



# ALYRA RENEWABLE ENERGY FINANCE ADVISORS

## Wind Power Presentation

New York Energy & Environmental Funders' Meeting  
Center for Economic and Environmental Partnership

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## Wind Power Presentation

- About Alyra
- Wind turbines / technology
- Wind resource / measurements
- Wind power industry overview
- Drivers of US wind power
- Economics of wind power
- US wind financing market
- Offshore wind in the US
- Why wind power?



## Alyra Renewable Energy Finance Advisors

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### How do we add value?

Alyra assists developers formulate strategies to achieve the most competitive solutions from the market. It could include helping select the right partners to effectively plan ahead for the best execution.

## About Alyra

Alyra Renewable Energy Finance Advisors was founded in February 2004 by Mohammed Alam, following his most recent energy banking career with Fortis where he led a range of structuring and restructuring of renewable and conventional power transactions. Before Fortis Mr. Alam worked at GE Capital's Capital Markets Group, focusing on structuring and advisory activities in the Latin American power and infrastructure sectors. Currently Alyra is advising two US developers on debt and equity structuring of wind projects.

### Alyra Core Competencies

- Broad experience base in renewables finance structuring, execution and restructuring.
- In-depth knowledge of the renewables financing markets, including a deep understanding of each financial institution's structural requirements.
- Extensive network of contacts in the wind industry. Includes developers who are seeking capital and institutional and strategic investors who are seeking investment and partnering opportunities.

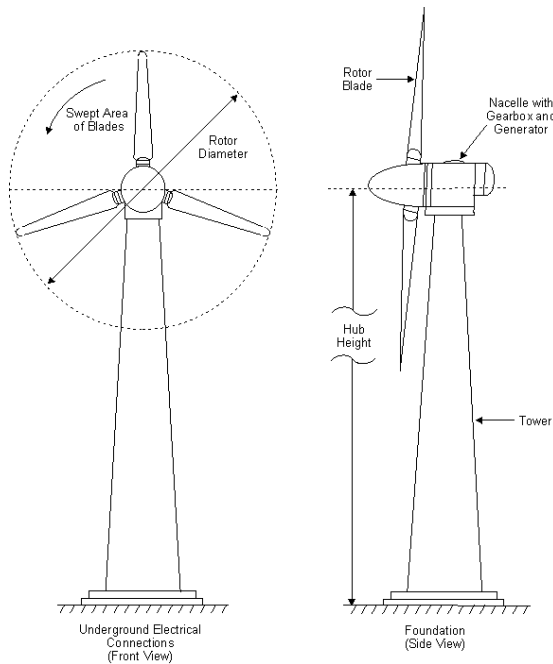
### Scope of Services

- Be the "ideas shop": Provide cutting edge analyses of strategic emerging issues which have long-term implications to renewables business.
- Assist in financing: Identify appropriate capitalization structures, debt/equity underwriters and most effective strategies for financing execution. Assist in negotiating and executing financing transactions.
- Assist in contract negotiations: Advise on negotiating project contracts, including partnerships and joint ventures.

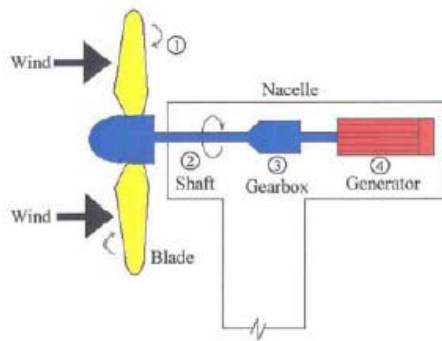
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## Wind turbines / technology



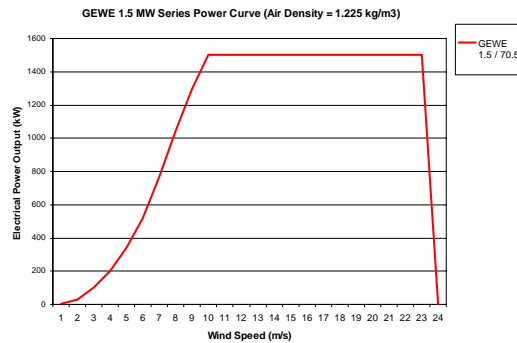
- One of the simplest power generation system
- Generally Horizontal axis, 3 bladed
- Main components
- Dimensions
- How it works
  - Intermittency
  - Wind speed





## Wind resource / measurements

- Wind power is a positive function of:
  - Wind speed (cubed)
  - Blade/Rotor swept area (Squared)
  - Wind density (altitude, temp)
- Wind power estimation:
  - A statistical process
  - One site speed, directional and density data > 1 year
  - Correlation with nearest met station data (long term)
  - Generate wind speed frequency distribution for each unit
  - Apply that to turbine power curve
  - Gross output
  - Further adjustments for availability, wake effects, topography, losses
  - Net output



**Power Curve – 1.5 MW**



## Wind power industry overview

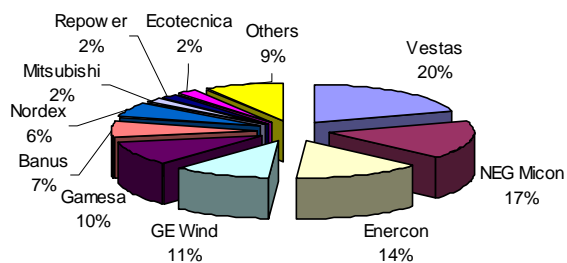
### 2003 Year End Installed Capacity

California	2043
Texas	1293
Minnesota	563
Iowa	471
Wyoming	285
Other States	1,719
<b>Total US Capacity</b>	<b>6,374</b>

### Global Installed Capacity

	YE 2003 Installed Capacity	YE 2002 Installed Capacity	YE 1998 Installed Capacity
Germany	14,609	12,001	2,583
United States	6,374	4,685	1,946
Spain	6,202	4,830	660
Denmark	3,110	2,880	1,380
India	2,110	1,702	968
EU (15) Total	28,706	23,308	
<b>Global Total</b>	<b>39,294</b>	<b>31,228</b>	<b>8,719</b>

### Turbine Vendor Share of Global Capacity 2003



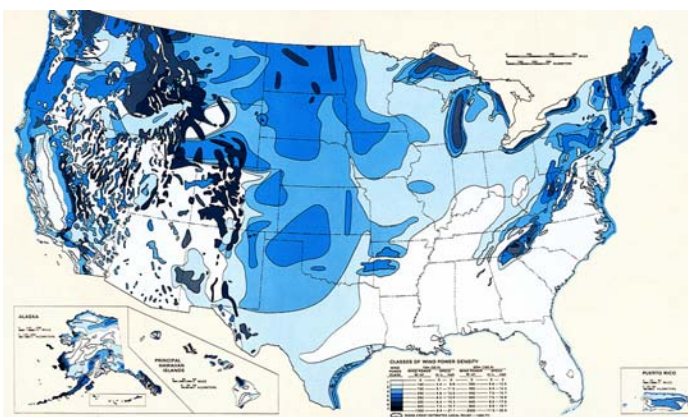
- Size – very small
- Strong growth
- Potential – huge
- Developers
  - 4 Majors: FPL, Shell, AEP, PPM
  - Mid-tier developers: repositioning
  - New entrants: promising, brings excellent track record in energy/finance
  - Many small developers
- Turbine Vendors
  - Vestas/NEG Micon – leaders, global presence
  - GE Wind – gaining market share
  - Gamesa – US entry in 03, home market strength, lack large turbine
  - Enercon – not present in the US



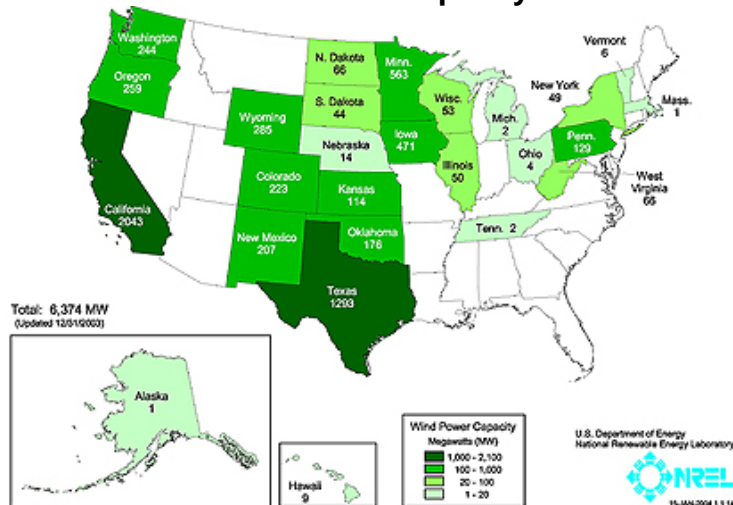
## Drivers of US wind power

- Production Tax Credit (PTC) – enabling
- Renewable Portfolio Standards (RPS) – the real catalyst
- Transmission - critical

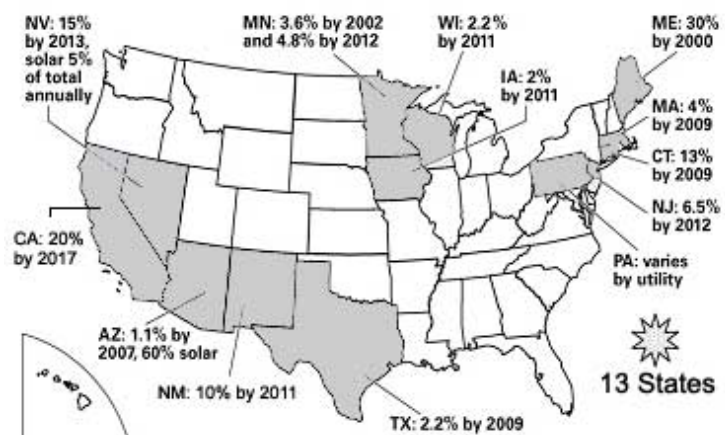
## US Wind Power Potential



## US Wind Power Capacity - 2003



## States with Renewable Portfolio Standards



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## Economics of wind power

- Large scale (150 MW) wind farm:
  - Capital cost: \$1,000 – 1,200/kW
  - Availability: 90% - 97%
  - Capacity factor: 30% - 40%
  - O&M Costs: 1.3 – 1.4 cents / kWh
  - All-in levelized cost of production (including financing cost): 3.1 – 3.6 cents / kWh
  - No capacity revenue
- Compare – large (850 MW), highly efficient gas-fired power plant:
  - At \$4-5/MMBTU gas price and 7,200 heat rate, only the fuel cost is around 2.9 – 3.5 cents / kWh
  - Capacity factor a driver
  - Competitive only with capacity revenue





## US wind financing market

- Markets of execution.
- Market liquidity/flexibility.
- Debt markets slowly expanding in the US.
- First ever public rating of wind financing in 2003.

Market	Product	Deal Size	Tenor	Pricing	Most Active Players
Commercial Bank	Senior Secured Floating Rate Loan	\$150 - \$200 MM	10 – 15 Yrs	L + [175 - 200] bps	12 - 15 banks, Mostly European
Term B / Private Placement	Senior Secured Fixed Rate Loan	\$200 - \$275 MM	12 – 20 Yrs	T + [300 - 400] bps	8 – 10 Life Insurance Cos, mostly Canadian
Capital Markets	Senior Secured Long Term Bond	[\$300] MM	12 – 20 Yrs	T + [300] bps	Traditional Institutional Investors, including hedge funds, mutual funds, pensions.



## Offshore wind in the US

- Strong, uniform wind is a major driver
- Overall operating costs could be reasonable, but O&M risks, including accessibility issues are significant and would vary by location
- First few projects would need stronger and longer contractual arrangements for construction, O&M and warranties
- Capital intensity
- Efficiency of larger offshore turbines – reaching limits
- Lastly, project success would depend on the supply demand dynamics of local RPS/REC environment



## Why wind power?

- Fuel diversity
- Economics & credit quality appealing to investors
- Intermittency not an issue from a system perspective
- Good for local communities
- Environmental benefits