Offshore Wind Works

- Offshore wind parks: 30 in 10 countries
- Operational since 1991
- Current installed capacity: 1,493 MW
- Global wind total: 125,000 MW+, equals over 35 million homes; US total today over 7 million homes powered by wind
- 2,497 MW of offshore under construction
- Over 20,000 MW in permitting offshore Europe
<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>MA</td>
<td>400-850</td>
</tr>
<tr>
<td>NYPA Great Lakes</td>
<td>NY</td>
<td>125+</td>
</tr>
<tr>
<td>NYPA, LIPA, Con Ed, EDC, MTA</td>
<td>NY</td>
<td>700</td>
</tr>
<tr>
<td>NJBPU</td>
<td>NJ</td>
<td>1,050</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>Deepwater</td>
<td>RI</td>
<td>400</td>
</tr>
<tr>
<td>Canada, Ontario</td>
<td>ON</td>
<td>500+</td>
</tr>
<tr>
<td>Cuyahoga County</td>
<td>OH</td>
<td>20+</td>
</tr>
</tbody>
</table>

**TOTAL MW**

4450 - 5050

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**Project in Federal Waters**

- Cape Wind
- Buzzards Bay
- Rhode Island
- Deep Water
- New Jersey
- Delaware

**Project in State Waters**

- Hull Municipal
- W.E.S.T. TX
- Canada, Ontario
- Cuyahoga County
Desired Qualities of an Offshore Wind 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 though turbines takes up only a few acres
Five Pillars of Developing an Offshore Wind Project

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

- Fatal flaw analysis is conducted to identify environmentally sensitive areas, shipping lanes, and other constraints
- An application is filed with PJM or NYISO to obtain a queue position
- Developers file application with MMS to obtain OCS lease block(s)
Permitting

- MMS regulations recently issued on Earth Day 2009
- Developers anticipate a 2 - 3 year permitting period for state and federal permits
  - Early and frequent communication with regulators and the community is preferred
  - Delaware is example
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 to determine grid upgrades and the costs of the upgrades.

- Developers work with communities and regulators to obtain acceptance and permits.
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
  - Maryland - Solicitation to supply government facilities
  - New York - RFPs for offshore wind energy announced from public power authorities: LIPA and NYPA in 2009
Offshore Market Drivers; Leveling Energy Playing Field

- Offshore avoids transmission challenges
- Coastal States RPS now meaningful numbers; national RPS likely in late 2009
- RGGI - carbon pays price; ongoing auctions providing $ for wind and energy efficiency
- National cap and trade legislation or EPA carbon regulation near certain
- Life cycle benefit/cost accounting frames debate
- Aging coal & nuclear plants not easily replaced
Supply Aligned With Demand

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

• Market Signals
  - Volatile and increasing fossil fuel prices
  - Climate change considerations; emissions reduction requirements
  - Economies of scale; Investors want bigger projects
Renewable Portfolio Standards
www.dsireusa.org / June 2009

WA: 15% by 2020*
MT: 15% by 2015
OR: 25% by 2025 (large utilities)
5% - 10% by 2025 (smaller utilities)
NV: 25% by 2025*
CA: 20% by 2010
AZ: 15% by 2025
HI: 20% by 2020

CO: 20% by 2020 (IOUs)
10% by 2020 (co-ops & large munis)*
KS: 20% by 2020
UT: 20% by 2025*
NM: 20% by 2020 (IOUs)
10% by 2020 (co-ops)
TX: 5,880 MW by 2015

MI: 10% + 1,100 MW by 2015†
OH: 25% by 2025†
IL: 25% by 2025
MO: 15% by 2021

MI: 10% by 2025 (Xcel: 30% by 2020)
WI: Varies by utility; 10% by 2015 goal
KS: 20% by 2020
UT: 20% by 2025*
MN: 25% by 2025
IA: 105 MW
WI: Varies by utility, 10% by 2015 goal

VT: (1) RE meets any increase in retail sales by 2012;
(2) 20% RE & CHP by 2017
NY: 24% by 2013
NY: 24% by 2013
MI: 10% + 1,100 MW by 2015†
OH: 25% by 2025†
IL: 25% by 2025
MO: 15% by 2021

MA: 15% by 2020
+ 1% annual increase (Class I Renewables)
RI: 16% by 2020
CT: 23% by 2020
DE: 20% by 2019*

ME: 30% by 2000
New RE: 10% by 2017
NH: 23.8% by 2025
NJ: 22.5% by 2021
PA: 18% by 2020†
NJ: 22.5% by 2021
MD: 20% by 2022
DE: 20% by 2019*
DC: 20% by 2020

29 states & DC
have an RPS
5 states have goals

Minimum solar or customer-sited requirement
Extra credit for solar or customer-sited renewables
Includes separate tier of non-renewable alternative resources
Canada Follows Europe: Feed-In Tariff

- Ontario Premier Dalton McGuinty has first North American Feed-In Tariff
- Ontario estimates 10,000 MW installed by 2015, leading to the creation of 50,000 new direct & indirect jobs in next 3 years
- All Public-Private tensions removed
- Feed-In has been market driver in Europe for last decade
- Market certainty attracts manufacturers from Europe to locate in Ontario
  - Ontario Feed-In Tariff enacted May 14, 2009
  - $190 Canadian/MWh (US $173)
## Revised Price Schedule

<table>
<thead>
<tr>
<th>Renewable Fuels</th>
<th>Capacity Range</th>
<th>Original Proposed Price (¢/kWh)</th>
<th>Revised Proposed Price (¢/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rooftop or Ground Mounted Solar PV</td>
<td>≤ 10 kW</td>
<td>80.2</td>
<td>80.2</td>
</tr>
<tr>
<td>Rooftop Solar PV</td>
<td>&gt; 10 kW ≤ 250 kW</td>
<td>71.3</td>
<td>71.3</td>
</tr>
<tr>
<td>Rooftop Solar PV</td>
<td>&gt; 250 kW ≤ 500 kW</td>
<td>63.5</td>
<td>63.5</td>
</tr>
<tr>
<td>Rooftop Solar PV</td>
<td>&gt; 500 kW</td>
<td>53.9</td>
<td>53.9</td>
</tr>
<tr>
<td>Ground Mounted Solar PV*</td>
<td>&gt; 10 kW ≤ 10 MW</td>
<td>44.3 (automatic depression)</td>
<td>44.3</td>
</tr>
<tr>
<td>On-shore Wind*</td>
<td>Any size</td>
<td>13.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Off-shore Wind*</td>
<td>Any size</td>
<td>19.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Waterpower *</td>
<td>≤ 10 MW</td>
<td>12.9</td>
<td>13.1**</td>
</tr>
<tr>
<td>Waterpower *</td>
<td>&gt; 10 MW ≤ 50 MW</td>
<td></td>
<td>12.2**</td>
</tr>
<tr>
<td>Biomass*</td>
<td>≤ 10 MW</td>
<td>12.2</td>
<td>13.8</td>
</tr>
<tr>
<td>Biomass*</td>
<td>&gt; 10 MW</td>
<td></td>
<td>13.0</td>
</tr>
<tr>
<td>Biogas *</td>
<td>≤ 500 kW</td>
<td>14.7</td>
<td>16.0</td>
</tr>
<tr>
<td>Biogas *</td>
<td>&gt; 500kW ≤ 10 MW</td>
<td></td>
<td>14.7</td>
</tr>
<tr>
<td>Biogas *</td>
<td>&gt; 10 MW</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Landfill gas *</td>
<td>≤ 10 MW</td>
<td>11.1</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 MW</td>
<td>10.3</td>
<td>10.3</td>
</tr>
</tbody>
</table>

*Eligible for Aboriginal or Community Adder

**Contract term for water power extended to 40 years
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
  - Turbine equipment manufacturing in NE states

- Project Jobs in 2-3 years; Delaware focused on job creation and training
Public-Private Partnerships: Delaware, New Jersey, and LIPA/Con Ed

- Delaware: 4 State Agencies (including DNREC) plus independent consultants resulted in transparent, competitive wind project
- Governor Jack Markell campaigned on offshore wind and economic development
- Full stakeholder involvement
- Environmental issues on public record
Positive Economic Impact for Delaware

- $1 Billion plus investment
- $200+ million direct economic impact for Delaware workers
- Regional 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 funded by Bluewater
- Project is full union job with Project Labor Agreement
- New Delaware businesses will locate where electricity is affordable and stable-priced
- Increased tourism by 2.5%  (University of Delaware)
Supporters of the Bluewater Delaware Wind Park

- Vice President Joe Biden
- US Senator Tom Carper
- Governor and Former Treasurer Jack Markell
- Unanimous state legislative approval
  - 21 senators and 41 representatives
- Delaware Insurance Commissioner Karen Welden Stewart
- Former Lt. Governor John Carney
- Delaware Municipal Electric Corporation (DMEC)
- 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
- 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
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
Public-Private Partnerships: New Jersey

- Developers filed proposals with NJBPU, March 08
- 3 Preferred Developers Selected: Bluewater, Deepwater, Fisherman’s
- Proposed OREC in lieu of PPA
- Governor Corzine’s Energy Master Plan: 1,000 MW by 2012; 3,000 by 2020
- $12 Million for 3 Met towers to promote development
- On-going State environmental baseline studies
New Jersey
Ocean Renewable Energy Credits

- ORECs similar to existing Solar RECs
- Developed to help finance projects in place of PPA
- Stakeholder process of 8+ months
- OREC rule anticipated to be final by end of Summer 09
Public-Private Partnerships: New York

- LIPA & Con Edison joint project, using strengths of both, April 09
- 700 MW off Long Island: likely PPA
- NY RPS increased by Governor Paterson to 30% renewables; NYSERDA expertise used
- NYPA Earth Day 09 Great Lakes RFEI/RFP: 125+ MW in fresh water, first ever
- Existing Long Island environmental studies as base
Marine Spatial Planning

- Offshore wind industry supports mapping critical habitats and conflicting uses:
  - Helpful to states to estimate potential economic development
  - Studying potential impacts can occur in parallel with environmental permitting
  - Slowing or stopping offshore development is counterproductive
Thank You

For more information contact:
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