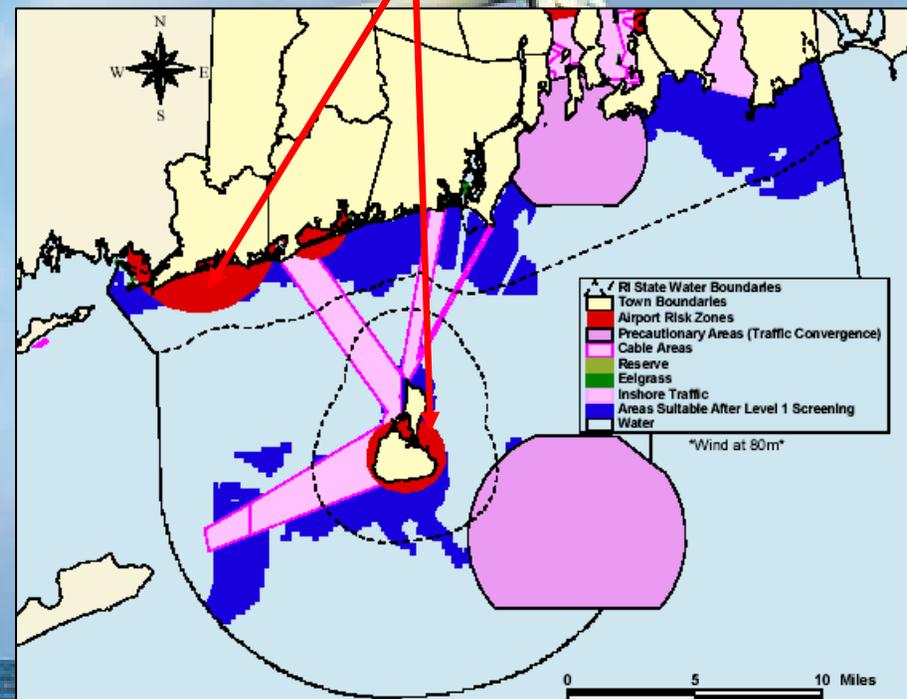
November 2006

CONFLICTS WITH EXISTING USE 1.10

Westerly Airport

- *Airport risk zones were applied to all airports*
 - *Risk zone was defined conservatively based on parameters outlined in FAA specifications*
 - *Risk buffer zone areas were removed from potential sites*
 - *A full FAA analysis would be performed during the EIS/permitting process of any project site*

Airport Risk Zones



CONFLICTS WITH EXISTING USE 1.11

Wildlife Habitat

- *Will be addressed in EIS*

CONFLICTS WITH EXISTING USE 1.12

Impacts of Wind Farm Lighting

- *Wind farms need lighting to satisfy FAA and Coast Guard requirements*
- *TN DOT/FAA/AR-TN05/50 suggested lighting*
 - *Simultaneously flashing red lights on the turbine in the outer perimeter of the farm*
 - *No more than a half mile apart in spacing*
- *USCG Navigation and Vessel Inspection Circular No 02-07*
 - *WTGs should be clearly marked and illuminated with either*
 - *Low intensity light*
 - *Phosphorescent coating enabling detection at distances suitable to avoid collision*

CONFLICTS WITH FUTURE USE 2.0

- **Stakeholders response indicated that this would not be a differentiator between areas**

IMPACTS ON ENVIRONMENTAL RESOURCES (ON AND OFFSHORE)

3.1 – 3.6

Seasonal bird Use of Area Waters

Migratory Bird Patterns

Pelagic Birds

Marine Turtles

Sea Mammals

Endangered Species

- *The impacts to each of these categories will be addressed in the EIS*

IMPACTS ON ENVIRONMENTAL RESOURCES (ON AND OFFSHORE) 3.7

Impacts on Ocean Currents

- *Impacts expected to be localized*
- *Cape wind EIS concluded that their project would not have a significant impact on the currents due to the small cross sectional area of structure and large spacing between structures*
 - *Cape wind project proposed is 130 WTGs*
 - *Same or similar size and spacing is assumed for a RI project*
- *RIWINDS total area occupied by 106 Foundations*
 - *16' dia. towers, 0.5 mile spacing*
 - *21,400 ft.² (=0.00077 sq. miles ≈ .003% of Total Area)*
- *Impacts will be addressed in the EIS*

AESTHETICS 4.1

Appearance of offshore wind farm (under different environmental conditions, lighting, etc.)

- *Example visualizations in production:*
 - *Little Compton*
 - *Block Island*

AESTHETICS 4.2

Number of people who are receptors and their perception of what they see

- *Data has not yet been developed for number of receptors*
- *Potential EIS issue*

AESTHETICS 4.3

Sound Impacts

- *New England Wind Forum*
http://www.eere.energy.gov/windandhydro/windpoweringamerica/ne_issues_sound.asp
- *“From less than a quarter of a mile away, the sound from wind turbines is not expected to exceed 55 dB, which is about as loud as an average home or office.”*

INTERCONNECTION WITH POWER GRID 5.1

Onshore Infrastructure requirements for each site

- *Buried transmission line to existing high voltage transmission line*
- *Indoor interconnect substation where cable comes ashore*
- *Example landfall site - Old Charlestown Naval Air Station*
- *5 miles to transmission line (Charlestown)*
- *13 miles to transmission line (Tiverton)*

INTERCONNECTION WITH POWER GRID 5.2

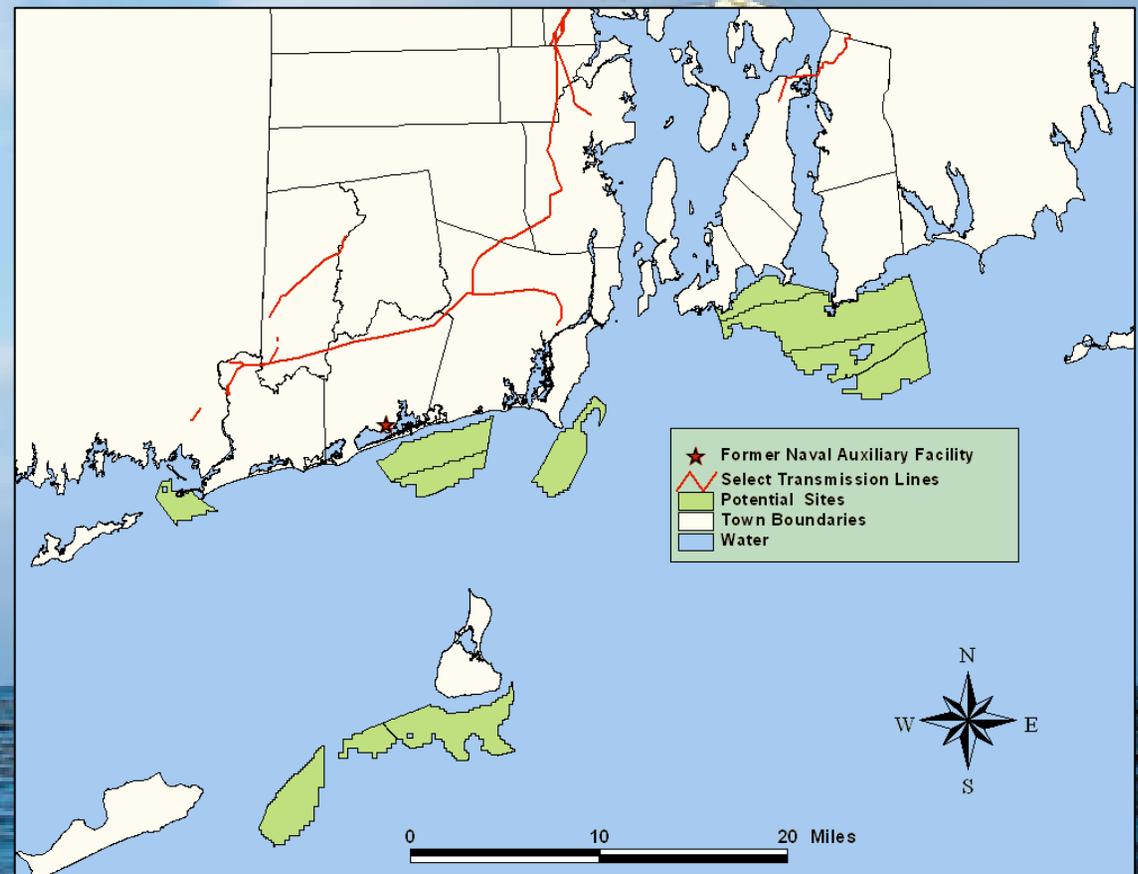
Difficulty in securing easements necessary for onshore transmission

- *Interconnection lines would be sited along other existing utility easements*
 - *Gas pipeline and transmission line ROWs or roadways*
 - *Reduces the number of easements required and property owners affected*

INTERCONNECTION WITH POWER GRID 5.3

Offshore Interconnection infrastructure

- *Submarine cable will run from the wind turbine area to the nearest appropriate “landfall.”*



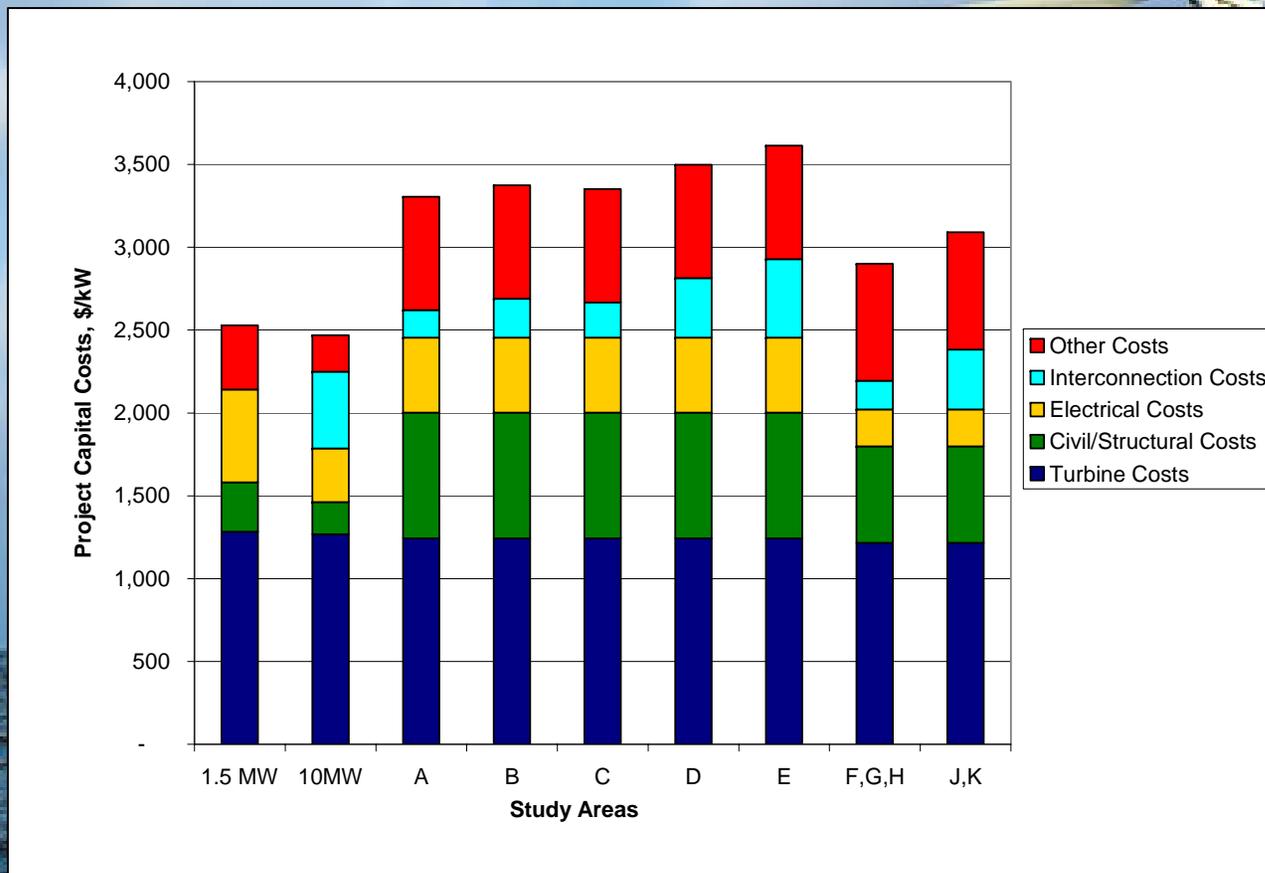
INTERCONNECTION WITH POWER GRID 5.4

Adequacy of existing transmission (generally and in relation to specific sites)

- *The utility will determine what improvements required after more detailed interconnection analysis*
- *National Grid thought upgrade of line capacity would be needed at a cost of approximately \$1M / mile for 25 miles of 115 kV lines*
- *These costs included in project capital cost estimates*
- *National Grid is checking estimates*

PROJECT ECONOMICS 6.1

All in cost for each of the sites, including interconnection to the grid



PROJECT ECONOMICS 6.1

All in cost for each of the sites, including interconnection to the grid

<i>Estimated Project Cost, \$M (2006 \$)</i>										
<i>Area Designation</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>J</i>	<i>K</i>
<i>Project Rating, MW</i>	30	30	30	30	30	200	200	200	200	200
<i>WTG, Tower, & Transition Section</i>	40	40	40	40	40	245	245	245	245	245
<i>Structural/Foundations</i>	25	25	25	25	25	117	117	117	117	117
<i>Electrical Collection System</i>	12	12	12	12	12	38	38	38	38	38
<i>Offshore Interconnection</i>	1	3	3	1	5	2	2	4	40	40
<i>Onshore Interconnection</i>	6	6	6	12	12	9	21	21	9	9
<i>Transmission Improvement</i>	0	0	0	0	0	25	10	10	25	25
<i>Indirects, Development & Contingency</i>	15	15	15	15	15	143	143	143	143	143
Total Estimated Project Cost	99	101	101	105	108	580	577	579	618	618

PROJECT ECONOMICS 6.2

Cash flows for each site

- *Pro forma cash flow analyses were prepared for each area during the siting study – handout provided*

PROJECT ECONOMICS 6.3

Security costs to protect farms from potential attack

- *No specific information available*
- *Not a differentiator*

PROJECT ECONOMICS 6.4

Potential for storm damage and associated costs

- *Preliminary foundation design included wave forces from a 100 year storm event*
- *The mono-tube foundation was designed to take the forces from these waves*
- *The tower and nacelle would be above the wave impacts but would need to be designed for the wind forces*
- *Based on this preliminary design, no damage to the mono-tube foundation would be expected*

PROJECT ECONOMICS 6.5

Risk assessment of alternative sites

- *No specific information available*
- *Not a differentiator*

PROJECT ECONOMICS 6.6

Cost variability of alternative bottom/foundation

- *Preliminary foundation design was based on anticipated soil conditions of the south coast of RI*
 - *Medium dense sand in the foundation zone*
 - *Soil sampling would be performed at any proposed foundation locations*
- *Alternate soil conditions would necessitate alternate foundation design*
 - *Loose silty material*
 - *Require increased mono-tube diameter and/or greater depth*
 - *May increase foundation costs*
 - *May deem location unsuitable*
 - *High Bedrock Elevations*
 - *Foundations would require rock anchors*

PROJECT ECONOMICS 6.7

Creation of new fish habitats and aquaculture

- *Danish study at Nystad and Horns Rev found that turbine towers appear to increase local fish diversity*

“Danish Off shore Wind – Key Environmental Issues”

*Published by DONG Energy, Vattenfall, The Danish Energy Authority
and The Danish Forest and Nature Agency*

November 2006

- *Not a differentiator between sites*

BENEFIT SHARING 7.1

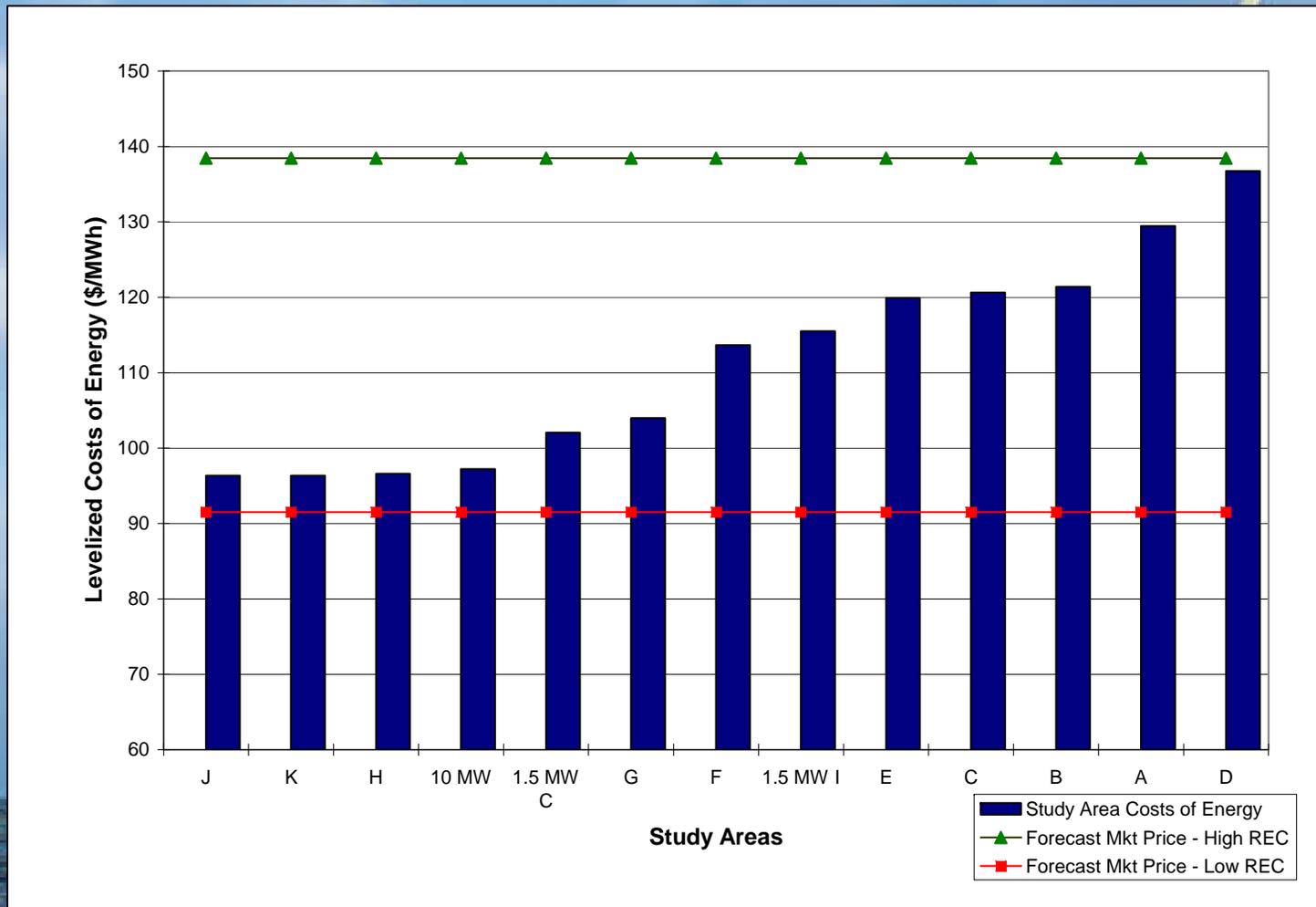
- **Ability to supply economical power to block island**

THE BEGINNING

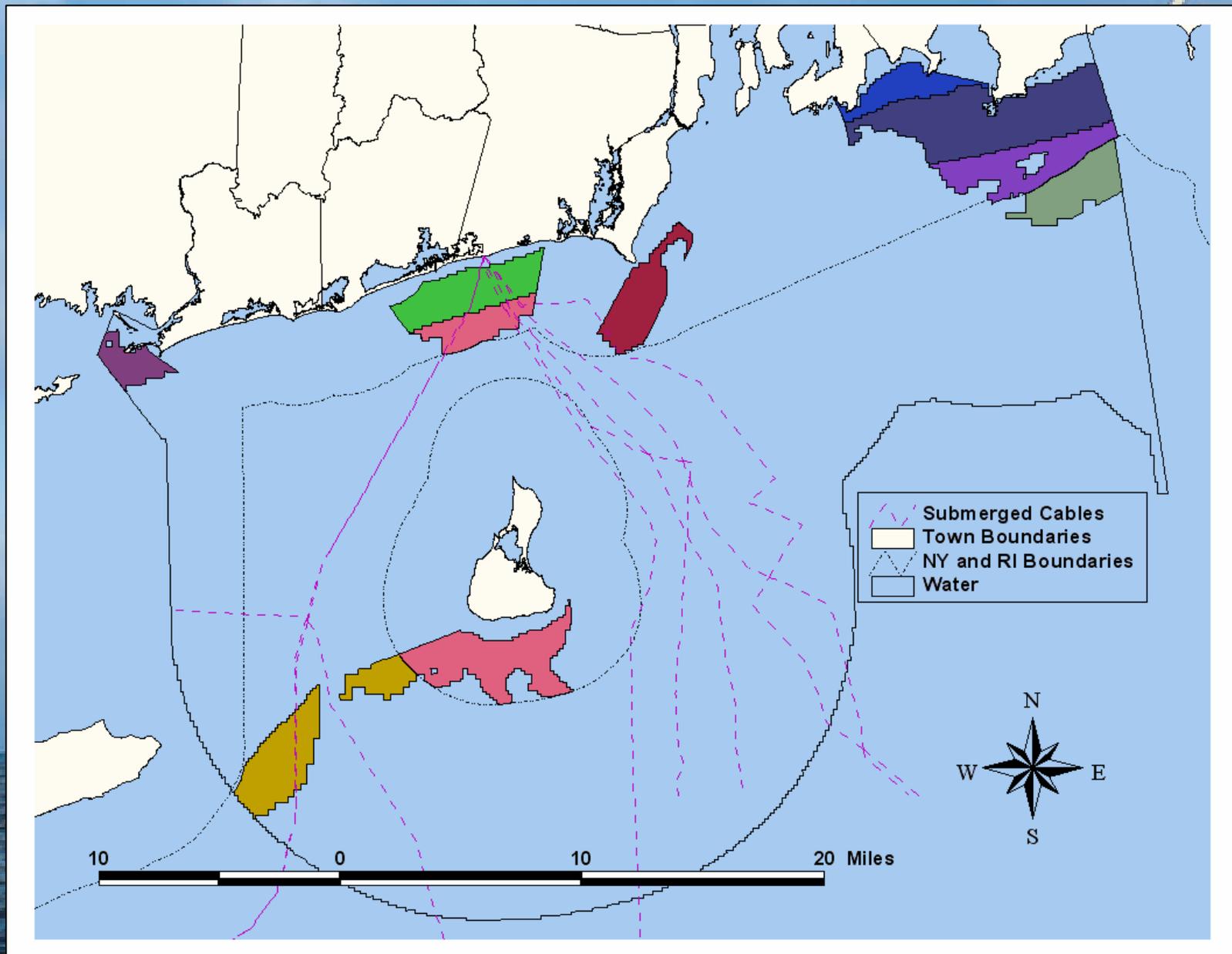


Projected Wind Energy Costs

Comparison to Wholesale Market Price Forecasts



SUBMERGED CABLES



KNOWN FISHERY AREAS

