Using Smart Technology to Control Building Energy Use

[Summary for Excerpt]: Smart building systems enable commercial and industrial buildings to get the most out of their energy efficiency upgrades and clean energy equipment. With automated controls and real-time data at their fingertips, smart technologies empower facilities teams to achieve near-term energy savings and prepare for a decarbonized future.

Improving energy efficiency and reducing building electric loads are key first steps toward decarbonization. While every commercial or industrial building has a unique capital improvement plan and timeline, efforts to cut energy use typically involve a combination of building envelope upgrades, equipment replacements, and process improvements with efficiency in mind.

To get the most out of these efficiency improvements and upgrades, property owners and facilities managers can install smart building systems to enable automated building operations and controls. From smart thermostats to comprehensive real-time energy management (RTEM) systems, smart technologies can optimize energy use of one or more systems in a building.

The benefits extend beyond energy savings, especially for buildings with tenants and multiple uses. Smart technologies grant greater control and customization to make workspaces more comfortable, whether by automating shading and lighting or programming temperatures to adjust based on occupancy levels.

Smart technology's ability to integrate building energy management and automatically respond to changes also positions it as both a resource for decarbonization planning and a tool for implementing decarbonization solutions.

Saving Energy While Informing Maintenance and Upgrades

Have you asked if your facility is working as hard for you as it could? While staff training and workforce development are key to preparing your organization for decarbonization, so is optimizing building systems to work smarter, not harder.

Smart building systems use sensors and monitors to collect real-time energy usage data that's leveraged to achieve more efficient building operations. Whether installing occupancy sensors to switch lights off in areas of a building that aren't in use or using heating, ventilation, and air conditioning (HVAC) controllers to fine-tune air flow and humidity in different zones, there are numerous ways to automate energy savings.

A portfolio of buildings across New York, representing 2.95 million square feet, reduced their energy use by 7.2% on average by installing RTEM systems. However, the total energy savings for a

given facility will depend on several factors, including the existing site conditions, building type and use, and occupancy rates.

Aside from automated controls, smart technologies can also provide diagnostics and actionable information to help property owners and facilities teams identify energy-saving upgrades and potential maintenance issues.

At Sherman Terrace, a 67-unit housing coop in the Bronx, the building management system sends email and text notifications when faults are detected, helping staff quickly respond to repairs. Monthly and quarterly reports of building performance provide recommendations for maintenance, energy conservation, and necessary capital improvements.

Smart metering helped Jack Resnick & Sons identify energy cost saving opportunities at their 563,391-square-foot building in Manhattan. The system collected data from building equipment and systems, such as chillers, boilers, and lighting control panels to determine optimum setpoints, schedules, and operations. This automation has cut annual energy consumption by 480,000 kilowatt hours (kWh), amounting to approximately $98,000 in cost savings. The cloud-based system's ability to detect loss of connectivity and equipment malfunction in real-time also reduces costs through preventative maintenance and shortened response times.

Using building data from their RTEM system, Yonkers Honda Service Center identified several energy efficiency improvements to cut their energy consumption. The installation of a smart thermostat, lighting retrofits, and HVAC upgrades delivered 370,783 kWh of energy savings (roughly $20,000 in cost saving) in their 48,500-square-foot facility. The system's equipment fault detection has helped inform budget and capital planning while avoiding added costs for emergency service or equipment replacement.

Increasing Adaptability and Marketability

Being responsive to change is critical for businesses and property owners alike. Whether preparing for building decarbonization or adapting to fluctuating occupancy in a hybrid work environment, smart building systems enable both rapid decision-making and long-term planning.

As buildings shift from fossil fuel-powered equipment to all-electric systems, smart technologies can be leveraged to optimize renewable energy and energy storage solutions. For instance, smart systems can manage how much onsite renewable energy generation is used to power the building versus stored in batteries for later use or fed into the grid based on historical usage data and the weather forecast.

Automated building controls also improve a property's marketability to tenants. Not only can building equipment like HVAC systems and lighting be optimized for energy efficiency, but also to align with a tenant's workspace needs. A smart building system could adjust temperature and ventilation throughout a workplace according to a pre-programmed schedule or occupancy data

collected by keycard swipes. This customization provides value to tenants, enhancing retention and the potential for higher rents.
As buildings make improvements and replace equipment, smart systems can be adapted or scaled to accommodate new infrastructure and technologies or address emerging needs. In an all-electric future, commercial and industrial buildings will be tasked with navigating new and complex energy uses, such as charging electric vehicles or leveraging energy storage to participate in demand response programs. Smart building systems offer a centralized platform for managing and optimizing these competing demands.

Retrofitting Your Building with Smart Technologies

Whether to comply with regulations or modernize your building, smart technologies are an asset to reduce energy loads and improve indoor comfort. From HVAC equipment to lighting and plug loads to window shading, they make it possible to interconnect and streamline energy management across an entire building. Facilities teams and occupants can utilize smart systems to draw insights into building operations to customize indoor environments, support preventative maintenance, and detect equipment failure.

Smart building systems are also critical to unlocking the full potential of energy-efficient equipment and clean energy systems. Building decarbonization strategies, such as heat recovery systems and heat pumps, benefit from automation and control systems to optimize their energy usage and emissions savings.

With real-time data at their fingertips, building owners and facilities teams are empowered to achieve near-term energy savings and chart their path toward a decarbonized future. Commercial, industrial, and multifamily buildings may be eligible for New York State and utility incentives to support adoption of energy management systems, smart technologies, and other energy efficiency improvements.

The New York State Energy Research and Development Authority (NYSERDA) can connect commercial and industrial leaders with technical experts and resources to take the guesswork out of decarbonization