

# Retrofits Are Key to an Energy Efficient Building Stock

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*Liberty Tower Lobby*

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Even if all new buildings from today on were built to be net zero energy, it would take several decades for the change to have an appreciable effect on overall building energy consumption. Indeed, 50% of commercial buildings in the United States were built before 1980. Moreover, older buildings adhere to outdated standards—if they adhere to any standards at all—and often have higher energy intensities than new construction. Retrofitting these older buildings is the only path toward substantially reducing the energy footprint of the existing building stock.

## **Efficiency through Retrofits**

In the world of retrofits, installing energy efficient heating, ventilation, and air conditioning (HVAC) systems; LED lighting; and building controls can help building managers lower the levels of energy consumption of building systems. For example, the 85-year-old Liberty Tower in Dayton, Ohio is using each of these strategies to improve energy efficiency. All interior and exterior lights in the 114,000-square-foot facility are being replaced with LEDs, the building's existing steam boiler is being replaced with two vertical fire tube boilers, and the building controls are being replaced and upgraded to provide advanced programming measures.

Switching to LED lighting provides a substantial savings opportunity in existing buildings. In the case of Liberty Tower, the new lighting system is expected to use 60% less energy than the system it's replacing. However, more savings are possible in LED retrofits through the addition of controls. Because LEDs provide better dimmability than fluorescent lights, they are better suited to controls. Even though the reduced energy consumption of LEDs reduces the amount of energy available to be saved, controls can allow an additional way of fine-tuning the amount of energy being used, thus providing more savings.

Lights can be dimmed when natural light is present or when a space is unoccupied to provide more savings. However, the level of light output during normal operation can also be adjusted based on feedback of occupants so that energy is not wasted providing more lighting than is needed. Additionally, LED lamps fail differently than incandescent or fluorescent lamps—they gradually grow dimmer at the end of their lifespan. As a result, using lighting controls to initially provide less than the entire output of the LED and steadily increasing output as the lamp fails could decrease the frequency at which lamps need to be replaced. This provides operational savings in addition to energy savings.

### **Upfront Costs**

Though savings from retrofits can be substantial, so too can the costs. For the Liberty Tower retrofit project, the total cost is estimated to be \$870,000 and provide annual utility cost savings of \$99,000, generating a payback period of 8 years. The payback period, for better or for worse, is considered by many in the industry as an easy shorthand for determining whether or not a given energy efficiency retrofit project or technology will be viable for a particular installation. Most building owners require a payback of 3 years or less, though this depends on the ownership and use of the building.

Liberty Savings Bank owns the Liberty Tower and occupies about 10% of the total floorspace, with the remainder leased to tenants. Because the company is family-owned and occupies part of the building, it can accept a larger payback. However, only about 60% of commercial floorspace in the United States is occupied by its owner. Consequently, larger ticket upgrades, such as deep building envelope or HVAC system upgrades, remain difficult to sell within the retrofit market.

Moreover, because retrofits are prioritized by their payback period and generally have a long lifespan, opportunities with unattractive longer payback periods are the ones that remain. Without either a change in technology or an outside force, the energy savings potential of these opportunities may go unrealized. In the case of Liberty Tower, the project is expected to generate more than \$70,000 in utility rebates, making the economic case more practical. With commercial buildings accounting for more than a third of total U.S. energy consumption, regulations and incentives will be the key to reducing the energy footprint of the existing building stock.

Join Benjamin Freas at the Navigant Research's [Retrofits for Commercial Buildings: Moving the Needle on Energy Efficiency in Existing Buildings](#) webinar on Tuesday, April 19, 2016 at 2:00 pm EDT to learn more about energy efficiency in buildings.

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