Source:
Water and Light
J. Kraig Kahler

FISCAL NOTES:

City Fiscal Impact Enter all that apply:	
$957,000	City's current net FY cost.
$312,000	Amount of Funds Already appropriated
$645,000	Amount of budget amendment needed
$345,000 $1,605,000	Estimated 2 yr net costs: One-time Operating / On-going
Program Impact:	
N	New program/ agency (Y/N)
Y	Duplicates/expands an existing program (Y/N)
N	Fiscal impact on any local political subdivision (Y/N)
Resources Required:	
Y	Requires add'l FTE personnel? (Y/N)
N	Requires additional facilities? (Y/N)
Y	Requires additional capital equipment? (Y/N)
Mandates:	
N	Federal or state mandated? (Y/N)

Agenda Item No. _____

TO: City Council
FROM: City Manager and Staff
DATE: May 29, 2009
RE: Electric Demand Side Management

EXECUTIVE SUMMARY:

Staff has prepared for Council consideration a report on the expansion of the Demand Side management (DSM) program for the remainder of FY 2009. DSM programs consist of the planning, implementing, and monitoring activities of electric utilities that are designed to encourage consumers to modify their level and pattern of electricity usage.

Aggressive pursuit of DSM programs is recommended as part of the least-cost future power supply options in the Integrated Resource Plan (IRP), completed by Burns and McDonnell, Inc., in October 2008. The DSM measures outlined in the IRP provide a roadmap to achieve energy and capacity savings of approximately 33 MW and 1,035 GWhs over the 20 year life of the study. Due to the inherent nature of DSM, some options are accepted by the public at a faster rate than others. Commercial acceptance is assumed over 15 years due to equipment replacement, depreciation and investment decisions. Residential acceptance gauged by demographic surveys indicates a range from immediate to 30 years for implementation. Once the plan is operational (over one to two years), the annual savings from these utility offerings is estimated at $7 million to $14 million in today's energy market. The measures are directed at increasing productivity in all three customer sectors and target efficiency gains in HVAC, thermal and appliances/lighting. The ongoing evaluation of these cost effective measures will identify where and how the funds need to be spent or stopped based on the utility benefit cost ratios.

The IRP listed three portfolios of suggested energy efficiency actions. The report did not address planning, implementation, or validations of the suggested actions. Columbia Water and Light (CW&L) staff reviewed all suggested measures from the three portfolios and identified the priority actions that created the greatest energy savings and the best utility benefit. Because CW&L has many DSM programs in place, some of the suggested actions will be incorporated into existing programs which will allow for rapid deployment, while others will require new programs to be created. To meet the stated goals of the IRP additional funding and personnel will be required. A detailed discussion of program expansions for FY09 is provided in the attached Appendix A, along with a draft of the comprehensive DSM Implementation Plan which is being developed and provided as reference.

DISCUSSION:

CW&L has well established DSM programs; however, these programs are limited. The IRP developed a proactive outreach that motivates customers to take actions to improve efficiencies in their home or business.

The current economic condition, which includes the ability for consumers to secure financing, may create a slower participation level than forecasted a year ago. Simultaneously, new federal tax incentives may encourage customers to replace equipment and appliances at a faster rate than those predicted in the IRP. The plan and program criteria will need to be flexible and adjusted as necessary. More aggressive DSM programs will require a significant increase in the investment CW&L currently makes to DSM programs. The current annual investment is approximately $1.4 million. Program acceptance and ramp-up time is anticipated at one to two years. At that point, funding to maintain the programs should not vary substantially until the program goals are realized and the maximum potential achieved.

For the remainder of FY09, CW&L estimates the need to hire three new staff (explanation in the Appendix A), appropriate funding for hybrid vehicles, rebates, incentive programs, and purchase an online data management system. The additional cost for the remainder of 2009 is estimated at $957,000. This report will be presented to the Water and Light Advisory Board at the June Board meeting.

FISCAL IMPACT:
The total additional DSM programming cost in FY09 is estimated to be $957,000. Funds are available in the FY09 electric budget to cover $312,000 of the estimated costs, including personnel and some increased rebates. The remaining $645,000 would be appropriated from retained earnings to cover purchase of hybrid vehicles, evaluation software, and fund expanded rebate and promotional efforts.

SUGGESTED COUNCIL ACTIONS:
No action needed at this time.

JKK/srb

Attachments

Cc: Water and Light Advisory Board

Appendix A

Demand Side Management Proposal - FY09

Database for Program Evaluation, Measurement and Verification (EM&V):
EM&V protocol is critical to the implementation of the Demand Side Management (DSM) plan. This system will be used to track customer participation and perform evaluations, measurements and validation of the programs. An online database will allow various program participants to enter the data as the customer makes efficiency improvements. As an example, a customer replaces an air conditioner then the contractor submits the necessary information for a rebate including demographic data and the SEER levels of the new and replaced units. Contractor entry saves paper and CW&L staff time, saving money and streamlining the rebate process. The unit replacement will be verified via the Protective Inspection permit process and spot checks by CW&L staff. The EM&V system will also track and cross reference customer participation in other rebates and identifies participation in other utility sponsored programs. A database is crucial in verifying the utility cost benefit of the various energy efficiency improvements.

FY09 Costs: Estimated at $250,000 for the first year, with additional cost as programs are added. CW&L staff is investigating opportunities to share the online data management program with other municipal utilities potentially reducing the total cost.

FY09 Benefits: Verification of programs is the key to all utility benefits. Specialized software is necessary to track, evaluate, and validate the estimated benefits of all DSM programs. Until data is collected and an analysis performed, all benefits are theoretical.

Marketing
DSM requires individual customers to implement energy conservation and energy efficiency measures in their homes and businesses. To maximize customer participation, multiple public outreach programs must be utilized. The programs will be designed to educate and motivate customers. Additional funding of marketing is necessary to meet the goals outlined in the IRP.

FY09 Costs: Estimated at $40,000

FY09 Benefits: The best designed programs will have no benefit if no one participates. Marketing is necessary to inform and educate individuals that will participate in the programs.

Residential Programs

Home Performance with Energy Star: CW&L currently offers a program of incentives to customers to bring their homes up to Energy Star standards via an EPA program called Home Performance with Energy Star (HPwES). Rebates are given to customers based on actions taken. The IRP refers to several efficiency measures that CW&L will incorporate into the HPwES program. Since the program is currently being funded in part by a Department of Energy (DOE) grant, the utility investment per year shown in the discussion is over the life of the study. The suggested measures indicate the following potential:

Air Infiltration - Air Changes per Hour (ACH)

The IRP suggests that 6,290 single family homes have air infiltration rates greater than .8 air changes per hour. Approximately 604 homes per year will take advantage of the incentives offered in the HPwES program. The suggested action is to reduce the ACH to less than .35 resulting in the following:

- Utility Benefit Cost Ratio (9.79)
- .41 kW saved per home per year
- 1,041 kWh saved per home per year
- Cost per rebate $260 per occurrence
- Cost per kW $634
- $157,040 utility investment per year once ramped up
- Benefit to the utility $1,537,421

Low E Windows

The data compiled was completed before the Energy Star Rebates from the federal government became available. Statistics now show that homeowners are more likely to replace inefficient windows with Energy Star – staff is predicting that the penetration rate will be greater than what is forecast in the study of 72 homes per year. The demographics and survey results indicate that 1,635 single family homes are likely to take advantage of a utility incentive achieving the following results:

- Utility Benefit Cost Ratio (15.93)
- .48 kW saved per home per year
- 1,102 kWh per home per year
- $180 rebate per window with a cap of $580 per customer
- Cost per kW $375
- $ 36,509 utility investment per year once ramped up
- Benefit to the utility $581,588

Attic Insulation

Columbia housing stock demographics indicate that over 1,101 homes would take advantage of an insulation rebate. CW&L staff feels that this number is low and will be verified by a marketing study identifying the age of house, etc.

The following results can be achieved by adding R-11 onto R-19

- Utility Benefit Cost Ratio (4.20)
- .34 kW saved per home per year
- 503 kWh saved per home per year
- Rebate based on cost per square foot @ $.18
- Cost per kW $1,220
- $30,000 utility investment per year once ramped up
- Benefit to the utility $120,000

Duct Sealing and Duct Insulation

Duct sealing and duct insulation are already components of the HPwES program. It is estimated that over 10,290 homes have ductwork which need to be sealed and a smaller percentage need to have insulation added. The incentive for these improvements will be increased in the new program parameters. These two measures will achieve the following results:

- Utility Benefit Cost (6.59) – duct sealing Utility Benefit Cost (2.40) – duct insulation
- .42 kWh saved per home per year
- 533 kWh saved per home per year
- Rebate suggested is $310 per occurrence for duct sealing and $310 per occurrence insulation
- Cost per kW $738
- $210,000 Utility investment per year once ramped up $210,000
- Benefit to the utility $943,950

FY 09 Costs: Additional funding for HPwES Estimated at $100,000 to cover incentives

FY09 Benefits: HPwES covers multiple efficiency improvements and every home is different. The IRP estimate of benefit/cost ratios range from 2.40 to 15.93, which means for every dollar invested in the benefit, would be a range of $2.40 to $15.93.

CW&L staff evaluations of current HPwES homes and current incentives estimates the following: $820 is the current average incentive per home, the home is achieving 3,155 kWh savings per year upon completion of retrofits (not including HVAC) providing a Utility Cost Benefit of (3.10).

Comprehensive energy assessments: Comprehensive energy analysis will be started using CW&L staff and certified Home Performance with Energy Star (HPwES) contractors. Currently there are 14 certified contractors within the Columbia market. The goal will be to outsource the audits of 5,000 homes within a five year period. Audits performed by a certified contractor will cost CW&L $200 each. CW&L will provide $100 for the assessment up front to the homeowner (or contractor to be determined) and will award an additional $100 to contractors when the improvements are completed and the final paper work submitted.

FY09 Costs: Estimated at $50,000 to cover the cost of 250 assessments to contractors.

FY09 Benefits: The comprehensive energy assessment is the basis for improvements that individuals will make in their homes. The assessments will provide the individuals, and the utility, with an outline of the best benefit/cost improvements.

Market Saturation Study: A statistically valid sample of residential and small general service customers will be surveyed and focus group meetings established to collect end-use data based on demographic profiles. This information will be used to effectively target existing programs and to determine the potential of new programs.

FY09 Cost: Estimated at $32,000

FY09 Benefits: This survey will provide needed data for future planning.

Commercial and Industrial Customer programs (C&I)

There is a great potential for energy efficiency gains within the commercial and industrial sectors C&I. These sectors represent over 50% of the total electrical consumption in Columbia. CW&L will 'mine' energy efficiency from its customers by proactively seeking customers with high benefit to cost ratio projects such as those with a higher energy intensity factor per square foot. Incentives will be developed to encourage the retailer, the manufacturer and the building occupants to engage in energy efficiency improvements in this area. Commercial acceptance is assumed over 15 years due to equipment replacement cycles, depreciation an investment decisions. The cost per kW will vary widely in this category due to the extreme differences in the type and size of equipment and efficiencies. All of the recommended areas of improvement were within Portfolio A. The recommended areas of improvement and incentives are for lighting, appliances, HVAC equipment, and industrial machine drive retrofits. The incentives fall within CW&L's existing program structure and will be evaluated on a case by case basis based on efficiency gains. As an example: for every $100 spent to incentivize lighting in an industrial facility the utility value is $2,688. The annual customer participation cannot be identified at this time due to lack of available customer and load data. Once the marketing study is complete a better understanding of potential will be identified.

Commercial HVAC Retrofits (estimated at 5, 10 and 20 ton package cooling and 80 ton water cooled chillers) – based on 500 square feet per ton.

- Utility Benefit Cost (3.4)
- 5,919 kW over the life of the study
- 7,854,314 kWh over the life of the study
- Cost per rebate based on the annual kWh savings times a one time credit of $.86 per kWh
- Estimate a $50,000 utility investment until ramped up
- Benefit to the utility $170,000

Commercial Appliance Retrofits

- Utility Benefit Cost (1.19)
- 142 kW over the life of the study
- 3,044899 kWh over the life of the study
- Cost per rebate based $.51 per kWh savings estimated on kWh savings in one year
- Estimate a $5,000 utility investment per year until ramped up
- Benefit to the utility $5950

Commercial Lighting

- Utility Benefit Cost (17.02)
- 8,432 kW over the life of the study
- 24,111,937 kWh over the life of the study
- Cost per rebate based on $100 per kW or a one time rebate in the amount of $.10 per kWh times the estimated kWh savings per year
- Estimate an $80,000 utility investment until ramped up
- Benefit to the utility $1,361,600

Industrial Machine Drive:

- Utility Benefit Cost (8.08)
- 1,835 kW over the life of the study
- 11,253,470 kWh over the life of the study
- Cost per rebate either $100 per kW or a one time credit of $.18 per kWh times the estimated kWh saved in one year
- Estimate a $50,000 utility investment until ramped up
- Benefit to the utility $404,000

Industrial HVAC

- Utility Benefit Cost (8.11)
- 318 kW over the life of the study
- 1,952,620 kWh over the life of the study
- Cost per rebate will be based on a one time credit of $.18 per kWh times the estimated kWh saved in one year.
- Estimate an $80,000 utility investment until ramped up
- Benefit to the utility $648,800

Industrial Lighting

- Utility Benefit Cost (26.88)
- 249 kW over the life of the study
- 1,524,744 kWh over the life of the study
- Cost of the rebate will be based on the $100 per kW or a one time credit in the amount of $.10 per kWh times the estimated kWh savings per year
- Estimate a $50,000 utility investment until ramped up
- Benefit to the utility $1,344,000

The utility investment necessary to achieve these savings in the commercial and industrial sector is $16,509,122 over the span study.

FY09 Costs: Estimated at $315,000

FY09 Benefits: There are multiple options for Commercial and Industrial efficiency improvements. The IRP estimate of benefit/cost ratios range from 3.41 to 26.88, which means for every dollar invested the benefit would be from $3.41 to $26.88.

Staffing and Equipment Requirements
To ramp-up the DSM programs, additional staff will be needed. Vehicles will be needed for field staff. Computers and office equipment will be needed for all additional staff.

Staff: Three new positions are requested for the remaining five months of FY09. The positions are:

- Commercial Services Supervisor – will oversee the work with commercial and industrial customers, oversee contractors, and manage incentive programs associated with the commercial and industrial sectors. The individual will create documentation of the saving and report to the appropriate agencies for Energy Star ratings.
- **Cost for remainder of FY09 - $24,000.**
- Residential Services Supervisor – will work with the HPwES contractors, report to the DOE and EPA on the program progress, and oversee the residential and small general service customer programs, validate and certify the Energy Star ratings of the participants, oversee contractors, and manage incentive programs associated with the residential and small general service sector. **Cost for remainder of FY09 - $24,000.**
- Rate Analyst – will maintain on-line database, validate savings, and analyze utility benefit. **Cost for remainder of FY09 - $22,000.**

FY09 Costs: Estimated at $70,000

FY09 Benefits: Staff is a necessary overhead investment. Without additional staff, programs can not be expanded and the benefits can not be evaluated.

Vehicles and Office Equipment: Two positions requested for FY09 are field positions and will require vehicles. Hybrid vehicles will be purchased. Due to the extended delivery period for hybrid vehicles and the plan to add an additional field position in FY10, funding for three vehicles is requested at this time. Staff will use personal vehicles and be paid mileage until vehicles are delivered. Office equipment will include computers, desks and other equipment needed for a new position.

FY09 Costs: Estimated at $100,000

FY09 Benefits: Another overhead investment, that is necessary to support the programs, is vehicles. Vehicles are assumed to be an overhead investment that will last a minimum of ten years.

Demand Side Management Savings Overview

DSM Programs	Utility Investment	Annual KW Saved	Cost per kW	Annual kWh Saved	Benefit/ Cost Ratio	Estimated Customer Participation
ADD TO REBATES & SUPER SAVER LOAN PROGRAM						
Air Conditioner Replacement Program (Incentive SEER 16 vs. SEER 13)	$435.00	0.36	$1,208.00	258	3.24	4,875
Heat Pump Replacement Program (Incentive SEER 16 vs. SEER 13)	$385.00	0.55	$700.00	620	6.76	4,089
Add Attic Insulation (From R-11 to R-30)	$415.00	0.34	$1,220.59	503	4.20	1,101
Add R-11 Wall Insulation To Exposed Walls (No Insulation)	$1,805.00	0.57	$3,166.67	2,517	3.07	944

- Recommended Utility Cost for the life of the study : $4,454,413
- Potential kW savings: 1,418
- Potential kWh savings: 3,608,313

ADD TO HOME PERFORMANCE WITH ENERGY STAR						
Reduce Duct Leakage To 5% From 25%	$310.00	0.42	$738.10	533	6.59	10,379
Install Low E Double Pane Windows (Replace Single Pane)	$180.00	0.48	$375.00	1,102	15.93	1,635
Reduce Air Infiltration To 0.35 ACH From 0.8 ACH	$260.00	0.41	$634.15	1,041	9.79	6,290
Insulate Duct work in attic	$310.00	.42	$738.10	533	6.59	3,145

- Recommended Utility Cost for the life of the study: $9,944,650
- Potential kW savings: 8,735
- Potential kWh savings: 15,699,626

AIR CONDITIONER/HEAT PUMP TUNE UP/PILOT PROGRAM						
Add refrigerant to undercharged units	$130.00	0.11	$1,181.00	488	8.24	4,875
Remove Refrigerant From Overcharged AC System	$50.00	0.10	$500.00	100	8.82	4,089
Increase Blower Speed Due To Low Evaporator Air Flow	$50.00	0.56	$89.29	630	51.83	1,187

- Recommended Utility Cost for the life of the Study: $1,816,358
- Potential kW savings: 2,263 kW
- Potential kWh savings: 4,276,644 kWh

ADD TO COMMERCIAL/INDUSTRIAL INCENTIVE PROGRAMS	Utility Investment over the life of the study	Total kW savings over the life of study	Suggested rebate	Total kWh savings over the life of the study	Benefit/ Cost Ratio	Estimated Customer Participation
Commercial HVAC Retrofits***	$8,254,561	5,919	customized		3.41	
Commercial Appliance Retrofits***	$3,890,193	142	$.51 per kWh times the annual kWh savings		1.19	New incentives will start in 2010
Commercial Lighting Retrofits***	$3,559,496	8,432	$100 per kW or $.10 per kWh per annual savings		17.02	
Industrial Machine Drive Retrofits***	$2,559,192	1,835	$.18 per kWh per annual savings		8.08	
Industrial Facility HVAC***	$444,052	318	$.18 per kWh times the annual kWh savings		8.11	
Industrial Facility Lighting Retrofits***	$104,929	249	$100 per kW or $.10 per kWh per annual savings		26.88	

- Recommended Utility Cost for the life of the study : $37,604,854
- Potential kW reduction: 16,895 kW
- Potential kWh reduction: 49,541,974 kWh

ADDITIONAL ACTION ITEMS	Utility Investment	Annual KW Saved	Cost per kW	Annual kWh Saved	Benefit/ Cost Ratio	Customer Participation
Install New Programmable Thermostat	$105.00	0.06	$1,750.00	494	7.58	To be evaluated
Increase Duct Size Due To Low Evaporator Air Flow	$490.00	0.75	$653.33	757	6.77	New construction
Size AC Units To 100% Of Manual J Due To Oversized AC (New)	$16.00	0.30	$53.33	246	7.63	New Construction
Size AC Units To 100% Of Manual J Due To Oversized AC (Replace)	$110.00	0.78	$141.03	738	30.55	New Construction
Refrigerator Early Retirement	$25.00	0.08	$312.50	646	42.17	Reviewing
Insulate Water Heater Electric Storage Tanks	$30.00	0.02	$1,500.00	194	8.10	Reviewing
Install Low Flow Shower Heads	$10.00	0.00		125	14.24	Reviewing
Install New Solar Screens (No Shading on E & W Sides)	$135.00	0.66	$204.55	160	13.87	Retail managed
Energy Star Clothes Washer (Needs Replacement)	$205.00	0.11	$1,863.64	150	2.66	Reviewing
Compact Fluorescent Lights (No CFL to 3)	$2.00	0.03	$66.67	249	8.49	New program in fall of 2009
Install Solar Powered Lights	$60.00	0.00		350	5.42	CW&L removed

EXISTING PROGRAMS						
New Home Energy Star Rebates*	$1,000				3.10	
Tree Power**	$39.00				1.73	
Super Saver Loan Program*					NA	
Load Management Program	$105.00	0.56	$187.50		1.07	
* Not Evaluated ** Did Not Pass Screening *** Individual Analysis Necessary						