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Data Centers: Optimizing economic, energy and environmental performance

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The U.S. is far and away the world's leading data center market, with New England alone hosting more than 125 data centers. Accordingly, this market occupies a significant and ever-growing real estate footprint in the region. Data centers must operate at the highest levels of reliability, providing continuity of service in order to guarantee 7x24 uptime and availability of data. However, there is also an opportunity for data centers to distinguish themselves and build a competitive advantage by optimizing their energy consumption and lowering the Total Cost of Ownership (TCO). Data centers can enhance their sustainable performance by reducing the consumption of energy and other resources, and optimizing their Power Usage Effectiveness (PUE) and Carbon Usage Effectiveness (CUE). When focusing on energy optimization, centers must also retain the capacity to evolve, maintaining the ability to react to dynamic customer energy demand, and to deliver operational performance metrics and Service Level Agreements profitably. Data centers that wish to improve their economic performance by optimizing their energy and environmental performance have a number of options to consider at each stage of their lifecycle. For new data center construction, consideration should be given to space planning and in-rack cooling design, to maximize reliability and energy efficiency, mitigate risks and single points of failure, implement efficient technologies for energy and water, simplify O&M tasks, and ultimately minimize PUE and CUE. There may also be opportunities to buy and sell thermal and electrical energy from and to the local district energy networks and grids, as applicable, or to install combined cooling and power technology on-site, fueled by natural gas, or even a renewable fuel. With completed or existing data centers, it is important to optimize the energy production, load balancing, as well as the operations and maintenance of the energy assets. Equipment should always go through commissioning and retro-commissioning to ensure that it is working according to specifications. Careful attention to each of these areas is the key to reducing energy costs and optimizing overall building performance. A more comprehensive view of the environmental impact of a center is also worth consideration, as water discharge can be dramatically reduced, along with water and sewer costs, using cooling tower technology solutions such as Zero Liquid Blowdown. In addition, the proper identification, sorting, transportation, treatment and disposal of hazardous electronic waste can improve a data center's environmental footprint. In summary, data centers have a plethora of options available to optimize performance and TCO. Maximum uptime is the primary objective, but this objective can be supported by a holistic optimization strategy that incorporates operations, energy, and environmental impact. Rowan Sanders is director of marketing and communications of Veolia Energy North America, Boston and is a monthly contributing Energy Efficient Solutions author for the New England Real Estate Journal's Green Building section.