

Lao Family Energy Makeover: A Case Study of Energy Savings for Non-Profits

Keeping costs low is a constant concern for businesses of all shapes and sizes. Non-profits, might be excluded from having to pay taxes, but they don't escape energy costs just like every other business. In fact, since non-profits tend to struggle with cash-flow, investing in energy efficiency can be more difficult than for their for-profit counterparts. But, as Xcel Energy and the Metro Clean Energy Resource Teams (Metro CERT) demonstrated, through a partnership with a local St. Paul non-profit, the Lao Family Community Center, very low-cost investments in energy efficiency can yield impressive returns, both in comfort and in cash.

The Lao Family Community Center was selected from a small group of non-profits who own their own building along the University Avenue corridor. This area has been dubbed the "Energy Innovation Corridor" and numerous partners have been working to demonstrate cutting-edge energy projects, to highlight, alongside the new light rail train, the possibilities for transforming our energy system.

The Xcel Energy Foundation partnered with the technical team at Metro CERT to select a non-profit, conduct an energy audit, solicit contractor donations, train employees, and provide project management for the energy makeover--all with the goal of demonstrating the variety of energy savings possible for non-profits.

Lao Family was clearly an excellent candidate for an energy makeover. The building they own was built in the 1950s, and as is typical for small organizations, no one

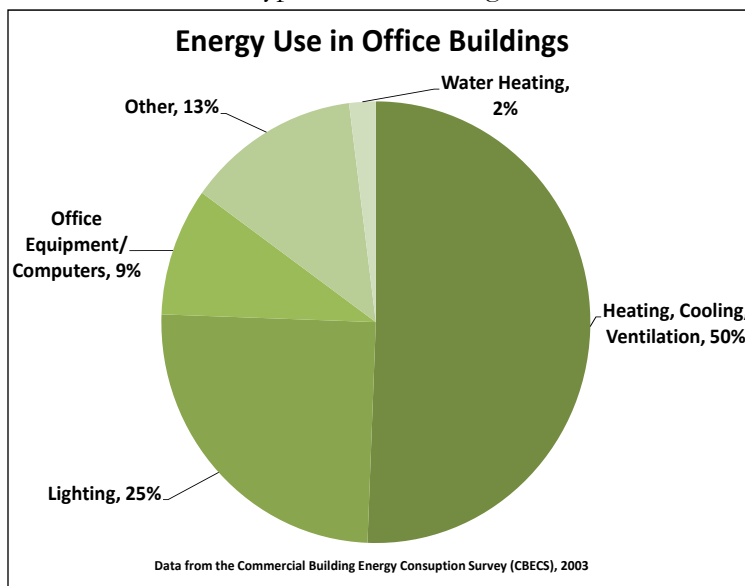


Project partners at the Lao Family Community Center

was in charge of addressing their energy use. The energy intensity of the building, prior to any makeover work was 80 kBtu/sq. ft., which is 30% higher than we found in the other building surveyed. In addition, the staff was very supportive of this work and they recognized a great opportunity to demonstrate energy saving tools not only to other non-profits, but also to the Hmong community that they serve.

The first step in helping Lao Family, and for getting started in your own building, was to get some expert help. Whether that means attending a workshop, taking advantage of free resources available or hiring an Xcel Energy auditor to take a close look at your building, don't assume that you'll catch everything on your own. As Sharon Nelson, assistant director of Lao Family puts it, "Get someone to come in and do an audit. They'll help you notice all the little things there are to do, and help you start the conversation. From there you can plan for implementation." Xcel Energy offers a subsidized business audit, that starts at \$400 and includes project planning and implementation support.

The energy audit for Lao Family made some specific recommendations regarding heating and cooling, lighting, building envelope improvements, water heating, and power factor correction. This case study will take a look at the improvements made to the Lao Family building in each of those areas, and offer tips for your own building and information about resources and rebates available.



Consider in your own facility:

HVAC: If your building is empty at any point day or night, a programmable thermostat is a must-have. If you already have one, check its program. When the building is unoccupied set the air conditioning up to 85 degrees and the heat down to 55. Install a locking cover to prevent employees and visitors from changing the settings. Finally consider if you have any unused spaces which could be set to a different temperature or shut off from rest of the building.

Lighting: Check your lighting to see if you have any of the larger T12 bulbs (1.5 inch diameter rather than the more efficient 1 inch bulbs). If you do, schedule a free Xcel Energy lighting audit to maximize rebates and get them replaced. Due to new federal efficiency standards, T12 bulbs will no longer be manufactured after July 2012, and at that point rebates may decrease (they are currently around 60% of installed costs).

Power Factor: Look at your Xcel Energy bill and find your power factor number, if it is below 90% this could be an opportunity for your building as well.

Air Sealing/Windows: Regular inspection and maintenance of door and window weather stripping is a great way to make sure your building isn't leaking out conditioned air. If you are considering a large project like a renovation or a roof replacement, be sure to talk to your contractors specifically about the effects on energy use, and inquire if there is a high efficiency option. If you need new windows, but can't cover the cost, try lining the old ones with plastic film for the winter, and installing window film to block out UV rays and heat.

Hot Water: Hot water use costs a business three ways: energy to heat it, supply from the city and sewage costs to dispose of it. Installing low-flow faucet aerators, fixing leaking faucets, and insulating water pipes are great ways to make a dent in your water costs.

Employees: Your employees are the best resource for reducing energy use. Education and engagement can lead to an enthusiastic and deep commitment on the part of employees to reduce energy use and green their workspaces. Consider forming a "green team" at your office to lead staff engagement and brainstorm energy saving actions.

Heating and Cooling

The Lao Family Community Center is a large building, with two floors and a basement. The main floor is office space; the basement has classrooms, a computer lab, and the mechanical room; and the upstairs has a meeting room and a very large, rarely used, gymnasium/auditorium. Heating and cooling this large building is the primary use of energy for Lao Family. The temperature in the entire building was irregular and hard to control with the manual thermostats that were in place. The upstairs housed one employee's office, but was otherwise only occasionally used.

Lao Family decided to move that employee's office to the main floor with the rest of the offices and Bruce Arnold Mechanical installed donated Honeywell thermostats. The new thermostats and the now vacant upstairs made it possible to keep the upstairs at 85 degrees in the summer and 58 in the winter while the rest of the building is a comfortable temperature. And with the new thermostats, the entire building gets set back to those temperatures when unoccupied. These simple steps achieved the single largest savings of all the work that was done at Lao Family, about \$1,500 per year.

Lighting

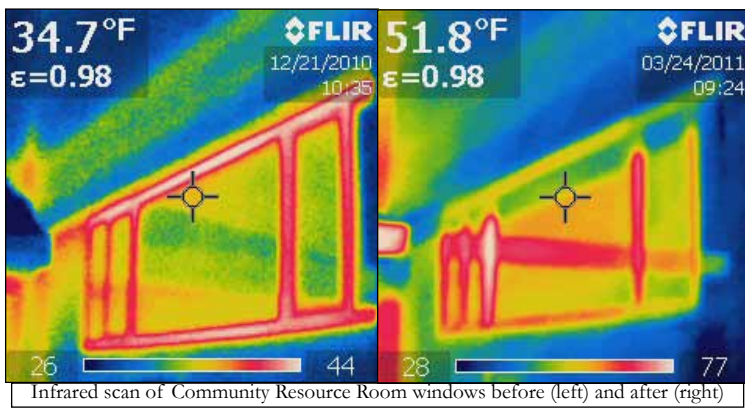
On average, lighting in an office building uses a quarter of its energy use. Lao Family is primarily lit with tube florescent, most of which are the more efficient, T8 bulb, using 32 watts. Newer T8 bulbs are available at 25 or 28 watts, which is an easy retrofit to do as bulbs burn out. A number of the incandescent floodlights in the building were replaced with super high efficiency LED (light emitting diode) lighting, donated by Toshiba and Energy Miser LLC. Xcel Energy offers rebates to replace inefficient T12 tube flourescents, and for installing LED lighting. However, many buildings would benefit from Xcel Energy's free lighting audit, a program called the "One-Stop Efficiency Shop." This program combines all the rebates and programs into one package. More information is available at <http://tinyurl.com/onestoplighing>

Power Factor Correction

Xcel Energy's audit of Lao Family revealed that they were paying a surcharge for their building's poor power factor. Power factor is a measurement of how well your equipment is using the energy that the power company supplies. A good power factor is 90% or higher, Lao Family's was 73.5%, which cost them \$900 in 2009. The installation of a power factor correction unit, donated by Staco Energy and installed by Bovolak Electric, helped improve this power factor, but at 80.5%, there is still room for improvement.

Windows and Air Sealing

Since the Lao Family building was built in the 1950s there have been big advances in building science and a rec-



ognition of energy as an expensive and a limited resource. Due to the age of the building and a limited repair budget, there were a number of building envelope improvement projects needed to improve Lao Family’s energy use.

Lao Family has many aluminum windows, which are particularly conductive and make some rooms unbearably cold and hard to regulate the temperature. The community resource room, a corner room with windows along both outside walls, was one such area. This room, located on the main floor next to offices is an ideal location for staff meetings, however due to the extreme cold in the winter and heat in the summer, the room was rarely used. The irregularity of the community room’s temperature also affected the board meeting room above. Finally, since staff were cold, they would use electric space heaters, which are costly to run.

New windows, donated by Andersen Windows and installed by Flannery Construction, immediately improved the rooms comfort level. The argon gas-filled, double pane windows, coated to block UV rays and heat, made a significant difference in the usability of the community room. However, the impact on building energy use was slight. While each window blocks heat transfer 70% better than the old windows, the total surface area of the building that changed was small, so the estimated savings is only \$300 per year. However the increased comfort in the community room gets the staff excited. Nelson says, “We don’t have four space heaters in that room anymore, the little things add up, but the windows are a very visible change.”

And while everyone wants new windows, it’s important to be strategic. Because of their cost, windows take 20-30 years to pay for themselves through energy savings, so replacing windows needs to have additional benefits in comfort and visual appeal. Additionally, purchasing new windows can be a mistake if they aren’t high enough quality. A cheap window, may not have a long enough lifespan to reach the payback, and after deterioration, might be as bad as or worse than the window it replaced. Look for argon gas-filled, double pane, with window film, and look for a long manufacturer’s warranty.

Some changes to a building envelope can be done

in house. Installing weather stripping, or caulking holes are easy to do and can add up to energy savings. At the Lao Family Community Center, a number of doors needed new weather stripping, and there were unused in-wall air conditioning units that need to be blocked to stop the leaking air. These improvements were able to be done by staff of Metro CERT and Lao Family, with materials picked up at a discount at the local Kendall’s Ace Hardware store.

The roof of the building is old and in need of repair, but like many small non-profits, such a repair is too expensive to take on without planning and fundraising. Lao Family may be eligible for a low-interest loan from the St. Paul Port Authority, if they choose an energy efficient white roof and added insulation, but at this point the project hasn’t been addressed.

Water Heating

A few of the simplest fixes at Lao Family reduced their water heating costs. By reducing the temperature of the water heat to from 150 to 120 degrees they will save \$40 dollars a year. Insulating the hot water pipes in the utility room and installing high-efficiency faucet aerators will save an estimated additional \$100/yr. These changes were all done in the matter of an hour or two by Lao Family and Metro CERT staff.

Over the course of the tracking period (2010 compared to 2009) Lao Family’s overall water use decreased by 31%, or 67,000 gallons. The exact cause of these savings, worth about \$450, is not known, mostly likely changes in kitchen use, fewer events, and some water saving practices combined to yield those results.

Behavioral Change

An often neglected part of energy reduction, is behavioral change. Buildings would not use any energy if people did not occupy them, and it is frequently human’s forgetfulness, stubbornness, or apathy that causes addi-

Energy Savings for Lao Family

Action	Estimated Annual Savings
Heating and Cooling (HVAC) (New Thermostats and Office move)	\$1,500
New Windows	\$300
Water Heating Improvements (aerators, pipe insulation, water temp)	\$140
Power Factor Correction	\$920
LED Lights	\$240
Total	\$3,100
Total energy costs	\$20,183
Percent reduction	15%

tional energy waste. Metro CERT staff worked with the Lao Family staff to survey staff and then provide targeted education to employees about energy use and issues related to energy consumption. The trainings focused on actions that each employee could do to reduce their daily energy use. A simple example of this is shutting off computers after work and turning off power strips to reduce phantom load. Nelson comments,



New symbol of conservation, created by artist Huy Bui

“Our staff has become more conscious of the fact that they can help reduce costs, which is another



Lao Family staff at the employee training

way to provide more resources to help our clients and the people we serve.”

Placing signs by energy using equipment (like light switches, faucets, hard-to-close doors, etc) can increase the frequency of the proper action taking place. At Lao Family, many of their clients do not read English or Hmong so the community decided to select a symbol that could represent conserving energy and not wasting resources. Metro CERT helped facilitate a contest for community artists to create a new symbol of conservation for Lao Family that will hopefully spread to the broader Hmong community.

Conclusion

Tracking the energy savings from this project will be an ongoing process, but the estimated savings for the first year is 15%, or about \$3,000, of which, halfway through the year, over \$1,800 have been documented. Assistant Director Nelson is pleased, “I thoroughly enjoyed the process, I feel so blessed to have had this support. We have the opportunity for long term energy savings. We can build on the success of what’s been done; it’s our responsibility to keep these changes going.”

And it’s an opportunity for your building as well, call Xcel Energy, get support, and get started.

Contact Xcel Energy for help with your own non-profit, business or home: 1-800-481-4700

Thanks to our many partners and donors!

