2012 Wind Technologies Market Report

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Report Summary

August 2013

2012 Wind Technologies Market Report

Purpose, Scope, and Data:

- Publicly available annual report summarizing key trends in the U.S. wind power market, with a focus on 2012
- Scope primarily includes wind turbines over 100 kW in size
- Separate DOE-funded annual reports on distributed and offshore wind
- Data sources include AWEA, EIA, FERC, SEC, etc. *(see full report)*

Report Authors:

- Primary authors: Ryan Wiser and Mark Bolinger, Berkeley Lab
- Contributions from others at Berkeley Lab, Exeter Associates, NREL

Funded by: U.S. DOE Wind & Water Power Technologies Office

Available at: http://www1.eere.energy.gov/wind/

Report Contents

- Installation trends
- Industry trends
- Cost trends
- Performance trends
- Wind power price trends
- Policy and market drivers
- Future outlook

New to the Current Edition of the Report

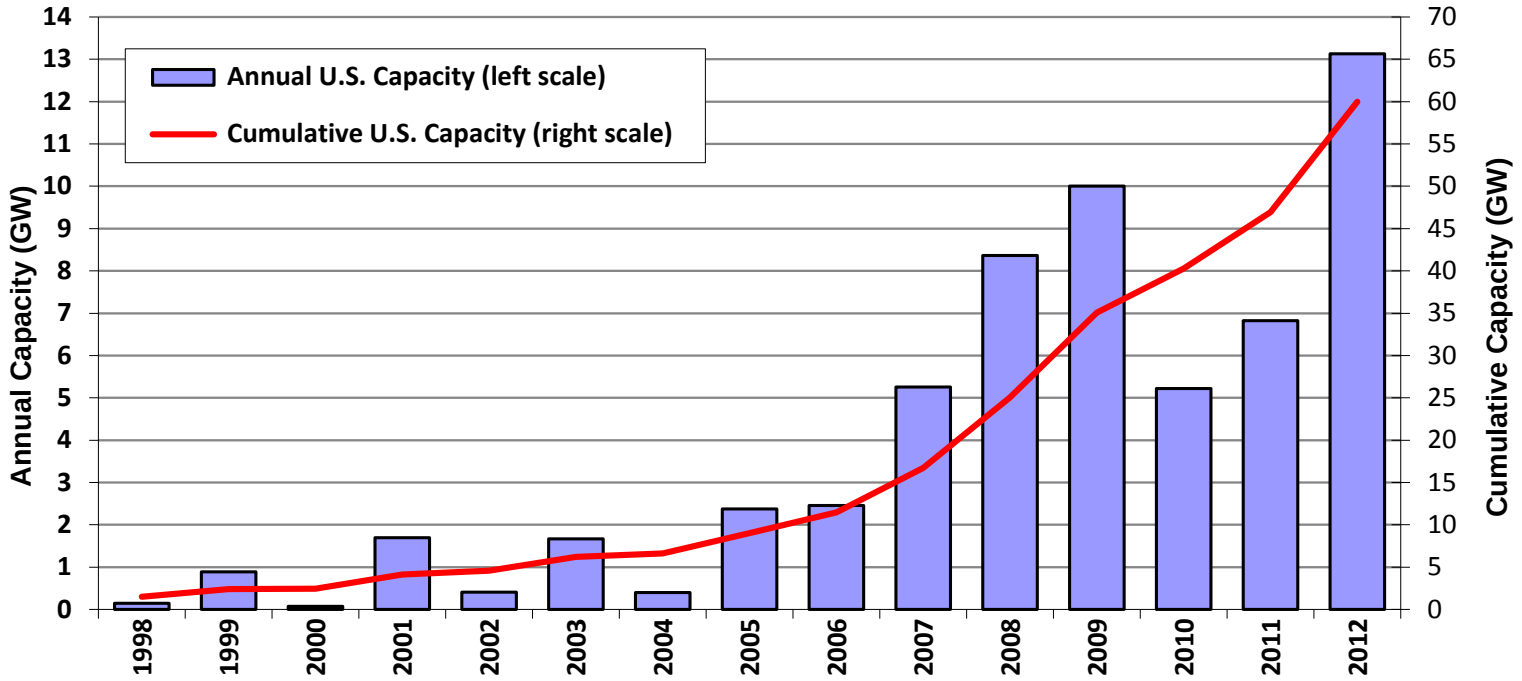
- Somewhat expanded analysis of wind turbine equipment imports & exports as well as operations & maintenance costs
- Summary of trends in wind project capacity factors by turbine design and estimated wind resource conditions
- Further emphasis on full-term power purchase agreement prices levelized over the contract term
- Reporting certain data based on revised regional definitions and boundaries

Key Findings

- Wind has been a significant source of new generation in the U.S.
- The supply chain is under duress, but domestic manufacturing content remained strong in 2012
- Turbine scaling is boosting wind project capacity factors, while the installed cost of wind is on the decline
- Trends are enabling very aggressive wind power pricing and solid economics in many regions despite low natural gas prices
- It will take time to re-build the project pipeline, ensuring a slow year for new additions in 2013, and then solid growth in 2014
- Medium to longer term growth remains uncertain, dictated in part by future natural gas prices as well as state and federal policy decisions, though recent declines in the price of wind energy help boost the prospects for future growth

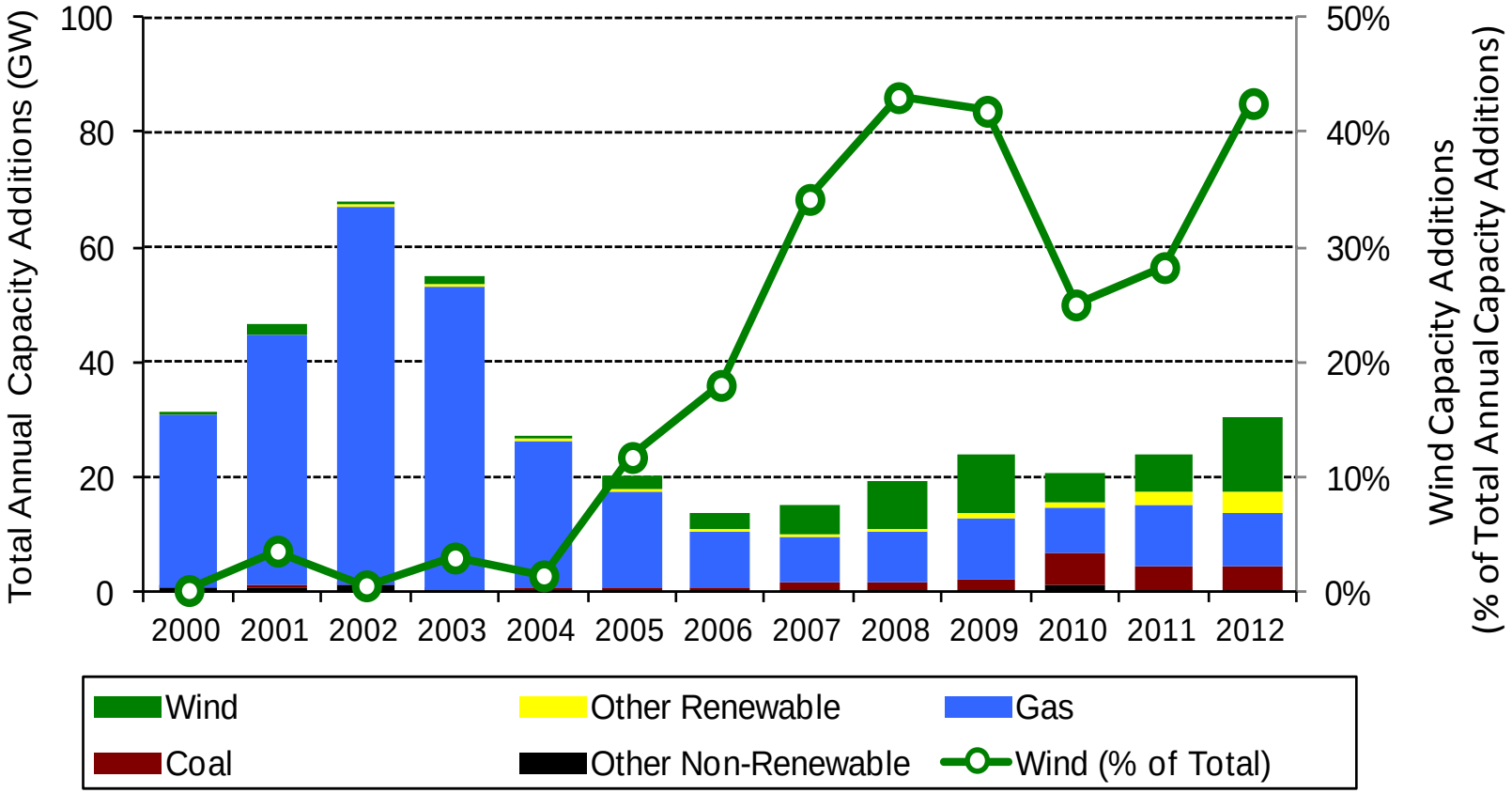
Installation Trends

Wind Power Additions Hit a New Record in 2012, in Part Driven By the Then-Planned Expiration of Federal Tax Incentives



- 13.1 GW of wind added in 2012, more than 90% higher than 2011
- $25 billion invested in wind power project additions
- Cumulative wind power capacity up by 28%, bringing total to 60 GW

Wind Power Was the Largest Source of U.S. Generating Capacity Additions in 2012



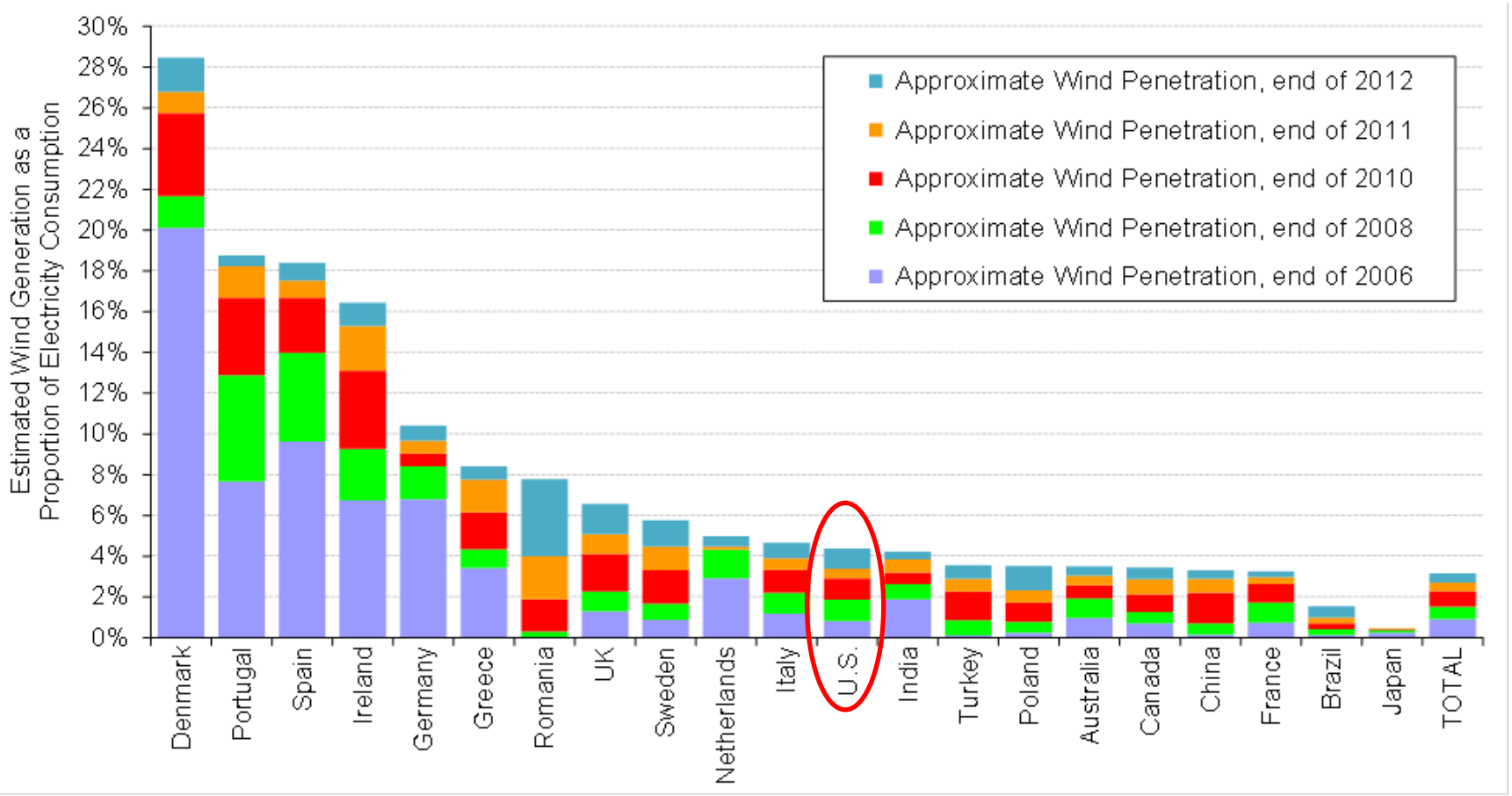
- Wind was, for the first time, the largest resource added in terms of gross capacity, despite persistently low natural gas prices

The U.S. Narrowly Regained the Lead in Global Annual Wind Power Additions

Annual Capacity (2012, MW)		Cumulative Capacity (end of 2012, MW)	
U.S.	**13,131**	China	75,372
China	12,960	**U.S.**	**60,005**
Germany	2,415	Germany	31,467
India	2,336	Spain	22,462
U.K.	1,958	India	18,602
Italy	1,272	U.K.	9,113
Spain	1,112	Italy	7,998
Brazil	1,077	France	7,593
Canada	936	Canada	6,214
Romania	923	Portugal	4,363
Rest of World	6,838	*Rest of World*	42,368
TOTAL	**44,958**	**TOTAL**	**285,558**

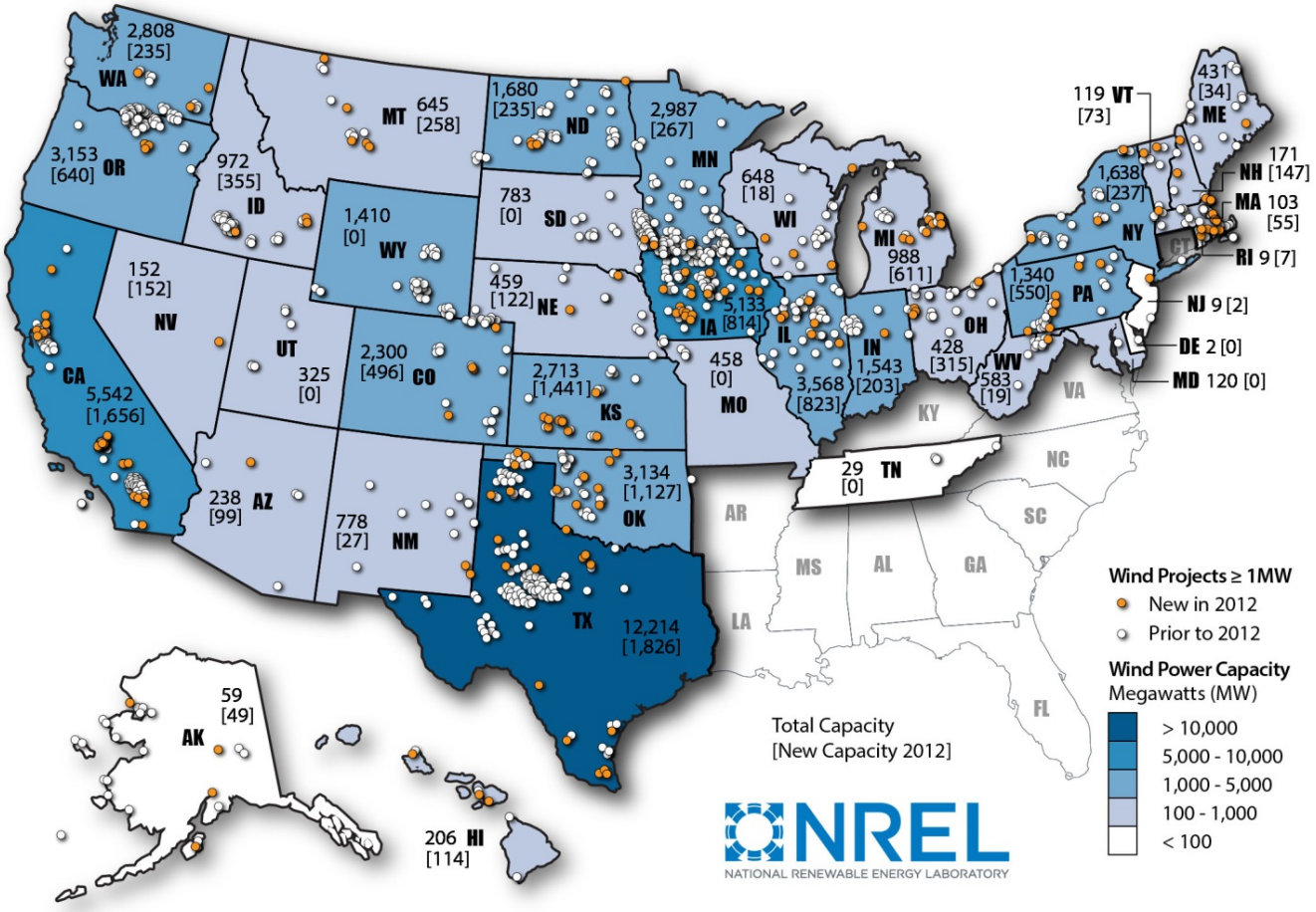
- U.S. led global growth in wind capacity in 2012; expected to lead global contraction in wind capacity additions in 2013
- Remains a distant second to China in cumulative capacity

U.S. Lagging Other Countries in Wind As a Percentage of Electricity Consumption



Note: Figure only includes the countries with the most installed wind power capacity at the end of 2012

Geographic Spread of Wind Power Projects in the United States Is Reasonably Broad



Note: Numbers within states represent cumulative installed wind capacity and, in brackets, annual additions in 2012.

Texas Added the Most Wind Capacity in 2012; 9 States Exceed 12% Wind Energy

Capacity (MW)			
Annual (2012)		Cumulative (end of 2012)	
Texas	1,826	Texas	12,214
California	1,656	California	5,542
Kansas	1,441	Iowa	5,133
Oklahoma	1,127	Illinois	3,568
Illinois	823	Oregon	3,153
Iowa	814	Oklahoma	3,134
Oregon	640	Minnesota	2,987
Michigan	611	Washington	2,808
Pennsylvania	550	Kansas	2,713
Colorado	496	Colorado	2,301
Idaho	355	North Dakota	1,680
Ohio	315	New York	1,638
Minnesota	267	Indiana	1,543
Montana	258	Wyoming	1,410
New York	237	Pennsylvania	1,340
Washington	235	Michigan	988
North Dakota	235	Idaho	973
Indiana	203	South Dakota	783
Nevada	152	New Mexico	778
New Hampshire	147	Wisconsin	648
Rest of U.S.	743	*Rest of U.S.*	4,673
TOTAL	**13,131**	**TOTAL**	**60,005**

Percentage of In-State Generation			
Actual (2012)*		Estimated (end of 2012)**	
Iowa	24.5%	Iowa	25.3%
South Dakota	23.9%	South Dakota	23.9%
North Dakota	14.7%	Kansas	20.1%
Minnesota	14.3%	Minnesota	16.9%
Kansas	11.4%	Idaho	16.0%
Colorado	11.3%	North Dakota	15.6%
Idaho	11.3%	Oklahoma	14.0%
Oklahoma	10.5%	Colorado	13.1%
Oregon	10.0%	Oregon	12.8%
Wyoming	8.8%	Wyoming	8.8%
Texas	7.4%	Texas	8.3%
New Mexico	6.1%	Hawaii	8.0%
Maine	5.9%	California	7.1%
Washington	5.8%	Montana	7.0%
California	4.9%	Maine	6.6%
Montana	4.5%	New Mexico	6.3%
Illinois	3.9%	Washington	6.1%
Nebraska	3.7%	Illinois	4.8%
Hawaii	3.6%	Nebraska	4.3%
Indiana	2.8%	Vermont	3.7%
Rest of U.S.	0.6%	*Rest of U.S.*	0.8%
TOTAL	**3.5%**	**TOTAL**	**4.2%**

* Based on 2012 wind and total generation by state from EIA's *Electric Power Monthly*.

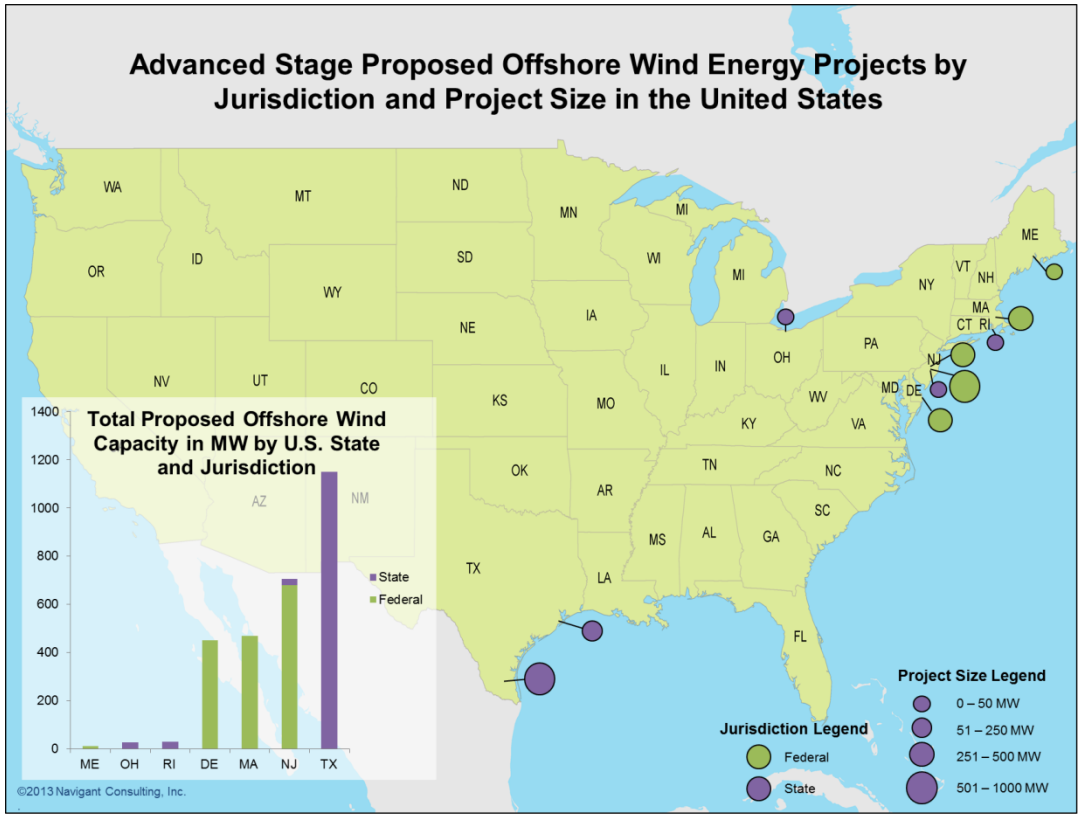
** Based on a projection of wind electricity generation from end-of-2012 wind power capacity, divided by total in-state electricity generation in 2012.

Source: AWEA project database, EIA, Berkeley Lab estimates

At end of 2012:

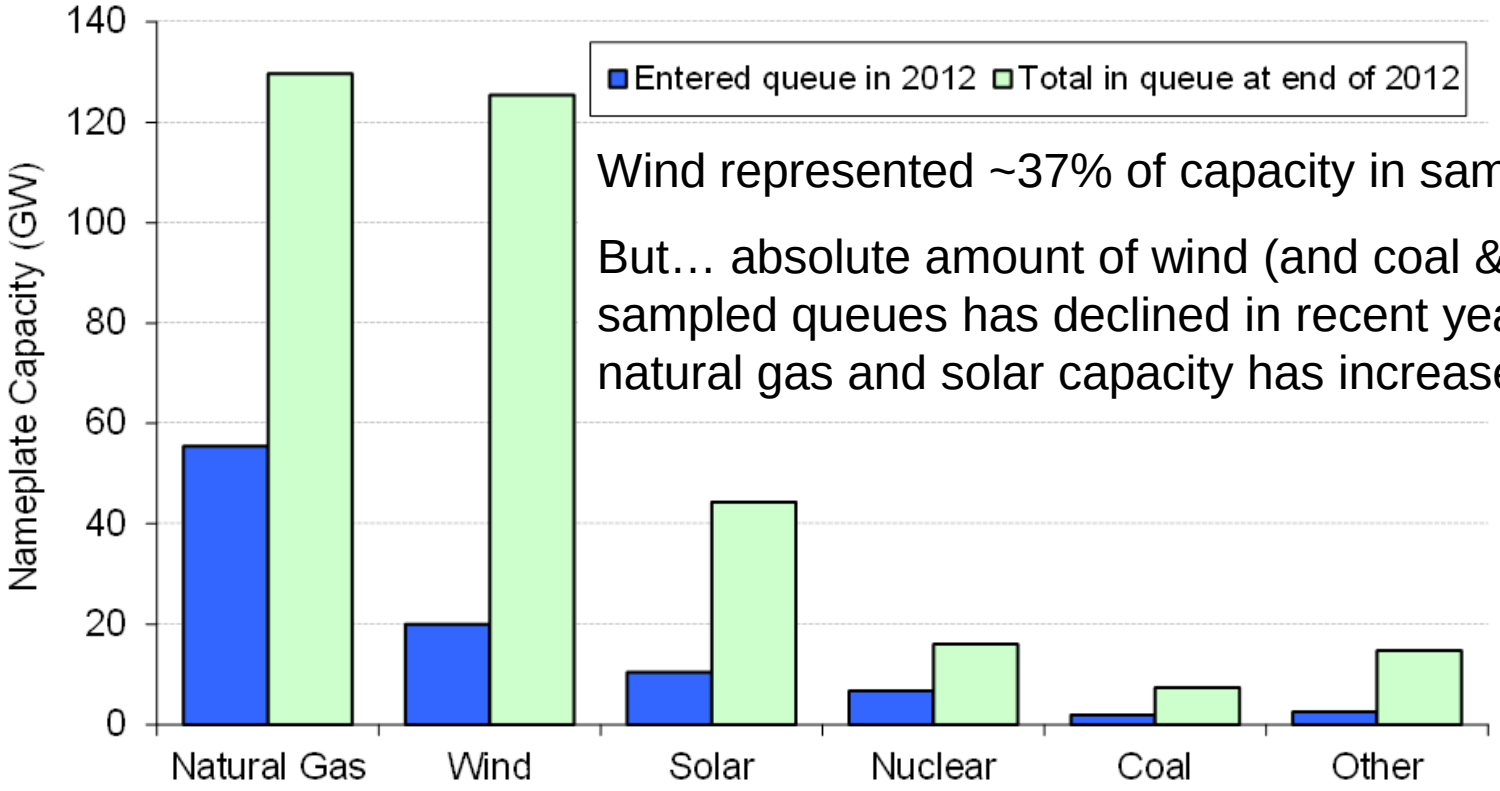
- Texas had more than twice as much wind capacity as any other state
- 22 states had >500 MW of capacity (15 > 1 GW, 10 > 2 GW)
- 3 states had the ability to provide >20% of total in-state generation from wind (9 > 10%, 17 > 5%)

No Commercial Offshore Turbines Commissioned in the U.S., but 10 Projects Totaling 2.8 GW Are Somewhat More Advanced in Development



- Two projects have power purchase agreements (PPAs):
  - Cape Wind (MA)
  - Deepwater Wind (RI)
- PPA terms for Statoil project in ME approved by state regulators
- Scale model of floating turbine deployed in ME in June 2013
- MD established offshore wind set-aside within state's RPS

Interconnection Queues Demonstrate that An Enormous Amount of Wind Is Under Consideration but that Relative Interest in Wind May Be Declining

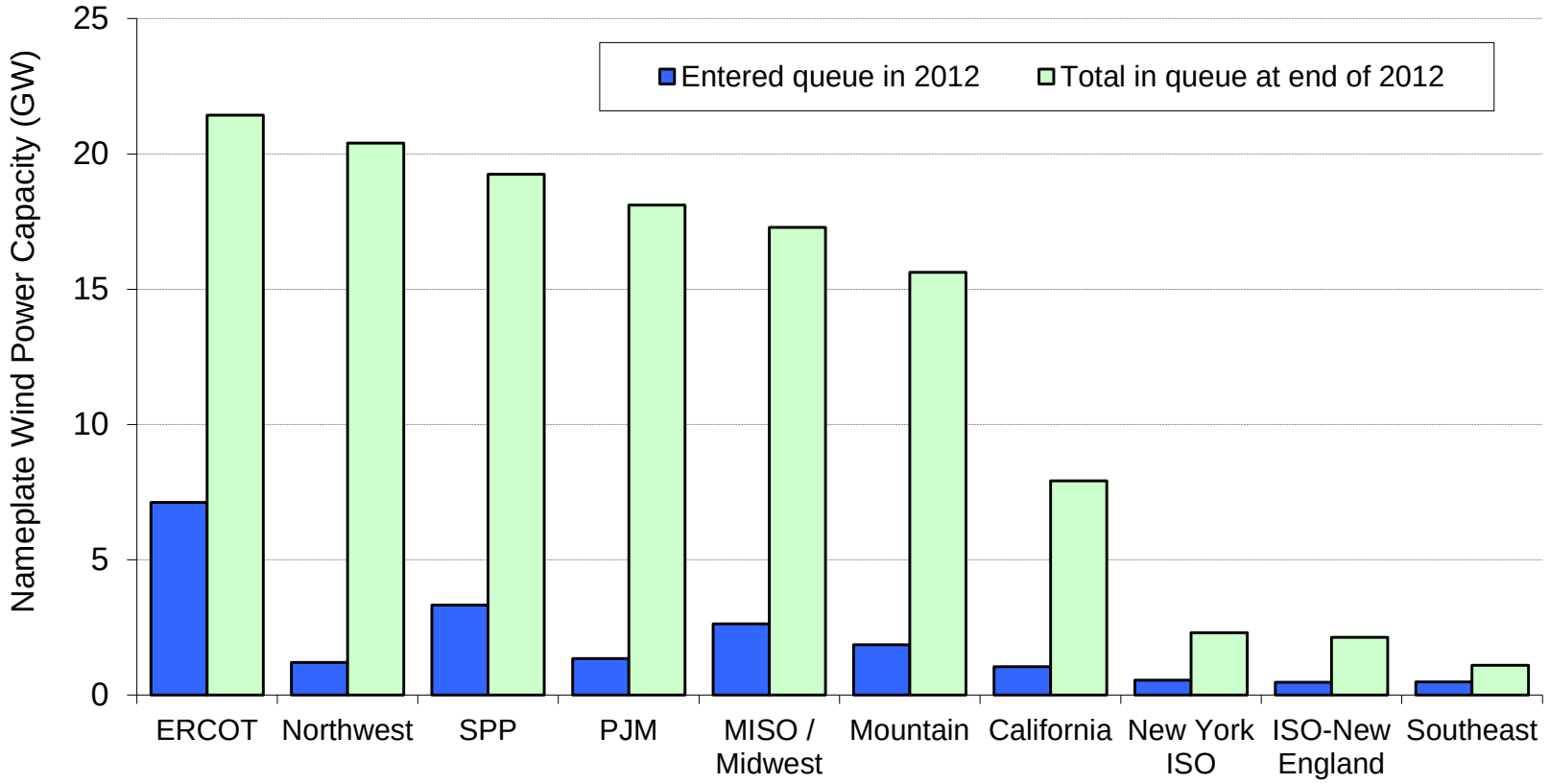


Wind represented ~37% of capacity in sampled 42 queues

But… absolute amount of wind (and coal & nuclear) in sampled queues has declined in recent years whereas natural gas and solar capacity has increased

Not all of this capacity will be built….

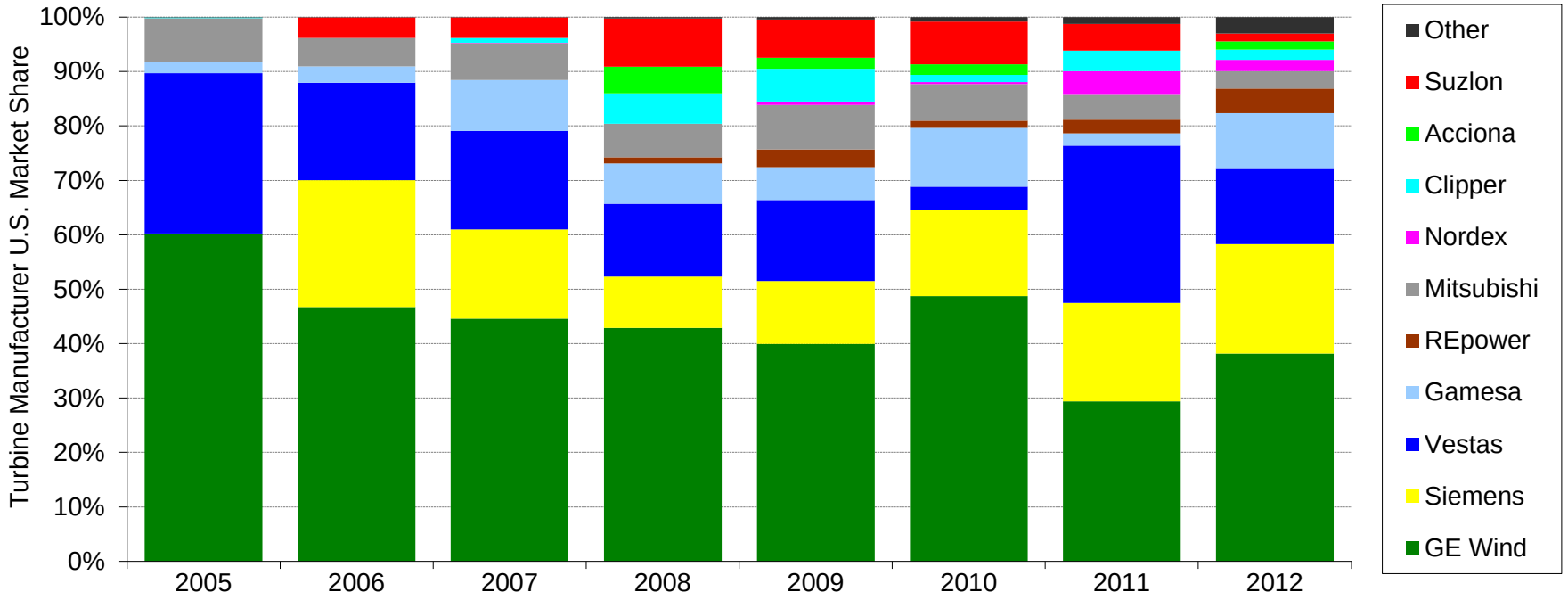
95% of Wind Capacity Planned for Texas, Northwest, Southwest Power Pool, PJM, Midwest, Mountain Region, and California



Not all of this capacity will be built….

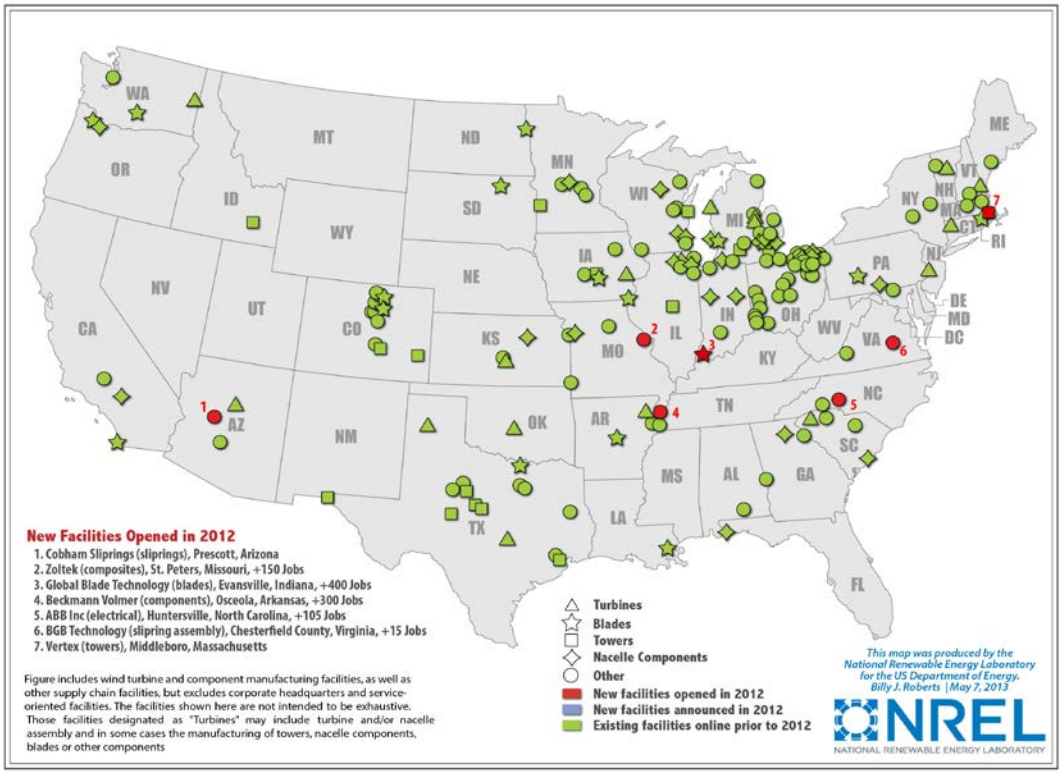
Industry Trends

"Big 3" OEMs Captured >70% of U.S. Market in 2012, yet Diversification Continues



- 25 OEMs installed > 1 MW of turbines in the U.S. in 2012, compared to just 5 in 2005; some recapture of market share by "big 3" OEMs since 2008-09
- 2012 installations by Chinese and South Korean manufacturers included: Goldwind, China Creative, Guodian, Sinovel, Hyundai, HZ, Sany
- Globally, GE ascended to an effective tie with Vestas as the top supplier

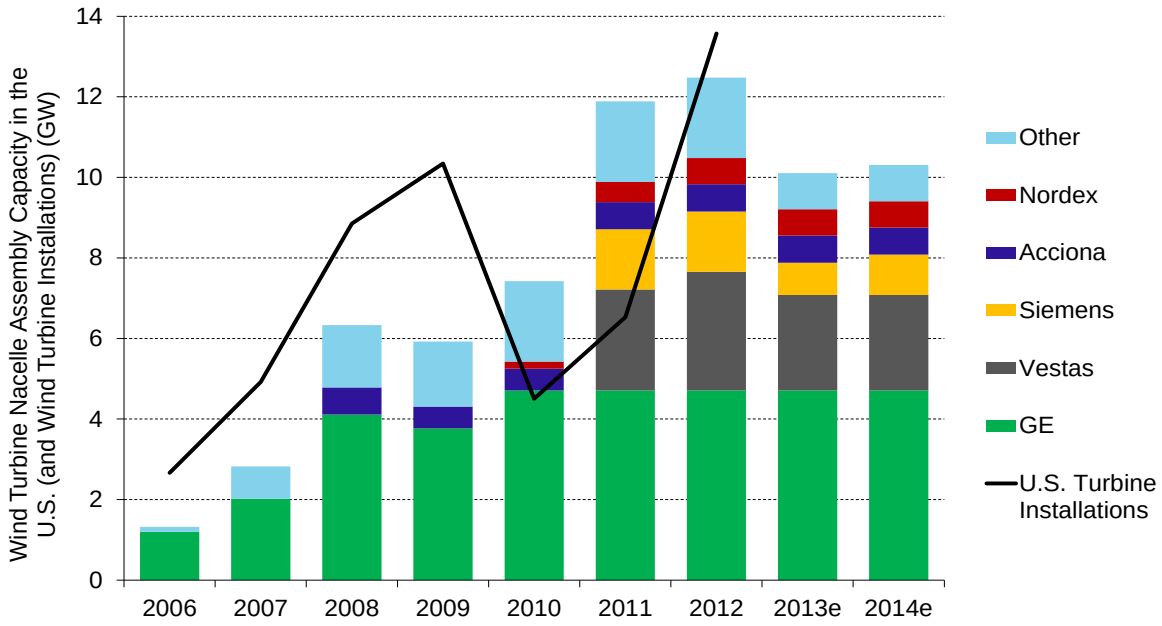
Manufacturing Supply Chain Responded to Record Year in Wind Additions, but with Substantial Growing Pains



Note: map is not intended to be exhaustive

- Manufacturers met the challenge of supplying 13 GW in 2012, but the late extension of PTC found some with already reduced workforces or closed facilities in preparation for lower demand
- 7 of 10 turbine OEMs with largest share of U.S. market in 2012 had manufacturing facilities in the U.S. in 2012, compared to one OEM in 2004
- Small number of manufacturing facilities opened in 2012, with a larger number of facilities closing (including Clipper & Nordic)

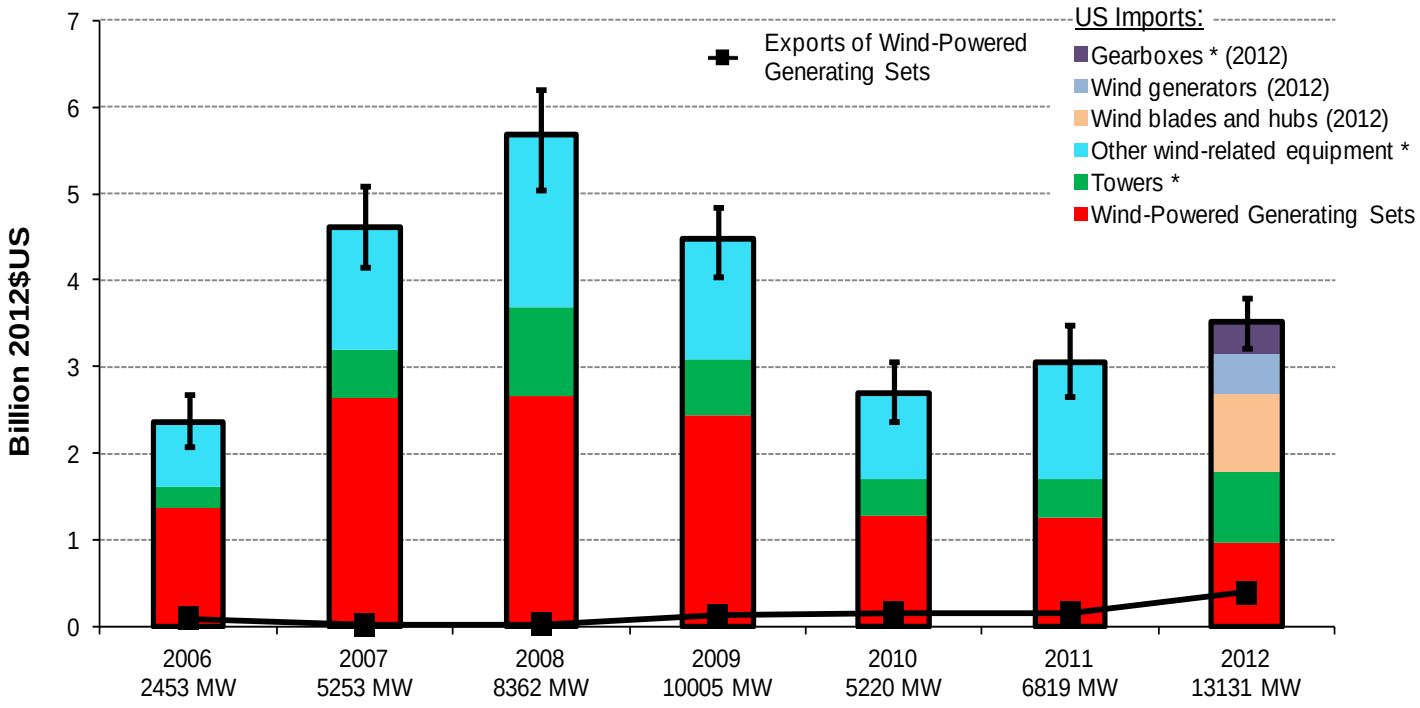
Over-Capacity of U.S. Nacelle Assembly Capability in Short Term Given Reduced Near-Term Deployment Expectations



- Near term forecasts for wind additions suggest an over-capacity of nacelle assembly capability in the short term, in contrast to 4 GW of under-capacity in 2009 and 1 GW of under-capacity in 2012
- 80,700 full time workers employed directly or indirectly in industry at end of 2012, but declines in manufacturing jobs

- Manufacturers have now begun receiving orders for 2013 and 2014, but it is not yet clear to what degree these orders will lead to a recovery of the sector

Growth in Both Wind-Related Equipment Imports and Exports in 2012



* estimated imports

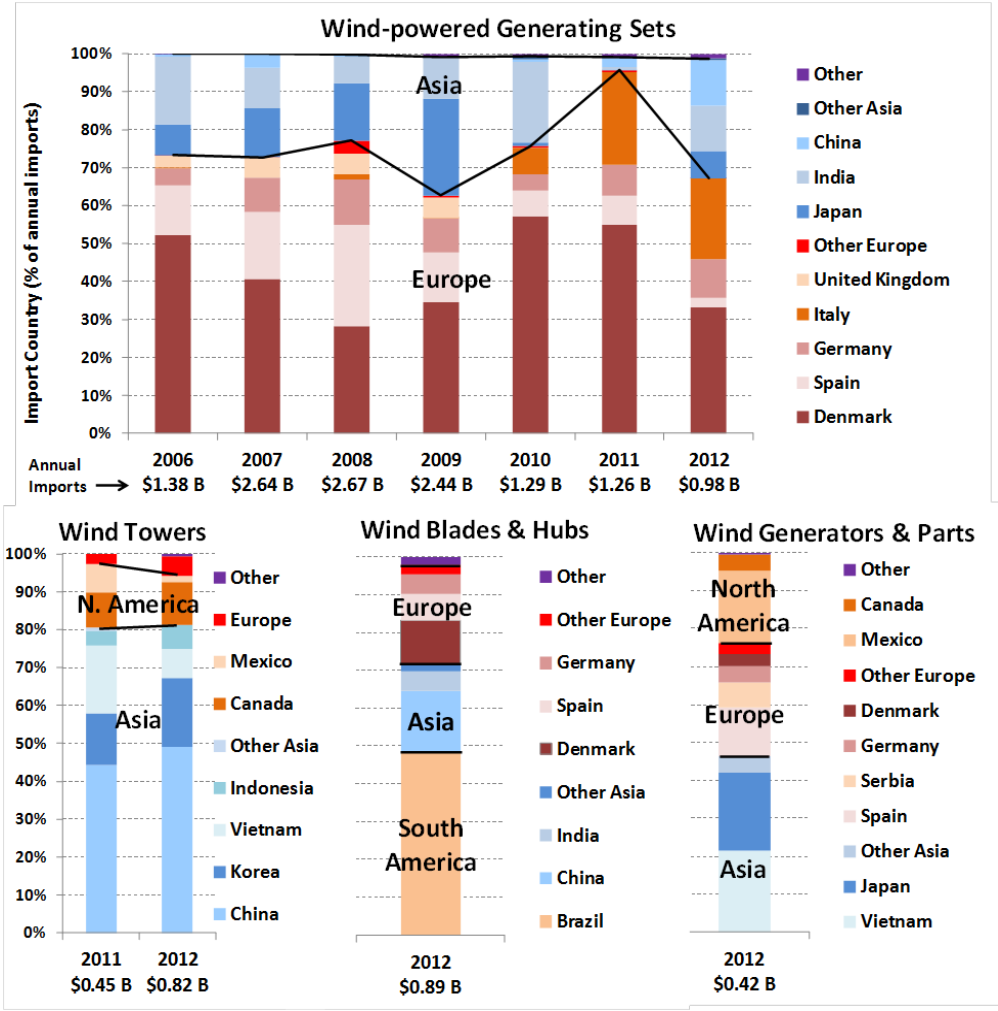
Overall, the U.S. is a net importer of wind equipment

Exports of wind-powered generating sets from the U.S. rose from $16 million in 2007 to $388 million in 2012 (almost entirely to Canada and Latin America)

- *Figure only includes selected trade categories; may miss other wind-related imports*
- *See full report for the many assumptions used to generate this figure*

Source Markets for Imports Vary Over Time, and By Type of Wind Equipment

- Considering total 2012 imports in these trade categories, almost half of import value comes from Asia, one-third from Europe, and significant amounts from Americas
- Majority of wind-powered generating sets from Europe
- Majority of tower imports from Asia; less from North America
- Most imports of blades & hubs from Brazil, China, and Denmark; diverse mix
- Under half of generators & parts imported from Asia; remainder Europe & North America



Despite Challenges, a Growing Percentage of the Equipment Used in U.S. Wind Projects Has Been Sourced Domestically

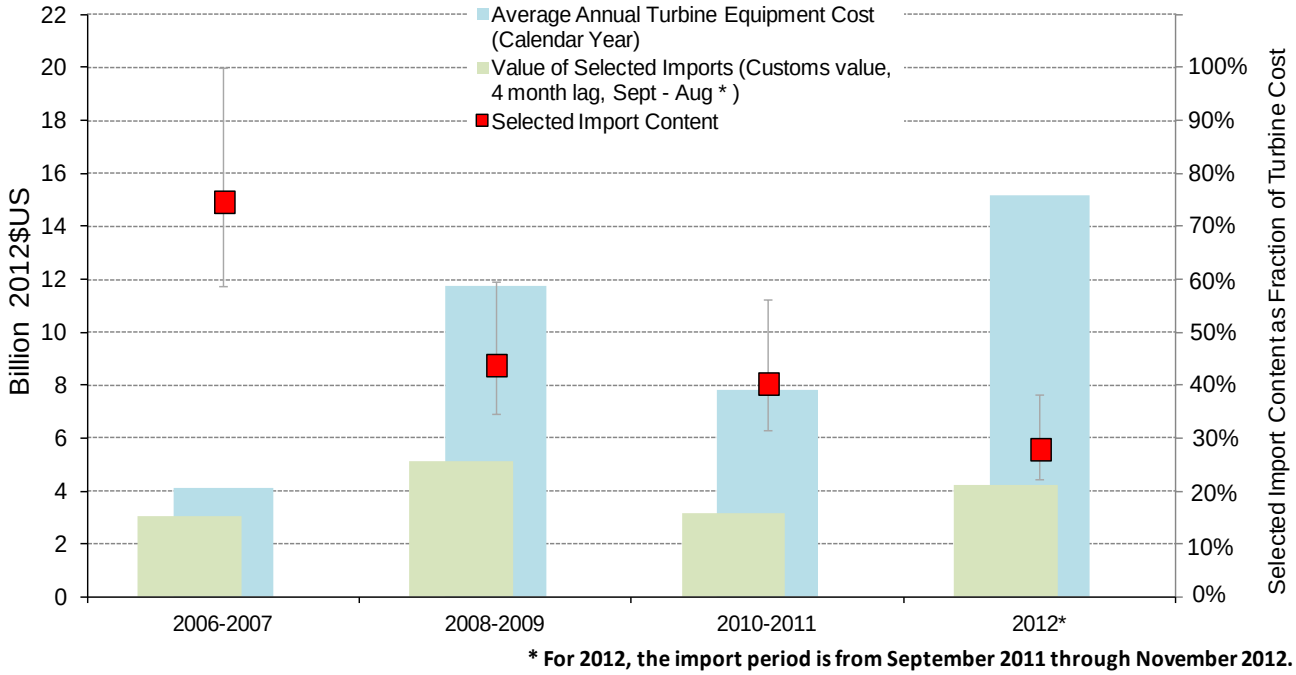
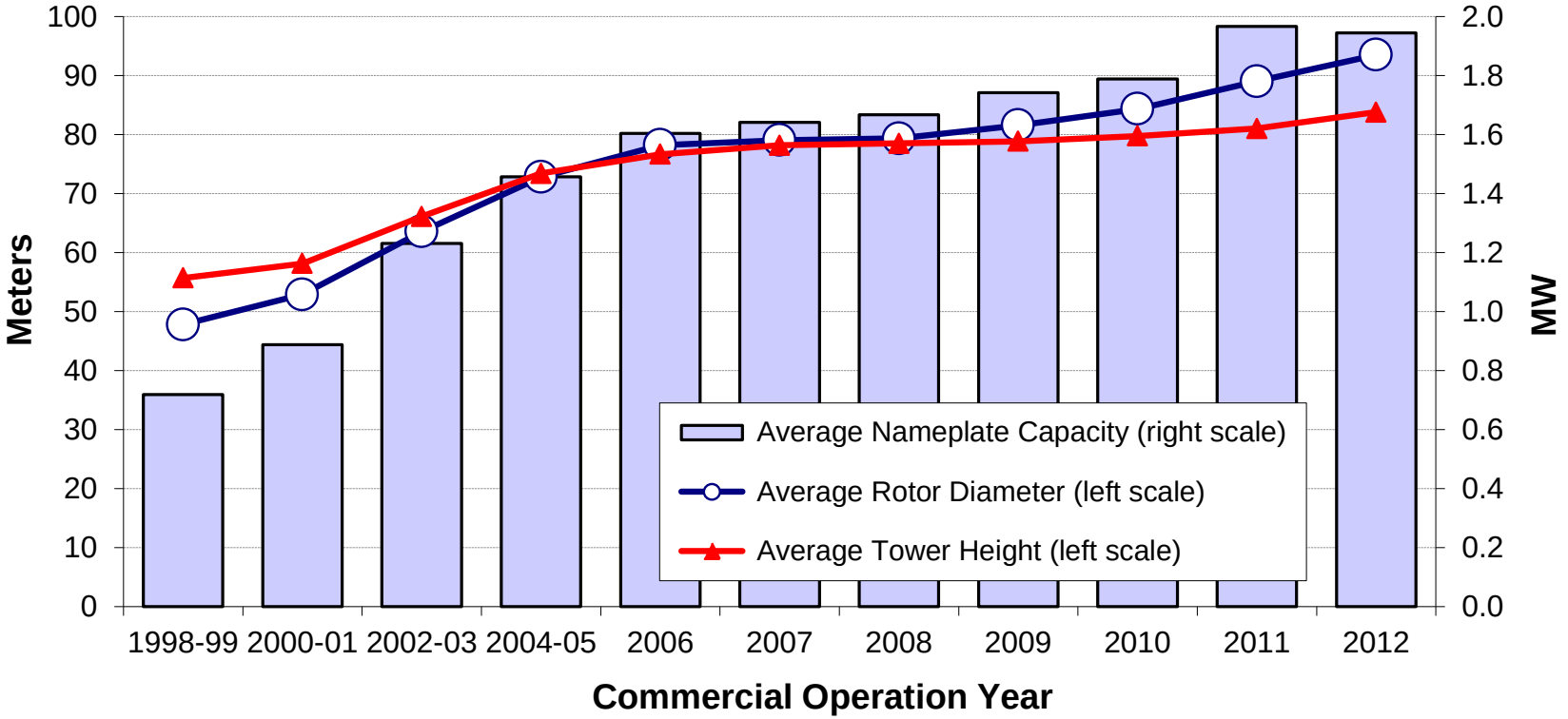


Figure may understate the wind industry's reliance on imports because wind-related imports can occur under other trade categories not captured here

See full report for the many assumptions used to generate this figure

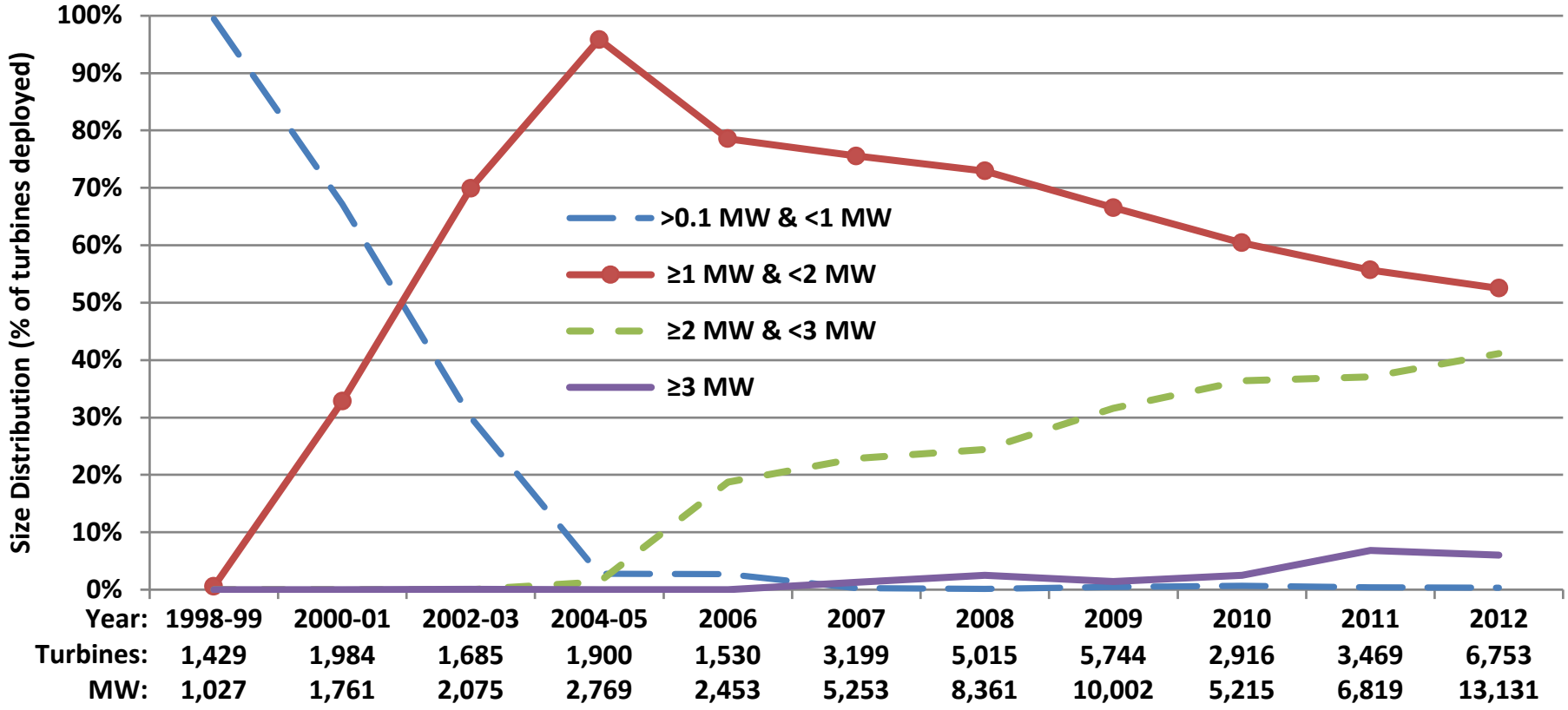
- If imports do not occur through other HTS codes, domestic content increased from: ~25% in 2006-07 to ~70% in 2012; whether these trends will be maintained in future years is highly uncertain

Average Capacity of Turbines Declined Slightly, but Average Hub Height and Rotor Diameter Continued to Increase



- Two periods of rapid scaling: 1998-2006 and 2009-present
- 2007-2008 mostly stagnant, as OEMs focused on meeting demand

Pace of Scaling Has Slowed Since 2006

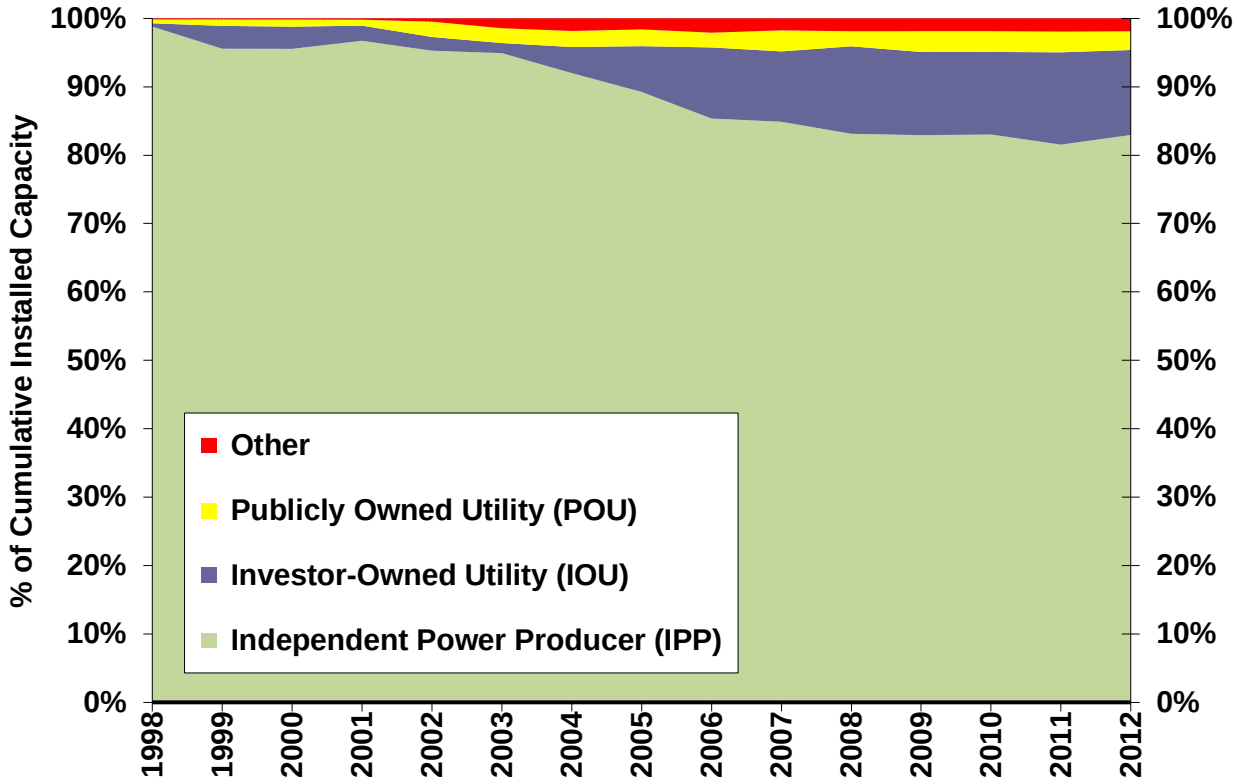


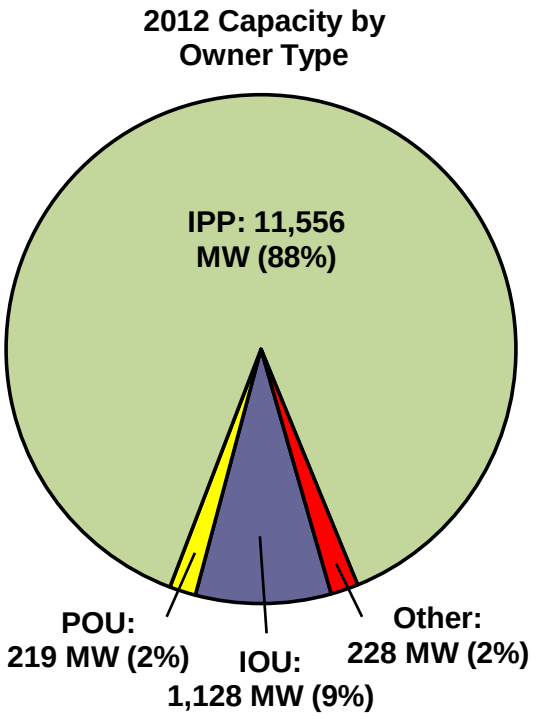
- 6 years (2000-2005) for MW-class turbines to displace sub-MW-class
- Another 7 years (2006-2012) for multi-MW-class turbines (2 MW and above) just to gain nearly equal market share with MW-class

The Project Finance Environment Held Steady in 2012

- Uncertainty surrounding the fate of the PTC in 2013 led to lower commitments of both tax equity and debt in 2012
  - Yields in both markets, however, remained largely unchanged from 2011
- In the debt market, a seemingly permanent shift to shorter bank loan tenors has created an opportunity for institutional lenders and bond markets that can offer longer-maturity instruments
  - Some developers are tapping into hybrid bank/bond instruments that play to the strengths of both types of debt in offering what, from the developer's perspective, appears to be a synthetic, fully amortizing long-term loan
- Next test of the depth of the tax equity market likely to be in 2014
  - Tax equity's reluctance to commit to projects more than 12 months in advance of commercial operations effectively turns the end-of-2013 PTC construction start deadline into an end-of-2014 commercial operations deadline
  - Section 1603 cash grant now a thing of the past for wind, while the backlog of grandfathered solar projects with 1603 grants will have diminished somewhat by 2014, bringing renewed competition for tax equity

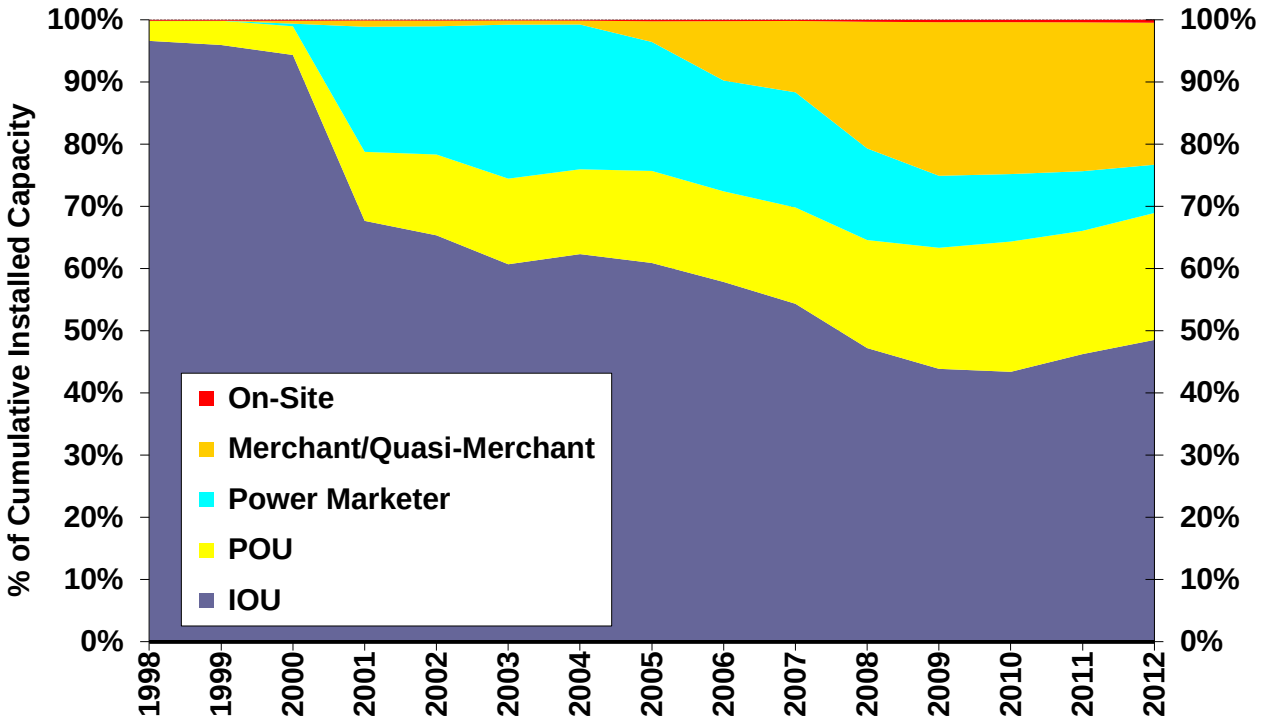
IPPs Remain the Dominant Owners of Wind Projects; Utilities Took a Breather in 2012

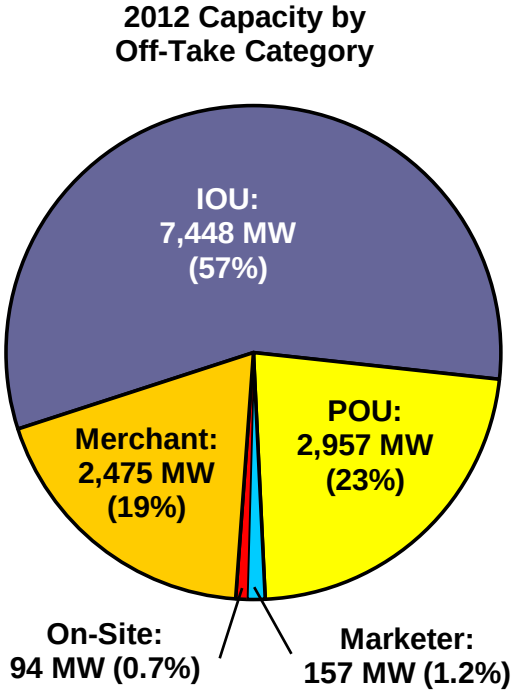




Utility ownership fell to 10% in 2012, down from 25% in 2011

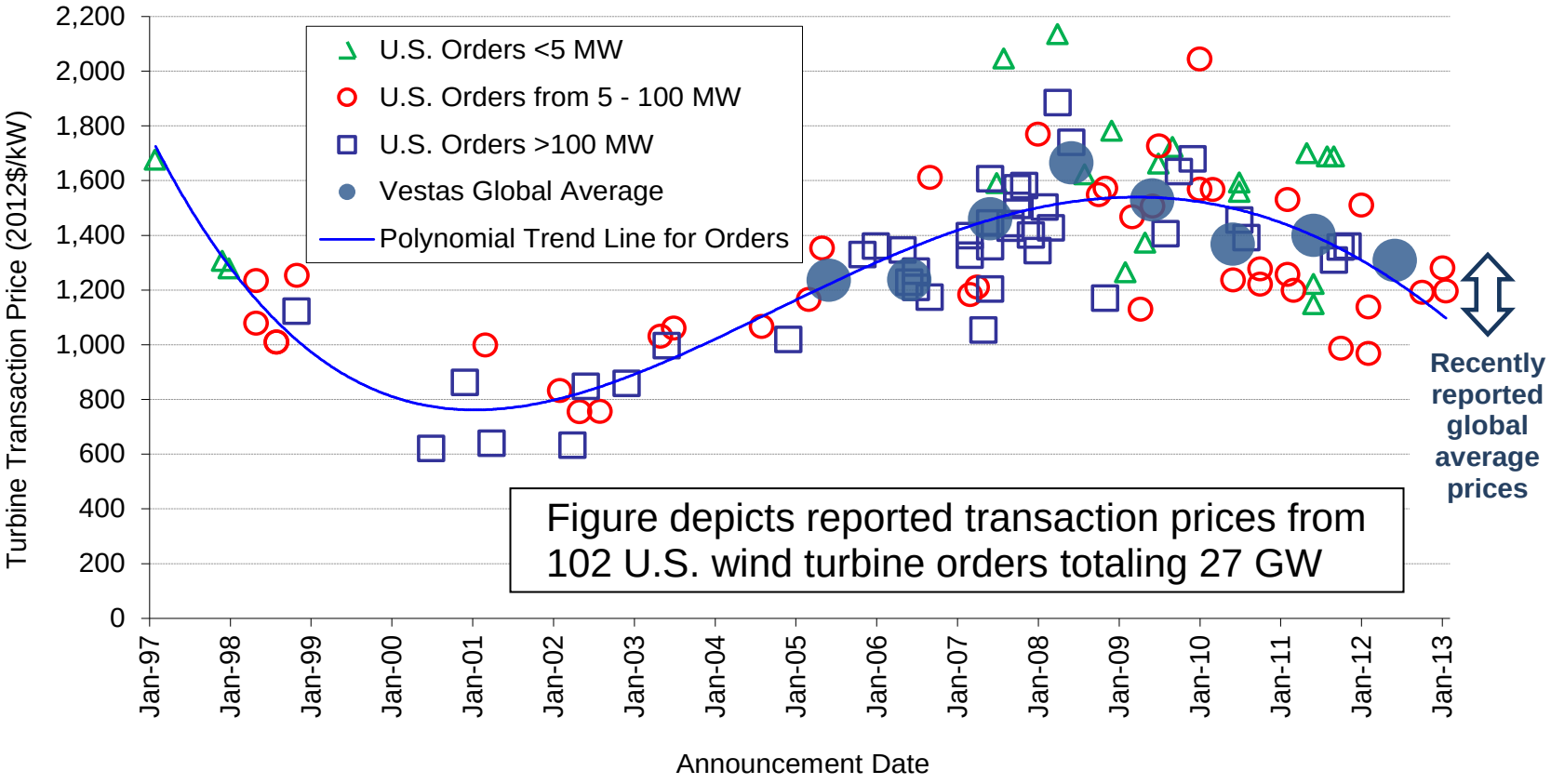
Long-Term Contracted Sales to Utilities Are the Most Common Off-Take Arrangement, and Have Gained Ground since the Peak of Merchant Development in 2008/2009





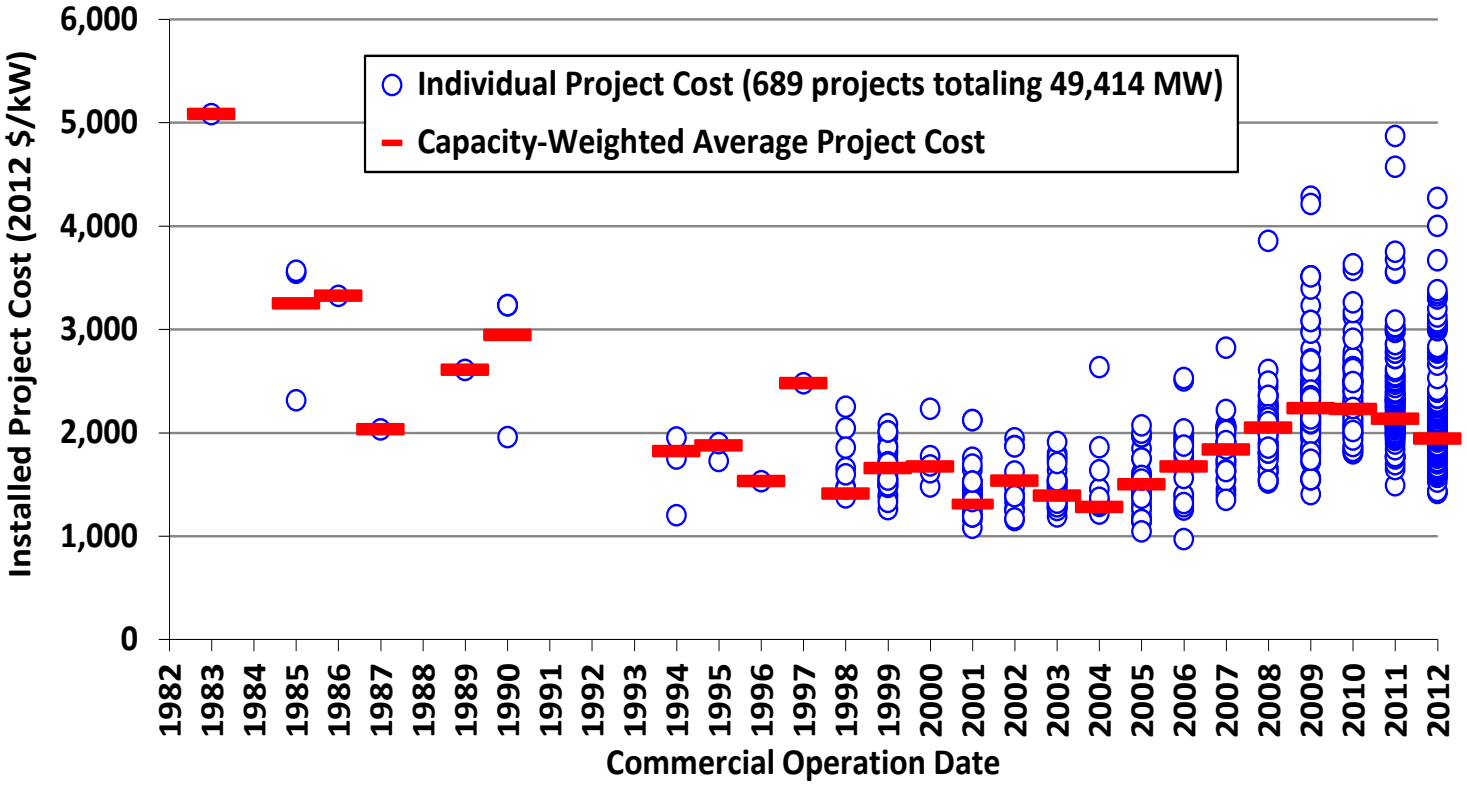
Cost Trends

Wind Turbine Prices Remained Well Below the Levels Seen Several Years Ago



- Recent turbine orders reportedly in the range of $950-1,300/kW, with more-favorable terms for buyers and improved technology

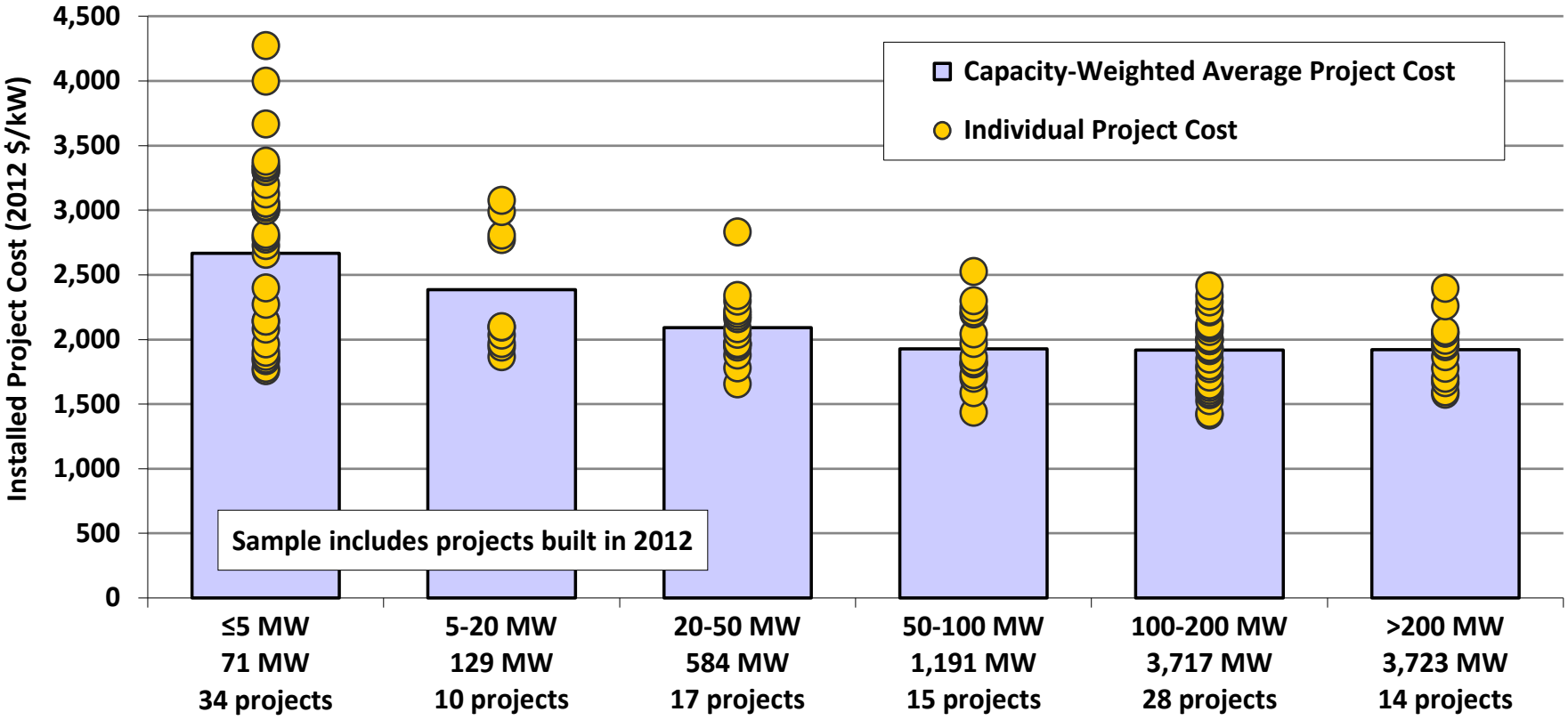
Reported Installed Project Costs Continued to Trend Lower in 2012



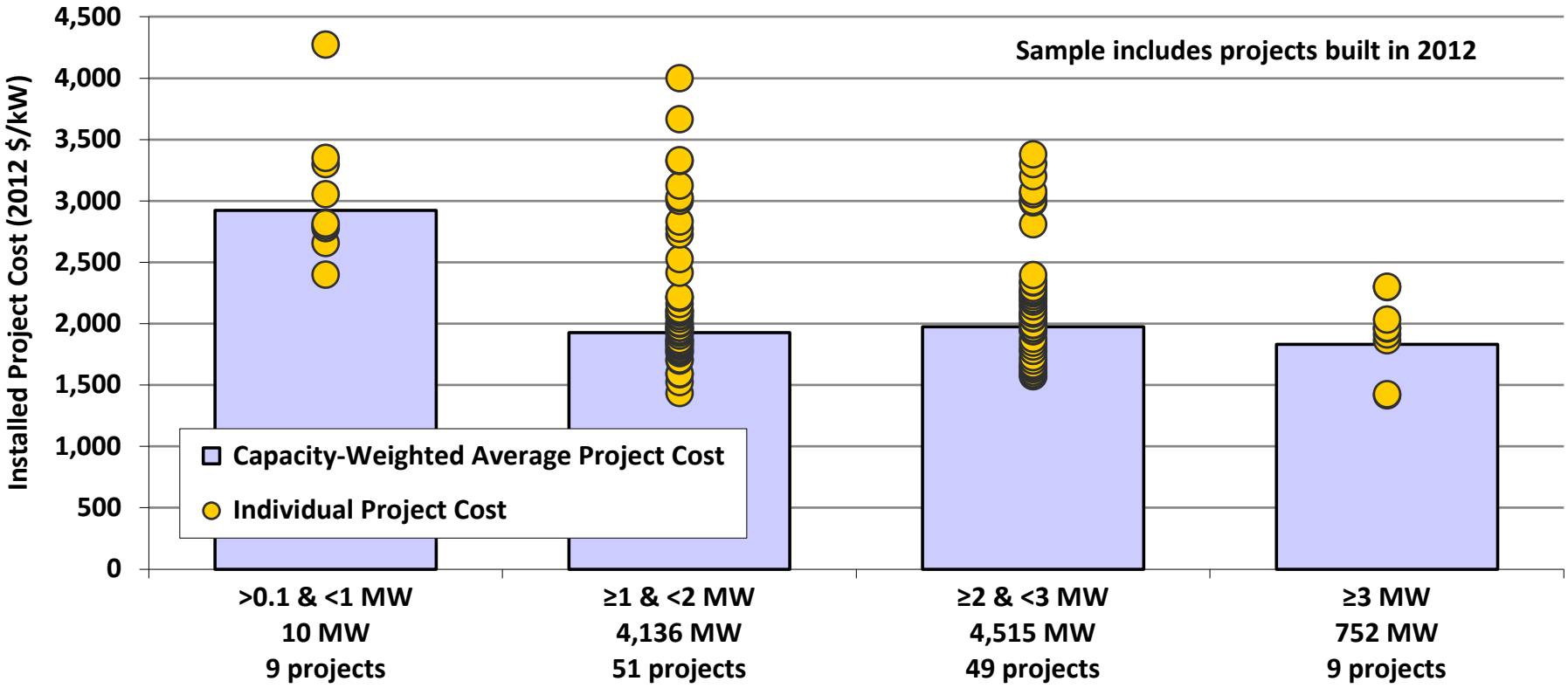
In 2012, the average cost was ~$1,940/kW, down ~$200/kW from 2011, and down $300/kW from the peak in 2009-10

Whereas turbine prices peaked in 2008/2009, project-level installed costs peaked in 2009/2010, reflecting the normal passage of time between when a turbine supply agreement is signed and when those turbines are actually installed

Economies of Scale Evident, Especially at Lower End of Project Size Range

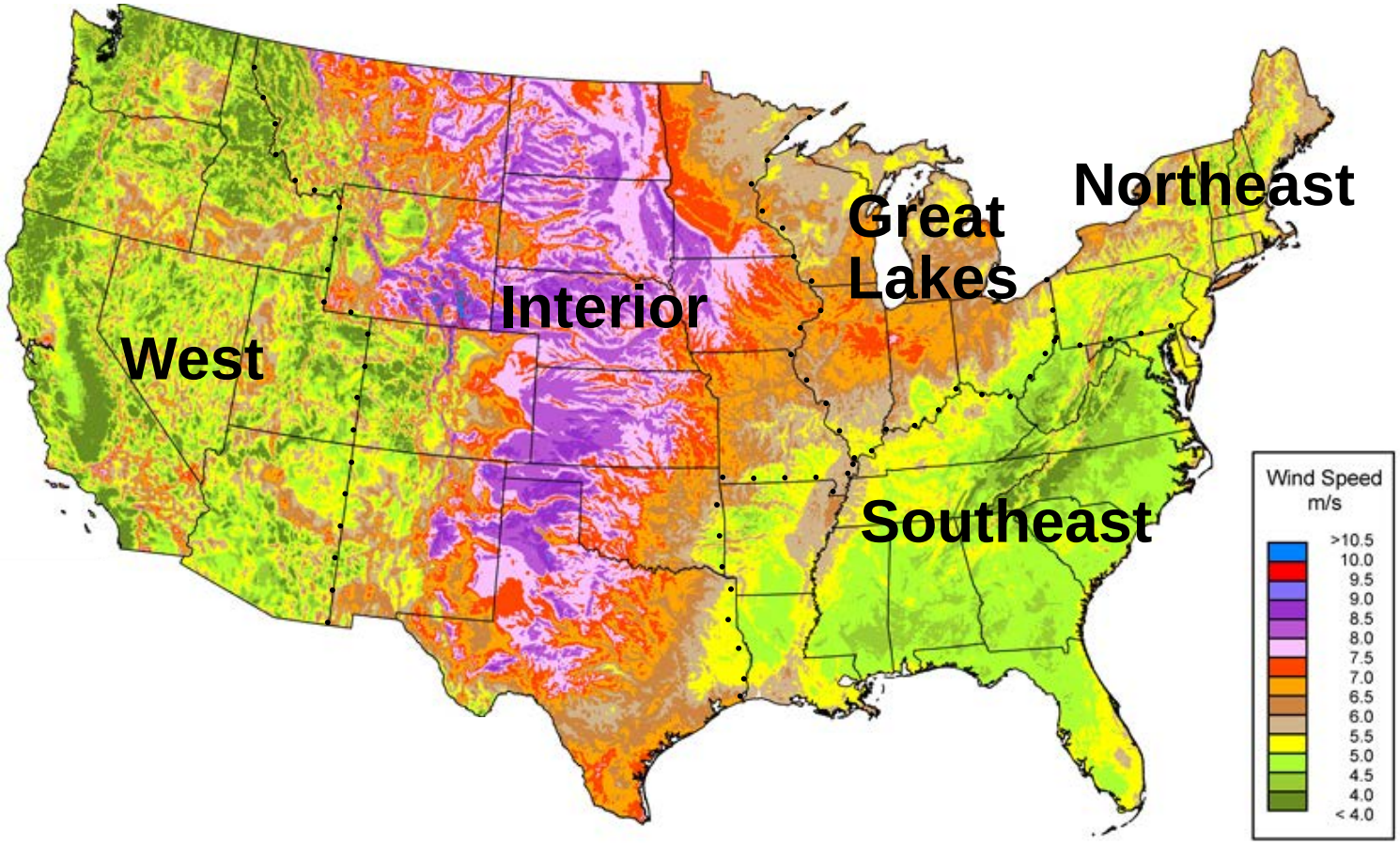


Economies of Scale Also Evident By Turbine Size

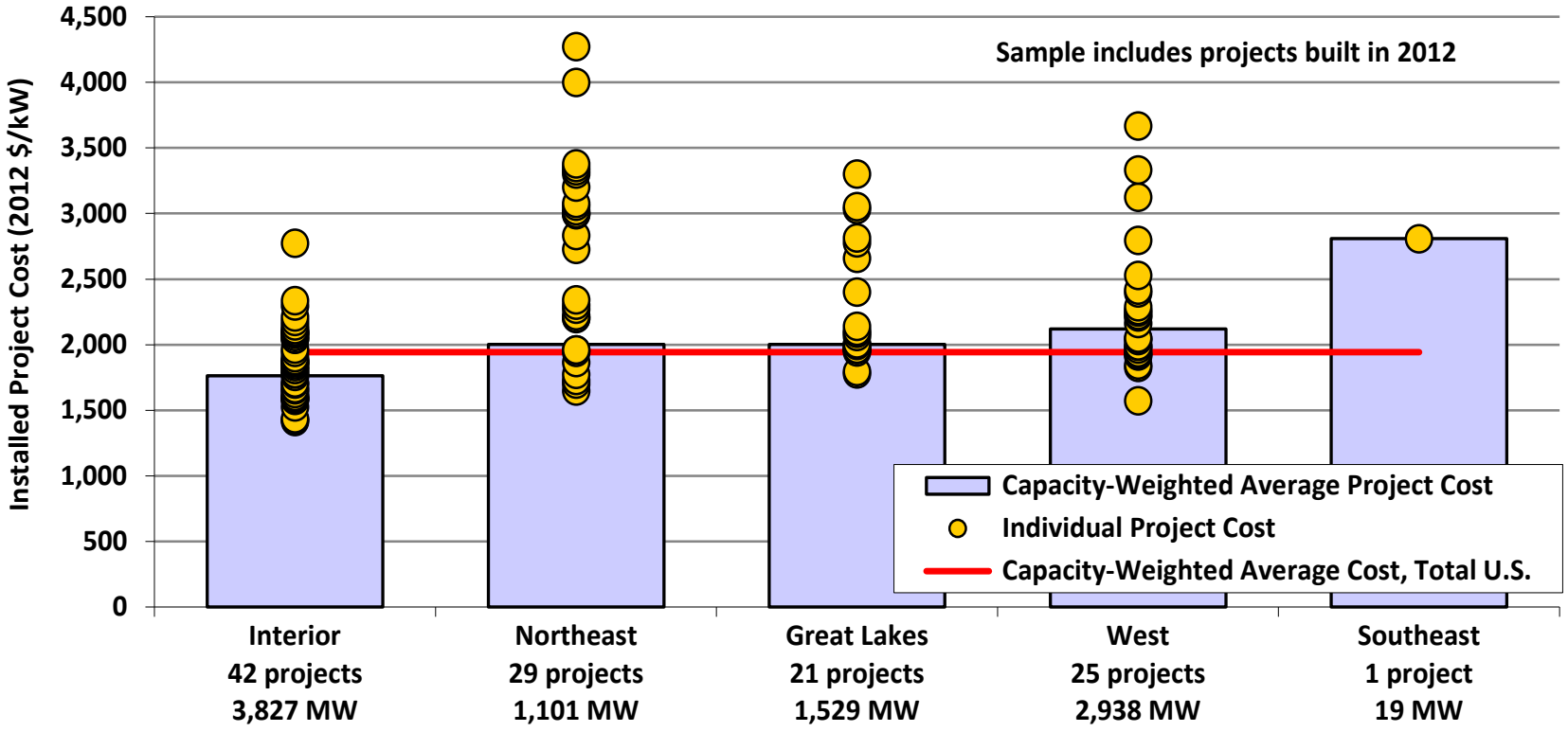


- Theory: A project may be built less-expensively using fewer larger turbines instead of a larger number of smaller turbines

Regional Definitions Based on Combination of Geography and Wind Resource

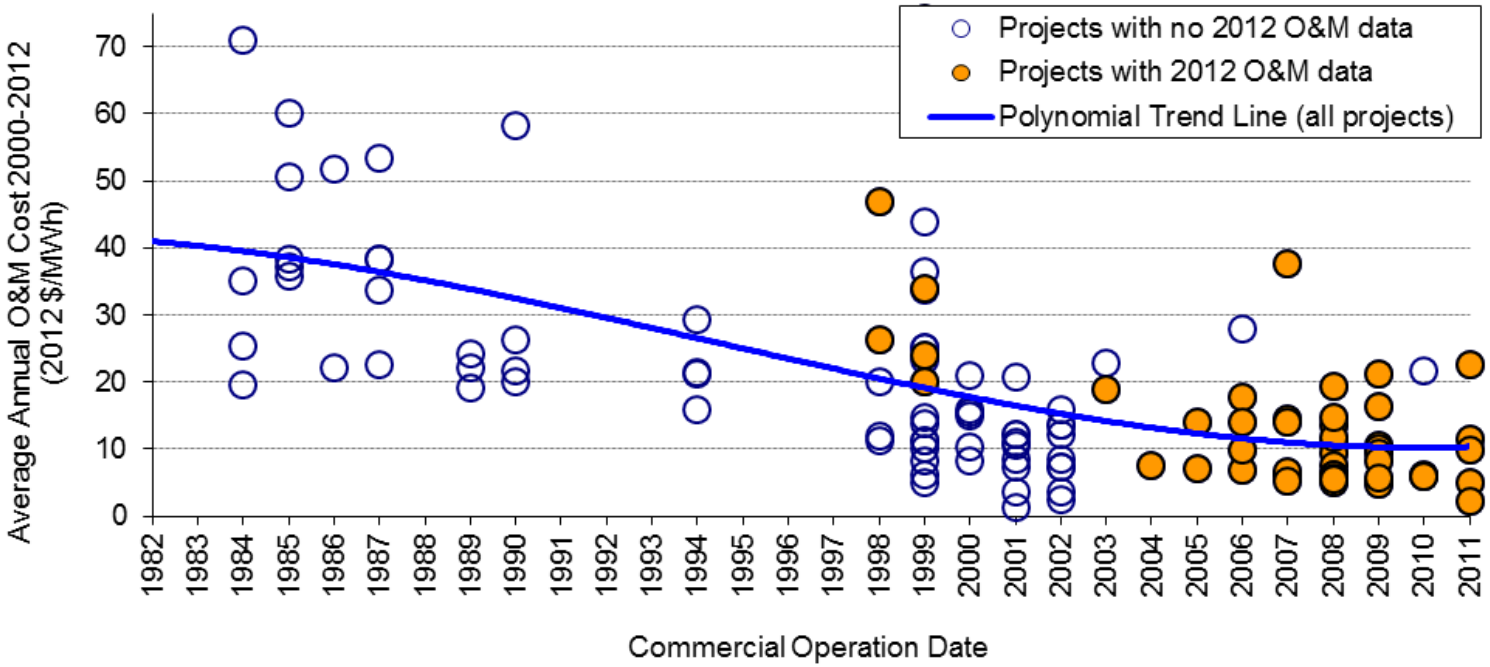


Some Regional Differences in Average Wind Power Project Costs Are Apparent



Different permitting/development costs may play a role at both ends of spectrum: it's easier/cheaper to build in the US interior and harder/more expensive along the coasts

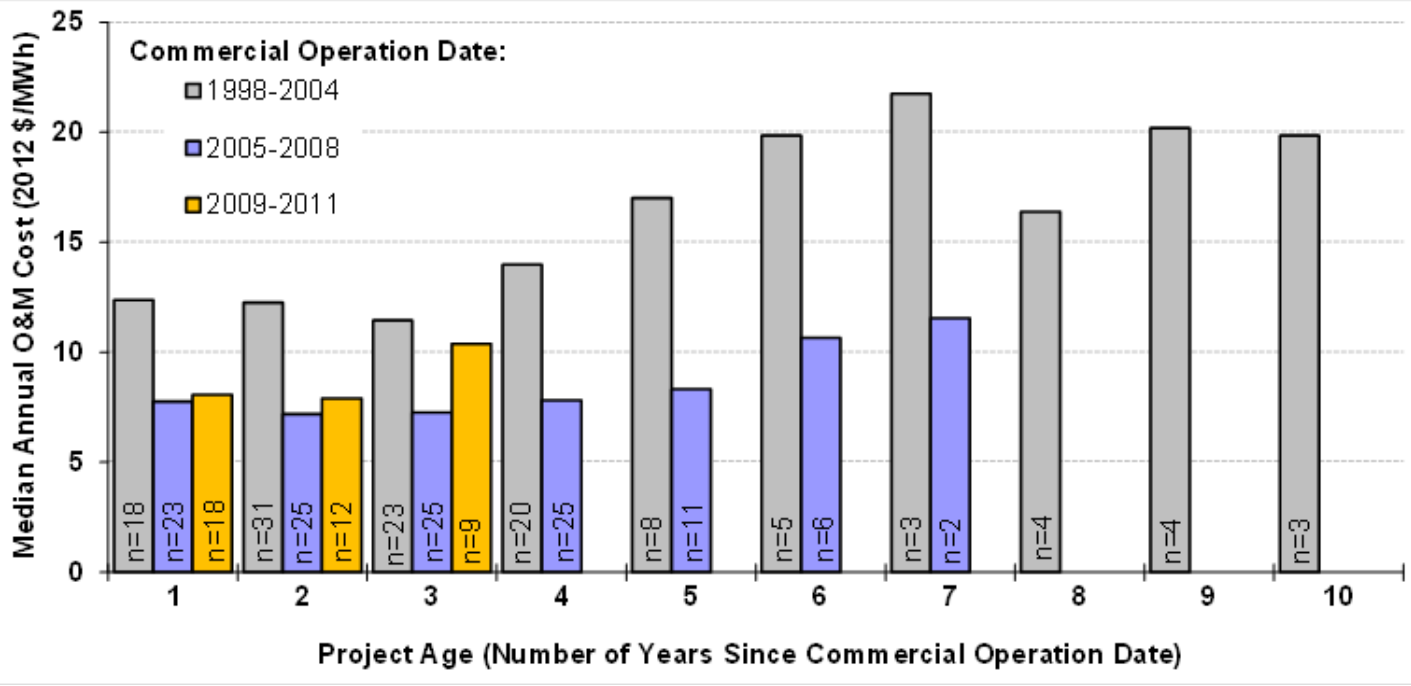
Operations and Maintenance Costs Varied By Project Age and Commercial Operations Date



Capacity-weighted average 2000-12 O&M costs for projects built in the 1980s equal **$34/MWh**, dropping to **$23/MWh** for projects built in 1990s, and to **$10/MWh** for projects built since 2000

*Note: Sample is limited, and consists of 138 wind power projects totaling 9,022 MW; few projects in sample have complete records of O&M costs from 2000-12; O&M costs reported here **DO NOT** include all operating costs*

Operations and Maintenance Costs Varied By Project Age and Commercial Operations Date

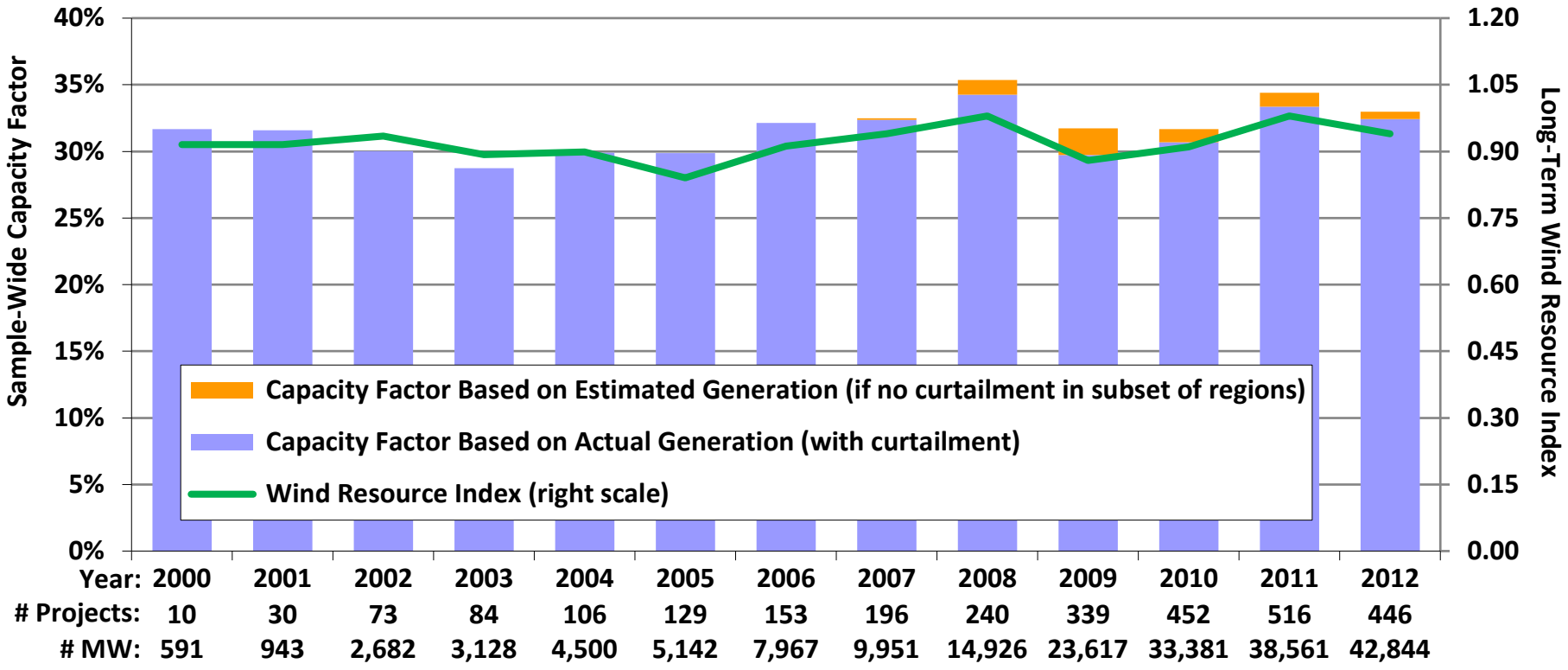


O&M reported in figure <u>does not</u> include all operating costs: Statements from public companies with large U.S. wind asset bases report total operating costs in 2012 for projects built in the 2000s of ~$24/MWh

Data are consistent with a recent NREL analysis based on data from GL Garrad Hassan covering the first two years of operations for > 3 GW of wind: that analysis suggests that turbine O&M costs may have increased among more recent (post-2008) projects

Performance Trends

Trends in Sample-Wide Capacity Factors Were Impacted by Curtailment and Inter-Year Wind Resource Variability



The wind resource index is compiled from NextEra Energy Resources reports. The pre-2007 portion of the index is adjusted to approximate the conversion from wind speed to generation (this adjustment is unnecessary starting in 2007).

Wind Curtailment Is Substantial, but Appears to Have Declined in 2012

Estimated Wind Curtailment (GWh and % of potential wind generation)

	2007	2008	2009	2010	2011	2012
Electric Reliability Council of Texas (ERCOT)	109.1 (1.2%)	1,416.6 (8.4%)	3,872.2 (17.1%)	2,066.5 (7.7%)	2,621.5 (8.5%)	1,038.0 (3.7%)
Southwestern Public Service Company (SPS)	N/A	0 (0.0%)	0 (0.0%)	0.9 (0.0%)	0.5 (0.0%)	N/A**
Public Service Company of Colorado (PSCo)	N/A	2.5 (0.1%)	19.0 (0.6%)	81.5 (2.2%)	63.9 (1.4%)	N/A**
Northern States Power Company (NSP)	N/A	25.4 (0.9%)	42.4 (1.7%)	44.3 (1.7%)	58.7 (1.6%)	120.5 (3.1%)
Midcontinent Independent System Operator (MISO) less NSP	N/A	N/A	249.6 (2.0%)	779.7 (4.2%)	782.6 (3.4%)	726.2 (2.5%)
Bonneville Power Administration (BPA)	N/A	N/A	N/A	4.6* (0.1%)	128.7* (1.4%)	70.8* (0.7%)
PJM	N/A	N/A	N/A	N/A	N/A	111.6# (1.8%)#
Total Across These Seven Areas:	**109 (1.2%)**	**1,444 (5.7%)**	**4,183 (9.7%)**	**2,978 (4.9%)**	**3,656 (4.9%)**	**2,067 (2.7%)**

- ERCOT numbers represent both forced (non-market) and voluntary (market) curtailment
- All other regions show only forced curtailment

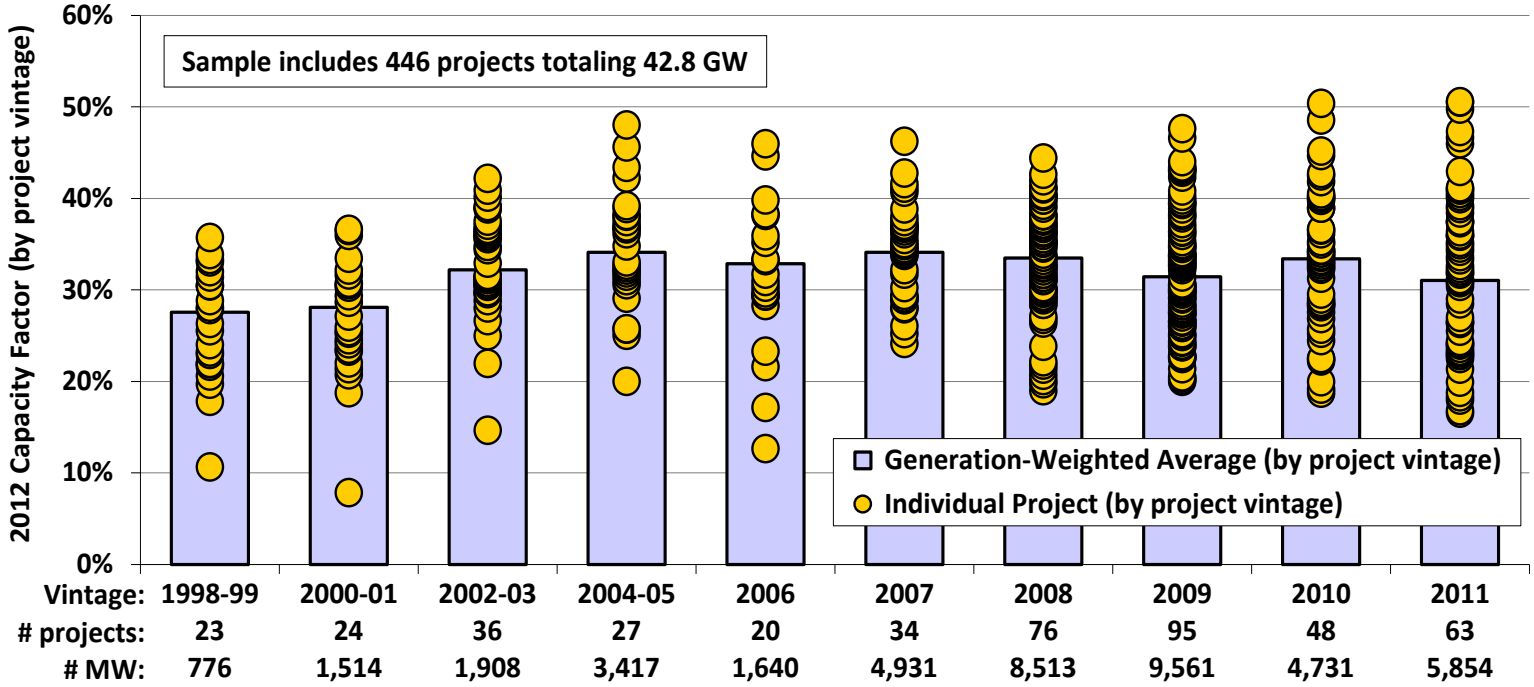
*A portion of BPA's curtailment is estimated assuming that each curtailment event lasts for half of the maximum possible hour for each event.

#2012 curtailment numbers for PJM are for June through December only (data for January through May are not available).

**Xcel Energy declined to provide 2012 curtailment data for its SPS and PSCo service territories.

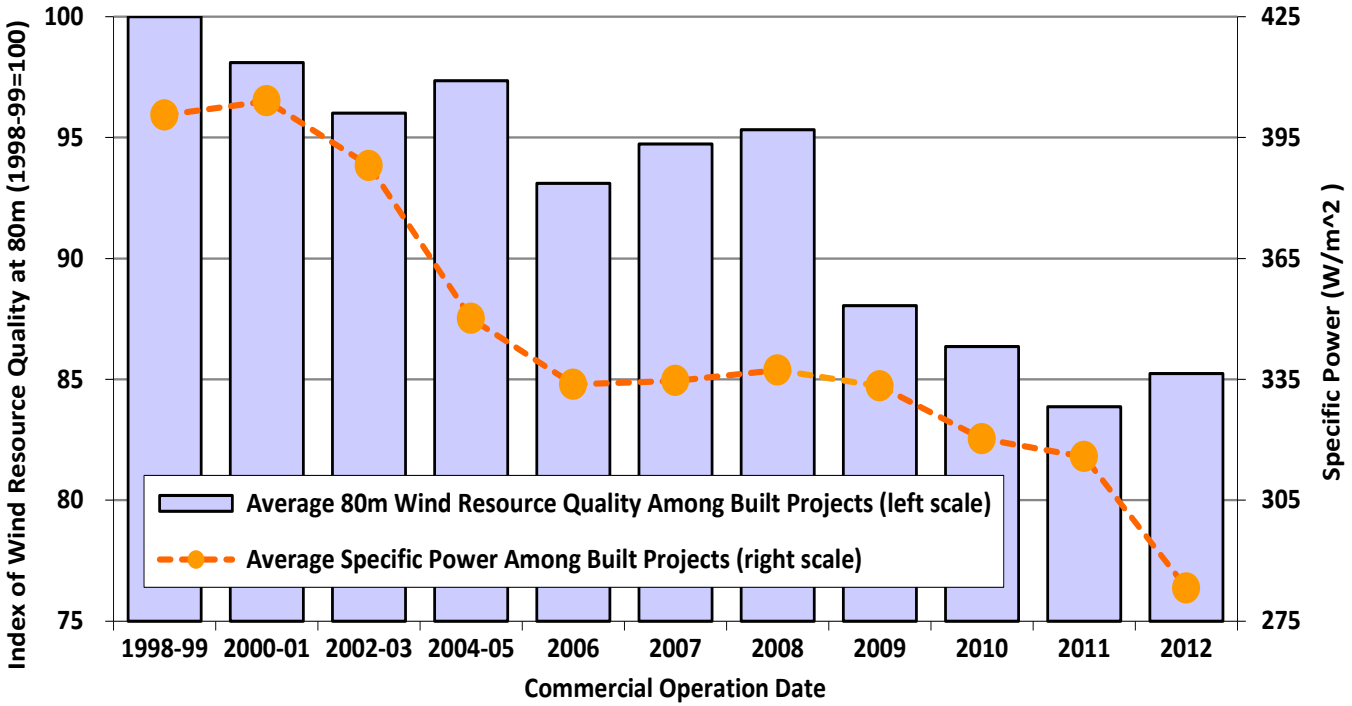
In areas where curtailment has been particularly problematic in the past – principally in Texas – steps taken to address the issue have started to bear fruit

Even Controlling for These Factors, Average Capacity Factors for Projects Built After 2005 Have Been Stagnant



Sample-wide average *not* strongly trending higher with more-recent vintages as might be expected based on rotor and hub height scaling trends: does not incorporate 2012 scaling and does not control for wind resource quality

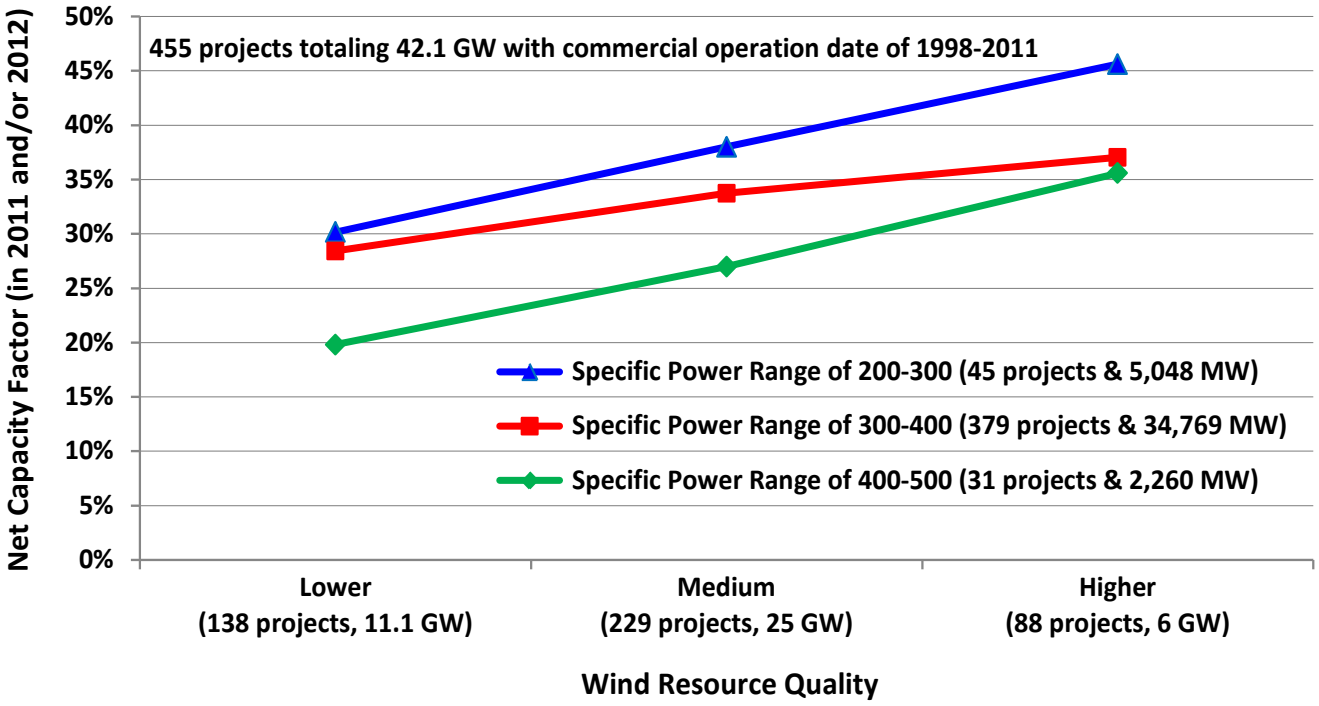
Despite Turbine Design Changes that Would Otherwise Boost Capacity Factors, Project Build-Out in Lower-Quality Wind Resource Areas Push the Other Way



All else equal:

- Growth in rotor swept area relative to turbine capacity (drop in specific power) will boost capacity factor
- Building projects in lower wind resource sites will hurt capacity factor

Controlling for Wind Resource Quality Demonstrates Impact of Turbine Evolution

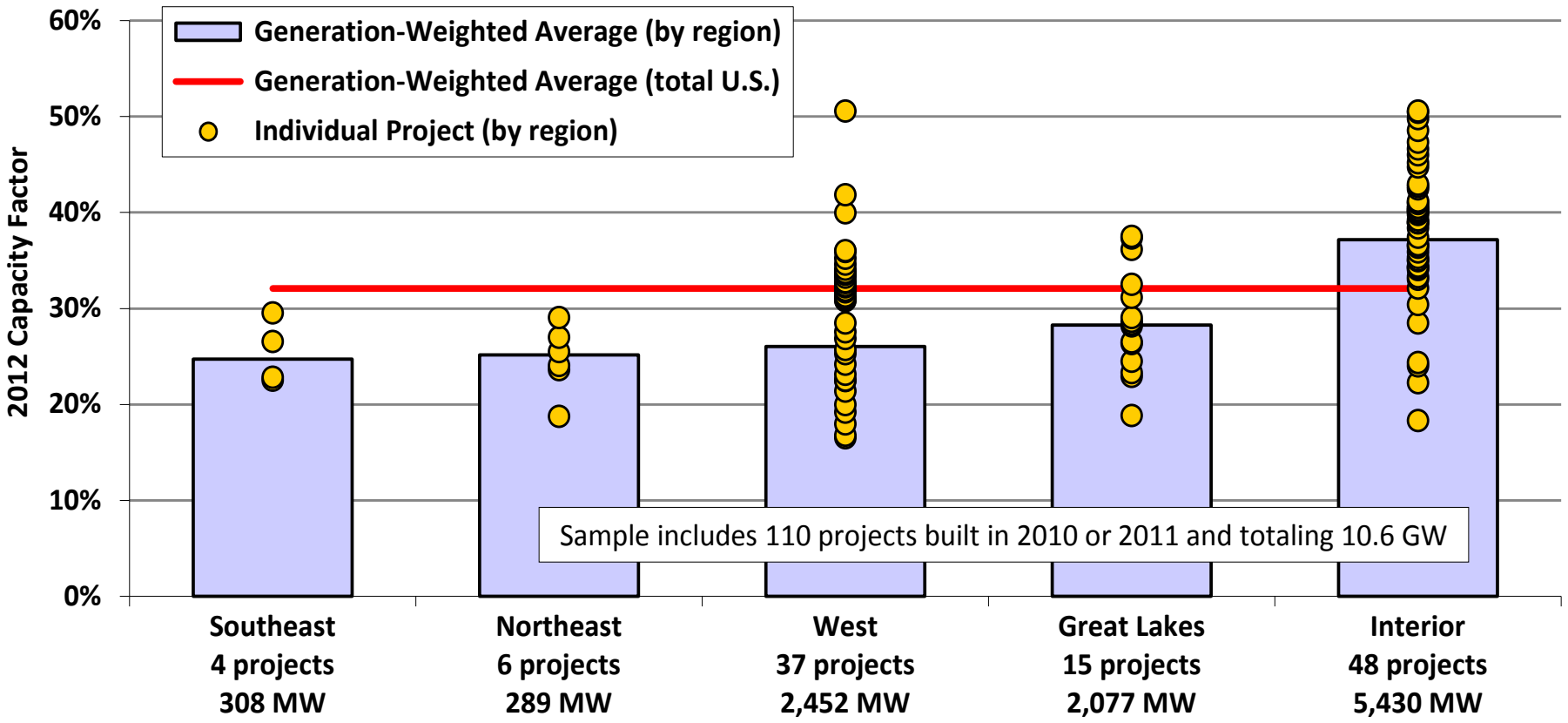


Wind Resource Quality is based on AWS Truepower site estimate of gross capacity factor at 80 m:

- Lower = 30%-40%
- Medium = 40%-50%
- Higher = > 50%

- Notwithstanding build-out of lower-quality wind resource sites, turbine design changes are driving capacity factors higher for projects located in fixed wind resource regimes
- Still too early for GE 1.6/100 turbines to be reflected in empirical capacity factor data: expect a much larger increase in years ahead

Regional Variations in Capacity Factor Reflect the Strength of the Wind Resource



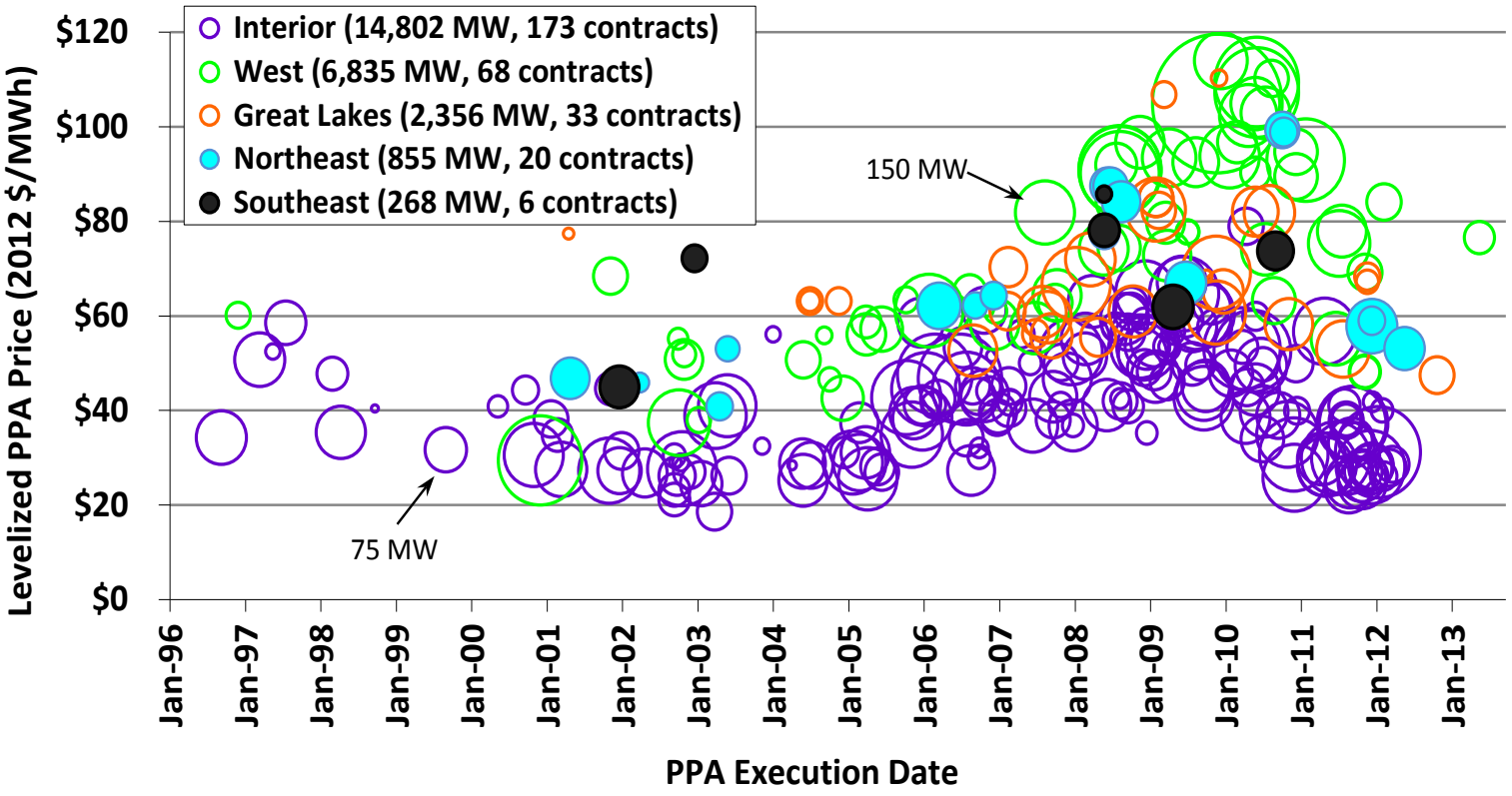
Wind Power Price Trends

Sample of Wind Power Prices

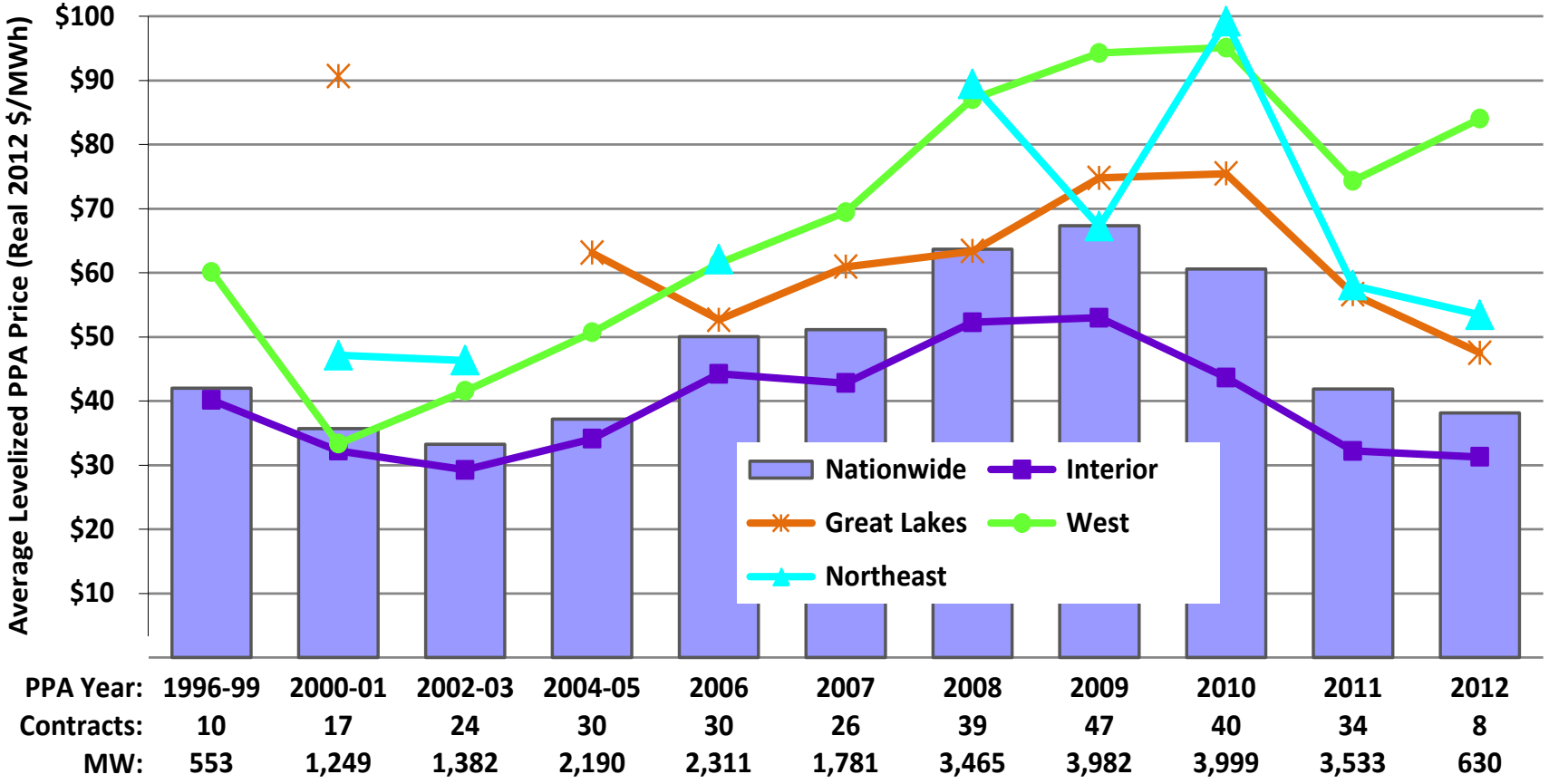
- Berkeley Lab collects data on historical wind power sales prices, and long-term PPA prices
- PPA sample includes 302 contracts from projects built from 1998-2012, totaling 24,626 MW (42% of all wind capacity added in that period, and 70% of all capacity added that is sold under bundled PPAs)
- Prices reflect the bundled price of electricity and RECs as sold by the project owner under a power purchase agreement
  - Dataset excludes merchant plants and projects that sell renewable energy certificates (RECs) separately
  - Prices reflect receipt of state and federal incentives (e.g., the PTC or Treasury grant), as well as various local policy and market influences; as a result, prices do not reflect wind energy generation costs

Wind PPA Prices Generally Have Been Falling Since 2009 and Now Rival Previous Lows Set a Decade Ago

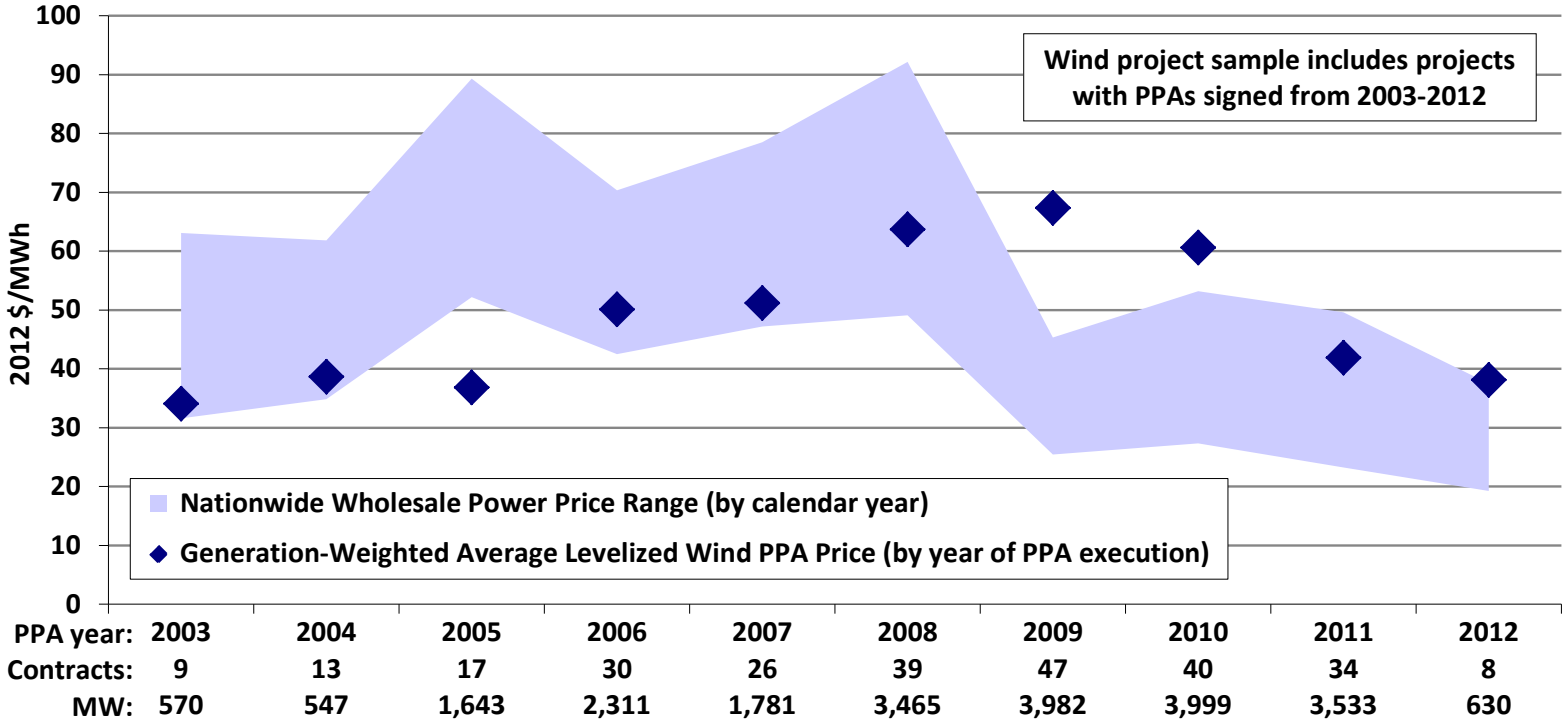
(this despite the trend to lower-quality wind resource sites)



A Smoother Look at the Time Trend Shows Steep Recent Decline in Pricing; Especially Low Pricing in Interior Region

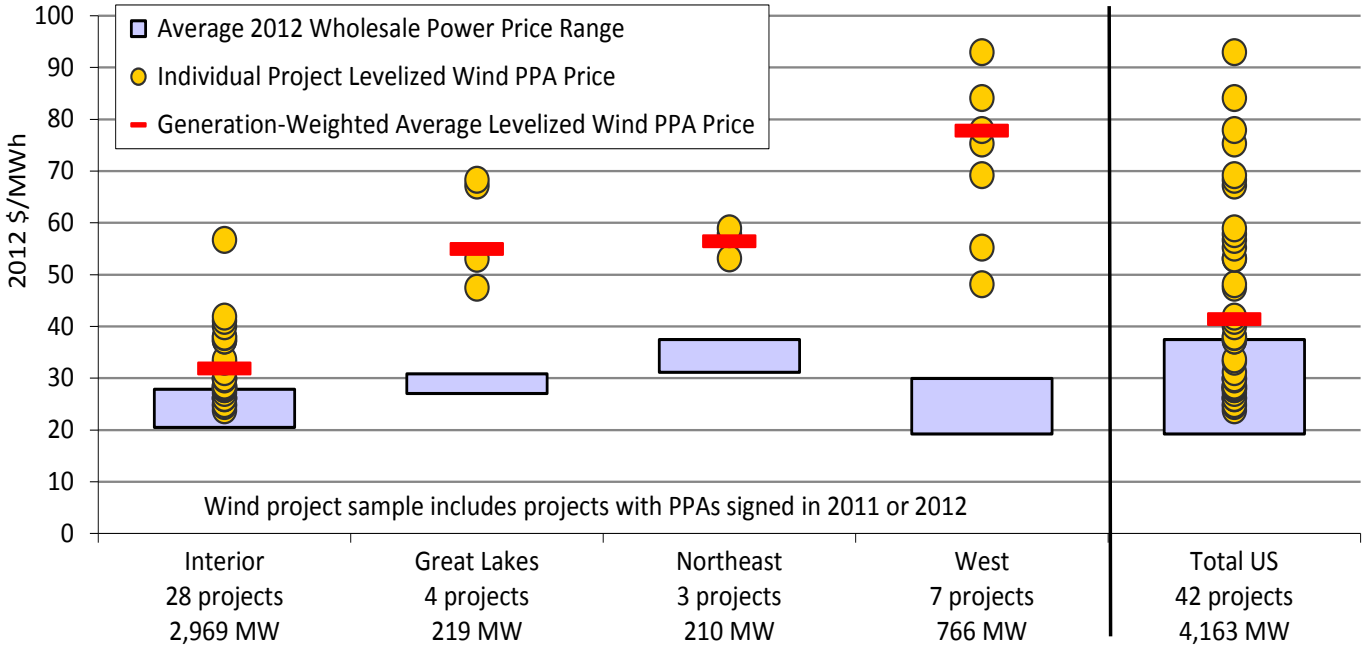


Low Wholesale Electricity Prices Continued to Challenge the Relative Economics of Wind Power



- Wholesale price range reflects flat block of power across 23 pricing nodes across the U.S.
- Recent wholesale prices reflect low natural gas prices, driven by weak economy and shale gas
- Price comparison shown here is far from perfect – ***see full report for caveats***

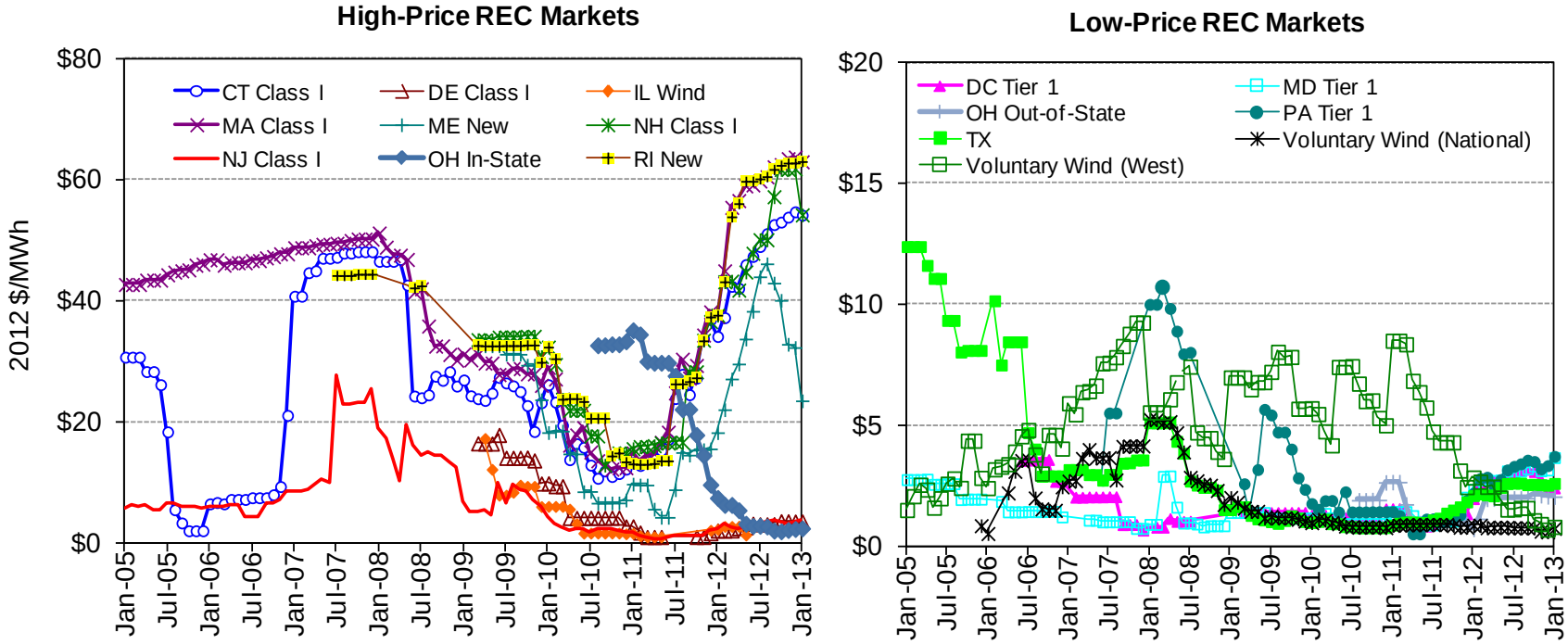
Gap Between Wholesale Prices and Wind PPA Prices Varied by Region in 2012



*Notes: Within a region there are a range of wholesale prices because multiple price hubs exist in each area; price comparison shown here is far from perfect – **see full report for caveats***

Wind PPA prices were most competitive with wholesale prices in the Interior region (where PPAs signed in 2011/2012 generally ranged from $20-40/MWh) and were least competitive in the West (with a PPA price range in 2011/2012 of under $50/MWh to over $90/MWh), with the Great Lakes and Northeast regions falling in between (with a PPA price range of roughly $50-70/MWh in 2011/2012)

Renewable Energy Certificate (REC) Prices Rose in Northeast, Remained Depressed Elsewhere



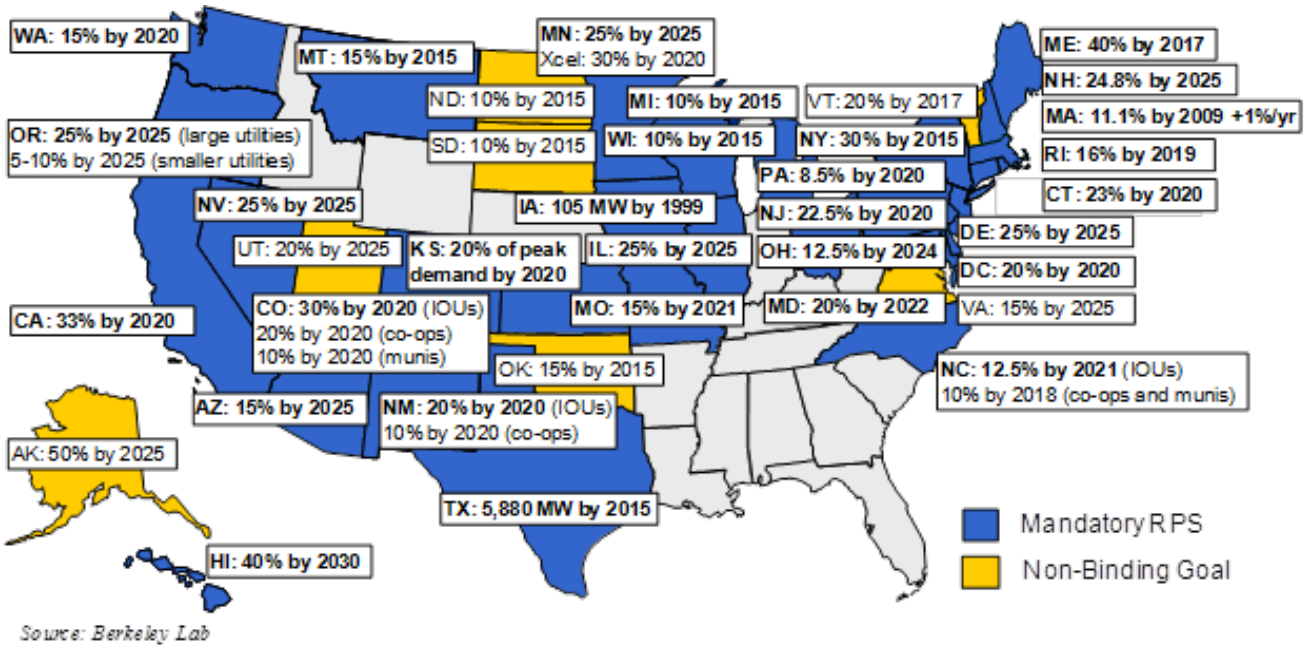
REC prices vary by: market type (compliance vs. voluntary); geographic region; specific design of state RPS policies

Policy and Market Drivers

Short-Term Extension of Federal Incentives for Wind Helps Restart Domestic Market

- Wind projects that begin construction before the end of 2013 are eligible to receive the PTC or ITC
- First-year "bonus depreciation" at 50% for projects built in 2013
- Treasury cash grant program available for projects that were under construction by the end of 2011 and placed in service by the end of 2012
  - 42% of the new wind capacity installed in 2012 elected the cash grant, a drop from 62% of the capacity installed in 2011, 82% in 2010, and 66% in 2009
- Section 1705 loan guarantee has wound down: program closed on loan guarantees to 1,024 MW of wind, 739 MW of which came online in 2012
- Little action on what are among the wind industry's two highest priorities – a longer-term extension of federal tax (or cash) incentives and passage of a federal renewable or clean energy portfolio standard – but the near-term extension of the PTC/ITC has helped restart the domestic wind market, and should enable moderate growth in capacity additions at least through 2014

State Policies Help Direct the Location and Amount of Wind Development, but Current Policies Cannot Support Continued Growth at Recent Levels



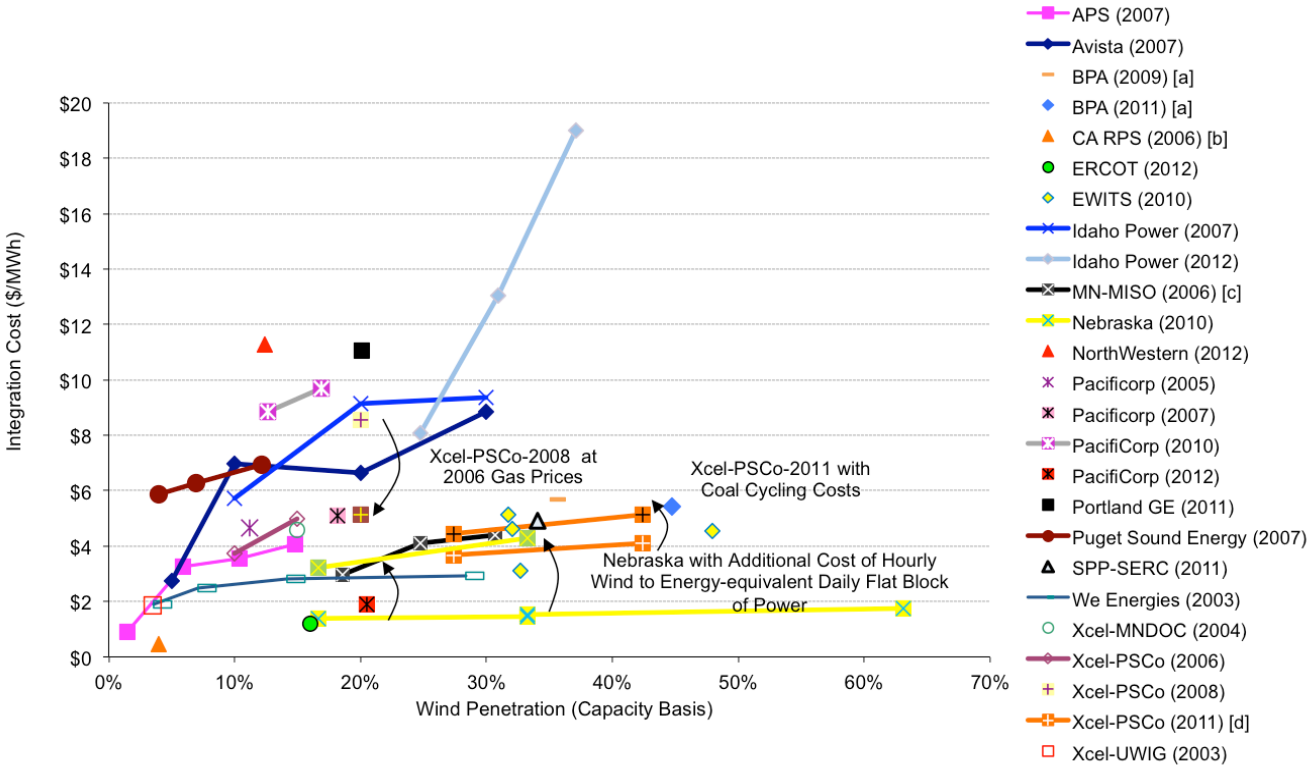
- 29 states and D.C. have mandatory RPS
- State RPS' can support ~3-5 GW/yr of renewable additions on average from 2013-2020 (less for wind specifically)

Solid Progress on Overcoming Transmission Barriers Continued

- 2,300 circuit miles of new transmission built per year, on average, over the last 5 years; 18,700 circuit miles planned through 2015
- AWEA has identified near-term transmission projects that – if all were completed – could carry almost 70 GW of wind capacity
- FERC continued implementation of Order 1000, requiring public utility transmission providers to improve planning processes and determine a cost allocation methodology for new transmission
- States, grid operators, regional organizations, and DOE continue to take proactive steps to encourage transmission investment to improve access to renewable resources
- Numerous transmission projects designed, in part, to support wind made further progress in development and/or construction in 2012; others faced set-backs
- Lack of transmission still a barrier to wind development in some regions (witness curtailment data shown earlier)

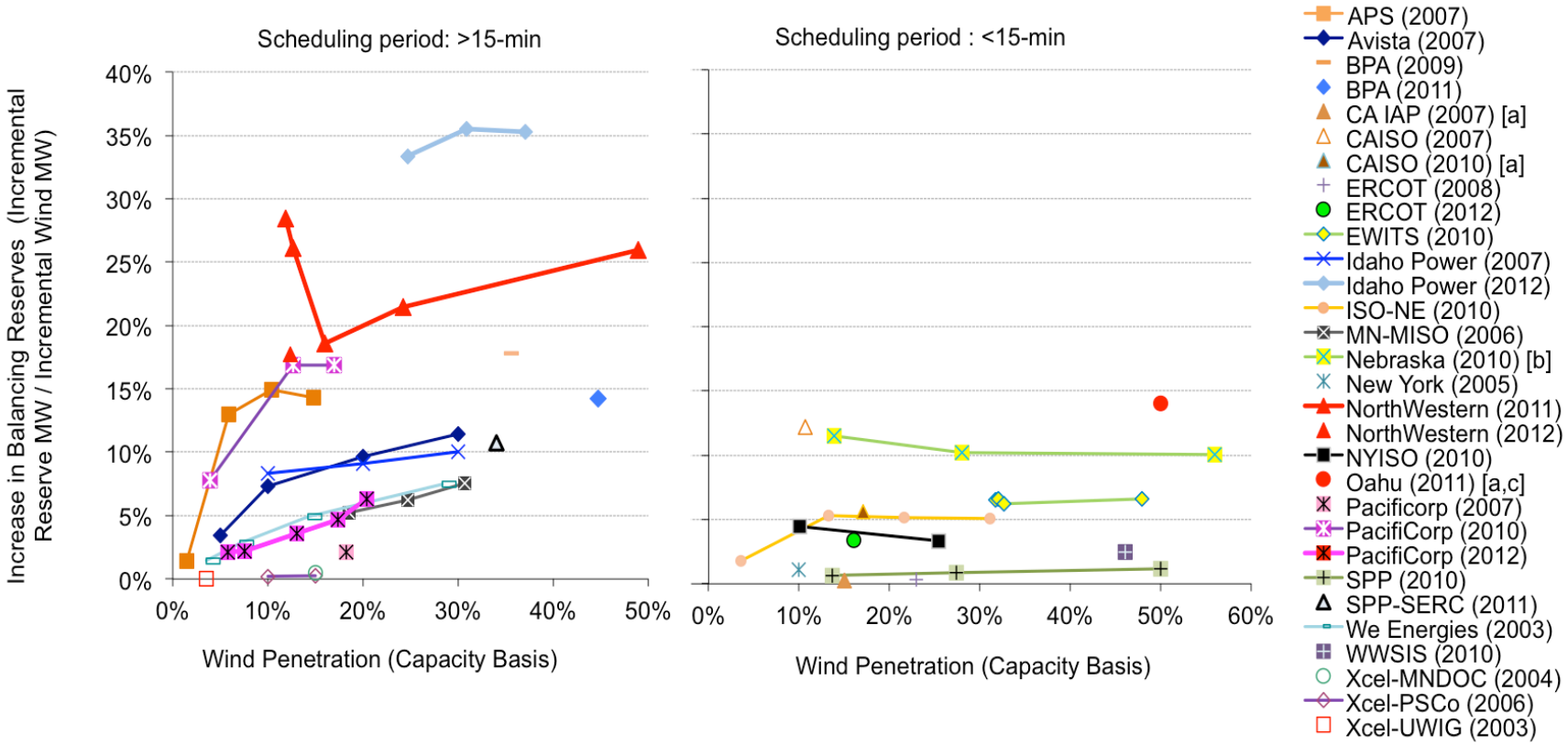
System Operators Implementing Methods to Accommodate Increased Wind Energy

Integrating wind energy into power systems is manageable, but not free of additional costs



Notes: Because methods vary and a consistent set of operational impacts has not been included in each study, results from the different analyses of integration costs and balancing reserves are not fully comparable. There has been some recent literature questioning the methods used to estimate wind integration costs and the ability to explicitly disentangle those costs.

Studies Find that Greater Wind Penetration Requires Increased Balancing Reserves



- The estimated increase in balancing reserves rarely exceeds 15% in these studies
- "Fast" markets (i.e., with shorter scheduling periods) can generally integrate wind more easily, with less need for increased balancing reserves (see graph on right)

Future Outlook

2013 Expected to Be a Slow Year for Wind Additions as Pipeline Recharges; Growth in 2014, then Uncertainty in 2015 and Beyond

Forecasts for Annual U.S. Wind Additions (MW)

Source	2013	2014	2015
Bloomberg NEF (2013a, 2013c)	2,800	8,000	3,200
IHS EER (2013)	2,000	6,000	7,300
Navigant (2013)	5,000	9,000	3,500
MAKE Consulting (2013)	3,500	7,700	4,500
EIA (2013b)	3,600	10,100	na

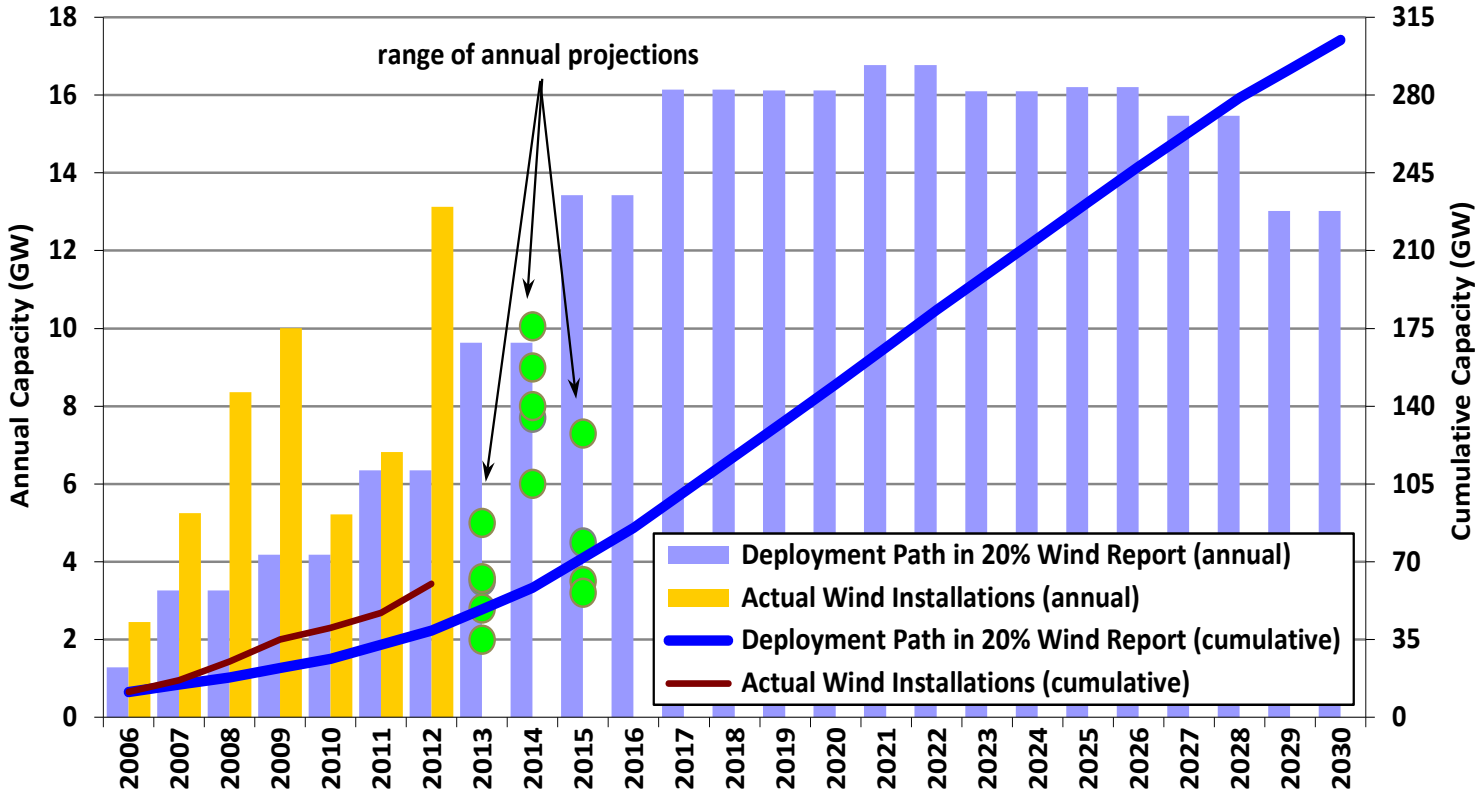
- Though PTC/ITC now available for projects that initiate construction by the end of 2013, it will take time to recharge the project pipeline
- While many projects will aim to meet the “start construction” deadline, 2013 will be a slow year, lowering not only U.S. but global growth forecasts
- 2014 is expected to be a strong year as developers commission projects that began construction in 2013

Current Low Prices for Wind Energy May Support Higher Growth in the Future, but Headwinds Include…

- Lack of clarity about fate of federal tax incentives
- Continued low natural gas and wholesale electricity prices
- Modest electricity demand growth
- Limited near-term demand from state RPS policies
- Inadequate transmission infrastructure in some areas
- Growing competition from solar in some regions

Growth expectations in near term do not match what would be required to achieve 20% wind by 2030

U.S. Is on Early Trajectory that May Lead to 20% Wind Electricity; Projections for 2013-2015, However, Fall Short of Annual Growth Envisioned in 20% Report



Conclusions

- Wind has been a significant source of new generation in the U.S.
- The supply chain is under duress, but domestic manufacturing content remained strong in 2012
- Turbine scaling is boosting wind project capacity factors, while the installed cost of wind is on the decline
- Trends are enabling very aggressive wind power pricing and solid economics in many regions despite low natural gas prices
- It will take time to re-build the project pipeline, ensuring a slow year for new additions in 2013, and then solid growth in 2014
- Medium to longer term growth remains uncertain, dictated in part by future natural gas prices as well as state and federal policy decisions, though recent declines in the price of wind energy help boost the prospects for future growth

For More Information...

See full report for additional findings, a discussion of the sources of data used, etc.

- http://www1.eere.energy.gov/wind/

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