Overview

Data centers enable organizations across a wide range of sectors to carry out their distinct missions. These integral operations represent just under two percent of overall energy consumption in the U.S.[1] However, implementation of energy efficiency measures could allow organizations to cut data center energy costs by 40 percent, resulting in substantial energy and monetary savings. [2]

Higher education institutions employ a variety of data center types to suit their needs, though small data centers, enterprise data centers, and high-performance computing (HPC) are most common. Institutions within the sector are at diverse stages of complete digital transformation, with some already housing sophisticated data center operations and others running legacy data centers. Implementing cutting-edge technology initiatives can also be a point of competition amongst institutions,

This fact sheet summarizes some of the key needs, barriers, and opportunities related to data center management and operations in the Higher Education Sector.

Needs

▶ Demand for Capacity

Like other sectors, higher education institutions are faced with growing demand within their organization. From supporting distance learning to internal university operations, IT and Facilities departments work vigorously to balance demand and capacity. Higher education institutions must adopt data center strategies that are flexible and scalable to support continued growth, while staying within budget.

▶ Management Burden

Universities may have mismatched server rooms that were developed piecemeal and lack standardization, which can make them more costly for IT and Facilities staff to manage. As data center needs expand, data center operators and managers should strategize enhancements that improve day-to-day management. In order to increase capacity without increasing the budget, data center expansion should be accompanied by operational efficiency gains. Aside from directly reducing operating costs, many energy efficiency improvements streamline and improve previous data center configurations.

Resources for Higher Ed Data Centers
▶ Data Center Profiling Tools
▶ Master List of Efficiency Actions
▶ Energy Assessment Process Manual
▶ DSIRE Policies & Incentives Database
▶ Small Data Centers Page
▶ DCEP Training
▶ EPEAT Energy Star products page
▶ ENERGY STAR Score for Data Centers
▶ Portfolio Manager for Data Centers

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[1] https://eta-publications.lbl.gov/sites/default/files/lbnl-1005775_v2.pdf
[2] https://www.nrdc.org/sites/default/files/data-center-efficiency-assessment-IB.pdf

Barriers

▶ Competition for Resources & Organizational Inertia

In cases where universities maintain and operate their own data centers, energy efficiency projects may be in competition with other proposed investments and capital expenditure projects. Capturing the attention of key stakeholders and navigating bureaucracy (e.g. complicated procurement policies) can also stall progress. Champions must effectively convince stakeholders that funds are worthy of being allocated (whether that means assembling a cross-functional task force or calculating a project's return on investment in a way that resonates).

▶ Data Center Equipment & Infrastructure

Old infrastructure can cause administrative headaches that could serve as an impetus for more energy efficient upgrades, but also stands to engender a resistance to change. Data center owners and operators may adapt a "If it isn't broken, don't fix it" mantra, driven by fear that change (if not well-funded and comprehensive) could prompt the failure of an (already) vulnerable system. While the current infrastructure may be sufficient for the time being, eventually, the constraints of an outdated system will compromise the ability to address future organizational needs.

▶ Funding Constraints

Higher education institutions may face limited access to funding for data center improvements. The degree to which this is a barrier to energy efficiency varies between institutions. Aside from budget limitations, some institutions may have more volatile funding or must partake in time-intensive processes to finance projects, which increases the overall level of effort required to undertake energy efficiency efforts.

Opportunities

▶ Low Cost, Big Win Savings Opportunities

Higher education institutions may be more likely to operate legacy and small data centers, however they may also have more opportunities for low cost, high efficiency improvements. Simple, yet effective measures, such as aisle containments or turning off unused servers, may deliver significant savings to data centers with minimal effort.

▶ Outsourcing to Colocation models & the Cloud

Outsourcing data center operations to colocation providers is a feasible alternative to the expansion or construction of new data centers as demand for capacity grows. Given that they often operate as part of a larger system or have strong relationships with related organizations, colocation and collaboration with other higher education institutions is also an emerging trend. Cloud computing also holds great potential to reduce a data center's energy demand and shift capital expenditures to operating expenditures. Cloud services can also provide IT flexibility that higher education institutions may not be able to otherwise afford, yet is key to forward-looking data center planning and management.

▶ Virtualization & Consolidation

Data center virtualization enables organizations to reduce the number of physical servers, as well as other equipment (e.g. storage, networking) and increase server utilization. Benefits include lowering capital and operating costs on multiple fronts - for everything from physical hardware to infrastructure and real estate to energy bills. These strategies can also free up resources in IT and Facilities, improving efficiencies and reducing the overall management burden of data center operations in higher education institutions. Consolidation also provides the opportunity to add new IT capacity if desired.