

Smart Cities Start with Smart Buildings

JANUARY 26, 2016



As more people move to urban areas, cities face ever more economic and environmental challenges, including resource constraints, economic restructuring, aging populations, and pressures on public finances. In their efforts to accommodate growing urban populations and the accompanying challenges, governments can use modern information and communication technologies to create “Smart Cities” and smart buildings that improve the quality and interactivity of urban services while reducing costs and ensuring sustainability.

Smart City applications have the ability to improve everything from traffic flow to emergency response to the operations of the buildings in which we live and work. The United States alone is home to more than 5 million large commercial buildings, including warehouses, offices, and schools. Buildings are

responsible for about two-thirds of U.S. electrical energy consumption, and the U.S. Department of Energy estimates that the country wastes 30 percent of our overall energy, representing huge financial and environmental losses.

Today, cutting-edge Internet of Things (IoT) solutions enable the businesses, schools, and other institutions on Dell's "Top 25 Future-Ready Economies" list to make better data-driven decisions for smarter buildings. By overlaying an IT network, connecting all traditionally unconnected equipment, and applying automated analytics and controls, building owners and managers can significantly reduce their buildings' energy waste and cut costs.

For instance, lighting control systems, thermostats, sensors, and alarms – all connected to the IoT – can automatically adjust building settings according to real-time usage patterns, leading to energy savings, improved air quality, and an increase in overall efficiency.

In addition to saving energy – and, as a result, costs – smart buildings improve the indoor experience for occupants. On a sunny day, windows automatically darken themselves, and when sensors detect an empty room, the heat automatically turns off. Buildings that employ these types of energy-saving technology improve occupants' quality of life, workers' productivity, and students' chances for academic success.

Smarter Buildings: The Foundation for Smart Cities

The rapid introduction of new IoT solutions allows building operators to make their properties smarter without having to undergo costly retrofits or hire expensive consultants. Lucid is one company leading the transition to smarter buildings and smarter cities. It works with the Clinton Global Initiative and runs Connected Cities, a program to help 100 U.S. cities integrate smart technologies into municipal buildings.

"Connected Cities exists to break down cost and complexity barriers, so cities know how to invest in efficiency and sustainability," says Vladi Shunturov, president and co-founder of Lucid. "Cities can leverage other participants' experience, so they don't have to architect their smart building initiatives and efficiency efforts from scratch."

Shunturov suggests that cities focus on three key areas to improve efficiency:

1. **Operations:** Centralize performance data and use analytical insights to reduce consumption by 17 percent, on average.

2. **Behavior:** Educate tenants in good habits and best practices, and create a feedback mechanism.
3. **Physical capital:** Where necessary, replace inefficient systems, using data intelligence to effectively target capital across large portfolios.

Current practices tend to focus on capital expenditure first – replacing old equipment with new – but this approach is often premature. Many times the better solution is to evaluate what already exists, improve its efficiency, and use the savings to invest in capital improvements. According to Lucid, building managers can realize significant energy savings purely from operational measures.

As a first step, cities interested in implementing smart building programs can increase the frequency of utility data collection, which will reveal important usage patterns. For instance, instead of tallying utility bills monthly, cities can use smart meters to take readings every 15 minutes. This will help them identify usage patterns and plan effective energy usage based on equipment requirements and building occupancy. In schools, this kind of improved efficiency means that cost savings can be allocated to where they'll be put to the best use: education and curriculum. In cities, improved efficiency translates into energy savings, simplified processes, and the ability to identify capital expenditures that do the most good without breaking the budget.

One U.S. organization uses Lucid's technology to verify its building-level sub-metering information, thereby avoiding the higher billing rates linked to peak demand charges, which can account for as much as 40 percent of energy bills in many utility territories.

The Lawrence Berkeley National Laboratory (LBNL) uses Lucid's technology to centralize data across 26 buildings and five different building systems. In the first two months of using Lucid's technology, LBNL's facilities team reduced the buildings' natural gas usage by 50 percent, thanks to insights from 15-minute interval data that empowered the team to configure the building's automation system to run more efficiently. Before using Lucid's software, LBNL was not aware that its automation system was misconfigured, so buildings were being heated and cooled at night, even though they were vacant.

Of course, it is important not to manage energy efficiency in isolation, because this can lead to uncomfortable, unproductive, or unhealthy environments. The beauty of smart buildings is that they enable multiple systems to collaborate across multiple contexts: resource efficiency, productivity, comfort, health, and education.

A Solid Foundation for Financing

For many communities, the greatest barrier to becoming a Smart City is cost. One interesting enabler for many cities is new financing mechanisms, which previously were the catalyst for the rapid deployment of solar and other renewable energy generation products. Increasing numbers of deployments and greater efficiency gains are bankable assets that offer cities opportunities for bonds and other financial mechanisms, but identifying opportunities and providing fiscal accountability require data.

For example, the city of Orlando, Florida, is investing about \$20 million in Smart City deployments. It is using data collected on energy cost savings to provide accountability and demonstrate these investments' performance over the long run. Because building conditions are dynamic – occupancy, weather, and usage patterns change continuously – savings validation mathematics tend to be difficult and time consuming unless they are fully automated and data is centralized and readily available.

As cities continue to grow and change, taking control of the spaces in which we live and work – and making them more intelligent – is critical to conserving resources, improving living and working conditions, and saving money. Fortunately, cities don't need to make huge investments to get started: They can become smart and efficient one building at a time.

To learn more from Dell about future-ready economies, please visit [Dell.com/futurereadyeconomies](https://www.dell.com/futurereadyeconomies).

Intel and the Intel logo are trademarks of Intel Corporation in the U.S. and/or other countries.