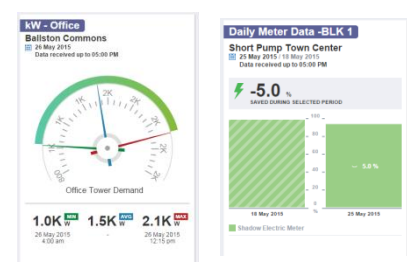


Building Intelligence

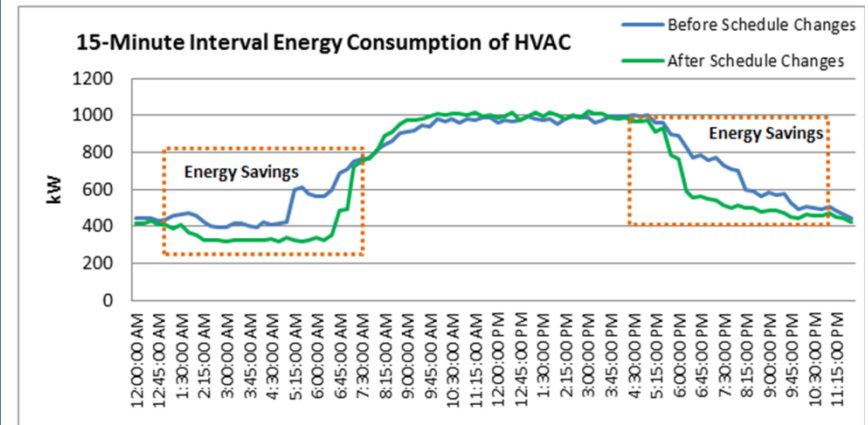
Switch Automation



What is it?

The Switch Automation platform is intended to be a “single pane of glass” view into the operations of a building. In its future state, it will provide monitoring and status of all of the data collected in a building including key information from HVAC, lighting, electrical, elevator, and security systems. In its current state, the platform is collecting key information from HVAC and electrical systems. One of the key advantages with this system is the ability to view electricity usage data in 15-minute intervals. By implementing a solution with the capability of monitoring energy use in 15 minute intervals, you take managing energy from 12 data points per year to over 35,000 points per year, which opens up much more opportunity for cost control.

One schedule change can save \$30,000



Benefits

- ❖ Actively manage energy on an hourly, daily, weekly basis rather than monthly or annually
- ❖ Greater utility bill predictability
- ❖ Better insight into operations of the building
- ❖ Improved monitoring and alerting of equipment can provide opportunity for proactive maintenance
- ❖ Opportunity for resident engagement and gamification

Good, Better, Best Approach to Implementation

- ❖ **Good:** Monitor near-real time utility data
 - ❖ Appropriate for smaller buildings with limited common area, unsophisticated equipment
- ❖ **Better:** Monitor near real-time utility data and 50 key points from other systems
 - ❖ Appropriate for medium-size buildings with a building automation system
- ❖ **Best:** Monitor near real-time utility data and unlimited key points from other systems
 - ❖ Appropriate for large buildings with central plants and robust building automation systems

Rooftop Unit VFD Retrofit

MSAV™ (Multi-Stage Air Volume)



What is it?

Lennox® developed a turn-key energy savings solution that can be installed on many different types of rooftop units with an ROI of around two years. The device turns a constant air volume system into a variable air volume system to better match heating and cooling supply with actual demand.

Simple Payback Example

RTU Tonnage	40
Fan Horsepower	10
Project Cost	\$2,280
Annual Energy Savings	\$2,144
Simple Payback Period (YEARS)	1.1

Benefits

- ❖ **Reduce energy consumption** by improving the part load efficiency up to 27% and supply fan power savings of up to 61% on existing equipment.
- ❖ **Increase indoor comfort** by ensuring more precise temperature and humidity control from the existing equipment.
- ❖ **Improve reliability** by reducing starting current, starting torque and mechanical stress which leads to reducing wear and tear, extending the life of motors, contactors, etc.

Best Applications

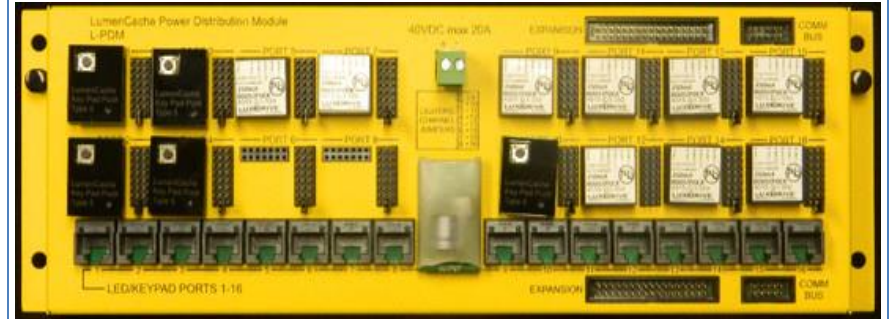
- ❖ RTUs with single zone constant speed fans that run continuously when RTU is operational
- ❖ RTUs that are 6 – 20 ton
- ❖ RTUs that operate at least 5 days per week, 8 hours per day

DC Powered LED Lighting

Lumen Cache®

What is it?

LED lights/fixtures need clean DC power converted from AC. Generally, that conversion occurs within a fixture itself in standard LED products. AC to DC power conversion includes power losses, DC powered LED lighting can maximize the energy savings from LED technology by avoiding the conversion losses.



Benefits

- ❖ It is very efficient, safe, and most importantly reliable
- ❖ Technology runs on Cat-5 cable and does not require traditional electrical wiring savings in material and labor costs.
- ❖ Eliminates need of heavy copper wire, conduit, and the hassle of installing lighting cans.
- ❖ Pricing for Lumen Cache should fall within 5% to 10% of the cost of a traditional LED lighting system when you factor in labor savings,

How It works

- ❖ The backbone of the Lumen Cache system is the Power Distribution Module (PDM), which creates up to 16 control channels, each of which can support groups of lights, sensors, switches and keypads depending on which "Puck" is snapped into the circuit.

An AC/DC Power Management module installed at the hub provides over-current protection to up to six PDMs and monitors the energy consumption to the PDMs and batteries. It can accept AC or renewable supply sources.

Cat 5 cable is run from the closet to each light or strings of lights (up to 15 depending on the voltage drop of each light). Because the network is all low voltage, no back boxes are required for most fixtures and fixture locations.

Cat 5 also is run to switch, sensor and other device locations.



Fill Valve and Flapper *Aqua Mizer®*

What is it?

The Aqua Mizer® device replaces a conventional toilet fill valve and flapper with one that can decrease the flush rate of the toilet, while increasing the flush force – resulting in a lower amount of water used for every flush. In addition to lowering the flush rate, the device prevents running toilets and catastrophic leaks.

Benefits

- ❖ Can lower flush rate without compromising flush force
- ❖ Prevents running toilets and catastrophic leaks
- ❖ Price includes on-site technical personnel to train maintenance staff on proper installation
- ❖ Can be packaged with showerheads and aerators where they have not already been installed for increased savings



Simple Payback Example

# Toilets	200
Material cost per toilet	\$29.65
Total Project Cost	\$5,930
Anticipated Water/Sewer Savings <i>(assumes 30% of water is used for toilet flushing, and save 30% of that use)</i>	9%
Annual Water/Sewer Cost	\$81,119
Annual Savings	\$7,301
Simple Payback Period (MONTHS)	9.7

Best Applications

- ❖ These devices are appropriate on standard floor-mount toilets that are NOT dual flush
- ❖ High cost savings will be achieved at buildings where Forest City pays the water bills and does not bill-back actual water consumption to residents
- ❖ Cost = \$29.65 per toilet

Variable Refrigerant Flow

Heating and Cooling

What is it?

Variable Refrigerant Flow (VRF) systems are a direct-expansion (DX) heat pump technology platform built on the standard reverse Rankine vapor compression cycle. These systems are thermodynamically similar to unitary and other common DX systems, and share many of the same components (i.e., compressor, expansion device, and heat exchangers). VRF provides flexibility by allowing for many different indoor units (with different capacities and configurations), individual zone control, and the unique ability to offer simultaneous heating and cooling in separate zones on a common refrigerant circuit and via heat recovery from one zone to another. Typical capacities range from 18,000 to 760,000 Btu/h for outdoor units and from 5000 to 120,000 Btu/h for indoor units.

Benefits

- ❖ Greater energy efficiency compared to ducted systems (no duct losses)
- ❖ Excellent load matching
- ❖ Individual zoning
- ❖ Sustainability credits
- ❖ Reduced roofing footprint compared to individual splits and heat pumps
- ❖ Demand response tool by controlling the on-off sequencing between zones

Embed video



Best Applications

- ❖ Multiple zoning and part load operations
- ❖ LEED certification is sought
- ❖ Sub-metering in apartment units of condenser energy using refrigerant flow estimation technology is allowed by jurisdiction