Data Center Energy Efficiency

As of 2023, U.S. data centers consumed approximately 176 TWh—about 4.4% of total U.S. electricity use. That's more than double the approximately 70 TWh recorded in 2014. And their appetite for power is expected to continue unabated. From 2023 through 2028, data center energy use is projected to grow at a compound annual rate of between 13% and 27%.[1]

Private and public sector efforts are underway to reduce energy use in data centers. The Office of Management and Budget's (OMB's) Data Center Optimization Initiative (OMB memorandum M-16-19) outlines the energy efficiency requirements and strategies for federal data centers. The Federal Energy Management Program (FEMP) helps federal agencies meet these requirements.

Center of Expertise

FEMP sponsors the Center of Expertise (CoE) for Energy Efficiency in Data Centers. CoE helps federal agencies and other organizations implement data center energy efficiency projects by supplying technical support, tools, best practices, analyses, and the introduction of technologies.

The CoE, located at the Lawrence Berkeley National Laboratory, partners with key public and private stakeholders to further efficiency efforts. Visit datacenters.lbl.gov.

Guidance for Small Data Centers

Small data centers (<5,000 ft^2 of computer floor) are especially important because, while they house half of all servers, they tend to have only poor-to-fair energy management. They are also commonplace in federal facilities. A number of resources are available to help improve energy efficiency in small data centers. Visit datacenters.lbl.gov/small-data-centers.

Simulation Tools

The Data Center Profiler (DC Pro) Tool is an early-stage assessment tool that helps data center operators estimate the power usage effectiveness, the industry standard for understanding and improving the energy efficiency of data center infrastructure systems. Current simulation tools also include three system tools: the IT Equipment Tool, the Air Management Tool, and the Electrical Power Chain Tool. Visit datacenters.lbl.gov/tools.
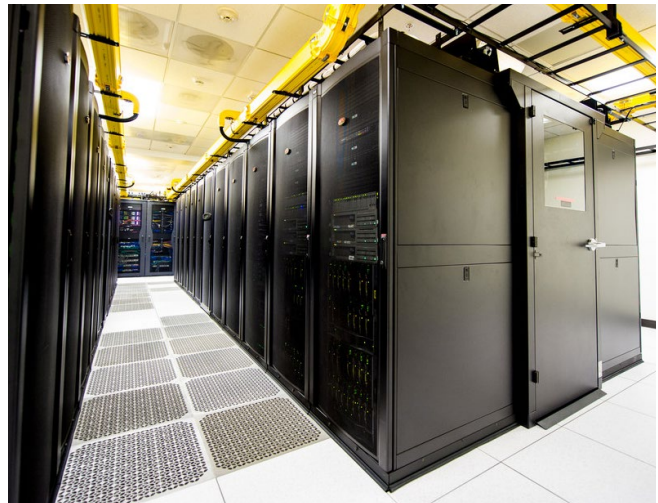
Small data centers (fewer than 5,000 ft2) house half of all servers, and their energy performance tends to be fair at best. They are commonplace in federal facilities, creating an opportunity for energy efficiency improvements. *Photo by Dennis Schroeder, NREL 27637*

Data Center Energy Practitioner Program

The data center industry and DOE partnered to develop the Data Center Energy Practitioner (DCEP) program. The DCEP training program certifies energy practitioners qualified to evaluate the energy status and efficiency opportunities in data centers. Visit datacenters.lbl.gov/dcep.

Other Training

FEMP and the CoE host live webinars and in-person training events covering various best practices and resources for data centers. Additionally, the FEMP Data Center Efficiency Series offers on-demand, web-based courses that narrow in on specific data center processes and systems. Continuing education units are available for FEMP courses. Visit datacenters.lbl.gov/training.

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[1] Shehabi, Arman, E. Masanet, N. Horner, S.J. Smith, and D. Sartor. 2024. 2024 United States Data Center Energy Usage Report. Berkeley, CA: Lawrence Berkeley National Laboratory. LBNL-2001637. https://eta.lbl.gov/publications/2024-lbnl-data-center-energy-usage-report.