Sustainability Action Plan
City of Cedar Hill, Texas

2011 Update

CEDAR HILL

Growing Green

For you, for the community, for the environment!

CarbonSolutionsAmerica

Creating Value, Footprinting Your Future

SUSTAINABILITY ACTION PLAN
CITY OF CEDAR HILL, TEXAS

2011 UPDATE

TABLE OF CONTENTS

INTRODUCTION

As stated in the 2011-2016 Sustainability Action Plan (SAP), City staff must provide an annual update to City Council for review and approval. This document summarizes work completed by City staff in calendar year 2011 to implement strategic actions and fulfill strategic objectives of the SAP for City Council approval. This will be done in two parts. The first part of this document provides narratives that detail actions that have either been completed or initiated during calendar year 2011. The second part of this document provides narratives that detail the City's broader progress to fulfill important strategic objectives.

COMPLETED & ONGOING ACTIONS

The 2011-2016 SAP contains a total of 21 actions, 15 objectives spanning three key focal areas designed to: 1) build institutional capacity required to implement Sustainability actions, 2) optimize energy and reduce emissions within governmental operations, and 3) continue to plan for Sustainability within the Cedar Hill community. Of the 22 actions in the plan, City staff has completed 3 short term actions and made significant progress in implementing 11 actions that are currently classified as ongoing within short, mid, and long term planning horizons. The remainder of this section provides a narrative for actions completed and initiated within the 2011 calendar year.[1]

Year	Action ID	Action Item Description	Planning Horizon	Status	Update
Year 1	Action 1.1	Develop Organizational Structure and Work Groups	Short	Complete	✓
	Action 2.1	System for Sustainabilty Grant Procurement	Short	Ongoing	✓
	Action 3.1	Secure Strategic Partners	Short	Ongoing	✓
	Action 6.2	Create Sustainability Website	Short	Complete	✓
	Action 15.4	Improve Community Recycling	Short	Ongoing	✓
Year 2-3	Action 4.1	Employee Sustainability Training Program	Mid	Ongoing	✓
	Action 5.1	Develop Data Management Procedures	Mid	Yet to be Complete	
	Action 7.1	Building Energy Audit & Retrofit Program	Mid	Ongoing	✓
	Action 7.2	EPA Energy Star Building Tracking Program	Mid	Yet to be Complete	
	Action 8.1	Infrastructure Audit and Retrofit Program	Mid	Ongoing	
	Action 9.1	Renewable Energy Pilot Program	Mid	Ongoing	✓
	Action 10.1	Green Fleet Optimization and Procurement Program	Mid	Ongoing	✓
	Action 11.1	Assess Water Rate Structure	Mid	Yet to be Complete	
	Action 11.2	Evaluate Radial Read Meters To Improve Water Use Tracking	Mid	Ongoing	✓
	Action 12.1	Municipal Recycling Program	Mid	Ongoing	✓
	Action 15.1	Community Web Portal	Mid	Yet to be Complete	✓
	Action 15.2	Strategic Planning Workshops	Mid	Yet to be Complete	
Year 3-5	Action 6.1	Secure EPA Energy Star Rating for Government Center	Long	Yet to be Complete	
	Action 13.1	Secure Tree City USA Growth Award	Long	Yet to be Complete	
	Action 14.1	Hold Planning Workshops to Introduce TOD as Energy HUB	Long	Yet to be Complete	
	Action 15.3	Conduct Community Surveys and Studies	Long	Yet to be Complete	
	Action 15.4	Community Garden Program	Long	Yet to be Complete	

[1] *Note. Attachment A contains documents prepared to demonstration completion of various action items.*

ACTION 1.1: DEVELOP ORGANIZATIONAL STRUCTURE AND WORKING GROUPS [COMPLETE]

Capacity is generally defined as the ability to perform or implement. In this context, without capacity this SAP will do nothing more than just "sit on the shelf." City staff developed a framework document intended to build capacity around the SAP to ensure that it can be implemented. This framework outlines three working groups to coincide with each chapter of the 2011-2016 SAP. Each working group will be responsible for completing actions associated with the objectives outlined in each chapter as shown below. Please refer to **Attachment A, Action Item Memo 1.1 (Organizational Structure)** for further details of the City's organizational structure.

- SAP Implementation Committee
- Chapter 2: Institutional Capacity Working Group (Objectives 1-6)
- Chapter 3: Municipal Operations Working Group (Objectives 7-12)
- Chapter 4: Community Planning and Development Working Group (Objective 13-15)

ACTION 2.1: DEVELOP SYSTEM FOR SUSTAINABILITY GRANT PROCUREMENT [COMPLETE]

During the development of the 2011-2016 SAP, the City did not have enough funding to finance all of the recommendations of this SAP. Therefore securing funding was identified as a critical objective to ensure the long term viability of the plan. There are a variety of organizations that have a track record of funding municipalities that have well articulated sustainability and energy management plans such as the Department of Energy (DOE), the Department of Housing and Urban Development (HUD) the Environmental Protection Agency (EPA), the state of Texas' State Energy Conservation Office (SECO), ONCOR and the North Central Texas Council of Governments (NCTCOG). To better access these and future grant programs, staff developed a general system to be followed to guide staff through the grant procurement process. The system generally consists of procedures designed to source grants, screen grants for competitiveness and likelihood of success, and grant application development. Please refer to **Attachment A, Action Item Memo 2.1 (Sustainability Grant Procurement)** for further details of the system.

ACTION 3.1: SECURE STRATEGIC PARTNERS [ONGOING]

City staff identified a preliminary list of strategic partners that could be engaged in the future to develop joint projects and sponsor program for Sustainability. The table below outlines a comprehensive list of strategic partners identified to date that Staff has had close interactions with and/or has co-developed Sustainability projects with. Staff classified this action as ongoing because developing strategic partnerships is an ongoing task that improves with time.

Partner	SAP Focus Area
ONCOR	Municipal Sustainability (Energy Management)
EcoTotality	Municipal Sustainability (Fleet Fuel Management)
Cedar Hill Chamber of Commerce	Institutional Capacity (Grants / Partnerships)
NCTCOG	Community Planning and Development (TOD and Planning)
Trinity River Authority, TX	Municipal Sustainability (Water)
City of Dallas	Institutional Capacity (Partnerships)
Regency Water Planning Group	Municipal Sustainability (Water)
Texas Water Development Board	Municipal Sustainability (Water)
Nissan	Municipal Sustainability (Fleet Fuel Management)
Senior Source	Municipal Sustainability (Green Procurement)
Waste Management	Municipal Sustainability and Community Planning (Recycling)
Metro Tech	Municipal Sustainability (Electronics Recycling)
Audubon	Community Planning (Land Conservation)
Independent School District	Institutional Capacity (Partnerships)
Cedar Hill State Park	Institutional Capacity (Partnerships)
Northwood University	Institutional Capacity (Partnerships)
Take Care of Texas	Institutional Capacity (Partnerships)

ACTION 4.1: EMPLOYEE SUSTAINABILITY TRAINING PROGRAM [ONGOING)

Staff made it a priority to develop a City employee training program that targets low cost to no cost ways to expand the technical expertise in the areas of grant procurement, municipal energy efficiency, and Sustainable community planning and development. To date, City building staff has attended training session to learn how to operate and maintain infrastructure for the Government Center Solar PV project. Building staff has also attended energy efficiency workshops covering topics such as LED lighting. Staff responsible for procuring Sustainability related grants has attended workshops and training sessions to evaluate automated meter reading technologies in preparation of the upcoming grant application.

ACTIONS 6.2 & 15.1: CREATE SUSTAINABILITY WEBSITE [COMPLETE]

Staff developed a webpage on the City of Cedar Hill website to showcase "Green Initiatives" undertaken.[2] The website links to the 2011 SAP and informs the community on the City's residential waste collection, recycling programs, and other Sustainability related elements. The most notable feature of the page is a link to the City's solar energy project implemented at the Government center. The link provides the community with details on the project and comes complete with a "Live Deck" monitoring system that provides users with up to date renewable energy power generation data. The site also translates technical data into statements that the public can easily understand. This is done by providing equivalency information that demonstrates environmental benefits of renewable power generation expressed in metrics such as number of trees planted and number of motor vehicles removed from the road in a year.

ACTION 7.1: BUILDING ENERGY AUDIT & RETROFIT PROGRAM [ONGOING]

City staff worked to expand upon the ONCOR "Energy Benchmark Report" report in an effort to identify specific Energy Conservation Measures (ECMs) that the ONCOR report did not provide. The City did not have the budget to conduct a comprehensive energy audit. However, staff worked with consultants to perform high level building walkthroughs to collect information needed to begin identifying specific ECMs that would help to meet Objective 7. At the conclusion of this process, the City identified seven low cost no cost energy retrofits that include lighting improvements in the recreation center, HVAC replacements in fire stations, and upgrades to energy control systems among others. These ECMs are listed below and are detailed further in **Appendix A, Action 7.1** in a report titled **"Energy Evaluation and Preliminary Energy Audit Recommendations."** Additional work is required to fully qualify the accuracy of the various financial paybacks for each ECM. The report details a list of 7 ECMs with associated

[2] *See Cedar Hill "Growing Green Website"* http://www.cedarhilltx.com/index.aspx?NID=1442

financial paybacks. However, with time additional ECMs will be discovered to develop a master "punch list" of energy reduction projects that are "shovel ready" when funding becomes available. This action is ongoing because staff plans to secure funding to complete these retrofits and add new ECMs to the list.

- ECM #1 – Main Gym lighting system
- ECM #2 – Main Gym Lighting Control
- ECM #3 – Gym Track Lighting Options
- ECM #4 – Public Works 2 Small A/C Upgrade
- ECM #5 – Fire Station 2 Rooftop A/C Upgrade
- ECM #6 – Water Pump Motor Upgrade
- ECM #7 – Energy Management Systems (Government and Recreation Centers)

ACTION 9.1: RENEWABLE ENERGY PILOT PROGRAM [ONGOING]

During the strategic planning process, the 2010 GHGI identified the Government Center (285 Uptown Boulevard) as the largest and most energy intensive building within the City's portfolio of buildings. In 2010, the Government Center consumed a total of 1,757,662 Kilowatts Hours of electricity and emitted 1,056 Metric Tons of Carbon Dioxide Equivalent Greenhouse Gases into the atmosphere. Following grant procedures, staff secured a grant from administered from the Stated Energy Conservation Office (SECO) in the amount of $952,058.00 from the Department of Energy in July of 2011 to install Solar PV panels. The system consists of 496 panels and is expected to generate 210,030 kWh of renewable electricity in calendar year 2011 saving the city approximately $21,000.00 annually. The system comes complete with a monitoring system that will enable the City to evaluate the systems performance and determine where future solar investments can be made in the City.

ACTION 10.1: GREEN FLEET OPTIMIZATION & PROCUREMENT PROGRAM [ONGOING]

In the 2011-2016 SAP, the City stated that it would conduct the necessary due diligence to evaluate technologies and strategies that will optimize fuel efficiency in City fleet vehicles before making significant investments. In keeping with this recommended action, the City purchased two electric vehicles (Nissan Leaf) and put in place an electric charging infrastructure. The City also purchased a wrap for the vehicles to publicize this accomplishment to the community. The City followed grant procurement procedures to take advantage of the rebate offered by Nissan ($15,000.00 for both cars) and to secure a grant from "EcoTotality" to purchase electric vehicle charging equipment ($8,600.00). In the SAP, the City identified potential barriers to making bulk purchases of these vehicles such as potential problems with battery warranties, range, the need for charging stations, and cost. The City will evaluate these barriers and monitor the effectiveness of these vehicles over the next year and provide City council with relevant progress reports.

ACTION 11.2: EVALUATE RADIAL READ METERS TO IMPROVE WATER USE TRACKING [ONGOING]

The City currently uses City vehicles and staff to physically read residential and business water meters. The City has begun researching different technologies to optimize this process to save staff time, reduce gasoline consumption, and reduce carbon emissions. As part of this process the City has evaluated a variety of different automated meter reading technologies and is currently working to submit a grant application to the Bureau of Reclamation, "Water Smart" program. The City will be asking for $300,000 in funding to purchase automated meter reading technologies. If successful in securing the grant, the City will install 3,000 new advanced water meters that will help to conserve an estimated 97 million gallons of water over the life of the program.

ACTION 12.1: MUNICIPAL RECYCLING PROGRAM [ONGOING]

Recycling Upate: Annualy Comparisons Against 2010 Baseline					
Month	2010 Baseline (Tons)	2011 Change From Baseline (Tons)	2011 Change from Baseline (Percent)	2012 Change From Baseline (Tons)	2012 Change from Baseline (Percent)
January	108.5	28.8	27%	237.04	218%
February	85.1	82.4	97%	234.44	275%
March	120.1	93.7	78%	338.29	282%
Total (Jan - March)	313.7	204.9	65%	809.77	258%

To address this action, the City issued 96 gallon recycle carts to all residents. The success of this initiative is monitored by tracking the volume of recyclables diverted from landfills by City residents annually. Staff is currently securing additional data to evaluate the success of the program. However, when comparing the months of January through March for calendar years 2010 (baseline year), 2011, and 2012 the program shows very positive results. For example, as shown in the table above, the City was able to increase the total amount it recycled from the 2010 baseline year by 204 tons during the months of January – March of 2011. This represents a recycling rate increase of approximately 65% from 2010 to 2011. The City continued to build upon this progress in 2012. In 2012, the total amount recycled during the months of January – March of 2012 increased by 809 tons. This represents a rate increase of 258% when comparing against the 2010 baseline year[3].

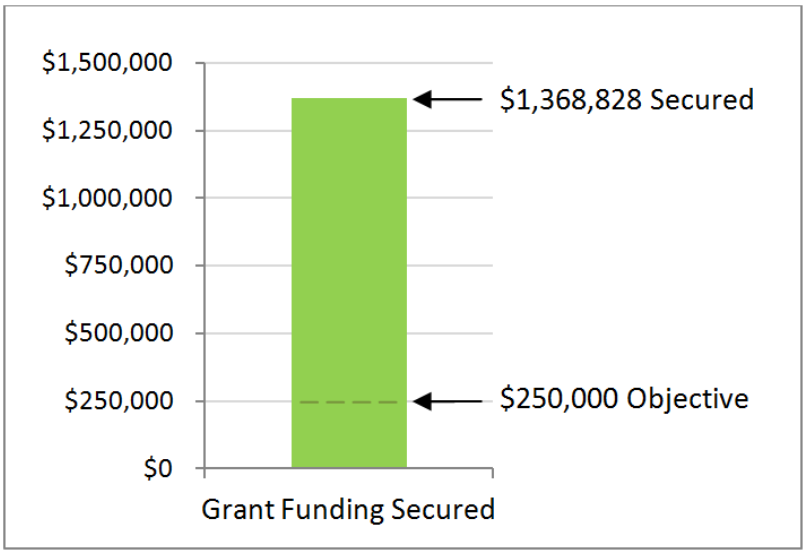
[3] *These figures were based on data collected for January, February, and March. Staff is currently working to secure additional data for all months in calendar years 2011 and 2012.*

PROGRESS MEETING PLAN OBJECTIVES

As stated in the introduction of this update, the 2011-2016 SAP contains a total of 15 objectives spanning three focal areas designed to: 1) build institutional capacity required to implement Sustainability actions, 2) optimize energy and reduce emissions within governmental operations, and 3) continue to plan for Sustainability within the Cedar Hill community. The City is making progress in fulfilling most objectives in the plan. However, staff has made some considerable progress on specific objectives that are discussed further in this update.

Objective	Descrption	Update
Objective 1:	Strengthen Institutional Capacity to Implement SAP Actions	
Objective 2:	Secure At Least $250,000 To Fund SAP Actions By 2013	✓
Objective 3:	Engage At Least 2 Strategic Sustainability Partners By 2012	✓
Objective 4:	Attend 1 Training Opportunity Annually for Sustainability	
Objective 5:	Develop Performance Tracking System By 2012	
Objective 6:	Increase Recognition and Communication For Sustainability	✓
Objective 7:	Reduce Electricity Used in Municipal Buildings To 5% and Natural Gas to 2% Below 2009 Baseline Levels by 2012	✓
Objective 8:	Reduce Electricity & Natural Gas Used in Infrastructure to 3% Below 2009 Baseline Levels By 2012.	
Objective 9:	Utilize Renewable Energy on Municipal Property	✓
Objective 10:	To Improve Average Fleet Fuel Economy by 2% By 2015	
Objective 11:	Improve Water Conservation in Municipal Operations	
Objective 12:	Reduce Solid Waste and Increase Recycling Rates in Municipal	✓
Objective 13:	To Increase Vegetative Cover, Open Space, and Natural Beauty	
Objective 14:	Integrate Energy Efficiency and Renewable Energy in TOD Plans	
Objective 15:	Facilitate Community Sustainability Education & Extension Program	

OBJECTIVE 2: SECURE AT LEAST $250,000 TO FUND SAP ACTIONS



The City successfully secured all of the funding necessary to fund the recommendations of the SAP greatly exceeding the funding objective. It did so by securing $1,368,828 worth of grant funding, exceeding the $250,000 objective by $1,118,828 or 448% (see bar graph). This represents one of the greatest accomplishments of the program and highlights the effectiveness of the system for sustainability grant procurement developed under Action 2.1. The breakdown of action items that were paid for by these funds is as follows: Action 9.1, the Renewable Energy Pilot

Program was funded through the help of a $952,058 SECO Renewable Energy Grant, a $50,000 SECO Emerging Clean Energy Technology Grant, a $1,550 Oncor Matching Grant Program and a $165,000 Oncor Commercial Rebate. Action 10.1, the Green Fleet Optimization & Procurement Program was made possible through the $8,620 EcoTotality Grant and a $15,000 Nissan Electric Car Rebate.

OBJECTIVE 3: ENGAGE AT LEAST 2 STRATEGIC PARTNERS BY 2012

As stated in Action 3.1, the City formed 18 strategic partnerships. As a result, staff far exceeded this objective in the first year of the plan. Pursuing and achieving this objective has brought significant benefits to the City, especially considering that many partnerships have helped to bring funding into the City to implement this plan. For example, the EcoTotality relationship led to the grant to install electric vehicle charging stations. The long lasting relationship with the North Central Texas Council of Governments (NCTOG) has played a major role in bringing funding for Transit Oriented Development (TOD) and other important Sustainability initiatives. Finally, relationships with companies like Waste Management have helped the City to increase recycling rates.

OBJECTIVE 6: INCREASE RECOGNITION AND COMMUNICATION FOR SUSTAINABILITY

The 2011-2016 SAP represents the first time the City has consolidated all of its Sustainability initiatives into one unified framework. After just one year of work on this plan, staff has managed to accomplish a variety of actions and meet various objectives worthy of recognition that have improved the overall brand image of Cedar Hill as a "Green" city. Some of these noteworthy accomplishments that contribute to positive recognition and brand image for the City include, but are not limited to:

- Development of the "Cedar Hill Green" website
- Vehicle wraps publicizing Nissan Leaf and Green Fleet Program
- News and good press associated with the government solar energy project
- Cultivation of strategic partnerships with other sustainability leaders in the community
- Acquisition of grant funding for the City's Sustainability Program

Objective 7: Reduce Electricity Used in Municipal Buildings to 5% and Natural Gas to 2% Below 2009 Baseline Levels by 2012

The 2011-2016 SAP set reduction goals for municipal buildings to reduce electricity and natural gas usage, by 5% and 2% respectively, by the year 2012. In 2009 the municipal buildings used 4,163,967 kilowatt hours (kWh) of electricity, and 6,788,400 Standard Cubic Feet (SCF) of natural gas. This translates into a reduction of over 208,000 kWh of electricity and 135,000 SCF of natural gas in combined reductions for the municipal buildings. The City has already identified Energy Conservation Measures (ECMs) (Action 7.1) to achieve this objective, but no measures have been completed to date. The City has, however, installed an impressive Solar Photovoltaic electricity generation system on the roofs of the Government Center building. This system is designed to produce over 210,000 kWh of electricity annually, which would offset a similar amount of electricity as outlined to be reduced in this objective.

Objective 9: Utilize Renewable Energy on Municipal Property

The City has made significant progress on carrying out this objective through the development of Action 9.1, the Renewable Energy Pilot Program. Under Action 9.1, the city installed a 152.768 kW solar array on the Government Center and set up an energy monitoring system that measures the amount of solar energy being generated. The system consists of 496 panels and is expected to generate 210,030 kWh of renewable electricity in calendar year 2011. The solar panels are estimated to offset approximately 8.32% of the buildings total electricity demand and save the city approximately $21,000 annually. The monitoring system that is in place is providing the City with valuable data to evaluate the strengths and weaknesses of solar installations as well as helping it to prepare for future scenarios when grant funding will not be needed to achieve attractive paybacks on solar technology.

Attachment A:
Completed Actions Documentation

DATE:	5-12-2011
TO:	City Council
FROM:	Melissa Valdez-Stephens
PROJECT:	Cedar Hill Sustainability Action Plan
SUBJECT:	1.1: Develop Organizational Structure and Work Groups

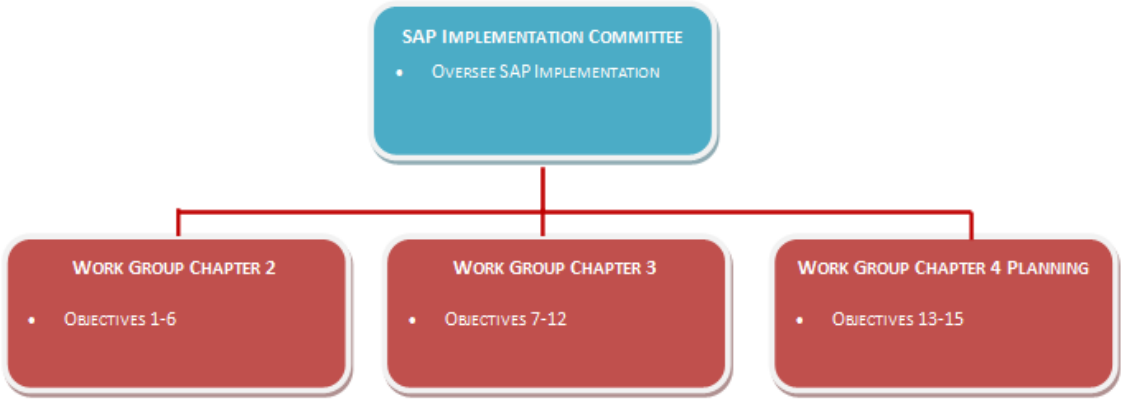
SUMMARY

This item was completed by the City Steering Committee to fulfill Action Item 1.1 (Develop Organizational Structure and Work Groups) as outlined in the City of Cedar Hill Sustainability Action Plan (SAP) Version 2011-2016. Upon City Council's approval, this action will become an official component of the SAP by which City Staff will perform work associated with the plan in general accordance with the organizational structure and work groups outlined in this document.

INTRODUCTION

Capacity is generally defined as the ability to perform or implement. In this context, without capacity this SAP will do nothing more than just "sit on the shelf." This document provides a basic framework intended to build capacity around the SAP to ensure that it can be implemented. This framework outlines three working groups to coincide with each chapter of the 2011-2016 SAP as outlined below. As shown in the figure below each working group will be responsible for meeting the objectives outlined in each chapter.

1. SAP Implementation Committee
2. Chapter 2: Institutional Capacity Working Group (Objectives 1-6)
3. Chapter 3: Municipal Operations Working Group (Objectives 7-12)
4. Chapter 4: Community Planning and Development Working Group (Objective 13-15)



WORK GROUP AND ACTION PLAN FRAMEWORK

The City reviewed a suite of models used by other cities to develop capacity around their action plans. During this process the City decided to follow the model presented in this document which focuses on using existing City staff organized into working groups that are overseen by a City led steering committee. This model was chosen over other models that generally included hiring a sustainability manager and developing a sustainability division. The City's decision to follow the steering committee model was rooted in the City's desire to utilize existing staff versus making new hires. In doing so, the City creates an opportunity to develop "in-house" expertise, expand existing roles, and capitalize on the existing social capital that already exists within the City regarding sustainability.

Sustainability Action Plan Steering Committee

The SAP will provide overarching policy guidance that unifies all working groups and action plans. In this capacity it is intended to be the sustainability roadmap for all future City initiatives. Therefore, the City will establish a SAP steering committee (the "Committee). The committee will be composed of at least one key staff member assigned to the working groups below it. The primary objective of the Committee will be to ensure that objectives outlined in the SAP are achieved. This will be done by doing one of two things: 1) by ensuring that actions approved by City Council for implementation are completed and 2) to develop proposals for SAP recommendations so that they may be implemented and completed in accordance with the planning horizons indicated in the SAP.

Institutional Capacity Working Group

This working group will be responsible for meeting the overall objectives outlined in Chapter 2 of the SAP (Objectives 1-6). These objectives focus on providing leadership, securing financing for the SAP via grants and other financing mechanisms, forging strategic regional partnerships, and managing important data to be provided to other working groups.

Municipal Operations Working Group

This working group will be responsible for meeting the overall objectives outlined in Chapter 3 of the SAP (Objectives 7-12). These objectives focus on reducing electricity use in municipal operations, conserving water resources, conserving fuel in fleet operations, and reducing solid waste. Staff for this work group will ideally contain staff from the Public Works, Facilities Maintenance, Fleet, and Parks and Recreation Department because these professionals tend to possess technical skill sets to oversee programs that include changing HVAC systems, replacing water pumps, and improving lighting efficiency at ball parks.

Community Planning and Development

This working group will be responsible for meeting the overall objectives outlined in Chapter 4 of the SAP (Objectives 13-15). These objectives focus on increasing vegetative cover and open space, working to integrate energy efficiency and renewable energy into TOD plans, and developing a community.

WORK GROUP COMPOSITION AND YEAR 1 ASSIGNMENTS

The table below outlines each action planned to be implemented during the first year of the SAP and identifies a member of Staff that will be responsible for its oversight.

Year	Action ID	Action Description	Planning Horizon	Status	Staff Assignment
Year 1	Action 1.1	Develop Organizational Structure and Work Groups	Short	Accepted by Council as Complete	NA
	Action 2.1	System for Sustainabilty Grant Procurement	Short	Adopted by Council for Implementation	Melissa Valdez-Stephens
	Action 5.1	Develop Data Management Procedures	Short	Accepted by Council as Complete	NA
	Action 7.2	EPA Energy Star Building Tracking Program	Short	Adopted by Council for Implementation	Consultant
	Action 3.1	Secure Strategic Partners	Short	Reccomendation yet to be Adopted	TBD
	Action 6.2	Create Sustainability Website	Short	Reccomendation yet to be Adopted	Melissa Valdez-Stephens
	Action 15.1	Develop Framework for Community Education & Extension Program	Short	Reccomendation yet to be Adopted	Don Gore

Staff outlined in this matrix will also sit on the SAP Implementation Committee. The Committee will meet two times over the first year of the SAP's implementation period to provide updates on their work. At the end of this period action items will be re-evaluated and progress will be reported to City Council. Also during the end of this period the SAP implementation Committee will be prepared to develop new proposals to implement midterm recommendations.

DATE:	5-12-2011
TO:	City Council
FROM:	Melissa Valdez-Stephens
PROJECT:	Cedar Hill Sustainability Action Plan
SUBJECT:	Action 2.1: Grant Action Plan

SUMMARY

This document outlines the responsibilities and procedures City staff will follow to meet strategic Objective 2 (Secure at Least $250,000 to finance SAP Actions). Successful completion of this action will bring additional revenue to fund actions within the SAP. Doing so will catalyze the SAP into action and make it easier for the City to develop action items over time.

GRANT ACTION PLAN

During the development of the 2011-2016 SAP, the City did not have enough funding to finance all of the recommendations of this SAP. Therefore securing funding was identified as a critical objective to ensure the long term viability of the SAP. There are a variety of organizations that have a track record of funding municipalities that have well articulated sustainability and energy management plans such as the Department of Energy (DOE), the Department of Housing and Urban Development (HUD) the Environmental Protection Agency (EPA), the state of Texas' State Energy Conservation Office (SECO), ONCOR and the North Central Texas Council of Governments (NCTCOG). Having the following procedures and protocols in place will help the City become even more competitive at securing grant

PLAN APPROACH & PROTOCOLS

The approach outlined below describes the City's general procedures to secure funding for the SAP.

1. Sustainability Grant Liaison– City staff (Melissa Stephens) has is the Sustainability Grant Liaison. In this capacity she will act as the point person to coordinate grant efforts because she is be both familiar with this SAP as well as grant writing.

2. Grant Sourcing – Federal budgets and political climates fluctuate. When the City received funding under the Department of Energy (DOE) Energy Efficiency and Conservation Block Grant (EECBG) program, the U.S. was experience a governmental trend of spending as part of the American Reinvestment & Recovery Act (ARRA). Today governmental spending is being curbed in both the house and senate. For example, based a recent article in from the Sustainable Cities Network, provided a review of a compromise federal spending package titled HR 1473 for the remaining 2011 fiscal year. The article noted that the package has both "good and bad" news for local governments seeking to improve energy efficiency, modernize fleet, reduce greenhouse gas emissions, and other sustainability initiatives. Positive news included that funding for these initiatives will still be

available. However, many well known programs including the EECBG and EPA Climate Showcase Communities will be "zeroed out." This will make grant competition for other sources of fund very competitive. The City of Cedar Hill will respond to this and other future fluctuations and make itself more competitive for future grants by implementing grant identification protocols as they are outlined below:

a. Register to receive federal grant notifications using Grants.gov. The Sustainability Grant Point Person will register with the Grants.gov website and subscribe to both the RSS feed feature and register to receive email notices using the "Advanced Search Criteria." When setting up the advanced search criteria the Grant Point Person will take care to select grant categories that correspond with the SAP, list the type of funding desired and select agencies of interest. Agencies of interest should at a minimum include: 1) the Department of Energy, 2) Department of Transportation, 3) Environmental Protection Agency, and 4) the National Science Foundation.

b. The Sustainability Grant Point Person will continue to monitor the state of Texas' State Energy Conservation Office (SECO) which has a well established program that often makes grant opportunities available to municipal governments. Finally ONCOR and the North Central Texas Council of Governments (NTCOG) also provide a variety of grant opportunities. Cedar Hill has already established an excellent relationship with these entities and should continue to foster this relationship in the future.

c. Develop a grant program tracking database. The Sustainability Grant Liaison will continue to populate and update the Sustainability grant tracking database. The database will contain the name, weblink, and other pertinent information for grant programs that are applicable to the SAP. It will be the Grant Liaison's responsibility to maintain the database and provide updates to it over time. This document concludes with a preliminary list of grant programs that should be tracked and further studied to determine if concrete opportunities can be identified.

3. Assessment of Competition and Likelihood of Success – As grant opportunities are identified it is important that the City have the ability to screen opportunities to determine the likelihood of success given the amount of time required to prepare a grant application. The Sustainability Grant Liaison will complete the following protocols after identifying a grant that may be applicable to the SAP.

a. Evaluate the quantity of funding available with the anticipated number of potential applicants and anticipated awards. This can be done by asking grant administrators directly how many applicants are expected. This can also be done by dividing the estimated grant award by the total number of likely applicants.

b. Attend grant conference calls and pre-proposal meetings whenever possible.

c. Provide a brief statement regarding the overall likelihood of receiving the proposed award

4. Project Preparation - In many cases, grant solicitations have quick turnaround times requiring potential applicants to have projects that are shovel ready. Many grants also require budget matching to remain competitive. This action plan recommends that portions of the City's budget for sustainability be available in the event that cost sharing and matching is required for a grant opportunity that demonstrates a high likelihood of success.

City of Cedar Hill Texas

Preliminary Energy Conservation Measure Report

Submitted by
Carbon Solutions America, LLC

Prepared by
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Matt Zirkelbach, LEED AP

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TABLE OF CONTENTS

INTRODUCTION

The City of Cedar Hill, Texas (City) will to implement a **'Sustainability Action Plan' (SAP**). This Preliminary Energy Conservation Measure Report was developed to help the City begin to develop a plan that will help the City achieve Objective 7 outlined in the plan which states that the City will *"Reduce Electricity Used in Municipal Buildings to 3% and Natural Gas to 2% Below 2009 Baseline Levels by 2012."* One of the ways the City plans to meet this goal by implementing Action 7.1: Energy Audits and Energy Efficiency Retrofit Matrix. As stated in the description for Action 7.1, the City plans to develop a matrix of energy efficiency retrofit projects that are shovel ready for the time in which grants and other funding becomes available. The matrix has yet to be completed and requires additional work to finalize. This report builds from work already completed as part of the ONCOR 2008 Energy Benchmark Report and work completed by the Steering Committee during the strategic planning process undertaken to develop the City's SAP. Its purpose is to begin the process of identifying future energy efficiency retrofits and their respective payback periods so that the City can populate the matrix. This report is divided into two parts. The first part titled "Brief Evaluation of Energy Conservation Measures (ECMs) outlines the results of information gathering and building walkthroughs conducted to identify specific ECMs that the City can implement to realize energy savings. The second part titled "Energy Audit Recommendations" discusses the general steps the City should take to conduct more detailed energy audits and provides a general cost estimate of anticipated costs.

BRIEF EVALUATION OF ENERGY CONSERVATION MEASURES (ECMS)

The ECMs contained in this report were developed using existing data from cursory facility walkthroughs with City facility managers, past energy evaluations, and discussions with City Staff. All efforts were made to fully evaluate energy systems. However site data was limited, and as such, these ECMs do NOT represent a comprehensive, investment-grade analysis or proposal, but rather an initial overview to help the City understand and various ECM concepts, their potential for increased efficiency, reducing operational costs, and prioritizing future energy retrofits designed to meet the objectives outlines the SAP. The remainder of this document outlines seven basic low cost ECMs that the City may wish to wish to spend additional time evaluating. These ECMs are listed on the following page. Please note that ECM calculations & opportunities discussed in this report must conform to the "Project Limitations & Restrictions" statement located in **Attachment A**.

- ✓ ECM #1 – Main Gym lighting system
- ✓ ECM #2 – Main Gym Lighting Control
- ✓ ECM #3 – Gym Track Lighting Options
- ✓ ECM #4 – Public Works 2 Small A/C Upgrade
- ✓ ECM #5 – Fire Station 2 Rooftop A/C Upgrade
- ✓ ECM #6 – Water Pump Motor Upgrade
- ✓ ECM #7 – Energy Management Systems (Government and Recreation Centers)

ECM #1 - RECREATION CENTER: MAIN GYM LIGHTING SYSTEM UPGRADE

The Recreation Center was recently constructed in 2004. It has 68,968 square feet. It houses a gymnasium, a workout center, a track, banquet rooms, offices, a gameroom, and showers. It also has an energy management system purchased from "Andover Controls" called "Continuum." The main gym lighting system as shown in the picture taken in the Recreation Center deploys approximately 28 metal halide fixtures, each accommodating a 400-watt lamp and ballast. The gym lights are currently turned on at 6 am and operate until 9 pm daily. ECM #1 will consider a direct replacement fixture to a higher efficient, hi-bay fluorescent type, which will reduce lighting costs and also reduce the associated cooling costs from the less efficient metal halide system. A number of high-bay, hi-output fluorescent fixtures exist from various manufacturers that will generally accommodate an equivalent lighting level at much high efficiency, although a specific lighting evaluation (testing actual light levels currently deployed) will be required before any specific fixture type is selected.

In this school gymnasium, 400W metal halide fixtures (left) were changed over to F32T8 industrial fixtures (right) at a one-for-one replacement, increasing light levels from 30 to 50 fc and CRI from 65 to 85 while reducing wattage per fixture from 450W to 224W. Courtesy of Acuity Lighting Group

The figure provides a sample gym lighting upgrade similar to what is being discussed here. An important issue is that metal halide lamps have a significant reduction in light output over their lives while fluorescent lamps do not. Also, fluorescent fixtures can generally "light-up" within 1-second, while metal halide systems will require many minutes to reach full light output. For this

ECM, it is generally assumed that a direct replacement hi-output fluorescent fixture can be installed in place of the existing fixtures (see Figure 1-2 for a gym lighting upgrade example), using a 6-lamp (6) F32T8 “High Lumen” Fluorescent fixture rated approximately 225 watts, including ballast. The current 400-watt metal halide, single lamp fixture is assumed to consume 458 watts, including ballast (estimate for a common, mid-grade lamp with magnetic ballast fixture – see calculation for alternate details). While labor and site installation costs will depend on the specific site conditions, a conservative estimate of $350/ fixture total installed cost for the 28-fixture gym system is estimated for ECM #1. The sample results for the proposed ECM #1 is as follows.

ECM 1 CALCULATIONS

- ✓ *Number of total fixtures: 28*
- ✓ *Estimated current wattage: 458 watts (assumed for mid grade lamp and magnetic ballast)**
- ✓ *Replacement fixture wattage: 225 watts*
- ✓ *Hourly energy savings for entire system: 6.524 kWh*
- ✓ *Annual operating hours: 5,250*
- ✓ *Electricity cost: $0.105/kwh*
- ✓ ***Estimated annual electricity savings: $3,596/yr***
- ✓ *Estimated installed cost for 28-fixture system: $9,800*
- ✓ *Investment payback at 100% full investment: 2.72 years*
- ✓ *Investment payback at 50% grant-rebate investment: 1.36 years*

ECM 1 NOTES

If the existing fixture is confirmed to deploy a higher efficient lamp and/or electronic ballast, the indicated replacement savings above will be less and the better approach may be to simply substitute a direct replacement, <320 watt hi-efficient lamp, which will not save as much operating costs, but with its cost considerably less installed cost, the payback investment will be even more attractive).

ECM #2 - RECREATION CENTER: MAIN GYM LIGHTING CONTROL

This ECM suggests that the existing 28 fixture gym lighting system can be sub-controlled into 2 (3 or 4) main control circuits, whereby manual timer controls can be placed on the system to significantly reduce the daily operating hours from the current 6 am to 9 pm schedule. Users would manually turn-on lighting for a pre-selected period ranging from 0 to 4 hours. Partial gym lighting can simultaneously be accomplished when only half the gym is in use, etc. installation will require that at least 2 manual timer controls be installed (preferable 3 or 4) in the existing control circuits. It is conservatively estimated that a minimum of 3 hr/day of system lighting will be saved using this system. The sample results for the proposed ECM #2 is as follows:

ECM 2 CALCULATIONS

Number of total fixtures: 28
Current fixture wattage: 458 watts
Control timer circuits to be installed: 2 (to 4)
Annual operating hours: 5,250
Estimated system equivalent average savings: 3 hrs/day
Annual energy savings for entire system: 13,465 kWh/yr
Electricity cost: $0.105/kwh
Estimated annual electricity savings: $1,414/yr
Estimated installed cost for control system: $ 800
Investment payback at 100% full investment: 0.56 years (i.e. <7 months)
Investment payback at 50% grant-rebate investment: 0.28 years (i.e. < 4 months)

ECM 1 NOTES

Because the re-strike time (time to “light-up”) of the current metal halide lamps may be many minutes, it is recommended that this ECM #2 be installed in conjunction with ECM #1, as the proposed fluorescent lamps typically re-light within 1 second. In addition, care must be taken training facility personnel that timers are set properly and not set to turn off at exactly the same time, especially during events when a sudden loss of light could present safety issues.

ECM #3 – GYM TRACK LIGHTING OPTIONS

The Recreation Center is currently deploying approximately 20 up-lighting fixture of unknown exact type. Facility personnel noted that these lights were unattractive and didn't provide real lighting benefit to the area mainly because they are pointing straight up. In addition to a fixture upgrade, there was much adjacent daylighting available during the day; such that new ceiling mounted fixtures might take advantage of effective daylighting sensor control. Depending on the exact type & size lamps this may make sense because of the extensive schedule these lights are on (daily 6 am to 9 pm).

ECM #3A – Track fixture retrofit potential will depend on a number of key issues, such as the exact lamp & fixture being used now. however the following estimate is provided to demonstrate the potential here. The initial assumption based on the site observation is that these fixtures deploy 175-watt metal halide lamps with a total fixture wattage of approximately 202 watts. The replacement recommended is a ceiling mount, fluorescent 2-lamp F32T8 hi-efficient fixture rated at approximately 56 watts. Because of the cost effectiveness while replacing the fixture, it is also recommended that the fixture deploy a integral daylighting control sensor & ballast, to allow for daylighting savings for those fixture adjacent to windows, which is recommended in ECM #3b below.

ECM #3B **-** Daylighting control with sensors on each fixture adjacent to window walls or other sources of good daylight.

ECM #3C- Timer control for this entire system on 2 or more circuits as already explained in ECM #2 above.

COMBINE ECM #3B & #3C, - The use of daylighting and timer control is grossly estimated to provide an effective average reduction of approximately 50% of the current operation time (i.e. 3 hours/day timer control + 5 hours/day day lighting average.

ECM CALCULATIONS

ECM #3 Upgrade sample analysis (based on factors & upgrades discussed above):
Number of total fixtures: 20
*Estimated current wattage: 202 watts (assumed for MH lamp and magnetic ballast)**
Replacement fixture wattage: 56 watts
Current annual operating hours: 5,250
Estimated new annual operating hours: 2,625
Electricity cost: $0.105/kwh
Estimated annual electricity savings: $1,918/yr
Estimated installed cost for 20-fixture system: $3,500 with integrated daylight sensor control
Estimated installed cost for timer control: $400
Investment payback at 100% full investment: 2.03 years
Investment payback at 50% grant-rebate investment: 1.02 years

ECM #4 – PUBLIC WORKS: 2 @ 5-TON A/C UNIT UPGRADE

The public works building is basically an office. It contains 6,913 square feet and was built in 1978. It is an old building with 2 old (20 year+), 5-ton heat pumps used for cooling & heating. This proposed ECM is to replace these 2 units with new, higher efficient units.In addition to associated energy savings, the new units' associated costs for downtime & O&M costs is generally MUCH lower than the old units, so all factors considered, an old, inefficient, hi-maintenance unit could ultimately be gross cost justified (a more detailed analysis addressing all these factors is required to confirm this potential). The sample results for the proposed ECM is as follows:

ECM 4 CALCULATIONS

Existing, age degraded estimated EER: 8.0

New Upgrade EER: 16.0

Tons total: 10

Hours/yr estimated full load use: 2,000 (based on total site annual @ ~60,000 kWh)

Annual estimated cost to operate @ $0.105/kWh: $3,150

Annual maintenance and downtime costs: $0? (none estimated at present)

Annual estimated cost to operate new units @ $0.105/kWh: $1,600

Annual estimated savings with new unit: $1,550

Installed estimated cost for 2 new units: $10,000

Investment payback at 100% full investment: 6.5 years

Investment payback at 50% grant-rebate investment: 3.3 years

ECM #5 – FIRE STATION 2: ROOFTOP A/C UPGRADE

The public works building is basically an office. It contains 6,355 square feet and was built in 1975. It is an old building with a 15-ton packaged rooftop A/C unit used for cooling. This proposed ECM is to replace this unit with a new, higher efficient model.In addition to associated energy savings, the new unit's associated costs for downtime & O&M costs is generally MUCH lower than the old unit, so all factors considered, an old, inefficient, hi-maintenance unit could ultimately be gross cost justified (a more detailed analysis addressing all these factors is required to confirm this potential). The sample results for the proposed ECM is as follows:

ECM 5 CALCULATIONS

Existing, age degraded estimated EER: 8.0

New Upgrade EER: 16.0

Tons total: 15

Hours/yr estimated full load use: 2,000 (based on total site annual @ ~85,000 kWh)

Annual estimated cost to operate @ $0.105/kWh: $4,725

Annual maintenance and downtime costs: $0 (none estimated at present)

Annual estimated cost to operate new units @ $0.105/kWh: $2,400

Annual estimated savings with new unit: $2,325

Installed estimated cost for new unit: $11,250

Investment payback at 100% full investment: 4.8 years

Investment payback at 50% grant-rebate investment: 2.4 years

ECM #6 – WATER PUMP MOTOR UPGRADE

It is important to realize that an upgrade to a more efficient motor will NOT pay for the total replacement, although the incremental cost investment to specify a premium efficient motor would likely provide an attractive payback, since the incremental costs for a premium motor is generally in the 10 – 15% range. A 2 to 4 year payback would be expected for this energy upgrade investment. In addition to associated energy savings, the new motor's associated costs for downtime & O&M costs is generally MUCH lower than the old motor, so all factors considered, an old, inefficient, hi-maintenance motor could ultimately be gross cost justified (a more detailed analysis addressing all these factors is required to confirm this potential). The sample results for the proposed ECM is as follows:

CURRENT 150 HP MOTOR OPERATING COSTS = $63,600/YR

Assuming the existing 150 hp pump motor draws 121 kW (~92.5% eff.) at full load, with an estimated annualized usage & loading factor adjustment of 75%, then the annual cost to operate the current motor at an estimated average utility cost of $0.08/kWh.

PROPOSED 150 HP PREMIUM EFF. MOTOR OPERATING COSTS = $61,250/YR

Assuming the existing 150 hp pump motor draws 116.5 kW (~96% eff.) at full load, with an estimated annualized usage & loading factor adjustment of 75%, then the annual cost to operate the current motor at an average utility cost of $0.08/kWh.

ECM 6 CALCULATIONS

Annual estimated savings based on above = $2,350/yr

Incremental estimated cost for 150 hp premium motor: approximately ~$ 4,800

Investment payback at 100% full investment: 2.04 years

Investment payback at 50% grant-rebate investment: 1.02 years

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ECM 6 NOTES

Critical considerations for this motor system analysis include the following issues: 1) Pump system & flow control can have a greater impact on the energy use than the differential between the standard and premium efficient motors, so these factors should also be considered in any

upgrade. 2) Annual usage factor (hrs/yr) is critical to this decision. If hours are high, the incremental cost for premium efficiency is a good investment 3) Motor dispatch sequence and potential for ASD (adjustable speed drives) if hp loading is <50% during many hours (operating efficiencies between 50% - 100% loading are typically fairly flat)

4) Premium eff costs about 10-20% more than standard eff. Motors, 5) Application resource is the DOE's – Motor Master Program

ECM #7 - EMS SYSTEM MODIFICATIONS & UPGRADES (REC. AND GOV. CENTERS)

The City Recreation & Government Centers are the larger energy users in the system. A brief analysis of their energy use profile indicates that there is potential for improvement in energy use and a corresponding reduction in annual energy budgets. Approaching the specific ECMs to facilitate lower energy use will typically start with the current EMS and building automation – control systems. Low and no-cost upgrades can typically be achieved by modifying the EMS settings, adjusting control equipment, or installing new controls for HVAC and lighting, such as:

- ✓ Temp reset 76 summer & 72 winter w/ Temp & humidity (wet –bulb / dry-bulb) A/C control
- ✓ Night & week-end Setback T-stat
- ✓ Exterior lighting control sensors & timers
- ✓ Master Interior lighting control w/ occupancy sensors / timer
- ✓ Staff personnel training & awareness

Longer-term payback ECMs will require investments for changing equipment or systems to higher efficient items (see previous ECMs).The anticipated energy $-savings potential at these 2 sites are estimated as follows:

ECM 7 CALCULATIONS

				Program Target*
SITE	**Current Budget/yr**	**ECM: No-Cost/ Low-Cost: $/yr**	**ECM: 3 – 5 yr Paybacks: $/yr**	**ECM: 5 – 10 yr Paybacks: $/yr**
Government Center:	**$215,000**	**$9,800**	**$19,200**	**$31,100**
Recreation Center:	**$185,000**	**$8,800**	**$17,100**	**$26,400**

The above ranges should provide some insight into the 2 sites' energy saving potential. Current analysis suggests that the *target goals for all ECMs within a 5 to 10 year simple payback, would provide the maximum savings at an attractive return. Keep in mind that savings will recur each year, such that a $31,000/yr savings equals $155,000 over 5 years. Of course, evaluating the existing systems and specifying ECMs will require considerable more analysis than used to estimate these gross values.

ENERGY AUDITS RECOMMENDATIONS FOR MOVING FORWARD

It is suggested that the City consider a 3-tier scope approach on any /all of their facilities, INCLUDING the new buildings as follows:

TIER-1

12 to 24 most recent month utilities profile with EUI indexing comparison to national with a verbal review (staff facility operator) of the main systems & operations schedule/profile --- this will identify any major problems and/or "easy kill" ECM opportunities. [*Some of this was performed by ONCOR in 2008, although that data is 2+ years old and they did no national benchmarking to identify problematic facilities, nor did they register the facilities with the DOE's ENERGY STAR portfolio. Water usage should also be included, UNLESS this is a "free city service" supply?*]

TIER-2

Based on the tier-1 results, the City will perform a 'high level energy audit' (i.e. walk through) and City personnel interviews to identify no/low cost ECM options and identify problematic equipment, settings, and operational items

TIER-3

ONLY IF the City confirms large dollar savings potential from the Tier-1 (and Tier-2 if performed) analysis, a 'mid-level, site audit' will be conducted on selected facilities searching for no/low cost ECMs (as in tier-2 above), but will also include larger & more complex ECMs with reasonable paybacks (typically within a 3 to 5 year payback). Targeted goals will typically be achieved with a Tier-3 approach.

In summary, the following provides a rough estimate of the costs associated with future energy audits to expand upon this report. To perform the Tier-1 & Tier-2 assessments above for the 14 municipal buildings (not pumping facilities) with an indicated gross size of approximately 270,000 s.f., the estimated cost would be approximately $45,000 (+/- 20%). Tier-3 costing would be directly tied to the number and complexity of ECMs identified for evaluation under the initial tiers of auditing.

ATTACHMENT A: PROJECT LIMITATIONS & RESTRICTIONS

The actual evaluations contained in this report were intentionally performed to provide a preliminary assessment in order to place options in perspective and identify key impacting issues. The intent was to initially explore the projects for future, more detailed considerations should initial results indicate attractive potentials. Every effort was made to use appropriate input data and evaluation criteria although considerable assumptions were utilized for many aspects of the evaluation, consistent with the intended project scope.

Because all project work represented in this report was performed as a "preliminary level evaluation with restricted scope" it is important to keep this issue in perspective when referencing or utilizing any data or results contained herein.

All simulations as well as technical and financial evaluations are representative of the "feasibility level" assessment only, and should not be considered to represent (guaranteed) actual project performance.

No evaluations or preliminary conclusions presented in this report should be considered sufficient for investment level assessment but instead were prepared to initiate further, more detailed analysis, should appropriate opportunity be identified at this phase.

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