

Vornado Realty Trust Re-tunes its Building to Save Energy Through “Optimizing” Building Operations

Vornado Realty Trust is one of the nation’s largest owners and managers of commercial real estate. Over 20 million square feet of Vornado’s 100 million square foot portfolio has earned the Energy Star label.

In October 2012, Vornado trained building operators to re-tune one of its buildings in Arlington, VA. Re-tuning provided the facilities management team with the ability to identify and understand building scheduling opportunities that drove significant, low-cost energy savings.

In 3 months since the training the company has saved an average of 27% on its heating bill and 3% on its electricity bill due to the following 5 measures that were identified:

1. Lowering the boiler hot water supply temperature set point
2. Lowering the static pressure on the main duct and branches
3. Changing the set points on fan discharge temperature and chilled water supply temperature
4. Lowering condenser water temperature supply
5. Using motion sensors for the conference rooms to set VAV boxes to night mode



Address: 2100 Crystal Drive, Arlington VA
Owner: Vornado Realty Trust
Size: 250,000 square feet

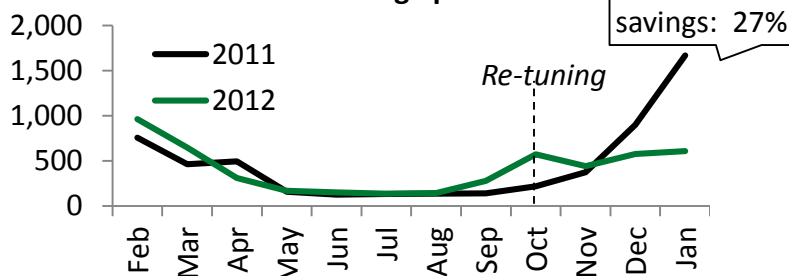
What is Re-tuning?

Building re-tuning is an approach for utilizing building automation systems (BAS) to save energy by identifying and correcting operational problems, such as inefficient scheduling, temperature set points, and static pressure set points. Re-tuning minimizes energy consumption and improves occupant comfort. This process can reduce building energy use between 5% to 20%.

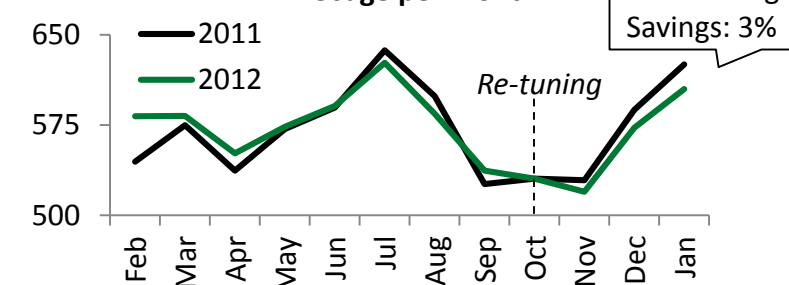
There are several training resources available to building owners and operators interested in learning more about re-tuning.

- In-person trainings are available through training centers in the following states/regions
 - California ([Laney College, Manex, and Energy Commercialization](#))
 - New York ([CUNY Building Performance Lab](#))
 - Philadelphia ([Consortium for Building Energy Innovation](#))
- PNNL has developed online training resources available at www.pnl.gov/buildingretuning
 - Classroom Training Material
 - Training Instructor Manual
 - Online Re-tuning Interactive Training
 - Energy Charting and Metrics Tool (ECAM)
 - ECAM Webinar Series
 - Guides to Re-tuning Measures

Therms Usage per month*



kWh Usage per month**



*Both Therm and kWh usage were normalized by degree days

**Fan and cooling kWh savings are most significant during the Spring and Fall months



Download data from your BAS and input into the re-tuning tool to identify low-cost energy savings

Strategies for Success

Step 1: Enroll in in-person trainings or leverage online resources

Re-tuning training centers offer in-person trainings where facilities and operations staff can learn about how to conduct this analysis to identify low-cost energy-saving measures at their buildings and how to train others in their organization in re-tuning.

DOE and PNNL also offer online resources to train building operators and engineers on re-tuning. First, PNNL has published a re-tuning training manual and an online curriculum to guide you through the re-tuning process. Second, building owners and engineers should train on how to use the Energy Charting and Metrics (ECAM) building re-tuning tool. ECAM is a Microsoft Excel tool that allows the user to analyze BAS data and to identify low-cost energy-saving opportunities.

Step 2: Download Data from BAS and Input into ECAM Tool

To start the re-tuning process, download operational data from the BAS to input into ECAM. The PNNL website has an ECAM webinar series with 3 recordings, presentations, and example raw data files that trainees can use to walk through ECAM and analyze interval meter and operational data from the BAS.

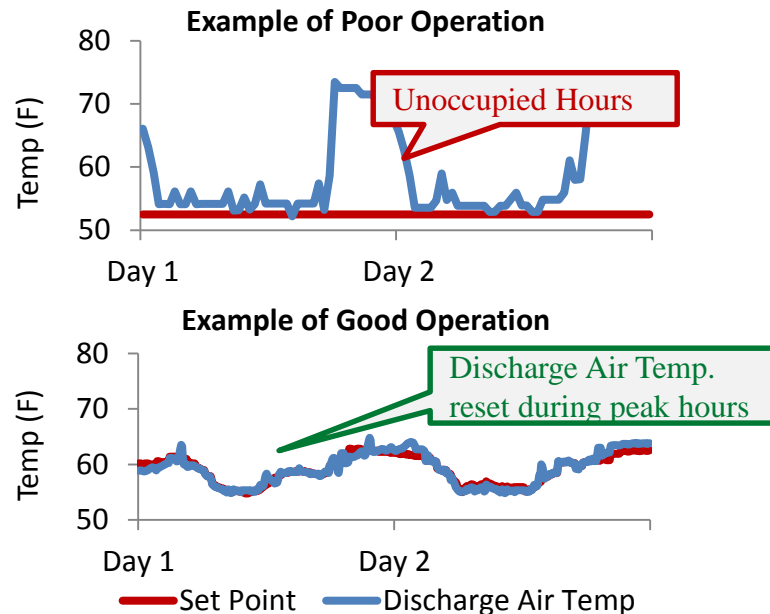
Two weeks of data is recommended (the more data, the better). The format of data varies with the BAS vendor and age, but the ECAM user guide provides step-by-step instructions to pre-process the data.

Step 3: Analyze Data from BAS and Identify Energy Saving Opportunities

ECAM plots BAS data into graphs that allow facilities staff trained in re-tuning to identify opportunities to save energy in the building. Common low-cost/no-cost re-tuning measures include:

- Tightening up equipment schedules
- Correcting economizer problems
- Implementing automatic reset and/or scheduled adjustments for discharge temperature and static pressure set points
- Adjusting zone terminal box set points
- Adjusting chiller plant and heating plant operations (including chilled water/hot water set point reset, chilled water/hot water loop differential pressure reset, and condenser water reset)

Example of Discharge Air Temperature Energy Conservation Measure



- Air handling unit (AHU) charts plot the discharge air and the discharge air temperature set point
- The top graph shows a constant set point, even during unoccupied hours
- The bottom graph is the energy-saving option that resets the set point to meet the load in the zones served by the AHU