Bluewater Wind is a developer of offshore wind energy committed to bringing clean, reliable and affordable electricity to New York, Delaware, Maryland, New Jersey, New England and the Great Lakes.
Offshore Wind Works

- Offshore wind parks: 30 in 10 countries
- Operational since 1991
- Current installed capacity: 1,493 MW
- Global wind total: 120,000 MW+, equals over 35 million homes; US total today over 7 million homes powered by wind
- 2,479 MW of offshore under construction
- Over 20,000 MW in permitting offshore Europe
### US Offshore Wind Estimates

<table>
<thead>
<tr>
<th>Project</th>
<th>State</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Wind</td>
<td>MA</td>
<td>420</td>
</tr>
<tr>
<td>Hull Municipal</td>
<td>MA</td>
<td>15</td>
</tr>
<tr>
<td>Buzzards Bay</td>
<td>MA</td>
<td>300</td>
</tr>
<tr>
<td>New England</td>
<td>RI, MA</td>
<td>400-</td>
</tr>
<tr>
<td>NYPA, LIPA, Con Ed, EDC, MTA</td>
<td>NY</td>
<td>700+</td>
</tr>
<tr>
<td>New Jersey (BPU)</td>
<td>NJ</td>
<td>1000</td>
</tr>
<tr>
<td>Bluewater Wind</td>
<td>DE</td>
<td>+/-360</td>
</tr>
<tr>
<td>Southern Company</td>
<td>GA</td>
<td>10</td>
</tr>
<tr>
<td>W.E.S.T.</td>
<td>TX</td>
<td>150-300</td>
</tr>
<tr>
<td>Cuyahoga County</td>
<td>OH</td>
<td>+/-20</td>
</tr>
</tbody>
</table>

**Total MW**: 3375 to 3975
Great Lakes Opportunities
Ohio  Michigan  Wisconsin  New York

• These 4 Great Lake states are actively pursuing offshore wind opportunities. Their governors and state legislatures are working with developers such as Bluewater and consultants to study the development potential. The Great Lakes Wind Collaborative has already estimated thousands of MW of offshore potential.

• Sites adjacent to significant load centers
• Suitable water depth - potential visibility issues
• Ice floe/increased cost of foundations but ice blocking design in marketplace
# The Bluewater Wind Team

One or more members have participated in the development of 23 of the world’s 30 offshore wind parks

<table>
<thead>
<tr>
<th>Category</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind turbine</td>
<td>Repower/Siemens/Multibrid/Vestas</td>
</tr>
<tr>
<td>EPC Contractor</td>
<td>Fluor</td>
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<tr>
<td>Owner’s Engineer</td>
<td>Ramboll</td>
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<tr>
<td>Permitting</td>
<td>Tetra Tech</td>
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<tr>
<td>Offshore Electrical Engineering</td>
<td>SEAS</td>
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<tr>
<td>Interconnection/Onshore Electrical Engineering</td>
<td>Energy Initiatives Group</td>
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<tr>
<td>Electrical Equipment Supply and Installation</td>
<td>ABB</td>
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<tr>
<td>Wind Resource Assessment</td>
<td>AWS Truewind</td>
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<tr>
<td>Wind Resource Assessment</td>
<td>Garrad Hassan</td>
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<tr>
<td>Wind Resource Assessment</td>
<td>EMD</td>
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<tr>
<td>Marine Field Studies</td>
<td>Aqua Survey</td>
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<tr>
<td>Marine Field Studies</td>
<td>Ocean Surveys</td>
</tr>
<tr>
<td>Federal Regulatory Affairs</td>
<td>Hill &amp; Kehne</td>
</tr>
<tr>
<td>Insurance</td>
<td>Marsh</td>
</tr>
</tbody>
</table>
Bluewater Wind’s Five Pillars of a Wind Project

- Wind Resource
- Site Control / Access
- Permits
- Interconnection to Grid
- Buyer of Energy / Economics
Desired Qualities of an Offshore Wind Energy Site

- Avg. winds stronger than 18 mph
- Constructible water depths
- No significant water use conflicts
- Environmentally compatible areas
- Accessible transmission & ports
- Large available project area footprint
Important Drivers for Offshore Wind

• **Policy**
  - RGGI: 10 participating states, successful auctions
  - Increasing number of states with RPS requirements
  - Potential national RPS in 2009
  - Increasing costs of carbon-based technologies

• **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)

• **Market Signals**
  - Volatile fossil fuel prices
  - Climate change considerations; emissions reduction requirements
  - Economies of scale
Bluewater’s project portfolio includes the following RPS states:

- Delaware: 20% by 2019
- New Jersey: 22.5% by 2021
- New York: 25% by 2013
- Rhode Island: 16% by 2020
- Massachusetts: 15% by 2020

These states have little land-based wind potential or have considerable roadblocks to large land-based wind
Offshore Resources

Supply Aligned With Demand

28 of coastal states use 78% of the electricity in the US
Market Signals

The Future of Fossil Fuels?

- National stimulus legislation supports renewable energy development
- Volatility of fossil fuel prices = risk and unpredictability
- Emerging issue of national energy security: lessen imports by supporting domestic energy sources
- Global warming on political agenda
- Coal plants already being reconsidered/avoided
National Stimulus Legislation and the Hundred Days

- Congress passed Stimulus allowing on land wind industry to continue for next two years while traditional tax investors return to market
- Offshore Wind benefits if project has financial close by end 2010 and commissioned by end 2012
- Working on Energy Bill in Congress to extend 30% Treasury Grant for offshore wind beyond 2012
- Expanding the 85,000+ wind jobs in 2008
- Additional US component manufacturing due to stimulus and interest credit
- National RPS/RES likely in late 2009
- Electric grid: More lines, smarter system
National Economic Policies

• New industry of well-paying green collar, clean tech jobs (focus today)
• State and local economic stimulus: Cannot outsource wind development
• National energy security, reduce imports and improve balance of payments
• Stabilize electricity prices (was focus in 2006-2008)
20% of US Electricity from Offshore = 54,000 MW by 2030
Meeting the Goal

- Land-based wind annual growth rate, past five years: 30%
- Achieving offshore 54,000 MW by 2030: 23% annual growth rate
- 23% growth equals an average of 3,375 MW/year, assuming 2,000 MWs are installed by 2014
- Need to build approximately 16 US built and flagged installation vessels for 54,000 MW
Wind as Major Wedge in Carbon Reduction

• No single cure: Wind, solar, energy efficiency, transportation shift to hybrids and plug-in bi-directional electric vehicles

• Wind is only planet-wide, commercially viable, utility scale, non-proliferating electricity technology

• Project carbon footprint eliminated after operating 9 months

• Deep Green: wind and hydrogen replaces hydrocarbons or electric vehicle storage
Environmental Benefits

- No carbon contribution to global warming, ocean acidification
- No air pollution (SO2, NOx, mercury)
- No water pollution or sea level rise
- No CO2
- No waste
- No fuel deliveries
- No mining or drilling
- No intake/discharge of water for cooling
- No land use for generation equipment offshore
- No noise pollution
- Promotes recreational/commercial fishing with artificial reefs created by foundations
Health Benefits

Pollution avoided per year from a 450 MW offshore wind park

- CO$_2$ (lbs) 1.35 billion
- SO$_x$ (lbs) 14.4 million
- NO$_x$ (lbs) 5.17 million

- Health care costs of pollution: Real but hard to quantify

First US Offshore PPA

- 200MW signed 25-year PPA between Bluewater Wind & Delmarva Power
- Total Investor Revenue: $3.6 Billion
- Energy - $103.93/MWh (2009$)
- RECs - $15.23/MWh plus REC multiplier
- Capacity - $70.23/kW year
- 2.5% annual inflation adjustor on energy, RECs, and capacity
- 70 cents - average monthly customer cost impact (PSC analysis, real levelized 2007$)
Supporters of the Bluewater Delaware Wind Park

- Vice President Joe Biden
- US Senator Tom Carper
- Lt. Governor John Carney
- Delaware Treasurer Jack Markell
- Delaware Insurance Commissioner Matthew Denn
- Delaware Municipal Electric Corporation
- Citizens for A Better Sussex
- Citizens for Clean Power
- Coalition for Climate Change Study and Action
- Delaware Audubon Society
- Delaware Building & Construction Trades Council
- Delaware Nature Society
- Endecon, Inc.
- Epworth United Methodist Church
- Green Delaware
- League of Women Voters
- Natures Path of Integrated Health
- News Journal Editorial Board
- Delaware Chapter of Sierra Club
- Society of Natural History
- St. Andrews School
- Unitarian Universalists of Southern Delaware
- City of Dover
- City of Lewes
- City of Milford
- City of New Castle
- City of Newark
- City of Seaford
- Town of Clayton
- Town of Middletown

bluewaterwind.com
# Approval Process

## Federal, State & Local Reviews

### 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
- Magneson-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
- DelDOT

### 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

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[BluewaterWind](https://bluewaterwind.com)
Wind as an Economic Driver: The Delaware Example

- $1.6 Billion investment (450 MW park)
- $200+ million direct economic impact for Delaware
- State-wide economic development: Delaware as offshore staging hub
- Brings up to 500 construction and up to 80-100 O&M jobs to Delaware
- Brings large contracts to Delaware ports
  - Construction
  - Operations and Maintenance
- Wind technician training at DelTech
- Delaware union jobs
- New businesses locate in places where electricity is affordable and stable-priced
- Increased tourism by 2.5% (University of Delaware)
Lessons From Delaware Success

- Engage the public early and often:
  - Identify all stakeholders
  - Educate, educate, educate
  - Honest and transparent communication
  - Visualizations play a critical role in acceptance
Offshore Wind Park Layout

- Wind turbine array
- Intra-array submarine cables
- Offshore transformer platform
- Submarine cable to shore
- Connection to existing grid at substation
Met Tower Installation

Met Tower Designs

Cape Wind

Horns Rev
Permitting Studies

• Avian studies ongoing
• Marine biological studies (mammals, finfish, turtles, shellfish)
• Benthic and fisheries habitat assessment
• Water quality studies
• Cultural surveys
• Navigation and FAA studies
• Wetlands and other terrestrial systems
# Offshore Wind Turbine Suppliers

<table>
<thead>
<tr>
<th>Turbine Manufacturer</th>
<th>Turbine model &amp; rated power</th>
<th>Date of availability</th>
<th>Offshore Operating Experience</th>
</tr>
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<tbody>
<tr>
<td>Vestas</td>
<td>V90 - 3 MW</td>
<td>2004</td>
<td>Commercial</td>
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<tr>
<td>Siemens</td>
<td>SWT-3.6 - 3.6 MW</td>
<td>2005</td>
<td>Commercial</td>
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<td>Siemens</td>
<td>SWT-2.3 - 2.3 MW</td>
<td>2003</td>
<td>Commercial</td>
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<tr>
<td>Vestas</td>
<td>V80 - 2 MW</td>
<td>2000</td>
<td>Commercial</td>
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<td>RePower Systems</td>
<td>5M - 5 MW</td>
<td>2005</td>
<td>Offshore Demo 2006 Borkum West pilot</td>
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<tr>
<td>Multibrid</td>
<td>M5000 - 5 MW</td>
<td>2005</td>
<td>Onshore 2005 Borkum West Pilot</td>
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<tr>
<td>General Electric</td>
<td>GE - 3.6-MW</td>
<td>2003</td>
<td>Commercial inactive</td>
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<tr>
<td>Bard Engineering</td>
<td>VM - 5 MW</td>
<td>2008-09</td>
<td>Onshore prototype 2008</td>
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<td>Nordex</td>
<td>N90 - 2.5 MW</td>
<td>2006</td>
<td>Offshore Demo 2003</td>
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<tr>
<td>Clipper Windpower</td>
<td>Liberty 2.5 MW</td>
<td>NA</td>
<td>Not yet offshore ready</td>
</tr>
<tr>
<td>Clipper Windpower</td>
<td>Britannia 7.5 MW</td>
<td>NA</td>
<td>Drawing board</td>
</tr>
</tbody>
</table>

[bluewaterwind.com]
Installation Vessel Construction

• **Background**
  Turbine installation vessels are integral to offshore wind park construction as only they can lift components weighing hundreds of tons at a height of 100 meters above the water and place it accurately in each of four lifts over the course of two days.

• **Existing fleet**
  European regulatory regimes, particularly in UK & Germany, have spurred significant growth with over 1000 MW expected to be commissioned in the next five years. There are currently 24 vessels under development. The market for installation vessels will be a constraining factor on growth.
Special installation vessel
Provides stable work platform
Foundation Installation

Handling a Monopile

Source: RPS Energy Presentation
Sub-sea Electrical Cable Installation

Cable-laying Vessel at Work

Source: www.hornsrev.dk
Offshore Substation Installation
Lifting a Transformer Platform
Turbine Installation

Assembling a Tower and Lifting a Bunny Ear

Source: www.mammoetvanoord.com
Thank You

For more information contact:
Peter Mandelstam, Founder and President
201.748.5000
peter@bluewaterwind.com