

City of Sample Energy Master Plan

March 9, 2011

City of Sample: Efficiency Opportunity

10% Electricity Reduction
for Facilities Benchmarked
through the CitySmart
Program =

- ✓ \$150,000 in annual energy cost savings
- ✓ Utility-paid cash incentives for implementing energy efficiency projects
- ✓ Improved usability / comfort in our offices, fire / police stations, and other city buildings
- ✓ Environmental benefits equivalent to taking 125 passenger vehicles off the road each year
- ✓ Positive public relations in the community, including press releases and incentive check presentations for any projects completed in the CitySmart Program

Our Mission

Energy costs are an enormous expense for our nation's cities; energy is often one of the largest line items in a city's budget. In order to significantly reduce such costs and improve energy efficiency, the City of Sample is participating in the CitySmart Program. The no-cost program will assist in the identification of energy efficiency opportunities in our buildings, and help us to:

- ✓ *Reduce Energy Expenditures*
- ✓ *Reduce Greenhouse Gas Emissions*
- ✓ *Create and Save Local Jobs (through upgrade projects)*
- ✓ *Leverage Incentives to Improve City Facilities*

The program provides technical and financial assistance for efficiency upgrades. Whether we are retrofitting an existing building or incorporating energy-efficiency technologies into new construction, we will identify and implement cost-effective projects that will allow us to use energy more efficiently. In addition, the CitySmart Program will help us form a long-term strategy to address rising energy costs. As part of our participation and with assistance from the program, we have prepared this Energy Master Plan to outline where we are today and what steps we will undertake to improve the efficiency of our buildings in 2011 and beyond.

Strategies for Improvement

- ✓ By adopting certain energy management best practices, we can mobilize and coordinate our efforts toward reducing energy costs
- ✓ By adhering to the listed efficiency strategies, we can minimize the life-cycle cost associated with our energy-consuming equipment

Commitment

The Energy Master Plan is an adaptable, evolving document. It is a starting point for consensus and uniform action, which will ensure that all appropriate departments and parties are informed of and involved in our plans. Because it will adapt to changing needs and new information, it will never be "final" or concrete; however, approval of this plan will allow us to plan effectively and efficiently in terms of funding, personnel availability,

and other restraints.

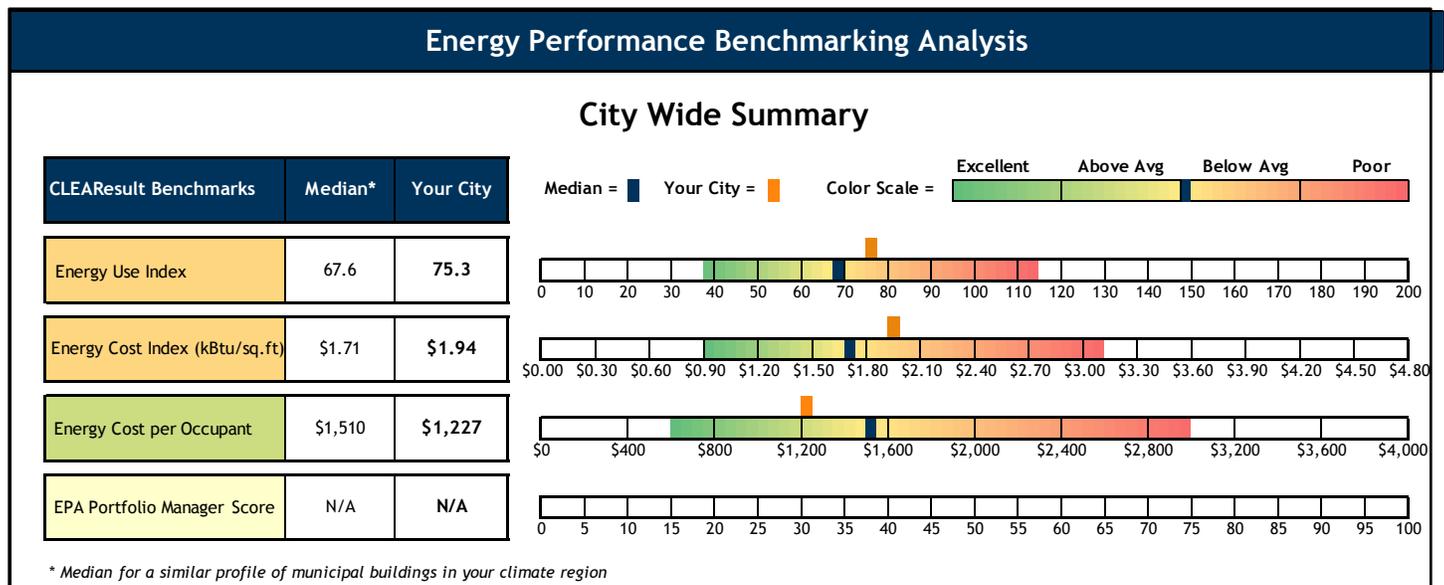
Project Implementation

- ✓ We have identified upcoming efficiency opportunities in city-owned facilities such as HVAC and lighting retrofits
- ✓ We have identified supplemental load reduction opportunities (virtual desktop computers and servers) and will engage the CitySmart Program as we continue to implement those opportunities.
- ✓ Our utility will pay us cash incentives for incorporating energy efficiency into equipment replacement/ installation (e.g., lighting, HVAC) at our facilities by December 1st 2011.

Current Assessment

Based on the utility bills and building information we provided, the CitySmart Program compared our energy use to other buildings in Texas and the U.S. The benchmarking process revealed our city buildings are performing slightly below average overall. More detailed assessments of each individual building can be found in the Benchmarking Report Appendix.

- ✓ Our city is performing in the 43rd percentile compared to similar cities
- ✓ By reducing our current energy consumption by 10 percent, we could save an estimated \$150,000 in annual utility bills at the buildings included in the benchmarking analysis



In addition to facility performance benchmarking, our energy management methods were also scrutinized against recognized “best practices” in the following key focus areas: Funding & Procurement, Planning & Decision-Making, Communication & Coordination, Evaluation & Assessment, Energy Management, and Personnel & Skills. Strengths in each category, along with strategies for improvement, are identified in the appendix.

Set Goals

The goal of implementing the Energy Master Plan is to avoid spending more money on energy than necessary. We attempted to quantify the “bottom-line effect” of improving the energy performance of our buildings. For the 19 buildings that we included in the benchmarking analysis, the chart below estimates how much reducing our electricity consumption would save us on electricity utility bills.

Annual Electricity Consumption (kWh)	Percent Reduction	Electricity Saved (kWh)	Our City's Blended Rate	Annual Electricity Bill Savings
9,759,000	10%	975,900	\$0.10 per kWh	\$97,590
	20%	1,951,800		\$195,180
	30%	2,927,700		\$292,770

To illustrate savings potential in more specific terms, we sampled a lower-performing building. The CitySmart Program staff helped us compare our building's electricity usage to the local average. The chart below indicates that we can save considerably on our utility bills by moving to an average consumption level.

Building Name	Square Feet	Annual Electricity Cost		Annual Savings
		Our Building	Local Avg	
Recreation Center	50,500	\$3.64/sq.ft.	\$2.32/sq.ft.	\$66,660

Create Action Plan

In benchmarking our procedures against recognized “best practices,” we confirmed a number of areas in which we want to improve our energy management methods. The appendix provides a complete breakdown of short- and long-term steps toward improving energy management in each focus area. However, the table below identifies the highest priority “next steps” for City of Sample:

Focus Area	Target Audience	Priority Item
Communication and Coordination	Management, Facility Personnel	Develop a green committee or energy efficiency task force. Meet quarterly to discuss progress and obstacles.
Evaluation and Assessment	Management, Facilities Personnel	Track and report energy usage (kWh), demand (kW), and therms along with energy costs. Compare energy usage to prior month along with same month year to year comparison (Example: February 2010 to February 2011).
Funding and Procurement	Financial Decision-Makers	Develop a 2-5 year budget strategy for implementing identified energy efficiency projects.
Energy Management Processes	Facilities Staff	Engage CitySmart representative before changing out equipment or exploring energy efficiency projects including. She can provide technical assistance and help provide cost savings calculations.

By continuing to refine our energy management practices at all organizational levels, we will ensure that we are getting the most out of our existing equipment and facilities. We will also position ourselves to identify, evaluate, and move forward with new energy efficiency investments on shorter timelines.

New construction, renovations, routine change-outs, and outdated and/or failing equipment all present opportunities to increase energy efficiency in our buildings. Unfortunately, many potential efficiency opportunities are left unrealized or delayed considerably. When less efficient equipment is installed or left in place, we incur higher utility costs over the life of the equipment. By taking the “life-cycle cost” and “cost of delaying efficiency” into consideration during our project evaluations, we will equip ourselves to make sound financial decisions.

Working with the CitySmart Program, we have identified the strategies listed below for achieving energy efficiency. We will evaluate the feasibility of each strategy separately, and consider incorporating into written guidelines or minimum specifications for energy-consuming equipment. By having our own target design specifications, we will ensure that energy efficiency is always a consideration in our buildings.

Measure	Energy Efficiency Strategy
Lighting	25% improvement over the lighting power density (LPD) guidelines put forth by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 2004
	30-40 foot-candles in office settings, per the guidelines of the Illumination Engineering Society of North America (IESNA) Lighting Handbook, 9 th Edition
	High-performance T8 lamps w/ premium efficiency ballasts in hallways, offices
	High-bay fluorescents (T5, T8) in bay areas, multi-purpose rooms, and other applicable areas
	Automatic lighting controls (occupancy sensors, automatics daylight controls, time clock controls) and adjustable lighting level strategies (Bi-level switching)
HVAC	System size closely matches the actual building loads, thus increasing operating efficiency, reducing operating costs, and extending equipment service life
	Improvement over minimum equipment efficiencies specified in ASHRAE 90.1 2004
	Usage of demand control ventilation
Roofing	ENERGY STAR®-labeled Cool Roof materials
	Increased insulation value on roofing systems
Window	Thermo pane, low-emissivity glass, thermal break frames

Operation and Maintenance

Attention to operation and maintenance provides the most rapid means of reducing consumption and costs in most buildings. Not only do correct procedures aid in the proper utilization of the facility's equipment (heating, cooling, ventilation, etc.) and the energy involved, but they also help to maintain the attractiveness and increase the longevity of the building itself. We have identified the O&M strategies listed below to help us achieve our energy efficiency goals.

O&M Opportunities	
Off-Hour	• First round savings when building is unoccupied
	• After-hours, Weekends, Holidays
Computers & Office Equipment	• Computers
	• Monitors
	• Printers
	• Scanners
Unnecessary Lighting	• Offices
	• Common areas
	• Display
	• Exterior
	• Photocell maintenance
HVAC Systems	• Temperature Settings
	• System Scheduling
	• Ventilation
	• Sensor Locations
	• Obstructions to airflow
	• System maintenance
	• Meeting Rooms, Bathrooms, Maintenance Closets
Exhaust Fans	• Off at night
	• Blinds closed at night
Door & Window Operation	• Close doors and windows
	• Weatherstripping
	• Drips and Leaks
Water Usage	• Temperatures
	• Aerators

Recognizing Achievements

In addition to joining the CitySmart Program sponsored by Utility X, we have already taken a number of steps to reduce our city's energy use:

- ✓ Upgraded several buildings to efficient lighting & HVAC systems
- ✓ We currently utilize occupancy sensors in some of our facilities helping us adjust building operations automatically when occupancy is reduced
- ✓ Have the framework in place for a city wide energy awareness program with the *Turn it Off* campaign

We anticipate that by implementing projects identified through this Energy Master Planning process and adopting energy management best practices, we will continue to improve our energy performance and reduce expenditures, which will allow more of our budget to be spent where it should – improving our citizens' daily lives.

Endorsement

Although we will seek approval of individual projects and expenditures separately, we request a review and endorsement of this plan. This will ensure that our facilities personnel have a clear understanding of the input, concerns, and support of the City Manager, City Council, and management.

The following people contributed to this plan:

Grant Coordinator
Accounting Manager
Finance Director
Acting Purchasing Manager
Construction Liaison Manager
Project Manager (Facilities Maintenance)

Prepared and Submitted by:

_____ Date _____
Grant Coordinator

Endorsed by:

_____ Date _____
Mayor

_____ Date _____
City Manager

_____ Date _____
Chief of Public Works Operations

_____ Date _____
Place 1

_____ Date _____
Place 2

_____ Date _____
Place 3

_____ Date _____
Place 4

_____ Date _____
Place 5

_____ Date _____
Place 6

Funding & Procurement

Finding funds to improve existing buildings is always a challenge. Energy reduction projects, however, are often cost-effective and can even be self-funding. Nevertheless, we also understand that many funding or financing options for energy projects may have a level of complexity or risk not ideally suited for our city buildings.

Existing Strengths

- Funding for energy efficiency projects is available in the 2011 budget
- We have established departmental criteria and/or authority for approving improvement projects (eg. Less than one year payback)
- We have a list of potential vendors to perform energy assessments and for other energy-related products and services

Short-term Action Items

- Take full advantage of the available incentive dollars through the 2011 CitySmart Program to make our energy improvement projects even more cost effective
- Incorporate the cost of not doing the project (e.g. maintaining the status quo) into our calculations when evaluating energy-efficiency projects

Long-term Action Items

- Establish a strategic plan for budgeting energy-efficiency improvements for the next 2-5 years

Planning and Decision-Making

We understand that inefficiency is often the result of low priority for building and operating high-performance buildings. We strive to place more importance on our planning regarding new building design, energy reduction projects in existing buildings, and our daily operational activities that impact energy performance.

Existing Strengths

- We have management support to identify and install energy-efficiency improvements
- We have identified energy efficiency opportunities that have not been implemented such as pumps at our waste water treatment plant and virtual machine servers
- We have a clear electricity consumption reduction goal: "The City's goal is to reduce average electricity consumption per square foot by at least 5 percent (as compared to the 2009 base year) and to reduce electricity expenses and overall carbon emissions accordingly"

Short-term Action Items

- Develop a written energy action plan for the next 1-5 years that includes performance goals, benchmarks, and other metrics regarding energy use and costs
- Establish written guidelines that outline operating rules (such as building usage, operating hours, personal refrigerators/heaters and plug loads), and enforce them regularly city wide

Long-term Action Items

- Utilize the Best Practices Team to regularly review the goals, plans, and successes to date and report to city decision makers
- Determine non-financial criteria (e.g. lighting quality, IAQ, environmental) to consider when making decisions on energy-efficiency improvements

Communication and Coordination

Energy costs are a significant expenditure and some portion is a controllable cost. To successfully manage energy costs, the facilities department needs to communicate regularly and effectively with the City Manager, City Council, Department Heads, and other personnel.

Existing Strengths

- We have an established Energy Awareness Program for building occupants and custodial staff – *Turn it Off* campaign
- We have the records to compile a list of energy-efficiency improvements completed at our city within the last five years
- Our citizens and tax-payers have taken an interest in energy efficiency and the environmental impact of our city

Short-term Action Items

- Routinely address energy use, costs, and improvements at staff meetings (e.g. Department Heads, Asst. City Manager)
- Take advantage of the CitySmart Program to help promote incentive check presentations at council meetings

Long-term Action Items

- Establish a framework so facilities staff meets regularly with our City Manager to discuss energy performance
- If we decide to pursue Energy Star Awards for our facilities, utilize Utility X incentive to pay for the engineering certification/inspection

Evaluation, Assessment, and Monitoring

We need to establish a baseline and maintain ongoing benchmarks of how our buildings perform so we can determine the value of making improvements. This will allow us to recommend priorities for building improvements in an environment of limited resources (funding & staff).

Existing Strengths

- We know: 1) the energy operating cost of each building, 2) how each building ranks by various energy performance metrics, 3) how each building compares both within and outside our city
- We have defined performance metrics for evaluating our future energy management successes
- We track utility bills for useful information on energy use and costs
- We have conducted inventory surveys to list all energy-using equipment in our city's facilities

Short-term Action Items

- Evaluate the revised building performance benchmarking reports from the CitySmart Program that compare our buildings to others in Texas and across the U.S.
- Prioritize facilities with the highest energy use for assessment and improvement
- Monitor and review monthly energy use to look for variations from the normal energy use, and then analyze and resolve the causes of those variations

Long-term Action Items

- Complete energy audits on our larger facilities

Energy Management

Given the importance, complexity, and cost of energy utilization in the city, we strive to have management policies and procedures that promote effective energy management.

Existing Strengths

- Our contractors are required to provide written performance specifications and O&M procedures/manuals for all our major energy-using systems
- We do our best to monitor and adjust system operations when occupancy, demands, or loads are reduced (examples: temperature setbacks, lighting controls)

Short-term Action Items

- Develop written design guidelines and minimum efficiency specifications for energy-consuming equipment for renovation and improvement projects
- Strive to purchase higher efficiency (15 or 16+ SEER) A/C equipment when replacing existing units
- Develop written design guidelines and minimum efficiency specifications for energy-consuming equipment for new construction

Long-term Action Items

- Consider adopting the following operating practices: 1) Establish HVAC set points to "lock out" thermostats, 2) Charge for personal use refrigerators, microwaves, etc, 3) Use software to turn off computers not in use
- Research additional opportunities for improving energy performance, such as installing LED signs, ENERGY STAR roofs, increased levels of insulation, occupancy sensors, more effective control systems, solar film for windows, solar water heating systems for large domestic hot water loads, and solar panels for electricity
- Commission new equipment and facilities with testing and verification of performance at startup
- Perform "retro-commission" of older & high-operating cost systems over last few years (e.g. every 5-7 years)

Personnel and Skills

Our city must employ personnel with adequate and appropriate skills to manage energy performance and costs. Moreover, our staff needs to have the responsibility, accountability, incentives, and time to consistently tackle the challenges of effective energy management.

Existing Strengths

- Our city employs personnel that have the skills to identify opportunities and manage energy use effectively
- Our energy management personnel regularly attend industry training and/or conferences outside the city

Short-term Action Items

- Identify ways that we can increase the amount of time that our energy management personnel have to focus on improving buildings' energy performance
- Consider creating clearly defined job performance and accountability for our key energy management personnel

Long-term Action Items

- Provide recognition and/or incentives for exemplary energy performance for energy management personnel (awards, prizes)