

Banding together to conserve resources

Application Note



Building Operations Case Study

Ric Boge didn't start out to become a resource conservation manager (RCM) for local government. He started as a baker. But that job and others in his diverse career gave him the needed skills—like data analysis, team building, diplomacy, and a sharp eye for detail—to help agencies in rural Skagit County, Washington, trim energy bills and make their dough rise.

Tools: Fluke 975 Air Quality Analyzer, Fluke 62 Mini Infrared Thermometer

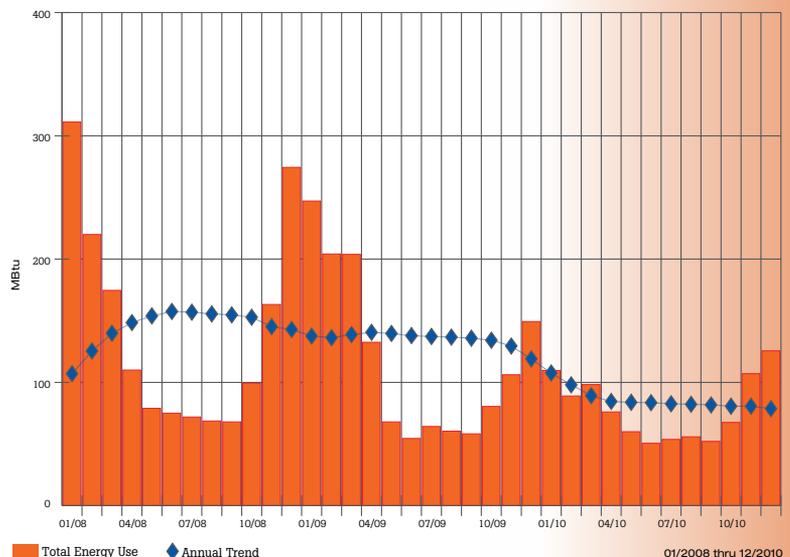
Operator: Ric Boge, shared resource conservation manager (RCM) in Washington State

Measurements: Spot-check air quality; search for hot spots; verify temperature of vents, supply air, and room surfaces; confirm CO, CO₂, air temperature, and relative humidity levels; check HVAC facility performance

Now Boge is in his third year of helping the cities of Burlington, Anacortes, and Sedro Woolley; the town of La Conner; two port districts; the local public utility district; Skagit County government; and the Swinomish Indian Tribal Community manage their utility usage. Such programs are not common across the United States, but the US Department of Energy has expressed interest.

Washington State has been a leader in resource conservation management, with a 20-year record of success, thanks in part to support by the Washington State University (WSU) Extension Energy Program and utilities such as Puget Sound Energy (PSE). But Boge's job as shared RCM puts a new spin on it. Alone, none of his nine clients has time to focus so closely

Three-years ending 12-2010. Monthly total energy use for Burlington City Hall.



on resource usage. By sharing Boge's time, they gain insights to help them achieve long-term savings. These public officials are spread thin. They handle some work themselves, but they rely on local HVAC/R and electrical contractors to handle new construction and retrofits—and often, to provide sound advice.

Boge sees his role as both advisor and teacher. "I train the staffs of participating jurisdictions in resource conservation management practices, so they become more self-sufficient, and don't necessarily need to rely on someone else," Boge said.

A question of relationships

Nine bosses? Boge's challenges don't end there. He spent most of his first six months as a shared RCM populating the database, attending meetings, and making phone calls to build relationships with people who count: building and grounds managers, conservation-minded employees, and local government leaders.

He maintains close contact with his government clients (he reports monthly to the Skagit Council of Governments), as well as the local gas and electric power utilities. The power company's RCM Support Group and local energy engineer provide important technical support. And the company helps fund the three-year shared RCM program, provided that Boge's clients meet annual milestones for reducing power use.

From park restrooms to libraries, city halls and public safety buildings to water and wastewater treatment plants, Boge checks energy consumption and other utility usage in 125 facilities—a total of 1.2 million square feet (.1 million square meters).

When he started late in 2008, he worked alone. He scrutinized natural gas and electricity consumption for his agency clients, using Utility Manager™ software to reveal monthly usage patterns where opportunities existed. He also became familiar with the power utility's Energy Interval Service (EIS), which records individual readings in 15-minute increments for special electric meters connected through the



Boge and Pittis use the Fluke 975 AirMeter™ tester to spot-check air quality in the Anacortes Public Library.

web. He used EIS reports to reveal daily usage and patterns where opportunities showed: a spike in electricity usage at 4 am, for instance, in an empty library.

Later he gained a part-time assistant who helped him with data entry. That gave him time to look at other utility costs, including sewer, water, and garbage. And just recently, with support from a state-wide shared RCM initiative, he added a part-time facility management conservation technician to help Boge's clients with the highly detailed paperwork required to apply for the energy conservation grants that the electrical utility has available. The additional technical staff support is provided through a Recovery Act grant provided by the Washington State Department of Commerce.

Common projects for energy-efficiency grant incentives include lighting retrofits and HVAC systems and controls. Replacing T-12 lamps with new generation T-8 fluorescent bulbs and ballasts, for instance, requires specifying

exactly which model numbers are coming out, and what new gear is going in. "For the facilities people we work with, even having the time to fill out the paperwork accurately and make sure it's all submitted as it needs to be is difficult. We can help them at least get the paperwork done and in, and they can choose to have the work contracted out, or do it themselves," Boge said.

New light in the library

In the spacious Anacortes Public Library, built in 2003, facilities manager Russ Pittis recently swapped out first generation T-8s with the even more efficient second generation T-8s. Those near the windows he equipped with light sensors that dim the lights during daylight hours, returning them to full illumination at night.

Pittis has also adjusted the building's HVAC systems. He reprogrammed the three gas-fired boilers to run more efficiently and shut down 11 of the building's 37 air-handling units. The library is equipped with 14 CO₂ sensors to help with



The Fluke 62 Mini Infrared Thermometer helps Anacortes Facilities Manager Russ Pittis search for hot spots that could signal equipment problems.

outside air adjustments and features a Siemens control system that feeds building operations data to Pittis over the web.

Tenants who change thermostat settings or use electric space heaters for comfort through what you might call “tenant creativity” can hammer energy savings. So Boge encourages clients to educate users and bring them on board as participants in the conservation drive. For example, if an office needs more warmth, use an infrared radiant heat panel that consumes 100 to 200 watts, instead of a space heater using 1500.

Still, comfort is a very personal issue. Workers handling and stacking books may feel warm because they’re physically active, while those nearby at computers cataloging books feel cool. Pittis uses the Fluke 62 Infrared Thermometer to verify the temperatures of vents, supply air, and room surfaces, and the Fluke 975 AirMeter to confirm CO, CO₂, air temperature, and relative humidity levels. (The best tool choices for determining supply air temperature are the Fluke 975 and the Fluke 971 Temperature Humidity Meter.) When they see the numbers even some complaining tenants are convinced.

Together the changes have cut thousands in energy costs, which pleases chief librarian Cynthia Harrison. Spending less on electricity and natural gas leaves more in her budget for new books.

Trimming the spikes

Electric power bills are based on more than the kilowatt hours consumed. Peak loads are also a factor, since the utility must reserve sufficient capacity to handle a spike in demand. Using EIS, Boge and Burlington’s Building and Grounds Supervisor Paul Tingley identified a spike in usage when building equipment in the Burlington Public Library fired up about 4 am. By delaying and phasing the starting times, they trimmed both the spike and their bills. This scenario has been replicated in a number of facilities. Boge credits operational changes and taking control of thermostats with the lion’s share of the program’s overall energy reductions.

Such fine-tuning is typical. As in many towns, budget cuts in Anacortes and Burlington have led to periodic employee furloughs. Sounds like an opportunity to save, but it’s not that simple. First, someone has to be responsible for programming thermostats and making sure everything is shut down on a day when the building normally would have been open. Then consideration has to be given to the fact that as some facilities close, demand for others—such as recreation facilities—can grow. And not all facilities are closed at once. Police and fire, for instance, stay open. By fine-tuning exactly which facilities to shut down when, Paul Tingley estimates that 12 furlough days will save his city \$15,500 in gas and power in 2011.

Water treatment plants are a special challenge for Boge. They run all the time and use large motors to pump liquids and aerate sewage. There’s little to be done in scheduling to cut energy use. But at the Anacortes wastewater treatment plant, sewer sludge is incinerated, using diesel to aid combustion. By fine-tuning the process, the operators found a way to cut the amount of diesel used, saving a whopping \$74,000 per year. Again, operational changes at the facility caused the overall energy reduction. Boge’s role here was simply to support the operators’ efforts and confirm with his data the great success they were having, thereby saving the city thousands of dollars every year.

After two years working with Boge and his team, Pittis and Tingley feel they have implemented the most obvious and easiest conservation projects. They have established internal conservation teams to help educate building occupants on what they can do to help. They have picked the low-hanging fruit. From here on it gets tougher. With little free money around, proving quick payback periods (five year’s payback for any city contribution) is



Shared Resource Conservation Manager Ric Boge (foreground) and Paul Tingley, Building and Grounds Supervisor for the City of Burlington, check HVAC facility performance with the Fluke Ti32 Thermal Imager.

imperative. Finding alternate funding sources can make or break a project. And with staffs small and shrinking, facilities managers need help from every direction—including their electrical and HVAC/R contractors.

“All of ‘em can fix it”

“If a unit goes out and we call for help it’s not just about calling them up to fix it. All of ‘em can fix it,” said Tingley. “It’s the guy who tells me ‘yes, I can fix it, but why would you put one of those back up? If you use this other fixture, energy savings alone will pay you back.’ And when that actually happens, you’re more apt to call that guy back again.”

He pointed to a city building where five of 11 exterior lighting units failed. Building users were concerned. Tingley’s electrical contractor studied the problem and proposed replacing all 11 fixtures with energy-saving alternatives. With rebates from the power company, the job would actually cost less than just fixing the five failed units. Result: brighter lights, less energy use, and a happy city customer.

**How to handle nine bosses:
The Ric Boge recipe**

1. Apply common sense.

“I’m not an engineer, I’m not technically trained in these fields, but it’s pretty obvious in many instances what can be done and what should be done.”

2. Build trusting relationships.

“Listen a lot and be very respectful of facility operators and maintenance personnel, because they know their facilities very well. I’m not going in there to tell them what to do—I want to hear their thoughts, and show them graphic examples of usage based on this database program I have. Talk about it and get their input.”

3. Communicate frequently with all stakeholders.

“From the elected officials down to the facilities personnel and the conservation committees that I tried to get established internally within each jurisdiction...I do a monthly update and communicate by phone, email, or in person to keep efficient energy management on their radar screen.”

4. Show them the results.

Having a reliable utility management database, a knack for numbers, and competence with spreadsheets is critical, Boge said. “That’s a lot of what I do—analyze data, put it into charts and graphs and sent it out to ‘em on a regular basis, so they can see.” He often tells them, “It’s your money! Change how you do things and keep some of it for more important purposes.”

Useful links for conserving energy resources

Utility Manager™ software:

<http://www.lpbenergy.com/utility-manager.htm>

Puget Sound Energy—Energy Interval Service brochure:

http://www.pse.com/SiteCollectionDocuments/business/3964_EISQwikStart.pdf

Resource Conservation Manager Program:

<http://www.pse.com/solutions/forbusiness/pages/efficiencyComPrograms.aspx?tab=2&chapter+1>

Itron Smart Meters:

<https://www.itron.com/na/Pages/default.aspx>

Washington State University Extension Energy Program—Resource Conservation Management:

<http://www.energy.wsu.edu/PublicFacilitiesSupport/ResourceConservation.aspx>

Washington State University Extension Energy Program—Shared RCM Program:

<http://www.energy.wsu.edu/PublicFacilitiesSupport/ResourceConservation/SharedRCM.aspx>

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