



Retrofit Case Study

Loft 27, Lowell, Mass.

Boston-based WinnCompanies has cut its electric bill for common areas by 25% at Loft 27, a 173-unit apartment building, as the result of efficiency retrofit and solar projects completed in 2012. The apartment development was created from the adaptive re-use of an historic former mill.

In 2006, WinnDevelopment acquired the large brick four-story mill, originally constructed in the 1920s, and renovated it over the next two years into apartments – 80% market-rate and 20% affordable – using federal and state low-income housing and historic tax credits and other funding sources.

Residents pay for their own electricity; the property pays for water and common area electricity.

Solar PV System Installed

In 2012, WinnDevelopment commissioned an energy audit of the property and embarked on an energy efficiency retrofit project. Simultaneously, it installed a solar photovoltaic system that supplies 55%-60% of the electricity used for common areas. The solar PV system was installed – and is owned and maintained – by a special-purpose entity established by WinnCompanies that is separate from the building owner. The 293 kilowatt-hour (kWh) solar PV system, which includes 1,278 solar panels on the building's flat roof and three inverters, produces about 360,000 kilowatt hours of electricity per year.

The retrofit project consisted of improvements to the building's HVAC system and new, more efficient LED lighting installed in all the apartments and some common areas. Mechanical improvements included variable frequency drives (VFDs) installed on the building's main



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water source heat pumps, cooling tower fan, and roughly 200 heat pumps in the apartments. Zone valves and flow setters were also installed on the apartment heat pumps to enable the VFDs to function.

Variable frequency drives permit adjustments of the amount of electricity that powers pumps and motors. Less electricity is used because pumps and motors are fed only the amount of electricity needed at any given time, rather than running at full capacity at all times.

Quickest Payback from Water Upgrades

In addition, the building's heat exchanger was cleaned and existing apartment water fixtures were replaced with low-flow fixtures. "We have found that water upgrade projects are the quickest payback item," said Darien Crimmin of WinnDevelopment, who described the Loft 27 retrofit and solar projects at the National Housing & Rehabilitation Association's *Preservation through Energy Efficiency Road Show* in Philadelphia.

The solar-generated electricity is sold to the property under a 15-year power purchase agreement that charges a rate (in cents per kilowatt hour) that is a little below the local utility company's retail rate. The rate started

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out at 16 cents per kilowatt-hour – compared to the retail rate of 16.5 cents – but was later lowered to 14.5 cents after the utility cut its rate.

Project Costs, Funding Sources

The efficiency retrofit project cost \$364,860, including expenses for an energy audit (reduced by a utility rebate), the HVAC system improvements, and the upgraded lighting. The funding sources used to pay for the retrofit work were a \$250,000 grant from the city of Lowell under the federal Energy Efficiency and Conservation Block Grant program and a significant grant from National Grid, the electric and natural gas utility company.

The solar PV system entailed \$1,311,676 for installation and soft costs (the special purpose entity paid for the equipment). These expenses were covered through a 10-year loan from Enterprise Bank and Trust Company, the 30% federal solar investment tax credit, and sponsor equity. The loan was specially negotiated.

Generated Savings

Crimmin said WinnDevelopment has had 15 months to measure the electricity cost savings generated by the retrofit and solar projects. “The city’s goal was to save at least 15%, and we’re hitting that.”

He noted that the actual savings in owner-paid electric costs have been 97% of what was projected.

Estimated annual electric cost savings to residents from the upgraded lighting in their apartments is \$35,793. The precise amount is unknown because tenants get their own monthly electric bills from the utility company. **TCA**

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