

# Offshore Wind Energy

February 18, 2010

Leslie Garrison, Bluewater Wind



# Bluewater Wind overview

## Overview

- Leading offshore wind developer
  - 238 MW contracted under long term PPAs with Delmarva and DEMEC (only offshore wind PPAs in the U.S.)
  - 350 MW preferential development right and \$4 MM met tower rebate in New Jersey
  - Over 3,300 MW in other development
- Dedicated team of 10 employees plus over 20 consulting firms and vendors

## Significant milestones

- **June 2008:** Received first U.S. offshore PPA with Delmarva over 2 conventional generation proposals
- **July 2008:** Began lease and permitting process for 2 met towers
- **Jan. 2009:** Secured \$4 MM met tower rebate in NJ
- **June 2009:** Received 2 met tower leases for NJ and DE projects
- **November 2009:** NRG Energy buys Bluewater Wind

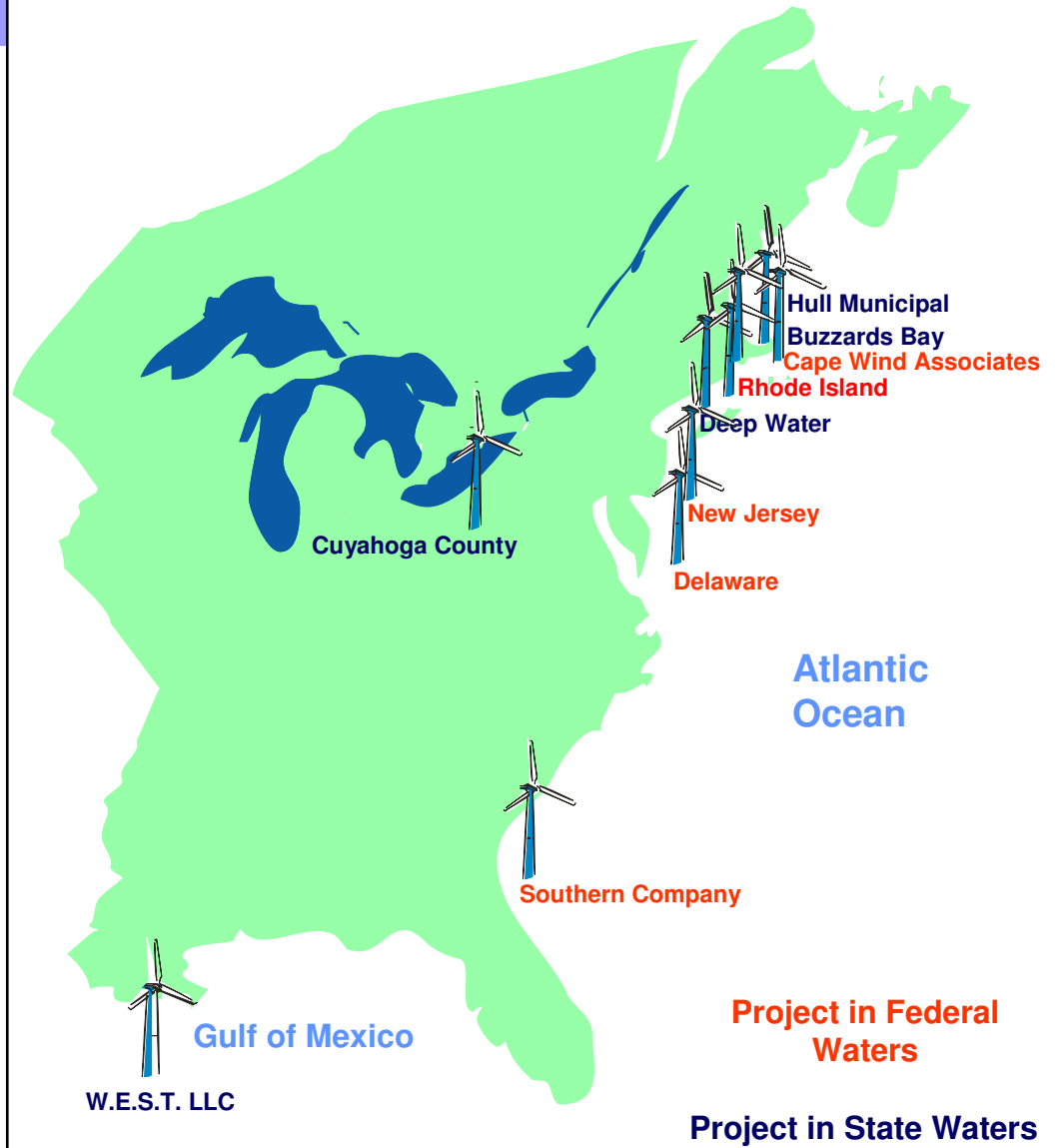
# European offshore wind experience

- 18 years experience with offshore wind projects
  - 48 wind parks totaling 2,134 MW in 8 countries
  - 2,604 MW in construction - 14 wind parks
- Leaders: Denmark, UK, Netherlands, Sweden
  - Over 2,000 MW permitted in the UK
  - 25,000 MW goal in Germany
  - UK Round 3: 34,000 MW awarded



## North America Announced Projects

Project	State	MW
Cape Wind	MA	420
Hull Municipal	MA	15
Buzzards Bay	MA	300
New England	RI, MA	400-850
NYPA Great Lakes	NY	500
NYPA, LIPA, Con Ed, EDC, MTA	NY	+/- 700
NJBPU	NJ	1,050
Bluewater Wind	DE	238-458
Southern Company	GA	10
W.E.S.T.	TX	150-300
Deepwater	RI	+/- 400
Canada, Ontario	ON	500+
Cuyahoga County	OH	20+
<b>TOTAL MW</b>		<b>4,328 – 5,148</b>



# Five Pillars Developing Offshore Wind

- Wind Resource
- Site Control/Access
- Permits
- Interconnection to Grid
- Buyer of Energy

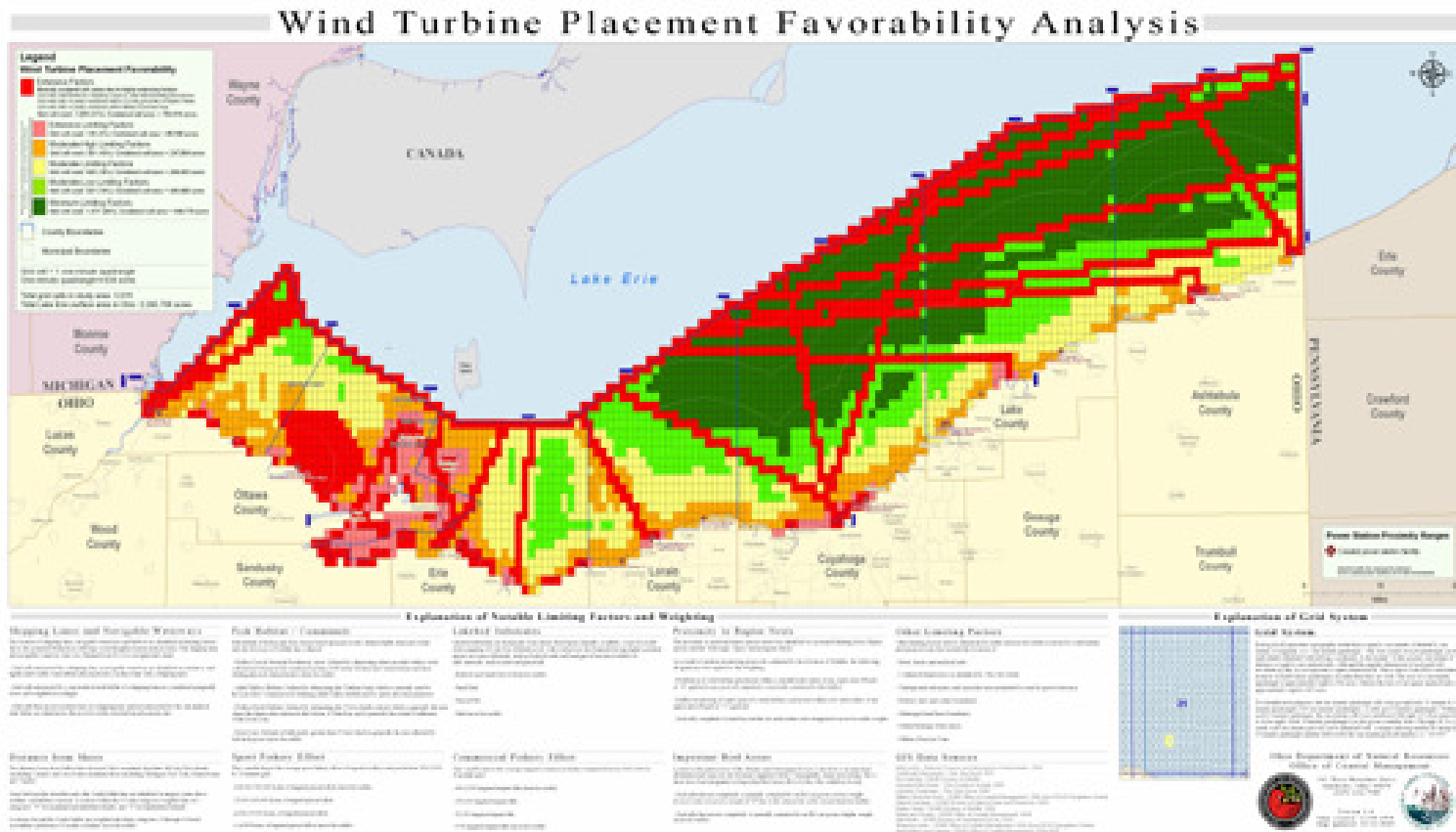
# 1) Investigating the Wind Resource

- Meteorologists use data from NOAA buoys and satellites to pre-screen a site's wind resource
- Meteorological towers installed to obtain highly accurate production estimates required for financing

## 2) Site Control & Access

- Fatal flaw analysis is conducted to identify environmentally sensitive areas, shipping lanes, and other constraints
- An application is filed with RTO to obtain a queue position
- OCS - Developers file application with MMS to obtain OCS lease block(s)
- Great Lakes - Developers file application with the state to obtain submerged land lease(s)

# 2) Site Control & Access





# 3) Permitting

- Department of Interior; Minerals Management Service (MMS)
  - Regulations issued on Earth Day 2009
- Developers anticipate a 2 + year permitting period for state and federal permits
  - Early and frequent communication with regulators and the community
- 5 Met tower leases issued nation-wide June 09
  - BWW New Jersey
  - BWW Delaware
  - Installation will be in Spring/Summer 2010

# 3) Permitting Studies

## *Environmental*

- Avian studies
- Marine biological studies (mammals, finfish turtles, shellfish)
- Benthic and fisheries habitat assessment
- Water quality studies
- Interconnection : Wetlands and protected areas

## *Social*

- Cultural surveys
- Navigation, Military Radar, and FAA studies

# 3) Permitting Process

## Federal, State & Local Approvals

### Federal Regulations and Reviews

- Energy Policy Act 2005
- Coastal Zone Management Act of 1972
- Rivers and Harbors Acts of 1890 and 1899
- Clean Water Act of 1977
- Navigation and Navigable Waters
- Federal Aviation Administration
- National Environmental Policy Act
- Archaeological and Historic Preservation Act of 1974
- Fish and Wildlife Coordination Act of 1958
- Endangered Species Act of 1973
- Estuary Protection Act
- Marine Protection, Research, and Sanctuaries Act
- US Coast Guard
- Marine Mammal Protection Act
- Magnuson-Stevens Conservation and Management Act
- Migratory Bird Treaty Act
- Abandoned Shipwreck Act
- Approval for Private Aids to Navigation

### State Regulations, Permits & Approvals

- DNREC- State Environmental Review (associated with EPA)
- Coastal Federal Consistency Certification
- Subaqueous lands permits and leases
- Wetlands permit
- Section 401 Water Certification
- NPDES Storm Water Permit
- Air Quality Permits
- DNREC- Div. of Fish and Wildlife
- DNREC- Div of Parks and Recreation
- Beach Preservation Act of 1972
- Delaware PSC
- DE River Basin Commission
- DE Heritage Commission
- DE Economic Development Office
- DE Energy Office
- DeIDOT

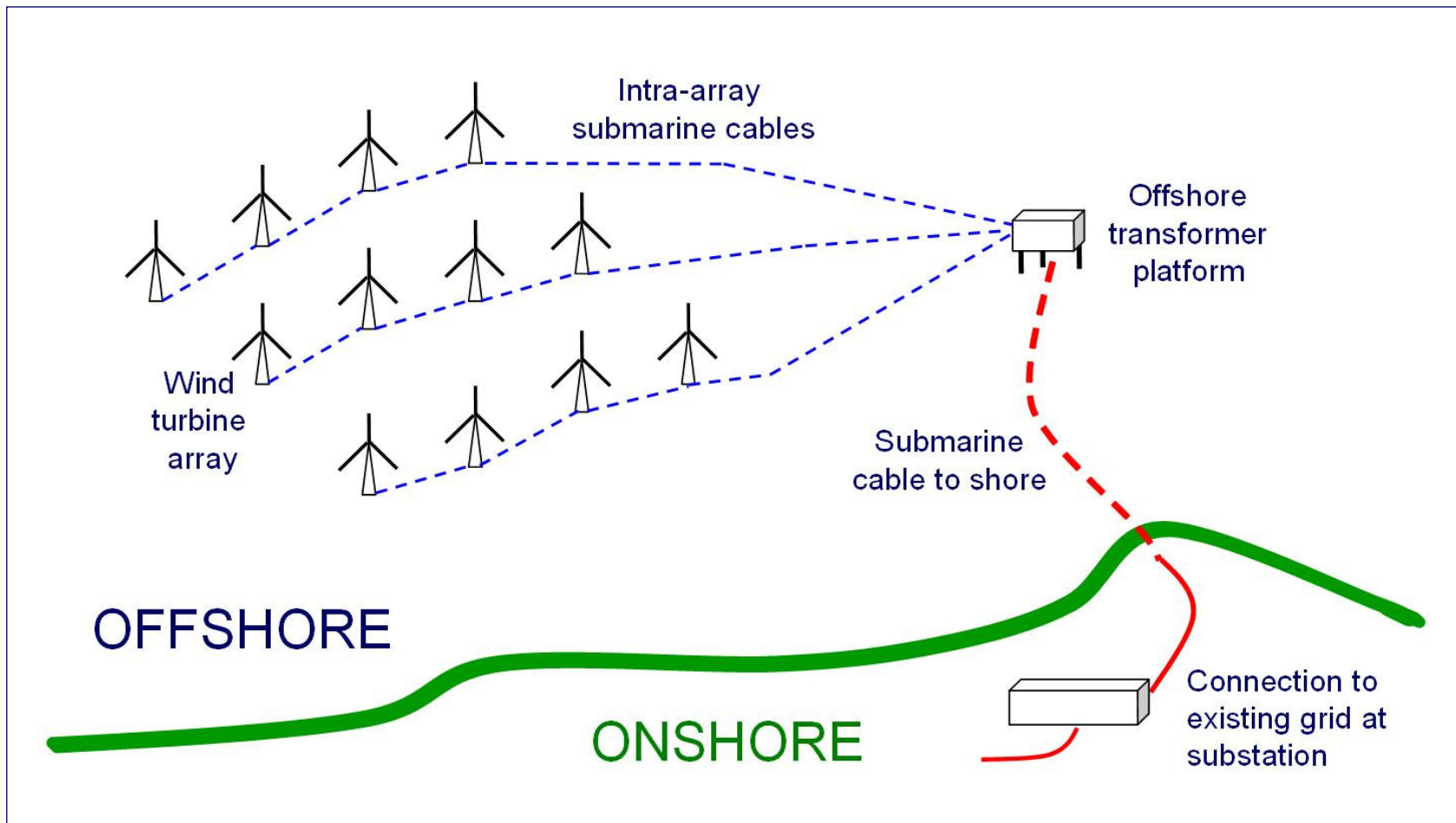
### Local Authorities

- To be participant in NEPA/State review
- Municipalities with potential visible impacts
- Local communities transited by onshore cable route
- Building permits as required

## 4) Interconnection to Grid

- Developers do initial feasibility analysis of electrical issues, identify power substations along the coast where energy can be injected into the grid with minimal infrastructure upgrades
- Multiple studies are completed by PJM/MISO to determine grid upgrades and the costs of the upgrades
- Developers work with communities and regulators to obtain acceptance and permits

# Offshore electrical design



# 5) Buyer of Energy

- Developers required to pre-sell power and Renewable Energy Credits by equity and debt investors
- States have differing approaches to encouraging renewable energy development
  - Delaware - PPA for long-term contract
  - New Jersey - Carve out for offshore RECs (ORECs)
  - Maryland - Solicitation to supply government facilities
  - New York - RFPs for offshore wind energy announced from public power authorities, utility in PPP
  - Ontario - European-style Feed-In Tariff, preference to interconnect, expedited permits

# Offshore Market Drivers; Leveling Energy Playing Field

- Strong RPSs established in Coastal States
- National RPS likely
- RGGI - regional carbon price; ongoing auctions
- National cap-and-trade legislation
- EPA carbon regulation likely
- Life cycle benefit/cost accounting frames debate
- Aging coal & nuclear plants not easily replaced

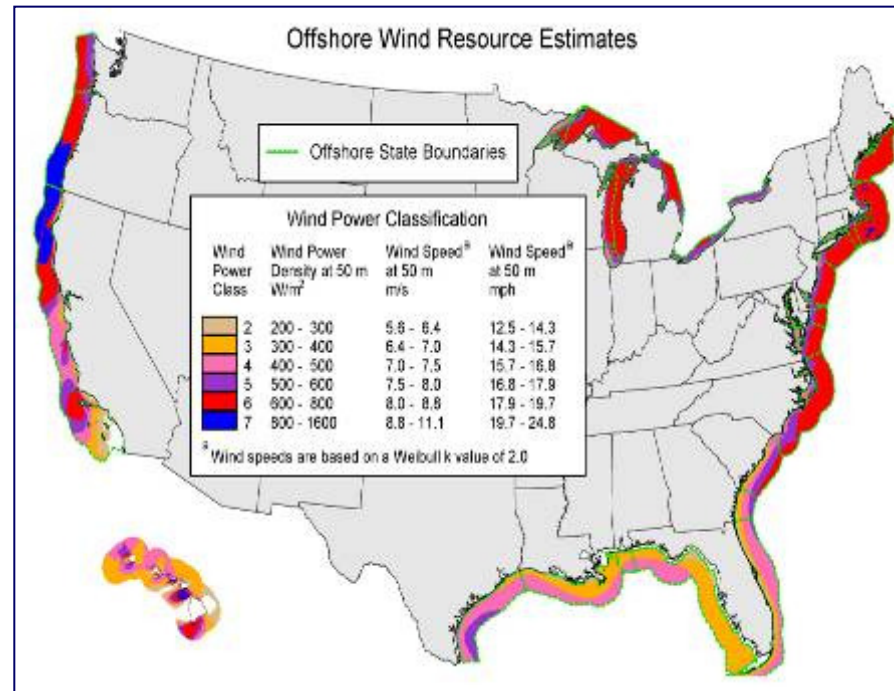
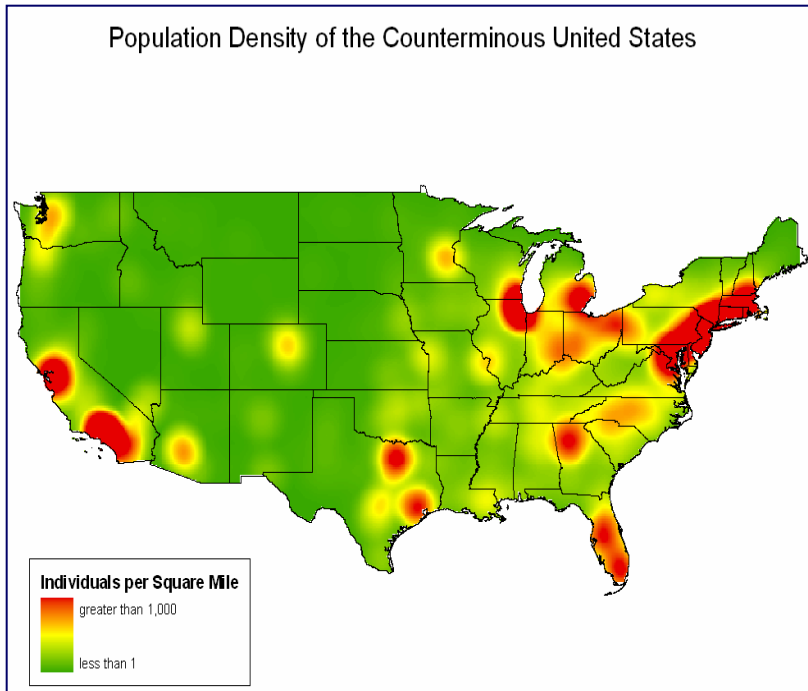
# Additional Offshore Drivers

- Offshore Resources
  - Stronger, more consistent winds near load centers
  - Decreased access to high wind land-based sites
  - Fewer wildlife barriers far offshore (avian and bat)
  - Can be developed far offshore - reducing NIMBYism
- Market Signals
  - Clean Tech Green Jobs Incentives, Federal & State
  - Volatile and increasing fossil fuel prices
  - Climate change considerations
  - Emissions reduction requirements
  - Economies of scale; investors want bigger projects



# Supply Aligned With Demand

28 of coastal states use 78% of the electricity in the U.S.



# Environmental Benefits

- No contribution to climate change / global warming
- No air pollution (SO<sub>2</sub>, NO<sub>x</sub>, PM, mercury)
- No water pollution or ocean acidification
- No CO<sub>2</sub>
- No waste
- No fuel deliveries
- No mining or drilling
- No intake/discharge of water for cooling
- No land use for generation equipment
- No noise pollution
- Promotes commercial & recreational fishing with artificial reefs created by foundations

# Offshore Wind Displaces Fossil Fuel Electricity & Pollution

Pollution avoided per year from a  
450 MW offshore wind park

CO<sub>2</sub> (lbs) 1.35 billion

SO<sub>x</sub> (lbs) 14.4 million

NO<sub>x</sub> (lbs) 5.17 million

Source: Analysis based on data provided in 'Assessment of Delaware Offshore Wind Power', University of Delaware. Dhanju, Whitaker, Burton, Tolman, and Jarvis. September 2005.

# Offshore Wind: The Green Economy Generator

- Immediate jobs can be created to lay the foundation for this industry:
  - Electric grid upgrades
  - Port upgrades
  - Vessel construction: 7,725 jobs created from 3 vessels  
\$378 Million in personal income increase  
\$910 Million in business activity
  - Turbine equipment manufacturing
- Project jobs in 2-3 years; Delaware focused on job creation and training

# Met Tower Installation

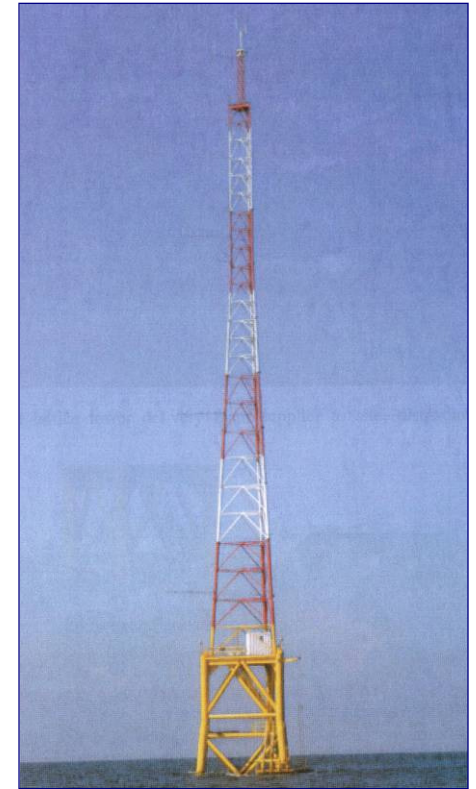
## Met Tower Designs



Cape Wind



Horns Rev



W.E.S.T.

# Turbine Installation Vessels

## Self-propelled and Jack-up



# Turbine Installation Vessels

## Turbine Parts on Installation Vessels



# Staging Port Development

## Receive and Pre-Assemble Components



Scroby Sands, Source: [www.2004ewec.info](http://www.2004ewec.info)



# Thank You

Leslie Garrison

201.841-7690

[leslie@bluewaterwind.com](mailto:leslie@bluewaterwind.com)

