



EERE Wind: Program Overview – AS D. Danielson

April 10, 2012

U.S. Department of Energy
Wind and Water Power Program

White House

- Generate 80% of the nations' electricity from clean energy sources by 2035
- Reduce carbon emissions 80% by 2050
- Stimulate jobs and economic recovery through RE development

DOE

- Promote energy security through reliable, clean, and affordable energy
- Strengthening scientific discovery and economic competitiveness through science and technology innovation

EERE

- Invest in clean energy technologies that strengthen the economy, protect the environment, and reduce dependence on foreign oil

WWPP

- Improve the performance, lower the costs, and accelerate deployment of innovative wind and water power technologies

The **mission** of the Wind Power Program is to enable U.S. deployment of clean, affordable, reliable and domestic wind power to promote national security, economic growth, and environmental quality

Wind Power

Total U.S. Wind Resource Potential

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Wind Class (@ 80 meters)	Velocity Range (m/s)	Land Based Wind			Offshore Shallow Water (< 30 meters)			Offshore Deep Water (> 30 meters)		
		Resource Potential (GW)	Capacity Factor (Weibull)	Quads (Quadrillion BTUs)	Resource Potential (GW)	Capacity Factor (Weibull)	Quads (Quadrillion BTUs)	Resource Potential (GW)	Capacity Factor (Weibull)	Quads (Quadrillion BTUs)
III	6.4 - 7.0	4186	30%	37.5						
IV	7.0 - 7.5	3544	35%	37.0	249	35%	2.6	292	35%	3.1
V	7.5 - 8.0	1109	40%	13.2	365	40%	4.4	505	40%	6.0
VI	8.0 - 8.8	64	42%	0.8	294	42%	3.7	712	42%	8.9
VII	8.8 - 11.9	16	45%	0.2	164	45%	2.2	1569	45%	21.1
Total :		8919		88.8	1072		12.8	3078		39.1

- Total Addressable U.S. Wind Energy Potential ≈ 141 Quads (13,000 GW equivalents)
- Total U.S. Energy Use ≈ 95 Quads (8,800 GW equivalents)
- Total U.S. Electrical Energy Use ≈ 13 Quads (1,200 GW equivalents)
- 20% by 2030 Goal ≈ 3 Quads (300 GW equivalents)
- Current U.S. Wind Contribution ≈ 0.47 Quads (47 GW equivalents)

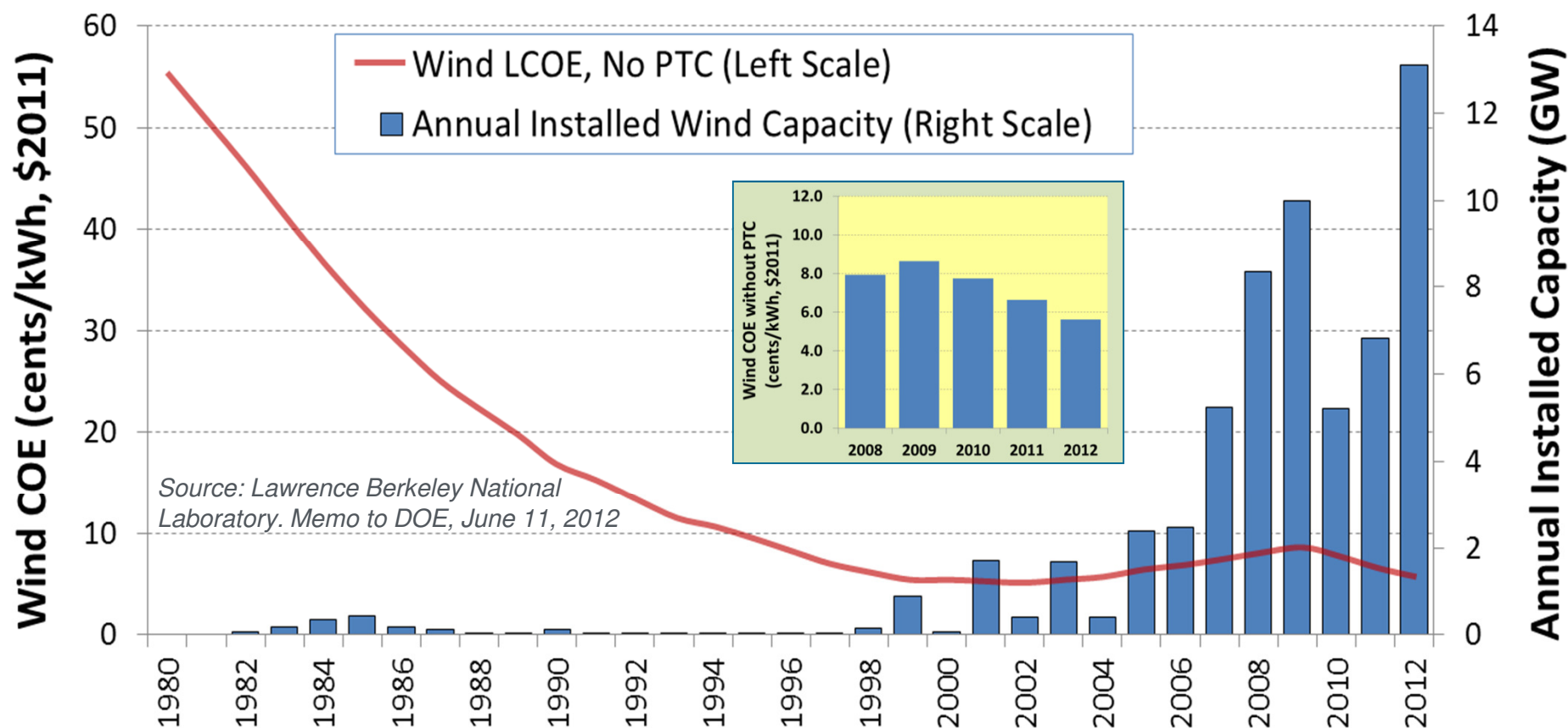
Significant SUSTAINABLE wind resource potential, greater than 10 times current total U.S. electricity consumption, supports high wind penetration scenarios

Source: NREL Wind Resource Database - Standard Version, April 2009

Wind Power U.S. Market Price Trend

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U.S. Wind Power Market Price (for good to excellent wind resource sites) and Annual Wind Capacity installations, 1980 – 2012

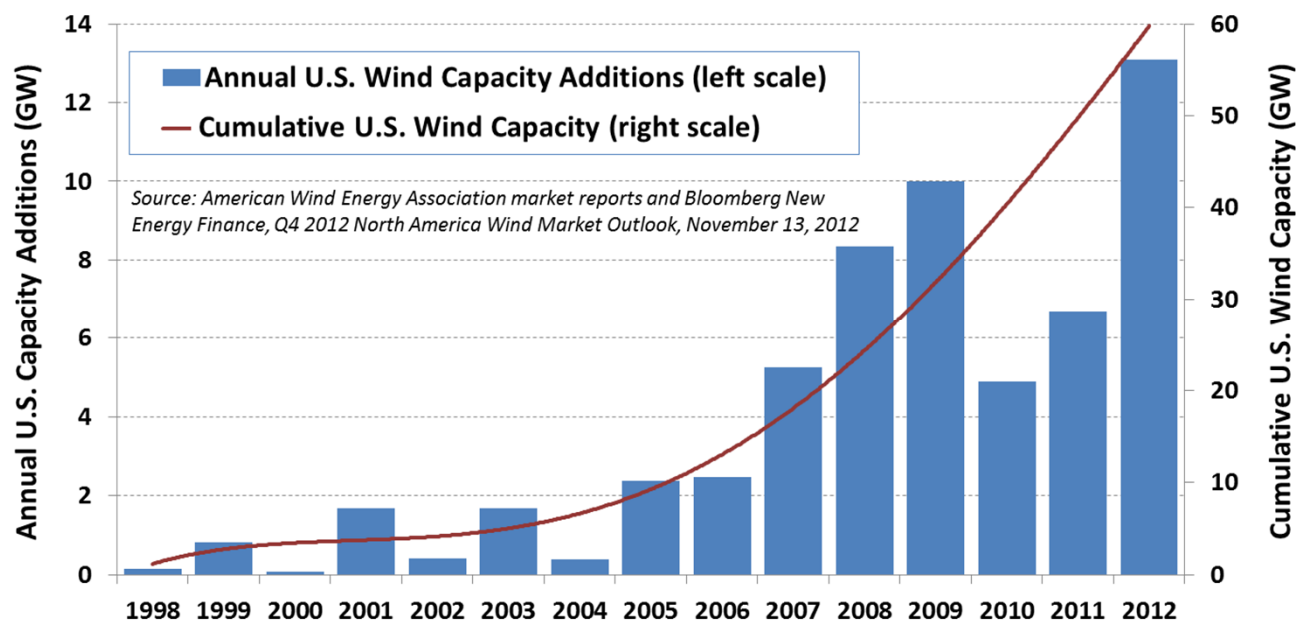
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State of the U.S. Industry Today

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- Wind is now over 4.5% of U.S. power generation
- Wind accounted for 43% of all 2012 U.S. power capacity additions, the highest of any resource
- Wind capacity doubled in past 3 years and grew by 8.7 GW/year over past 5 years
- 56 GW wind capacity added over past decade
- 61 GW total installed wind capacity in 2012
- Over 80,000 U.S. jobs in wind installation and operations
- U.S. wind industry growth at risk with expiration of PTC – wind installations anticipated to drop below 3-4 GW/year in 2015 and beyond
- Investment in U.S. Wind industry critical now



**Growth in U.S. Wind Power has great momentum over the last decade,
but future wind growth is at risk without PTC or RES**

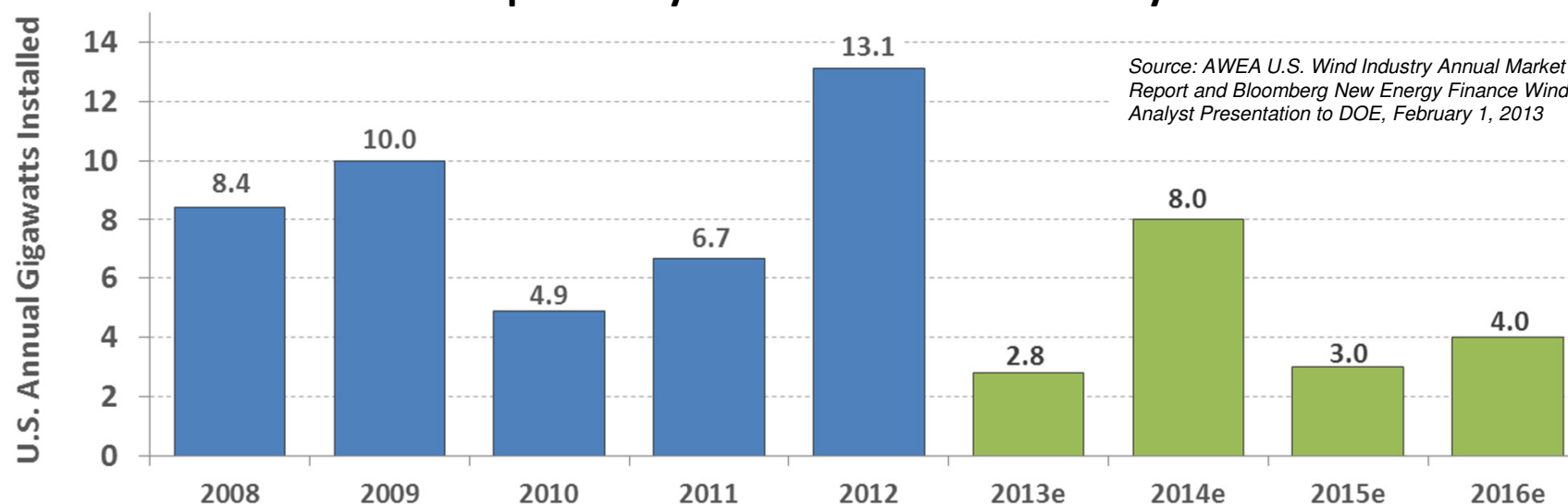
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U.S. Industry Near-Term Outlook

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U.S. annual capacity installations peaked in 2012 and then drop rapidly due to 12-18 month manufacturing lead times impacted by late 2012 PTC uncertainty



US Offshore wind significantly lags behind Europe and China

Source: H2 2012 Offshore Wind Market Outlook, Bloomberg New Energy Finance, 14 August 2012

	Cumulative Capacity at	Additional Capacity
OFFSHORE	2012 YE	Forecast 2013-2016
Europe	4,531	9,555
China	290	6,067
Other	15	559
U.S.	0	400
Total	4,836 MW	16,581 MW

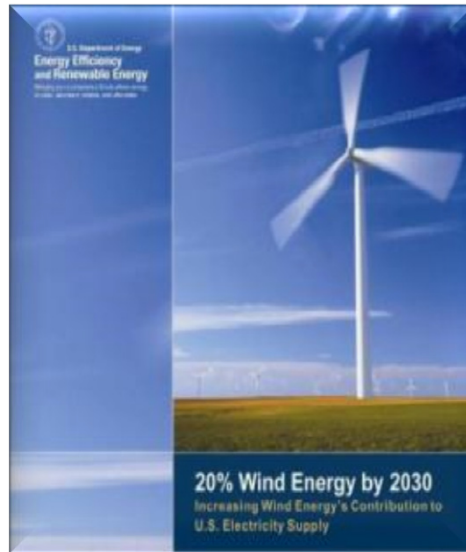
**Given long term U.S. policy uncertainty –
drastic reduction in U.S. Wind manufacturing, deployment and related jobs projected**

National Lab Core Capability - Wind		NREL	SNL	ANL	PNNL	LBNL	LLNL	ORNL
Test Facilities	Controllable Grid Interface	✓						
	Dynamometer Testing	✓						
	Structural Testing	✓						
	SWiFT Test Facility		✓					
Engineering & Science	Advanced Controls R&D	✓						
	Advanced Design Tools	✓	✓					
	Aerodynamics R&D	✓	✓					
	Atmospheric Systems Science			✓	✓		✓	
	Blades and Rotor Systems		✓					
	Materials		✓					
	Power System Modeling			✓				✓
	Wind Integration R&D	✓						
Market Barrier Removal	Biological Systems Science			✓				
	Economic Analysis	✓				✓		
	Environmental Impacts	✓			✓			
	Policy and Social Impacts	✓						

Wind Program LCOE and GW Goals

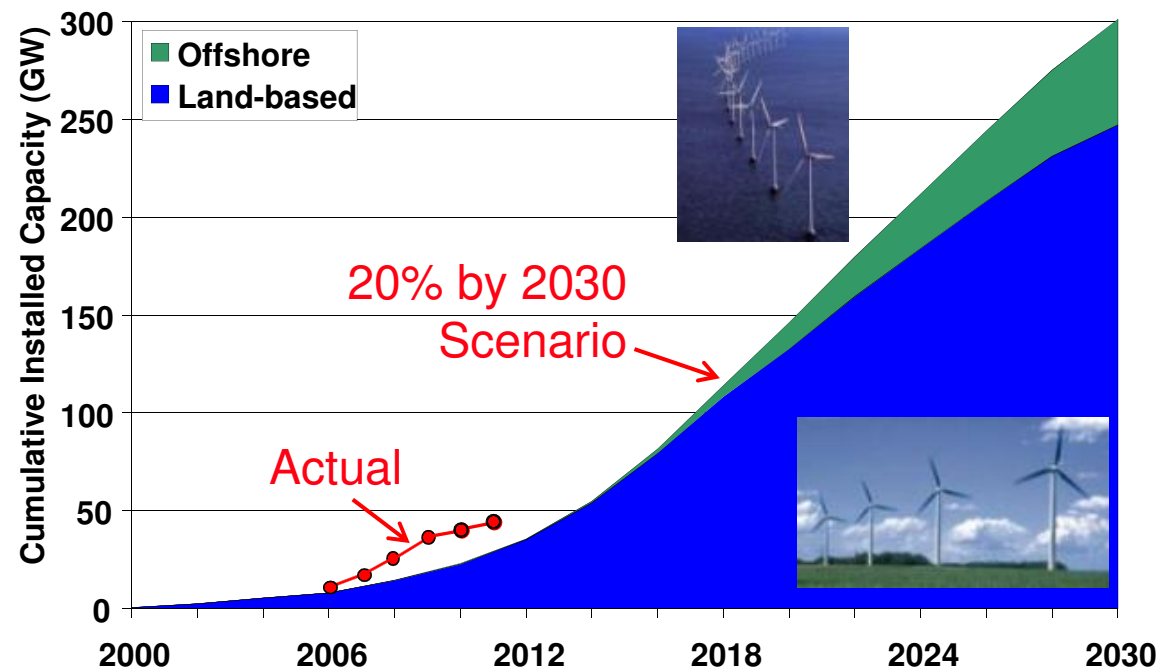
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*Cumulative 2011 capacity includes 3,360 MW installed through Q3 2011 and assumes 33% of 8,482 MW under construction as of Q3 2011 in service by the end of 2011 for a total of 6,160 MW installed in 2011.

20% Wind Scenario



Wind Program Goals	2010		2015		2020		2030	
Market Segment	COE (¢/kWh)	GW	COE (¢/kWh)	GW	COE (¢/kWh)	GW	COE (¢/kWh)	GW
Land-based Utility Target	8.2	40	6.5	75	4.8	125	4.2	250
Offshore Target	25.3	0	23.3	0	9.3	10	6.0	54

Aggressive Wind LCOE and GW goals are achievable with anticipated Wind Program impacts

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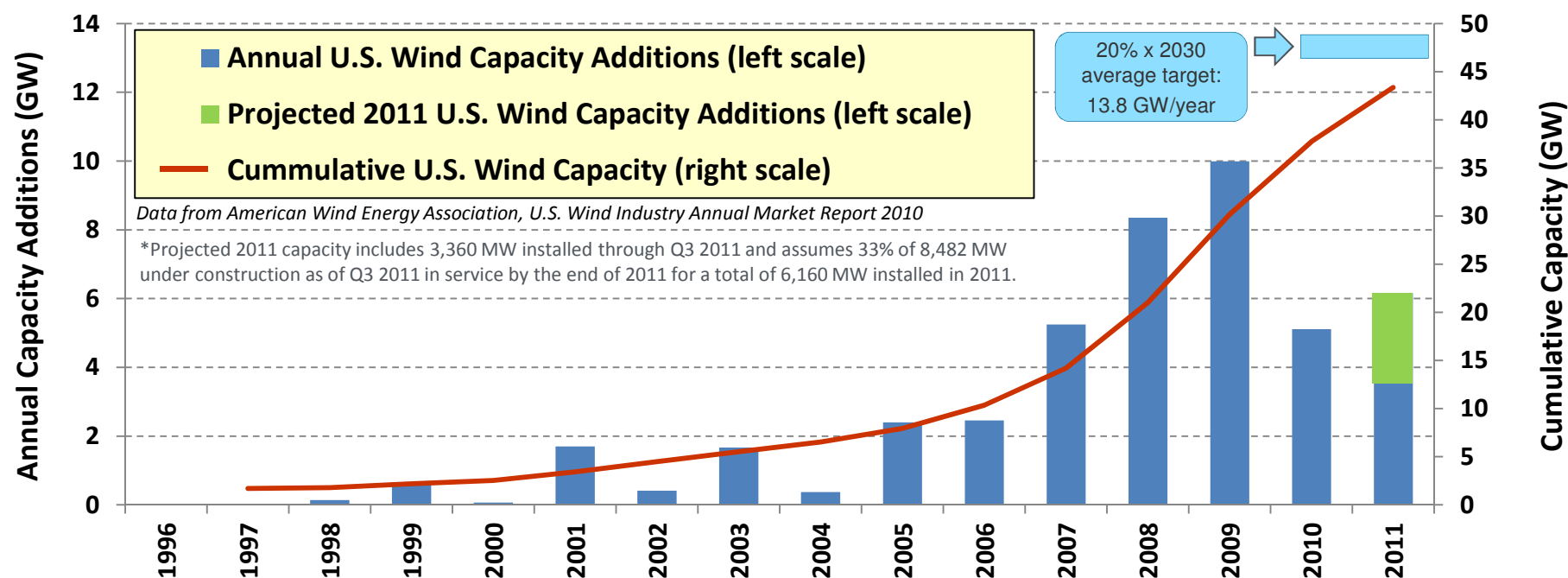
Critical Indicator - U.S. Installations

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Critical 2010 and 2011 projected installation decline influenced by multiple factors beyond the economic downturn and lower electricity prices:

- No long term stable policies (expiring PTC, no RES)
- Lack of wind compatible transmission capacity (275 GW Wind transmission queue)
- Lack of permitting at high wind speed locales (environmental, fish & wildlife, radar, siting)



Wind power installations have significantly slowed due to lack of long term, stable policies and unresolved transmission and environmental market barriers