LIPA WIND POWER PROJECTS

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Long Island Power Authority

Existing Long Island Wind Projects

LIPA's 50 kW AOC Wind Generator
One in Calverton and two at Shoreham

10 kW Bergey Turbines at
Southampton College and
Brookhaven Town Hall


Long Island Offshore Wind Initiative
A unique coalition
working together to bring
the first Offshore Wind Farm
to America
©AMEC Border Wind

Long Island Offshore Wind Initiative

Why Offshore Wind for Long Island?

- Growth in energy demand – Scarce Land
  - *Peak Energy Requirements grew 10% from 2001 to 2002*
  - *July 29, 2002 – Record High Peak Demand -* ***5,059 MW***
- New York State Renewable Portfolio Standard
- Population Density and Limited Land Availability
- Wind Resource substantially higher than on land

LI Wind Study Process

- Phase I Siting Study sponsored by LIPA and NYSERDA released April 2002
  - *Evaluation of LI Offshore Wind Resource*
- Formation of LIOWI
- Phase II Study Released January 22, 2003
- RFP Issued January 22, 2003
- RFP Deadline May 1, 2003
- LIPA Board of Trustees approves PPA negotiations to commence with Florida Power & Light Energy (FPLE) May 26, 2004

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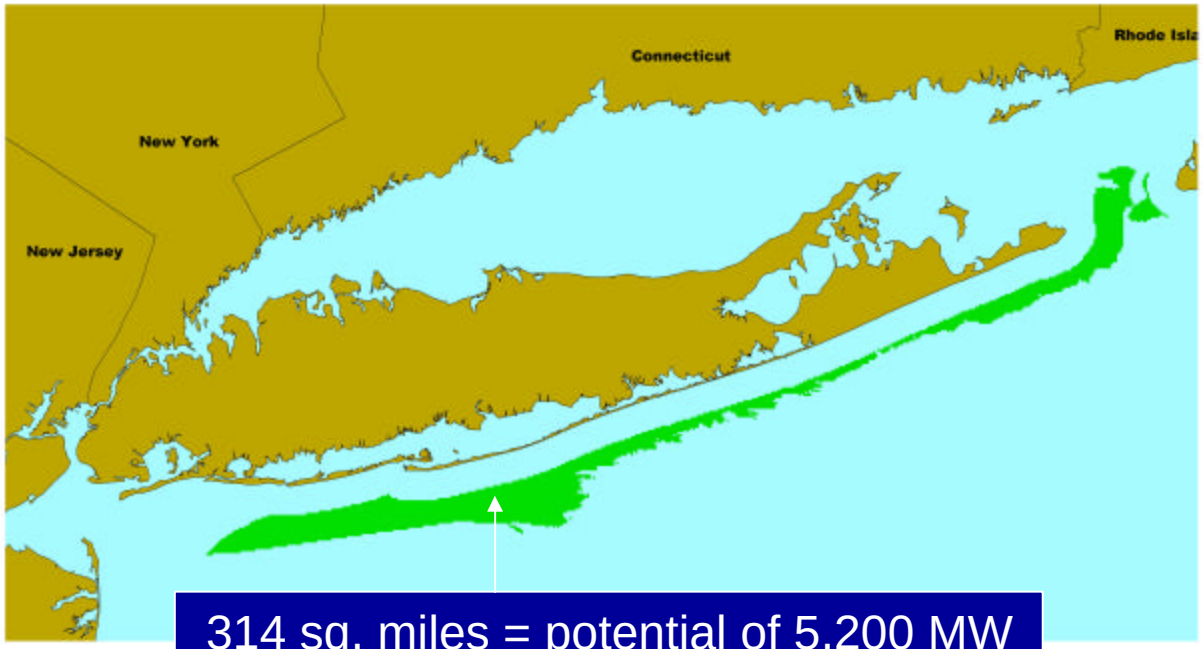
Phase 1 - Site Screening Results



314 sq. miles = potential of 5,200 MW
= 77% of LI's electricity

Winds >18 mph at 65 m

Depth <100 ft

Distance >3 mi.

Outside of shipping lanes

Siting Issues Examined

- **GEOPHYSICAL/OCEANOGRAPHIC:**

  Tides & waves, bottom conditions, geology, sediment transport, extreme winds (hurricanes)

- **BIOLOGICAL & ENVIRONMENTAL:**

  Fisheries, marine life resources, visual impact, birds, vessel traffic, cultural resources

- **TRANSMISSION**:

  Shoreline landfall options, interconnection design, grid impacts, costs

- **LEGAL & REGULATORY ISSUES**:

  Rigorous environmental review

  as required under the National Environmental Policy Act (NEPA) and any other applicable laws

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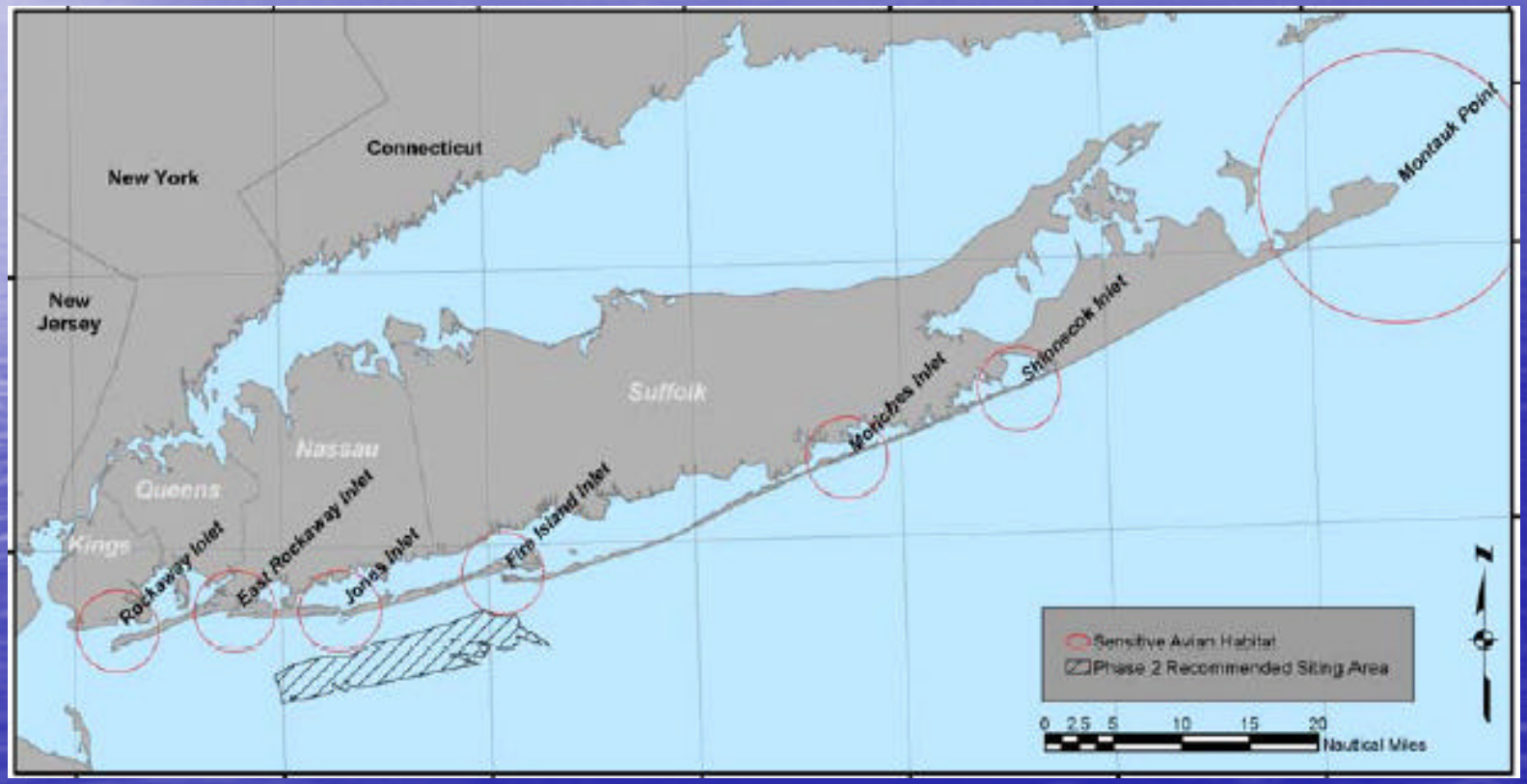
Phase II Avian Avoidance Areas



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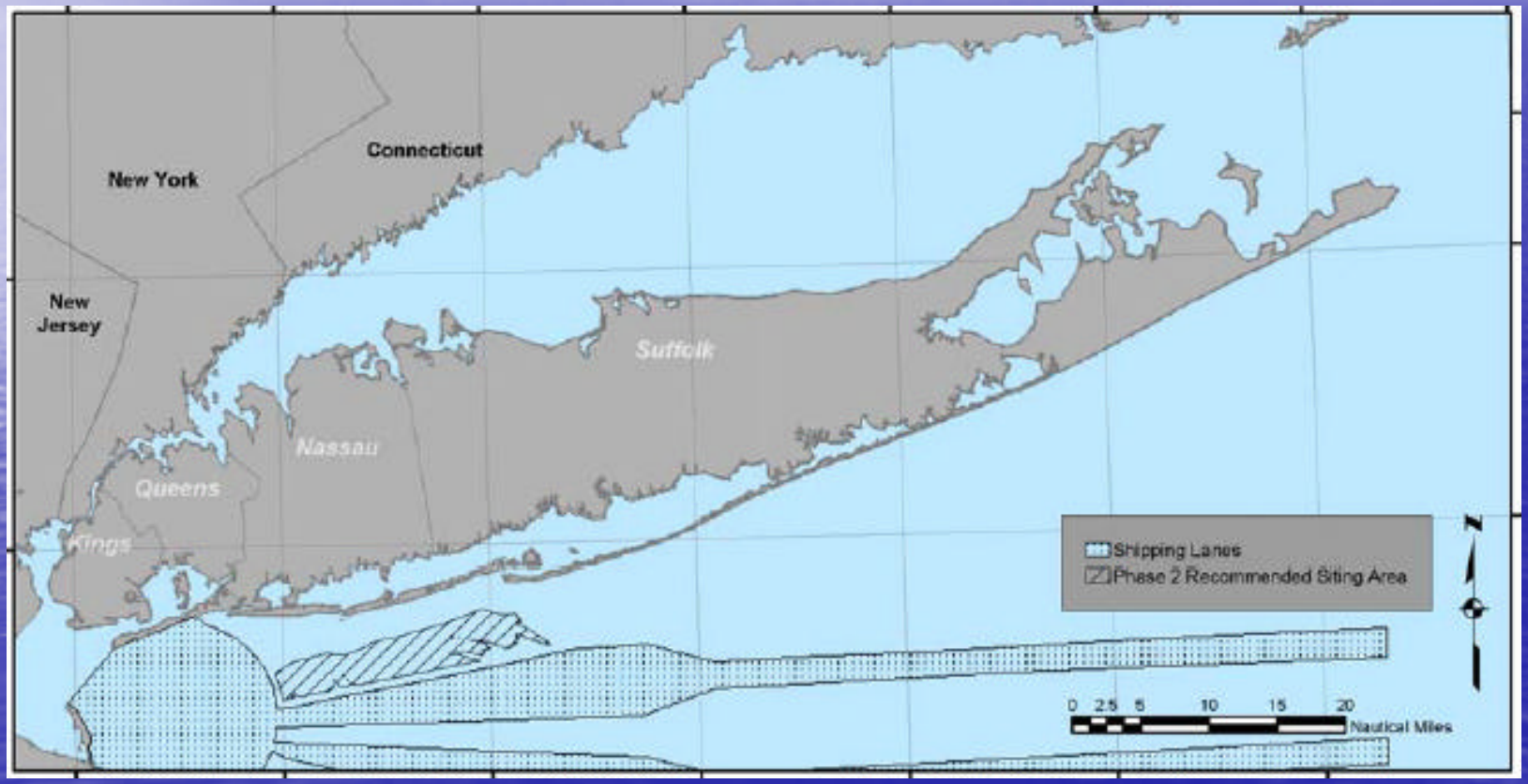
Phase II - Shipping Lanes



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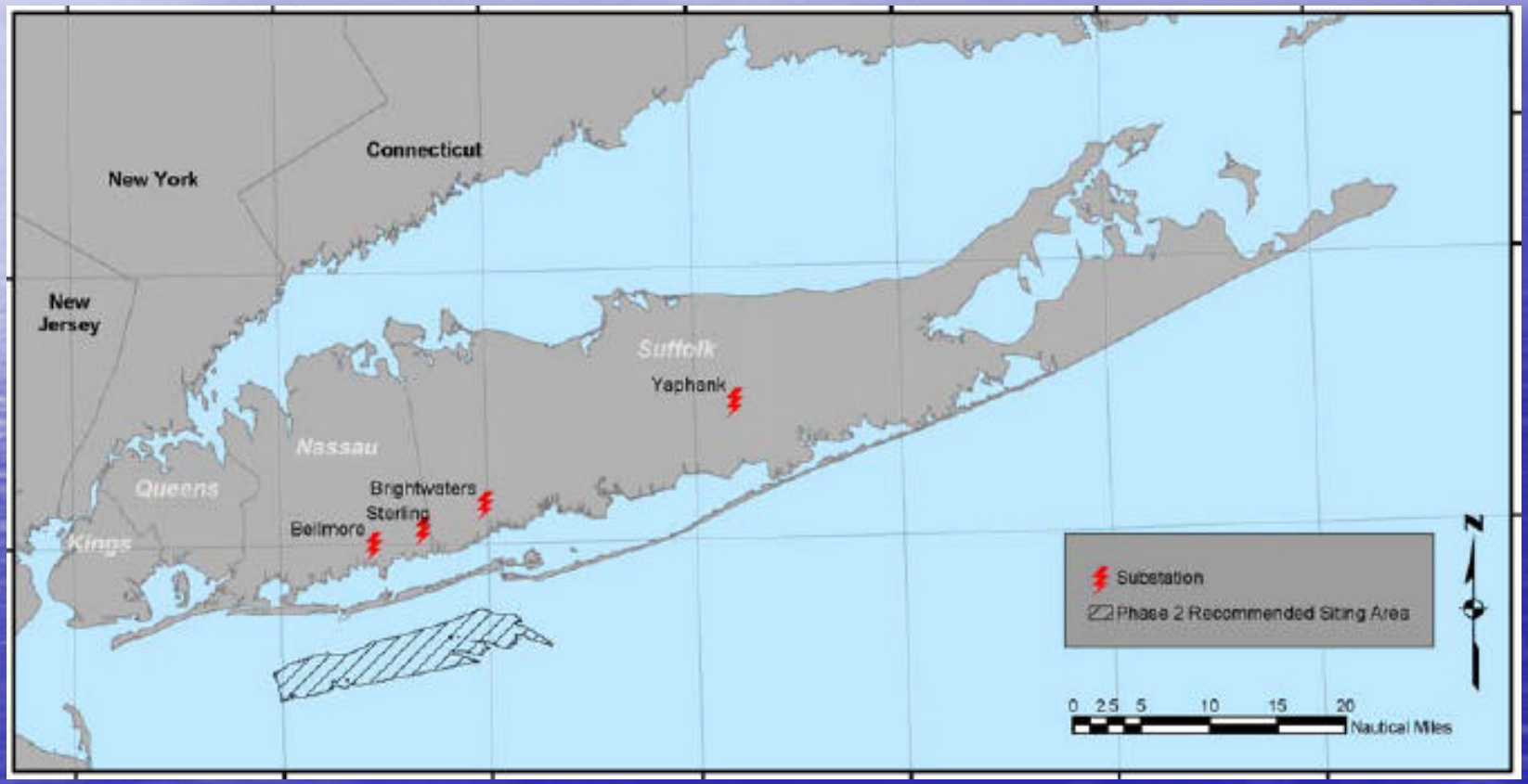
Phase II – Grid Interconnection



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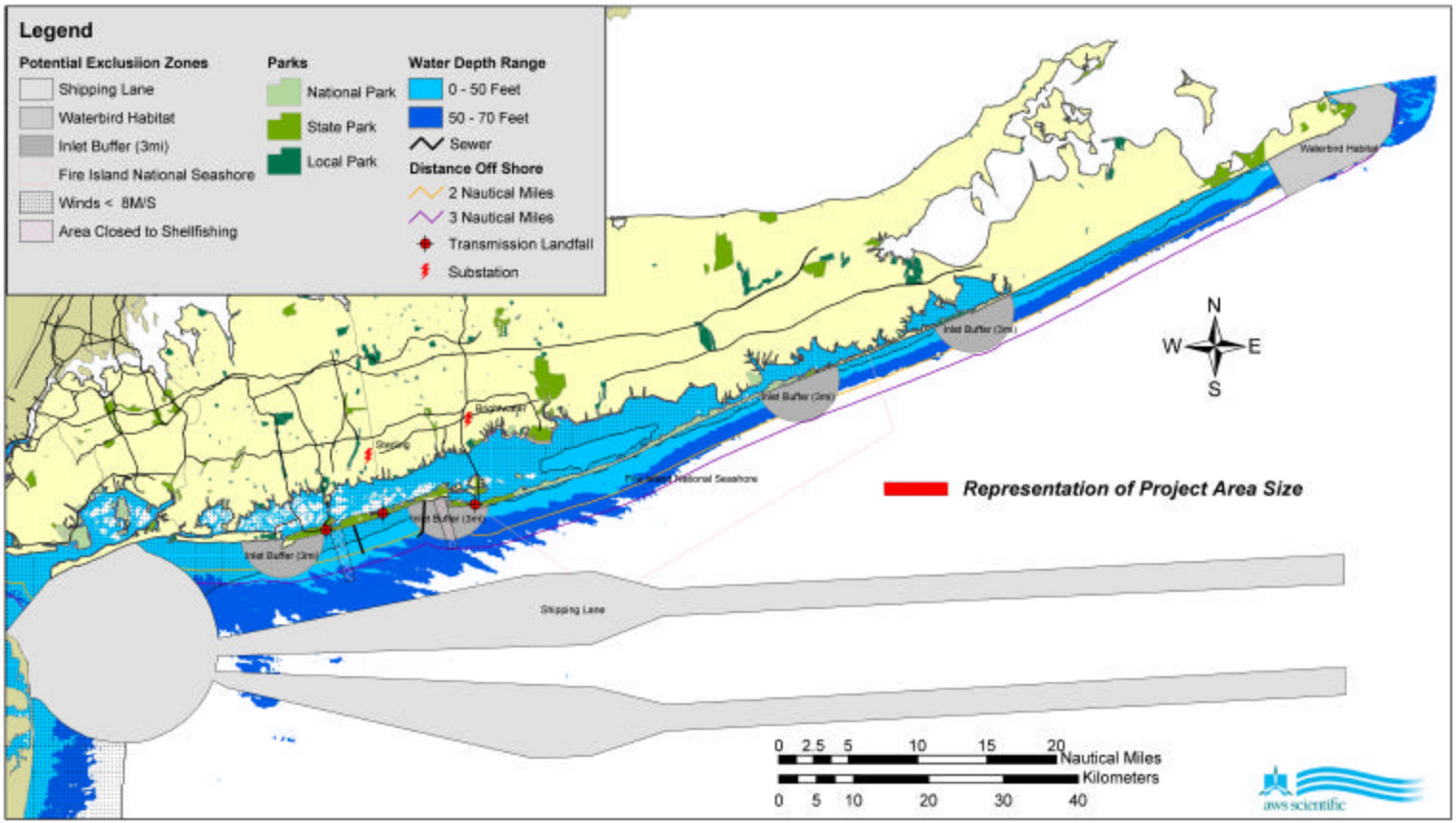
Phase II – Site summary



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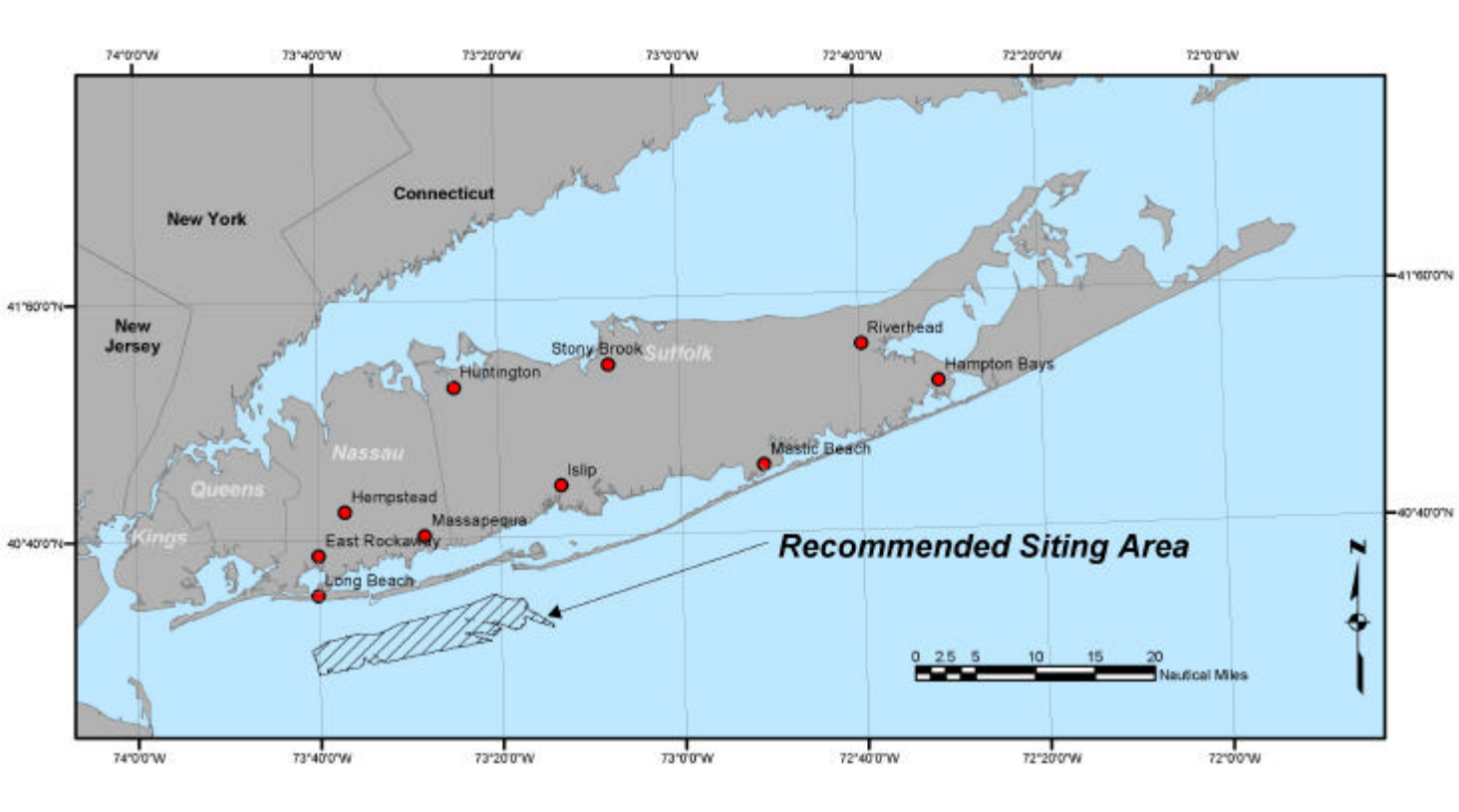
Recommended Siting Area



Total area size 52 sq. nautical miles
Median water depth 59.5 feet

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Why The Recommended Area?

- Shallow water depths extend farther from shore
- Desirable minimum wind speed (> 18 mph)
- Visual impacts minimized
- Proximity to substations - 100 to 140 MW new generation
- Avoids migratory bird flyways & sensitive habitat
- Other considerations: fishing, artificial reefs, archeological sites,shipwrecks/obstructions

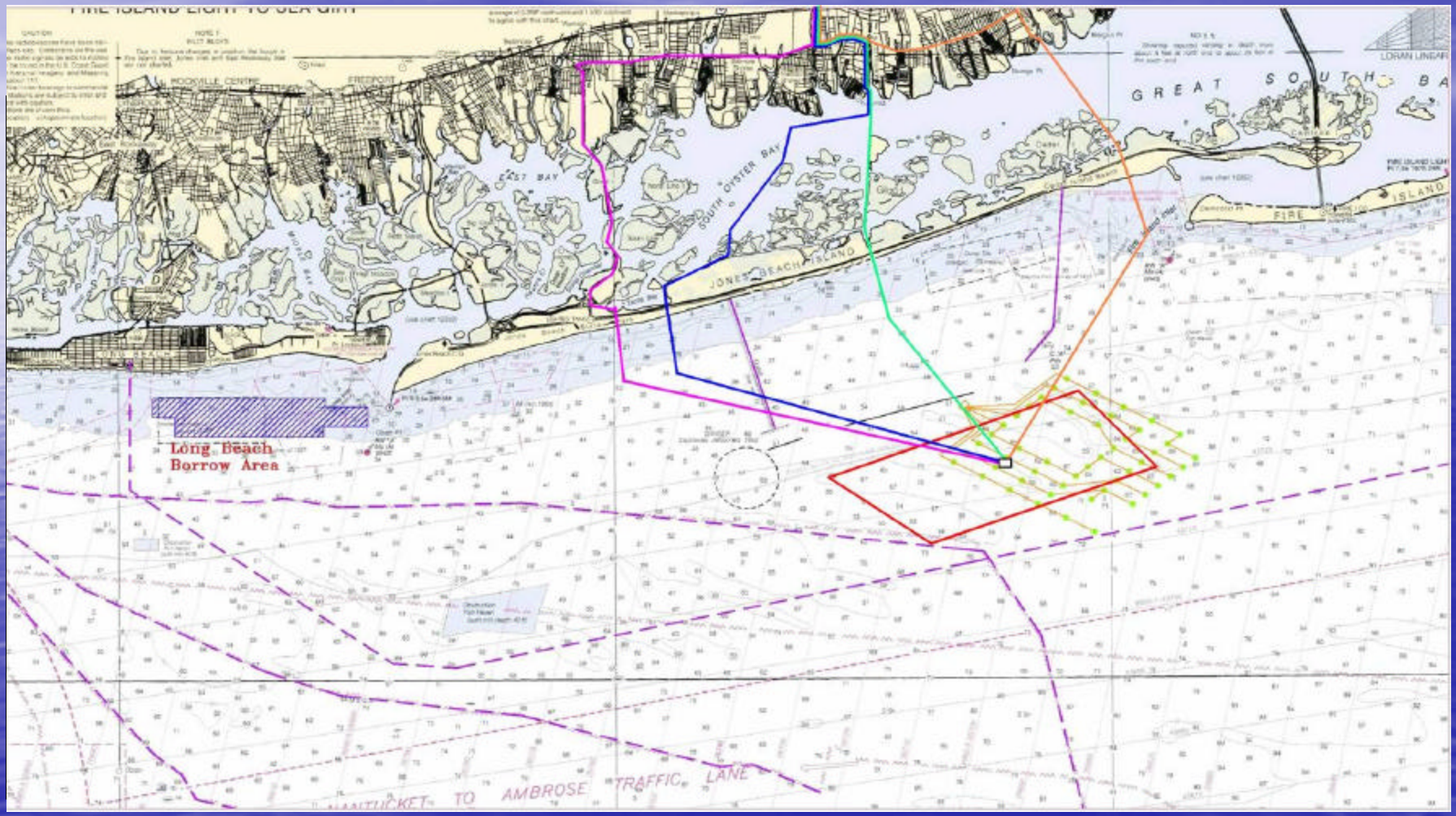
Typical Offshore Components

- Turbine: 2 to 4 MW each
- Tower: height >200 ft
- Spacing: 1/3 – 1/2 mile
- Rotor diameter: 250-350 ft
- 8-21 rotations per minute
- Monopile or other design
- Offshore substation
- Submarine cable

Project Responsibilities

- Developer will construct, own, operate and maintain the 140 MW project
- LIPA will provide underground transmission cable
- LIPA to purchase 100% Electricity output through a long-term power purchase agreement

Current Proposed Wind Farm Layout



Wind Project area about 8 sq. nautical miles
Cluster design 3 miles southwest of Robert Moses State Park

Environmental Review Process

Project is expected to be subject to rigorous environmental & public review by many different entities, including but not limited to the following:

US Army Corps of Engineers
US Coast Guard
US Fish and Wildlife Service
National Ocean & Atmospheric Administration
NYS Department of Environmental Conservation
NYS Public Service Commission
NYS Office of Parks, Recreation & Historic Preservation
and others.....

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Long Island Benefits

- Electricity for 42,000 Long Island homes
- Output reduces summer peak load demand
- Environmentally friendly energy resource
- Power produced stays on Long Island
- Create local Jobs and Tourism
- *Annual emission reductions:*

  - **sulfur dioxide – 1,225 tons**
  - **nitrogen oxide – 440 tons**
  - **carbon dioxide – 303,000 tons***

carbon dioxide reduction equates to over ½ billion vehicle miles driven

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Solicitation Plan

LIPA envisions commercial operation of the 140 MW offshore wind power facility during 2007 – 2008 .

Long Island Offshore Wind Initiative

Wind Partners

- Citizens Advisory Panel
- Citizens Campaign for the Environment
- LI Neighborhood Network
- EarthSave Long Island
- Environmental Advocates of NY
- Natural Resources Defense Council
- National Collegiate Clean Energy Initiative
- NY Public Interest Research Group
- Pace University
- Greenpeace
- Renewable Energy Long Island
- Sustainable Energy Alliance **- coalition of over 30 environmental, civic and faith-based groups**


Long Island Offshore Wind Initiative
For Reports & Information:
www.lioffshorewindenergy.org

NY Public Service Commission Article VII

Required to construct a new electric transmission line of a design capacity of 125 kV or more extending a distance of one mile or more, or to construct a new transmission line greater than 100 kV or less than 125 kV, extending a distance of ten miles or more.

PSC issues Certificate of Public Need and Environmental Compatibility after a series of public hearings and submittal by Developer of numerous detailed supporting documents.

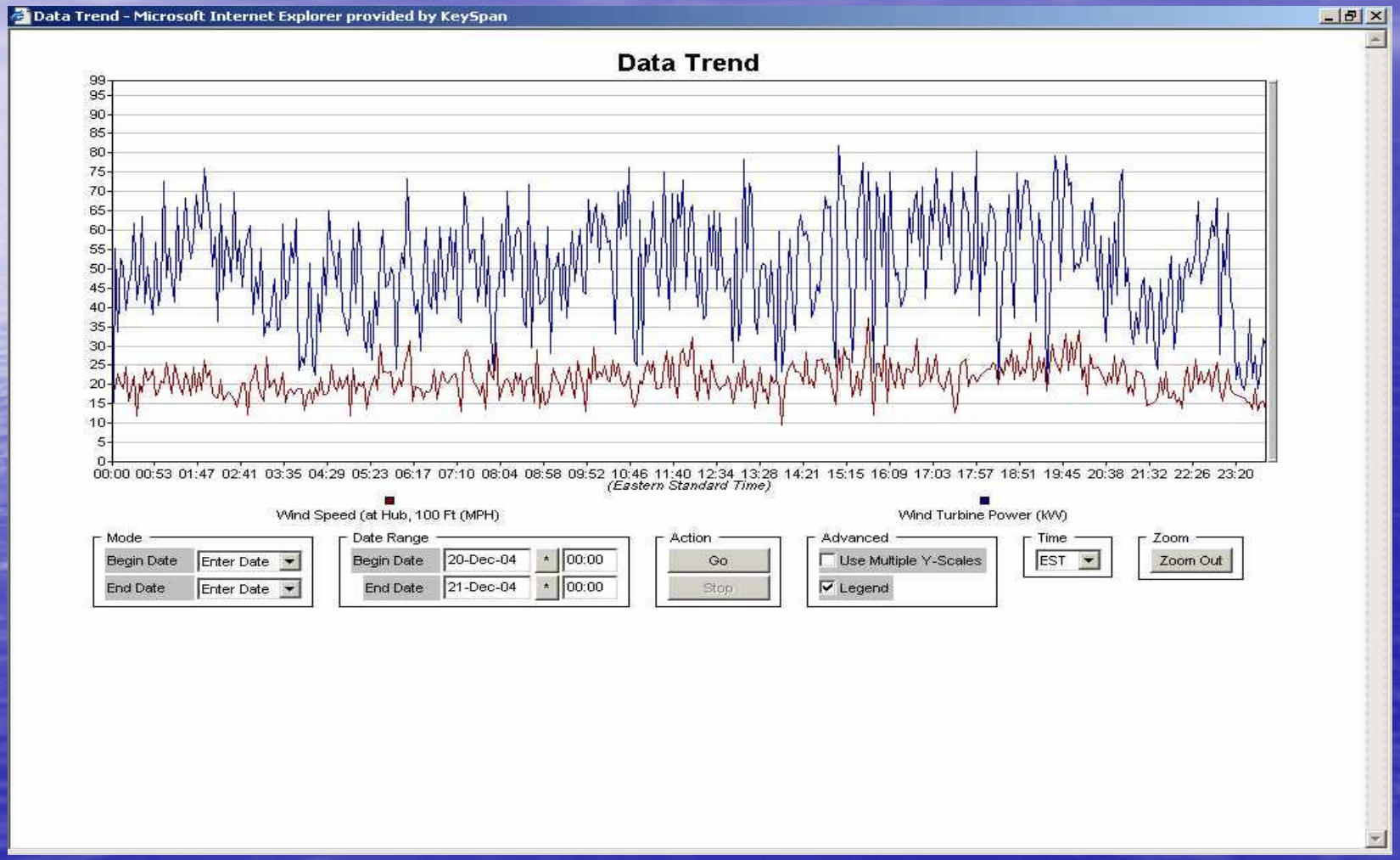
Operational issues still to be addressed:

- Wind is not dispatchable.
- Issues of scheduling wind output in NYISO environment.
- System resource allocation planning incorporating wind output.
- Large Turbine technology is improving-
  - Ability to produce or absorb VARs
  - Ability to smooth out effect of gusting winds

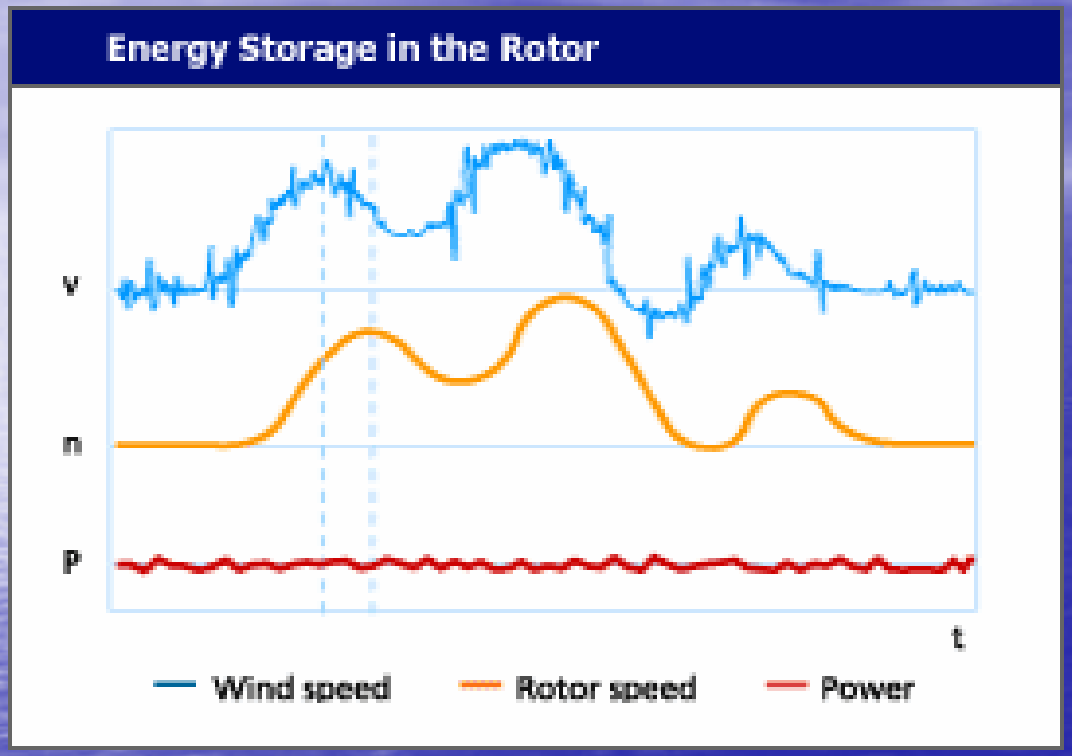
Initial Operational Issues Identified by NYISO

- Voltage regulation at the Point-of-Interconnection, with a guaranteed power factor range.
- Low voltage ride-through.
- A specified level of monitoring, metering, and event recording.
- Power curtailment capability.

Actual Performance Curve of 50 kW AOC Wind Turbine in Calverton
Directly coupled induction generator

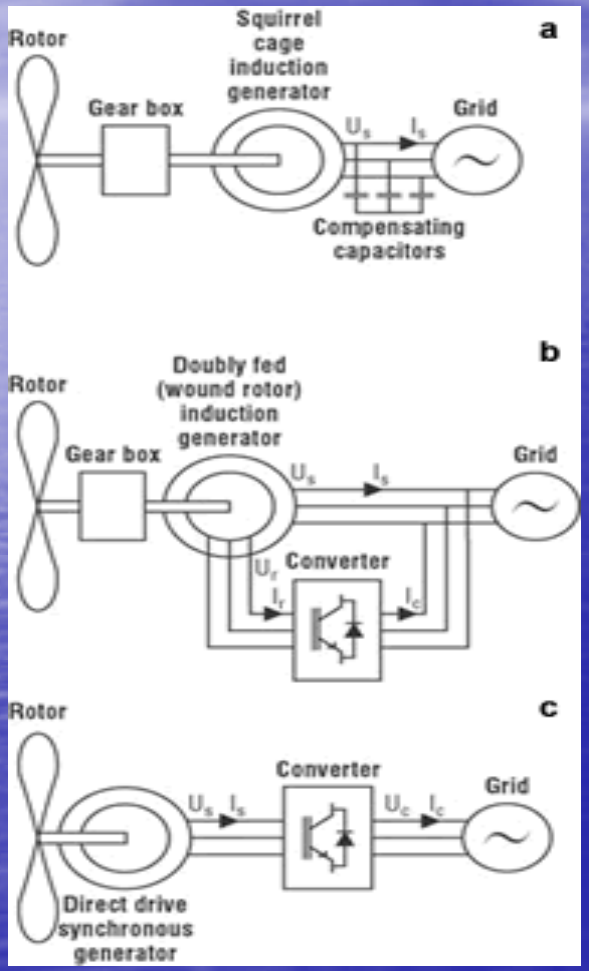


Power output regulation utiliizing active controls



Source: GE 3.6 MW Offshore Turbine Sales Literature

GE 3.6 MW Turbines Arklow Bank, Ireland



In a **variable speed turbine** with doubly fed induction generator, the converter feeds the rotor winding, while the stator winding is connected directly to the grid. The electrical rotor frequency can be varied by this converter (AC-DC-AC), thus decoupling mechanical and electrical frequency and making variable speed operation possible. In a variable speed turbine with direct drive synchronous generator, the generator and the grid are completely decoupled by means of a power electronic converter, also allowing variable speed operation.

Resources for Additional Information:

LIPA– www.lipower.org

LI Offshore Wind Initiative - www.lioffshorewindenergy.org

National Renewable Energy Laboratory – www.nrel.gov/wind

Utility Wind Interest Group - www.uwig.org

American Wind Energy Association – www.awea.org

AWS Truewind – www.awstruewind.com
New York state wind resource map

GE Wind – www.gewindenergy.com

Vestas - www.vestas.com/uk/Home/index.asp