Resource Management in Local Government

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ABSTRACT

Many organizations have been involved in energy management and conservation programs for decades now. Traditionally, these programs have focused on installing equipment to minimize consumption and loads. A resource conservation management (RCM) program expands upon these traditional efforts to include best practices in operation and maintenance and building occupant behavior. In past years, programs within King County government have implemented capital projects to save energy and water, and have promoted waste reduction, recycling, and environmental purchasing. However, there has been no coordinated effort to integrate strategies between departments, track cumulative savings, or to communicate results. In the spring of 2005, King County took steps to umbrella and enhance existing efforts by signing a memorandum of understanding with Puget Sound Energy to establish an RCM program. A resource conservation manager was hired in August 2005, and the program is now beginning to take shape. This article will discuss the progress of the King County RCM program to date, including proposed program structure and challenges posed by the type and size of organization.

RCM PROGRAM MODEL

A challenge faced by all resource conservation managers is how to demonstrate program value and achievements. Over the years, I have

developed a model to track program efforts that provides a high degree of accountability. This model basically divides program reporting into distinct types of activities: utilities accounting, operational measures, equipment upgrades, and new construction. The concept is that savings generated from each activity can be identified and tracked separately. Identifying savings from specific program activities is not always easy, especially when you are talking about the impact of operational changes. However, if you can subtract out "known" savings—i.e. billing errors, equipment upgrades, and other specifics, you can make reasonable assumptions about the remaining change in use patterns relative to operational programs that have been implemented. Then, once you establish specific savings figures, you can complete the program loop by capturing those savings and reallocating them to various revolving funds which will provide ongoing program financing.

KING COUNTY STATISTICS

King County is the largest populated county government in Washington State. The organization is divided into seven electoral branches, with primary operational support provided through the executive

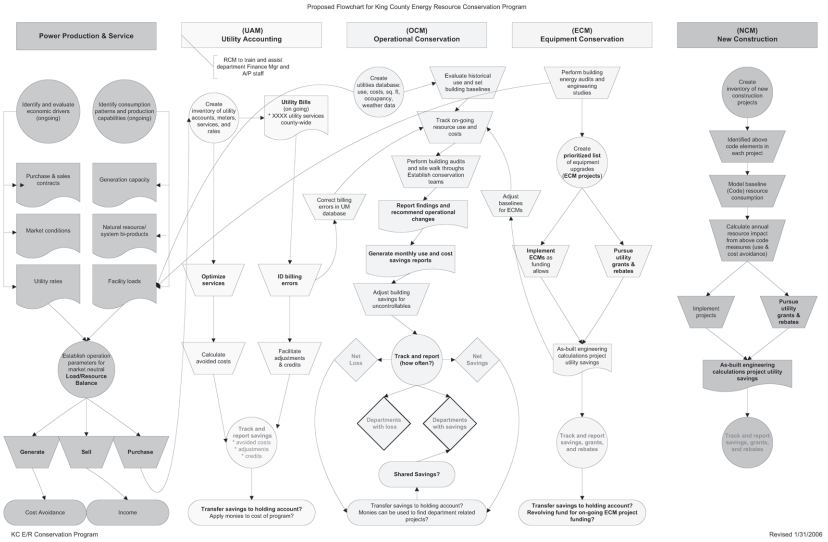

Figure 1. RCM Program Model

branch. This branch, in turn, is divided into eight major departments, each of which is then divided into multiple divisions. The county employs approximately 15,000 full time staff.

Responsibility for utility bills may reside within a division or may be taken care of at the department level. To date, we have identified over 1,500 utility accounts (mostly energy), and estimate that the county spent roughly $22 million on energy and resources in 2004.

Similar to utility billing, responsibility for building operation, maintenance, and construction may also be coordinated at either the division or department level. The county owns more than 230 conditioned buildings and occupies leased space in another unknown number of buildings. We have accounted for roughly 7 million square feet of facility space thus far.

As you may imagine, the statistics listed above pose a challenge in and of themselves. The sheer volume of utility accounts and buildings will make it difficult to maintain accurate county-wide records on utility costs and consumption as well as building square footage and occupancy numbers. The number of contacts within the county for similar responsibilities makes maintaining communication and consistency another challenge. What's more, not only does King County have a complex organizational structure, there are also two fully separate accounting systems that remain from a merger that occurred more than 10 years ago. Reconciling totals is virtually impossible with existing systems.

UTILITIES ACCOUNTING

Utility statements and rates can be complex. By implementing a standard for reviewing and tracking utility bills, it is not uncommon to realize savings from 1-2 percent of total costs. These savings can be achieved from identifying dormant meters, meters that are not our responsibility, combining accounts, changing rates, and, most importantly, from identifying billing errors.

Over the last several months, I have focused on setting up and populating a county-wide database for utility costs and consumption. This accounting system will be the workhorse of the RCM program, as it will be used to establish baselines and quantify savings. In general, utility cost accounting systems are a valuable management tool for a

number of reasons, among them their ability to provide historical use totals and statistics, to create reports by different company levels, and to perform complex adjustments and savings calculations. Company-level reports from our database are provided in Figures 2 and 3. The utility tracking efforts will certainly provide more value than the savings generated in identifying and reconciling billing errors.

As part of the database setup effort, division finance managers, accounts payable personnel, and local utility representatives have been contacted to gather as much utility account information as possible. A multitude of spreadsheets have been compiled into one master list of accounts and meters. This information is being verified along with meters, units, rates, and multipliers. From there, the database is taking shape one department at a time. Already, several thousand dollars in potential billing errors have been identified, as well as dormant and non-county accounts, opportunities to save money through rate changes, and energy use patterns which require operational analysis.

Once database setup is complete and energy bills have been populated via electronic downloads from utilities, the system will be

King County
Site Energy Cost Comparison -- Year Ending 12/2005

Site	Total Elec Cost	Natural Gas Cost	Other Fossil Cost	Total Energy Cost	% Chg	SqFt	Total Energy Cost /SqFt	Occupants	Total Energy Cost /Occupant
Regional Justice Center	$970,325	$423,210	$0	$1,393,535	+13421.3%	581,500	$2.40	6,228	$223.75
Correctional Facility	$396,165	$3,299	$593,309	$992,773	+74.9%	385,274	$2.58	6,312	$157.28
Youth Service Center	$191,580	$6,281	$140,626	$338,487	+175.2%	174,860	$1.94	3,456	$97.94
Adult & Juvenile Detention Subtotals:	$1,558,070	$432,790	$733,935	$2,724,795		1,141,634	$2.39	15,996	$170.34
Cedar Hills Drug & Alcohol Treatment	$24,444	$0	$0	$24,444	N/A	0	N/A	0	N/A
Work Training Center - North	$4,078	$0	$0	$4,078	N/A	0	N/A	0	N/A
Drug & Alcohol Agency	$784	$0	$0	$784	N/A	0	N/A	0	N/A
Dept of Community Health & Services	$18	$0	$0	$18	N/A	0	N/A	0	N/A
Community and Human Serv... Subtotals:	$29,324	$0	$0	$29,324		0	N/A	0	N/A
Administration Building	$244,497	$0	$42,958	$287,455	+541.1%	234,243	$1.23	6,564	$43.79
Yesler Building	$166,406	$17,781	$0	$184,187	N/A	111,734	$1.65	3,228	$57.06
Black River Office Building	$108,452	$393	$0	$108,845	+1763206.9%	74,915	$1.45	3,948	$27.57
King Street Center	$0	$0	$0	$0	N/A	469,474	N/A	16,884	N/A
General Office Administr... Subtotals:	$519,355	$18,174	$42,958	$580,487		890,366	$0.65	30,624	$18.96
Courthouse	$624,851	$0	$647,729	$1,272,580	+289.9%	568,468	$2.24	14,772	$86.15
Southwest Dist Court / Precinct #4	$34,187	$2,114	$0	$36,301	N/A	11,443	$3.17	2,340	$15.51
Aukeen District Court	$21,389	$6,450	$0	$27,839	N/A	14,110	$1.97	348	$80.00
Issaquah District Court	$18,603	$5,417	$0	$24,020	+5335.0%	16,553	$1.45	300	$80.07
Shoreline District Court	$15,337	$0	$0	$15,337	N/A	11,895	$1.29	288	$53.25
Northeast District Court (Redmond)	$0	$4,083	$0	$4,083	N/A	9,900	$0.41	348	$11.73
Federal Way District Court	$0	$0	$0	$0	N/A	9,513	N/A	0	N/A
Bellevue District Court	$0	$0	$0	$0	N/A	18,000	N/A	135	N/A
Judicial Administration Subtotals:	$714,367	$18,064	$647,729	$1,380,160		659,882	$2.09	18,531	$74.48
Northshore CSS / Public Health	$31,531	$4,629	$0	$36,160	+86868.3%	0	N/A	0	N/A
North Multi-Service Center (NDMSC)	$35,737	$0	$0	$35,737	N/A	0	N/A	0	N/A
Auburn (South) Public Health	$0	$0	$0	$0	N/A	0	N/A	0	N/A
Eastgate Public Health	$0	$0	$0	$0	N/A	0	N/A	0	N/A
Federal Way Public Health	$0	$0	$0	$0	N/A	0	N/A	0	N/A
Renton (SE) Public Health	$0	$0	$0	$0	N/A	0	N/A	0	N/A
White Center (Burien) Public Health	$0	$0	$0	$0	N/A	0	N/A	0	N/A
Public Health Subtotals:	$67,268	$4,629	$0	$71,896		0	N/A	0	N/A
Company Totals:	$2,888,384	$473,657	$1,424,621	$4,786,663		2,691,882	$1.78	65,151	$73.47

Site Energy Cost Comparison -- Printed by Utility Manager Tuesday, January 16, 2007 at 1:09 pm
Data prorated into calendar month according to billing from and thru dates -- % Change based on site comparison yr -- N/A indicates missing data
% Chg is the percentage change in cost relative to the same month of each site's comparison year
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Figure 2. Site cost comparison

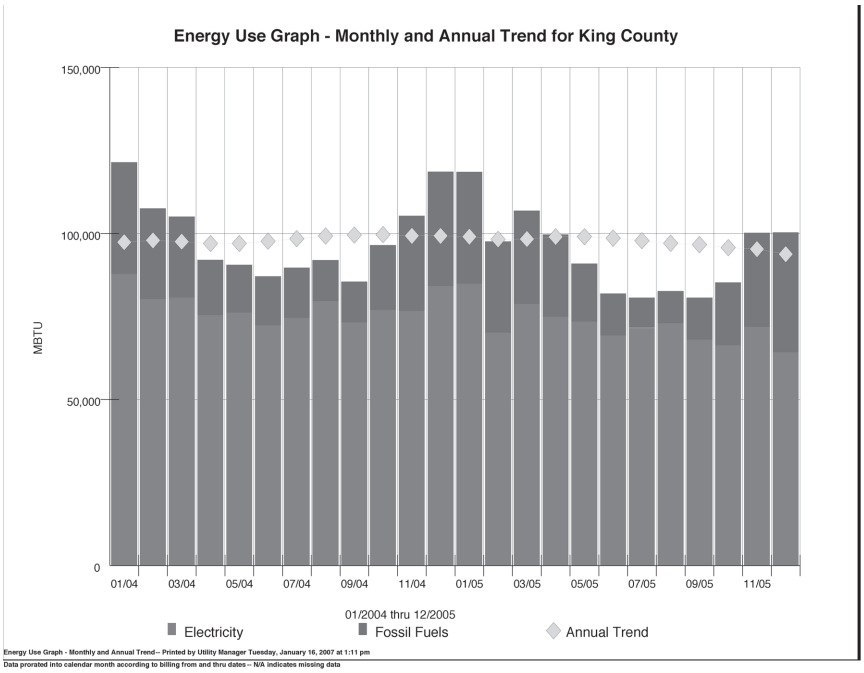

Figure 3. County energy use trend

deployed on a network where county staff will have access and responsibility for maintaining respective accounts. These individuals will be trained on the system as well as the process of utility bill auditing. By training staff to facilitate this process, we can work within existing organizational structures to assure tight utility budgets and accurate data.

OPERATIONAL MEASURES

People who occupy, operate, and maintain our buildings play a significant role in how much energy and resources a facility consumes. Each day, we all make decisions that impact the bottom line. For example: all building users are capable of turning off lights in unoccupied rooms. Building operators make decisions about system set points. And maintenance insures that systems run efficiently. Companies can spend thousands of dollars on efficient equipment, but if the whole building

community isn't aware of its role in maintaining efficiency and minimizing waste, building performance can soar well above projected levels. An example of how the building community can impact energy and resource consumption is shown in Figure 4.

Building Operators (40%)	*Building Occupants (20%)*	*Building Maintenance (40%)*
• Daily building operation	• Daily operation	• Control settings
• Cleaning process	• Evening shutdowns	• PM & Line-ups
• Identifying & reporting MT issues	• Model behavior	• Quick response

Figure 4. Staff impact to energy

Top-level support for program activities has been provided for the county in the form of an existing county code, Title 18—Energy Management, as well several executive policies relating to energy management, green building, and environmental purchasing. Most recently, however, the King County executive issued an Executive Order that will require that at least 50 percent of King County's stationary energy use come from renewable energy sources by 2012. To achieve compliance with this order, emphasis will be placed on accounting for county energy use and implementing programs to minimizing use through increased efficiency, optimized operation and maintenance, and conservation efforts. In other words, the executive has just issued an order that directly supports the RCM program. Additionally, as part of a plan to achieve compliance with the new executive order, a goal has been set to reduce county energy use by 10 percent per square foot, also by 2012.

This top-level support is essential for the successful implementation of operational RCM program elements.

Temperature standards and building operating guidelines have already been drafted and are being reviewed by county staff. It will be essential to get these documents circulated while the new order is still fresh in people's minds.

KING COUNTY
Energy & Resource Conservation Program

King County

Energy and Resource Use Guidelines

In support of King County Executive Order PUT 7-6, Renewable Energy and Related Economic Development, and King County Title 18, Energy Management Plan, the following guidelines are set forth to establish general operating standards for energy and resource consumption in county occupied buildings. Adherence to these standards will reduce county utility expenditures, optimize indoor environmental conditions, and minimize environmental damage through reduced greenhouse gas emissions.

The county's current annual energy use is approximately 1,398,695 MMBTUs per year. Correspondingly, annual utility expenses exceed 22 million dollars. Goal number 3 of the Energy Management Plan, targets a 10% per square foot energy reduction by 2012. If achieved, this goal will effectively reduce county energy expenses by over $2 million and will save enough energy to power roughly 540 single family homes. Implementation of the guidelines outlined in this document is critical to meeting this goal.

The county is committed to continually improving the efficiency of all systems in our buildings. To help achieve a standard level of efficiency and to optimize our efforts, all county staff and visitors will be expected to follow the guidelines herein set forth.

A one-page summary of these guidelines will be provided for posting in county buildings. Individual building control points will be realigned each year to meet these standards.

HEAT & VENTILATION

Allowances & Responsibilities

Building Occupants	• Adjust occupied space temperature by 3 degrees • Use push-button overrides for pre-authorized after-hour use • Keep materials away from/off of HVAC vents
Maintenance & Operations	• Setup and maintain HVAC schedules including holidays and events • May modify occupied space temperature by 3 degrees for spaces without DDC controls

Operating Schedules

Heating systems should be operated in the most economical and efficient way possible; i.e. they should operate for the minimum amount of time required to provide the approved climate for a specific area and activity.

Figure 5. Operating guidelines

Figure 6. Reminder signs

Additionally, focus will be placed on employee awareness by creating program branding and a campaign to promote easy conservation actions for all staff, stickers to help remind staff to conserve, and checklists for daily shutdowns. We will begin a process of building audits guided by the performance indicators that will be provided by our new accounting system. Energy intensive buildings will be targeted for both operational and equipment improvements. Building staff will receive feedback on its performance in the form of informal reminder notes, more formal reports to managers, and regular reports on energy and resource use. And finally, staff that makes concerted or creative efforts will be recognized for its achievements.

EQUIPMENT UPGRADES

Technology, as we all know, is constantly changing. As new products enter the marketplace, it often makes economic sense to upgrade equipment to save energy and resources. By inventorying building equipment and systems, along with operational characteristics, we can identify cost-effective opportunities to improve efficiencies and reduce waste through equipment upgrades. These projects can take the form of no-cost or low-cost in-house jobs, such as adding light switches, installing localized controls, or adjusting dampers. More likely, however, projects will be larger efforts that are executed as part of a capital improvement program. In either case, utility rebates and grant partnerships will be pursued and total investment, cost savings, and environmental benefit will be tracked.

To get a handle on projects already completed by county agencies, local utility companies were contacted to provide a list of projects

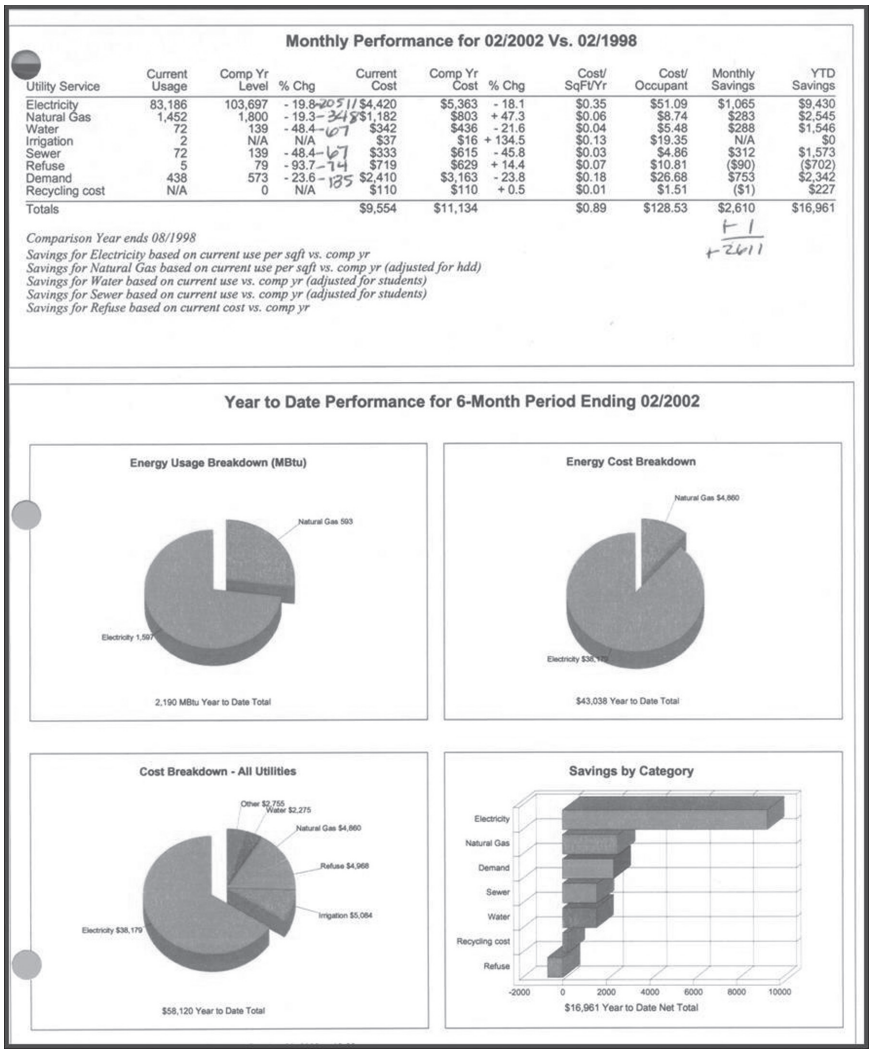

Figure 7. Monthly reports

completed in partnership with their grant or rebate programs. Going back five years, over 56 projects were identified through this process. Together, these projects are generating over $1.3 million a year in utility savings and have qualified for $1.9 million in utility grants. Information still missing is the actual project cost, which is needed to determine payback. Furthermore, there are no doubt a multitude of projects that

have been completed outside of these utility programs.

This is indeed a good baseline to start from. A goal of the new RCM program will be to continue to track equipment upgrade projects and promote the involvement of local utility staff in analyzing projects for resource savings potential and to further our partnerships with them in terms of showcase projects and project funding. Training will be developed to help project managers get involved in this process. Additionally an ECM project tracking system will be created such that we can easily compile and report on these efforts.

Current ECM Totals (approximate)

- 56 projects since 2000
- $1.9 million utility grants
- $1.3 million/year savings
- Only includes projects done through utility programs

Figure 8. ECM totals

NEW CONSTRUCTION

Washington State has had an aggressive energy code for many years, and recently King County has committed to building above those codes to achieve more aggressive environmental standards called LEED. Oftentimes, innovative design is received with skepticism and it is important to demonstrate performance through measurement and verification. By quantifying and verifying the amount of resource savings that result from King County's efforts to exceed model code efficiencies, we can help demonstrate the value added by this program.

Since inception, several county buildings have been LEED certified under the existing Green Building program. The RCM program will work with the green building team to help quantify the resource impact that its efforts are having on county utility use and costs. The utility accounting system will be used to monitor these buildings' performance as well, which will help validate program efforts and quantify savings.

SUMMARY

An RCM program is good business, but it takes time to develop. Often you hear people comment that it will take a year before you see results from program efforts. In the case of a large company similar to King County, it may take more than a year to even establish a baseline. When dealing with volumes of data and complex internal structures, a distinct plan of action needs to be developed and followed to eat the elephant one bite at a time.

Because the King County Executive made energy a top priority, many of the typical roadblocks faced by this type of program have been removed. As a result, it is anticipated that actions will precede numbers and it may take longer to verify results than to achieve them. The challenge will be to continue to make progress on completing the setup of our database while moving forward with program implementation. Another significant challenge will be tracking and participating in the volume of activities taking place. With a multimillion dollar capital improvement program, it will be very difficult to maintain records on utilities impact. Accounting for ECM savings, which is typically rather straightforward, is going to be a complex job within our governmental structure.

Finally, an RCM program is a continuous effort. Once basic program structure and components are in place, new elements are continually added to enhance and expand existing activities. This article is being written after just eight months from the hire date of a program manager. In eight more months, the report may be entirely different as the focus and climate of our organization changes. And as the program develops, it will require reiteration and perseverance to keep strategies alive. The bottom line is that it takes time to make change happen. By implementing an RCM program, an organization can establish the framework necessary to make change happen.

ABOUT THE AUTHOR

Lori Moen is the energy and resource conservation program manager for King County in Washington State. Her certifications include CEM (Certified Energy Manager) and CEP (Certified Energy Procurement Professional) from the Association of Energy Engineers, Commercial Energy Plans Examiner and Inspector from the International Code

Council, and CSBA (Certified Sustainable Building Advisor). Lori has over 15 years experience in resource conservation and public education. During her career she has helped save millions of dollars in utility resources through utilities accounting, behavioral changes, and equipment upgrades. She is an accomplished speaker, presenting at workshops, conferences, and even on television to technical audiences as well as the general public. Lori has developed and now teaches a section of the National Sustainable Building Advisor course entitled "O&M in Sustainable Buildings." Ms. Moen has been a member of AEE since 1998 and is currently serving on the interim board for the newly formed Pacific Northwest Chapter.