

The Wind Power Technologies Office accelerates U.S. deployment of clean, affordable, and reliable domestic wind power through research, development, and demonstration. These advanced technology investments directly contribute to the goals for the United States to generate 80% of the nation’s electricity from clean, carbon-free energy sources by 2035; reduce carbon emissions 26%–28% below 2005 levels by 2025; and reduce carbon emissions 80% by 2050 by reducing costs and increasing performance of wind energy systems. Wind power currently provides approximately 4.5% of the nation’s electricity.

## What We Do

The Wind Power Technologies Office uses an integrated, three-pronged approach to drive technology development and project deployment in the wind energy sector:

- ✓ **Research and Development (R&D)** provides industry-wide wind technology improvements targeted at reducing costs and improving overall plant performance and reliability.
- ✓ **Risk Mitigation** activities and demonstrations help overcome financial, institutional, and technical barriers to financing and deploying wind energy projects, with a focus on U.S. offshore wind.
- ✓ **Reduction of Market Barriers** includes solving environmental, permitting, radar, and grid issues that impact access to strong wind resource areas.

## Program Goals/Metrics

- Reduce the unsubsidized market levelized cost of energy (LCOE) for utility-scale land wind energy systems from a reference wind energy cost of \$0.069/kWh in 2014 to \$0.057/kWh by 2020 and \$0.042/kWh by 2030, which would compete with the predicted LCOE of electricity generation from the lowest-cost fossil generation (natural gas).<sup>\*</sup> This would include wind grid integration and variability costs.
- Reduce the unsubsidized market LCOE for offshore fixed-bottom wind energy systems from a reference cost of \$0.20/kWh in 2014 to \$0.17/kWh by 2020 and \$0.14/kWh by 2030 to enable regionally competitive pricing.<sup>\*</sup>
- Meeting the office’s wind power LCOE goals will support deployment of wind at high-penetration levels, sufficient to meet up to 20% of projected U.S. electricity demand in 2030.

## FY 2016 Priorities

- **Enable a U.S. offshore industry** by investing in the technology development and demonstration of offshore wind systems, speeding the deployment of the first U.S. offshore wind projects, and refining technologies by domestic wind technology manufacturers.
- **Reduce costs of energy at the wind turbine component level** through new generation of rotor designs that incorporate higher tip speeds and new innovative drivetrain concepts; the establishment of a new R&D and demonstration partnerships with industry and academia for smart wind plant technologies; and a new aeroacoustics experimental testing program.

*<sup>\*</sup>For Programmatic purposes, all levelized costs of energy are reported at a 7% discount rate.*

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request
Technology RD&T and Resource Characterization (Land, Offshore, Distributed)	36,969	34,658	58,160
Technology Validation and Market Transformation	20,054	46,250	41,990
Mitigate Market Barriers	8,577	11,207	28,062
Modeling and Analysis	13,526	10,185	12,588
NREL Site Wide Facility Support	9,000	4,700	4,700
<b>Total, Wind Power Technologies</b>	<b>88,126</b>	<b>107,000</b>	<b>145,500</b>

- **Reduce costs of energy at the wind plant level** through research in complex wind plant aerodynamics, advanced component development, wind plant reliability improvement, and distributed wind applications. Key research institutions and computational assets will be leveraged to conduct high-fidelity modeling to understand the complex flow of the resource in wind farms to increase wind farm energy capture, reduce annual operational costs, and improve project financing terms.
- **Facilitate environmentally responsible wind deployment** through continued multi-year R&D efforts to overcome permitting challenges associated with wind-wildlife interactions, collaboration with federal agencies on mitigating the effects of wind turbines on long-range surveillance and terminal radars, system reserve and power markets evaluation, next-generation wind integration studies, and operational tool development.

## Key Accomplishments

- **Accelerated the wind industry’s technological progress by an estimated six years:** Without EERE involvement, the overall reliability, commercial risk, and cost of wind energy would be six years behind where it is now,<sup>1</sup> at a loss of more than two-thirds of cumulative wind power deployed through 2008. In 2012, wind energy added nearly half of all new power capacity in America—even more than new natural gas capacity.
- **Drove improvements in wind components and continues to showcase technology innovations to increase viability and reliability of wind:** Through research, development, and demonstration, EERE and its partners have achieved significant improvements in the production of key wind turbine components, particularly composite-related structures. Through innovation and a robust U.S. wind market, U.S. manufacturing captured more than 70% of the domestic wind energy market in 2013 (up from around 20% in 2006). The United States is home to more than 550 manufacturing companies, across more than 40 states, in the wind energy supply chain.

<sup>1</sup> Pelsoci, Thomas M (2010). “Retrospective Benefit-Cost Evaluation of U.S. DOE Wind Energy R&D Program: Impact of Selected Energy Technology Investments.”

- **Awarded funding and began development of the first U.S. offshore wind energy projects:** The Offshore Wind Demonstration Funding Opportunity—a 5-year, \$168 million initiative with multiple recipients competitively awarded in FY 2013—has completed the preliminary engineering and project development phases. In 2014, the Office selected and funded three of seven projects to move to final design, construction, and installation. The selected demonstration projects are anticipated to complete construction and be in operation by the end of 2017—accelerating the deployment of breakthrough wind power technologies, which will help diversify our nation’s energy portfolio, promote economic development, and launch a new U.S. industry.
- **Spearheaded construction of wind technology testing centers:** In collaboration with universities and national laboratories, EERE and its partners have driven construction of facilities where academic and industry technology developers can validate their wind technology designs in controlled settings and speed technology transfer, commercialization, and manufacturing.

