

Offshore Wind Power
Mid-Atlantic Governor's Ocean Summit
New York June 4th, 2009

Peter Mandelstam, Chair, AWEA Offshore Wind Working Group



Offshore Wind Works

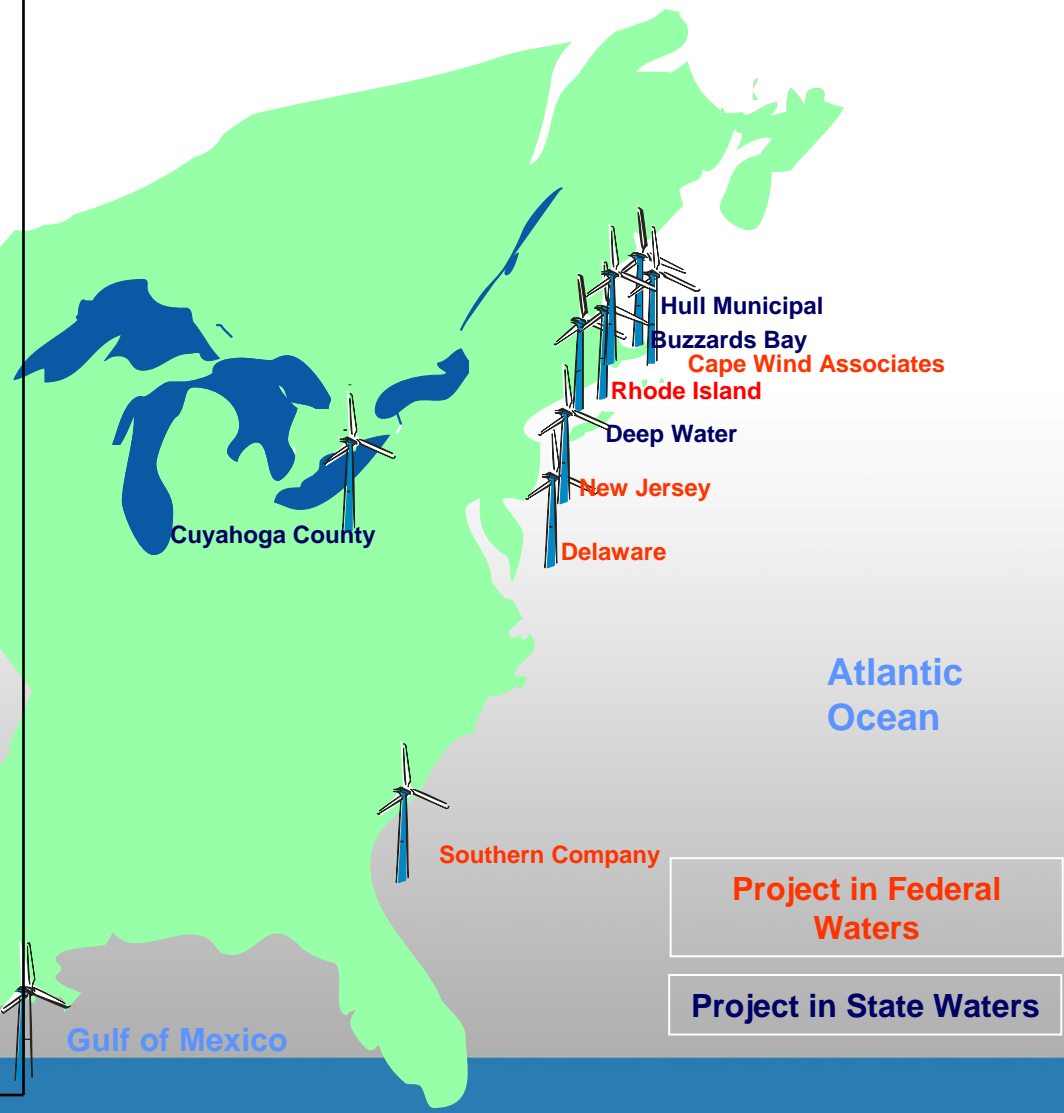
- Offshore wind parks: 30 in 10 countries
- Operational since 1991
- Current installed capacity: 1,493 MW
- Global wind total: 125,000 MW+, equals over 35 million homes; US total today over 7 million homes powered by wind
- 2,497 MW of offshore under construction
- Over 20,000 MW in permitting offshore Europe



US 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	125+
NYPA, LIPA, Con Ed, EDC, MTA	NY	700
NJBPU	NJ	1,050
Bluewater Wind	DE	+/-360
Southern Company	GA	10
W.E.S.T.	TX	150-300
Deepwater	RI	400
Canada, Ontario	ON	500+
Cuyahoga County	OH	20+

4450 -
W.E.S.T. LLC
5050



Project in Federal Waters

Project in State Waters

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

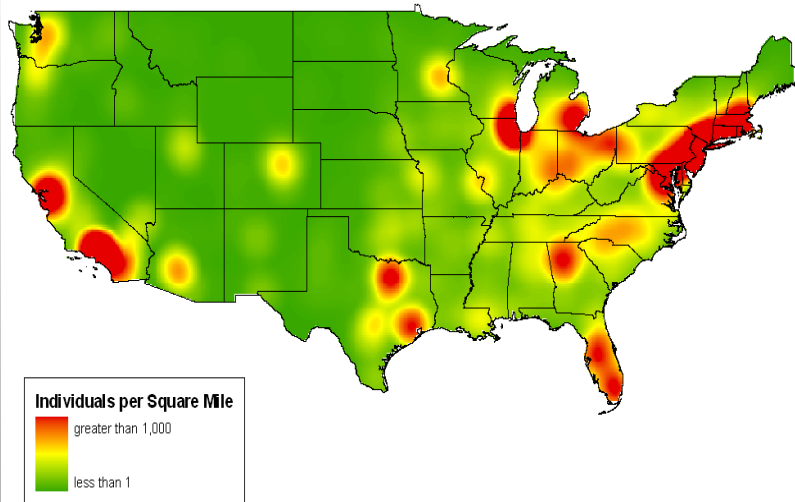
Offshore Market Drivers; Leveling Energy Playing Field

- 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

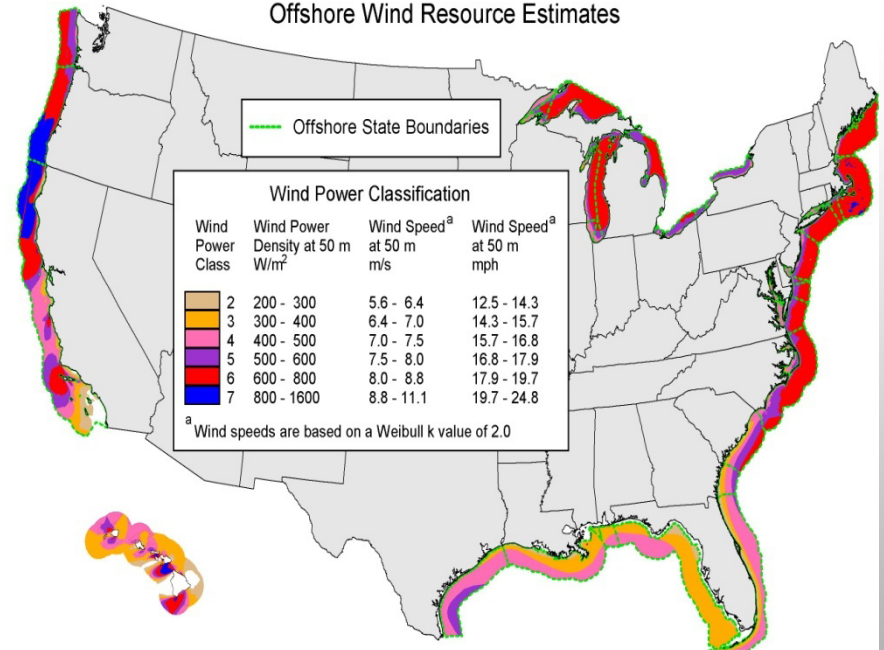
Supply Aligned With Demand

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

Population Density of the Conterminous United States



Offshore Wind Resource Estimates

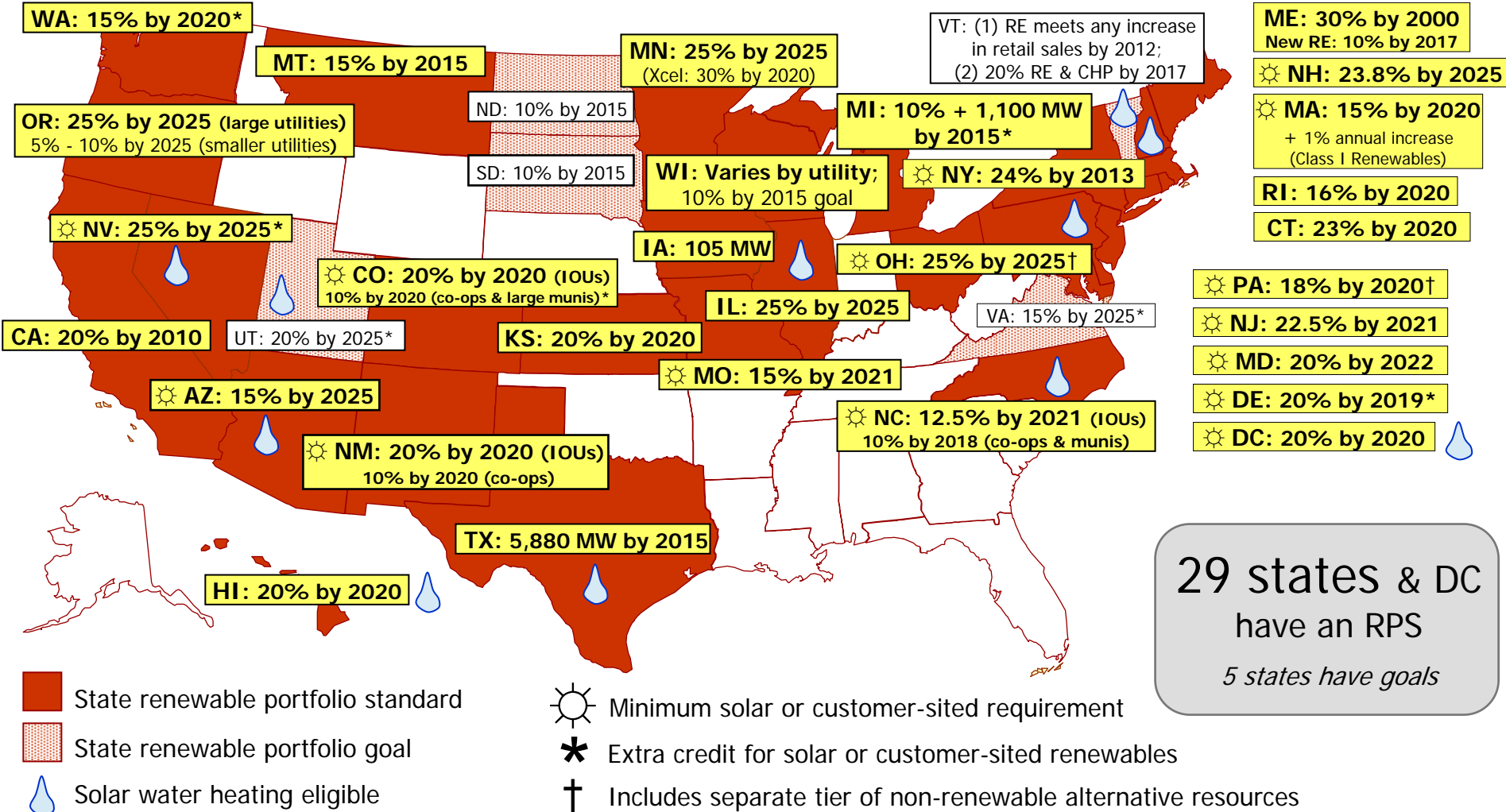


Additional Offshore Drivers

- **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



29 states & DC
have an RPS
5 states have goals

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)

Ontario Feed-In Tariffs 5/29/09

Revised Price Schedule

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

*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

- \$1Billion 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
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

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

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