“Southern Winds”
Offshore Project Summary

Liz Philpot
Mary Hallisey Hunt

Georgia Wind Working Group
December 3, 2007

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“Southern Winds”
Offshore Project Summary

- Joint project between the Georgia Tech Strategic Energy Institute and Southern Company
- Project started July 1, 2005
- Project objective is to study the viability of wind power generation off the Georgia coast
- Project deliverable: A final report

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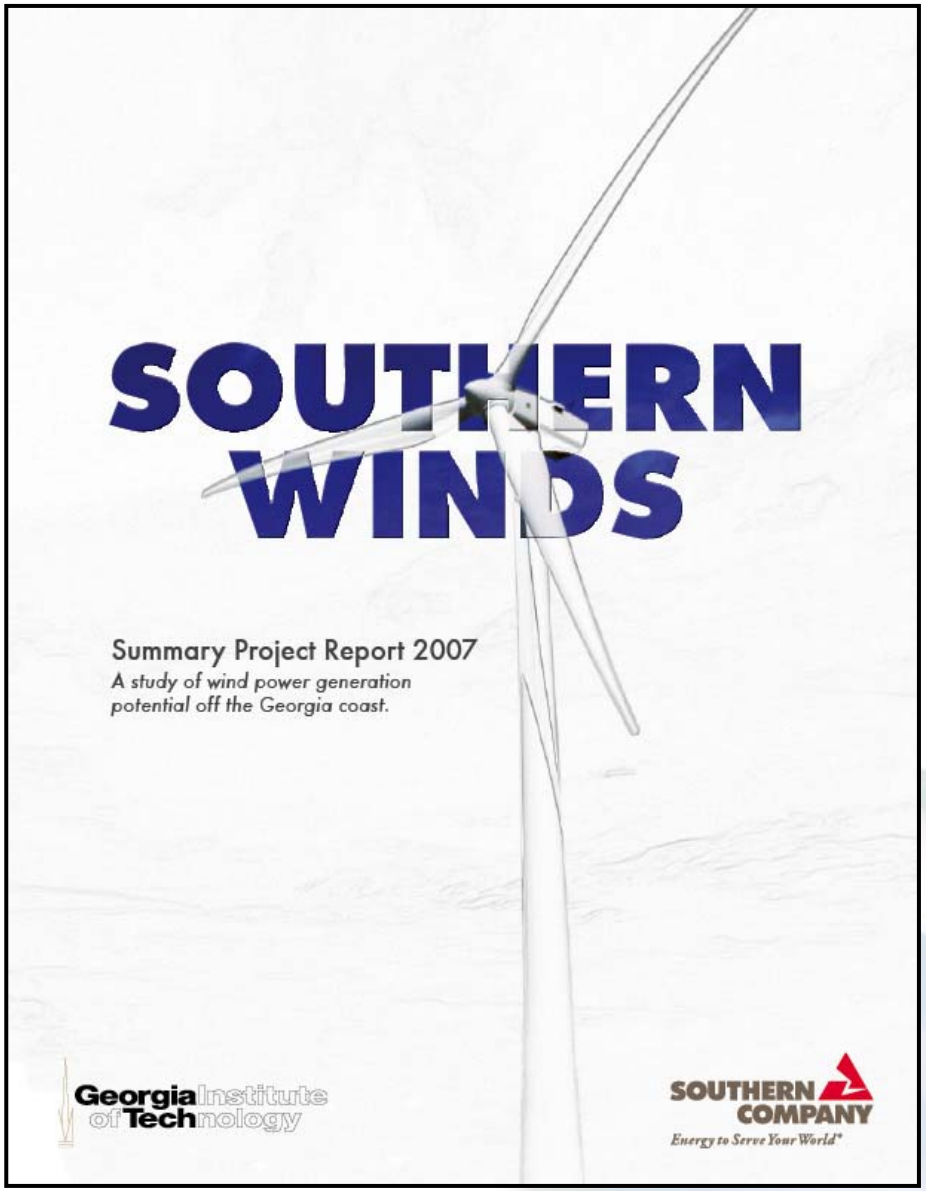

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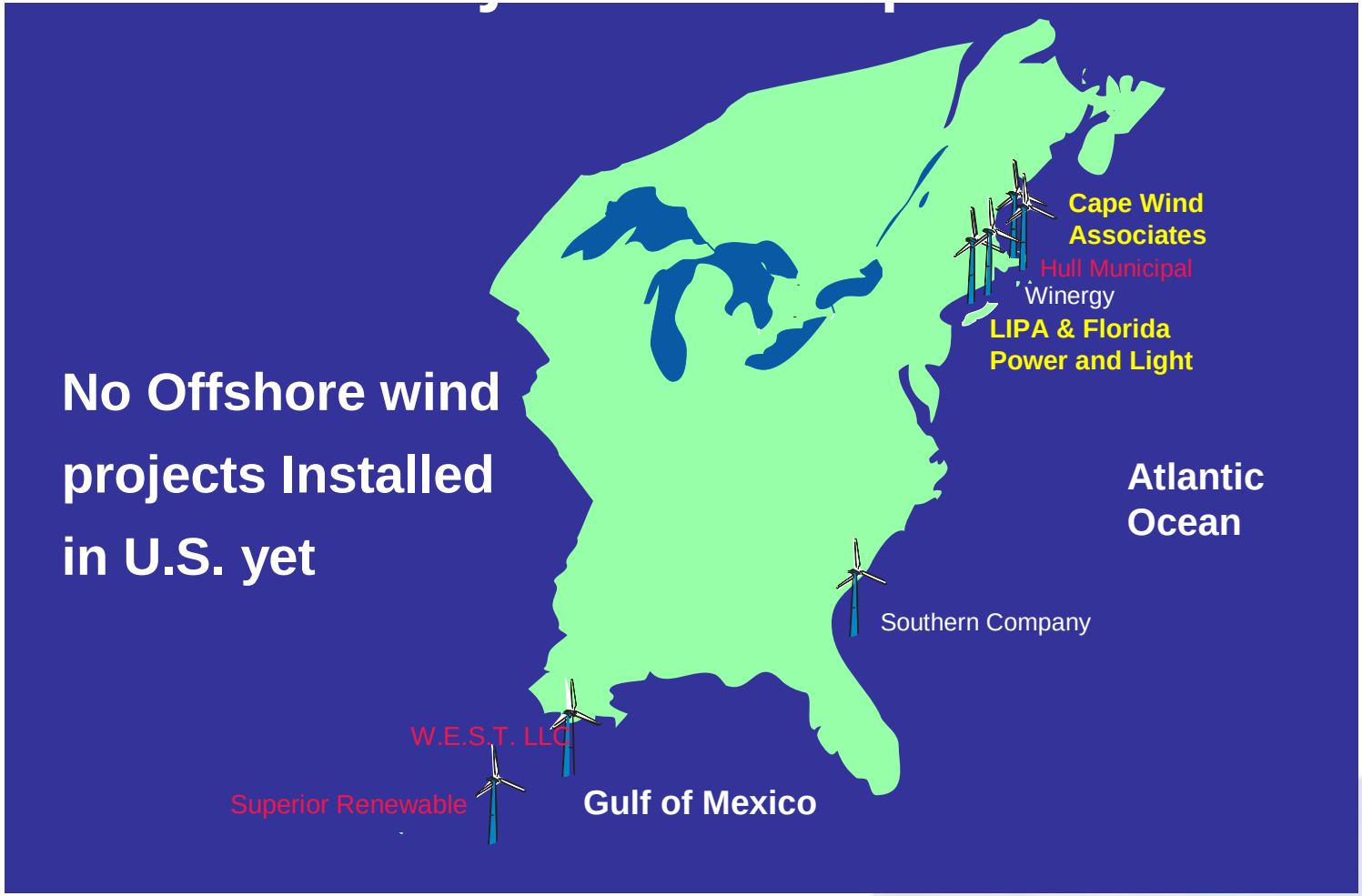

Figure courtesy of Walt Musial, NREL

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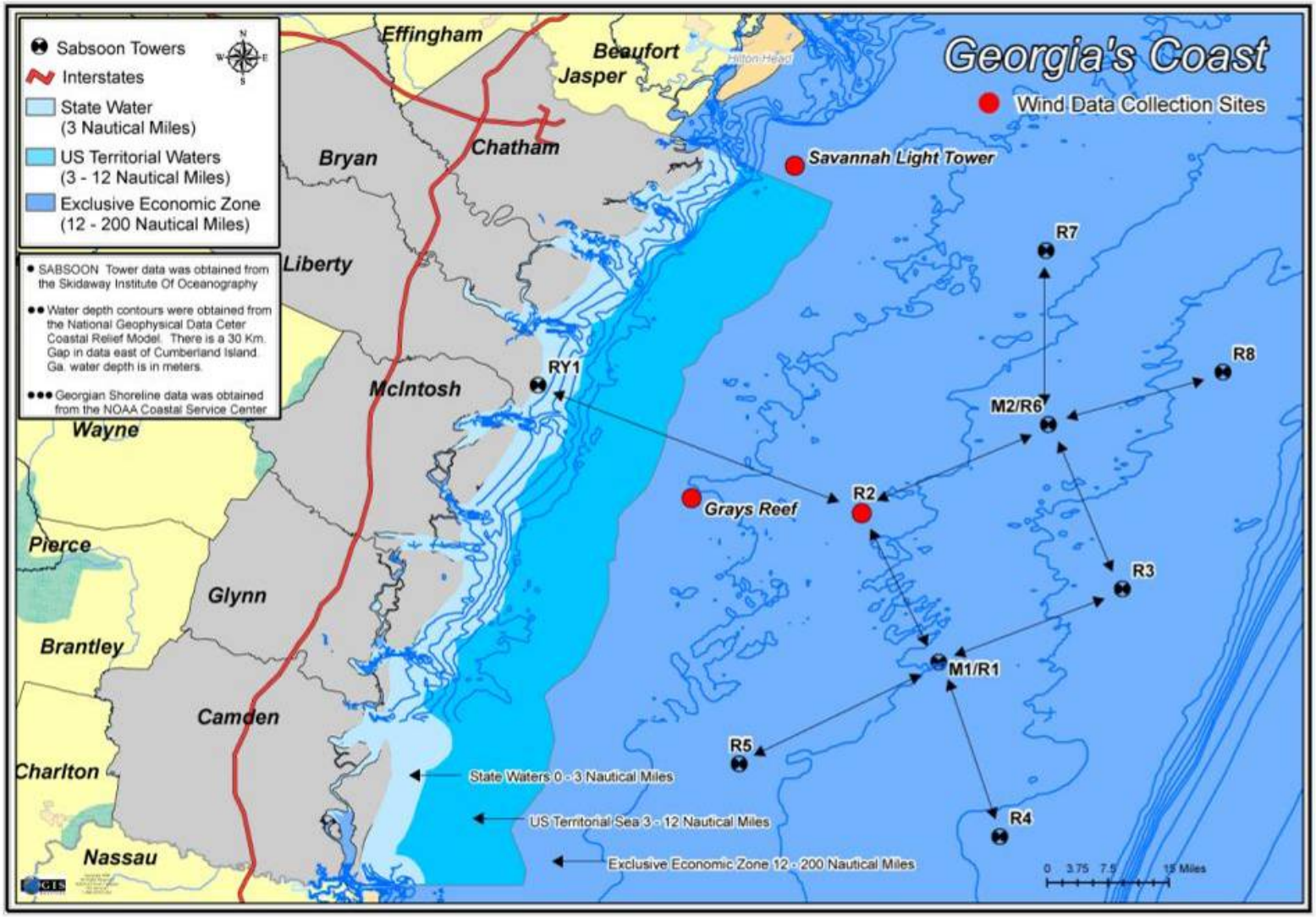

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Georgia Tech Wind Data Locations

Name	Distance/ Height	Date	
R2 SABSOON Tower	35 miles / 50 meters	June ’99 - present	
Savannah Light Tower	10 miles/ 30 meters	May ’85 – Nov ‘96	
Gray’s Reef Buoy	15 miles/ 5 meters	Mar ’88 - present	

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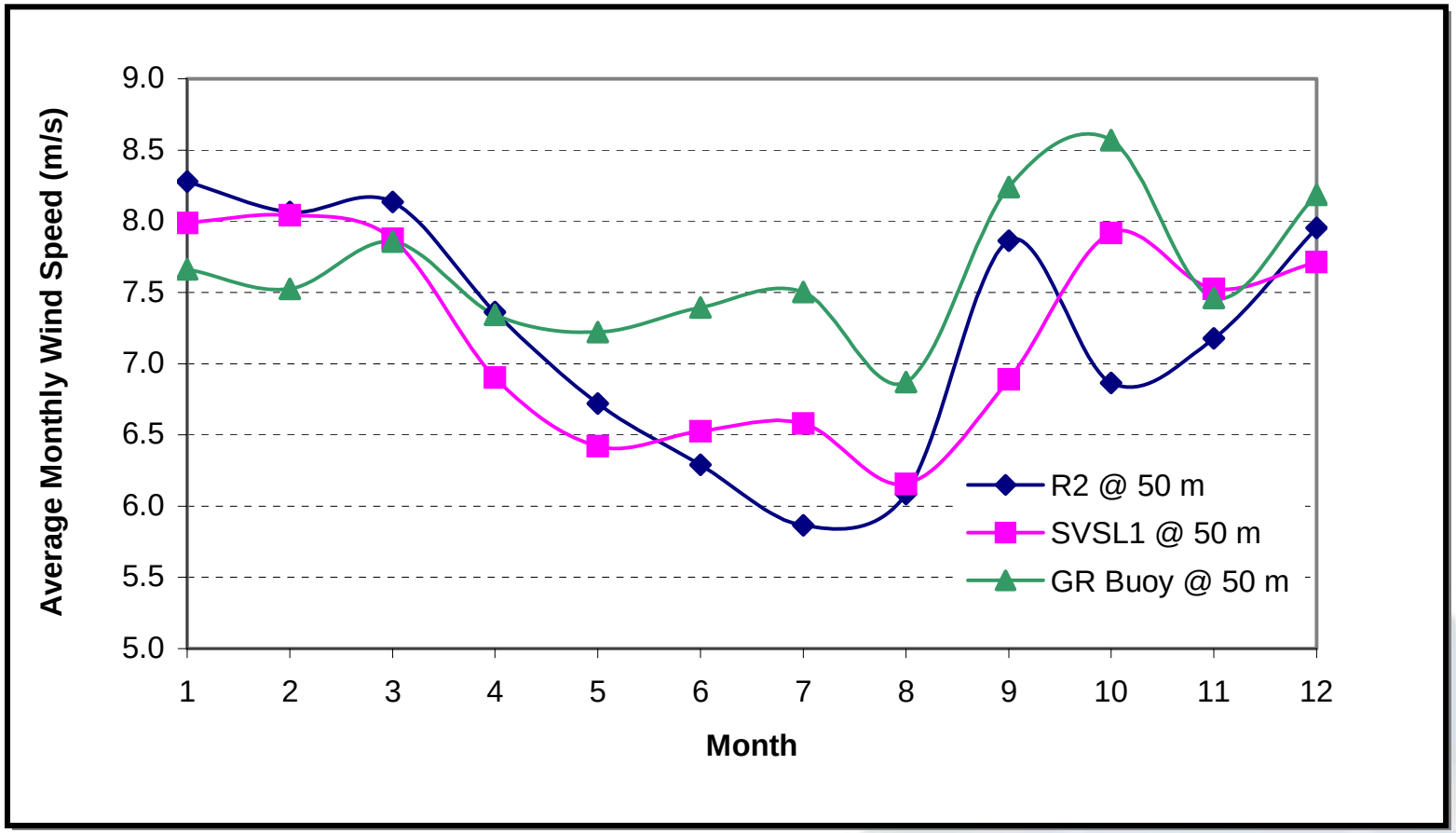
Average Monthly Wind Speeds



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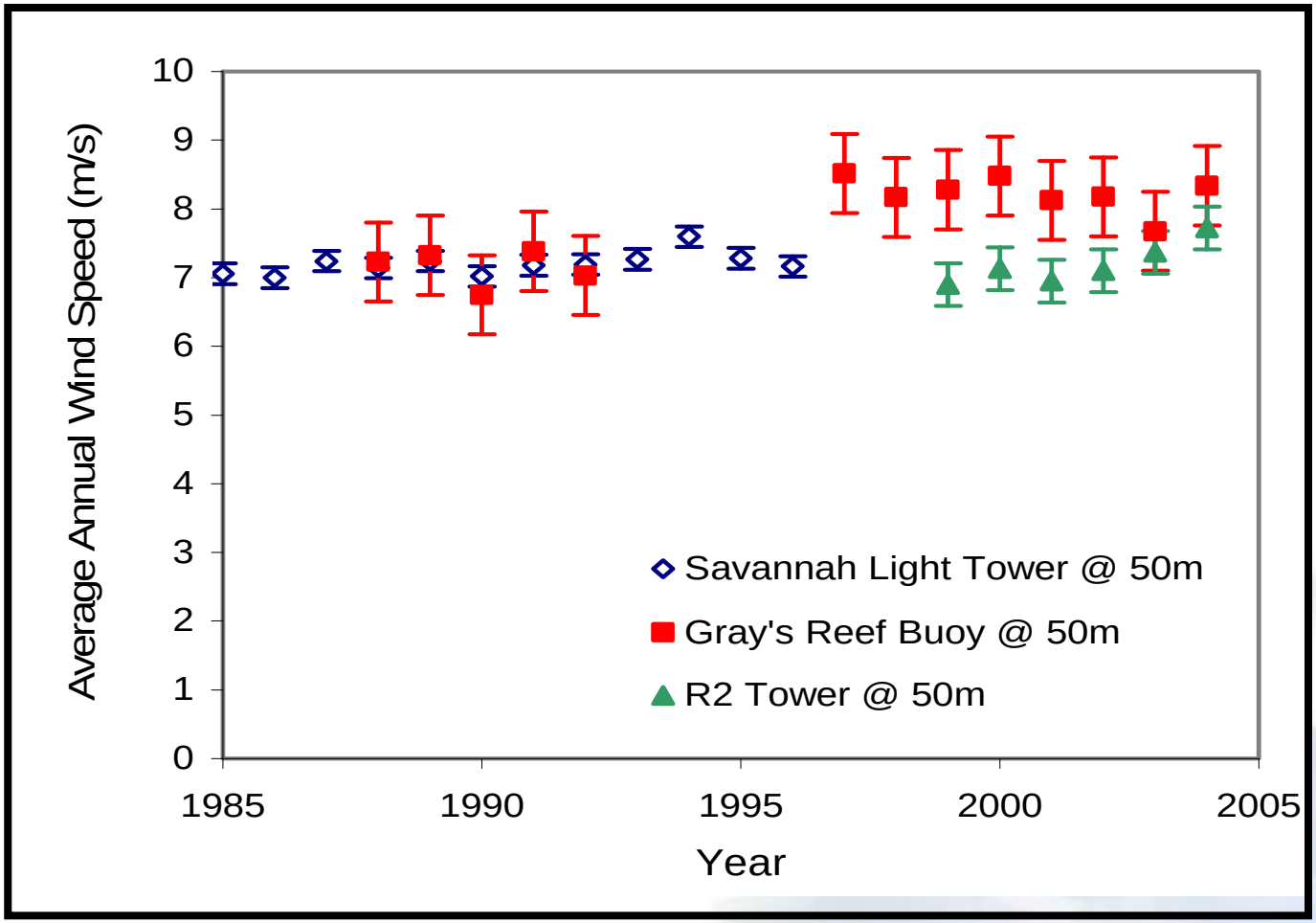
Average Annual Wind Speeds



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Summary of Overall Average Wind Speeds

Location	Height (m)	Wind Speed (m/s)	Extrapolated Wind Speed at 50 m (ms/)
R2	50	7.36	7.36
SLT	32.9	6.73	7.02
GR	5	5.79	7.29
StA	5	5.66	7.12

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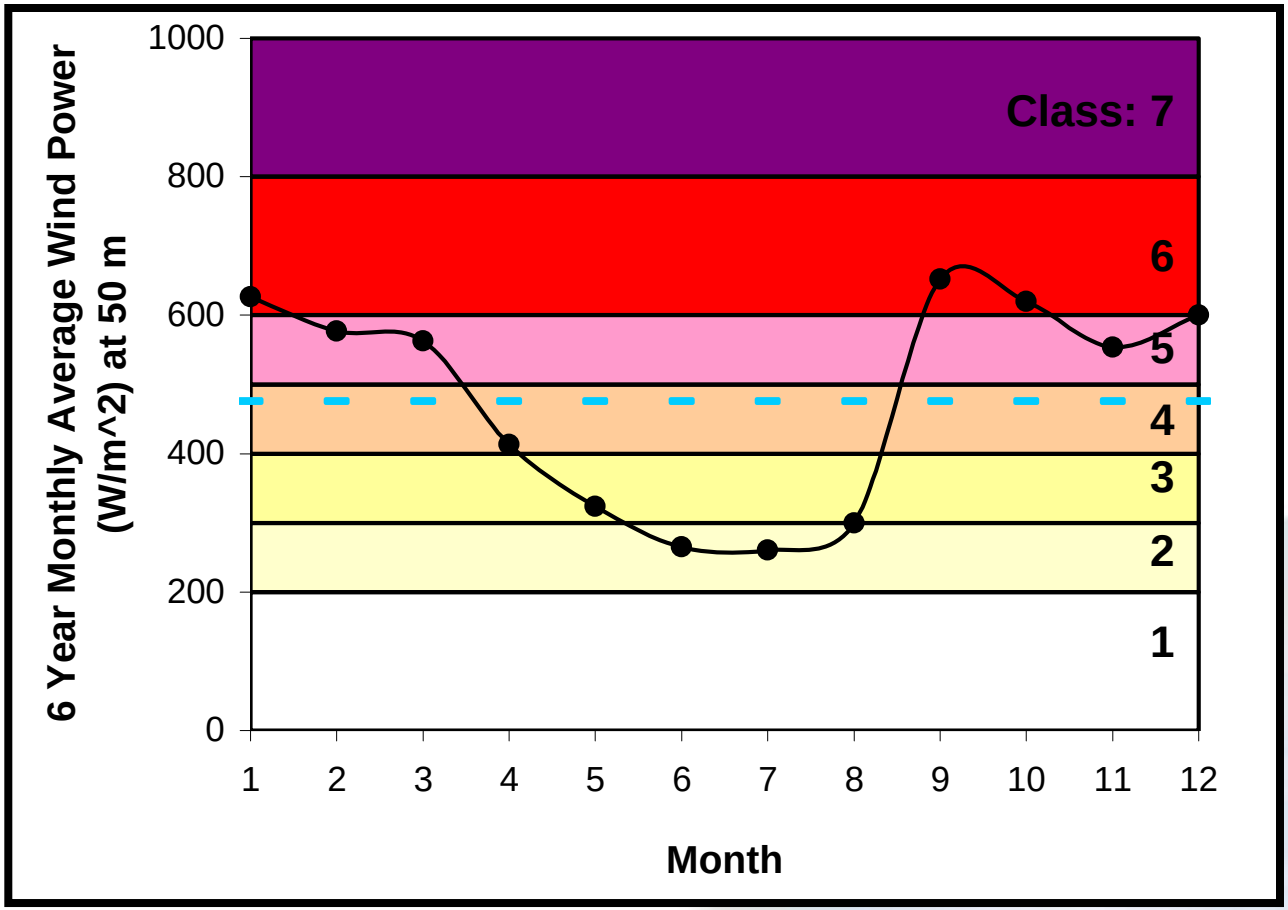
R2 Tower Monthly Average Wind Power Density (W/m^2)



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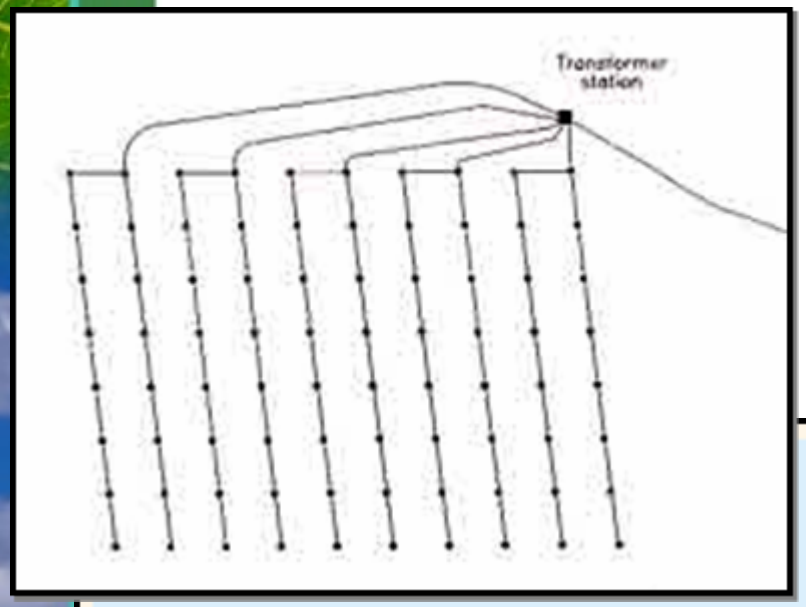
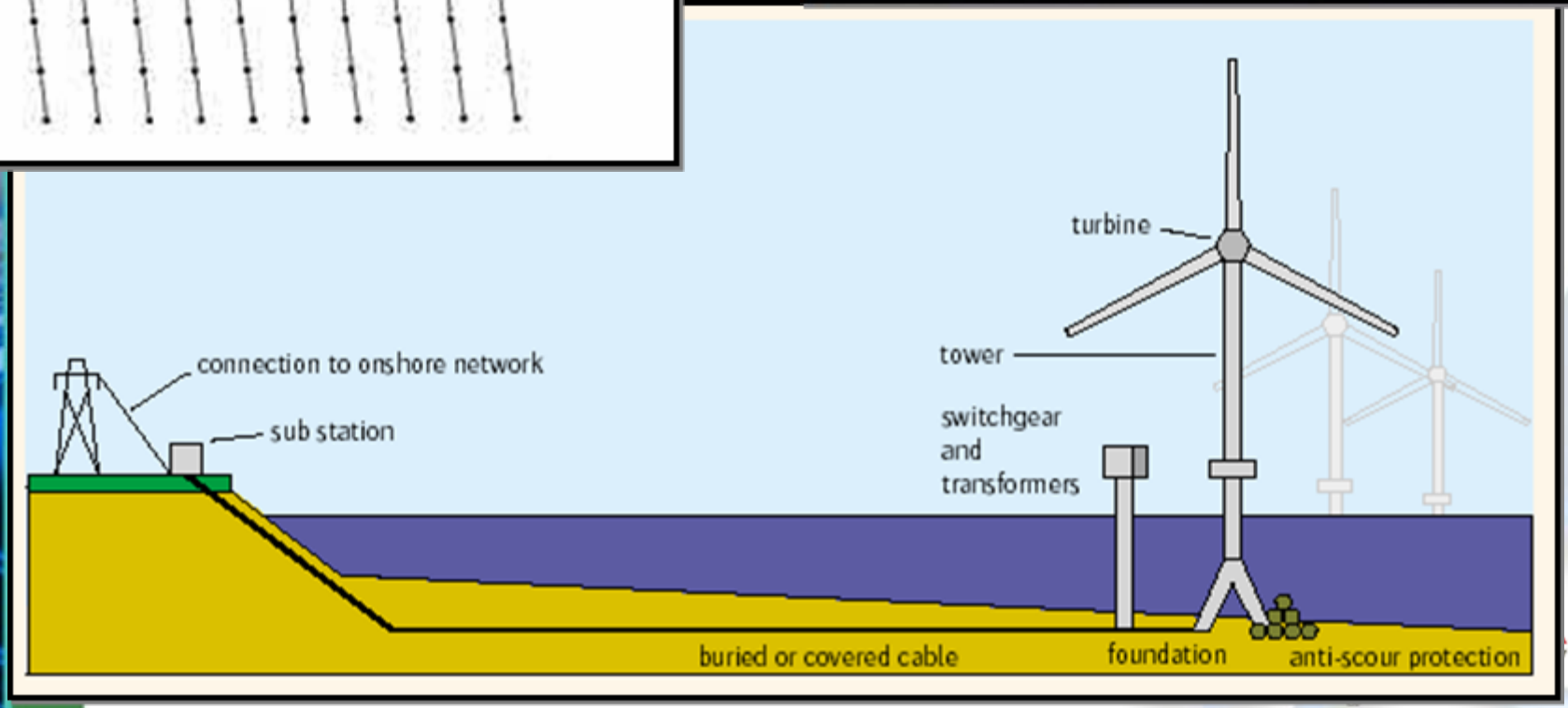
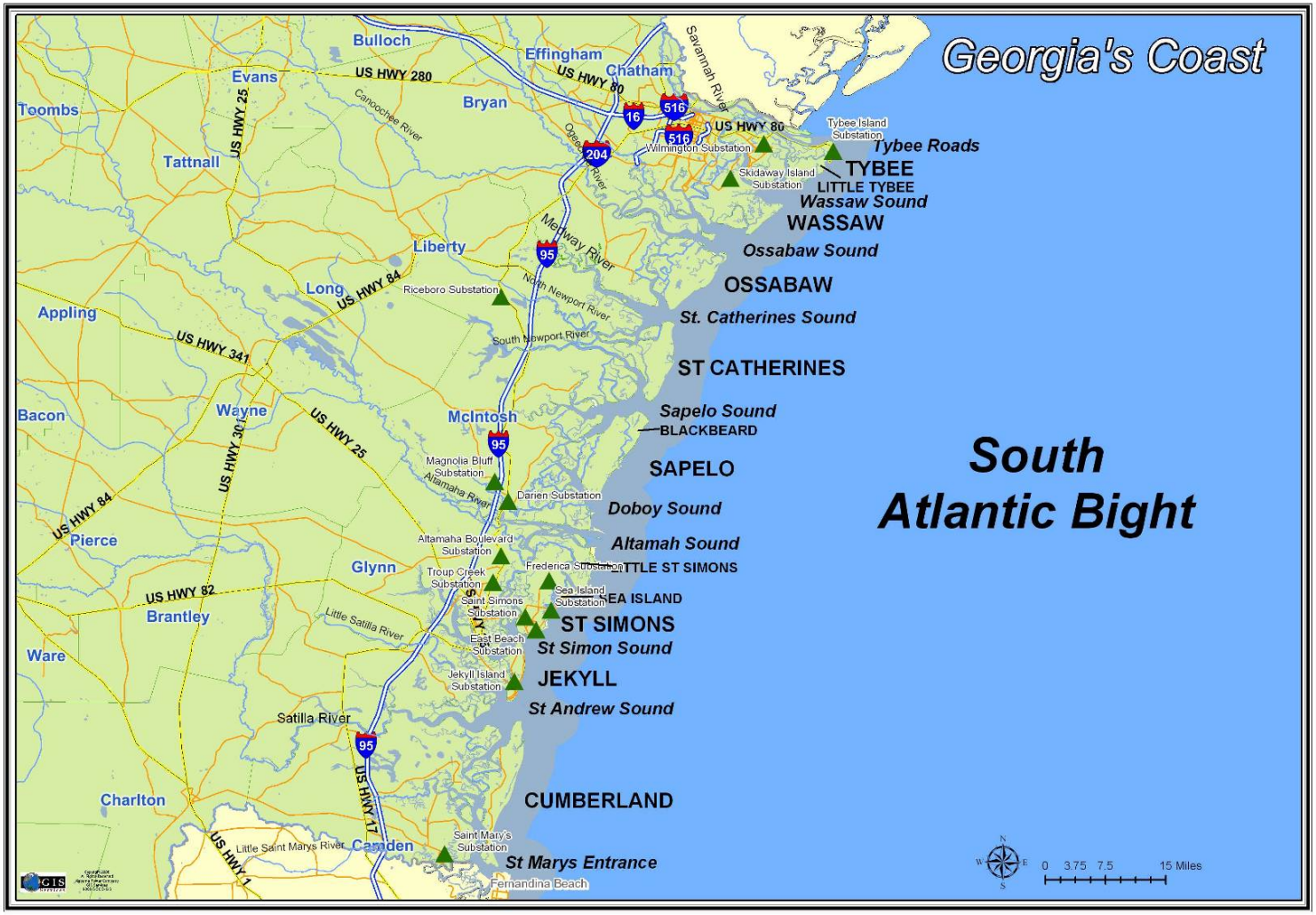
Typical Offshore Wind Farm Layout





Source: NREL



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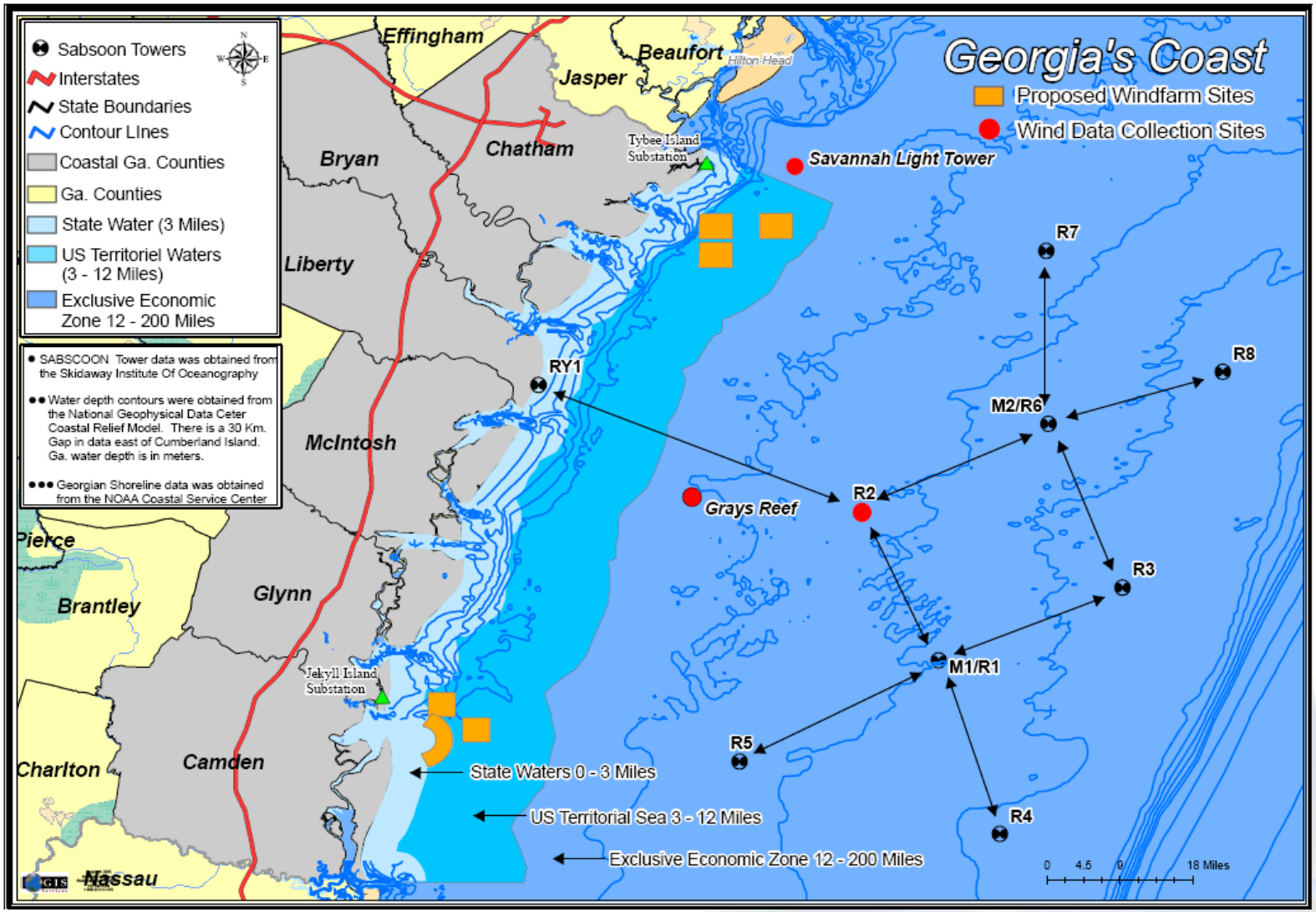

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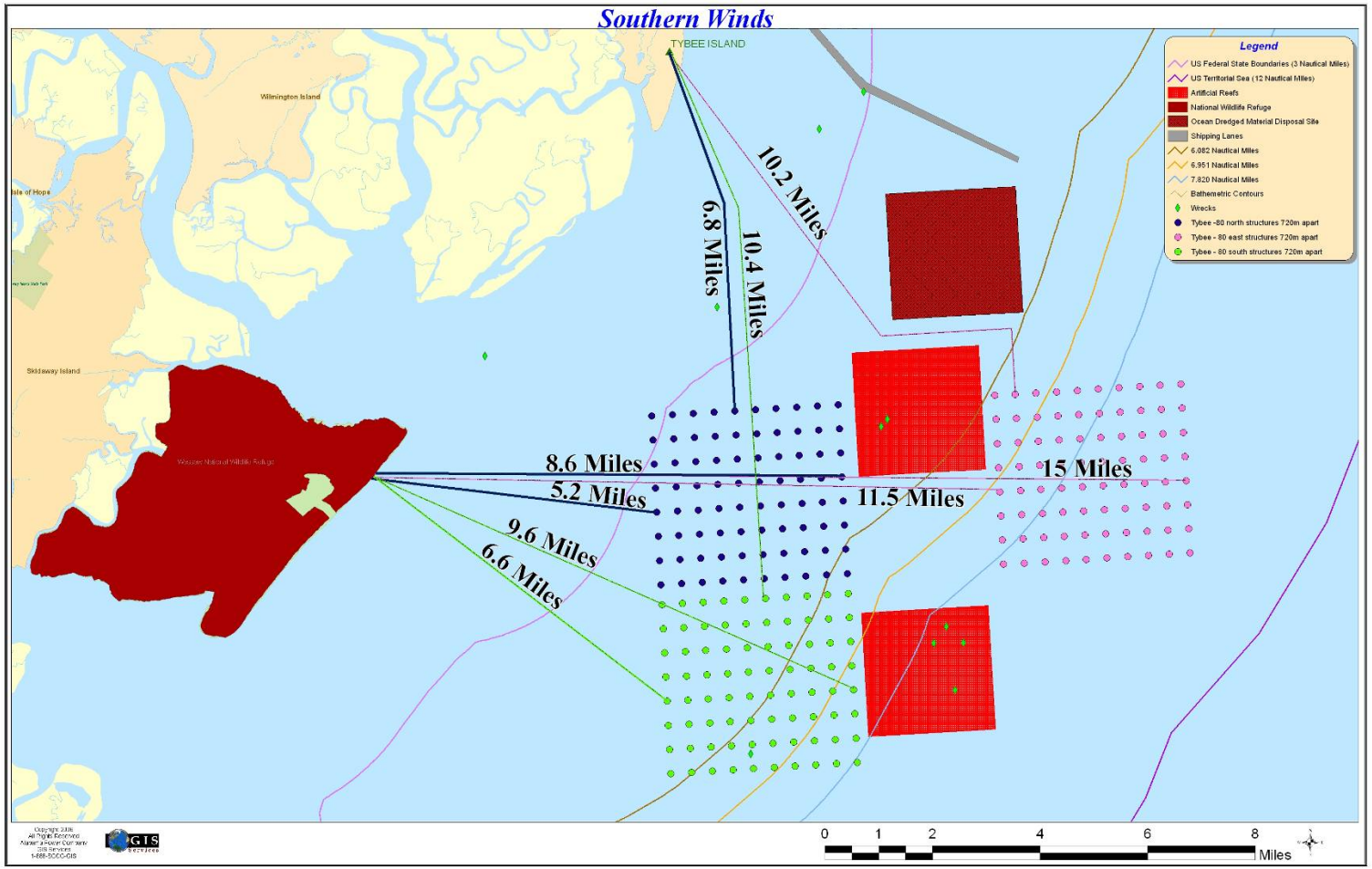
Mileages for Tybee Island Sites



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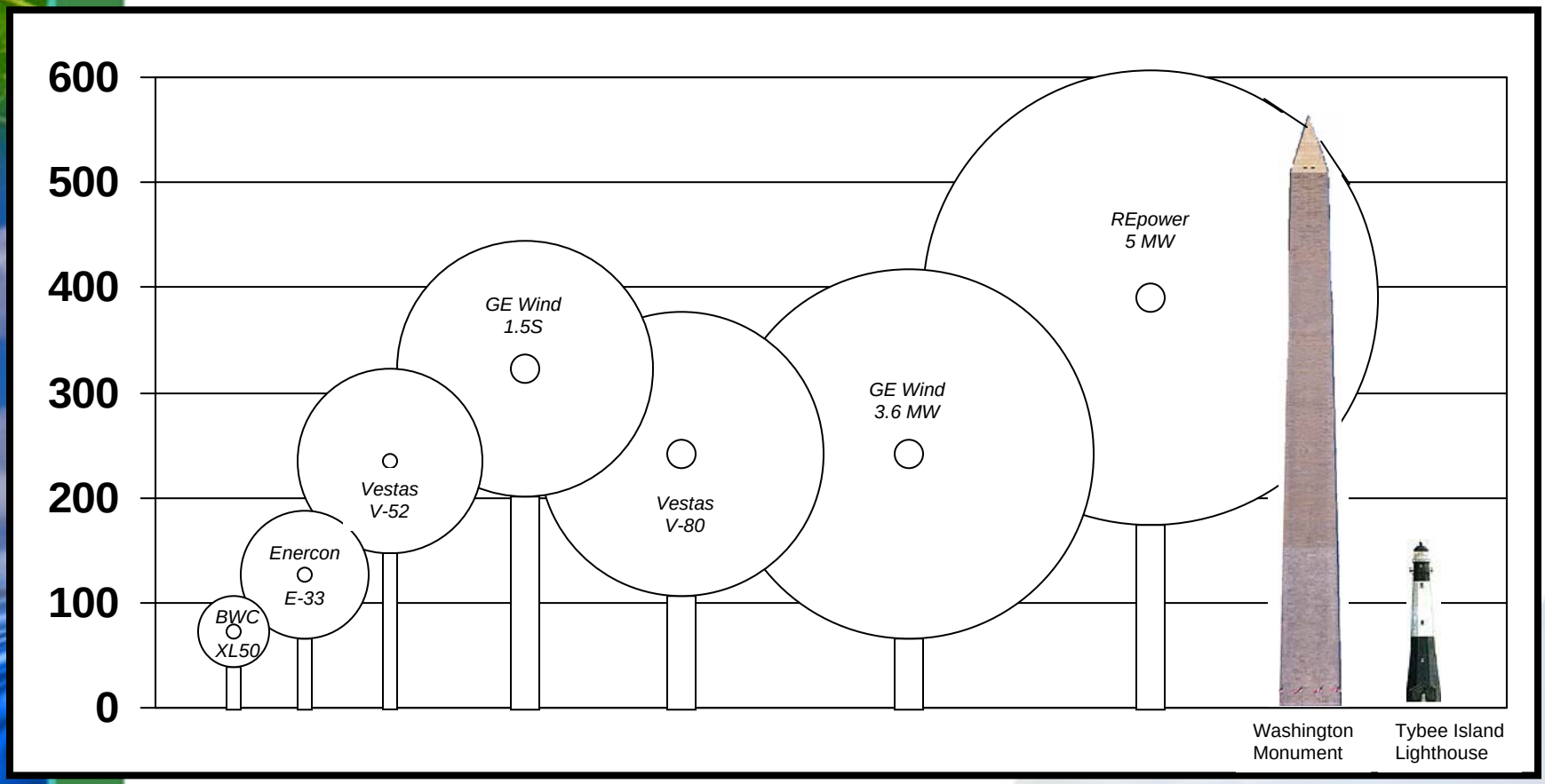
Wind Turbine Size



Capacity	50 kW	330 kW	850 kW	1500 kW	2000 kW	3600 kW	5000 kW		
Rotor diameter	46 ft (14 m)	110 ft (33 m)	171 ft (52 m)	232 ft (71 m)	265 ft (80 m)	341 ft (104 m)	413 ft (126 m)		
Tower height	82 ft (25 m)	144 ft (44 m)	243 ft (74 m)	328 ft (100 m)	230 ft (70 m)	243 ft (74 m)	394 ft (120 m)	558 ft (170 m)	154 ft (47 m)

Photosimulation View from Tybee Island

5 turbine wind farm – Eastern Site
(approximately 10 miles)

80 turbine wind farm – Eastern Site
(approximately 8 - 13 miles)

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Photosimulation View from Tybee Island

5 turbine wind farm – Northern Site
(approximately 6.8 miles southeast of Tybee)

80 turbine wind farm – Northern Site
(approximately 7 - 13 miles)

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Photosimulation View from St. Simon's Island

5 turbine wind farm –
Arcing Site
(approximately 13 miles)

80 turbine wind farm –
Arcing Site
(approximately 8-13 miles)

Weather Considerations

- Hurricanes
- Lightning

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Hurricanes: The Saffir-Simpson Scale

Category	Wind Speed	Barometric Pressure	Storm Surge	Damage Potential
1 (weak)	75 - 95 mph 65 - 82 kts 33 - 42 m/s	> 28.94 in. Hg > 980.0 mb > 97.7 kPa	4.0 - 5.0 ft. 1.2 - 1.5 m	minimal damage to vegetation
2 (moderate)	96 - 110 mph 83 - 95 kts 43 - 49 m/s	28.50 - 28.93 in. Hg 965.1 - 979.7 mb 96.2 - 97.7 kPa	6.0 - 8.0 ft. 1.8 - 2.4 m	moderate damage to houses
3 (strong)	111 - 130 mph 96 - 113 kts 50 - 58 m/s	27.91 - 28.49 in. Hg 945.1 - 964.8 mb 96.2 - 97.7 kPa	9.0 - 12.0 ft. 2.7 - 3.7 m	extensive damage to small buildings
4 (very strong)	131 - 155 mph 114 - 135 kts 59 - 69 m/s	27.17 - 27.90 in. Hg 920.1 - 944.8 mb 91.7 - 94.2 kPa	13.0 - 18.0 ft. 3.9 - 5.5 m	extreme structural damage
5 (devastating)	> 155 mph > 135 kts > 70 m/s	< 27.17 in Hg < 920.1 mb < 91.7 kPa	> 18.0 ft > 5.5 m	catastrophic building failures possible

Source: Hurricane Categories

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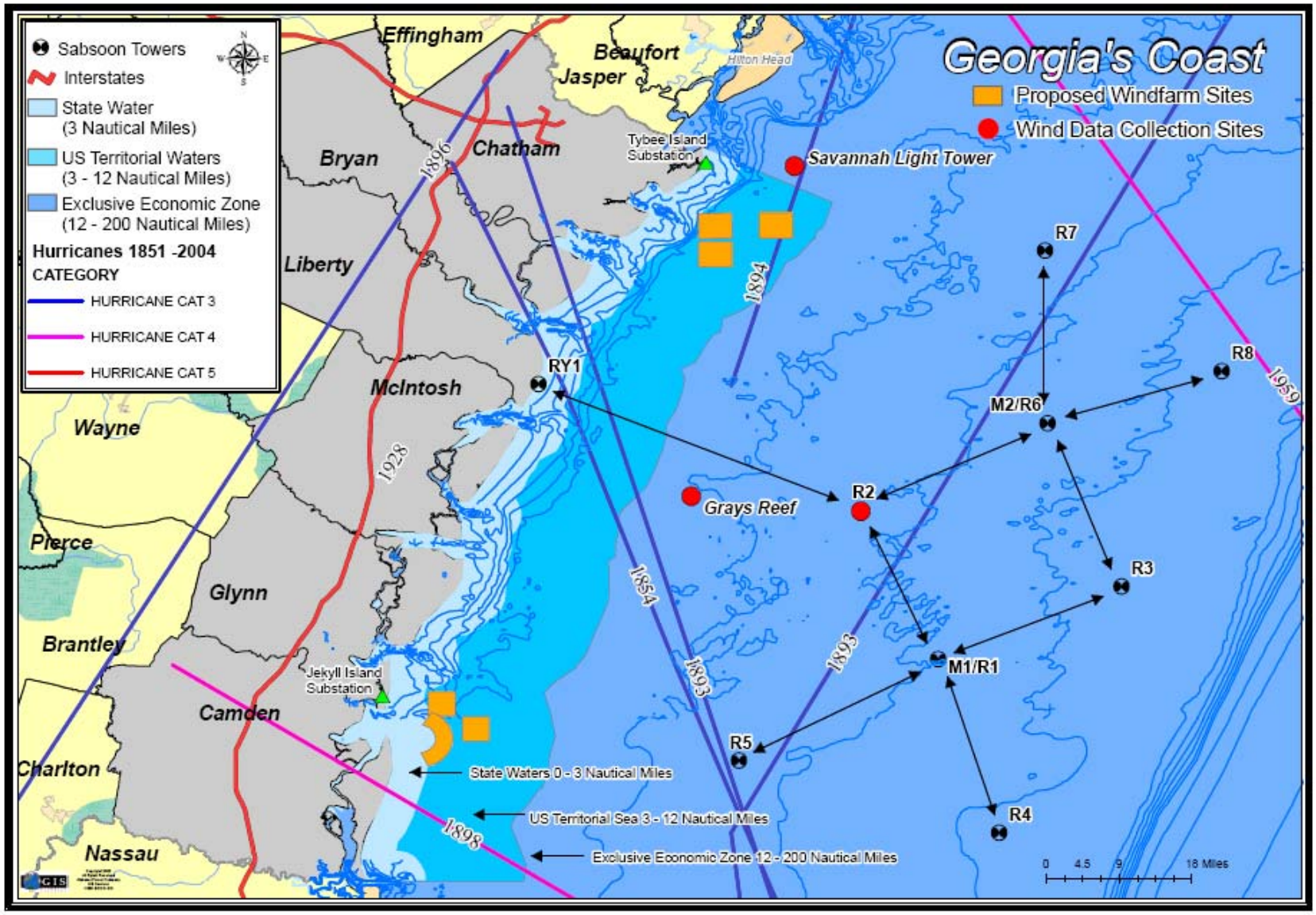
Major Hurricanes 1851 - 2004



Lightning

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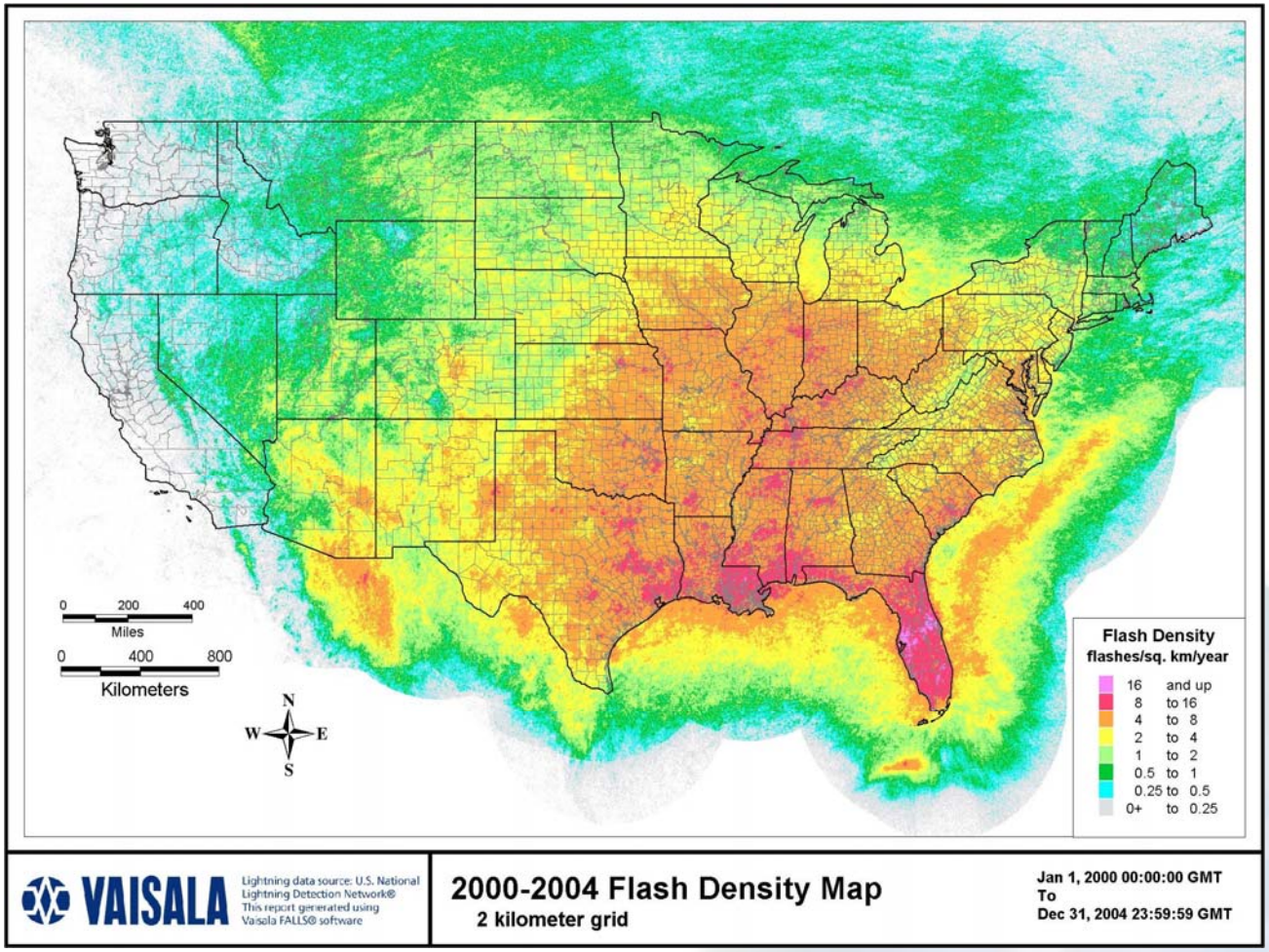
Lightning



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Environmental Issues

NEPA review required by MMS includes

- Wind farm footprint
- Cabling pathway
- Landfall location review

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Environmental Considerations

- Migratory pathways
- Habitats – marine, fisheries, avian
- Natural reefs and other aquatic life

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Regulatory – Federal
(Beyond 3 nautical miles from shore)

- Federal governing authority – Department of Interior Minerals Management Service
- Significant coordination with other federal, state, and local authorities
- Multiple federal governing authorities

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Regulatory – State
(From shoreline to 3 nautical miles seaward)

- Primary governing act – Georgia Coastal Management Act
- Multiple state governing authorities apply
- Key agencies include the Georgia Department of Natural Resources and others

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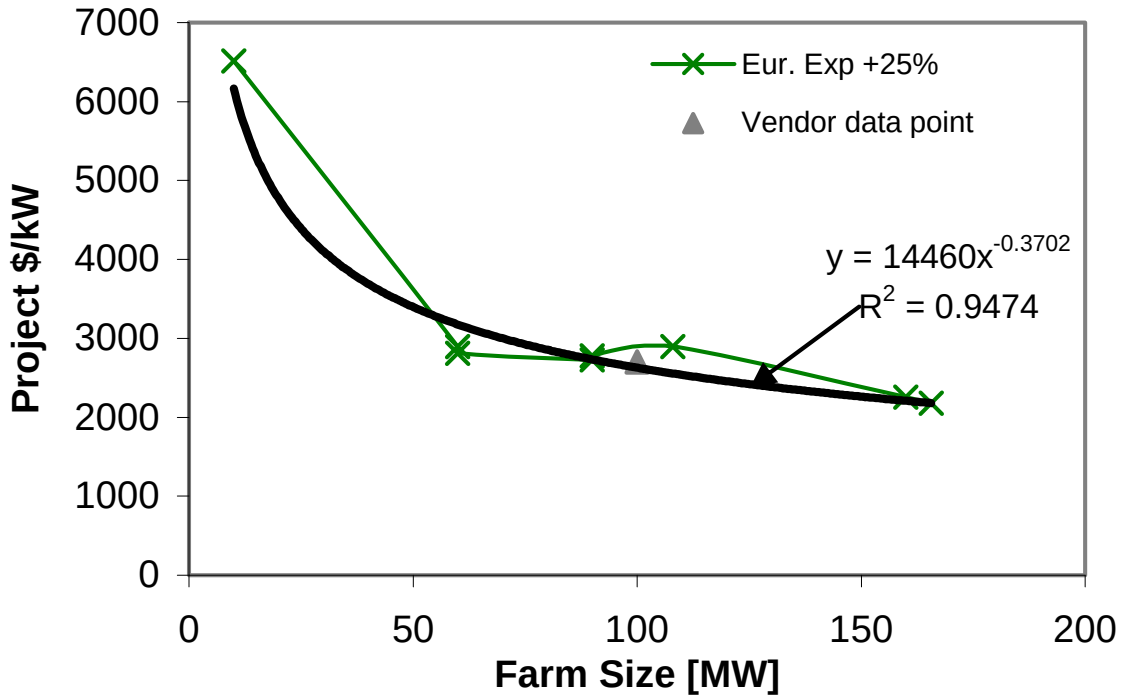
European Costs + 25% Increase ($2006)



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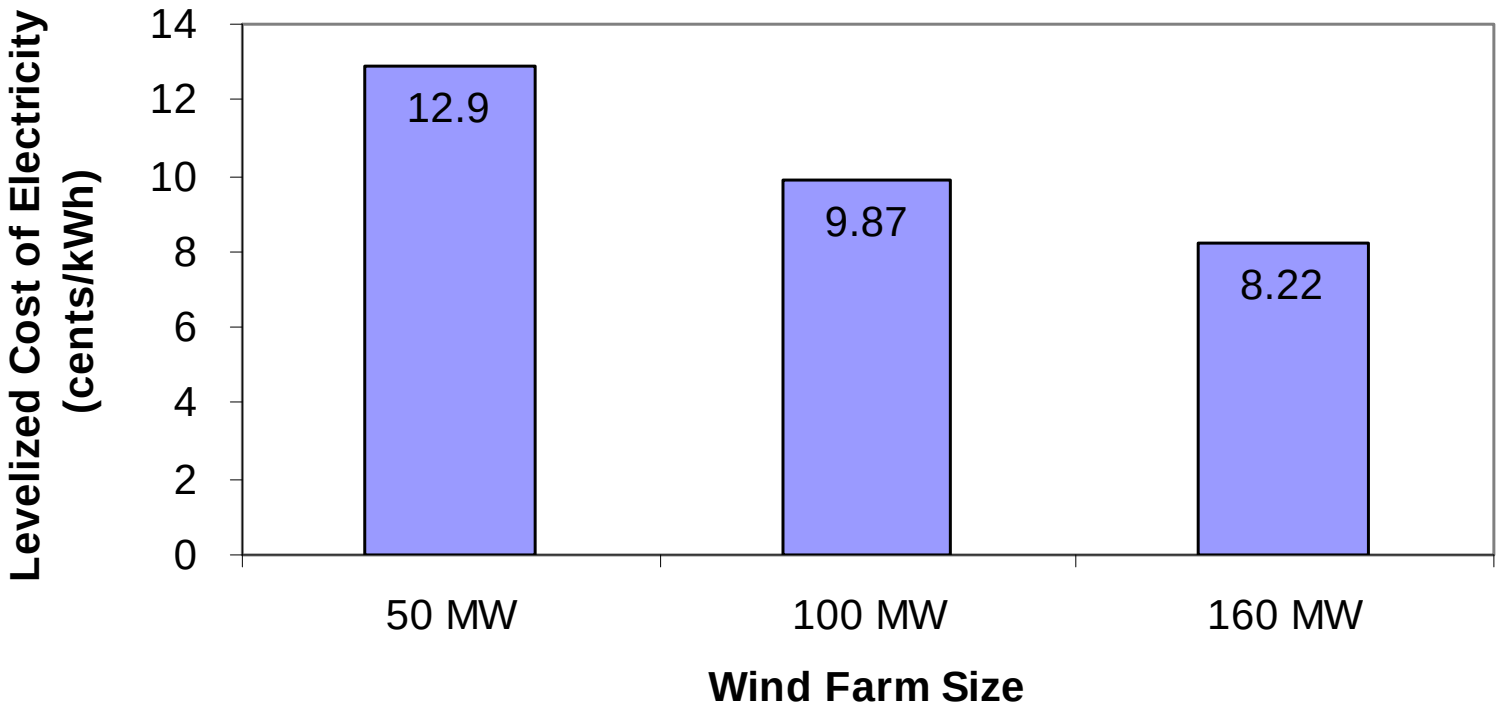
Wind Farm Levelized Cost:
(with Production Tax Credit: 1.9 cents/kWh)



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Conclusions

Georgia Offshore Wind Resource

Solid Class 4: 17 mph average, 2-20 miles Offshore.

Hurricane Probabilities ~ 1% per Year.

20 yr levelized cost of renewable zero emissions electricity

50-160 MW Scale; $0.08-$0.12/kwhr

Scroby Sands in UK Operating at Similar Wind Resource

Capacity Factor Low due to Equipment Reliability Issues

No “Show Stopper” Environmental Issues

Biological Studies will be Required for Permitting

MMS Permitting Process Targeted for Completion in 2008

Coastal Community Acceptance Important

Legislation Requires Competitive Process for Lease Site

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Recommendations

- Continue to follow the MMS rulemaking process
- Install a meteorological tower for wind resource assessment
- Construct a 10 MW “Demonstration” Project near Tybee Island

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