

Creating the Equation for Growth

# US Wind Market Opportunity 2011-2016

# **Lucintel Brief**

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#### Lucintel

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## **Executive Summary**

- US renewable energy capacity grew at a 25% CAGR during the last 5 years (2005-2010) while cumulative wind energy capacity exhibited a CAGR of 34% over the same period
- Value of the US wind energy market was \$ 10 billion in 2010, after a 49% decline vs. 2009
- By 2016, US wind energy market expected to reach \$24 billion (15% CAGR), with a cumulative capacity of 94 GW
- Federal government subsidies and political willpower to continue incentives, continued environmental consciousness, increase in demand for electricity, oil price increases and interest in strengthening national energy independence will drive wind energy growth to new horizons
- South Dakota, Kansas and California are prominent among states having the most attractive prospects for wind energy growth
- Future wind market expected to be more fragmented and international due to emerging economies



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# US renewable space still young with tremendous growth potential



### **Key Insights**

- Renewable energy is expected to grow at 18% (CAGR) in next 5 years (excluding Hydro) due to:
  - Government subsidies
  - Extension of cash grants to 2011
  - Continued environmental consciousness
  - Expected oil price increases
- Anticipated slow growth of nuclear energy:
  - Obama administration FY 2010 budget significantly reduced funding to \$ 20 million in 2010 vs. \$ 177 Million in 2009
  - Could recent challenges in Japan represent an opportunoty for renewal old plants?



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## Wind energy offers huge growth potential



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## US wind market Fell in 2010 with future recovery in the works





## Several states in the US possess significant wind energy potential



## Relative market attractiveness of top wind energy potential states shows strong potential in Kansas, South Dakota and California

Parameter	Texas	Kansas	Montana	Nebraska	South Dakota	North Dakota	lowa	Wyoming	Oklahoma	New Mexico	California
Wind potential				J				$\bullet$	C		$\bullet$
Net electricity import	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$		$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	
Wind opportunity relative to natural gas reserve	$\bigcirc$	•	J	•	•	•	•	O	•	٠	•
Need for additional capacity		ightarrow						$\bigcirc$	ightarrow		
Shortfall RPS	$\bigcirc$		$\bigcirc$	$\bigcirc$			$\bigcirc$	$\bigcirc$			
Transmission wind grid connectivity					lacksquare						
Overall wind attractiveness	$\bullet$					•			$\bullet$		
High High Low-Medium Low No											



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# US has recently renewed cash grant wind incentives associated with the Economic Recovery Act

#### Wind energy projects under various incentives in 2009



PTC has a strong impact on growth of wind energy



19992000200120022003200420052006200720082009



Key Insights

- Cash grants program established in 2009 to support renewable energy sector during global financial crisis
  - Extension of cash grants to 2011 from 2010
- Wind project developers may choose a 30% Investment Tax Credit (ITC) or 30% cash grant in lieu of Production Tax Credit (PTC)
  - ITC will expire at end of 2016
- PTC increased to 2.2 cents/KWh in 2010 from 2.1 cents
   / KWh in 2009
  - PTC will expire at end of 2012
- Wind power capacity additions declined in the three years (2000, 2002, and 2004) when PTC was allowed to expire
- PTC is better incentive option (6% greater benefit than ITC) with a capacity factor of 30% and a project cost of \$ 1,800/KW

Source: Lucintel

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### New administration has put tremendous support behind wind energy

# US renewable energy policies driving wind energy space



### Wind energy budget history



#### **Key Insights**

- DOE provided budget of \$2.3 billion for energy efficiency and renewable energy in FY 2011
  - Renewable energy budget for FY 2011 increased by 16% compared to FY 2010
  - Budget for wind energy grew more in FY 2011 relative to other renewable sources
- Senate approved \$858 billion in tax cuts and credits, including extensions of ethanol tax credits and renewable initiatives



# State policies play a significant role in directing wind power development; most states have a Renewable Portfolio Standard goal





# Seven states have achieved their RPS goal, while the majority still offer ample opportunity for renewable energy

Target Year	% Renewable Target	Current renewable %	States	Target Year	% Renewable Target	Current renewable %	
2025	15%	6%	New Mexico	2020	20%	5%	
2020	33%	18%	New York	2015	30%	22%	
2020	30%	10%	North Caroline	2021	12.5%	4%	
2020	27%	5%	North Dakota*	2020	10%	9%	
2019	20%	2%	Ohio	2025	25%	1%	
2020	40%	8%	Oklahoma*	2015	15%	7%	
2010	1 GW from wind	~ 4 GW	Oregon	2025	25%	63%	
2025	25%	2%	Pennsylvania	2020	18%	3%	
2020	20%	4%	Rhode Island	2019	16%	2%	
2020	15%	5%	South Dakota*	2015	10%	5%	
2022	20%	6%	Texas	2025	10,000 MW	~ 10,000 MW	
2017	40%	50%		2015		~ 350 MW	
2015	10%	4%	Utan*	2025	20%	2%	
2020	30%	12%	Vermont	2017	20%	28%	
2021	15%	4%	Virginia*	2025	15%	5%	
2015	30%	37%	Washington	2020	15%	75%	
2025	23.8%	7%	Wisconsin	2015	10%	5%	
2025	23.070	1 70	West Virginia*	2025	25%	2%	
2021	22.5%	2%	District of	2020	20%	0%	
2025	50%	18%	Columbia	_020	_0,0	0,0	
	Target         2025         2020         2020         2020         2019         2020         2019         2020         2010         2020         2010         2020         2010         2020         2020         2020         2020         2020         2015         2020         2021         2025         2021         2025	Target Year         % Renewable Target           2025         15%           2020         33%           2020         30%           2020         30%           2020         20%           2019         20%           2020         40%           2020         20%           2010         1 GW from wind           2025         25%           2020         20%           2020         15%           2021         20%           2022         20%           2020         30%           2015         10%           2021         15%           2021         30%           2021         30%           2025         23.8%           2025         50%	Target Year         % Renewable Target         Current renewable %           2025         15%         6%           2020         33%         18%           2020         30%         10%           2020         30%         5%           2020         20%         5%           2019         20%         2%           2020         40%         8%           2019         20%         2%           2020         40%         8%           2010         1GW from wind         ~4 GW           2020         20%         4%           2020         20%         5%           2021         20%         6%           2022         20%         6%           2021         10%         5%           2021         30%         12%           2021         15%         4%           2025         23.8%         7%           2021         22.5%         2%           2021         50%         18%	Target Year% Renewable TargetCurrent renewable %States202515%6%New Mexico202033%18%New York202030%10%North Caroline202027%5%North Dakota*201027%2%Ohio202040%8%Oklahoma*20101 GW from wind-4 GWOregon202525%2%Pennsylvania202020%4%Rhode Island202015%5%South Dakota*202015%5%South Dakota*202110%4%Vernont*202230%12%Virginia*202115%3%37%202523.8%7%West Virginia*202122.5%2%District of Coumbia	Target Year% Renewable TargetCurrent renewable %StatesTarget Year202515%6%New Mexico2020202033%18%New York2015202030%10%North Caroline2021202027%5%North Dakota*2020201027%2%Ohio2025202040%8%Oklahoma*2015202025%2%Oklahoma*2015202125%2%Oklahoma*2020202020%4%Oregon2025202115%5%South Dakota*2019202220%6%South Dakota*2015202415%6%Texas2025201510%4%Utah*2025202115%37%Virginia*2025202523.8%7%Wisconsin201520212.5%2%Wisconsin2015202523.8%7%Wisconsin202520212.5%2%District of Columbia2020	Target Year% Renewable ArrgetCurrent renewable %StatesTarget% Renewable 	



# Growth opportunities for renewable energy to meet RPS targets abound in several of the highest wind energy potential states

State	Target Year	% Renewable Target	Expected year in which RPS achieved *				
Texas	2025 2015	10,000 MW 500 MW (Non- wind)	Achieved Already				
Kansas	2020	20%	Not achieved before 2015				
Montana	2020	30%	Achieved Already				
Nebraska	No RPS target						
South Dakota	2015	10%	2012				
North Dakota	2015	10%	2011				
Iowa	2010	1 GW of wind	Already achieved				
Wyoming	No RPS target						
Oklahoma	2015	15%	Not achieved before 2015				
New Mexico	2020	20%	Not achieved before 2015				
California	2020	33%	Not achieved before 2015				

\* If annual renewable installations are same as 2009 for next 5 years

#### **Key Insights**

- Illinois, Ohio, Pennsylvania, and California have large capacity opportunities to meet their renewable energy targets
- Washington, Texas, Iowa, Montana, and Oregon have little to no capacity increases needed to meet current renewable policy targets
- Expected that North Dakota and South Dakota will achieve their RPS goal before 2015

60% of total RPS goals not achieved



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# Three major wind energy states have surpassed their RPS goal and 15 years ahead of schedule

Parameter	Texas	Kansas	Montana	Nebraska	South Dakota	North Dakota	lowa	Wyoming	Oklahoma	New Mexico	California
Total electricity capacity (GW), 2010	~ 105	~ 14	~6	~8	~4	~7	~15	~8	~21	~8	~66
% Renewable capacity of total electricity capacity (GW) by 2010	10%	8%	54%	6%	56%	31%	25%	20%	10%	9%	27%
% Renewable electricity generation by 2010 (MWh)	5%	4%	37%	2%	45%	9%	10%	4%	7%	5%	18%
Surpassed RPS goal ?	Yes	No	Yes	NO RPS Target	No	No	Yes	NO RPS Target	No	No	No

**Key Insights** 

- Texas, Montana, Iowa achieved their Renewable Portfolio Standard (RPS) goal before target date
  - · Texas leads the country in cumulative installed wind energy capacity
- California regulators raised the state's Renewable Portfolio Standards to 33% from 20% by 2020
  - Opens the door to more clean energy
- North Dakota, South Dakota and Oklahoma have voluntary goals for adopting renewable energy
  - Majority of electricity produced in South Dakota comes from hydroelectric power (42%)
    - Hydro energy (on or before 2008) is not considered in RPS goal



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# **Emerging Trends in US Wind Energy Industry**



# Growing OEM involvement in offshore wind market, though involvement still considered initial



Introduced new 4.0 MW wind turbine for offshore applications

- Acquired Norwegian company that builds offshore wind turbine called ScanWind
- Provide direct drive wind turbines to LEED Co's of 20 MW offshore wind project in Ohio waters of Lake Erie



Introduced new 3.0 MW direct drive wind turbine for offshore applications

- Opened offshore wind office in Boston
- Selected by Cape Wind to provide wind turbine of 3.6 MW for its wind project off the coast of Nantucket in Massachusetts



Introduced 3.0 MW wind turbines for offshore wind turbine

- Selected by Trillium Power Wind Corporation to provide offshore wind turbine of 3.0 MW on the Ontario of the Great Lakes
- Opened sales office in Toronto for offshore wind turbine



Designing and developing 5.0 MW offshore wind turbine

 Alliance with Northrop Grumman Shipbuilding to install offshore wind turbine in US by the end of 2012



# Transmission development appears to be gaining some traction



- Approved a \$4.93 Bn wind power transmission project
- Carry electricity from remote western parts of the state to major population centers such as Dallas, Houston, Austin and San Antonio
- Handle 18,500 MW of power

#### Approved a \$ 1.4 Bn for a 350 mile transmission line



• Provide Maine wind power project greater access to southern New England



Allocated \$ 60 million in Recovery Act funds to promote collaborative long term analysis and interconnection wide transmission planning for Eastern, Western, and Texas interconnection in 2009

Google<sup>®</sup> Invest \$ 5 Bn in project to build 350 miles of transmission off Atlantic Coast from New Jersey to Virginia to tap into gigantic offshore wind potential



## New York could be first state to ban controversial drilling practices





#### **Key Insights**

- Fracking allows drillers to harvest valuable natural gas trapped in underground rock known as shale rock.
- 2 to 5 million gallons of water necessary to fracture one horizontal well in a shale gas formation
- Fracturing fluids (water and chemical additives) then returned back to the surface which polluting water
- Expected that natural gas price increase by 7% CAGR in next 5 years
- Texas also increasingly looking at controversial issue



Seven states have achieved their RPS goal, while majority still offer ample opportunity for renewable energy with new administration placing tremendous support behind wind energy





#### US wind energy budget history

#### **Financial Year**

#### **Key Insights**

- Illinois, Ohio, Pennsylvania and California have large capacity opportunities to meet their renewable energy targets. Recently California increased RPS target to 33% from 20%
- Washington, Texas, Iowa, Montana, and Oregon have little to no capacity increases needed to meet their current renewable policy targets
- Renewable energy budget for FY 2011 increased by 16% compared to FY 2010
  - Budget for wind energy grew more in FY
     2011 compared to other renewable sources
- Senate approved \$858 billion in tax cuts and cred its, including extensions of ethanol tax credits an d renewable initiatives
- PTC increased to 2.2 cents/KWh in 2010 from 2.1 cents/KWh in 2009
- Extension of cash grants to 2011 from 2010



# Average wind turbine size capacity has increased by 22% in 2010 compared to 2005 with increase in the blade length



#### Key Insights

- Growth of turbine size has slowed:
  - Dominance of GE's 1.5 MW turbine
  - Logistical challenges associated with transporting larger turbines
- Average hub height and rotor diameter have scaled with time
- Expected average blade length reach to 43 Meter by 2016, which help:
  - Need for higher strength-to weight ratio material
  - Reduce transportation cost
  - Increased power generation
  - Need of new bonding material





# Wind energy becomes cost competitive by 2015, if natural gas prices increase 15% annually and current incentives are continued







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# Conclusions

- US renewable energy, and wind energy in particular, has high potential and will continue double digit growth over 2011-2016 period
- US markets driven by State level dynamics with RPS targets playing a significant role in directing wind power development
- While strong growth expected, potential for continued volatility in US market remains
  - Lack of long term Federal Energy Policy
  - State Level connectivity issues
  - Budget deficits make State economic competitiveness a priority
- Companies with diversified business portfolio better positioned for managing growth
  - China, Brazil and other markets represent strong and complementary markets
  - Clipper's heavy dependence on US market for instance facilitated its sale to UTC
  - Future market may be characterized by new entrants and increased competition in boom years and large overcapacity in others
- Strong growth expected in the foreseeable future, led by Kansas, California and South Dakota
  - Emergence of California opens interesting potential to disrupt market as current supply chain focused on MidWest
- Understanding value chain shifts and roles of non US markets in supply chain will prove important for success





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### **Key Questions**

- Is market space / opportunity of current product offerings sufficiently robust?
- Markets are focus for many: how can my company profitably differentiate?
- Based on our core skills, where should we focus?
- Should we build or buy? Is build even an option?
- What game changer actions exist and/or is a more incremental approach best?
- What is the order sequence of market entry segments / products?





### **Reach Lucintel**

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