# Annual wind report confirms tech advancements, improved performance, and low energy prices

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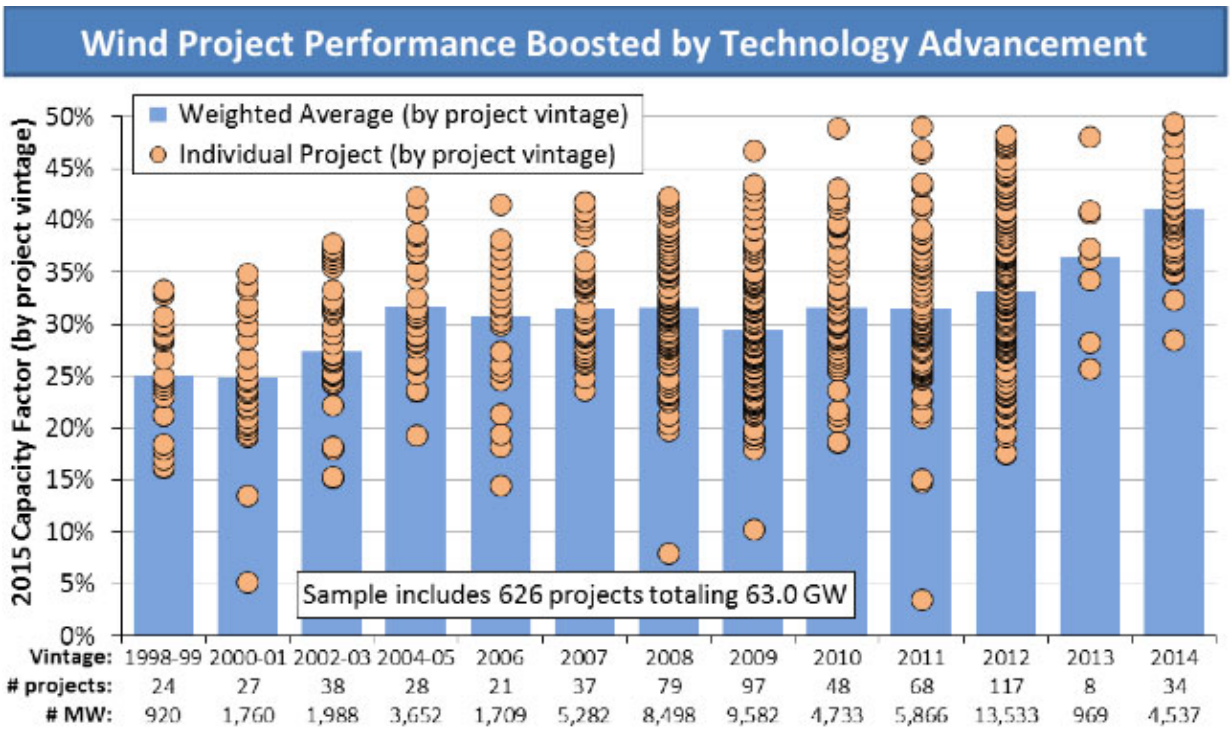


Wind project performance chart. Credit: Berkeley Lab

Wind energy pricing remains attractive to utility and commercial purchasers, according to an annual report released by the U.S. Department of Energy and prepared by the Electricity Markets & Policy

Group at Lawrence Berkeley National Laboratory (Berkeley Lab). Prices offered by newly built wind projects are averaging around 2¢/kWh, driven lower by technology advancements and cost reductions.

"Wind energy prices—particularly in the central United States—are at rock-bottom levels, with utilities and corporate buyers selecting wind as the low-cost option," said Berkeley Lab Senior Scientist Ryan Wiser. "Moreover, enabled by technology advancements, wind projects are economically viable in a growing number of locations throughout the United States."

Key findings from the U.S. Department of Energy's reflective "Wind Technologies Market Report" include:

- Wind power represented the largest source of U.S. electric-generating capacity additions in 2015. Wind power capacity additions in the United States surged in 2015, with $14.5 billion invested in 8.6 gigawatts (GW) of new capacity. Wind power constituted 41% of all U.S. generation capacity additions in 2015, up sharply from its 24% market share the year before and close to its all-time high. Wind power currently meets about 5% of the nation's electricity demand, and represents more than 10% of total electricity generation in twelve states, and more than 20% in three of those states.
- Bigger turbines are enhancing wind project performance. Since 1998-99, the average capacity of wind turbines installed in the United States has increased by 180% (to 2.0 megawatts (MW) in 2015), the average turbine hub height has increased by 47% (to 82 meters), and the average rotor diameter has increased by 113% (to 102 meters). Moreover, turbines originally designed for lower wind speeds are now regularly deployed in higher wind speed sites, boosting project performance. Increased rotor diameters, in particular, have begun to dramatically increase

wind project capacity factors. For example, the average 2015 capacity factor among projects built in 2014 reached 41%, compared to an average of 31% among projects built from 2004-2011 and 26% among projects built from 1998-2003.

- Low wind turbine pricing continues to push down installed project costs. Wind turbine prices have fallen 20% to 40% from their temporary highs in 2008, and these declines are pushing project-level costs down. Wind projects built in 2015 had an average installed cost of $1,690/kilowatt(kW), down $640/kW from the temporary peak in 2009 and 2010.
- Wind energy prices remain very low. Lower installed project costs, along with improvements in capacity factors, are enabling aggressive wind power pricing. After topping out at nearly 7¢/kWh in 2009, the average levelized long-term price from wind power sales agreements has dropped to around 2¢/kWh—though this nationwide average is dominated by projects that largely hail from the lowest-priced central region of the country. Recently signed wind energy contracts compare favorably to projections of the fuel costs of gas-fired generation extending out through 2040. These low prices have spurred demand for wind energy, both from traditional electric utilities and also, increasingly, from non-utility purchasers like corporations, universities, and municipalities.
- The manufacturing supply chain continued to adjust to swings in domestic demand for wind equipment. Wind sector employment reached a new high of 88,000 full-time workers at the end of 2015, and the profitability of turbine suppliers has generally rebounded over the last three years. For wind projects recently installed in the United States, domestically manufactured content is highest for nacelle assembly (>85%), towers (80-85%), and blades and hubs (50-70%), but is much lower (

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