Ravalli Electric Cooperative teams up with Trapper Creek Job Corp to create impressive energy savings

In 2011, Bonneville Power Administration (BPA) notified Ravalli Electric Cooperative (REC) that its wholesale power cost was going up. In turn, REC alerted its membership of the pending rate increase. Consequently, REC's largest consumer of electricity, the Trapper Creek Job Corp (TCJC), contacted REC to learn how it could become more energy-efficient. Not only was TCJC interested in saving money, but they were also interested in reaching agency energy efficiency goals. TCJC applied various energy efficiency measures using rebates and incentives offered by its utility to implement the successful project described here.

Site Overview and Mission Incorporated

TCJC is located south of Darby, Montana. The campus serves approximately 225 students, in addition to 50 permanent and 20 temporary employees.

The campus was originally built in the 1960s and is currently used as a Job Corps Center. Job Corps is a no-cost education and career technical training program administered by the US Department of Labor. This program helps young people between the ages of 16 and 24 improve their quality of life through career technical and academic training. The TCJC site has 20 main buildings (all less than 12,000 sq. feet) with significant loads, and several other small outbuildings/storage structures. TCJC is primarily an all-electric facility (except for some propane in the kitchen for cooking), and the main campus is served by a single electric meter.

In line with the mission of the Trapper Creek site, the projects discussed in this case study provided training opportunities for the students as well as energy savings. In several cases, students were able to assist in the work (e.g., duct sealing and testing) so they could learn proper procedures and practices. In at least one case, a student was hired by a local heating, ventilation, and air-conditioning contractor as a result of the skills he acquired during these efforts.

Investigating Energy Savings Opportunities

Before the power cost increase, few energy efficiency measures had been considered. To understand where the energy was going and the consequent impact of energy efficiency measures, temporary metering was conducted throughout the site over a 4-year period. The temporary metering was performed with different types of equipment depending on the specific needs.

Trapper Creek Campus. *Photo Credit Erik Boyer*

Examples of the metering equipment used are the following:

- True Power loggers
- Amperage loggers
- Run-time loggers
- Temperature/CO_2 loggers

Before the initiation of this project, the site had a 5-year average annual energy consumption of 3.2M kWh per year. To begin the process of reducing the energy consumption, it was imperative to determine the site's energy savings potential. REC and TCJC requested support from BPA's Energy Efficiency Customer Service Engineer, Erik Boyer, to perform an energy scoping audit. The purpose of the audit was to investigate TCJC's energy use and to provide general recommendations for energy efficiency measures.

The audit took place in mid-July 2011. Subsequent to the audit, it was determined necessary to establish building-level energy consumption. Initial baseline monitoring (completed in 2011 and 2012) indicated that the buildings with the largest energy consumption were the welding shop, food service building, gym, carpentry shop, recreation center, and dormitories. The audit also showed issues with deteriorated ductwork, antiquated thermostats, aging heating ventilation and air-conditioning systems, and non-functioning packaged thermal air-conditioning units.

Since then, additional monitoring and data logging continue to gather information on system operations and performance. As a result, more energy efficiency measures have been identified and are being integrated, such as increased insulation, heat recovery ventilators, demand control ventilation, and domestic water heat pump water heaters.

Since 2012, more than two dozen energy efficiency projects have been completed, and more are planned each year. Year over year, the site energy usage has gradually decreased against a 2009–2011 baseline. At the end of year 4, the energy

efficiency measures installed at TCJC had decreased the annual energy consumption by more than 14%. At the beginning of August 2016 (75% of the way through the year), TCJC is already at a 15.1% drop in energy use and is expected to end up near 18–20%. As of August 8, 2016, the cumulative energy and energy cost savings is 1,611,580 kWh and $87,025, respectively.

The following is a summary of energy conservation measures that were or are currently being implemented at TCJC:

- Underfloor air-handling duct repairs/sealing
- Standby engine generator block heaters
- Installation of ductless heat pumps
- Attic insulation
- Domestic hot water pipe insulation
- Domestic hot water heat pump water heater
- Air-source heat pumps
- Web-enabled programmable thermostats
- Heat recovery ventilators
- Demand control ventilation
- LED exit signs
- Linear LED fixtures and lights

Energy Conservation Measure Summary Savings

Program Year	Projected Baseline Usage (kWh)	Actual Usage (kWh)	Energy Savings (kWh)
2011-2012	2,947,000	2,743,000	204,000
2012-2013	3,030,000	2,714,000	316,000
2013-2014	3,076,000	2,688,000	388,000
2014-2015	2,890,000	2,482,000	406,000
2014-2015 (to date)	1,969,000	1,670,000	299,000

Project Financing and Culture Change

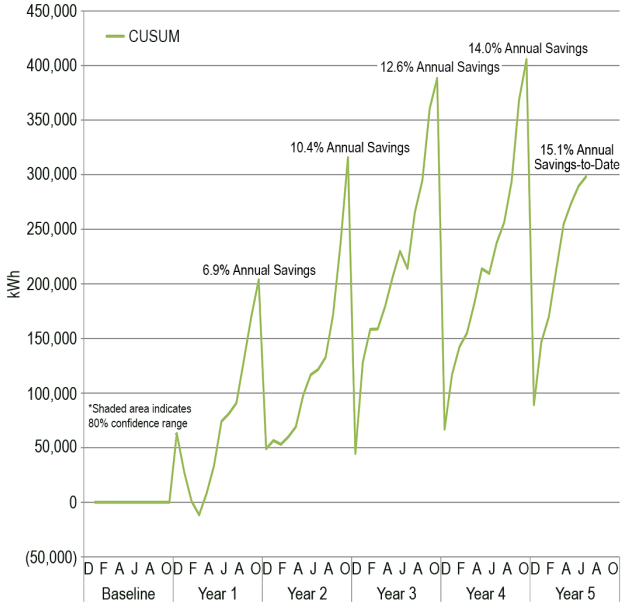
Each year BPA and REC had an incentive budget for energy efficiency and provided incentive funds to organizations that completed energy efficiency projects. To determine which energy efficiency projects to invest in, there was a team of 2–3 individuals (from REC and BPA) that would visit the site routinely to identify opportunities. They would work with Trapper Creek personnel to determine the site needs and uses. During the first couple of years, TCJC leaned extensively on BPA and REC for guidance on integrating energy efficiency into their facilities. Over time, though, TCJC site staff began to proactively look for opportunities on their own and would lean on BPA and REC only as needed. Currently, TCJC uses BPA and REC for guidance on complex projects or new technologies but is becoming much more self-sufficient in identifying and implementing energy efficiency projects.

The cumulative energy savings obtained at the TCJC site were the result of many small projects. The costs of these projects averaged between $2,000 and $3,000. The aggregate simple payback period was approximately 2 years, which equates to approximately a 50% return on investment.

TCJC projects were funded in a number of different ways:

1. Fiscal year budget—TCJC staff leveraged capital, maintenance, and student training budgets
2. Department of Labor—Department of Labor provides funding for facilities that are degrading and deficient (e.g., inadequate ventilation)
3. REC energy efficiency incentive reimbursement—REC provides incentive reimbursements for qualifying projects.
4. REC energy efficiency incentive direct acquisition—REC has directly funded projects (using the energy efficiency incentive) in lieu of reimbursement if TCJC capital was not available.
5. BPA/TCJC Intergovernmental Agreement—BPA holds earned energy efficiency incentives in an account that can be used for projects on behalf of TCJC. It serves as a revolving fund for projects.
6. Research funding—BPA and the Northwest Energy Efficiency Alliance have provided funding for studying the performance of new technologies in the field.

Site Energy Savings Over a 5-Year Period



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