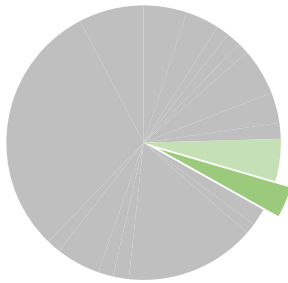




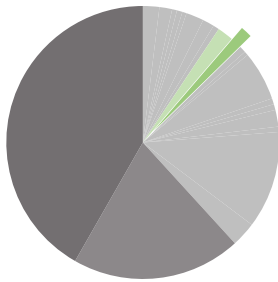
Federal Energy R&D: Building Technologies

BY DAVID M. HART AND COLIN CUNLIFF | APRIL 2018

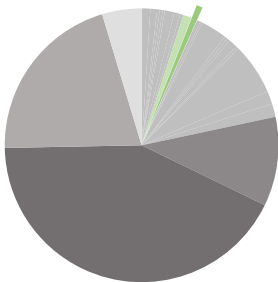
This briefing is part of a series on the U.S. energy budget. See: itif.org/energy-budget.



Buildings (green)
Other Efficiency (green)
Energy R&D (light gray)



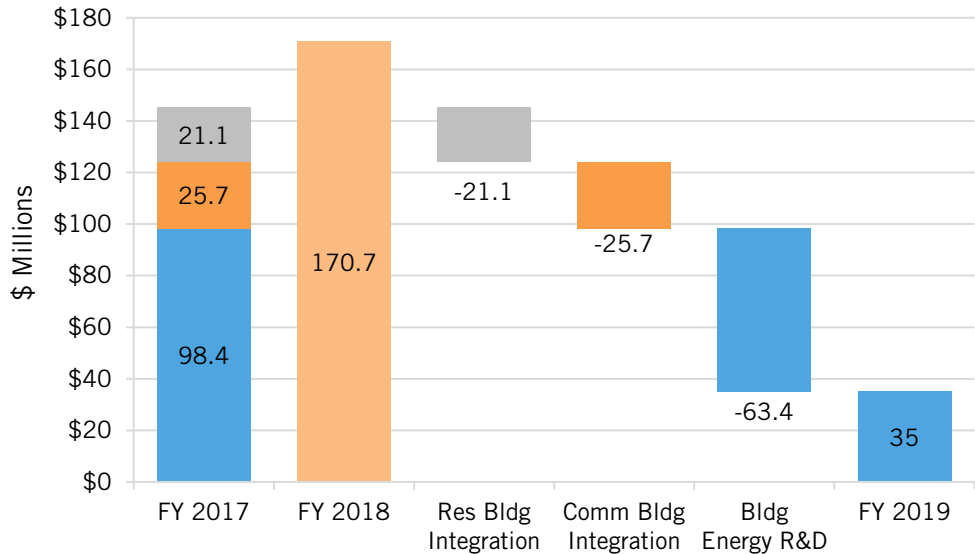
Buildings & Energy R&D
Basic Science R&D
Defense R&D



Buildings & Energy
Basic Science
Defense
Environ Mngmt
Other DOE

The Department of Energy’s (DOE) Building Technologies Office (BTO) invests in research and development (R&D) of novel technologies that are designed to improve the efficiency and reduce the energy costs of the nation’s residential and commercial buildings—particularly the largest energy users therein: lighting, space conditioning and refrigeration, water heating, appliances, and miscellaneous electric loads (MELs), as well as the building envelopes themselves. BTO also works on improved energy modeling and system controls to predict and manage energy-efficient appliance/equipment, system, and whole-building energy usage.

Figure 1: The FY 2019 Budget Request Would Cut Building Technologies R&D by 76 Percent



What’s At Risk

Residential and commercial buildings are the single largest energy-consuming sector in the U.S. economy, accounting for roughly 75 percent of the nation’s electricity use and 40 percent of its total energy demand. As a result, Americans spend nearly \$400 billion each year to power their homes, offices, schools, hospitals, and other buildings. The Building Technologies program has established the ambitious goal of reducing the average energy use per square foot of commercial buildings by 30 percent by 2030, and that of new single-family homes by 60 percent and existing homes by 40 percent by 2020. In addition to these whole-building targets, the Building Technologies program is pursuing substantial improvements to the efficiency of energy services within buildings, including lighting (65

percent improvement); water heating (35 percent); heating, ventilation, and air conditioning (HVAC) (25 percent); building envelope and windows (35 percent); appliances (30 percent); and sensors and controls (20 percent).¹ Achieving these goals by 2030 would decrease total energy use by 5 quadrillion BTUs, cut carbon emissions by 450 million metric tons, and save consumers over \$100 billion annually in energy costs.²

Building Technologies R&D Subprograms

BTO R&D activities are divided among three main subprograms:³

- **Building Energy R&D (BERD)** sponsors R&D in energy-efficient building technologies: Buildings-to-Grid; heating, ventilation and air-conditioning & refrigeration (HVAC&R); windows & envelope; solid-state lighting; and Building Energy Modeling (BEM).
- **Commercial Buildings Integration (CBI)** conducts R&D and analytical studies of building systems (e.g., lighting, HVAC, envelope, sensors and controls) and whole commercial buildings (e.g., office buildings, schools, hospitals, stores, warehouses, public infrastructure buildings) to assess the interactive effects of combining multiple novel technologies within a commercial building system.
- **Residential Buildings Integration (RBI)** works to innovate new housing construction and home improvement retrofit technologies, and validate the performance of these innovations.

Key Elements of the FY 2019 Budget Proposal

- **Elimination of the Residential Buildings Integration (RBI) subprogram**, including support for the Home Energy Score, which provides energy-use information to homeowners, renters, retrofit contractors, etc. Additionally, the Better Buildings Residential Program Solution Center—which furnishes regional and local partners who implement existing home retrofits with best practices and lessons learned—and the Zero Energy Ready Homes program would be eliminated.
- **Elimination of the Commercial Buildings Integration (CBI) subprogram**, including the Better Buildings Challenge (BBC) and Better Buildings Alliance (BBA) programs, which together have partnered with more than 400 businesses and organizations across the country to develop innovative solutions, share resources, and replicate positive gains in energy efficiency. Additionally, cost-shared technology demonstrations and other technology-to-market activities designed to reduce market barriers for efficiency upgrades for small and medium-sized commercial buildings would be discontinued.
- **A 64-percent reduction in Building Energy R&D**, including termination of campus- and neighborhood-level demonstrations of transactive energy controls,

which enable efficient energy management. Tech-to-market, demonstration and validation programs, and manufacturing R&D activities for emerging technologies such as organic LEDs would also be eliminated. The budget request does, however, provide new funding for Buildings-to-Grid and Beyond Batteries R&D activities.

ENDNOTES

1. DOE, “Congressional Budget Justification,” <http://www.energy.gov/budget>.
2. DOE, “Building Technologies Office FY 2017 Budget At-A-Glance” (Washington, D.C.: Department of Energy, Energy Efficiency and Renewable Energy, March 2016), https://www.energy.gov/sites/prod/files/2016/03/f30/At_A_GLANCE%20%28BTO%29.pdf; DOE, “Building Technologies Office Multi-Year Program Plan: Fiscal Years 2016-2020” (Washington, D.C.: DOE/EERE, February 2016), <https://www.energy.gov/sites/prod/files/2016/02/f29/BTO%20Multi-Year%20Program%20Plan%20-%20Final.pdf>.
3. The Building Technologies Office also houses the Equipment and Building Standards subprogram, a regulatory program which sets energy efficiency standards for appliances, equipment, and processes. Because this program is regulatory in nature, it is not included in our assessment of federal R&D.

ABOUT THE AUTHORS

David M. Hart is a senior fellow at ITIF and professor of public policy and director of the Center for Science, Technology, and Innovation Policy at George Mason University’s Schar School of Policy and Government.

Colin Cunliff is a policy analyst for clean energy innovation at ITIF.

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