Automated Re-tuning[™] Brings Harmony to Building Operations



Gains in energy savings and comfort flourish when automated Re-tuning methods are implemented in buildings

In the U.S., buildings consume a substantial amount of energy to provide heating, cooling, lights and other functions. In many cases, these structures could be far more energy efficient and more comfortable for occupants if no- or low-cost Re-tuning methods were applied to the controls and systems that manage the various building functions.

Re-tuning is the systematic process of detecting, diagnosing, and correcting operational problems in building systems and their controls. Much less costly than a retro-commissioning approach that could involve updating or replacing existing equipment, Re-tuning can nonetheless deliver significant efficiency and comfort rewards, as well as extend the lifetime of building devices and systems.



Re-tuning of building controls can be accomplished inexpensively, yet it yields significant energy savings.

Pacific Northwest National Laboratory has developed, refined and championed Re-tuning approaches, including automated methods, through a series of state and national projects that began in 2000 and continue today. The U.S. Department of Energy has funded a number of these projects.

AUTOMATED RE-TUNING: CONVENIENT AND EFFECTIVE

Automated Re-tuning can be used in buildings that possess a building automation system (BAS), which manages many building functions. Often, BASs have not been optimized to achieve efficient building performance. Automated Re-tuning works in tandem with the BAS, assessing and sometimes addressing operational issues in a wide range of systems and functions, including heating, ventilation and air conditioning (HVAC) units, operation schedules, and more. PNNL has developed two automated methods:

• The Open Energy Information System—"OpenEIS." This software tool derived from early Re-tuning development efforts in Washington state. Under this approach, building operators manually gather operational data from the BAS, and then submit it to the OpenEIS tool for automated analysis. Designed as a periodic check on building performance, the tool can identify a wide range of control and system issues that need to be adjusted to enhance operational efficiency. It's an effective method for individual building operators considering more expensive and intensive retro-commissioning. Deployment of algorithms to detect, diagnose and, in some cases, self-correct operational problems. The algorithms, coupled with the VOLTTRON[™] distributed sensing and control software platform and integrated with a BAS, automatically gather building operations data and provide a continuous monitoring capability that identifies performance issues. This tool can't fix broken systems, but, for instance, it can autonomously fix issues such as incorrect heating and cooling schedules. The method was developed and improved through the PNNL-led Clean Energy and Transactive Campus project, an effort jointly funded by Washington state and DOE. This tool is particularly effective for a group of buildings, such as a campus, due to its automated data-gathering capability.

There also is help for buildings that do not possess a BAS. A manual Re-tuning process is available that enables limited, but nonetheless beneficial, performance improvements.

REAL-WORLD APPLICATION OF AUTOMATED RE-TUNING BEGINS

The OpenEIS tool has been enhanced and updated to support the city-scale use of Re-tuning strategies and tools in Seattle, WA. The municipal government adopted a "tune-up" mandate that applies to many large nonresidential buildings (50,000 gross square feet or greater) within the city. Affected building owners and operators will be required to tune building energy and water systems every five years. Through the new rule, the city seeks to promote high-performance buildings with reduced emissions and energy use, help maintain affordability for building owners and tenants through reduced utility expenses, and support green jobs. In addition to improving OpenEIS to support tune-up implementation, PNNL provided technical support to the city during mandate development.



Re-tuning of building controls and systems benefits all types of structures. Seattle, Wash., has adopted a tune-up requirement for many large, non-residential buildings in the city.

MORE INFORMATION

For more information about Re-tuning and its benefits for all types of buildings, as well as other informational and training materials, see the **Building Re-tuning™** website: http://www.retuning.org/

ABOUT PNNL

Interdisciplinary teams at Pacific Northwest National Laboratory address many of America's most pressing issues in energy, the environment and national security through advances in basic and applied science. Founded in 1965, PNNL employs more than 4,000 staff and has an annual budget of approximately \$1 billion. It is managed by Battelle for the U.S. Department of Energy's Office of Science.

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