Advanced Rooftop Unit Control Retrofit Small Retail Case Study

ARC Retrofits combine new efficiency technologies to existing systems for improved energy savings

Project Background & Scope

Bonneville Power Administration (BPA) has identified Advanced RTU Control (ARC) Retrofits as a promising electricity efficiency measure. ARC Retrofits include multi-speed, supply-fan control, optimized ventilation levels and integrated, differential economizers. In 2013, BPA conducted an ARC Retrofit, Emerging Technology (ET) Field Test. As part of this ET Field Test, Peninsula Light Company provided incentives for ARC Retrofits on two RTUs, serving a small retail store.

Technologies

The Catalyst controller used in this retrofit, combines common energy saving measures with new innovative fan controls in an easy-to-implement device for single zone rooftop unit retrofits. The total effectiveness of the combined energy saving measures often reduces the unit's total HVAC annual energy consumption by 25-40%. This solution was applied to two packaged rooftop unites serving a small retail establishment.

Catalyst Controller

Implementation

Transformative Wave Technologies (TWT) installed Catalyst controllers, their eIQ platform and power meters on the two, 15-ton RTUs serving the small retailer. The two RTUs are packaged, air-conditioning units with gas-heat and 3 horsepower supply-fan motors. In addition to installing Catalyst controllers, a Catalyst building management system was also installed to better manage setpoints, schedules and comfort issues.

Results

Since the RTUs use natural gas for heating and only electricity-use was measured, only the supply-fan and cooling energy-use was analyzed. Prior to the retrofit, the supply-fan and cooling electricity savings were estimated, at 1,000 kWh per ton. So, for the two, 15-ton RTUs the annual electricity savings were estimated to be 30,000 kWh.

Current operation of the CATALYST solution has shown a show a 45% reduction in total HVAC electrical usage during the MV period. Using the measured data to date to define system performance results in annual electrical savings of 24,500 kWh or 140 kWh/ton per 1,000 hours for a typical meteorological year. This value is 15% lower than the original savings estimate. The shortfall in savings relative to the initial estimate appears to be a result of lower than anticipated fan loading and a higher than balance point for than assumed in the estimate.