

Wind Power Overview

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This presentation:

- National and regional overview
- Take-away point: the bulk of US wind energy development is likely occur in our vast heartland, not offshore
- Take-away point: wind energy provides the opportunity for us to economically meet climate change and pollution reduction goals



Energy issues at forefront

- Katrina and Rita have changed the climate change equation
- *Time* magazine on impact of global warming, cost of coastal development



Wind power is a reality today

- U.S. growth rate: 24% average over past five years (1999-2004)
- Global wind energy industry: adding the equivalent of 3 nuclear plants annually
- Denmark gets 20%, Germany 6% power from wind



2005 will be record year in U.S.

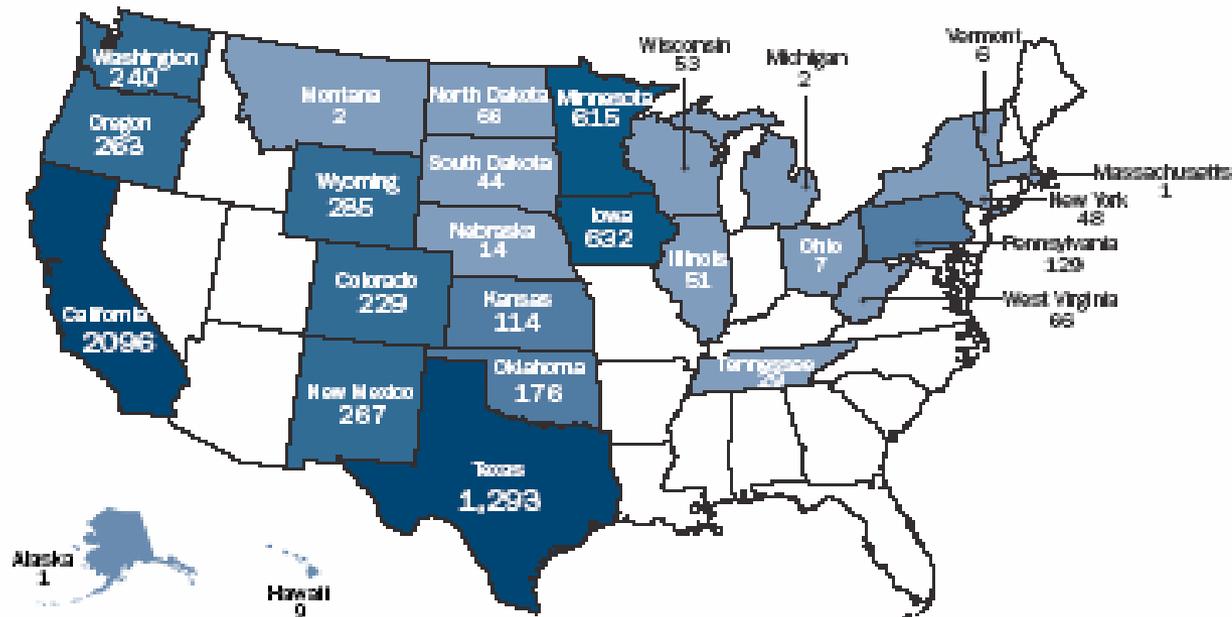
- **Up to 2,500 megawatts expected nationwide**
- **New projects include:**
 - 149.4MW, Hopkins Ridge, Washington
 - 100.5 MW, Trimont Wind Farm, Minnesota
 - 106.5 MW, Weatherford Center, Oklahoma
 - 128 MW, Sweetwater Phase II, Texas (over 700MW will be added in Texas this year)
 - 128 MW Maple Ridge, upstate New York
 - 150 MW, Century Wind, Iowa



Wind power development in the U.S.

United States Wind Power Capacity (MW)

6,740 MW as of 12/31/04



Wind farms across the U.S. are expected to produce close to 18 billion kWh in 2005 (about 0.5% of U.S. electricity generation), enough electricity to serve more than 1.6 million households.



Operating characteristics

- Over 98-99% availability
- Projects operate at 35% capacity factor, can be higher at good sites
- A single 1.5-MW turbine generates enough to power 500 homes, year after year
- Wind turbines can contribute to grid reliability



Market drivers: economic

- Cost now in competitive range
- No fuel price volatility
- Integration costs modest to zero
- Insurance against risk from tighter environmental regulations



Market drivers: environmental

Environmental advantage

- Zero emissions (and energy payback time is 3 to 8 months depending on wind speed at site, one of the best of any energy technology)
- No water use
- No mining, drilling, shipping for fuel
- No waste to manage, reduce, or store



Market drivers: customer demand

Popular demand

- Locally: Nebraska 2005 rural poll shows over 70% of respondents agreed 10 percent of Nebraska's electricity should come from alternative energy sources. Eighty-four percent said wind power can be produced and used locally.
- Nationally: National poll shows overwhelming public desire for new energy policy direction, including 87% supporting expanded wind energy development (Yale University poll)



Market drivers: state policy

States are taking the initiative

- Renewable energy standard (RPS) in 21 states and the District of Columbia
- Other incentives and measures to promote renewable energy
- Effectiveness may vary, but all recognize public benefit of a diverse resource mix including renewables



Constraints and barriers

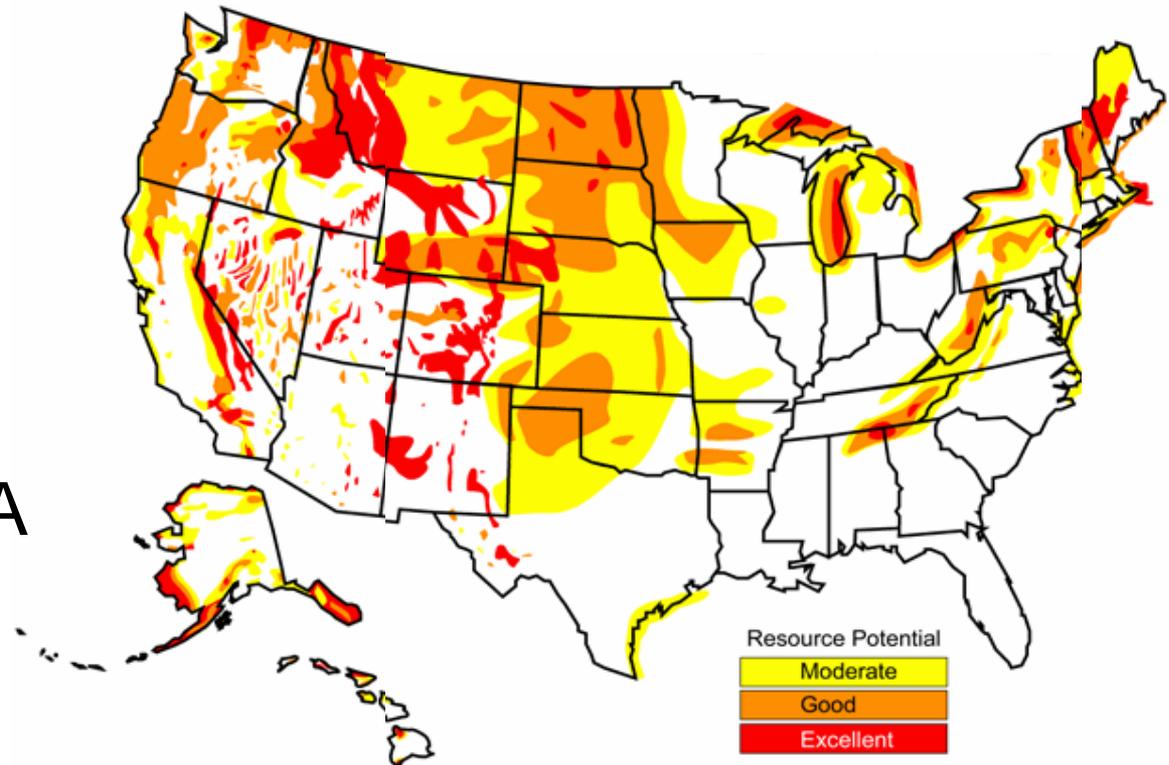
- Policy constraints: “consistently inconsistent” federal production tax credit wreaks havoc with company planning-but credit is needed to level playing field, further shave costs
- Transmission constraints both regulatory and physical: what is needed are non-discriminatory rules, upgrades and new investment in transmission



Wind energy potential: a national strategic resource

Online wind maps and resources include:

- DOE: NREL, WindPoweringAmerica
- AWSTruewind



Vast inexhaustible potential on land

- More than twice US electricity supply
- In order to generate 15% of U.S. electricity, only 0.6% of the land in lower 48 states would be developed—with most existing land use continuing as before
- 600 gigawatts (20% of power supply) are cost-effective at “busbar” when natural gas prices exceed \$4 per thousand cubic feet



Vast, distant potential offshore

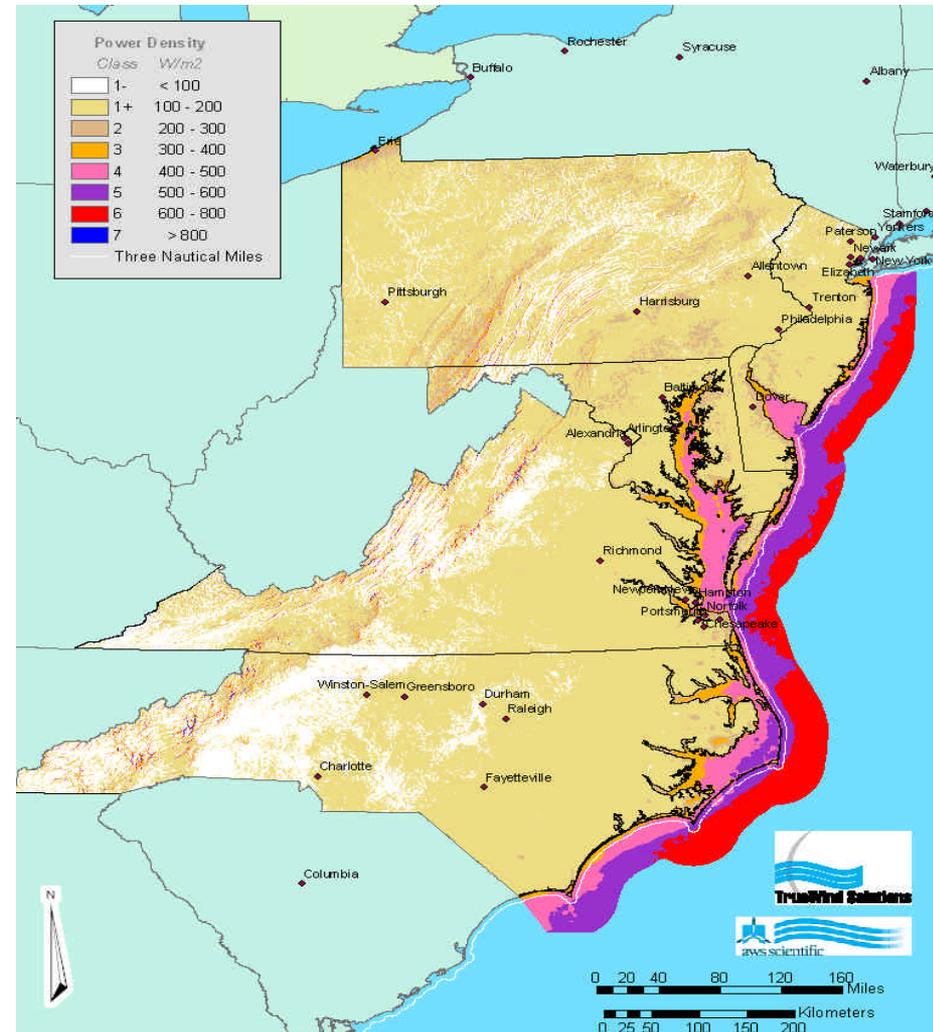
- US Offshore wind energy potential is over 900 GW
- Will need deep water technology, which is 10-15 years away, needs more R&D
- Wind regimes vary with coastal regions, are better further offshore, but costs are higher
- Continental shelf makes development in East Coast more feasible



Mid-Atlantic Wind Power Class Map

- Commercial Land Wind Projects Require Class 4+ Wind Class
- Offshore Wind Projects Require Class 5+ Due to Higher Construction Costs

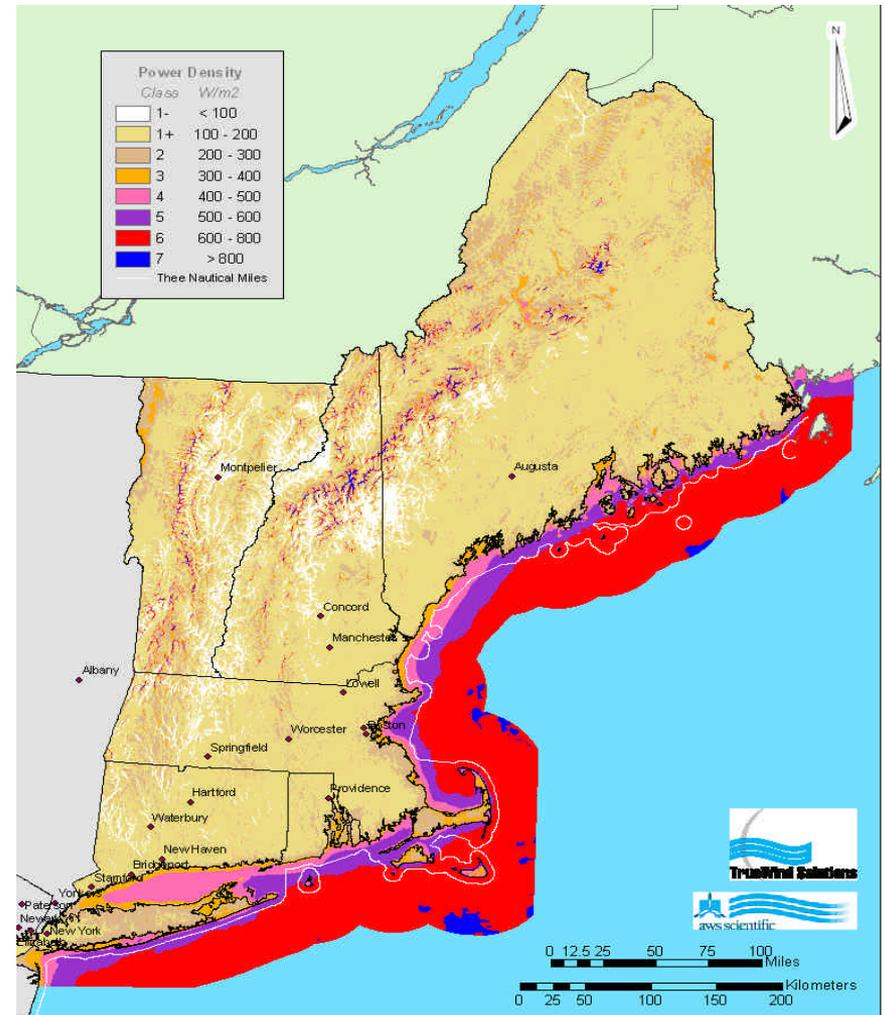
Source: AWS Truewind



New England Wind Power Class Map

- Commercial Land Wind Projects Require Class 4+ Wind Class
- Offshore Wind Projects Require Class 5+ Due to Higher Construction Costs

Source: AWS Truewind

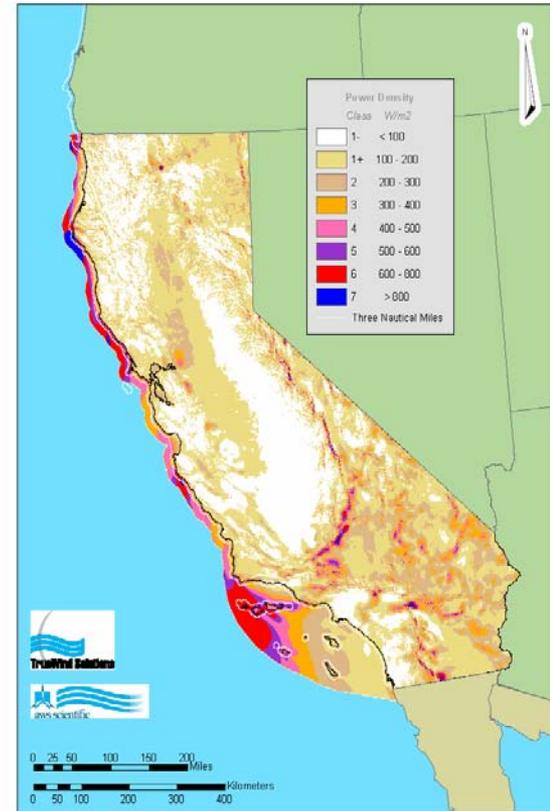


West Coast:

California wind classes,
on land and offshore

Over 2,000 MW developed in
windy passes, more under
development,
none offshore

Source: AWS Truewind



Offshore wind development in perspective

- 600MW to 700 MW offshore in operation, out of 47,300 MW operating globally
- All in Europe, mostly in Denmark
- Zero in operation in U.S.
- Applications in Massachusetts (420MW), New York (100 MW)
- Additional applications in Florida, Texas, Louisiana, Mid-Atlantic



Regulatory process for offshore

- Federal:

EXISTING: NEPA process with participating agencies Cape Wind final EIS expected late 2005

UNDER WAY: In addition to existing process, Energy Policy Act of 2005 gives Department of Interior lead role for alternative energy on the OCS, with Minerals Management Service to develop regulatory regime

- State: Permitting process varies by state



Wind's contribution

- Wind energy is a cost-effective option for generating power while helping meet climate change and pollution reduction goals
- No single technology is silver bullet
- Wind can be part, perhaps big part of a “silver buckshot” at our energy woes



How wind can contribute to coastal management: the big picture

Large-scale wind power development in heartland can help reduce

- global warming,
- polluting emissions
- need to import LNG and other fuels



How can this be achieved?

Panoply of measures including

- long-term incentive
- national RPS
- transmission measures to complement pipeline and transmission infrastructure proposed for natural gas, oil, other fuels



Need information about wind power?

Go to AWEA's Web site at www.awea.org

Send an email to windmail@awea.org

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