



Retro-Commissioning Sensor Suitcase

THE CHALLENGE

Small commercial buildings—those 50,000 square feet or smaller—account for 94 percent of all commercial buildings in the United States. They also account for 44 percent of total commercial buildings energy use.

These buildings are some of the most neglected with respect to energy-efficiency improvements, operations, and maintenance. Often, owners aren't aware of the conditions of their buildings and energy-using systems. They might have difficulty accessing capital for investing in system upgrades and maintenance, or they lack in-house staff who have energy system expertise.

Whatever the reason, the results are often increasing energy costs due in great part to inefficient, inadequately maintained systems.

THE SOLUTION

To help alleviate these challenges, Pacific Northwest National Laboratory and Lawrence Berkeley National Laboratory researchers developed the Retro-commissioning Sensor Suitcase.

The technology is a portable case containing 16 small matchbox-sized, battery-powered sensors. The user mounts the sensors in specific building locations—for example, on lighting fixtures or near thermostats—guided by instructions from a tablet computer.



Retro-commissioning Sensor Suitcase is a portable case containing 16 small matchbox-sized, battery-powered sensors users mount in specific building locations, such as on heating and air conditioning units or near thermostats.

The sensors measure variables that impact energy use, such as indoor and outdoor temperature and lighting status. After four to six weeks, the user collects the sensors and places them into the suitcase. Data from the sensors are transferred to a personal computer, where software analyzes them.

After the user enters a small amount of building information, such as square footage or occupancy level, a report is quickly generated with building-specific energy-savings recommendations, such as installing occupancy sensors that turn lights off when an area is unoccupied or adjusting heating and cooling temperature settings. Each recommendation is accompanied by an estimated annual energy cost savings.

THE BENEFITS

The team estimates the recommendations can save building owners about 10 percent on annual energy bills. That's \$3,500 annually on national average for a 25,000 square-foot building,

Additionally, retro-commissioning is performed in four to six weeks, compared to six months or longer by conventional methods. Conventional retro-commissioning can cost upwards of

\$1.50 per square foot—for a 50,000 square-foot-building, that's \$75,000. With this technology, the team estimates a sales price of \$2,500 to \$3,500 based on the research prototype.

The technology is designed so that anyone can use it with easy-to-follow, step-by-step instructions that allow non-experts who have a brief training on the technology to deploy the sensors. It is reusable—a technology intended to be used repeatedly across many buildings. Finally, the technology is portable, making it easy to transport from building to building..

COMMERCIALIZATION

In 2017, the Retro-commissioning Sensor Suitcase was transferred to Orlando, Florida-based GreenPath Energy Solutions via a **non-exclusive license agreement**. GreenPath, who provides energy management solutions to the aviation, commercial, and public markets, was looking for a technology that would complement its existing energy benchmarking, energy auditing, and retro-commissioning services for the small to medium-sized commercial building market.

The collaboration among the national laboratory inventors, commercialization staff, and GreenPath was recognized with a 2020 Federal Laboratory Consortium Award for Excellence in Technology Transfer.

The technology is available to interested companies for licensing in multiple fields of use. Beyond Greenpath, the technology is part of two projects, one leveraging the U.S. Department of Energy's Technology Commercialization Fund and the other a pilot sponsored by the U.S. Army.

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