



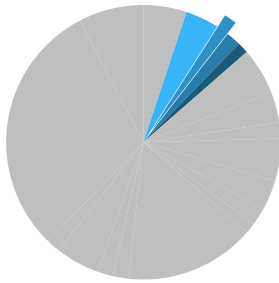
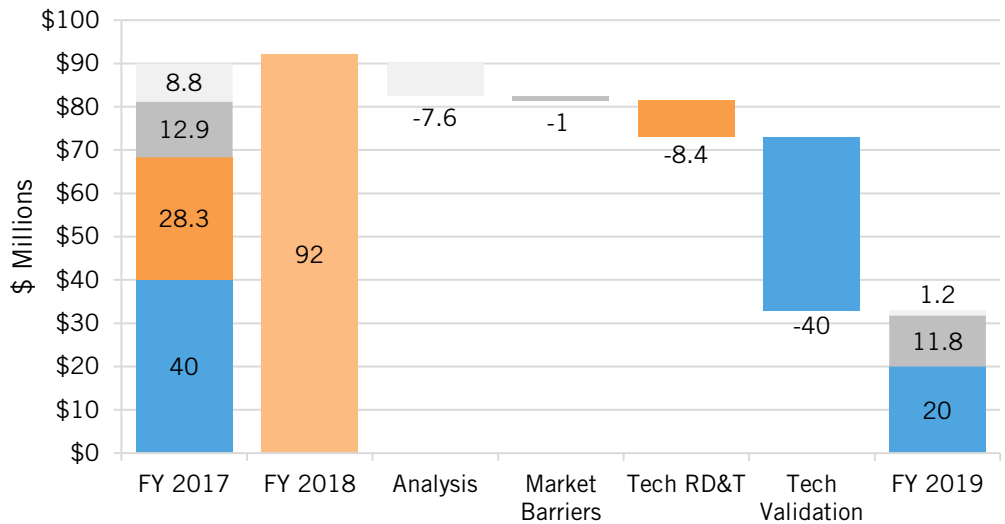
Federal Energy R&D: Wind Energy

BY DAVID M. HART AND COLIN CUNLIFF | APRIL 2018

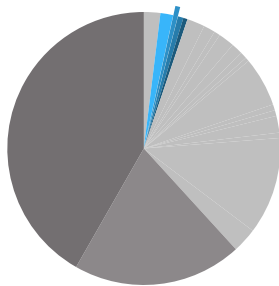
This briefing is part of a series on the U.S. energy budget. See: itif.org/energy-budget.

The Department of Energy’s (DOE) Wind Energy program targets innovations in onshore, offshore, and distributed wind power to capture the kinetic energy in wind and turn it into electricity via spinning generators. The program also works to integrate wind generation more effectively into the bulk power system, which enables wind farms to provide more-reliable power output and other services to the grid.

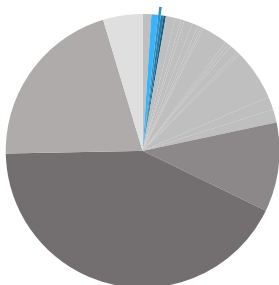
Figure 1: The FY 2019 Budget Request Would Cut Wind Energy R&D by 64 Percent



Wind (blue)
Other Renewables (blue)
Energy R&D (light gray)



Wind & Energy R&D
Basic Science R&D
Defense R&D



Wind & Energy
Basic Science
Defense
Environ Mngmt
Other DOE

What's At Risk

DOE’s Wind Energy program has already achieved substantial cost reductions and technology improvements that have enabled the rapid expansion of land-based wind power. The cost of energy from land-based wind power has decreased from more than 55 cents per kilowatt-hour (\$0.55/kWh) in 1980 to a national average of \$0.046/kWh in 2015, thus enabling the expansion of wind power to 41 states.¹ DOE should build on this success to improve performance and reduce costs much further until unsubsidized wind power becomes more competitive across more parts of the country. DOE’s “Wind Vision” report provides a path to reducing unsubsidized wind-energy costs to \$0.023/kWh by 2030, a decrease of 50 percent from today’s costs.² Achieving this goal could enable up to 200 gigawatts (GW) of total wind capacity by 2030, thereby contributing to energy affordability and security while also reducing carbon emissions.³

The first U.S. offshore wind farm, which began operating off the coast of Rhode Island in December 2016, provides encouragement to a nascent domestic offshore wind industry.⁴ Offshore wind could present a low-carbon energy alternative for the 28 coastal and Great Lake states, although additional cost reductions will be needed to make it cost competitive with other sources of electricity—as it already is in parts of Europe. Validation and demonstration of new offshore wind technologies will also provide investors with greater confidence in the growing array of energy projects in U.S. waters.⁵

Wind Energy R&D Subprograms

R&D in the Wind Energy program is divided into four subprograms:

- **Technology Research, Development, & Testing (RD&T) and Resource Characterization** focuses on complex aerodynamics, advanced component manufacturing, wind-plant reliability, resource characterization, controls, sensors, and modeling—and manages wind-specific test facilities that enable validation of R&D results.
- **Technology Validation and Market Transformation** conducts high-risk testing and validation of new technologies, including innovative offshore wind pilot projects, and collect and produces public performance and environmental data sets.
- **Mitigate Market Barriers R&D** evaluates technology solutions to address wind-turbine radar interference, and funds other R&D on wind-energy grid integration and grid-infrastructure modernization challenges.
- **Modeling and Analysis** evaluates and prioritizes wind-energy technology-innovation opportunities for land and offshore applications.

Key Elements of the FY 2019 Budget Proposal

- **Elimination of the Technology Validation and Market Transformation subprogram**, which has focused on validation of innovative offshore wind technologies, threatens to derail progress toward the 2030 cost goal for unsubsidized offshore wind energy of \$0.14/kWh.
- **A 29-percent reduction in the Technology RD&T and Resource Characterization subprogram**, which houses the Atmosphere to Electrons (A2e) initiative, the Exascale Predictive Wind Plant Flow Physics Modeling project, and the Big Adaptive Rotor (BAR) initiative, provides support to Sandia's Scaled Wind Farm Technology (SWiFT) facility in Texas and National Renewable Energy Laboratory's National Wind Technology Center (NWTC) in Colorado, which hosts testing facilities for industry and academia to test and validate their innovations.

- **An 87-percent reduction to the Modeling and Analysis subprogram**, including reductions to the System Management of Atmospheric Resource through Technology (SMART) activities, which aim to lower costs through enhanced power production, more-efficient material use, lower operation and maintenance costs, and greater grid-integration and reliability features.
- **Elimination of several R&D activities in the Mitigate Market Barriers R&D subprogram**, including the WINDEXchange and Wind Energy Regional Resource Centers, which help communities weigh the benefits and impacts of wind energy by providing the best available science to support their decisions.

ENDNOTES

1. DOE, “Wind Energy Technologies Office Accomplishments” (Washington, D.C.: DOE, 2017), <https://www.energy.gov/sites/prod/files/2017/05/f34/108630-Wind%20Accomplishments-FactSheet-web150.pdf>.
2. Katherine Dykes, et al., “Enabling the SMART Wind Power Plant of the Future Through Science-Based Innovation” (Washington, D.C.: DOE NREL, August 2017) <https://www.nrel.gov/docs/fy17osti/68123.pdf>.
3. Ibid.
4. DOE, “2016 Offshore Wind Technologies Market Report” (Washington, D.C.: DOE NREL, 2016), <https://www.energy.gov/sites/prod/files/2017/08/f35/2016%20Offshore%20Wind%20Technologies%20Market%20Report.pdf>.
5. Matthew Stepp, “What Interior’s Lease Auction Says about Offshore Wind Innovation,” Innovation files (June 12, 2013), <https://www.innovationfiles.org/what-interiors-lease-auction-says-about-offshore-wind-innovation/>.

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