SUSTAINABILITY ACTION PLAN

CITY OF FORT LAUDERDALE

UPDATE 2011

GREEN YOUR ROUTINE

Promote community sustainability by protecting, preserving and restoring the natural environment through reducing the City's contribution of greenhouse gas emissions to the environment

ACKNOWLEDGEMENTS

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Heather Steyn (Administrative Assistant I)
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(Environmental Resources Supervisor)
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A Message from the City Manager:

Dear Mayor & Commissioners:
On behalf of the City of Fort Lauderdale's Green Team, I am pleased to present this 2011 Sustainability Action Plan (SAP) update, a collaborative effort among the Sustainability Advisory Board, Carbon Solutions America and City staff.

According to the International City/County Management Association (ICMA), sustainable decisions are those that integrate Environment, Economy and Social Equity, the three elements of the Sustainability Triple Bottom Line. The City Administration is committed to this approach and to integrating sustainability into all level of decision-making throughout the organization.

To ensure successful implementation of actions outlined in the plan we will integrate this plan with our new strategic planning process that will identify goals and objectives across five core service areas referred to as Cylinders of Excellence: Infrastructure, Public Places, Neighborhood Enhancement, Business Development, and Public Safety. Key community indicators and performance measures identified through strategic planning will link to the SAP. Action items will be implemented through a cross-disciplinary interdepartmental team, the Green Team.

I would like to recognize and thank the Sustainability Advisory Board and City staff for their work in updating this plan. This is our roadmap and guide for 2012.

Yours truly,

Lee Feldman, City Manager

A Message from the Sustainability Advisory Board:

The Sustainability Action Plan is a reflection on the dedication of many such as the Sustainability Advisory Board (SAB) members, industry professionals, and city staff working collectively on initiatives that will lead our City towards a sustainable future. As chair of the SAB, I encourage the City to implement many of the initiatives discussed. This is just the beginning of our journey and with continued support and dedication the possibilities are limitless.

Jon Albee, Chair – Sustainability Advisory Board

City of Fort Lauderdale
Sustainability Action Plan Update 2011

The City of Fort Lauderdale presents the 2011 Sustainability Action Plan (SAP) Update. This report provides recommendations for new and existing initiatives to encourage and assist our residents, businesses, developers, staff and organizations to practice sustainability. By developing and implementing innovative programs now, our City can position itself to become a global leader through local action in sustainable practices.

INTRODUCTION:

In 1987, the World Commission on Environment and Development ("Brundtland Commission") defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". In essence, sustainable development embraces the triple bottom line that takes into account not only fiscal but also social and environmental factors.

The City of Fort Lauderdale understands that by implementing the SAP, our community will be better prepared, through good stewardship and improved efficiency, to improve quality of life, foster eco prosperity and climate resiliency.

In 2009, our City Commission created the Citizens' Sustainability 'Green' Committee (CSGC) – the Sustainability Advisory Board in 2011 – and approved the City's first SAP. This SAP update is based on recommendations by the SAB and it provides the foundation for a long-term, comprehensive strategy that will help our city to become more sustainable by preparing itself to thrive in a low carbon economy.

This report presents our 2011 SAP update and incorporates a variety of reports, most notably the 2010 CSGC report and the 2010 SAP. The report is a living document and therefore not all aspects may have been addressed in their entirety. We consulted stakeholders including citizens, SAB, businesses and others, and conducted surveys and research in order to provide a document that will serve as a starting and turning point for our City's future.

TOP FIVE PRIORITIES:

1. Integrate sustainability into all levels of decision-making.
2. Assign City staff to implement sustainability initiatives.
3. Create financial incentive programs.
4. Support Green Training of the Local Workforce.
5. Create program to identify environmentally preferable purchasing practices.

The top five priorities were identified through a modified decision matrix based on established methodologies (see page 5). Key Performance Indicators (KPI) are tracked to determine progress and performance (Table I.1). Detailed data for all action items can be found in the attachments.

Table I.1: Key Performance Indicators update, trends and goals.

GENERAL		2008	2009	2010	TREND	GOAL/ TREND 2020
Population	Number	183,220	184,892	165,521	↘	212,571
Household Size	Number	2.26*	No data	2.29	↗	2.38
Dwelling Units	Number	93,461*	No data	94,833	↗	101,612
Households	Number	79,217*	No data	81,256	↗	89,456
City Budget**	million $	$605.80	$601.40	$611.70	↗	-
General Fund**	million $	$349.40	$327.50	$324.10	↘	-
Capital Improvement Budget**	million $	$125.80	$89.30	$58.52	↘	-
AIR QUALITY	**UNIT**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
City greenhouse gas emissions	MTCO2e	72,644	72,403	72,700	↗	58,164
Community greenhouse gas emissions	MTCO2e	2,858,066	2,820,461	2,827,747	↘	2,262,198
ENERGY	**Unit**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
City electricity usage	MWh	105,661	105,297	106,011	↗	84,808
Community electricity usage	MWh	1,148,787	-	1,185,194	↘	948,155
Renewable energy installed	MWh	TBD	TBD	TBD	-	TBD
Renewable energy incentives	$	-	-	>$500,000	↗	TBD
WATER	**Unit**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
Water drawn	Gallons	15,966,363	16,412,234	15,223,679	↘	14,919,205
Wastewater flow	MGal	13,456	13,319	13,632	↗	10,905
Estimated sewered population	Number	No data	No data	231,181	↗	252,885
BUILT & NAT. ENV.	**Unit**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
City buildings electricity usage	MWh	29,097	29,406	29,346	↗	26,188
Residential electricity usage	MWh	1,148,787	No data	1,185,194	↗	1,066,675
Commercial electricity usage	MWh	1,784,945	No data	1,711,468	↘	1,540,321
Residential natural gas usage	therms	1,376,318	No data	No data	-	TBD
Commercial natural gas usage	therms	17,640,667	No data	No data	-	TBD
Industrial natural gas usage	therms	2,244,062	No data	No data	-	TBD
TRANSPORTATION	**Unit**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
Diesel usage City fleet	Gallons	405,758	407,916	408,396	↗	326,716
Gasoline usage City fleet	Gallongs	989,373	1,004,547	1,006,057	↗	804,845
Fleet vehicles	Number	1,524	1,578	1,546	↗	-
WASTE	**Unit**	**2008**	**2009**	**2010**	**TREND**	**GOAL/ TREND 2020**
Recycled material	tons	7,989	8,268	8,650	↗	10,380
Households serviced	Number	36,191	37,398	37,398	↗	-

*2006 **Fiscal Year

The KPI data were collected from several sources including but not limited to: City Management, Public Works Department, Finance Department, Broward County, and FPL. The trend icon depicts changes from 2008 to 2010; the 2020 goals are based on SAP goals outlined in each chapter. In future reports, it is expected that the KPI database will be expanded to include other relevant metrics that are deemed necessary.

OUR GOALS:

LEADERSHIP
GOAL 1: Lead by Example.
GOAL 2: Implement and Enforce Sustainability Policies.
GOAL 3: Stimulate Green Local Economy.
GOAL 4: Prepare for Climate Change Impacts.

AIR QUALITY
GOAL 1 Reduce GHG Emissions by 20% below 2010 levels by 2020.
GOAL 2: Improve Air Quality in Other Sectors.

ENERGY
GOAL 1: Reduce Electricity Usage by 20% below 2010 levels by 2020.
GOAL 2: Source 20% Electricity from Renewable Energy by 2020.

WATER
GOAL 1: Reduce Water Demand by 20% by 2020.
GOAL 2: Reduce and Improve Wastewater and Stormwater Treatment.

BUILT AND NATURAL ENVIRONMENT
GOAL 1: Encourage and Plan Green Buildings and Development.
GOAL 2: Preserve and Expand Natural Spaces.
GOAL 3: Improve Energy Performance in Buildings.

TRANSPORTATION
GOAL 1: Reduce Fossil Fuels Use in Vehicles by 20% below 2010 by 2020.
GOAL 2: Reduce Vehicle Miles Traveled.
GOAL 3: Plan for Alternatives to Driving Opportunities.

WASTE
GOAL: Increase Recycling Rates by 20% by 2020.

PROGRESS TRACKING
GOAL: Track Progress of Sustainability Efforts.

METHODOLOGY

The following chapters include action items that are prioritized based on a score that was derived from a 12-point evaluation matrix (see table below). This matrix is based on ICLEI's[1] Climate and Air Pollution Planning Assistant (CAPPA) decision making tool and was customized to Fort Lauderdale's needs and demands. The top five priorities were extracted from the Leadership chapter based on the highest scoring and as recommended by several stakeholder groups including but not limited to City management, City staff, expert groups and citizens.

1. Implementation Costs	2. O&M Costs	3. Simple Payback	4. Time Horizon	5. Staff Effort	6. Governmental Control
Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute
1 > $1 million	1 > 2 Full-time equiv. (FTE)	1 > 15 yrs	1 > 5 Years	1 > 4,000 hrs	1 No control
2 $100k- $1 million	2 1 to 2 FTE	2 10 to 15 yrs	2 2-5 years	2 1,200 – 4,000 hrs	2 Programs (no incentives)
3 $10k-$100k	3 1/2 to 1 FTE	3 5 to 10 yrs	3 1-2 years	3 200 – 1,200 hrs	3 Programs (with incentives)
4 $1k-$10k	4 1/10 to 1/2 FTE	4 2 to 5 yrs	4 6-12 months	4 40 – 200 hrs	4 General influence
5 < $1k	5 < 1/10 FTE	5 < 2 yrs	5 < 6 months	5 < 40 hrs	5 Full responsibility
7. GHG Emissions avoided	**8. Energy saved**	**9. Landfill Waste diverted**	**10. Quality of Life**	**11. Health improvem**	**12. Creates Local Jobs**
Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute	Score / Attribute
1 < 100 tons/yr	1 < 1 MWh/yr	1 < 50 lbs/person/yr	1 None	1 None	1 None
2 100-1000 tons/yr	2 1-10 MWh/yr	2 50-100 lbs/person/yr	2 Mostly not	2 Mostly not	2 1-10
3 1000-10000 tons/yr	3 10-100 MWh/yr	3 100-200 lbs/person/yr	3 Neutral	3 Neutral	3 10-100
4 10,000-100,000 tons/yr	4 100-1,000 MWh/yr	4 200-300 lbs/person/yr	4 Several improv.	4 Several improv.	4 100-1,000
5 > 1 million tons/yr	5 > 1,000 MWh/yr	5 > 300 lbs/person/yr	5 Significant.	5 Significant.	5 Over 1,000

City Realignment of Organizational Structure

A new organizational structure of the City's departmental structure is currently being implemented. The Administration will be organized into five Core Service Areas: Infrastructure, Public Places, Neighborhood Enhancement, Business Development, and Public Safety. Each Core Service Area will be headed by a selected Department Director who will assemble an inter-departmental team and develop a Strategic Plan that is consistent with the Vision Statement of the City. Each Strategic Plan will have a three to five year planning horizon. Teams will also be responsible for developing and monitoring a coordinated Annual Action Plan in line with the annual budget. A new Structural Innovation Office will be responsible for performance measurement, benchmarking and process improvement. The reorganized departments include the following: City Manager, Finance, Fire Rescue, Human Resources, Information Services, Parks & Recreation, Police, Public Works, Sustainable Development and Transportation and Mobility.

[1] ICLEI – Local Governments for Sustainability - is an international association of local governments and their associations that have made a commitment to sustainable development. More information : http://www.icleiusa.org/

CHAPTER 2: LEADERSHIP

Goal 1:	Lead by Example.
Objective 1.1:	**Increase organizational capacity.**
Action 1.1.1:	Assign City staff to implement sustainability initiatives.
Action 1.1.2:	Set aside annual budget for sustainability projects and staff time.
Action 1.1.3:	Create common data base of best green management practices.
Action 1.1.4:	Create strategic partnerships with local educational institutions and businesses; large energy and water users; regional organizations.

Accomplishments:

- In 2009, a City internal Green Team was created and meets bi-weekly.
- In 2010, the City hired an Energy Manager consultant for one year.
- In 2011, a City internal Energy Management Team was created and meets bi-monthly.

Actions that may have a small impact can be of large symbolic value and demonstrate leadership in sustainability. The City budget must consider sustainability projects and increase its organizational sustainability capacity by assigning staff, reaching out to partners, and implementing best practices.

Comment:

City employees will be educated about sustainability initiatives and incentivized to become pro-active implementers of sustainable practices. Challenge programs are considered that target specific groups to improve certain behaviors; for example a fuel challenge program is recommended in which drivers can participate in a program that will reward them for driving in a more fuel efficient manner.

Background

The City's Green Team serves as a platform to establish sustainability goals for each department with regular reports to the Green Team. Individual sustainability champions for the departments will be identified who have a personal interest and passion for resource conservation, recycling and outreach efforts. The City Energy Management Team (CEMT) is a more energy focused group and the team members will develop pro-active approaches to conserve electricity and fuel.

Action 1.1.1: Assign City staff to implement sustainability initiatives.
The City will assign or hire staff who is specifically tasked to implement sustainability initiatives. It is paramount that the City builds its organizational capacity and makes sustainability tasks part of all job description.
Status: Not started
Responsible Party: City Management
Timeline: 6-12 months
Metric: Sustainability staff
Budget: Staff time (1,200-4,000 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions
Issues: Extra cost

Example City of Asheville, NC

The City of Asheville, NC (Population: 83.000) hired a sustainability officer. The salary is funded through the general fund with a $25,000 annual budget. Duties include amongst others:

- Design of overall strategy and process for the project
- Develop and maintain Sustainability Plan and Climate Action Plan
- Track and report through the City's performance management program
- Oversee and maintain sustainability budget
- Coordinate and lead City's Green Team
- Identify and secure funding resources from outside sources for projects
- Perform financial analysis on ongoing and new projects
- Represent the City at key meetings
- Foster, develop, and launch projects in partnership with city departments and external stakeholders.

Reference: click here.

Action 1.1.2: Set aside annual budget for sustainability projects and staff time.
The City Fleet Department will consider aspects of fuel efficiency and fuel source in the annual fleet replacement analysis. Each vehicle that is considered for replacement will be replaced with a vehicle that has higher fuel efficiency and/or uses low carbon fuel technologies, such as hybrids or electric vehicles.
Status: Not Started
Responsible Party: City Management
Timeline: 2-5 years
Metric: Annual Budget
Budget: TBD ($100,000 to $1,000,000 including salary); staff time (1,200-4,000 hours)
Benefits: Long-term commitment; resource conservation; energy and fuel savings.
Issues: Long-term funding.

Action 1.1.3: Create common data base of best green management practices.
The City will compile a list of best practices that help implement sustainability initiatives. The data base is a valuable tool for both residents and staff and could be published on the City's sustainability website.
Status: Not Started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Green Practices List
Budget: Staff time (40-200 hours)
Benefits: Guidelines help implement sustainability efforts
Issues: Regular updates require dedicated staff.

Action 1.1.4: Create strategic partnerships with local educational institutions and businesses; large energy and water users; regional organizations.
Public-public or public-private partnerships are a key in implementing the City's long-term sustainability aspirations. Particularly teaming up with organizations that help educate the community will be paramount. Similarly, large users of resources such as energy or water must be involved and engaged in sustainability initiatives.
Status: Continued Action
Responsible Party: City Management
Timeline: 1-2 years
Metric: Established partnerships
Budget: Staff time (1,200-4,000 hours)
Benefits: Resource conservation, education and outreach
Issues: Bureaucratic barriers and unwillingness to pursue partnerships.

Southeast Florida Regional Compact

In 2009, the inaugural Southeast Florida Regional Climate Leadership Summit was held to develop a regional collaboration that supports a coordinated climate change strategy. The Southeast Florida Regional Climate Change Compact represents a joint commitment of Broward, Miami-Dade, Palm Beach and Monroe Counties to partner in mitigating the causes and adapting to the consequences of climate change. The Compact was formalized following the Southeast Florida Climate Leadership Summit, when elected officials came together to discuss challenges and strategies for responding to the impacts of climate change. The Compact outlines a collaborative effort to participate in a Regional Climate Team toward the development of a Southeast Florida Regional Climate Change Action Plan. Reference: click here.

Goal 1:	Lead by Example.
Objective 1.2:	**Follow Sustainable Procurement Practices.**
Action 1.2.1:	Create program to identify environmentally preferable purchasing practices.
Action 1.2.2:	Modify the City's procurement process to provide incentives for local businesses to provide sustainability related services.

Accomplishments:

- The City's procurement system provides bids electronically through BidSync and BuySpeed.
- City purchases eco-friendly cleaning supplies
- City print shop switched to low VOC, vegetable based ink where feasible, and offers more recycled content paper.

By implementing and enforcing sustainability oriented procurement policies and practices, the City can lead by example. There are many examples of environmentally preferable purchasing policies that can be incorporated. The City will encourage local businesses and act as a green market incubator by providing incentives to the business community to adopt a triple bottom line framework.

Comment:

Going electronic is a very simple way to achieve rapid paper savings. Currently, the City's procurement department consumes large amounts of paper as bids and bid responses have to be duplicated that can reach several reams of paper. It will enforce a policy that helps reduce the amount of paper printed.

Action 1.2.1: Implement policy of environmentally preferable purchasing practices.
The City will implement and enforce a policy of environmentally preferable purchasing practices (EPP) to encourage the purchase of recycled, durable and less toxic goods. Best practices guidelines will be used such as the General Services Administration (GSA's Comprehensive Procurement Guidelines).
Status: Continuous Action
Responsible Party: Finance
Timeline: 6-12 months
Metric: EPP Policy
Budget: Staff time (200-1,200 hours)
Benefits: Resource conservation; lead by example
Issues: Cost increase for certain products.
Specific idea: The City will refrain from or discourage purchasing asphalt coatings that are coal tar based. These coatings contain chemicals that can cause cancer. Several cities have banned coal tar based asphalt used in driveways or parkways (City of Austin, Washington D.C.).

Action 1.2.2: Modify the City's procurement process to provide incentives for local businesses to provide sustainability related services.
It is recommended that the City modifies the procurement process to provide incentives for local businesses to provide services that enhance sustainable development in the City. Businesses that perform "greener" than others will be given a preference. It will consider 3rd party certifications as a benchmark such as Energy Star or WaterSense.
Status: Continuous Action
Responsible Party: Finance
Timeline: 1-2 years
Metric: Incentives for green bidders
Budget: Staff time (1,200-4,000 hours)
Benefits: Resource conservation; green economy creation; lead by example
Issues: Clear definition of greener services

Goal 2:	Implement and Enforce Sustainability Policies.
Objective 2.1:	**Implement and Enforce Policies that Encourage Sustainability.**
Action 2.1.1:	Create the City's sustainability mission and a Sustainability Element into the Comprehensive Plan.
Action 2.1.2:	Adopt Energy Disclosure Ordinance.
Action 2.1.3:	Reflect and incorporate sustainability in new and existing policies.
Action 2.1.4:	Consider implementation of standardized energy management such as ISO 50001.

Accomplishments:

- The Sustainability Advisory Board is currently creating a sustainability mission statement.
- There are a number of City internal sustainability policies in place, including but not limited to: recycling of various materials (paper, toner cartridges, cardboard, cans); electronic paper viewing; carpooling and route planning; energy and water conservation.

Comment:

It is an important milestone for the City to create a meaningful and material sustainability mission. Such a statement will help implement targets and track progress over time. The City is currently in the process of developing a long-term vision for the community and it will be paramount to include aspects of sustainable development such as Smart Growth, renewable energy, alternative and efficient modes of transportation.

The City will not only introduce policies that aid sustainability efforts, but enforce existing policies, as well. A comprehensive energy management plan may prove helpful if staff is assigned to this task. The City must not only implement and enforce policies geared towards community efforts, but also educate the community about these initiatives.

Action 2.1.1: Create the City's sustainability mission and a Sustainability Element into the Comprehensive Plan.
The City will create a sustainability mission and a sustainability element into the Comprehensive Plan which will support long-term strategies.
Status: Not started
Responsible Party: City Management
Timeline: < 6 months
Metric: Sustainability mission
Budget: Staff time (<40 hours)
Benefits: Long-term planning tool
Issues: Realistic and achievable mission

Action 2.1.2: Adopt Energy Disclosure Ordinance.
The City will consider adopting an energy disclosure ordinance requiring large commercial buildings to conduct energy audits and publish their annual energy performance. This will provide valuable information about energy performance through benchmarking annual electricity consumption and help increase the understanding of energy conservation. If ordinance is generally followed through, it will engage voluntary energy reporting for residential homes.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Energy Disclosure Ordinance
Budget: Staff time (200-1,200 hours)
Benefits: Energy and cost savings
Issues: Enforceability and resistance of energy disclosure

Example San Francisco Energy Disclosure Ordinance

The City of San Francisco passed a landmark Energy Ordinance requiring owners of commercial buildings to perform energy benchmarking. The San Francisco Existing Commercial Buildings Energy Performance Ordinance requires annual bench marking and energy audits every five years. The owner of every non-residential building in the City must annually file with the Department of the Environment an Annual Energy Benchmark Summary report ("AEBS") for each covered building using ENERGY STAR® Portfolio Manager. The AEBS is based on the assessment in Portfolio Manager of the entire non-residential building and related facilities, and must use 12 continuous months of data ending no earlier than two months prior to submittal to the Department of the Environment. Reference: click here.

Action 2.1.3: Reflect and incorporate sustainability in new and existing policies.
As a standard procedure, all policies will be aligned with the City's long-term sustainability vision. Specific sustainability best practices in the form of a checklist will be developed that review aspects of resource conservation, sustainable transportation or waste management before policy implementation.
Status: Not started
Responsible Party: City Management
Timeline: 6-12 months
Metric: Checklist for policies
Budget: Staff time (200-1,200 hours)
Benefits: Alignment of larger sustainability efforts
Issues: Applicability or feasibility.

Action 2.1.4: Consider implementation of standardized energy management such as ISO 50001.
The City will consider implementation of standardized energy management such as published recently by the International Standard Organization (ISO 50001). A small working group will also research and recommend relevant and proven sustainability management system.
Status: Not started
Responsible Party: City Management
Timeline: 2-5 years
Metric: Energy management standard
Budget: Staff time (200-1,200 hours)
Benefits: Targeted approach to conserve energy and save costs
Issues: Costly implementation

Background ISO 50001 Energy Management Standard

The ISO 50001 standard will provide organizations and companies with a recognized framework for integrating energy efficiency into their management practices. Multi-national organizations will have access to a single, harmonized standard for implementation across the organization with a logical and consistent methodology for identifying and implementing energy efficiency improvements. The standard will also:

- Assist organizations in making better use of their existing energy-consuming assets.
- Offer guidance on benchmarking, measuring, documenting, and reporting energy intensity improvements and their projected impact on reductions in GHG emissions.
- Create transparency and facilitate communication on the management of energy resources.
- Promote energy management best practices and reinforce good energy management behaviors.
- Assist facilities in evaluating and prioritizing the implementation of new energy-efficient technologies.

Reference: click here

Goal 2:	Implement and Enforce Sustainability Policies.
Objective 2.2:	**Promote and Support Sustainability Initiatives.**
Action 2.2.1:	Develop and maintain a website that is solely dedicated to Fort Lauderdale's sustainability.
Action 2.2.2:	Promote Residential Energy Pledge.
Action 2.2.3:	Use demonstration center for education, workshops and outreach activities.

Accomplishments:

- The City is currently developing the City's "Green" webpage which will be launched by the end of 2011.
- The City's Smart Watts program is promoted on the webpage (click here)
- Fort Lauderdale has become a pledge driver for the Energy Star program (click here).
- Holiday Park's Social Center will serve as a demonstration center for energy efficiency and renewable energy after the retrofit (2012).

Comment:

The principles of transparency, participation, collaboration, and accountability have now been accepted and successfully implemented through extensive use of Web 2.0 technology and sophisticated interactive wiki-type websites and cloud computing. Social media including Facebook or Twitter are ubiquitous and powerful tools for outreach and education; however many municipalities fear that using social media may present legal risks as the content on these platforms cannot be controlled.

Promotion and support for sustainability initiatives is an ongoing effort. There are a number of outreach activities, but a more coordinated effort is will help implement Fort Lauderdale's sustainability vision. The City's website will be one of the most important tools in aiding this effort. Other programs that can be incorporated, including the free Energy Star pledge drive, are valuable outreach means.

Action 2.2.1: Develop and maintain sustainability website.
The City will develop and maintain a City "green" website that informs the community about ongoing sustainability programs, projects and initiatives.
Status: Under construction
Responsible Party: City Management
Timeline: < 6 months
Metric: Website publication
Budget: Staff time (200-1,200 hours)
Benefits: Outreach and education
Issues: Continuous maintenance

Action 2.2.2: Promote Residential Energy Pledge.
The City will continue to be a pledge driver on the Energy Star platform.
Status: Continued action
Responsible Party: Public Works
Timeline: < 6 months
Metric: Number of energy pledges
Budget: Staff time (40-200 hours)
Benefits: Outreach and education of residents
Issues: Continuous maintenance

Action 2.2.3: Use center for education, workshops and outreach activities.
The City will use the demonstration center (Social Center at Holiday Park) for education, workshops and outreach activities.
Status: Continued action
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Events
Budget: Staff time (200-1,200 hours)
Benefits: Outreach and education of residents about energy efficiency and renewable energy topics
Issues: Budget for outreach and education

Action 2.2.4: Develop protocols for use of Web 2.0 technologies.
The City Attorney, in conjunction with the Sustainability Advisory Board, will develop protocols which will assure the compatibility of proposed usage of Web 2.0 technologies with the Sunshine Statutes when used by City staff, elected officials, and advisory board members. It is recommended that the City Attorney, in conjunction with Sustainability Board, submit a request to the Attorney General of Florida for an attorney general opinion on the compatibility with the Sunshine Statutes of the above protocols.
Status: Under discussion
Responsible Party: City Attorney
Timeline: < 6 months
Metric: Protocol
Budget: Staff time (200-1,200 hours)
Benefits: Outreach and education of residents about energy efficiency and renewable energy topics
Issues: Legal risks

Action 2.2.5: Implement FTP-type mass storage system.
Consistent with Action 2.4, the City will implement an FTP-type or other mass storage system for use in storing all documents, references, proposals, drafts, and other written materials relevant to the mission of the Sustainability Advisory Board and to the City's sustainability programs and initiatives.
Status: Under discussion
Responsible Party: City Management
Timeline: < 6 months
Metric: FTP site
Budget: Staff time (200-1,200 hours)
Benefits: Increased outreach and education
Issues: Legal risks

Goal 3:	Stimulate Green Local Market.
Objective 3.1:	**Recruit Green Local Workforce.**
Action 3.1.1:	Support Green Training of the Local Workforce.
Action 3.1.2:	Encourage building owners to hire local design and construction professionals.
Action 3.1.3:	Create financial incentive programs.

Accomplishments:

- The City partnered up with a non-profit organization to promote a federally-funded green training program that trains the workforce for weatherization, solar energy and energy auditor jobs.
- The City has partnered up with the Museum of Discovery and Science to promote energy efficiency and renewable energy workshops.
- Through the City's Smart Watts program energy retrofits and solar rebates and loans are offered which require the use of contractors.

The City of Fort Lauderdale has started a unique financial incentives program – Smart Watts Rebates and Loans. The City hopes to vitalize the green job market with this program by encouraging residents and small businesses to retrofit buildings. It is hoped that this pilot program can be turned into a long-term effort that will encourage energy conservation and create green jobs. The City will consider discussing long-term financial aspects with local or regional financial institutions and create a larger scale program.

Comment:

Financial incentive programs with public and private partners are promising to deliver good results in energy conservation and the creation of local green jobs. City and county governments have the option of funding the cost of solar equipment installation upfront for consumers via bonds. The money will be repaid by a property tax placed on the homeowners or businesses that installed the system. Several communities in Florida are currently implementing similar programs. The City is considerting to reach out to financial partners in order to create a long-term program based on the Smart Watts pilot.

Action 3.1.1: Support Green Training of the Local Workforce.
The City will continue to support green training of the local workforce with partnerships similar to the existing partnership with the OIC of Broward.
Status: Continued action
Responsible Party: City Management
Timeline: 1-2 years
Metric: N/A
Budget: Staff time (200-1,200 hours)
Benefits: Create new employment opportunities, vitalize the economy
Issues: Definition of "green" training

OIC of Broward Green Training

The Opportunities Industrialization Center (OIC) of Broward Green Jobs Training Scholarship Program was funded by two grants through the American Recovery and Reinvestment Act (ARRA). The local purpose of these two grants, "Pathways" and "Energy Training Partnership" is to create new jobs and save existing ones by offering updated skills and certifications in the energy efficiency and solar power industries. Vocational training and basic education at Broward Technical Centers is paired with OIC of Broward County Employability skills training and support services. This free training is offered until early 2012. Reference: click here.

Action 3.1.2: Encourage building owners to hire local design and construction professionals.
The City will encourage building owners to hire local design and construction professionals, particularly those with specialized training or expertise in sustainable design and construction.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: N/A
Budget: Staff time (1,200-4,000 hours)
Benefits: Encourage sustainable building design and construction
Issues: Available local companies

Action 3.1.3: Create financial incentive programs.
The City will create long-term program supporting resource conservation and environmental best practices. Particularly, Property Assessed Community Energy (PACE) programs will be considered.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Financial incentive program
Budget: Staff time (1,200-4,000 hours)
Benefits: Encourage sustainable building design and construction
Issues: Available local companies

Example Port St. Lucie SELF Loan Program

Port St. Lucie local leaders decided that low-interest loans would be the best way to defray up-front costs of residential solar and energy efficiency. But St. Lucie County lacked both the legal authority and the practical financial expertise to be able to make the loans. So they formed the Solar and Energy Loan Fund (SELF) as a separate, not-for-profit entity, and put it on a path to becoming certified by the U.S. Treasury Department as a Community Development Financial Institution (CDFI). Forming a nonprofit also allowed the funds to revolve, so that loan repayments could then be re-loaned, creating a sustainable program. SELF needed to attract capital to be able to make the loans, and for that it needed buy-in from some of the local banks. SELF is using the federal money to make the first loans, which will allow the organization to demonstrate its lending capability and complete the process of earning CDFI distinction. Once SELF is awarded CDFI status, it will have access to a committed pool of public and private monies—from financial partners including PNC, SunTrust, Oculina Banks, and IBM/PGA Credit Union—worth $20 million. Applications for the 4% interest loans have already begun rolling in. The average loan request is around $8,000, and as of March, 2011, the program has received 139 application requests, and completed 27 energy audits—with 8 more scheduled—for residents who have already been approved for underwriting. There has also been some interest from commercial property owners, and SELF is considering expanding the program to serve the business community.

Reference: click here.

Goal 4:	Prepare for Climate Change Impacts.
Objective 4.1:	**Plan for climate adaptation and mitigation.**
Action 4.1.1:	Utilize existing planning strategies and include adaptation strategies into the City's plans.
Action 4.1.2:	Enhance communication about climate change adaptation in coordination with other agencies and municipalities.
Action 4.1.3:	Partner with local, regional and state agencies or educational institutions to increase preparedness.

Accomplishments:

- The City of Fort Lauderdale has an established emergency management system.
- The Community Rating System (CRS) Coordinator and its Building Official acts as a Floodplain Manager.
- Fort Lauderdale is also part of FEMA's National Flood Insurance Program (NFIP).
- Other adaptive measures include beach nourishment, vegetation management, and barriers to water intrusion.

Municipalities have the potential to plan for events that they cannot exert control over, such as improving hurricane preparedness of a community. A holistic, multi-disciplinary effort will tie in adaptation planning with mitigation strategies. The adaptation goal is to prepare the City for climate change impacts, utilizing existing planning strategies and include adaptation strategies into the City's plans.

Comment:

Fort Lauderdale is located in a region that knows the value of preparedness. It is critical that the City utilize the region's preparedness doctrine for the risks associated with climate change. The Sustainability Action Plan can be used as a tool to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies.

Action 4.1.1: Include adaptation strategies into the City's plans.
The City is recommended to include adaptation strategies into the City's plans. A systematic approach will be applied that includes identification of areas vulnerable to sea level rise, looking at multi-disciplinary sectors (transportation, water, sewage etc) followed by developing targeted adaptation strategies.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Adaptation strategies
Budget: Staff time (1,200-4,000 hours)
Benefits: Climate change preparedness
Issues: Costly initiatives

Action 4.1.2: Enhance communication about climate change adaptation in coordination with other agencies and municipalities.
The City will enhance communication about climate change adaptation in coordination with other agencies and municipalities.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: TBD
Budget: Staff time (1,200-4,000 hours)
Benefits: Regional approach
Issues: Bureaucratic barriers.

Action 4.1.3: Partner with local, regional and state agencies or educational institutions to increase preparedness.
The City will partner with local, regional and state agencies or educational institutions to increase preparedness.
Status: Not started
Responsible Party: City Management
Timeline: 2-5 years
Metric: Partnerships
Budget: Staff time (1,200-4,000 hours)
Benefits: Regional approach
Issues: Bureaucratic barriers

CHAPTER 2: AIR QUALITY

Goal 1:	Reduce GHG Emissions by 20% below 2010 levels by 2020.
Objective 1.1:	**Reduce GHG emissions from City operations by 20% below 2010 levels by 2020.**
Action 1.1.1:	Lobby for greenhouse gas emission targets at regional and state level.
Action 1.1.2:	Assign and train staff to report annual GHG inventory.
Action 1.1.3:	Incorporate GHG emission reductions into decision-making process.

Accomplishments:

- City produced GHG inventories for ICLEI reporting purposes since 2008.
- Since 2010, over 2,700 tons of greenhouse gas emissions per year (4%) have been avoided (mainly through EECBG projects).

The majority of greenhouse gas emissions stem from the combustion of fuels and electricity usage and therefore these areas must be targeted. City staff will be trained and tasked to monitor emissions. Any budgetary decision must incorporate climate change risk assessments in order to reduce greenhouse gas emissions. Projects, programs or activities that result in significant greenhouse gas emissions should be avoided if fiscally responsible.

Comment:

The Sustainability Advisory Board recommends that setting a GHG reduction goal serves as a public statement in that the City of Fort Lauderdale is serious about climate change mitigation and keeping the air clean for its citizens. By setting a goal, the City can better monitor its progress against a reasonable and attainable limit that can then be used as an example for other cities to follow.

Info: 20% reduction of GHG emissions equals:

- 1,454 tons[1] reduction per year in order to reach 58,164 tons by 2020.
- 4% reduction from 1990 levels by 2012 (Kyoto Protocol: 7% below 1990 by 2012)
- 6% reduction from 1997 levels (Broward County goal: 7% below 1997 by 2015).

[1] Tons refer to metric tons of carbon dioxide equivalent.

Background:

Reducing GHG emissions from City operations by 20% below 2010 levels by 2020 equals a total reduction of 14,541 tons compared to "business as usual", i.e. no action taken (see **Figure A.1**). The majority of GHG emissions result from electricity and fuel usage and therefore a major focus must be placed to reduce this consumption.

The Energy and Transportation Chapters discuss specific steps the City must take to reduce energy consumption through reductions in electricity and fuel.

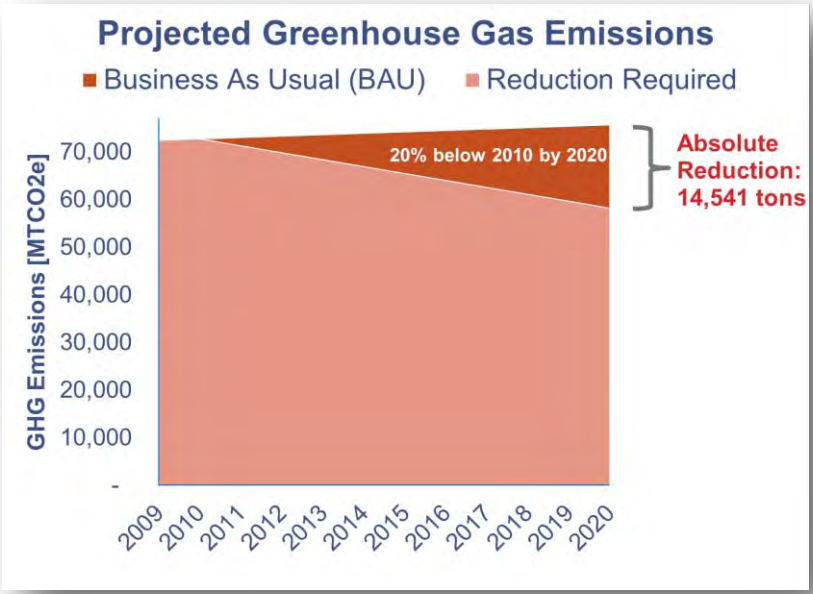


Figure A.1: Projected greenhouse gas emissions from 2009 until 2020 and the recommended reduction target.

Table A.1: This achievement matrix shows annual emission reductions to reach a 20% reduction below 2010 by 2020. Also shown are reduction projects underway which account for 2.3% through electricity and fuel reductions.

GHG Emissions City Operations			
Goal Year Target: 20% emission reduction below 2010 by 2020.			
Base year: 2010	Goal year: 2020		Unit: [MTCO2e]
Business As Usual (BAU)	**Base Year**	**Year 2**	**Goal Year BAU**
	2010	2011	2020
City Operations [MTCO2e]	72,705	73,002	75,678
Change from Base Year	0%	0.4%	4.09%
GOAL: 20% below 2010 by 2020.	**Base Year**	**Year 2**	**Goal Year Target**
	2010	2011	2020
City Operations [MTCO2e]	72,705	71,251	58,164
Absolute Reduction	-	1,751	17,514
Change from BAU	0.0%	**-2.0%**	**-20.0%**
Reductions underway:		-2.3%	-2.3%
% Short of goal:		**0.3%**	**-17.7%**

Table A.1 provides an overview of annual GHG reductions necessary to achieve a 20% reduction below 2010 by 2020. For 2011, approximately 0.3% reductions are still needed to achieve the 2% goal. The City assessed greenhouse gas emissions associated with City-wide activities. Emissions rose by 297 MTCO2e from 2009 to 2010 resulting in over 72,700 tons. Water and wastewater treatment along with the operation of buildings constituted the largest part of the emissions (**Figure A.2**).

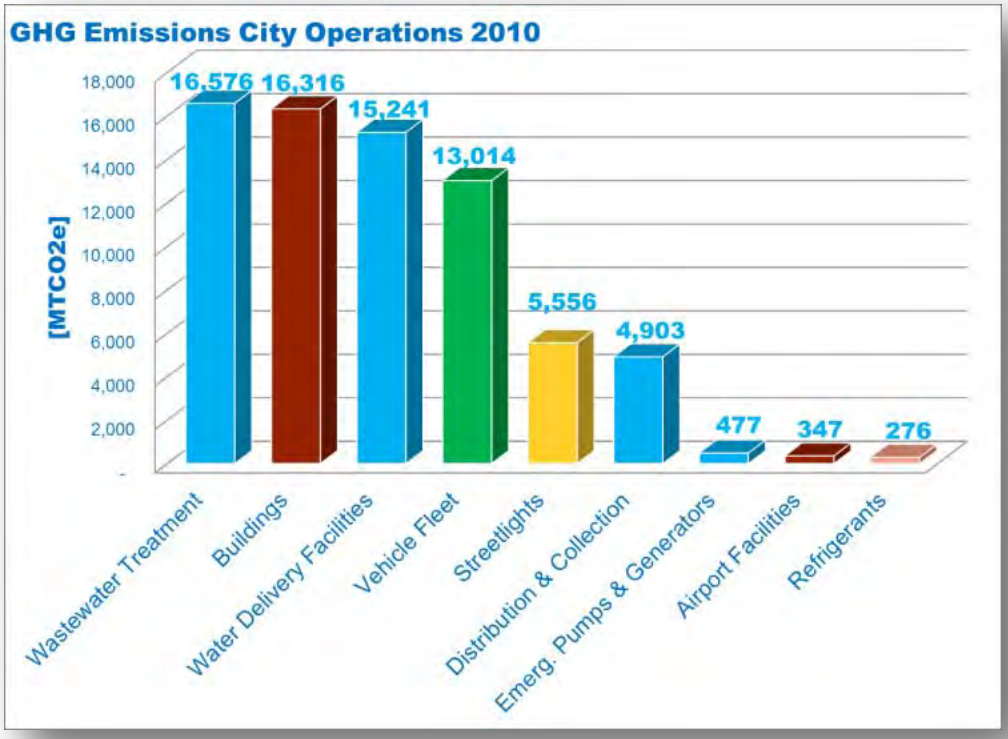


Figure A.2: GHG emissions by sector. Blue: water/wastewater processes; red: electricity usage in facilities; green: fleet fuel consumption; pink: refrigerants.

Note:

- Electricity consumption makes up the largest portion of the City's greenhouse gas inventory; therefore it will be mandatory to target all activities that can reduce electricity usage within the City.
- Water and wastewater treatment processes use large amounts of electricity; targeting water conservation actions will help reduce electricity and emissions.
- The Energy, Water and Transportation Chapters discuss the majority of GHG reduction projects.

Action 1.1.1: Lobby for greenhouse gas emission targets at regional and state level.
The City will communicate its commitment to reduce greenhouse gas emissions to regional and state agencies.
Status: Not started
Responsible Party: City Management
Timeline: 1 year
Metric: N/A
Budget Required: Staff time (40-200 hours)
Benefits: Greenhouse gas targets will support general energy consumption reduction and thus achieve cost savings.
Issues: Increased collaboration

Action 1.1.2: Assign and train staff to report annual GHG inventory.
The City's greenhouse gas inventory will be reported at minimum on an annual basis. In succeeding years, it will be necessary to assign and train personnel to regularly collect, analyze and present greenhouse gas emission trends.
Status: Not started
Responsible Party: Public Works
Timeline: 1 year
Metric: Staff assignment
Budget Required: Staff time (<40 hours)
Benefits: Responsible staff member can also identify reduction project leading to energy savings.
Issues: Funding

Action 1.1.3: Incorporate GHG emissions into decision-making process.
The City's management is encouraged to account for greenhouse gas emissions when making decisions related to procurement, capital improvements, programs, events and long-term planning. Activities involving energy consumption, transportation or development will result in greenhouse gas emissions. It is prudent to take this into consideration, particularly when approving large scale projects.
Responsible Party: City Management
Status: Not started
Timeline: Immediate
Metric: N/A
Budget Required: Staff time (40-200 hours)
Benefits: Responsible staff member can also identify reduction project leading to energy savings.
Issues: Staff training

Goal 1:	Reduce GHG Emissions by 20% below 2010 levels by 2020.
Objective 1.2:	**Reduce GHG emissions from community operations by 20% below 2010 levels by 2020.**
Action 1.1.1:	Create climate change challenge program.
Action 1.1.2:	Assess lifecycle emissions.

Accomplishments:

- The City assessed the community's greenhouse gas inventory for the years 2007 to 2010.
- Energy program Smart Watts successfully launched in April 2011 for residents and small businesses.
- Smart Watts workshops educate residents about sustainability and climate change.

GHG emissions result mainly from fuel and electricity usage. Therefore, a focus on opportunities to reduce this consumption is necessary. The Energy Chapter discusses specific steps that will help the community reduce energy consumption. Additionally, the Outreach Chapter recommends specific actions to educate residents about climate change and sustainability aspects within the community.

Info: Setting a 20% reduction of greenhouse gas emissions results in:

- Reduction requirements of at least 56,555 tons each year.
- 565,549 tons of greenhouse gases reduced by 2020.

Background:

The City assessed greenhouse gas emissions associated with community-wide activities. To achieve a 20% reduction in community greenhouse gas emissions by 2020, over 560,000 tons of emissions must be avoided (**Figure A.3**). Emissions resulting from electricity usage amount to approximately 58% of the entire greenhouse gas inventory. **Figure A.4** shows a break-down of individual electricity sectors and their respective emissions. The commercial sector fell from just over 1 million tons to about 0.95 million tons emission from 2007 until 2010. A similar trend can be observed in the industrial sectors.

This is attributed to the economic recession significantly slowed down all business operations. Over the same time span residential emissions have increased, from 657,238 tons to 658,930 tons in 2010. Initiatives to reduce electricity consumption are the main tool to lower greenhouse gas emissions.

As it becomes evident from **Figure A.4** the commercial and residential sector are top targets. With the implementation of the Smart Watts program, the City has taken an important step to educate and incentivize the community about climate change mitigation through energy conservation. By providing practical low-to-no cost behavioral changes and a "toolkit" to jump-start residential energy savings, residents are being empowered to make a positive impact on the future of our city.

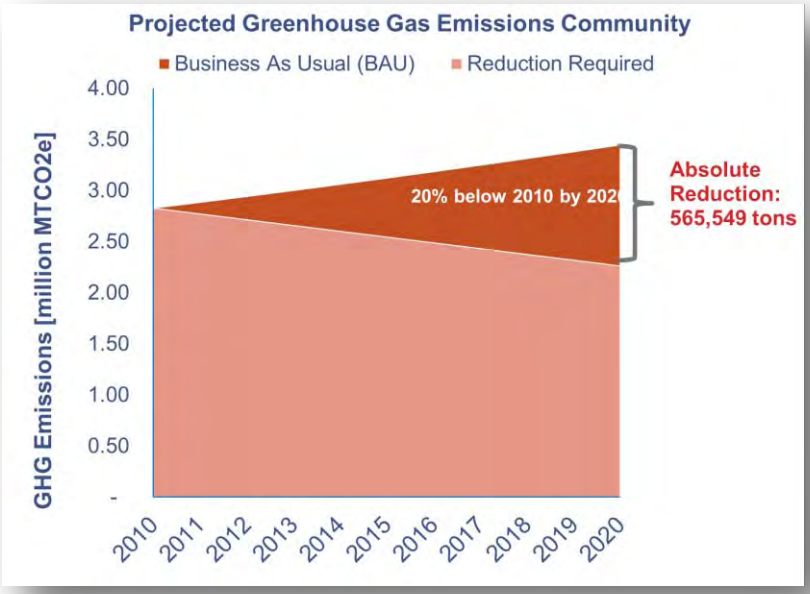


Figure A.3: Projected greenhouse gas emissions from 2010 until 2020stemming from community activities.

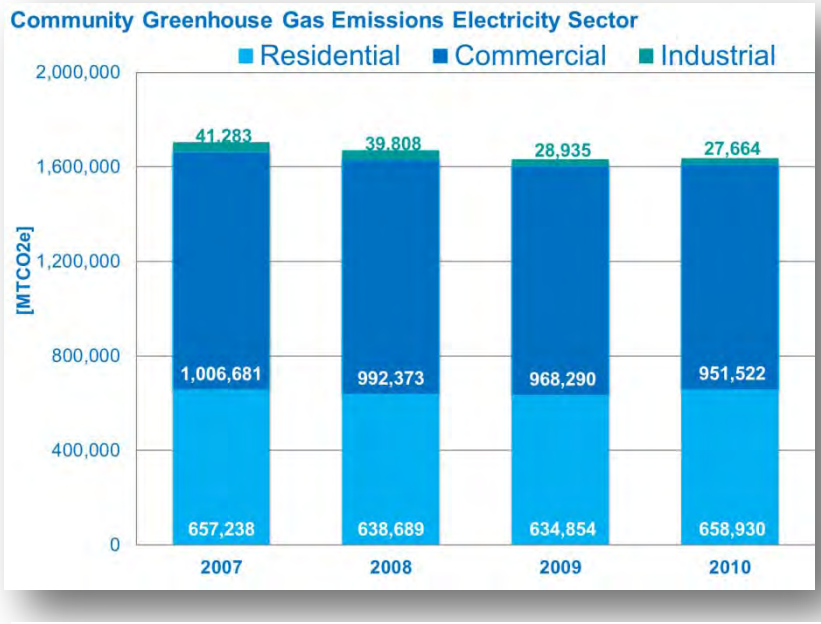
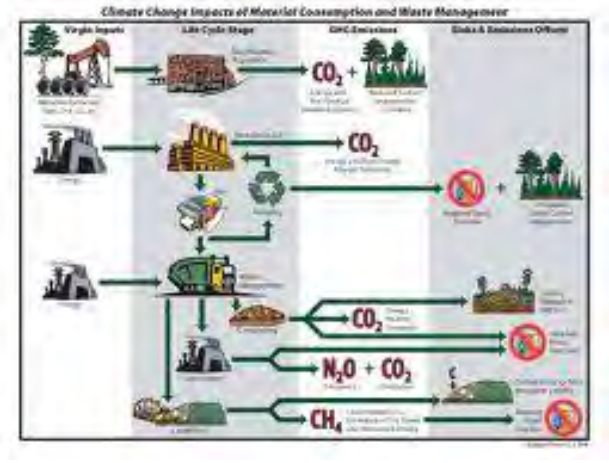


Figure A.4: Greenhouse gas emission in the electricity sector for 2007 to 2010.

Action 1.2.1: Create climate change challenge program
The City will create a climate change challenge program for the community or increase their participation in the regional Climate Change Compact. This program can help set climate change mitigation goals such as reducing greenhouse gases in specific sectors by a certain timeframe. The program could be part of a larger framework and integrate with similar programs such as Smart Watts.
Status: Not started
Timeline: 2 years
Metric: Challenge Program
Budget Required: Staff time (40-200 hours)
Responsible Party: Public Works
Benefits: Increase awareness of climate change issues.
Issues: Staff time



Action 1.2.2: Assess lifecycle emissions.
The City will undertake a more comprehensive assessment of the community greenhouse gas inventory. The City has been provided with a geo-political community greenhouse gas inventory for 2010. This approach is generally limited and does not take into account the wider context of relevant emission sources resulting from upstream or downstream, trans-boundaries, embodied or end-of-lifecycle emissions. Community activities are more complex than operations within a municipality. Many emissions are generated across geo-political boundaries including, for example, waste management or commuting activities. A new protocol is currently being developed by ICLEI which provides guidance to account for activities that go beyond the geo-political boundary.
Status: Not started
Timeline: 1 year
Metric: Technical report
Budget Required: Staff time (1,200 – 4,000 hours)
Responsible Party: Public Works
Benefits: This assessment is useful to help prioritize action items for community wide greenhouse gas reduction programs.
Issues: Funding

Goal 2:	Improve Air Quality in Other Sectors.
Objective 2.1:	**Improve offshore air quality.**
Action 2.1.1:	Advocate for a statewide ban of onboard incinerations on cruise ships.

Implementation:

The City staff and/or Sustainability Advisory Board members will research applicability of this action and determine which ships should be regulated, if feasible and what opportunities exist to avoid onboard incineration.

Comment:

The Sustainability Advisory Board stated that air emissions from the shipping and cruise ship industries are a result of incinerators and ship engines. Cruise ship incinerators burn a variety of wastes, including hazardous wastes, oil, oily sludge, sewage sludge, medical and bio-hazardous waste, outdated pharmaceuticals and other solid wastes such as plastics, paper, metal, glass and food (California Cruise Ship Environmental Task Force, 2003). The emissions from onboard incineration and its ash can include furans and dioxins, both found to be carcinogenic, as well as nitrogen oxide, sulfur oxide, carbon monoxide, carbon dioxide, particulate matter, hydrogen chloride, toxic and heavy metals such as lead, cadmium and mercury, and hydrocarbons (Bluewater Network, 2000). There are currently no national standards limiting emissions from ship incineration. The City of Fort Lauderdale can advocate for stricter regulations of shipping incineration and prohibit incineration within 20 miles off the coast of Florida.

Background:

Currently, the Port Everglades Tariff rules that "there shall be no shipboard incineration of materials while in Port Everglades." The Environmental Projects Manager of Broward County – also responsible for Port Everglades – stated that there are international maritime specifications that cover the design, manufacture, performance, operation and testing of incinerators designed to incinerate garbage and other shipboard waste similar to upland waste-to-energy plant requirements. Cruise lines have committed to reduce the production of incinerator ash by minimizing generation of waste and maximizing recycling opportunities and the discharge of incinerator ash containing hazardous components is prevented through a program of waste segregation and ash testing. Additionally, most if not all cruise lines have policies in place that prohibit incineration within 10-12 nautical miles from any land.

CHAPTER 3: ENERGY

Goal 1:	Reduce Electricity Usage by 20% below 2010 levels by 2020.
Objective 1.1:	**Reduce Electricity Usage of City Operations by 20% below 2010 levels by 2020.**
Action 1.1.1:	Implement Energy Manager no cost/low cost recommendations.
Action 1.1.2:	Reduce energy use in City buildings by 20% by 2020.
Action 1.1.3:	Integrate electricity reduction goal into Capital Improvement Plan.

Accomplishments:

- Energy Manager has conducted several interviews, walkthrough audits and provided a detailed analysis of top priority projects in the Energy Reduction Strategy.
- The City completed energy projects including water pump upgrades, chiller replacement City Hall, software to turn off PCs; and an energy audit of the Social Center.

The City will implement all no-cost projects and to prioritize the low, medium and high cost projects. In order to realize the ambitious reductions in electricity usage, the City must have in place a solid funding plan that will assure capital project improvements to reach the ambitious electricity reduction goals.

Comment:

The City Commission and the Sustainability Advisory Board will recommend all energy conservation measures identified by the Energy Manager for implementation. As the majority of these recommendations represent low cost/no cost opportunities, this is seen as a good opportunity to reduce electricity consumption and positively influence behavior internally while achieving annual savings.

Info: 20% reduction of electricity usage below 2010 levels by 2020 equals (Figure E.1):

- 16% reduction in GHG emissions or reduction of 11,788 MTCO2e.
- 81% of GHG emission goal.
- 21 million kWh avoided.
- $2.1 million in electricity cost savings.

Background:

Figure E.1 and **Table E.1** provide an overview of annual electricity reductions necessary to achieve a 20% reduction below 2010 levels by 2020. For 2011, the City must still reduce usage by approximately 2.2% to achieve the 4.6% goal. The table provides a path to achieve the required electricity reduction commitments.

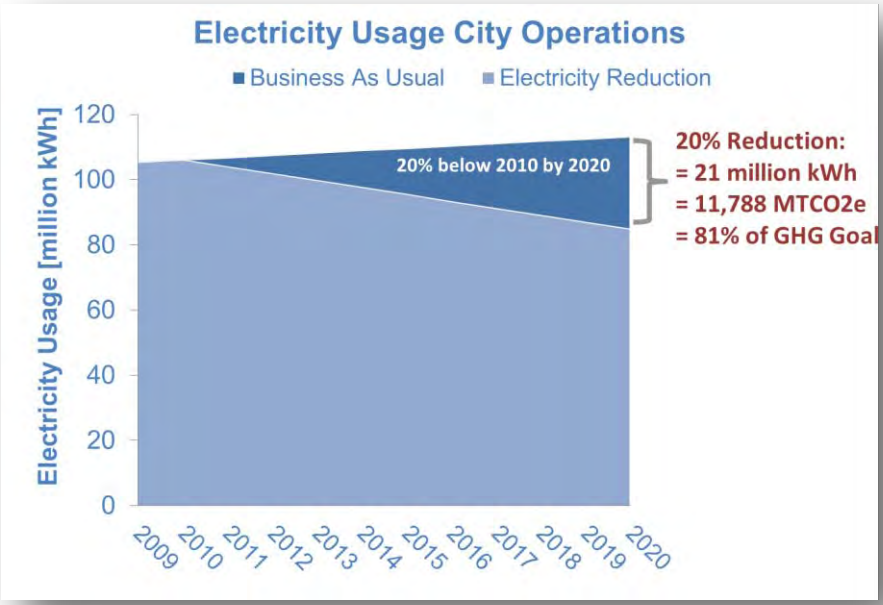


Figure E.1: Electricity Usage City Operations. Shown is the City's electricity usage from 2009 with a projection to 2020 with and without reductions (business as usual).

Table E.1: This achievement matrix shows annual electricity reductions to reach a 20% reduction goal below 2010 by 2020. Also shown are 2011 energy conservation measures.

Electricity Demand City Operations						
Goal Year Target: 20% Electricity Reduction below 2010 by 2020.						
Base Year: 2010	Goal Year: 2020	Unit: million kilowatt hours [mkWh]				
BUSINESS AS USUAL	**Base Year**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Goal Year**
	2010	2011	2012	2013	2014	2020
City Ops. [mkWh]	106	107	107	108	109	113
Change from Base Year	0.0%	0.7%	1.3%	2.0%	2.7%	6.7%
GOAL: 20% REDUCTION	**Base Year**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Goal Year**
	2010	2011	2012	2013	2014	2020
City Ops. Target [mkWh]	106	104	102	100	98	85
Change from BAU	0.0%	-2.7%	-5.3%	-7.9%	-10.4%	-20.0%
	Goal	**-2.7%**	**-5.3%**	**-7.9%**	**-10.4%**	**-20.0%**
	% SHORT OF GOAL:	**-0.3%**	**-2.9%**	**-5.5%**	**-8.0%**	**-17.6%**
Specific projects 2011:		**-2.4%**	**-2.4%**	**-2.4%**	**-2.4%**	**-2.4%**
Pump Upgrade	completed	0.7%	0.7%	0.7%	0.7%	0.7%
Software	completed	0.2%	0.2%	0.2%	0.2%	0.2%
City Hall Chiller	completed	0.2%	0.2%	0.2%	0.2%	0.2%
Energy Manager	started	1.0%	1.0%	1.0%	1.0%	1.0%
Demo. Center	started	0.2%	0.2%	0.2%	0.2%	0.2%

In 2011, for example, approximately 2.4% of the 2.7% goal has been achieved. This was accomplished by completing several retrofit and upgrade projects. Note, that some of these initiatives are still underway and actual achievements may change.

The City's major electricity consumers are buildings and water/wastewater treatment processes. **Table E.2** outlines the top 5 electricity consumers for each sector.

Data shows that, in order to reduce electricity consumption, a major focus must be placed on some or all of these facilities and activities. Each sector requires a different approach; in fact each facility must be looked at individually. Low cost and no cost improvements can be implemented to some extent and top priority projects are suggested in the Energy Manager's Energy Reduction Strategy provided to City staff. However, it will take continued commitment to achieve the goals outlined in this SAP update.

Table E.2: Top 5 City energy users for buildings and water treatment facilities.

Top 5 Energy Users in 2010 (Buildings)					
No.	**Building/Facility**	**Department**	**kWh**	**% of Total**	**Billing**
1	Police Headquarters	Police	4,990,533	5%	$388,342
2	City Hall	Public Services	3,360,000	3%	$260,442
3	City Parking Garage (downtown)	Parking and Fleet	2,040,480	2%	$157,214
4	Internat. Swim. Hall of Fame (ISHOF)	Business Enterprises	2,004,880	2%	$171,517
5	Holiday Park, War Memorial Office	Parking and Recreation	1,190,933	1%	$117,093
		Totals	**13,586,827**	**13%**	**$1,094,608**

Top 5 Energy Users in 2010 (Water/Wastewater Facilities)					
No.	**Facility**	**Address**	**kWh**	**% of Total**	**Billing**
1	GTL Wastewater Treatment Plant	1500 SE 18TH ST	27,413,333	26%	$2,167,761
2	Fiveash Water Treatment Plant	4301 NW 9TH Ave	20,505,493	19%	$1,582,451
3	Fiveash Wellfields	3401/3501 W Prospect F	5,457,307	5%	$449,201
4	Fiveash Generator & Wellfield	5050 W Broward Blvd	2,829,120	3%	$221,245
5	Distribution and Collection	4000 NE 25TH Ave	1,624,533	2%	$170,079
		Totals:	**57,829,787**	**55%**	**$4,590,737**

Action 1.1.1: Implement No Cost/Low Cost Recommendations from Energy Manager Priority Project List.
The Energy Manager provided a list of high priority projects that were geared towards no cost/low cost energy conservation measures (ECMs). The City will implement these measures immediately.
Status: Not started
Responsible Party: City Management
Timeline: <6 months
Metric: Electricity reduction [kWh]
Budget: Staff time (40-200 hours)
Benefits: Cost savings
Issues: Enforcement of behavior.

Action 1.1.2: Reduce Electricity Use in City Buildings by 20% by 2020.
The City will aim for a 20% reduction in electricity usage by 2020. The top five energy users for the building sector are described in **Table E.2**; these buildings will be targeted first.
Status: Started
Responsible Party: City Management
Timeline: 6-12 months
Metric: Electricity consumption of buildings
Budget: Costs to retrofit 10% of City buildings is estimated $1.50 per square foot (DOE); total space (1,176,489 sqft); staff time (200-1,200 hours)
Benefits: 10% energy reduction results in annual savings of $290,000 per year. Increased comfort within the buildings.
Issues: Funding.

Action 1.1.3: Integrate electricity reduction goal into Capital Improvement Plan (CIP).
In order to achieve the electricity reduction goal of 20% below 2010 baseline by 2020, the City will integrate the goal into the Capital Improvement Plan. This plan will focus on capital improvement projects that will reduce the electricity consumption such as retrofits for City buildings and upgrades to water treatment processes. These two sectors have been identified as the largest energy consumers. The Energy Manager report and the City's Capital Improvement Program will be vital documents to provide details about project prioritization.
Status: Not started
Responsible Party: City Management
Timeline: 6-12 months
Metric: Funding plan
Budget: Staff time (200-1,200 hours)
Benefits: Annual cost savings
Issues: Future Funding
References: Energy Manager ECM report; Capital Improvement Program (link can be found here)

Goal 1: Reduce Electricity Usage by 20% below 2010 levels by 2020.

Objective 1.2:	**Reduce community electricity usage by 20% below 2010 levels by 2020.**
Action 1.2.1:	Evaluate data from Smart Watts program.
Action 1.2.2:	Reach out to financial partners.
Action 1.2.3:	Devise community energy strategy.

Accomplishments:

- Smart Watts incentives - launched in April 2011 - are available to residents and small businesses.
- Over $500,000 in Smart Watts rebates and loans are offered.
- Smart Watts loans provide financial incentives to retrofit residential and commercial buildings.

The City must reach out to community partners for leveraged financing and establish a long-term program. Smart Watts is an excellent pilot program that currently collects feedback and utility data from residents; this data can be used to evaluate the potential development of a long-term program alongside a custom-tailored community energy strategy.

Comment:

Providing financial incentives beyond the initial Smart Watts program is necessary. This could be accomplished using the Smart Watts revolving loan program as seed capital to create a sustainable energy program funding mechanism. It will be paramount to reach out to community partners before the end of the Smart Watts program.

Info: As a guideline, reducing electricity consumption in residential homes and commercial buildings by 20% will result in:

- Total cost savings for residents and businesses of over $23 million and $34 million each year, respectively (at 10 cents per kilowatt hour).
- Total of over 322,000 tons greenhouse gases avoided each year.

Background:

The Home Energy Saver Workshop program is one of three Smart Watts programs offered by the City of Fort Lauderdale to reduce electricity and natural gas consumption and improve energy conservation. In addition to the workshops, Smart Watts includes an Energy Efficiency Rebate Program and a Homeowner Energy Efficiency Loan Program. Information about these City programs is available here: http://www.fortlauderdale.gov/smartwatts/.

Action 1.2.1: Evaluate Data and Findings from the Smart Watts Program.
The Smart Watts program facilitates the collection of valuable data from surveys and evaluates recommendations from workshop participants, amongst others. It will be beneficial to use this data to establish how the program could be continued in the future based on current demand.
Status: Started
Responsible Party: Public Works
Timeline: <6 months
Metric: Evaluations
Budget: Staff time (40-200 hours)
Benefits: Analysis will provide robust foundation for a mature energy program. The City's community will benefit from increased energy reductions, cost savings and leading by example.
Issues: Personnel availability

Action 1.2.2: Reach out to financial partners.
The City will reach out to financial institutions in the community to assess options to expand the current Smart Watts loan program. This will include partnering up with neighboring municipalities who have implemented a similar program.
Status: Not started
Responsible Party: City Management
Timeline: <6 months
Metric: Meetings
Budget: Staff time (200-1,200 hours)
Benefits: Energy savings; increased grant opportunities
Issues: Feasibility and willingness to create public-private partnerships

Case Study Successful Revolving Loan Programs:

Austin utility energy's energy efficiency programs and offerings date back to 1982. Combined, they have saved more electricity than the annual output of a 500 megawatt power plant. The program offers low interest loans that are unsecured and do not require a lien on the property. These loans can cover costs for installation of energy efficient upgrades (HVAC systems), weatherization and insulation measures. Note that Austin owns their electric company which helps to implement programs like these.
Reference: click here.

Action 1.2.3: Devise Community Energy Strategy.
A detailed community strategy that outlines specific actions will help to pave the road to a more sustainable city. Energy virtually affects every aspect of life and energy conservation will directly lead to cost savings. The strategy will also help to better position the City to capitalize on future grant opportunities. The City will also include an outreach plan to include other partners such as FPL, TECO or planning councils and agencies.
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Strategy document
Budget: Staff time (200-1,200 hours)
Benefits: Cost savings for residents and businesses; more grant opportunities.
Issues: Funding and time to develop strategy

Case Study Community Energy Strategy:

The City of Salem, OR focus is on community-wide energy conservation efforts revolves around five broad goals. The Community Energy Strategy was developed with input from the community and assistance from representatives of Salem-Keizer Transit, Willamette University, State of Oregon Department of Administrative Services, SEDCOR (Salem's Economic Development Corporation), Oregon Energy Trust, Portland General Electric and some of Salem's largest employers. Example activities include:

- Develop and capitalize a loan fund to provide up front financing for energy efficient lighting upgrades in existing commercial buildings after completing energy audits.
- Develop an energy efficiency awareness campaign to promote energy savings programs and disseminate information about Salem's energy use (tell Salem's story).
- Develop a website to serve as a clearinghouse of information about energy programs, projects, policy and incentives.
- Complete the final Community Energy Strategy report and conduct outreach to raise awareness (includes hosting annual event).

Reference: click here.

Goal 2:	Source 20% Electricity from Renewable Energy by 2020.
Objective 2.1:	**Set Annual Goal for Renewable Energy.**
Action 2.1.1:	Assess current use of solar powered systems and set goal for community.
Action 2.1.2:	Create annual budget for solar powered applications.
Action 2.1.3:	Revise regulations to encourage installation of wind powered systems.
Action 2.1.4:	Test reliability of renewable energy systems.

Accomplishments:

- Fort Lauderdale residents received 135 solar rebates through the Florida Solar Rebate Program[1] (18 residential solar pool heaters, 88 residential solar hot water, and 29 solar photovoltaic installations).
- Installation of donated five kilowatt photovoltaic power supply system at the Beach Community Center.
- One wind turbine installation; one planned wind turbine project.

The City will set an ambitious goal for renewable energy such as solar or wind powered systems for both City operations and community applications. Current barriers will be removed such as uncertain and unclear ordinances or regulations that prolong permit applications.

Financing mechanisms must be explored that will expedite the distribution of renewable energy systems.

Comment:

A recent wind turbine permit application has been submitted to the City and is currently under consideration by the City Commission. Several advisory boards, including the Sustainability Advisory Board have been asked to make a recommendation. The board decided to make a motion for the City to accept the permit application in June 2011. It is hoped that this precedence will help pave the way for increased deployment of renewable energy systems, particularly small wind applications. Vertical smaller wind turbines are safe for fauna and relaxing to watch.

[1] Broward County solar maps (May 2011): http://www.broward.org/NaturalResources/ClimateChange/Documents/Broward_Solar_ADA.pdf

Action 2.1.1: Assess Current Use of Solar Powered Systems and Set Goal for Community.
The City will assess the current use of solar powered systems for both city operations and the community. The analysis will be used to set an ambitious goal for renewable energy in Fort Lauderdale's community.
Status: Not started
Responsible Party: Public Works
Timeline: <6 months
Metric: Installed capacity [kWh]
Budget: Staff time (200-1,200 hours)
Benefits: The goal setting process will help to devise a renewable energy strategy and encourage deployment of renewable energy systems.
Issues: Data availability; financing of renewable energy systems.

Action 2.1.2: Create Annual Budget for Solar Powered Applications.
The City will set aside a minimum annual budget for solar powered applications for city operations.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Budget for solar projects
Budget: TBD (costs for 2-kW system about $16,000 to $20,000; some areas sell 4-kW systems for the same price after rebates (Department of Energy, see case study); staff time (200-1,200 hours)
Benefits: Energy and cost savings; lead by example
Issues: Typically low ROI due to costly installations.

Case Study Value and Cost of Solar Electricity:

The Department of Energy reports that home value increases $20 for every $1 reduction in annual utility bills. A solar energy system that saves $200 per year would also add $4,000 to the value of a home. In a recent survey, 8 of 10 Americans want builders to offer solar power as an option for new homes. Half of those surveyed said they would pay up to 10% more for a solar-equipped house. Solar electric system cost varies depending on many factors, including system size/rating, roof-integrated system or system mounted on top of an existing roof, manufacturer, retailer and installer. A 2-kW system, which will offset the electricity needs of an energy efficient home, will cost about $8 to $10 per watt. Reference: click here.

Action 2.1.3: Revise regulations to encourage installation of wind powered systems.
The City will revise current land use regulation and generally encourage the installation of wind powered systems. Stakeholder groups will be consulted and concerns considered.
Status: Not started
Responsible Party: City Management
Timeline: <6 months
Metric: Revisions
Budget: Depends on system size and design; staff time (200-1,200 hours)
Benefits: Energy and cost savings
Issues: Typically ROI due to costly installations

Action 2.1.4: Test reliability of renewable energy systems.
The City will test the capacity of back-up solar and wind electricity generating systems with battery storage capacity to power critical facilities in Fort Lauderdale during both normal and disaster situations.
Status: Not started
Responsible Party: City Management
Timeline: 2-5 years
Metric: Reliability tests
Budget: Staff time (200-1,200 hours)
Benefits: Energy independence
Issues: Few renewable energy systems installed yet.

Goal 2:	Source 20% Electricity from Renewable Energy by 2020.
Objective 2.2:	**Create renewable energy incentives for residential and commercial buildings.**
Action 2.2.1:	Expand financial incentives for renewable energy systems.
Action 2.1.2:	Encourage real estate listings of renewable energy systems.

Accomplishments:

- The Smart Watts rebates and loans provide financial incentives to homeowners and small businesses to purchase solar powered systems.
- A total of $230,000 in rebates have been made available which includes rebates for solar installations.

Comment:

As discussed before, the City of Fort Lauderdale's Smart Watts program provides an excellent starting point for a long running program. The program will end in March 2012, but the City will explore options to expand this program as soon as possible.

The City will explore a financial incentive program for renewable energy systems that builds on lessons learned from the Smart Watts program. As current renewable energy installations are still costly, financing options can encourage more rapid acceptance. Home values are increased by installing solar systems and the City will consider partnering with realtor associations to list these attributes during home sales.

Action 2.2.1: Expand Financial Incentives for Renewable Energy Systems.
The City will expand financial incentives for renewable energy systems and build on the existing Smart Watts program. Particularly solar hot water or solar powered pool pumps appear to be viable with lower financial assistance needs. The City will approach financial institutions and discuss public private financing opportunities.
Status: Continued action
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Financial incentives
Budget: TBD; staff time (40-200 hours)
Benefits: Encourage deployment of renewable energy systems; stimulate green job market
Issues: Finding financing partners

Case Study Green Biz Energy Collaborative Lake Worth and Lantana

The Greater Lake Worth Chamber of Commerce, the Town of Lantana and the Greater Boynton Beach Chamber of Commerce ("Greenbiz Energy Collaborative") have partnered for the implementation of a Florida Clean Energy Grant that was awarded by the State of Florida Energy and Climate Commission. The program is modeled after property assessed clean energy (PACE) district concepts, which traditionally focus on residential renewable energy and energy efficiency installations, but this financing program will utilize multiple financial methodologies and will initially focus solely on commercial projects. The program will concentrate on developing standards for typical commercial buildings as well as retail, restaurant and industrial buildings. A residential component may be added in the future. The goal of the project is to develop a working model that other cities and chambers can opt into for immediate and cost-effective implementation. Reference: click here.

Pictures: FAU's downtown campus solar system and real-time monitor

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Action 2.2.2: Encourage real estate listings of renewable energy systems.
The City will encourage listings of renewable energy systems in real estate listings.
Status: Not started
Responsible Party: City Management
Timeline: 2-5 years
Metric: Renewable energy system listings
Budget: Staff time (40-200 hours)
Benefits: Encourage deployment of renewable energy systems.

Case Study Colorado Green Home Listing

Prospective homebuyers, lenders, and appraisers can use the green multiple listing server (MLS) to determine whether a listed home has earned certification for energy efficiency improvements – including an Energy Star rating, LEED for Homes certification, NAHB Green certification, or a low HERS index rating – or has been equipped with a renewable-energy application such as a solar power and/or solar hot water system, or a wind power system. As long as the energy efficiency upgrade or certification is properly documented, it likely can be included in the MLS listing. Reference: click here.

CHAPTER 3: WATER

Goal 1:	Reduce Water Demand by 20% by 2020.
Objective 1.1:	**Incentivize, encourage and enforce water conservation.**
Action 1.1.1:	Expedited, continuing escalation of high-user potable water fees in single-family zoning.
Action 1.1.2:	Implement and enforce landscape ordinance requiring low-volume/avoidance watering.
Action 1.1.3:	Discontinue new construction of dual water metering for irrigation and cooling tower.
Action 1.1.4:	Directly engage all large water users in long-range water resource planning and conservation.
Action 1.1.5:	Consider innovative projects including harvesting rain water.

Accomplishments:

- The City published the 2010 water report[1].
- City started partnership with Broward County (H2O partnership).
- The City has a water use ordinance.
- Fort Lauderdale celebrated the 25th Anniversary of the Drop Savers Water Conservation Poster Contest.

The City will promote and use water conservation efforts that are already in place and model best practices. Innovative projects will be considered such as water reuse throughout City properties and buildings. Projects and practices must be implemented that improve water use efficiency for the City's largest consumptive uses, and water efficient products will be promoted to conserve water in buildings. The City will foster business partnerships to help reach water and energy conservation goals.

Comment:

The City of Fort Lauderdale supplies approximately 255,000 Floridians with clean water. The City has to reach a per capita use of 170 gallons per day goal by 2028 per the Consumptive Use Permit. The City also operates three water and wastewater treatment plants which account for approximately 70% of City's electricity usage. Conserving water will directly help the City save energy and costs.

[1] http://www.fortlauderdale.gov/h2o/water_report.pdf

Info: The United States average per capita water demand was 179 gallons per day (GPD) in 2005. The per capita consumption rate in the South Florida Water Management District (SFWMD), 179 GPD, is almost 20 more than any of the state's four other water management districts. The high usage for the SFWMD is due to the increased rate of irrigation for both agriculture and landscaping. The per capita water usage in the City of Fort Lauderdale is 189 gallons per day (GPD).

Background:

The majority of the City's water retail customers include residential, commercial, and industrial properties within the City of Fort Lauderdale, Lazy Lake, and a portion of Lauderdale-by-the-Sea. There are users in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward County. The utility maintains wholesale agreements for potable water supply with the City of Oakland Park, the City of Wilton Manors, the City of Tamarac (east of 34th Avenue), the Town of Davie, and Port Everglades. Emergency potable water interconnections are maintained with the City of Dania Beach, the City of Pompano Beach, the City of Plantation, and Broward County Water and Wastewater Services.

Action 1.1.1: Expedited, Continuing Escalation of High-User Potable Water Fees in Single-Family Zoning.
The City will continue escalating high-user potable water fees, thereby bolstering incentive to reduce irrigation and other excessive use, which not only depletes a finite resource but also overproduces greenhouse gas emissions. The City has raised these rates recently and additional increases are considered. This initiative will modify behavior economically, encouraging the reduction of the following: overall potable water use (particularly for irrigation), GHG production, and corresponding strains on the potable water production and distribution systems.
Status: Continued Action
Responsible Party: Public Works
Timeline: 5-10 years
Metric: Rate schedule
Budget: Staff time (200-1,200 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions

Action 1.1.2: Implement and enforce landscape ordinance requiring low-volume/avoidance watering.
Cemeteries, golf courses, plant nurseries, corporate and school campuses, and residential communities consume large amounts of potable water. Irrigation systems can be inefficient or run on a timer instead of in relation to area rainfall. The City can implement a landscape ordinance that requires low volume watering methods and installation of water/rain sensors.
Status: Not Started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Ordinance adoption
Budget: Staff time (200-1,200 hours)
Benefits: Water, energy and cost savings
Issues: Costs to community. Rain sensors cost approximately $20 per water timer.

Example Volusia County:
In 2004, Volusia County enacted an ordinance that sets minimum standards for environmental protection that require rain sensor devices and establish general restrictions on water use for conservation purposes. This ordinance also includes recommendations for efficient watering methods. Reference: click here.

Action 1.1.3: Directly engage all large water users in long-range water resource planning and conservation.
The City will continue to engage all large water users in long-range water resource planning and conservation and foster business partnerships to help reach water and energy conservation goals. This includes setting conservation goals in collaboration with the Southeast Florida Utility Council, the City's Water Resources Task Force and the Water Advisory Board.
Status: Continued action
Responsible Party: Public Works
Timeline: 2-5 years
Metric: Partnership initiatives
Budget: Staff time (1,200-4,000 hours)
Benefits: Save water and costs
Issues: Interest

Example NatureScape Program:
Landscape irrigation accounts for up to 50% of water consumption in Broward County and landscape runoff is a major source of water pollution. Broward County teamed up with the City of Fort Lauderdale and other cities to implement the NatureScape program that promotes water conservation via H2O audits. Plant choices and the way yards are maintained can greatly impact future water supplies. NatureScape encourages the use of native plants in landscaping. Natives generally require little watering once established, and are naturally pest resistant, which means less use of expensive and toxic chemicals. By using native plants water can be conserved and pollution is reduced while maintaining a healthy landscape. Program: click here.

Action 1.1.4: Consider innovative projects including water reuse and harvesting rain water.
The City will develop innovative projects for water capture and/or reuse in City properties and in City facilities through contests or challenge programs, for example. This will also include greywater and code issues.
Status: Not started
Responsible Party: Public Works
Timeline: >5 years
Metric: Gallons of water collected/reused
Budget: TBD; staff time (1,200-4,000 hours)
Benefits: Water, energy and cost savings
Issues: Costs of implementation; potential restrictions of rain water usage

Case Study 1: Purple is the new "green" in Pompano

The City of Pompano Beach began planning how to use alternate sources of water in 1979. Paramount concerns of the City were how to (1) provide a supply of fresh drinking water for residents, (2) fight saltwater intrusion into the subsurface aquifer that stores the drinking water, (3) protect the environment, and (4) irrigate property during periods of drought. Purple pipes, sprinkler heads and water meter boxes are now commonplace in Pompano Beach and distribute treated wastewater from the City's reclamation facilities (see picture). An added benefit of the purple pipe program is cost savings. The cost for reclaimed water is $0.48 per 1,000 gallons as compared to a minimum cost of $1.61 to $2.72 per 1,000 gallons of drinking water. References: click here.

Water Partnership with Broward County

The City of Fort Lauderdale has partnered with Broward County in an aggressive media campaign to promote water conservation, and to provide incentives and rebates. The program was kicked off in September 2011. Incentives include water efficient aerators, showerheads, and (for businesses) pre-rinse spray valves. Rebates will be provided only for high efficiency toilets that are WaterSense approved.

Goal 2: Reduce and Improve Wastewater and Stormwater Treatment.

Objective 2.1: Improve Wastewater Treatment Infrastructure.

Action 2.1.1: Reduce inflow and infiltration.

Action 2.1.2: Study wastewater plant – solids disposal system.

Accomplishments:

The City of Fort Lauderdale completed the WaterWorks 2011 program. Water and wastewater master plans have been in place since 2007 and helped improve the City's infrastructure to provide the most up-to-date, cost-efficient water service and to improve the quality and reliability of the City's drinking water system.

Wastewater management and treatment are critical to the development and maintenance of a sustainable community. In the comprehensive plan, the City has already identified the importance for investment in the wastewater infrastructure. An aging system and projections for increased demand for wastewater treatment services call for these investments.

Info: Wastewater flow has increased 5% from 2006 until 2009 (**Figure WW.1**). The average wastewater flow was 1,184 million gallons in 2009 with an average rain fall of 6 inches.

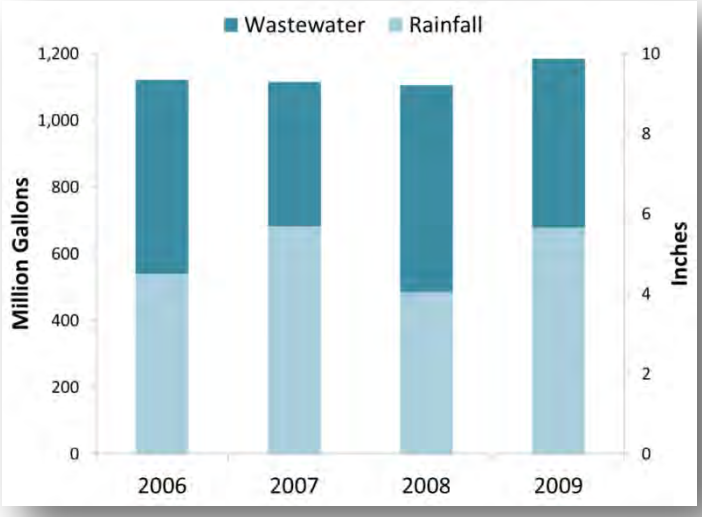


Figure WW.1: Wastewater flow [gallons] and rainfall [inches] from 2006 until 2009.

Action 2.1.1: Reduce Inflow and Infiltration.
Inflow and infiltration mitigation provides immediate payback as a result of less water volume being pumped and treated, thereby reducing the City's largest source of energy consumption and greenhouse gas production, i.e. water treatment. The City will prioritize more funds for this ongoing budget line item program to accelerate progress and reduce unnecessary water treatment. This concept would reduce GHG production and treatment costs in general by reducing ground water infiltration to the sanitary sewage waste stream.
Status: Smaller I&I projects ongoing
Responsible Party: Public Works
Timeline: < 6 months
Metric: Wastewater flow reduction [millions gallons]
Budget: estimated at $70 million over 10 years; staff time (1,200-4,000 hours)
Benefits: Significant energy savings, opportunity to switch to alternate treatment process
Issues: Funding

Action 2.1.2: Study Wastewater Plant - Solids Disposal System.
The current system of lime stabilization, although convenient and low profile, generates significant amount of greenhouse gas emissions in the production of lime and process energy. The current disposal system uses lime and then is land filled or field spread. Although the system would be a large capital expense if found viable, early planning now will optimize the appropriate depreciation of the current operating systems and appropriately minimize the cost of the new system. The City is encouraged to fund a professional engineering re-study of the digestion options and cost/GHG benefits.
Status: Not started
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Engineering study
Budget: Cost of study; staff time (>4,000 hours)
Benefits: Analysis will provide robust foundation for a mature energy program. The City's community will benefit from increased energy reductions and cost savings. The City will benefit in grant applications and by leading by example.
Issues: Personnel availability

Goal 2: Reduce and Improve Wastewater and Stormwater Treatment.

Objective 2.2:	**Improve Stormwater Infrastructure.**
Action 2.2.1:	Enforce policy to adhere to stormwater runoff pretreatment requirements.
Action 2.2.2:	Bio retention swales in urban areas.
Action 2.2.3:	Improve specific storm inlets to enhance pretreatment.

The stormwater system is predominantly gravity fed, however there are still opportunities for energy efficiency and sustainability. The City will consider several action items to improve the general stormwater infrastructure. The City will also address some best management practices for stormwater such as pollution control. Stormwater runoff can become contaminated from multiple sources. Improper disposal of chemicals, either directly into the stormwater system, or indirectly in a runoff area can cause contamination of the water.

Comment:

Stormwater is connected to but is distinctly different than the wastewater management system. Stormwater management has been highlighted in the Comprehensive Plan, and this will be addressed in terms of areas of sustainability planning as well. One concern has been electric-powered stormwater pumping on a regular basis, particularly on a municipal level, which is inherently undesirable regarding cost and questionable pretreatment.

Action 2.2.1: Enforce Policy to Adhere to Stormwater Runoff Pretreatment Requirements.
Enforce lawn, yard slopes and elevations of yard grading with a policy whereby retention and detention stormwater policies are adhered. Note that this is already part of the City's National Pollutant Discharge Elimination System program. In this aspect the City will also allow for pervious driveways – which are currently against City's building code, to enhance natural percolation and reduce amount of stormwater treatment.
Status: Ongoing
Responsible Party: Public Works
Timeline: 1-2 years
Metric: TBD
Budget: TBD; staff time (200-1,200 hours)
Benefits: Reduction of pollution runoff into waterways from single-family zoned districts
Issues: Enforcement feasibility

Action 2.2.2: Bio Retention Swales in Urban Areas.
The City will examine the development of an alternative set of details, including swales that can be used in lieu of the standard stormwater sewer system in the public right-of-way.
Status: Not started
Responsible Party: Public Works
Timeline: 2-5 years
Metric: TBD
Budget: TBD; staff time (200-1,200 hours)
Benefits: Water pre-cleansing through percolation, reduction of storm runoff, collecting rain water for plants
Issues: Acceptance of swales; standing water attracts mosquitos.

Action 2.2.3: Improve Specific Storm Inlets to Enhance Pretreatment.
It is proposed that on a case-by-case basis City stormwater staff would identify the needs and perform the following based on cost-effective priorities: removing unnecessary asphalt or concrete aprons currently placed around storm inlet grates and adjusting elevations and level frames to inlet grates, where capable of improving performance.
Status: Ongoing
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Review of storm inlets
Budget: Survey; staff time (1,200-4,000 hours)
Benefits: Enhance the highly desirable soil percolation or "pretreatment" of the first half inch of polluted storm runoff; benefit for the recharge of the potable aquifer, thereby reducing saltwater intrusion, which, in turn, reduces treatment of potable water and the associated GHG generated. This initiative can also enhance vehicle and pedestrian safety at certain excessively low inlet grates.

CHAPTER 4:
BUILT & NATURAL ENVIRONMENT

Goal 1:	Encourage and Plan Green Buildings and Development.
Objective 1.1:	**Encourage and Reward Green Buildings.**
Action 1.1.1:	Amend the Unified Land Development Regulations (ULDR) to add specific requirements which promote green development.
Action 1.1.2:	Lobby at State level for increased energy efficiency in the Florida Building Code.
Action 1.1.3:	Develop green building Checklist.
Action 1.1.4:	Expedite permitting for green buildings.
Action 1.1.5:	Encourage green roofs using native plants.
Action 1.1.6:	Create green building awards.
Action 1.1.7:	Promote development of vegetable gardens.
Action 1.1.8:	Incentivize sustainable landscaping for commercial property owners.

Accomplishments:

- Two Gold LEED certified building in the City (110 Tower, Pine Crest School).
- One Silver LEED certified building in the City (Edgar P. Mills Multi-Purpose Center).
- One LEED certified property in downtown Fort Lauderdale (AutoNation building).
- Approximately 35 LEED registered projects in Fort Lauderdale including Housing Authority LEED ND, Northwest Gardens.
- Three City LEED registered projects: Fort Lauderdale Executive Airport (FXE) LEED Gold registered project, Silver LEED Fire Station #35 and #46 (new construction).
- Downtown Master Plan and South Andrews Avenue Master Plan encourage green roofs.

Codes and Regulations can have a large, measurable impact on the pursuit of the City's Sustainability Action Plan. However, the City of Fort Lauderdale does not have the ability to modify or amend the Florida Building code. The only exception that allows the City to make an amendment to this code is if they can prove that the amendment is specific to their jurisdiction and therefore exceptionable.

Comment:

Buildings that are LEED certified have become a universal metric of how well a building performs in terms of resource conservation and aspects of health and comfort. The certification is costly and can range from 4% to 10% of the construction costs. Also in many cases, LEED buildings do not necessarily account for all savings unless they are operated correctly and by trained staff.

Background:

Buildings in the United States are responsible for 39% of greenhouse gas emissions, 40% of energy consumption, 13% of water consumption and 15% of the gross domestic product (GDP) per year. Therefore, green building is a source of significant economic and environmental opportunity. Lately, there has been a much stronger push from the federal level to fund energy efficiency programs targeting buildings.

Info: Within the City of Fort Lauderdale, there are approximately 80,239 residential housing units, 60% multi-family and 40% single-family residences. Over two thirds of these housing units were built 30 years ago and are often inefficient energy consumers. In the residential sector, electricity use resulted in 23% of all community greenhouse gas emissions.

Action 1.1.1: Amend the Unified Land Development Regulations (ULDR) to add specific requirements which promote green development.
The City of Fort will amend the Unified Land Development Regulations (ULDR) to add specific requiements which promote green development including requiring bicycle parking, showers / lockers in support of commuters, amongst others.
Status: Not started
Responsible Party: Sustainable Development
Timeline: < 6 months
Metric: ULDR amendments
Budget: Staff time (200-1,200 hours)
Benefits: Long-term commitment to sustainable development

Action 1.1.2: Lobby at State level for increased energy efficiency in the Florida Building Code.
Florida building code improvements can only be made by the state. Therefore, the City of Fort Lauderdale must work with other interested parties to put together a task team to present a request to the State of Florida and the Florida Building Commission for a staged increase in FBC energy efficiency requirements.
Status: Not started
Responsible Party: City Management
Timeline: < 6 months
Metric: Lobby activities
Budget: Staff time (200-1,200 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions
Issues: Push back at State level

Action 1.1.3: Develop Green Building checklist.
The City will require that all new construction and major renovations reach a minimum number of points of an approved green building checklist (i.e. LEED, FGBC).
Status: Not started
Responsible Party: Sustainable Dev.
Timeline: < 6 months
Metric: Checklist
Budget: Staff time (200-1,200 hours)
Benefits: Incentive for green buildings
Issues: Administrative burden

Action 1.1.4: Expedite permitting for green building.
The City will expedite permits and lower permitting fees for Green Buildings. The City is also considering reviewing the City's Code of Ordinances including the Unified Land Development Regulations (ULDR) to identify barriers or opportunities for green projects.
Status: Not started
Responsible Party: Sustainable Dev.
Timeline: < 6 months
Metric: Fast tracked permits
Budget: Staff time (200-1,200 hours)
Benefits: Incentive for green buildings, environmental benefits
Issues: Administrative burden
Other Information: The City of Fort Lauderdale has an expedited permitting process for affordable housing and developers that want to pay additional fees to use the fast-track review. One staff person is usually designated to manage the expedited permitting process. This streamlines the process between all departments.

Example: Miami Dade Expedited Permitting Process Ordinance

Miami-Dade passed an ordinance to expedite the permitting process for "green" buildings certified by a recognized environmental rating agency. Commercial, industrial, and residential projects are all eligible. Additionally, solar water heating and solar photovoltaic projects are included in the "fast track" for permitting review. The County also offers – unlike Fort Lauderdale – a flat permit fee for $250 for all jobs up to $60,000.

Action 1.1.5: Encourage Green or Cool Roofs.
The City will consider incentive programs, e.g. offering one bonus square foot of additional floor area for each square foot of rooftop garden area constructed; consider requiring public assistance developments to install green or cool roofs.
Status: Not started
Responsible Party: Sustainable Dev.
Timeline: 1-2 years
Metric: Square foot of rooftop garden area
Budget: Green roof estimate: $17/sqft Cool roof estimate: $0.50/sqft; staff time (1,200-4,000)
Benefits: Roofs minimize energy use, reduce the heat island effect, slow water before it enters site infrastructure which helps the purification process.
Issues: Green roofs can leak if not installed properly.

Action 1.1.6: Create Green Building awards.
The City will design a Green Building Award to be given every quarter. In order for this initiative to be successfully implemented, collaboration and coordination is required between the Sustainability Advisory Board (SAB) and the Community Appearance Board.
Status: Not started
Responsible Party: SAB
Timeline: 1-2 years
Metric: Annual award
Budget: TBD; staff time (<40 hours)
Benefits: Recognition of green builders

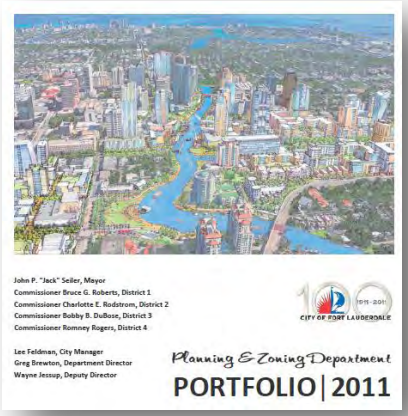
Action 1.1.7: Promote Development of Vegetable Gardens.
The City will establish zoning and sustainable agriculture policies that allow for sustainable agricultural land uses throughout the City on Under-Used Public and Private Land Using Sustainable Urban Agriculture Practices. A business tax license category can be developed for sustainable urban agriculture at a nominal fee. Job creation can be encouraged in the sustainable agriculture industry throughout the City in enterprise employment zones. Incentives can be created for the production and consumption of locally grown produce, e.g. from food producing tree, and be used as a marketing tool for the City.
Status: Underway
Responsible Party: Sustainable Development
Timeline: 2-5 years
Metric: Number of vegetable gardens
Budget: Staff time (200-1,200 hours)
Benefits: Locally grown produce; job creation
Issues: Use of water; toxic chemicals; polluted soils
Note: A citywide urban farm and community garden ordinance is currently under development (see memorandum in attachements).

Action 1.1.8: Incentivize Sustainable Landscaping for Property Owners.
Review Florida-friendly landscaping promotions and educational workshops and assess areas for improvement, e.g. approach, motivate and educate commercial property owners and managers to apply sustainable landscaping methods. This could be tied in with Community Appearance Board Awards for both commercial and residential exemplifying water and landscaping best management practices.
Status: Not started
Responsible Party: Sustainable Development
Timeline: 1-2 years
Metric: Sustainable landscaping incentives
Budget: TBD; staff time (1,200-4,000 hours)
Benefits: Energy and water savings
Issues: Potential resistance from property owners

Goal 1:	Encourage and Plan Green Buildings and Development.
Objective 1.2:	**Incorporate energy efficient building and land use into Comprehensive Plan.**
Action 1.2.1:	Develop and expand Greenways/Blueways network and initiatives.
Action 1.2.2:	Encourage infill development or reuse/rehabilitation of existing structures.
Action 1.2.3:	Require future development to consider reducing demands for cooling and lighting.
Action 1.2.4:	Plan to increase mixed use and density.

Accomplishments:

- The City is pursuing regular updates of the SAP with focus on green buildings and development.
- Applications for development proposals are evaluated by planning staff to meet standards which strive to meet overall sustainability intent.



The City's Comprehensive Plan reflects a range of actions that align with sustainability principles. The City's Planning and Zoning Portfolio (available here) is a synopsis of numerous efforts and responsibilities, including plans, programs, and initiatives that represent a significant investment in the City's present and future. These efforts are based on extensive community participation and public input, and echo thoughts, ideas and needs conveyed by the City's constituents. The projects and programs shape the vision for creating a successful world-class city, with a vibrant waterfront downtown, and an exceptional beach destination, surrounded by diverse and livable neighborhoods.

Action 1.2.1: Develop and expand Greenways/Blueways network and initiatives.
The City will develop and expand Greenways/Blueways network and initiatives including goal setting, coordination between departments and agencies, determining and defining Greenways/Blueways network vicinity, development opportunities, amongst others.
Status: Started
Responsible Party: Sustainable Development
Timeline: 6 months
Metric: TBD
Budget: Staff Time (1,200-4,000 hours)
Benefits: Long-term planning supports sustainability strategy

Action 1.2.2: Encourage infill development or reuse/rehabilitation of existing structures.
The City will consider more infill development to improve existing neighborhoods (see Dorsey Riverbend example). Note, that infill will be encouraged in concert with water inundation map that discourages development in low lying, vulnerable areas regarding climate change.
Status: Not started
Responsible Party: Sustainable Development
Timeline: 6-12 months
Metric: Number of avoided greenfield developments
Budget: Varies case by case; staff time (200-1,200 hours)
Benefits: Reduced loss of land
Issues: Funding

Fort Lauderdale's Home Investments Partnership (HOME) Program.

Example: Dorsey Riverbend Infill Development

Model Home Row, located in the Dorsey Riverbend neighborhood, is near completion. The project was initiated in 2002 by the CRA in partnership with the City of Fort Lauderdale Office of Housing and Community Development. Together they purchased sixteen lots in and around Walker Elementary, creating a focal point that showcased the potential for infill development. The project provides quality, attractive housing options on land that was once underutilized. Homes are designed to be competitive with the designs and comforts offered in other new homes in other parts of Broward County. Some of the amenities/features of the homes include front porches, interior knock-down finish, tile roofs, and a stamped or solid concrete driveway.

Action 1.2.3: Require future development to consider reducing demands for cooling and lighting.
The City shall require future development to consider topography, vegetation, and solar access during the design phase to reduce demands for cooling and lighting. Downtown, Beach and South Andrews Master Plans already reference the need for development to respond to the natural environment in terms of design regarding solar orientation, wind direction and rain.
Status: In progress
Responsible Party: Sustainable Development
Timeline: 1-2 years
Metric: TBD
Budget: Staff time (200-1,200 hours)
Benefits: Energy and cost savings
Issues: Additional costs to development

Action 1.2.4: Incentivize and encourage increased mixed use and density.
Engage in planning efforts that accommodate levels of mixed use, including light industrial with residential, and density. Focus areas include convenient transit, walkability, jobs, shopping, recreation, civic spaces, open spaces, sense of community, and housing diversity in the City's neighborhoods.
Status: Started
Responsible Party: Sustainable Development
Timeline: 2-5 years
Metric: TBD
Budget: Staff time (1,200-4,000 hours)
Benefits: Energy, transportation and cost savings
Issues: Personnel availability

Goal 2:	Preserve and Expand Natural Spaces.
Objective 2.1:	**Preserve and expand coastal habitats.**
Action 2.1.1:	Provide more green space in residential development.
Action 2.1.2:	Enforce ordinance to protect sea turtles.
Action 2.1.3:	Develop program to preserve natural beach environment.

Accomplishments:

- Future Parks and Facilities acquisitions include Tunnel Top Park; Coontie Hatchee Park; Cypress Creek Sand Pine Preserve; Dolphin Isles Park; Esterre Davis Wright Park; Peter Feldman Park; Florence Hardy Park Addition; Harbordale Park; North Fork Riverfront Park; Sailboat Bend Preserve; "Bill" Keith Preserve.
- Warbler Wetlands acquisition, a 6.2 acre conservation site, will be managed and developed by the City. The overall management priority will be protection, enhancement, and interpretation as an ecological preserve. Secondarily, the site will be managed as a non-consumptive recreational, educational, and wildlife management area.
- River Oaks stormwater preserve, 9.1 acres.

Fort Lauderdale's green spaces include parks, natural local habitats such as wetlands, beaches and urban forests. The objective is to develop and maintain green spaces that support natural local habitat, promote sustainable landscaping and provide passive and active outdoor recreation opportunities. The City will assess opportunities to develop a city-wide green space program that encourages, promotes, incentivizes and coordinates initiatives that relate to green spaces such the green space preservation, existing park land acquisition program, wetland restoration, and beach sustainment.

Action 2.1.1: Provide more green space in residential development.
The City will identify opportunities to provide more green space in residential development under consideration of sustainable landscaping.
Status: Started
Responsible Party: Sustainable Development
Timeline: < 6 months
Metric: Green space
Budget: Staff time (200-1,200 hours)
Benefits: Quality of life

Action 2.1.2: Enforce ordinance to protect sea turtles.
The City has created an ordinance to restrict artificial lighting to beach lighting activities on the beach to protect sea turtles. This ordinance will be enforced more aggressively. Additionally, the City will coordinate between the Building and Code Enforcement Departments with regards to the issuance of building permits.
Status: Started
Responsible Party: Sustainable Development
Timeline: < 6 months
Metric: Lighting reduction
Budget: Staff time (< 40 hours)
Benefits: Sea turtle protection
Issues: Enforcement feasibility
Comment: Protecting sea turtles is an important part of preserving the natural environment. The City has an ordinance in place that requires reduced lighting at the beach.

Action 2.1.3: Develop program to preserve the natural beach environment.
The City will develop a program to preserve the natural beach environment. The program will encourage, promote, incentivize and coordinate initiatives that relate to the natural beach environment such as wetland restoration, beach sustainment and even eco-tourism.
Status: Not started
Responsible Party: Park and Recreation
Timeline: 2-5 years
Metric: Program
Budget: TBD; staff time (200-1,200 hours)
Benefits: Restoration of natural resource

Goal 3:	Improve Energy Performance of Buildings and Infrastructure.
Objective 3.1:	**Make 20% of all City Buildings More Energy Efficient by 2020.**
Action 3.1.1:	Reduce plug load of individual electronics in all City buildings.
Action 3.1.2:	Develop and maintain Energy Star Portfolio for City buildings and infrastructure.
Action 3.1.3:	Establish plan to retrofit 30% of all City facilities older than 20 years (based on square footage).
Action 3.1.4:	Consider cool roofs or green roofs for City buildings.

Accomplishments:

- The City completed the City Hall's chiller replacement.
- An energy audit was performed at the Holiday Park Social Center and basic retrofits will be made over the coming year.

As outlined here and the Energy Chapter, the City will consider setting aside a capital improvement budget that will be used to improve the energy performance of the highest energy consuming buildings. Direct savings can be achieved through immediate implementation of Energy Manager recommendations.

Info: According to the Department of Energy, buildings account for 40% of energy consumption. In Fort Lauderdale, building operations make up about 30% of the total electricity consumption with the top 5 energy users using 13% of the total energy (Police headquarters, City Hall, City Parking Garage, Swimming Hall of Fame, and Holiday Park War Memorial). Targeting these facilities will result in direct savings.

Comment:

Changing behavior of City staff to save energy will have a significant effect and help achieve meaningful savings. The City will implement employee challenge programs that help incentivize staff members to conserve energy.

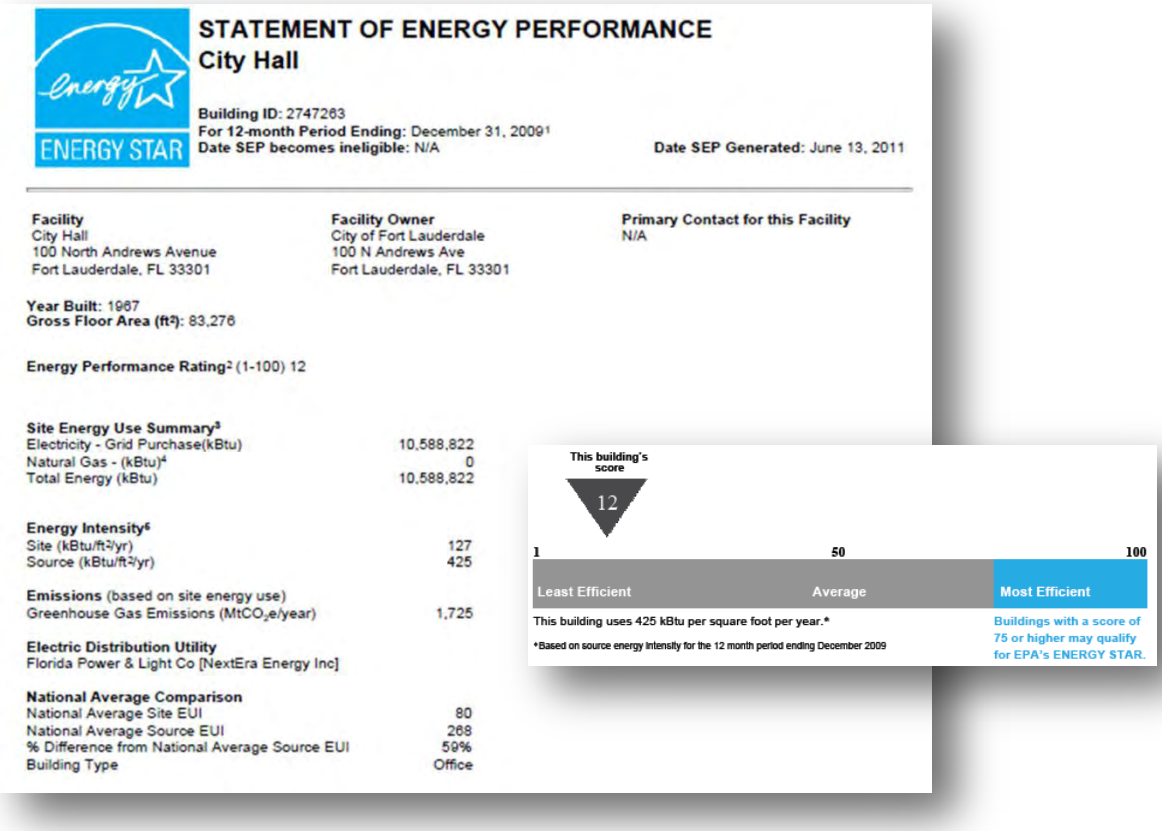
Action 3.1.1: Reduce plug load of individual electronics in all City buildings.
The City will reduce plug load of individual electronics (space heaters, radios, coffee makers, fridges) in order to reduce electricity consumption. It was estimated that $11,000 per year could be saved if all space heaters were removed in City Hall.
Status: Not started
Responsible Party: City Administration
Timeline: < 6 months
Metric: Electricity consumption [kWh]
Budget: Staff time (< 40 hours)
Benefits: Energy and cost savings
Issues: Resistance from staff

Action 3.1.2: Develop and maintain Energy Star Portfolio for all City buildings.
The City uses Energy Star Portfolio Manager which is an online benchmark tool that helps to assess current energy performance of a building and certain infrastructures, including water treatment plants. This can also be used to assess eligibility for Energy Star designation for buildings of high performance.
Status: Continuous action
Responsible Party: Public Works
Timeline: < 6 months
Metric: Database
Budget: Staff time (200-1,200 hours)
Benefits: Benchmark and improve energy performance of buildings
Issues: Regular maintenance of database

Example: Fort Lauderdale City Hall

City Hall is located in the center of Fort Lauderdale on North Andrews Avenue. The administrative heart of the government was built in 1967 and over the years the building has been re-structured to accommodate the growing population and City services. The installed equipment is aging fast and particularly the building's air conditioning unit shows a low performance. In the latest capital improvement program it was even recommended to consider construction of a new building (FY2011-2015). Elevators, A/C handlers, electric and generators have all exceeded their life expectancy and are prone to failure. Furthermore, the building is currently too small for all occupants and in need of a substantial upgrade.

The Energy Star Portfolio Manager provides a high level albeit insightful analysis based on the building's electricity use as it compares it to similar facilities. City Hall's building's score was based on 2009 electricity data and resulted in a very low score of 12. This is on the low end of the efficiency scale. In 2010, the City replaced the building's chiller which will help to improve the energy performance of this facility.



STATEMENT OF ENERGY PERFORMANCE
City Hall

Building ID: 2747263
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 13, 2011

Facility
City Hall
100 North Andrews Avenue
Fort Lauderdale, FL 33301

Facility Owner
City of Fort Lauderdale
100 N Andrews Ave
Fort Lauderdale, FL 33301

Primary Contact for this Facility
N/A

Year Built: 1967
Gross Floor Area (ft²): 83,276

Energy Performance Rating[2] (1-100) 12

Site Energy Use Summary[3]
Electricity - Grid Purchase(kBtu) 10,588,822
Natural Gas - (kBtu)[4] 0
Total Energy (kBtu) 10,588,822

Energy Intensity[6]
Site (kBtu/ft²/yr) 127
Source (kBtu/ft²/yr) 425

Emissions (based on site energy use)
Greenhouse Gas Emissions ($MtCO_2e$/year) 1,725

Electric Distribution Utility
Florida Power & Light Co [NextEra Energy Inc]

National Average Comparison
National Average Site EUI 80
National Average Source EUI 268
% Difference from National Average Source EUI 59%
Building Type Office

This building's score
12
1 50 100
Least Efficient Average Most Efficient
This building uses 425 kBtu per square foot per year.*
*Based on source energy intensity for the 12 month period ending December 2009
Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

Action 3.1.3: Establish plan to retrofit 30% of all City facilities older than 20 years (based on sqft).
The City is encouraged to develop a detailed plan to retrofit all City buildings and facilities with cost-effective energy efficiency measures and take advantage of all utility incentive programs and other financial resources.
Status: Not started
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Retrofit plan
Budget: Staff time (40-200 hours)
Benefits: Electricity savings, increased comfort
Issues: Funding of retrofits

Action 3.1.4: Identify cool roofs or green roofs for City buildings.
The City will identify buildings that can be retrofitted with cool roofs or green roofs to lead by example. The structural capacity must be tested to retrofit for a green roof.
Status: Not started
Responsible Party: Public Works
Timeline: 2-5 years
Metric: List of buildings
Budget: Green roof estimate: $17/sqft Cool roof estimate: $0.50/sqft; staff time (200-1,200 hours)
Benefits: Green roofs minimize energy use, reduce the heat island effect, slow water before it enters site infrastructure which helps the purification process.
Issues: Green roofs can leak if not installed properly.

Goal 3:	Improve Energy Performance in Buildings.
Objective 3.2:	**Make 20% of Residential and Commercial Buildings More Energy Efficient by 2020.**
Action 3.2.1:	Require energy survey before home sale.
Action 3.2.2:	Create green home and businesses revolving loan.
Action 3.2.3:	Implement energy efficient new public/affordable housing projects.

Accomplishments:

- Smart Watts educational workshops for residents were successfully launched in April 2011.
- Smart Watts rebate program have been launched in 2010.
- Smart Watts loan program commenced in May 2011 and provides financial incentives to retrofit buildings.

The Energy Chapter provides recommendations to expand the Smart Watts program and make it a long-term effort. Building on this recommendation, the City will set a goal of 20% increased energy efficiency for residential and commercial buildings. This will be achieved through a mix of regulations and incentives.

Info: Within the City of Fort Lauderdale, there are approximately 80,239 residential housing units, 60% multi-family and 40% single-family residences. Over two thirds of these housing units were built 30 years ago and are often inefficient energy consumers.

Action 3.2.1: Require energy survey before home sale.
The City will consider an ordinance that requires home owners or buyers to take an energy survey before selling their home. Several utilities offer free online or in person energy surveys which help to pinpoint to areas that need improvement.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Energy Survey documentation
Budget: Staff time (200-1,200 hours)
Benefits: Energy and cost savings
Issues: No follow through on surveys

Example Austin's Energy Conservation Audit and Disclosure Ordinance

In 2008, the City of Austin adopted the Energy Conservation Audit and Disclosure Ordinance which requires an energy audit during the home selling process. Of the first 400 audits performed, nearly 90 percent of homes needed both additional attic insulation and duct repair to be considered "acceptable" by the city's standards. Homeowners are not required to make suggested improvements, but it is an important bargaining chip in the buying process. One Austin home was found to be leaking 81 percent of its air conditioning and heating into the attic. Making suggested improvements on the home could cut energy bills in half and create more job opportunities.
Reference: click here.

Action 3.2.2: Create green homes and businesses revolving loan fund (also see Energy Actions).
A Green Homes and Businesses Revolving Loan Fund can be created by the City to offer a program that provides financial incentives for residents to make energy efficient improvements and sustainable upgrades to their homes. This initiative will supply capital for cost-effective and environmentally friendly upgrades to residential properties. In order to successfully implement this initiative, the City will need to decide how the process is going to be structured and develop a Loan Administration Plan that outlines interest rates, eligibility criteria, the approval processes, and borrower requirements.
Status: Not started
Responsible Party: City Management
Timeline: 6-12 months
Metric: Loan program
Budget: Staff time (1,200-4,000 hours)
Benefits: Energy and cost savings
Issues: Seed capital for loan program

Action 3.2.3: Implement energy efficient new public/affordable housing projects.
The City will incorporate energy efficiency and conservation when considering new public/affordable housing project. This could be achieved by requiring energy audits for these projects and offer assistance for weatherization based on the result of the energy audit.
Status: Ongoing
Responsible Party: Sustainable Development
Timeline: 2-5 years
Metric: Energy audits in affordable housing projects
Budget: Staff time (1,200-4,000 hours); cost for retrofits
Benefits: Energy and cost savings, increase comfort, increase home value, reduce reliance on assistance programs, reduce risk of eviction
Issues: Funding for retrofits

Background

According to the Department of Housing and Urban Development (HUD), energy costs consume 19% of total annual income for single, elderly, poor, and disabled persons living on social security (compared with a national average of only 4%; U.S. HUD, 2007h). Reducing energy costs is an effective way to ensure that housing remains affordable for these individuals. The Federal Government's Partnership for Home Energy Efficiency (PHEE), a collaborative effort between EPA, the U.S. Department of Energy (DOE), and HUD, estimates that many households can save between 20% and 30% on energy costs by improving energy efficiency (Energy Savers, 2007). In rented affordable housing units, energy cost savings can accrue to the renter or the building owner (Shafer, 2003). In some affordable housing units, utility costs are embedded in rent payments, meaning the building owner will reap the direct benefits of energy efficiency improvements, with the resident benefiting indirectly from a lower risk of rent increase. When residents pay utility bills directly, they are the direct beneficiaries of much of the energy cost savings; building owners can still benefit directly from reduced energy consumption in building common areas and indirectly from reduced utility allowances and energy assistance program costs.

Example: Seattle HomeWise Program

The Seattle, Washington Office of Housing administers a HomeWise program that offers a free home energy audit to residents who meet certain low-income qualifications. Following the energy audit, the city will implement a weatherization package of energy efficiency projects to improve home insulation, venting, and envelope sealing. The program receives its funding from the DOE Weatherization Program through the Washington Department of Community, Trade, and Economic Development (Seattle, 2008). Reference: click here.

CHAPTER 6: TRANSPORTATION

Goal 1:	Reduce Use of Fossil Fuels in Vehicles.
Objective 1.1:	**Reduce Use of Fossil Fuel in City Fleet Vehicles.**
Action 1.1.1:	Increase fleet fuel efficiency by 20% by 2020.
Action 1.1.2:	Include fuel efficiency and fuel source in fleet replacement analysis.
Action 1.1.3:	Develop strategy to reduce fleet fossil fuel usage by 1% per year.
Action 1.1.4:	Aggressively expand replacement of City fleet vehicles with hybrid and alternative fuel, low CO2 emitting vehicles.

Accomplishments:

- Fleet Management is currently implementing a fuel use monitoring system and assessing opportunities to purchase low carbon fuels.
- Purchased hybrid bucket truck which saves 7,000 gallons of diesel and avoid 71 tons of greenhouse gas emissions each year.

The City's Fleet Services Department will use data records from the recently installed fuel monitoring system to establish a fleet baseline of fuel efficiency and fuel usage. This data will help to identify areas of improvement on a more granular level, such as driver behavior and department-specific assessments. Future replacement vehicle choices will be based on fuel efficiency criteria and fuel type preferences. Where feasible and affordable, it is suggested to consider alternative fuel powered vehicles.

Comment:

The City has set in place various policies that are addressing reduced fuel demand, improved fuel efficiency and behavioral changes. For example, an idling policy is in place which targets behavioral changes of City drivers; however, in the past it has been challenging to entice all drivers to conserve more fuel through changes in driving behavior. The City Fleet Manager is considering development of a driver challenge program that incentivizes fuel conserving driving behavior.

Info: Over the past four years, fuel purchases have increased on average by 2% per year (Figure T.1). The number of fleet vehicle has slightly increased from 1,524 in 2008 to 1,546 in 2010. Fleet Management is currently in the process of determining the overall fleet fuel efficiency.

Background

Fleet vehicle numbers grew slightly from 1,524 (2008) to 1,546 (2010). This equals an approximate fuel consumption of 908 gallons per vehicle averaged over three years and is higher than the U.S., average fuel (667 gallons per vehicle in 2008[1]). The City's fleet department makes every effort to constantly right-size the fleet. Every six months, fleet staff evaluates current vehicle utilization. Over the past three years, the fleet has been reduced by 49 vehicles and currently there are 1,522 vehicles. It is estimated the fleet is 99% right sized. There are several vehicles that are pooled internally, most of them as replacement for vehicles that need repairs. Fleet staff also regularly assesses the specified vocational purpose of each vehicle in order to avoid using vehicles that are either over-powered or under-powered for the job. Both of those conditions can lead to excessive fuel usage and unwanted production of greenhouse gases.

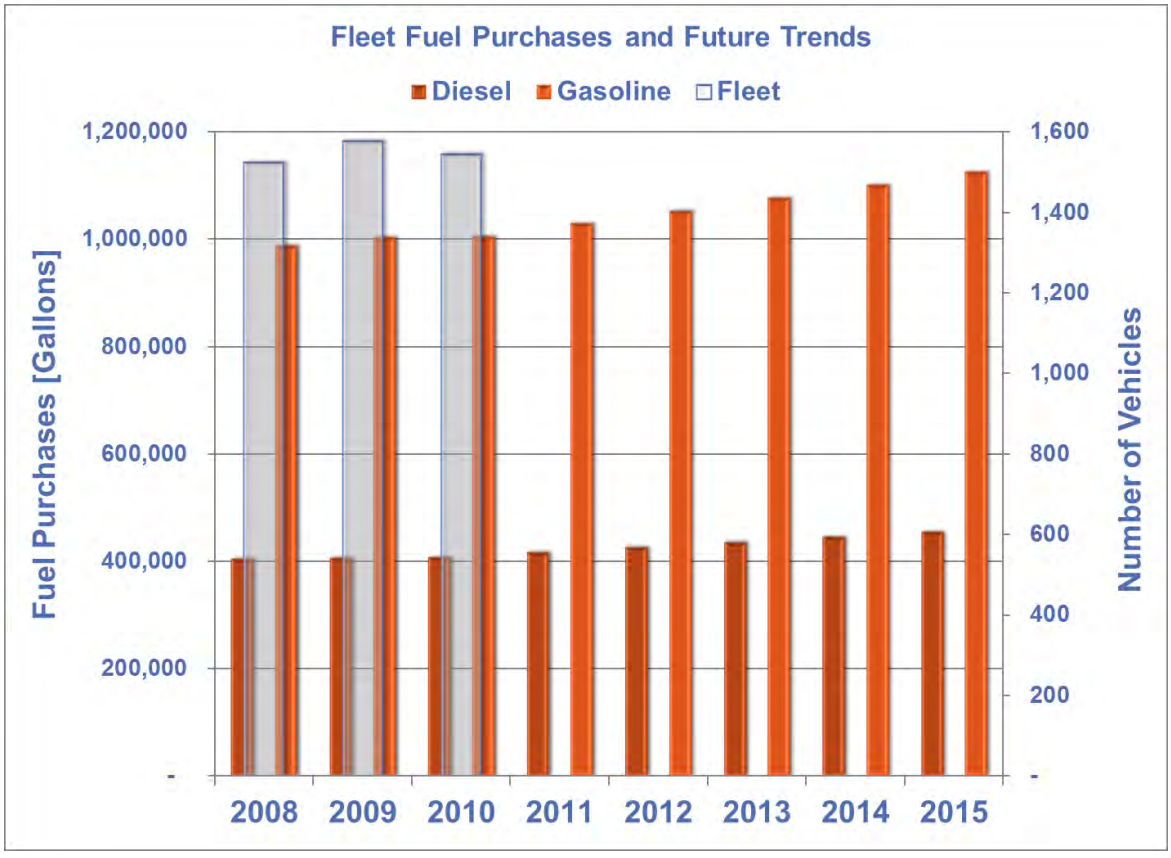


Figure T.1: Fleet fuel purchases and number of vehicles from 2008 and projected to 2015.

[1] Motor Vehicle Fuel Consumption and Travel, Research and Innovative Technology Administration Bureau of Transportation Statistics. Available online: http://www.bts.gov/publications/national_transportation_statistics/html/table_04_09.html

Action 1.1.1: Increase fleet fuel efficiency by 20% by 2020.
The Fleet Manager is establishing the current fuel efficiency levels using data from the fuel monitoring system.
Status: Not started
Responsible Party: Public Works
Timeline: <6 months
Metric: Fleet fuel efficiency [miles per gallon]
Budget: Staff time (40-200 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions
Issues: Extra costs for more fuel efficient cars

Action 1.1.2: Include fuel efficiency and fuel source in fleet replacement analysis.
The City Fleet Department will add the aspects of fuel efficiency and fuel source in the annual fleet replacement analysis. Each vehicle that is considered for replacement will be replaced with a vehicle that has higher fuel efficiency and/or uses low carbon fuel technologies, as is feasible with the vehicle's specified vocational use.
Status: Not Started
Responsible Party: Public Works
Timeline: <6 months
Metric: Fleet fuel efficiency [miles per gallon]
Budget: Costs for more efficient/low carbon vehicle; staff time (<40 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions
Issues: Extra costs for more fuel efficient cars.

Action 1.1.3: Develop strategy to reduce fleet fossil fuel usage by 1% per year.
The City will develop a strategy to reduce the fleet's fossil fuel usage from diesel and gasoline consumption by 1% per year. This could be achieved through a mix of tools that include alternative fuels or reduced vehicle miles traveled, or challenge programs.
Status: Not Started
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Fuel reduction strategy
Budget: Staff time (200-1,200 hours)
Benefits: Energy and energy cost savings; reduction of GHG emissions
Issues: Alternatives to fossil fuels are typically more costly.

Action 1.1.4: Aggressively expand replacement of City fleet with hybrid and alternative fuel, low emitting vehicles.
The City is encouraged to aggressively expand replacement of City fleet vehicles with vehicles that produce fewer greenhouse gas emissions.
Status: Not started
Responsible Party: Public Works
Timeline: 1-2 years
Metric: Low carbon vehicle replacement
Budget: TBD; staff time (200-1,200 hours)
Benefits: Energy and cost savings; reduction of GHG emissions
Issues: Increased costs, obsolescence of technology

Goal 1:	Reduce Use of Fossil Fuels in Vehicles.
Objective 1.2:	**Reduce Community-Wide Use of Fossil Fuel.**
Action 1.2.1:	Reduce vehicle engine idling at bascule bridges and railroad crossings.
Action 1.2.2:	Provide a community wide infrastructure for the supply of alternative fuels.

Accomplishments:

- Fort Lauderdale's community buses - the Sun Trolleys - are biodiesel vehicles that are operated in downtown.
- The City recommends recycling used grease from restaurant owners and – if not cost-preventive – to turn it into biodiesel.

The reduction of fossil fuel consumption in the community will have multiple benefits through energy savings, emission avoidance and foreign oil independency. The intent is to encourage idling reduction and the purchase of alternative fuels.

Comment:

Currently, the City of Fort Lauderdale's modal distribution is 94% vehicular and 6% other, which is better than the Broward County overall average of 99% vehicular and 1% other, but far less than optimal for a region with a favorable outdoor climate and annual temperature/humidity range. Efforts to promote mass transit among business users and local residents are linked to improvements in infrastructure to enhance access, connectivity and outdoor environments.

Action 1.2.1: Reduce Vehicle Engine Idling.
The City will post signs reminding drivers to turn off their engines while waiting at bridges and railroad crossings, schools, loading areas etc. The signs should in simple words explain the benefits of reduced idling.
Status: Continuous Action
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Signage/digital timers
Budget: TBD; staff time (200-1,200 hours)
Benefits: Fuel savings; improved air quality; decreased particle matter; increased vehicle life; 1 hour of idling equals about 33 miles driven; the EPA reports that 0.7 gallons of fuel are used per hour of engine idle time.
Issues: Funding of signs or timers

Action 1.2.2: Provide a community-wide infrastructure for the supply of alternative fuels.
The City will explore opportunities to provide an infrastructure for the city-wide supply of alternative environmentally safe fuels, e.g. compressed natural gas (CNG), electric power, or biodiesel if there are good local sources. Similar to the case study outlined below, the City could reach out to potential transportation stakeholders and assess the feasibility of providing an alternative fuel infrastructure with strong focus on electric car charging stations.
Status: Continuous Action
Responsible Party: Sustainable Development
Timeline: > 5 years
Metric: Feasibility study
Budget: TBD; staff time (>4,000 hours)
Benefits: Fuel security; low carbon fuel usage avoids greenhouse gas emissions
Issues: Availability of alternative fuels

Example: Alternative Fuels Corridor Economic Feasibility Study (2009):

The Washington State Department of Transportation issued a feasibility study to assess opportunities for an alternative fuels corridor. This study evaluated how retail gas stations could be incentivized to offer alternative fuels along the Interstate 5 corridor (275 miles in Washington). Capital and operating costs were estimated and compared to revenue projections. Main barriers of alternative fuels were the following:

- Ethanol: lack of pipelines and high transportation costs, lack of blending and storage facilities (in the Northwest).
- Biodiesel: availability and costs, high transportation costs.
- Compressed natural gas: limited domestic gas resources, considered "non-renewable", additional pipelines needed.
- Electricity: few electric cars available, lack of charging stations, increased demand for low carbon power generation.
- Hydrogen: research 10-15 years away, lack of delivery and fueling stations, need for increased hydrogen production.

The deployment of an alternative fuel infrastructure is challenged by the fact that several diverse stakeholder groups have to be considered which can block the decision-making process, including: governmental bodies, private companies and consumers. The report concluded that coordinated action is necessary to move forward with an alternative fuel infrastructure and made the following recommendations:

- Strong policy leadership and consistency of political message.
- Adequate regulatory framework for alternative fuel stations.
- Financial incentives to encourage high capital investments.
- Upfront commitment from manufacturers.
- Public outreach and education to assure and inform consumers.

Reference: click here.

Goal 2:	Reduce Vehicle Miles Traveled.
Objective 2.1:	**Increase Vehicle Occupancy Rates.**
Action 2.1.1:	Expand flexible work hours and tele-commuting opportunities.
Action 2.1.2:	Expand availability of parking for carpools at City facilities.
Action 2.1.3:	Develop carpool incentive program.

Accomplishments:

- City staff is carpooling for events or meetings.
- Multi-purpose trips are planned in most departments.
- Building and Parks and Recreation staff use route planner.
- Electronic cell phone parking meter collections.
- A commuter survey was taken in 2008 which showed that City staff had an interest to reduce single car occupancy.

Efforts to encourage increased vehicle occupancy nationwide have had limited success. Therefore, the City will promote and implement an incentive program to encourage multi-purpose, multi-passenger trips and change commuting patterns and behavior within the City.

Comment:

Recent research has indicated that objections to group-riding policies are deeply ingrained in most travelers. One way of overcoming this bias is by educating new drivers as to the benefits of increased auto occupancy.

Action 2.1.1: Expand flexible work hours and tele-commuting opportunities.
The City will introduce and promote flexible work hours and tele-commuting opportunities to staff members.
Status: Continuous action
Responsible Party: Human Resources
Timeline: 6-12 months
Metric: City policy
Budget: Staff time (<40 hours)
Benefits: Traffic congestion reduction; fuel and cost savings
Issues: Inadequate equipment at home; distant management.

Action 2.1.2: Expand availability of parking for carpools at City facilities.
The City will expand current availability of parking for carpools and provide other incentives to encourage carpooling.
Status: Continuous action
Responsible Party: City Management
Timeline: 6-12 months
Metric: Carpool parking spaces
Budget: TBD; staff time (<40 hours)
Benefits: Traffic congestion reduction; fuel and cost savings
Issues: Resistance to carpooling due to personal schedules and travel flexibility, amongst others.

Action 2.1.3: Develop carpool incentive program.
The City will develop a program in coordination with the Florida Department of Transportation (FDOT) District IV Carpooling program to provide a hangtag for priority parking for carpool vehicles.
Status: Not started
Responsible Party: City Management
Timeline: 1-2 years
Metric: Hangtags for priority parking
Budget: TBD; staff time (1,200-4,000 hours)
Benefits: Traffic congestion reduction; fuel and cost savings
Issues: Resistance to carpooling due to personal schedules and travel flexibility, amongst others.

Example City of Jacksonville

The City of Jacksonville is working toward developing a viable transit system. The Mass Transit Element was developed by the City in concert with the Traffic Circulation and Ports, Aviation and Related Facilities Elements of the 2010 Comprehensive Plan. One of the goals relates to maximizing vehicle occupancy by promoting this initiative in the Central Business District and citywide.

As outlined in the Element, a natural consequence of growth is an increased number of trips on the City's transportation network. In a worst case scenario, each new trip created by growth could result in an additional vehicle on the network. The impact of growth can be offset, however, when several trips are satisfied by a single

vehicle. This can be done by sharing rides in personal or company owned vehicles, known as carpooling and vanpooling, or through the use of mass transit vehicles, such as buses and pedestrian mover systems. Group-riding techniques have an enormous potential for alleviating peak-period congestion. Prearranged ride-sharing functions best when both origins and destinations are concentrated within relatively small areas with a long trip in between, when arrival and departure times fall within a relatively short interval, and in instances where there is severe roadway congestion and restricted parking at the destination.

Recent research has indicated that objections to group-riding policies are deeply ingrained in most travelers. One way of overcoming this bias is by educating new drivers as to the benefits of increased auto occupancy. By amending its current parking policies for area schools, the Duval County School Board can discourage the establishment of dependence by new drivers on the private automobile as their primary transportation mode.

Mass transportation systems have the potential to significantly affect peak-period traffic. Transit vehicles and systems usually make more efficient use of existing facilities because their higher potential vehicle capacity allows more passengers to be carried over the same route or distance than private cars. However, transit vehicles must often operate on the same highway network where congestion has led to the consideration of transit as a trip alternative. The temporary reservation of one or more highway lanes for the exclusive use of buses or other high occupancy vehicles is one way to address this conflict.
Reference: click here.

Goal 2:	Reduce Vehicle Miles Traveled.
Objective 2.2:	**Promote and expand public transit opportunities.**
Action 2.2.1:	Promote and expand initiatives to develop a mass-transport link between between major destinations in the city and connections to the regional transportation network.
Action 2.2.2:	Implement program to improve mobility infrastructure for biking, walking and transit citywide.
Action 2.2.3:	Support local fixed rail projects such as the Wave, FEC Commuter Service, or Central Broward East/West Project.
Action 2.2.4:	Fund education efforts to inform residents about sustainable transportation initiatives and local options

Accomplishments:

- City has developed an employee transportation program in partnership with South Florida Commuter Services.
- City staff coordinates efforts with various outside agencies to collaborate on existing transportation initiatives such as: FEC Corridor Transit Study, Broward County 2035 Long Range Transportation Plan, and The Wave.

Promoting public transit programs will be crucial to create an environment that depends less on non-renewable resources and will enhance the quality of life. As the majority of residents depend on their vehicles and no adequate public transportation is in place, the City must strongly show their support for mass transit projects.

Comment:

Characteristic for the City of Fort Lauderdale is peak hour traffic congestion from west to east in the morning and vice versa. Planned mass transit systems will help to alleviate peak hour traffic congestions. Generally, new projects will consider local aspects, connect to existing mass transit systems and cater to transit demand.

Action 2.2.1: Promote and expand initiatives to develop a mass transportation link between major destinations in the city and connections to the regional transportation network.
The City will promote initiatives to develop a mass-transport link between the port and airport for cruise ship passengers.
Status: Continued action
Responsible Party: Transportation and Mobility
Timeline: 2-5 years
Metric: Outreach efforts
Budget: Staff time (200- 1,200 hours)
Benefits: Traffic congestion reduction.
Issues: Promoting the best mass transportation method.

Action 2.2.2: Implement program to improve mobility infrastructure for biking, walking and transit citywide.
The City will support efforts to promote active transportation by targeting infrastructure improvements in existing areas of mid to high residential density to improve connectivity to nearby commercial, recreational, and other uses. The infrastructure must be designed to provide a safe, comfortable, and accessible environment for walking and bicycling. Status: Not started
Responsible Party: Transportation and Mobility
Timeline: 2-5 years
Metric: Long Range Transportation Plan
Budget: Staff time (1,400- 4,000 hours)
Benefits: Congestion relief, improved safety and connectivity.

Action 2.2.3: Support fixed rail projects, such as the Wave, FEC Commuter Service, or Central Broward East/West Project.
Additional support is needed to improve visibility of the local TMA and to better communicate route system to potential riders.
Status: Not started
Responsible Party: Transportation and Mobility
Timeline: 1-2 years
Metric: Support efforts
Budget: Staff time (200- 1,200 hours)
Benefits: Enhanced access and outdoor environments, improved connectivity.
Issues: Costs; integration into existing mass transit systems.

Action 2.2.4: Fund education efforts to inform residents about sustainable transportation initiatives and local options.
The City will consider developing a green transportation site on the City website and expanding collaboration with transportation agencies involved in improving mobility options and GHG reduction strategies. The site will interlink with existing efforts (e.g. MPO).
Status: Not started
Responsible Party: Transportation and Mobility
Timeline: 2-5 years
Metric: Green transportation website
Budget: Staff time (1,200- 1,400 hours)
Benefits: Congestion relief
Issues: Acceptance of mass transit in the City.

Goal 3:	Plan for Alternatives to Driving Opportunities.
Objective 3.1:	**Plan and Support Alternative Driving Options.**
Action 3.1.1:	Change land use regulations to enable alternatives to driving.
Action 3.1.2:	Incentivize public/private collaboration to integrate improvements to transit, bicycle and pedestrian facilities into private development.

Accomplishments:

- The City's Sustainable Development and Transportation and Mobility Departments and others provide extensive review, comments and recommendations for all Development Review Committee projects to encourage sustainable principles such as compact site design, accommodation for pedestrians, cyclists, and users of transit, amongst other.
- The Sustainable Development Department coordinates with the City's Transportation Planner on transportation projects.

Thoughtful change to land use to influence mobility choices is critical to achieving efficiency in transportation. There is clear evidence that mixed land uses and neighborhoods with pedestrian and bicycle access to local shopping, entertainment, and recreation reduce the need for motorized trips, reduce traffic congestion, and improve air quality.

Action 3.1.1: Change land use regulations to enable alternatives to driving.
The City will expand current collaborative efforts between various departments on transportation projects as well as regional planning efforts to explore alternatives to driving.
Status: Not started
Responsible Party: Transportation and Mobility
Timeline: 1-2 years
Metric: Land use regulations
Budget: Staff time (1,200- 4,000 hours)
Benefits: Congestion relief, improved air quality
Issues: Acceptance of alternative mobility choices

Action 3.1.2: Incentivize public/private collaboration to integrate improvements to transit, bicycle and pedestrian facilities into private developments.
The City will continue to support public/private collaboration to integrate improvements to transit, bicycle and pedestrian facilities into private developments. This will include building on existing efforts (e.g. Broward County B-Cycle partnership, see recent article here).
Status: Not started
Responsible Party: Transportation and Mobility
Timeline: 2-5 years
Metric: Partnerships
Budget: Staff time (1,200- 4,000 hours)
Benefits: Congestion relief
Issues: Incentive funding

CHAPTER 8: WASTE

Goal 1:	Increase Recycling Rates by 50% by 2020.
Objective 1.1:	**Double Recycling Rates in All City Departments.**
Action 1.1.1:	Create champion of each City department to implement recycling efforts.
Action 1.1.2:	Determine recycling rates in each department and double efforts within 2 years.
Action 1.1.3:	Conduct survey to assess barriers to recycling.
Action 1.1.4:	Reduce paper consumption for documents by supporting paperless technologies.

Accomplishments:

- Nearly 50 city government locations receive weekly recycling collection service, utilizing a combination of office bins, 96 gallon recycling carts and recycling dumpsters. Each full cart diverts about 1 cubic yard from the waste stream, helping the City reduce disposal costs.
- City facilities recycle cardboard, electronic waste, printer cartridges and batteries.
- City employees have begun implementing internal waste policies and initiatives.

City staff will embark on a coordinated effort to revitalize recycling in government facilities. Individual champions can help to push for a more ambitious recycling effort. Technologies can be useful tools to assist in this effort, particularly to reduce the City's paper waste.

Comment:

The City's internal Green Team is a good platform to encourage departmental champions to implement ambitious recycling goals. It would be helpful to request quarterly reports from each champion on these efforts in order to track progress, but also to award laudable initiatives.

Action 1.1.1: Enhance Green Champions to implement recycling efforts.
The City's Green Team will assign "green champions" for City department to implement recycling efforts. These champions will be staff members who are interested or passionate about sustainability initiatives in general.
Status: Not started
Responsible Party: Public Works
Timeline: <6 months
Metric: Champions
Budget: Staff time (200-1,200 hours)
Benefits: Department specific implementation
Issues: Extra staff time; resistance from other staff members

Action 1.1.2: Determine recycling rates in each department and double efforts within 2 years.
The Green Champions will be tasked with determining the current recycling rates in each department and striving to double these within 2 years.
Status: Not Started
Responsible Party: Public Works
Timeline: <6 months
Metric: Department-wide recycling rates
Budget: Staff time (200-1,200 hours)
Benefits: Department specific implementation
Issues: Available data; extra staff time

Action 1.1.3: Conduct survey to assess barriers to recycling.
The City's Green Team will conduct a survey amongst staff with the goal of eliminating barriers that prevent employees from recycling.
Status: Not Started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Recycling survey
Budget: Staff time (200-1,200 hours)
Benefits: Information about recycling habits
Issues: Extra staff time

Action 1.1.4: Reduce paper consumption for documents by supporting paperless technologies.
The City will reduce the paper consumption for documents and increasingly make use of paperless technologies.
Status: Continued Action
Responsible Party: City Management
Timeline: 1-2 years
Metric: Number of paperless technologies
Budget: TBD; staff time (40-200 hours)
Benefits: Paper waste reduction; cost savings
Issues: Implementation cost; ease of reading electronic documents

Goal 1:	Increase Recycling Rates by 50% by 2020.
Objective 1.2:	**Increase Residential Recycling Rates in the Community.**
Action 1.2.1:	Convert residential curbside carts to automated carts.
Action 1.2.2:	Explore Pay-As-You-Throw Program.
Action 1.2.3:	Enforce existing recycling programs.
Action 1.2.4:	Support organic waste composting.
Action 1.2.5:	Provide the opportunity for recycling/reuse of plant containers numbered 5 or 6.
Action 1.2.6:	Ban or reduce single use of plastic bags.
Action 1.2.7:	Beach recycling.

Accomplishments:

- The City helped secure commitment to stimulate single stream recycling.
- Successfully launched recycling programs along the City's beaches and at selected parks and marinas
- The City has established partnerships with a number of public and private schools to expand the network of drop-off recycling opportunities within the community.
- Continued partnership with local HOAs to promote multi-family recycling through educational workshops.
- Implementation of pharmaceutical recycling.

The City will consider setting ambitious waste reduction goals, such as zero waste within the next 20 years. Communities that can find ways to do more with less will have an advantage in the future. Formulating goals to reduce waste production will include pairing enforcement mechanisms and financial incentives with any proposed ordinances. Strategies to reduce waste generation and disposal must include redirecting items that still have value for their intended purpose, expanding recycling to include more materials, more sectors and settings, improving enforcement and education to achieve greater participation; and creating financial incentives for waste prevention. Short-term strategies will include the implementation of residential single-stream recycling utilizing automated carts. A 20% recycling increase is based on similar implementation efforts in other jurisdictions.

Comment:

Wherever waste is collected, the City can provide the opportunity to divert applicable items from the waste stream towards recycling. In a sustainable community, recycling is not something people just do at home; they practice it at work as well. In order to do that, the opportunity to recycle must be there. For the recycling business, organics is the next big thing. By segregating organic materials from the waste stream, communities are able to: keep nutrients within the region, increase recycling rates, produce valued soil products, promote green jobs, and produce clean energy.

Figure W.1 shows current recycling rates. It is estimated that in 2013, with implementation of the automated recycling carts program, recycling rates will jump by as much as 30% and increase steadily by 2% over the following years, reaching a projected 93% in 2020.

Info: In the City of Fort Lauderdale, residential recycling rates almost doubled from 2007 to 2010 and are currently at around 47%. Green waste, which includes yard waste and source separated bulk trash, also doubled during the same time while landfilled solid waste decreased.

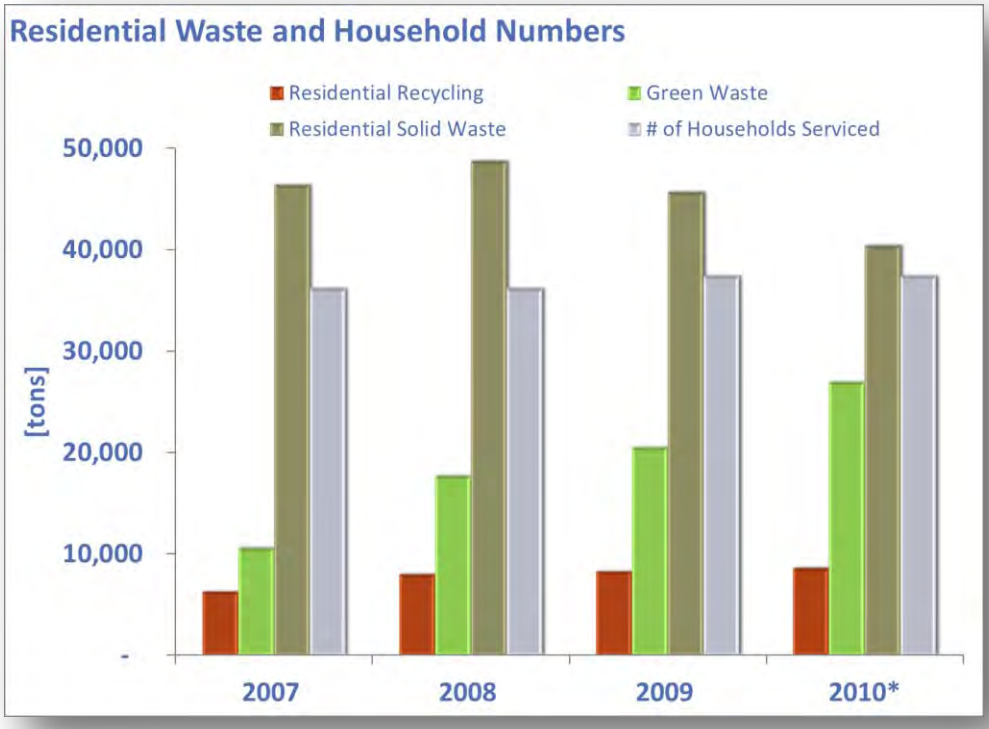


Figure W.1: Residential waste and recycling rates.

Action 1.2.1: Convert residential curbside carts to automated carts.
The City will convert all residential curbside carts to automated carts.
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Number of automated carts
Budget: > $1 million; staff time (1,200 – 4,000 hours)
Benefits: Increased waste collection efficiency and safety
Issues: Implementation costs

Action 1.2.2: Explore Pay-As-You-Throw Program.
The City will consider implementing a pay-as-you-throw program, also known as unit pricing or variable-rate pricing. Residents are charged for the collection of municipal solid waste based on the amount they throw away. This creates a direct economic incentive to recycle more and to generate less waste.
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: PAYT Program
Budget: TBD; staff time (40 – 200 hours)
Benefits: Reduced waste
Issues: Illegal dumping

Example Feasibility Study Boroughs of Leechburg and Kittanning

The Boroughs of Leechburg and Kittanning, PA issued a feasibility study on Pay-As-You-Throw (PAYT) programs. PAYT, which also known as variable rate pricing or unit pricing, is a system under which residents pay for municipal solid waste (MSW) services per unit of waste collected rather than a fixed fee. As a result, PAYT encourages waste reduction and subsequently greater recycling rates. Both cities have curbside recycling services as well as drop-off recycling centers and special collection days for bulky items, such as household appliances and tires. It was determined that a PAYT program is feasible for Kittanning Borough as the City provides their own waste hauling services and it has access to a local recycling facility. An advantage of the PAYT program is that it gives customers a direct economic incentive to reduce the amount of waste generated either through recycling or source reduction. A disadvantage is a perception that illegal dumping will increase once residents are asked to pay for each container of waste generated. According to the EPA, most communities with PAYT programs have found this not to be the case, especially when they offer their residents recycling, composting, and other programs to allow individuals to reduce waste legally. Sticker programs have been developed in some communities with PAYT to provide a legal outlet for bulky waste disposal. For lower income residents, coupon or voucher programs are being used to reduce trash collection costs.
Reference: click here.

Action 1.2.3: Enforce existing recycling programs.
The City will enforce the multi-family recycling ordinance. Whenever possible a 1-to-1 or pairing of trash and recycling containers is recommended.
Status: Not started
Responsible Party: Public Works
Timeline: < 6 months
Metric: Recycling rates
Budget: Staff time (200 – 1,200 hours)
Benefits: Reduced waste
Issues: Willingness to recycle

Action 1.2.4: Support organic waste composting.
The City will work in concert with the County to achieve the goals set out by the County's climate action plan: 1) Establish organics processing and markets infrastructure to accept green waste, woody wastes and other organics. Support the current state ban on disposal of segregated yard trash loads to ensure highest and best use of yard trash including composting and mulching; 2) Extend green waste recycling to residences through modification of municipal solid waste franchise agreements to provide separate collections of yard waste and possibly other organics. Establish and support increased recycling of yard waste at residential drop-offs; Establish programs to implement food waste recycling and composting programs, including food generated by supermarkets, schools, institutions or large commercial food preparation settings to appropriate facilities for composting; direct the processing and recycling of green and woody waste generated from road and right-of-way maintenance.
Status: Not started
Responsible Party: Public Works
Timeline: 2-5 years
Metric: TBD
Budget: Staff time (1,200 – 4,000 hours)
Benefits: Keep nutrients within the region, increase recycling rates, produce valued soil products, promote green jobs, and produce clean energy
Issues: Odor problems with improper composting

Action 1.2.5: Provide the opportunity for recycling/reuse of plant containers numbered 5 or 6.
The City will explore different approaches for either recycling or reusing black plastic plant containers numbered 5 or 6. Currently, these containers are not allowed in residential recycling. Sellers might be required to take them back, perhaps using a container deposit as an incentive for the buyer to return them.
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: TBD
Budget: Staff time (200 – 1,200 hours)
Benefits: Increased plastics recycling, particularly in an environment with significant planting activities
Issues: Willingness to recycle.

Action 1.2.6: Ban or reduce single use of plastic bags.
Studies show that Americans used almost 90 billion retail bags in 2003, a small percentage of which are reused or recycled. While many retail establishments, as well as entire cities such as San Francisco and Washington, DC, have taken steps to address this problem, the use of plastic bags remains ubiquitous and threatens the environment due to improper disposal and the sheer wastefulness of single use. The City can take a position on this issue; pass a resolution in support of a fair and meaningful approach to reducing plastic bag usage, and advocate for action by the State via our legislative lobbyist. Action would be based on the Florida Department of Environmental Protection (DEP) Retail Bag Report published on February 1, 2010, which provides regulatory and non-regulatory options for reducing disposable retail bags. The bag laws in both D.C and Maryland provide a financial incentive to businesses for following the law. The laws encourage use of reusable bags.
Status: Not started
Responsible Party: Public Works
Timeline: 2-5 years
Metric: TBD
Budget: Staff time (1,200 – 4,000 hours)
Benefits: Increased plastics recycling, reduced waste
Issues: Willingness to participate.

Action 1.2.7: Beach Recycling.
Our beach, one of the jewels of the City and source of huge amounts of waste, is a critical place to provide recycling containers next to each trash container.
Status: On-going
Responsible Party: Parks & Rec
Timeline: 6-12 months
Metric: Beach recycling containers
Budget: Staff time (1,200 – 4,000 hours)
Benefits: disposal costs and increases the material sent to the Material Recovery Facility; material for which the City receives revenue.

Goal 1:	Increase Recycling Rates by 50% by 2020.
Objective 1.3:	**Increase Commercial Recycling Rates in the Community.**
Action 1.3.1:	Non City-event recycling.
Action 1.3.2:	Incentivize deconstruction rather than demolition.
Action 1.3.3:	Conduct study to increase recycling.

Accomplishments:

- Currently, non City-sponsored events – more than 200 annually - are encouraged to recycle on the Event Application.
- City staff has a program to supply a limited number of recycling containers if requested.
- Information is provided by the City for businesses to find weekly pick-up services for recyclable items, material-specific services, and donation opportunities for used materials.

In order to stimulate recycling in the commercial sector, the first step is to conduct a baseline analysis and develop a best practices model for change. Professional consulting services are needed to evaluate existing levels of commercial recycling, recommend options for mandating and/or incentivizing impacted stakeholders, outline requirements for ordinance change, identify funding implications and strategies, and implement a pilot program.

Comment:

Businesses and restaurants/bars produce an enormous volume of waste. Offices especially have a high content of paper waste. Since all waste service providers operating in the City limits must obtain a license from the City, the City can require, as a condition of that license, that both trash service and recycling service be provided to every customer serviced. This is one approach to increase recycling levels within the City. The City can't necessarily force a business or restaurant/bar to embrace recycling as part of their routine, but the fact that it's available should be a wake up call and lead to a change in behavior from throwing everything away as trash to a behavior that entails sorting the waste in order to divert what is recyclable. In a sustainable community, recycling is not something people just do at home; they practice it at work as well. In order to do that, the opportunity to recycle must be there.

Action 1.3.1: Non-City Event Recycling.
When the City approves an event application, it strongly encourages the applicant to provide a recycling plan and make choices that minimize waste. Event coordinators can pick up recycling containers and bags if needed prior to the event and return containers after event. Many private waste haulers will provide recycling containers to their customers. The City is currently assessing to mandate recycling for events with 500 or more expected attendees and expand the Green Your Routine program to include non City-sponsored events.
Status: On-going
Responsible Party: Parks & Rec
Timeline: 6-12 months
Metric: TBD
Budget: Staff time (1,200 – 4,000 hours)
Benefits: Waste diversion; decreased waste disposal costs for the event.
Issues: Costs and staff time.

Action 1.3.2: Incentivize deconstruction rather than demolition.
The City will incentivize deconstruction rather than demolition. Demolition means any wrecking activity directed to the disassembling, dismantling, dismembering and/or razing of any structure. Deconstruction includes recycling and recovery and soft-stripping of non-structural components/parts with emphasis on reuse (salvage).
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Reduced demolition rates
Budget: Staff time (200 – 1,200 hours)
Benefits: Conserves landfill space; decreased nuisance dust and noise
Issues: Extra cost for material recovery and distribution

Action 1.3.3: Conduct study to increase recycling.
The City will conduct a study to determine the best method for increasing recycling in the multi-family/commercial sectors.
Status: Not started
Responsible Party: Public Works
Timeline: 6-12 months
Metric: Reduced demolition rates
Budget: Staff time (200 – 1,200 hours)
Benefits: Conserves landfill space; decreased nuisance dust and noise
Issues: Extra cost for material recovery and distribution

CHAPTER 8: PROGRESS TRACKING

Goal 1:	Track Progress of Sustainability Efforts.
Objective 1.1:	**Commit to Regular and Goal Oriented Reporting.**
Action 1.1.1:	Publish annual sustainability update and progress report.
Action 1.1.2:	Assure all sustainability actions are goal directed evidence based and cost-effective.
Action 1.1.3:	Seek advice from program administrators of successful sustainability programs.
Action 1.1.4:	Adopt integrated environmental management, auditing, evaluation, and revision system.

Accomplishments:

- The City produced their inaugural Sustainability Action Plan in 2010.
- GHG inventories for the years 2008 to 2010 have been reported.
- Several metrics are tracked including electricity usage, water consumption, and waste tonnages.
- The City's internal green team keeps track of sustainability initiatives.
- The Smart Watts program tracks data, surveys and evaluates participants.

Adequate staff resources will be made available to regularly report progress on all sustainability initiatives. Progress on such sustainability programs and towards goals will be updated at least annually. Progress will be reported as objective measurements of goals that actually benefit our citizens. Specific targets will be followed and monitored to determine progress. A standardized sustainability management system would help assist staff in this effort while emphasizing the City's commitment to accountability.

Comment:

The Sustainability Advisory Board recommended that a sustainability management system should be established that fully integrates into the City's administrative, budgeting, and auditing process. The Sustainability Advisory Board resolution suggests how to gradually implement the development and measurement of outcomes into the City's culture, and sets a conservative timeline for doing so. (also see Citizens Sustainability Report, 2010, p. 21).

Action 1.1.1: Publish annual sustainability update & progress report.
The City will commit to publish an annual sustainability update and progress report. The annual report will specify how well the programs are progressing towards meeting the goals for which they were intended. An annual greenhouse gas inventory should be included as an integral part of such reports.
Status: Continued action
Responsible Party: Public Works
Timeline: <6 months
Metric: Annual report
Budget: Staff time (40-200 hours)
Benefits: Performance tracking
Issues: Staff time

Action 1.1.2: Assure all sustainability actions are goal-directed, evidence-based and cost-effective.
City program managers and recipients of grants and contracts will collect and report performance information in terms of goals or outcomes. City staff, in conjunction with a citizen workgroup, will research and perform fact-finding on various methodologies. This helps to support and show the effectiveness and cost-effectiveness; such determinations will be done before initiatives are implemented.
Status: Continued action
Responsible Party: City Management
Timeline: <6 months
Metric: Goal analysis
Budget: Staff time (200-1,200 hours)
Benefits: Performance tracking
Issues: Staff time

Action 1.1.3: Seek advice from program administrators of successful sustainability programs and from individuals with particular expertise in this area.
The City will develop and reward a culture that encourages knowledgeable individuals who are not on staff to participate. The City will take advantage of the “wisdom of the crowd". Additional training of staff in sustainability issues will be considered.
Status: Continued action
Responsible Party: City Management
Timeline: 2-5 years
Metric: External opinion
Budget: Staff time (1,200-4,000 hours)
Benefits: In-depth information about performance of sustainability programs
Issues: Staff time; willingness to share information

Action 1.1.4: Adopt integrated environmental management, auditing, evaluation, and revision system.
The City will consider adopting an integrated sustainability management system for performance evaluation. The City manager should appoint a staff and citizen workgroup that has the responsibility to recommend such a system. The workgroup will subsequently have the responsibility to recommend sustainability initiatives, to monitor their progress, and to recommend whatever changes are necessary to meet the predetermined goals of the initiative. The work group could assist the City Manager in research regarding various options and methodologies. Associated costs and benefits will be evaluated for the

implementation and management of such a system. A report will be delivered to the Commission.
Status: Not started
Responsible Party: City Management
Timeline: > 5 years
Metric: Report on environmental management system
Budget: Staff time (> 4,000 hours)
Benefits: Integration of sustainability efforts; performance tracking
Issues: Staff time; implementation cost

Case Study:

A highly objective and comprehensive study of integrated management systems was recently commissioned and reported by the European Union. All of the 23 cities involved in the study reported that benefits outweighed costs. However, the municipalities uniformly reported that a quantitative estimate of costs versus benefits would only be determined in the long term, between 2020 and 2030. This report appears to be the most comprehensive and objective assessment of environmental management systems (EMSs) to date. Most of the municipalities used some variation or combination of three basic management systems common to the European Union – the Environmental Management and Auditing System (EMAS), ISO 14001, and ecoBudget. Each system was evaluated for performance in delivering an integrated approach according to the following parameters: (A) Adaptability in differing administrative contexts; (B) adaptability to the whole urban area; (C) legal compliance; (D) continuous environmental improvements; (E) decentralized implementation; (F) vertical and horizontal integration; (G) stakeholder involvement; and, (H) long-term planning. The framework was distilled to five major steps repeated in annual cycles: (1) Baseline review; (2) target setting; (3) political commitment; (4) implementation and monitoring; and, (5) reporting and evaluation. In order to be successful, it was determined that a sustainability action plan must be managed as cost-effectively as possible, and must simultaneously address multiple concerns and potential outcomes across departments, geographic areas, social strata, economic interests, and political entities. It was noted that recommendations for engaging and monitoring political support were the weak points of both EMAS and ISO 14001 as individual programs. ISO 14001 was considered deficient as a management system by the US EPA in that it concentrated on processes and did not require formal outcome measurements. The assessment concluded that a combination of EMAS and ecoBudget would be the best IEMS to fulfill the parameters and framework noted above, and would fill the gaps left by any one system.

Reference: Sustainability Report Citizens Sustainability Green Committee (now Sustainability Advisory Board), 2010.

Summary of Action Items Sustainability Advisory Board Actions < 6 months 6-12 months

SECTOR	PRIORITY	LEAD	SCORE	TIME	METRIC
LEADERSHIP					
Goal 1: Lead by Example.					
Objective 1.1: Increase organizational capacity.					
Action 1.1.1: Assign City staff to implement sustainability initiatives.	1	CM	43	4	Sustainability staff
Action 1.1.2: Set aside annual budget for sustainability projects and staff time.	2	CM	42	3	Annual budget
Action 1.1.3: Create common data base of best green management practices.	3	PW	36	4	Green practices list
Action 1.1.4: Create strategic partnerships with local educational institutions and businesses; large energy and water users; regional organizations.	4	CM	33	3	Partnerships
Objective 1.2: Follow Sustainable Procurement Practices.					
Action 1.2.1: Create program to identify environmentally preferable purchasing practices.	1	FNC	42	4	EPP Policy
Action 1.2.2: Modify the City's procurement process to provide incentives for local businesses to provide sustainability related services.	2	FNC	33	3	Incentives
Goal 2: Implement and Enforce Sustainability Policies.					
Objective 2.1: Implement and Enforce Policies that Encourage Sustainability.					
Action 2.1.1: Create the City's sustainability mission and a Sustainability Element into the Comp. Plan.	1	CM	39	5	TBD
Action 2.1.2: Adopt Energy Disclosure Ordinance.	2	SD	37	3	Energy Disclosure Ordinance
Action 2.1.3: Reflect and incorporate sustainability in new and existing policies.	3	CM	34	4	Checklist
Action 2.1.4: Consider implementation of standardized energy management such as ISO 50001.	5	PW	32	2	Standard
Objective 2.2: Promote and Support Sustainability Initiatives.					
Action 2.2.1: Develop and maintain sustainability website.	1	CM	38	5	Website
Action 2.2.2: Promote Residential Energy Pledge.	2	PW	37	5	Number of pledges
Action 2.2.3: Use demonstration center for education, workshops and outreach activities.	3	PW	36	3	Events
Goal 3: Stimulate Green Local Economy.					
Objective 3.1: Recruit Green Local Workforce.					
Action 3.1.1: Support Green Training of the Local Workforce.	1	CM	36	3	n/a
Action 3.1.2: Encourage building owners to hire local design and construction professionals.	2	CM	31	3	n/a
Action 3.1.3: Create financial incentive programs.	3	CM	25	2	Financial incentives
Goal 4: Prepare for Climate Change Impacts.					
Objective 4.1: Plan for climate adaptation and mitigation.					
Action 4.1.1: Include adaptation/mitigation strategies into the City's plans.	1	SD	33	3	Strategy
Action 4.1.2: Enhance communication about climate change adaptation in coordination with other agencies and municipalities.	2	CM	27	3	TBD
Action 4.1.3: Partner with local, regional and state agencies or educational institutions to increase preparedness and mitigate risk.	3	CM	26	2	Partnerships

Summary of Action Items

Sustainability Advisory Board Actions

< 6 months

6-12 months

SECTOR	PRIORITY	LEAD	SCORE	TIME	METRIC
AIR QUALITY					
Goal 1: Reduce GHG Emissions by 20% below 2010 levels by 2020.					
Objective 1.1: Reduce GHG emissions from city operations by 20% by 2020.					
Action 1.1.1: Lobby for greenhouse gas emission targets at regional and state level.	1	CM	36	4	N/A
Action 1.1.2: Assign and train staff to report annual GHG inventory.	2	PW	33	4	Staff assignment
Action 1.1.3: Incorporate GHG emission reductions into decision-making process.	3	CM	31	3	N/A
Objective 1.2: Reduce GHG emissions from community activities by 20% by 2020.					
Action 1.2.1: Create Climate Change Challenge Program.	1	CM	35	4	Challenge program
Action 1.2.2: Assess lifecycle emissions.	2	PW	25	2	Technical report
Goal 2: Improve Air Quality in Other Sectors.					
Objective 2.1: Improve offshore air quality.					
Action 2.1: Advocate for a statewide ban of onboard incineration on cruise ships.	1	CM	35	2	N/A
ENERGY					
Goal 1: Reduce Electricity Usage by 20% below 2010 levels by 2020.					
Objective 1.1: Reduce City electricity usage by 20% below 2010 baseline by 2020.					
Action 1.1.1: Implement no cost/low cost recommendations from Energy Manager priority project list.	1	CM	42	4	Electricity reduction [kWh]
Action 1.1.2: Reduce energy use in City buildings by 20% by 2020.	2	CM	38	3	Electricity consumption
Action 1.1.3: Integrate electricity reduction goal into Capital Improvement Plan (CIP).	3	CM	35	3	Funding plan
Objective 1.2: Reduce community electricity usage by 20% below 2010 levels by 2020.					
Action 1.2.1: Evaluate data and findings from the Smart Watts Program.	1	PW	36	4	Evaluations
Action 1.2.2: Reach out to financial partners.	2	CM	35	3	Meetings
Action 1.2.3: Devise community energy strategy.	3	CM	31	3	Strategy document
Goal 2: Source 20% electricity from renewable energy by 2020.					
Objective 2.1: Set Annual Goal for Renewable Energy.					
Action 2.1.1: Assess current use of solar powered systems and set goal for community.	1	PW	40	3	Installed capacity [kWh]
Action 2.1.2: Create Annual budget for solar powered applications.	2	CM	39	3	Budget for solar projects
Action 2.1.3: Revise regulations to encourage installation of wind powered systems.	3	CM	38	3	Revisions
Action 2.1.4: Test reliability of renewable energy systems.	4	PW	25	2	Reliability tests
Objective 2.2: Create Renewable Energy Incentives for Residential and Commercial Buildings.					
Action 2.2.1: Expand financial incentives for renewable energy systems.	1	CM	32	4	Financial incentives
Action 2.2.2: Encourage real estate listings of renewable energy systems.	2	CM	31	4	Renewable energy listings

Summary of Action Items Sustainability Advisory Board Actions < 6 months 6-12 months

SECTOR	PRIORITY	LEAD	SCORE	SCORE	METRIC
WATER					
Goal 1: Reduce Water Demand by 20% by 2020.					
Objective 1.1: Incentivize, encourage and enforce water conservation.					
Action 1.1.1: Expedited, continuing escalation of high-user potable water fees in single-family zoning.	1	PW	40	4	Rate schedule
Action 1.1.2: Implement and enforce landscape ordinance requiring low-volume/avoidance watering.	2	PW	38	4	Ordinance
Action 1.1.3: Directly engage all large water users in long-range water resource planning and conservation.	3	PW	30	2	Partnership initiatives
Action 1.1.4: Consider innovative projects including harvesting rain water.	4	PW	29	1	Water collected or reused [gallons]
Goal 2: Reduce and Improve Wastewater and Stormwater Treatment.					
Objective 2.1: Improve Wastewater Treatment Infrastructure.					Wastewater flow [gallons]
Action 2.1.1: Reduce inflow and infiltration.	1	PW	38	5	Engineering study
Action 2.1.2: Study wastewater plant - solids disposal system.	2	PW	19	3	
Objective 2.2: Improve Stormwater Infrastructure.					
Action 2.2.1: Enforce policy to adhere to stormwater runoff pretreatment requirements.	1	PW	33	3	TBD
Action 2.2.2: Bio retention swales in urban areas.	2	PW	32	2	TBD
Action 2.2.3: Improve specific storm inlets to enhance pretreatment.	3	PW	28	3	Survey
BUILT & NATURAL ENVIRONMENT					
GOAL 1: Encourage and Plan Green Buildings and Development.					
Objective 1.1: Encourage and Reward Green Buildings.					
Action 1.1.1: Amend the Unified Land Development Regulations (ULDR) to add specific requirements which promote green development.	1	SD	46	5	Lobby activities
Action 1.1.2: Lobby at State level for increased energy efficiency in the Florida Building Code.	2	CM	44	5	Lobby activities
Action 1.1.3: Develop Green Building checklist.	3	SD	40	5	Checklist
Action 1.1.4: Expedite permitting for green building.	4	SD	37	4	Fast tracked permits
Action 1.1.5: Encourage green roofs using native plants.	5	SD	36	3	Rooftop garden area [sqft]
Action 1.1.6: Create green building awards.	6	SD	35	3	Annual award
Action 1.1.7: Promote development of vegetable gardens.	7	SD	34	2	Number of vegetable gardens
Action 1.1.8: Incentivize sustainable landscaping for commercial property owners.	8	SD	33	3	Incentives
Objective 1.2: Incorporate energy efficient building and land use into Comprehensive Plan.					
Action 1.2.1: Develop and expand Greenways/Blueways network and initiatives.	1	SD	41	5	TBD
Action 1.2.2: Encourage infill development or reuse/rehabilitation of existing structures.	2	SD	40	4	No.of avoided greenfield dev.
Action 1.2.3: Require future development to consider reducing demands for cooling and lighting.	4	SD	38	3	TBD
Action 1.2.4: Incentivize and encourage increased mixed use and density.	4	SD	33	2	TBD

Summary of Action Items

Sustainability Advisory Board Actions

< 6 months

6-12 months

SECTOR	PRIORITY	LEAD	SCORE	TIME	METRIC
BUILT & NATURAL ENVIRONMENT					
GOAL 2: Preserve and Expand Natural Spaces.					
Objective 2.1: Preserve and expand coastal habitats.					
Action 2.1.1: Provide more green space in residential development.	1	SD	41	5	More green space
Action 2.1.2: Enforce Ordinance to protect sea turtles.	2	SD	35	5	Lighting reduction
Action 2.1.3: Develop program to preserve natural beach environment.	3	Park	34	2	TBD
GOAL 3: Improve Energy Performance in Buildings and Infrastructure.					
Objective 3.1: Make 20% of City Buildings More Energy Efficient by 2020.					
Action 3.1.1: Reduce plug load of individual electronics in all City buildings.	1	CM	46	5	Electricity consumption [kWh]
Action 3.1.2: Develop and maintain Energy Star Portfolio for all City buildings and infrastructure.	2	PW	43	5	Database
Action 3.1.3: Establish plan to retrofit 30% of all City facilities older than 20 years (based on sqft).	3	PW	38	3	Retrofit plan
Action 3.1.4: Consider cool roofs or green roofs for City buildings.	4	PW	36	2	List of buildings
Objective 3.2: Make 20% of residential and commercial buildings more energy efficient by 2020.					
Action 3.2.1: Require energy survey before home sale.	1	SD	39	3	Energy Survey documentation
Action 3.2.2: Create green homes and businesses revolving loan fund (also see Energy Chapter).	2	SD	38	4	Loan program
Action 3.2.3: Implement energy efficient new public/affordable housing projects.	3	SD	36	2	Energy audits
TRANSPORTATION					
GOAL 1: Reduce Fossil Fuel Use in Vehicles by 20% below 2010 levels by 2020.					
Objective 1.1: Reduce Use of Fossil Fuel in City Fleet Vehicles.					
Action 1.1.1: Increase fleet fuel efficiency by 20% by 2020.	1	PW	37	5	Fuel efficiency [miles per gallon]
Action 1.1.2: Include fuel efficiency and fuel source in fleet replacement analysis.	2	PW	36	5	Fuel efficiency [miles per gallon]
Action 1.1.3: Develop strategy to reduce fleet fossil fuel usage by 1% per year.	3	PW	35	3	Fuel reduction strategy
Action 1.1.4: Aggressively expand replacement of City fleet vehicles with hybrid and alternative fuel, low CO2 emitting vehicles.	5	PW	29	3	Low carbon vehicle replacement
Objective 1.2: Reduce Community-Wide Use of Fossil Fuel.					
Action 1.2.1: Reduce vehicle engine idling.	1	PW	42	4	Signage/digital timers
Action 1.2.2: Provide a community wide infrastructure for the supply of alternative fuels.	2	CM	33	1	Feasibility study
GOAL 2: Reduce Vehicle Miles Traveled.					
Objective 2.1: Increase Vehicle Occupancy Rates and Encourage Programs to Reduce VMTs.					
Action 2.1.1: Expand flexible work hours and tele-commuting opportunities.	1	HR	41	4	City policy
Action 2.1.2: Expand availability of parking for carpools at City facilities.	2	PW	30	4	Carpool parking spaces
Action 2.1.3: Develop car pool incentive program.	3	CM	29	3	Hangtags for priority parking
Objective 2.2: Promote and expand public transit opportunities.					
Action 2. 2.1: Promote and expand initiatives to develop a mass transportation link between major destinations in the city and connections to the regional transportation network.	1	CM	40	5	Outreach efforts
Action 2.2.2: Implement program to improve mobility infrastructure for biking, walking and transit citywide.	2	SD	37	2	Mobility Bond Program

Summary of Action Items Sustainability Advisory Board Actions < 6 months 6-12 months

SECTOR	PRIORITY	LEAD	SCORE	TIME	METRIC	
TRANSPORTATION						
Action 2.2.3: Support fixed rail projects, such as the Wave, FEC Commuter Service, or Central Broward East/West Project.	3	CM	36	3	Support efforts	
Action 2.2.4: Fund education efforts to inform residents about sustainable transportation initiatives and local options.	4	CM	32	2	Green transportation website	
GOAL 3: Plan for Alternatives to Driving Opportunities.						
Objective 3.1: Plan and Support Alternative Driving Options.						
Action 3.1.1: Change land use regulations to enable alternatives to driving.	1	TM	36	3	Land use regulations	
Action 3.1.2: Incentivize public/private collaboration to integrate improvements to transit, bicycle and pedestrian facilities into private developments.	2	CM	32	2	Partnerships	
WASTE						
GOAL 1: Increase Recycling Rates by 50% by 2020.						
Objective 1.1: Double Recycling Rates in All City Departments.						
Action 1.1.1: Enhance Green Champions to implement recycling efforts.	1	PW	44	5	Green Department Champions	
Action 1.1.2: Determine recycling rates in each department and double efforts within 2 years.	2	PW	39	5	Department-wide recycling rates	
Action 1.1.3: Conduct survey to assess barriers to recycling.	3	PW	38	4	Recycling survey	
Action 1.1.4: Reduce paper consumption for documents by supporting paperless technologies.	4	CM	37	3	No. of paperless technologies	
Objective 1.2: Increase Residential Recycling Rates in the Community.						
Action 1.2.1: Convert residential curbside carts to automated carts.	1	PW	38	4	Number of automated carts	
Action 1.2.2: Explore Pay-As-You-Throw Program.	2	PW	36	4	PAYT Program	
Action 1.2.3: Enforce existing recycling programs.	3	PW	35	5	Recycling rates	
Action 1.2.4: Support organic waste composting.	5	CM	32	2	TBD	
Action 1.2.5: Provide the opportunity for recycling/reuse of plant containers numbered 5 or 6.	6	PW	29	4	TBD	
Action 1.2.6: Ban or reduce single use of plastic bags.	7	CM	28	2	TBD	
Action 1.2.7: Beach recycling	9	Park	26	4	TBD	
Objective 1.3: Increase Commercial Recycling Rates in the Community.						
Action 1.3.1: Non City-Event recycling.	8	PW	32	3	TBD	
Action 1.3.2: Incentivize deconstruction rather than demolition.	4	PW	30	2	TBD	
Action 1.3.3: Conduct study to increase recycling.	5	PW	25	3	TBD	
PROGRESS TRACKING						
GOAL 1: Track Progress of Sustainability Efforts.						
Objective 1.1: Commit to Regular and Goal Oriented Reporting.						
Action 1.1.1: Publish annual sustainability update and progress report.	1	CM	29	5	Annual report	
Action 1.1.2: Assure all sustainability actions are goal directed, evidence based and cost-effective.	2	CM	27	5	Goal analysis	
Action 1.1.3: Seek advice from program administrators of successful sustainability programs.	3	CM	22	2	External opinion	
Action 1.1.4: Adopt integrated environmental management, auditing, evaluation, and revision system.	4	CM	19	1	Report	

Energy Reduction Strategy.

City of Fort Lauderdale
Energy Reduction Strategy (ERS)

August 10, 2011

Prepared by Louis Braquet, PE & Carsie Hall, PhD

Energy Reduction Strategy Overview

As a critical component of the City's Energy Manager Program, the "Energy Reduction Strategy" (ERS) identifies and lays out a series of energy saving measures & activities that will allow the City to systematically achieve it's gross goal of more than a 1% reduction in energy use while conforming to the program's budget constrained objectives of applying no-cost & low-cost initiatives. Within this report, these energy saving activities are generally referred to as Energy Conservation Measures (ECMs), and will be presented along with additional energy and utility data management activities designed to target, track and verify results of the program. Even while using the very conservative savings claimed in this ERS report, results will more than double the savings desired by the City, or specifically they result in a minimum 2.09% energy savings Citywide.

After careful examination of the City's energy data & usage characteristics, along with a number of personal interviews of the City's energy sector leaders, and on-site inspection visits, this ERS Report recommends various ECMs that are customized for each of the **City's major Energy Sectors** as follows:

1 – Buildings (approximately 160 City buildings)

2 – Plants (2 water treatment plants, a wastewater plant, various pumps & lift stations)

3 – Fleet (approximately 1,532 City vehicles)

When the recommended ECMs in this ERS Report are implemented, they will readily surpass the City's current 1% energy reduction goal and they will offer the potential to greatly exceed these savings even further, as detailed in this report. The primary methodology for targeting and estimating these energy savings involved the historical analysis of the City's utility and fuel usage profiles in each Energy Sector to quantify their 2010 baseline energy usages, targeting the most promising ECMs for each sector, and then providing a framework for ongoing monitoring of results achieved by the program. The ERS is a practical policy document that will be incorporated into the current Sustainability Action Plan (SAP).

City Energy Sector Profiles & Analysis

Consistent with the evaluation process of the City's energy data, Figure-1 provides a summary of 2010 Baseline Gross Energy Usage by all of the City's Energy Sectors, where it can easily be seen that the major energy users include the Energy Sectors previously listed (i.e. buildings, water plants, and fleet). Accordingly, Figure-2 indicates the equivalent data by energy source (i.e. electricity, fuel oils, natural gas, etc.), while Figure-3 provides a more detailed breakdown of the Fleet Sector energy use by fuel type, gasoline or diesel.

In order to evaluate and prioritize the various energy data using an industry accepted consistent basis, the units of "million Btus/yr" (i.e. million 'British Thermal Units' per year) provides for a uniform comparison between all energy sources and will be the referenced energy units used in this report. In this Btu format, it is easy to see that:

- **Water Plants, Fleet and Buildings account for over 70% of city energy use,**
- **Electricity and fleet fuels account for over 75% of City energy consumption.**

Attempting to maintain a program focus of capturing the most value with the least amount of cost & complication, the benchmark analysis dictates that this ERS focus primarily on the 3 major energy sectors (Fleet, Buildings, & Water Plants), with a corresponding energy source focus on electricity and fleet fuel.

City Sector	Annual Usage	Units	Energy million Btu/yr	Energy %	Cost $/yr	Cost %
Wastewater Treatment	29,814,055	kWh	101,726	14%	$2,981,405	18%
Buildings	29,346,203	kWh	100,129	14%	$2,934,620	18%
Water Delivery Facilities	27,413,745	kWh	93,536	13%	$2,741,375	16%
Vehicle Fleet*	1,414,452	gal	181,861	26%	$3,331,486	20%
Natural Gas	1,639,250	therms	163,925	23%	$2,726,073	16%
Streetlights	9,993,360	kWh	34,097	5%	$999,336	6%
Distribution & Collection	8,819,333	kWh	30,092	4%	$881,933	5%
Emerg. Pumps & Generators	37,620	gal	5,218	1%	$7,735	0%
Airport Facilities	623,815	kWh	2,128	0%	$62,381	0%
Refrigerants	446	lbs	N/A	N/A	$4,312	0%
Total			**712,711**		**$ 16,670,657**	

**Reference Fleet Fuel Use Detail*

FIGURE-1: 2010 Baseline Energy Use by City Sectors

Energy Source	Annual Usage	Units	Energy million Btu/yr	Energy %		Cost $/yr	Cost %
Electricity	106,010,511	kWh	361,708	51%	$	10,601,051	64%
Fuel	1,452,072	gal	187,078	26%	$	3,339,221	20%
Natural Gas	1,639,250	therms	163,925	23%	$	2,726,073	16%
Refrigerants	446	lbs	N/A		$	4,312	0%
Total			**712,711**		**$**	**16,670,657**	

FIGURE-2: 2010 Baseline Energy Use by Energy Source

2010 Fleet Fuel Usage Profile								
Diesel			**Gasoline**			**Combined**		
Gallons	**Energy MMBTu**	**Cost $**	**Gallons**	**Energy MMBTu**	**Cost $**	**Gallons**	**Energy MMBTu**	**Cost $**
408,396	56,359	$ 1,007,645	1,006,057	125,757	2,328,518	1,414,452	182,116	3,336,163

FIGURE-3: 2010 Detail of Fleet Sector Energy Use By Fuel

Within each Energy Sector, specific analysis & criteria was used to further focus ECM applications for meeting the scope of this project, specifically targeting the "most value for the buck with least complexity", which will be explained in more detail in each Energy Sector's specifics later in this report.

The target ECMs being recommended represent the result of an evaluation process where more costly and more complex options were eliminated in favor of those providing low/no-cost, focused implementation, with relatively simple monitoring for results, and opportunities for significant savings impacts. Simply providing dozens of energy-saving options in each sector, regardless of their cost, complexity, and payback potentials was not a consideration in this project's scope.

ERS Savings Targets, Sector Goals, & Tracking Results

ERS Energy Savings Targets

The ERS deployed a targeting strategy for a minimum 1% reduction in City energy consumption (mmBtu/yr basis) assuming very conservative results and further breaks down the City target goal into each major Energy Sector, and then by each ECM recommended within that sector. The combined implementation of the suggested ECMs will result in achieving a minimum of 2.09% Citywide savings, well above the City's 1% goal.

Using the City's 2010 Benchmark data (reference Figures-1 & 4) with a gross annual energy consumption of 712,711 mmBtu/yr, the minimum desired savings from the ERS will be 1% of that annual value, or specifically 7,128 mmbtu/yr. Figures-4 displays the City's energy use parameters, while Figure-5 shows the actual net savings for each Energy Sector by fuel types for implementation of all ECMs recommended in this ERS as detailed in the following section.

SUMMARY - 2010 CITY ENERGY USAGE PARAMETERS:

Class	2010	units	btu/unit	mmbtu	% of Total
Electricity	**106,010,511**	kwh	3,413	361,813.9	**50.8%**
Gasoline - Fleet	1,006,057	gal	125,000	125,757.1	17.6%
Diesel - Fleet	408,396	gal	138,690	56,640.4	7.9%
Diesel Gen-Sets	37,620	gal	138,690	5,217.5	0.7%
Nat Gas	1,639,250	therms	100,000	163,925.0	23.0%
			TOTALS	**712,711**	100%
			ERS Program's Target 1% of TOTAL =	**7,127.1**	mmBtu

FIGURE-4: City Energy Use by Major Sectors

Target ECMs by Energy Sector & Source Goals	Minimum % Save	Net Impact For 'TOP-Sites' Only (2010 Data) mmbtu	*% of Gross City's Energy Type*
Electricity - Buildings	9.6%	5,427.2	*1.50%* Electricity (KWH)
Electricity - Plants	3.0%	5,921.2	*1.64%* Electricity (KWH)
Gasoline - Fleet	2.3%	2,892.4	*2.30%* Gasoline
Diesel - Fleet*	1.2%	679.7	*1.20%* Diesel
Nat Gas - Buildings**	0.0%	-	*0.00%* Nat Gas

NOTES:

** Not All ECMs can be equally applied to Diesel Fleet*

***Nat Gas Savings Inherent to Electric HVAC ECMs*

14,920.5 Minimum ERS BTU Savings

2.09% Minimum % Saved Gross City Energy

FIGURE-5: Targeted ERS Net City Savings and by Major City Energy Sectors

Sector Goals & Savings Methodology

The City's 1% energy savings goal was focused on those Energy Sectors and facilities within each sector, which will benefit most from the recommended ECM implementations. This ERS report details the estimated impact of each recommended ECM and provides the sum value of all ECMs suggested for that sector. Generally, the ERS will take credit for the most conservative of potential savings for each ECM.

Specifically, many ECMs recommended for Building, Fleet, & Plant Sectors will have industry proven track records with well-documented savings achievements of a given range, with variations for climate zones and a site's specific particulars. However, to maintain our ultra-conservative approach, the ERS will typically assume credit for only 75% of the lower end of those savings potentials. In addition, when deploying multiple ECMs within a site, their impacts tend to influence each other such that gross savings are not simply a sum of each ECM. Therefore, to better account for this "diversity" issue, the net "cumulative" savings is further reduced to 80% of the value for each ECM. The net result of applying both of these conservative estimating procedures is that the ERS will only be taking credit for 60% of the lowest savings potential for each ECM presented!

ERS Savings Calculation Example:
If a recommended ECM suggests an anticipated savings range of 4% - 10% in typical applications, then this ERS Report would only claim a net savings of 2.4% as follows:

> ECM savings calculated as 75% of the lowest range value of 4%, or 3.0%, and then reduced to account for the cumulative effect of multiple ECMs by reducing that ECM savings to 80%, resulting in a net savings of 2.4%.

As seen in the above example and for purposes of this ERS Report, an ECM with a savings target range of 4% - 10%, would only be assumed to provide the City with a net 2.4% savings. Obviously, the tendency will therefore be for the City to experience much greater savings than those claimed in this ERS report.

Each targeted Sector was segregated for an efficient concentration in deploying suggested ECMs. For instance, the City energy data analysis indicated:

- That a substantial portion of all energy usage in the Buildings Sector was in the Top-Tier Buildings, such that ~16% of all City electricity is used at only 10 building sites.
- That ~55% of all City electricity use is used at 9 pumping sites, referenced as Top-Tier Plants.

Figures-6 & 7 provide the energy use data specific to these Top-Tier Buildings and Top-Tier Plants accordingly.

This type of "focused deployment" allows the City to more easily manage the implementation of the ECMs while achieving a large portion of the anticipated results, instead of attempting to deploy ECMs at all sites throughout the City. It also significantly reduces the costs & complexities of the program while still achieving the desired results. The specifics and profiles of these Top-Tier sites will be further explained in each Sector's plan.

2010 Benchmark Data - Top-Tier Buildings					
Account #	Address	Department	ID	kWh 2010	Billing 2010
2297943363	1300 W BROWARD BLVD	Police	Police HQ	4,990,533	$388,342
2244041303	100 ANDREWS AVE	Public Services	City Hall	3,360,000	$260,442
2256049319	100 SE 1st Avenue	Parking	I assume a parking garage	2,040,480	$157,214
5888049284	800 NE 8th Street	General	Park, Holiday - W.M. Audit. Off	1,190,933	$117,093
5645342311	501 Seabreeze Blvd. # SV/	General	ISHOF Vault?	1,115,120	$96,261
828416321	528 NW 2nd Street # FIRE	Fire	Fire Station 2	941,680	$74,438
5643348369	501 Seabreeze Blvd.	General	International Swimming Hall of	889,760	$75,255
9027947408	6000 NW 21st Ave # FIRE	Fire	Fire Station 53	724,560	$58,568
7764692294	700 NW 19th Avenue	General	Planning, Building, and Zoning	700,000	$61,881
2282295001	1450 W Sunrise BLVD #CC	Parks and Rec	Carter Park - Concesion, Press	611,040	$74,464
Totals				16,564,107	$1,363,959
% of Total City Electricity				16%	

FIGURE-6: Energy Use at the 10 Top-Tier Buildings (~16% of All City Energy)

2010 Benchmark Data - Top-Tier Plants					
Account #	Address	Department	ID	kWh 2010	Billing 2010
7206647369	4301 NW 9TH AVE #FIVE/	Fiveash	Water Treatment Plant	15,118,933	$1,138,613
7214646379	1500 SE 18TH ST #GTL W\	GTL	Wastewaster Treatment	11,628,800	$951,071
7213648343	1400 SE 18TH ST #GTL W\	GTL	Wastewaster Treatment	11,509,333	$774,731
7697302573	1500 S STATE ROAD 7 # W	Fiveash	Water Treatment Plant	5,386,560	$443,838
3952444077	1500 SE 18TH ST #GTL W\	GTL	Wastewaster Treatment	4,275,200	$441,958
7154948140	3401 W PROSPECT RD # \	Fiveash	Wellfield	3,251,840	$269,369
2164188035	5050 W BROWARD BLVD	Fiveash	Fiveash Generator Bld & Well F	2,829,120	$221,245
7176949118	3501 W PORSPECT RD # \	Fiveash	Wellfield	2,205,467	$179,832
848846002	4000 NE 25TH AVE #SEW/	D & C	Sewage Pump	1,624,533	$170,079
Totals				57,829,787	$4,590,737
% of Total City Electricity				55%	

FIGURE-7: Energy Use at the 9 Top-Tier Plants (~55% of All City Energy)

Result Monitoring & Tracking

By tracking energy data in the same sectors in future years (adjusted for weather & utilization factors) the City can readily monitor the results of the ERS strategy. The baseline or benchmark data discussed in this report is the City's 2010 energy data as presented in these reports, which will be used as the "before" or "base case" for all ECM implementations. It is critical to point out here that simply tracking $-cost values is NOT appropriate since utility rates & fuel adjustments can vary greatly over time, resulting in a total skewing of cost savings. The ONLY way to track future savings is on an energy-unit usage basis adjusted for annual weather parameters with some consideration for facility utilization parameters (such as a 'total fleet miles driven/yr index', or 'total gallons of water pumped/yr index', etc.), which will be explained in more detail in each Sector's ECM recommendations.

NOTE that it was stressed in the City interviews that these "facility usage benchmark indexes" must be established ASAP, using the most current and best data currently available. These benchmark indexes can then be adjusted and refined in future years as the energy program evolves. Both fleet operations and public works identified data that could be used such as annual miles driven, or annual gallons pumped, etc. The building facility usage index may be slightly more difficult to establish, but tracking hours of operation, employee or visitor headcounts, etc. could be a useful basis for such an index. Weather data is also critical to comparing various years' energy usage, especially in the Building Sector (annual rainfall data may be useful in the Plant Sector as well), and programs are available to automatically account for these weather variations, such as the ENERGY STAR Portfolio Manager's free, online program.

City Utility Accounts Auditing Process

With as many utility accounts as the City has, it is extremely important that energy data is being tracked and accounted for properly, and that the City is not paying for erroneous accounts, improper meter numbers / locations, or for accounts that are not on the most advantageous utility rates. **Because ensuring proper energy use data is being accounted for is critical to the targeting and verification processes detailed in this report,** it is strongly recommended that the City establish a utility account auditing process to monitor and confirm (audit) all City utility accounts, to verify service location, utility meter number with account number, and that utility rate(s) are correct. While this is more of an accounting auditing process, this activity has significant potential to identify invalid account billings, wrong meter accounts, and more expensive utility rate and cost factors. Implementation costs associated with this process are minimal once the program's format has been established, which can be done in-house or via a 3rd party program.

While this utility auditing process does NOT directly reduce energy use, it can have quite a positive impact on reducing energy costs for the City, especially if wrong-meters, crossed accounts, or improper rates are uncovered. No energy savings are being directly claimed for this activity, although it offers significant potential for dollar-savings as well as supplying validation of the energy data used in this program's benchmark & verification process.

Overview of City ECM Targets

The following sections of this ERS document provide the details of the ECMs (energy conservation measures) as targeted for each of the City's 3 primary Energy sectors as follows:

1 – Building Sector (approximately 160 City buildings)
2 – Plant Sector (2 water treatment plants, 1 wastewater treatment plant, pumps, lift stations)
3 – Fleet Sector (approximately 1,532 City vehicles)

As was previously discussed, it is noted that the ECMs listed for each City Energy Sector take into account the specific parameters of this project, such as the restricted implementation budget, recommendations to be relatively easy to implement, and with a low-cost / no-cost focus. The ECMs take into account the electric & fuel energy profile of the entire city, as well as each Energy Sector's specifics, and include the results of numerous interviews with City personnel as well as site visits.

The target ECMs provided in the following sections represent the result of an evaluation process where more costly and more complex-to-implement ECMs were eliminated in favor of those providing low/no-cost, focused implementation, relatively simple monitoring for results, and opportunities for significant savings impacts. **Figure-8 shows the actual net savings for each Energy Sector by fuel types with an indicated 2.09% Citywide energy savings for implementation of all ECMs recommended in this ERS report, as detailed in each Sector's ECM write-up.**

It should be further noted that simply providing dozens of energy-saving options in each sector, regardless of their cost, complexity, and payback potentials was not a consideration in this project's scope.

Target ECMs by Energy Sector & Source Goals		Net Impact For 'TOP-Sites' Only (2010 Data)	
	Minimum % Save	mmbtu	% of Gross City's Energy Type
Electricity - Buildings	9.6%	5,427.2	*1.50%* Electricity (KWH)
Electricity - Plants	3.0%	5,921.2	*1.64%* Electricity (KWH)
Gasoline - Fleet	2.3%	2,892.4	*2.30%* Gasoline
Diesel - Fleet*	1.2%	679.7	*1.20%* Diesel
Nat Gas - Buildings**	0.0%	-	*0.00%* Nat Gas
NOTES:			
** Not All ECMs can be equally applied to Diesel Fleet*		**14,920.5**	Minimum ERS BTU Savings
***Nat Gas Savings Inherent to Electric HVAC ECMs*		**2.09%**	Minimum % Saved Gross City Energy

FIGURE-8: Citywide Net Energy Savings by Major City Energy Sectors

City ECM Recommendations by Energy Sector

The Buildings Sector

Buildings Sector Benchmarking, Measurement & Verification Process

The Building Sector, which includes over 160 buildings, energy team will develop an energy-use benchmark parameter(s), which will then be used to monitor, verify, and adjust ECM programs to confirm achievements and identify weak spots that need adjusting. These benchmarking parameters are a valid and necessary "efficiency program tool" used to target, monitor, adjust & confirm that conservation programs are obtaining required results. This monitoring program can be developed by the City internally or used via a 3rd party software based program such as ENERGY STAR's Portfolio Manger Program.

Specifically, the Buildings Sector tracks electricity utility usage and site size (square-footage) on both a Citywide and individual building basis to determine variations from the 2010 benchmark energy-usage basis that can be adjusted for various impacting conditions such as weather, building usage / function, and occupancy patterns. Tracking these benchmarking comparisons results will target sites that display high use (on a comparative Btu per square-foot basis) or displays increasing energy usage above its past usage history, for a closer focus by the City energy team.

While the ECMs presented in this section would generally apply to most all of the City's 160 Buildings sites, it is critical to point out here that the savings estimates presented in this ERS project ONLY take into account the ECM implementation at the 10 locations of Top-Tier Buildings sites (see site reference listing in Figure-6). By initially focusing on these Top-Tier sites, we can stay consistent with the project scope of making implementation as easy and as focused as possible, while obtaining "the most bang for the buck". That said, in the future these ECMs should be considered for all applicable Buildings sites, whereby ultimate savings would accordingly be appreciable higher for the City.

The ERS analysis focused recommendations for the Buildings sector on 4 ECM activities:
1 – Plug Load & Occupant Engagement
2 – 2° F Occupied (Day) Building Temperature Re-Set
3 – 5° F Unoccupied (Night) Building Temperature Set-Back
4 – 2° F Chilled Water Re-set

These 4 ECMs are detailed later in this section, but Figure-9 displays their summary targets and impacts values, with all 4 ECMs providing a Building Sector savings estimated at 9.6% and a net savings impact to the City's overall energy usage of 0.76%:

	Sector	Energy Use mmBtu/yr	SAVINGS Savings % ECM - %	Saved mmBtu	TOTAL mmBtu	Total Sector % Saved	Total City % Saved
B.	**Buildings: Top-Tier**	56,533					
	ECM Description						
B-1	Plug Loads Occupant Engagement(Typical 4-10% savings)		2.4%	1,357			
B-2	2*F Day Temp Re-Set (Typical >2% per degree)		2.4%	1,357			
B-3	5*F Night Temp Set-Back (Typical >1% per degree)		3.0%	1,696			
B-4	2*F Chilled Water Re-set (Typical >1.5% per degree)		1.8%	1,018			
	TOTALS for Buildings Sector		**9.6%**	**5,427**	**5,427**	**9.6%**	**0.76%**

FIGURE-9: Buildings Sector ECMs & Savings

Buildings Sector ECMs

1. ECM B-1: "Active Plug Load Management with Occupant Engagement" –

As can be seen in Figures-10 & 11, electricity usage in typical commercial buildings includes a rather sizable component that accounts for what is termed "plug loads". Plug loads generally designate electric equipment & appliances that are plugged into wall outlets and not hard-wired into the building's permanent electrical system. Figure-10 indicates that depending on the exact circumstances, these plug loads can account for 25% of a building's total electricity usage. In addition, recent studies indicate that these plug loads are increasing as more and more technology is deployed in the workplace. Figure-11 provides some additional details of what specific items are typical for office electric technology plug loads, such as computers, monitors and printers, etc. However, it is important to keep in mind that other items that are not classified as office technology are also included as plug loads, such as vending machines, space heaters & fans, small cooking & microwave units, coffee machines, desk lighting, radio & TV units, etc.

During interviews with City Staff it was brought to light that there were some high draw plug load items being used in the buildings and additional items were regularly left running and / or unattended. By mitigating & actively controlling the usage of these plug load items, overall building energy use can be lowered resulting in gross building energy

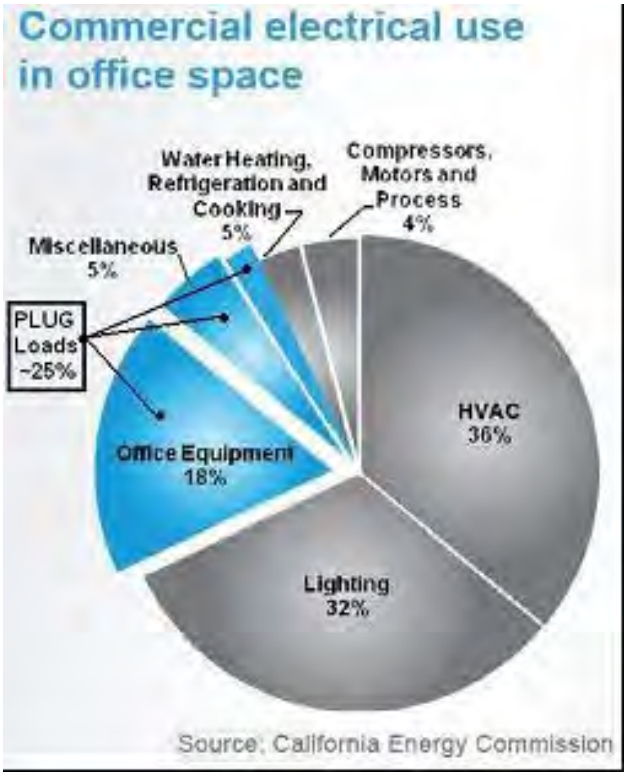


FIGURE-10: Typical Gross Electricity Usage in Commercial Buildings

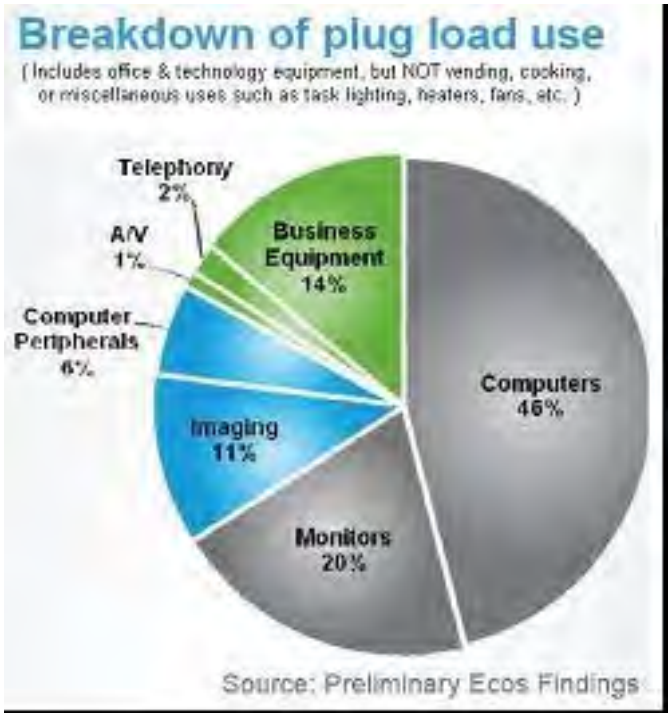


FIGURE-11: Typical Office Technology Plug-Load Electricity Usage

Implementation of this ECM B-1 includes a broad range of applications as follows:

- **Behavioral changes - i.e. manually turning off task area equipment like workstation lights, radios, fans, PCs, monitors and printers, wearing appropriate clothing levels to accommodate seasonal temperature changes in the office space**

- **Reductions in plug-load energy through occupant engagement, especially targeting limited use of electric space heaters, coffee-makers, and other high-energy use appliances**

- **Deploying the use of energy-saving computers, monitors, copiers, vending machines, etc. Implement a policy that only purchases ENERGY STAR rated office equipment for new purchases or equipment upgrades, and targets high use / high heat items such as older model CRT monitors replaced with new LCD ENERGY STAR rated models.**

- **Corporate-level IT controls for PC shutdown or hibernation modes during non-office hours such as deployed through a network power management software program.**

- **Some degree of automation may be required to fully implement this ECM such as occupancy power strip monitors, cooking & vending machine controllers, and other central use equipment monitoring devices.**

Projected Energy Savings:

This ECM B-1 will typically be expected to result in energy savings in the range of 4% to 10%. However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 2.4% of annual energy use in this sector.

Because this ECM addresses direct occupant behavioral activities it requires a significant level of motivation & buy-in in order to be successful. Because occupants have likely not been required to "sacrifice" any comfort (space heaters & fans) or satisfaction criteria in the past, implementation can be expected to be met with resistance. Training & motivational support, such as daily & weekly e-mails, posters and recognition activities are mostly successful in these circumstances with typically minimal cost to implement. Once occupants become actively "engaged" in saving plug load energy, results are quite impressive. Of course, supplying occupants with proper tools, training, and energy management devices is also critical to their cooperation and ultimate program success.

2. ECM B-2: "Occupied (Daytime) Temperature Re-set" –

By increasing the air conditioning supply-air setpoint temperature during occupied times by >2 degrees, from 72°F to 74°F (or up to 76°F), significant energy savings can be realized while also lowering the annual run time loading of the equipment.

Projected Energy Savings:

This ECM B-2 will typically be expected to result in approximately a 2% energy savings for every degree the occupied setpoint temperature is raised, **with estimated energy savings in the range of 4% for the recommended 2 degree temperature raise. However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 2.4% of annual energy use in this sector**, or more if the temperature level is increased above the recommended 74°F, up to 76°F.

While most City facilities may not have the proper controls in place to readily accomplish this ECM, the level of control required (simple set-back timer T-stats installed at main air handler & fan coil units) is minimal and typically inexpensive. This ECM should not require an expensive new energy management system (EMS) to be installed and as such, paybacks of under 2 years should be anticipated, especially when combined with ECM B-3 below.

3. ECM B-3: "Unoccupied (& Nighttime) Temperature Set-up" –

By increasing the unoccupied supply-air setpoint temperature from 74°F (see ECM B-2 above) to a minimum of 79°F, significant energy savings can be realized while also lowering the annual run time loading of the equipment.

Projected Energy Savings:

This ECM B-3 will typically be expected to result in approximately a 1% energy savings for every degree the unoccupied setpoint temperature is raised. This ECM should result in a 5% energy savings **with** a 5°F raise from 74°F to 79°F. **However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 3% of annual energy use in this sector**. Even more savings can be realized if the temperature level is increased above the recommended 79°F.

While most City facilities may not have the proper controls in place to readily accomplish this ECM, the level of control required (simple set-back timer T-stats installed at main air handler & fan coil units) is minimal and typically inexpensive. This

ECM should not require an expensive new energy management system (EMS) to be installed although some timer-programming may be required to ensure that the space has achieved the desired occupied temperature by the time occupants arrive. Regardless, the recommended settings should be sufficient for "reasonable" comfort levels should unusual events cause unexpected occupancy. Accordingly, paybacks of under 2 years should be anticipated, especially when combined with ECM B-2 above.

4. ECM B-4: "Chilled Water Reset" –

Increasing the chilled water supply temperature from 42°F to 44°F (especially during lower cooling load times during unoccupied time and night time) will result in compressor energy savings of approximately 1.5% for every degree the chilled water supply temperature is raised. This ECM should produce energy savings of approximately 3%, **although 1.8% savings is conservatively assumed for this project.** Even more savings can be obtained if the temperature-reset level is increased above the assumed 44°F.

Projected Energy Savings:

This ECM B-4 will typically be expected to result in approximately a 1.5% energy savings for every degree the chilled water supply temperature is raised. This ECM should therefore result in a 3% energy savings **with** the recommended 2°F raise from 42°F to 44°F**. However, consistent with the 'ERS Savings Methodology' as previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 1.8% of annual energy use in this sector**. Even more savings can be realized if the chilled water reset temperature level can be increased above the indicated 44°F.

Implementation of this ECM B-4 should be relatively straightforward as most central chiller systems are equipped with this type control option, or can be readily adapted to accommodate the control. Of course, this ECM will require some professional HVAC system evaluation prior to implementation to ensure proper system operation & equipment safety parameters, which may require some additional control of the chiller interconnected cooling tower systems. Many HVAC contractors may not be willing to deal with this control scheme since it requires more involvement than simply operating the system 24-7 on a single, lowest 42°F setting, even though that approach typically results in wasted energy.

The Fleet Sector

Fleet Sector ECM Benchmarking, Measurement & Verification Process

The City's Fleet Energy Sector, consisting of approximately 1532 vehicles, will develop an energy-use benchmark parameter(s), which will then be used to monitor, verify, and adjust ECM programs to confirm achievements and identify weak spots that need adjusting. These benchmarking parameters are a valid & necessary "efficiency program tool" used to target, monitor, adjust & confirm that conservation programs are obtaining required results. This monitoring program can be developed by the City internally or used via a 3rd party software based program such as DOE, Vehicle Manufacturers, or DOT Energy Programs.

Specifically, the Fleet Sector will track energy usage parameters (gasoline & diesel fuel), and vehicle particulars (miles driven & MPG target) on BOTH a fleet-wide and an individual-vehicle basis to determine variations from a benchmark fuel-usage basis that can be adjusted for various conditions such as population patterns and/or vehicle use specifics. Tracking results will target vehicles and/or departments that have high and/or increasing energy usage for a closer focus by the City energy team. The CANceiver devices & analysis software currently being deployed by the City can readily integrate into this process as well as being a very useful tool in implementing & monitoring all Fleet ECMs.

The ERS analysis focused recommendations for the Fleet Sector on 4 ECM activities:
1 – Replacement Vehicles Increased Efficiency
2 – Reduce Annual Fleet Miles
3 – Target MPG Adherence to OEM Specs
4 – Active Driver Engagement Program

These 4 ECMs are detailed later in this section, but Figure-12 displays their summary targets and impacts values, with all 4 ECMs providing a Fleet Sector savings estimated at 2.3% and a net savings impact to the City's overall energy usage of 0.59%:

Fleet Sector ECMs

1. **ECM F-1: "Replacement Vehicles Increased Efficiency" –**
   This ECM recommends the City establish a minimum target of at least a 15% improvement in MPG ratings for new replacement vehicle as compared to retired vehicles (weighted MPG to annual miles driven method for the replaced vehicles). Obviously the key concept here is likely being practiced in some form if even by default since new vehicles generally have better efficiency ratings than comparable older

vehicles, and also that vehicle efficiencies generally deteriorate with age. However, by having a formal process in place with a minimum 15% improvement goal, results are expected to be substantial, especially as the program progresses over the years. For

	Sector	Energy Use mmBtu/yr	SAVINGS Savings % ECM - %	Saved mmBtu	TOTAL mmBtu	Total Sector % Saved	Total City % Saved
F.	**Fleet Fuels (gasoline & diesel)**						
	Gasoline	125,757					
	Diesel	56,640					
	ECM Description						
F-1	Replacement Vehicles Increased Effficiency >15% MPG		1.2%	2189			
F-2	Reduce Annual Fleet Miles (> 0.5%)		0.3%	547			
F-3	Target MPG Adherence to OEM Specs (> 0.8%)		0.5%	912			
F-4	Active Driver Engagement Program (> 0.5%)		0.3%	547			
	TOTALS for Fleet Sector		**2.3%**	**4,195**	**4,195**	**2.3%**	**0.59%**

FIGURE-12: Fleet Sector ECMs & Savings

most passenger vehicles, the savings goal can be increased well above the minimum with various considerations for different size, type, engine options, etc. With the wide mix & use types of vehicles involved in the City fleet, the fleet team is in the best position to establish and manage this ECM, therefore no specific recommendations for vehicle types was deemed appropriate here.

Projected Energy Savings:

Savings associated with this ECM F-1 assumes approximately 200 vehicles are replaced annually (assumes average replacement vehicle age of approximately 7.7 years) with a core fleet size of 1532. If the City only achieves the recommended minimum fuel efficiency increase of 15%, then results would have a positive impact on the entire fleet of approximately 2% fuel savings (assuming all vehicles were being driven similar mileage over the year). **However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 1.2% of annual fuel use in this sector**. Savings can easily be more if the efficiency improvement is increased above the recommended minimum 15%.

2. ECM F-2: "Reduced Fleet Miles Driven" –

This ECM recommends a minimum annual target of a 0.5% reduction per year in annual gross fleet miles, which is equivalent to only a 70 miles/yr reduction assuming a fleet average of 14,000 miles/yr driven. This ECM puts into practice the active encouragement or enforcement of various techniques that seek to maximize the use of the vehicles such as trip scheduling & planning by arranging visits to reduce mileage via efficient trip planning and multi-visit scheduling, which turns multiple trips into a single, more efficient trip. Much of this can be achieved at the departmental level as well through driver training programs.

Projected Energy Savings:

This ECM F-2 will typically be expected to result in a minimum 0.5% fuel savings for the initial year. Over a 10-year period, this will result in approximately a 5% reduction in annual fleet miles over present usage. **However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 0.3% of annual fuel use in this sector** (equivalent to only a 42 mile/yr reduction per vehicle assuming a fleet average of 14,000 miles/yr driven).

3. ECM F-3: "Target MPG Adherence" –

This ECM focuses primarily on regular on-road vehicles (cars & light trucks) as far as targeting a reasonable compliance with OEM's (original equipment manufacturer's) MPG ratings as an initial baseline for each vehicle. While the published MPG ratings may not exactly apply to each vehicle, there are reasonable adjustments that can be adopted but would generally still place the vehicle's efficiency in a close range to OEM's MPG. This ECM is inherently depending on a collection of well documented fleet efficiency techniques that includes proper efficient-driving techniques, reduced idling, a continued active proper maintenance program, etc. City fleet personnel were well versed in these techniques as discussed during the interviews.

A critical component to success with this ECM is an easily utilized, formal mechanism to track critical vehicle data such as miles driven fuel consumption, maintenance intervals, and the City has already taken the initiative with their recent application of the Ward CANceiver vehicle data & fuel management devices. This metric should be tracked by each vehicle although departmental adjustment(s) should be made to take into account specific use characteristics of the vehicle. As such, a departmental MPG and City-wide MPG can be tracked and used to verify results on a gross fleet basis, and to target a collective gross reduction in City-wide fuel usage.

As mentioned, continuing active proper maintenance programs are critical to this ECM (tune-ups, fluid changes, tire inflation, A/C usage techniques, etc.) and will contribute to success with this goal. In addition, this ECM can benefit through a direct coordination with ECM F-3 whereby results on both ECMs will be mutually enhanced.

Projected Energy Savings:

Savings for t**his ECM F-3 are expected to range much higher than a suggested minimum target of 0.15 MPG improvement** (equivalent to a 0.8% savings assuming a fleet average MPG of 18.0 MPG, i.e. an increase from 18.0 MPG up to 18.15 MPG would be expected). **However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 0.5% of annual fuel use in this sector**.

4. ECM F-4: Driver Engagement Program -

Because the driver has such a significant influence on a vehicle's fuel efficiency, with wasted fuel use ranging well above 30% for poor driving techniques. With simple modifications, a driver can have a huge positive impact on the efficiency of an operated vehicle. Many fleets have had significant success when implementing a well-rounded driver engagement program consisting of training, motivation, and individual feedback / recognition. This ECM F-4 recommends implementation of a comprehensive program similar to the successful one deployed at Polk County, Fla. The specific details of that program are included as an Appendix attachment to this ERS report (see Appendix) or can be accessed via the web-link provided in the Appendix.

As a brief overview, the Polk County fleet program involved a number of key elements, although not all may be acceptable to the City. Specifically, a three-pronged approach was used to modify driver behavior:

- First, the maximum travel speed of the County's on-highway vehicles was limited to 55 mph.
- An in-house Eco-Driver training program was developed to train, reinforce, and promote driving habits proven to reduce fuel consumption and assure driver buy-in, and
- The County added an incentive program to allow employees to share monetarily in their own conservation success

A number of added benefits were realized, most likely due to the 55 mph speed limiting aspect of the program, such as reduced accidents & accident costs!

Projected Energy Savings:

As with most all the ECMs included in this ERS report, energy savings would be expected to be much higher than the actual minimal values being claimed for this project's implementation. This is particularly true for this ECM F-4 because quite a bit will depend on the level of implementation, the follow-through with adherence to the program, and a combination of factors that will overlap with the other fleet ECMs recommended. For reference, the actual results in Polk County after 2 years of this ECM implementation were quite impressive with over a 13% reduction in fuel consumption and with a corresponding $1.5 million fuel cost savings!

While Polk County's levels of savings are certainly achievable, the overall approach in this ERS report has been very conservative with consideration for the City's very limited budget, especially in the beginning. Therefore, it is estimated that fuel savings associated with this ECM F-4 should be minimally 0.5%, even with a minimal implementation budget allocated. However, to be consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 0.3% **of annual fuel use in this sector**, with the understanding that actual savings should be much higher.

THE Plant (pumping) Sector

Plant Sector ECM Benchmarking, Measurement & Verification Process

The Plant Sector, consisting of numerous water pumping & treatment facilities, will develop an energy-use benchmark parameter (s), which will then be used to monitor, verify, and adjust ECM programs to confirm achievements and identify weak spots that need adjusting. These benchmarking parameters are a valid & necessary "efficiency program tool" used to target, monitor, adjust & confirm that conservation programs are obtaining required results. This monitoring program can be developed by the City internally or used via a 3rd party software based program such as the DOE's PSAT (Pumping Systems Assessment Tool – see Appendix) Programs.

Specifically, the plant Sector will track electric utility usage (kwh) and gallons of water pumped / processed on both a Citywide and an individual plant-site basis to determine variations from a benchmark energy-usage basis that can be adjusted for various conditions such as weather (rainfall amounts) and population patterns. Tracking results will target sites that have high and /or increasing energy usage for a closer focus by the City.

While the ECMs presented in this section would generally apply to most all of the City's Plant (water pumping) sites, it is critical to point out here that the savings estimates presented in this ERS project ONLY take into account the ECM implementation at the 9 locations of Top-Tier Plants sites (reference listing in Figure-7). By initially focusing on these Top-Tier sites, we can stay consistent with the project scope of making implementation as easy and as focused as possible, while obtaining "the most bang for the buck". That said, in the future these ECMs should be considered for all applicable Plant sites, whereby ultimate savings would accordingly be appreciable higher for the City.

The ERS analysis focused recommendations for the Plant Sector on 3 ECM activities:
1 - Implement DOE's PSAT Program
2 - Staff Challenge Program
3 - Inflow and Infiltration (I&I) Initiative

These 3 ECMs are detailed later in this section, but Figure-13 displays their summary targets and impacts values, with all 4 ECMs providing a Plant Sector savings estimated at 3.0% and a net savings impact to the City's overall energy usage of 0.83%:

	Sector	Energy Use mmBtu/yr	SAVINGS				
			Savings % ECM - %	Saved mmBtu	TOTAL mmBtu	Total Sector % Saved	Total City % Saved
P.	**Plants:Top-Tier**	197,373					
	ECM Description						
P-1	Implement DOE PSAT Program (3%-15% savings)		1.8%	3,553			
P-2	Staff Challenge Program (1%-10%)		0.6%	1,184			
P-3	Inflow and Infiltration (I&I) Initiative (1%-10%)		0.6%	1,184			
	TOTALS for Plant Sector		**3.0%**	**5,921**	**5,921**	**3.0%**	**0.83%**

FIGURE-13: Plants Sector ECMs & Savings

The Plant Sector energy is primarily associated with (water) pumping operations, either in drainage, sewerage, or drinking water systems. This is consistent with typical municipal water pumping operations as displayed in Figure-14, which indicates that >87% of energy in these systems is used in some sort of pumping activity. These municipal pumping systems tend to more complex and modifications more capital intensive than in the other City energy sectors, although a high-level ERS approach was considered as outlined in Figure-15.

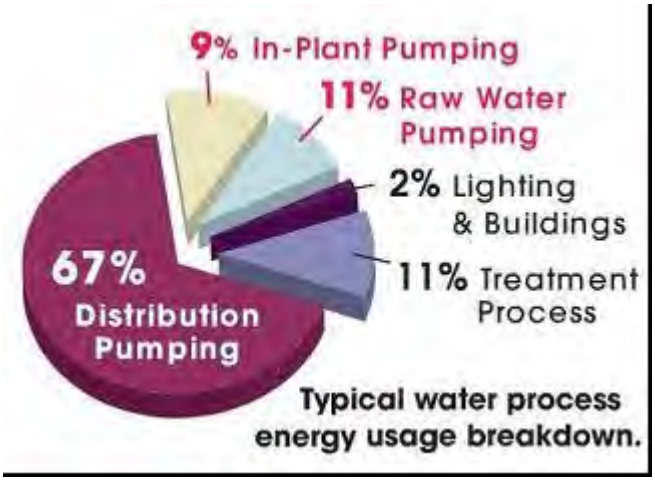


FIGURE-14: A Typical Pumping Systems Energy Usage Profile

The energy strategy approach as outline in the Figure-15 can work even for restricted budgets, since potential ECMs can be screened out for the more costly items like higher efficient motors, power factor correction systems, and new controls as indicated under "passive energy efficiency". Instead, more efforts can be assigned to those "active efficiency" areas such as pump controls & dispatch optimization, along with monitoring & modeling of the systems to tweak out additional energy savings within constrained budgets while identifying & prioritizing future capital intensive options for when budgets do become available,

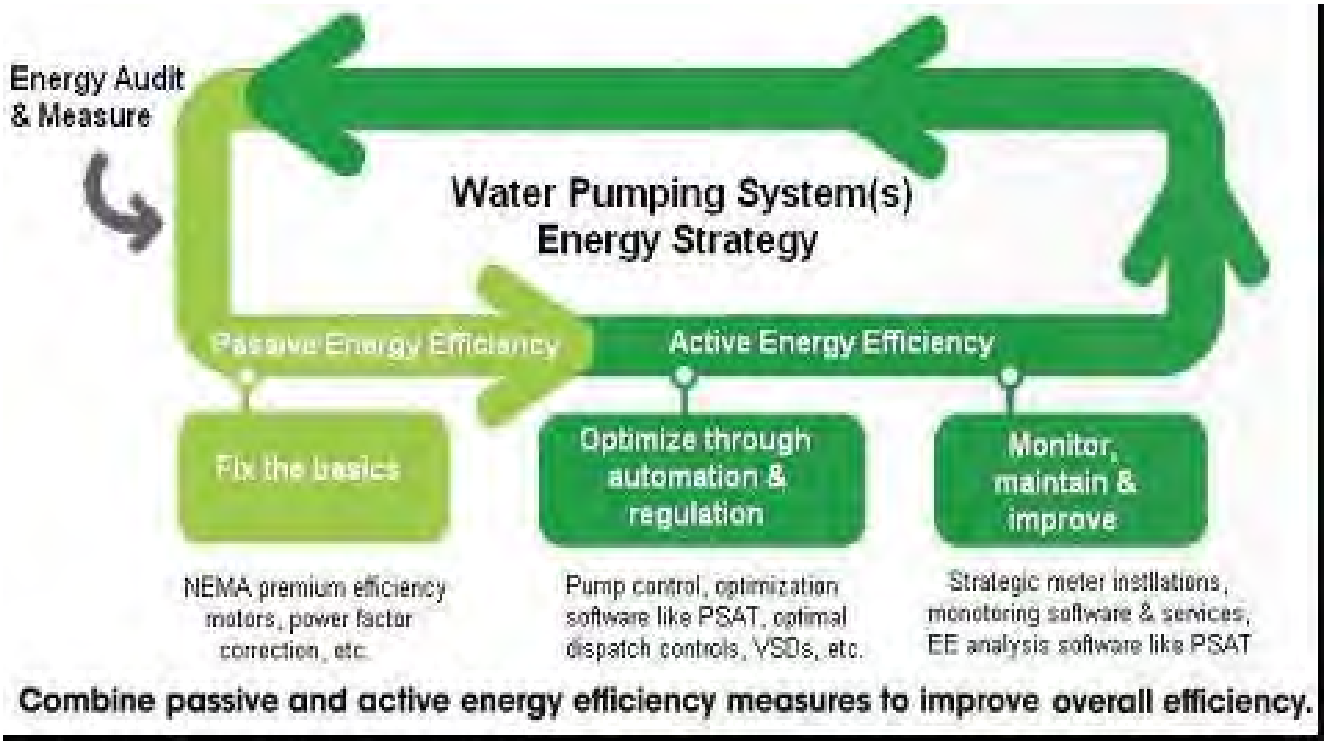


FIGURE-15: Basic Energy Strategy for Water Pumping Systems

Plant Sector ECMs

1. **ECM P-1: Implement DOE PSAT (Pumping System Assessment Tool) –**
   The PSAT program is a U.S. Department of Energy's (DOE) Industrial Technologies Program (see Appendix for web link & attachment files), integrated pumping system optimization program consisting of software, technical training, and system monitoring for optimal dispatch and efficiency. Items such as optimal system pressure(s), hierarchy of pump dispatch, VFD drive applications, and system weak points can be addressed by this program.

Because the program requires specific training and understanding of the principals addressed, 2 or 3 selective hi-tech, enthusiastic personnel should be assigned for training & certification in this PSAT program. The program is essentially "free" from DOE, although training & application costs should be minimal.

Obviously, significant energy savings in this sector will be difficult to obtain under the scope of this project since it is already a highly evaluated & monitored sector. That said, industrial sites that have fully implemented the PSAT Program, including having staff personnel certified, have experienced appreciable energy savings depending on the exact site circumstances.

An overview fact-sheet of the PSAT Program is provided as an attachment item to this report (see Appendix), which contains additional program details and a web-link is also provided in the Appendix to initiate using the program, however, some key program details are as follows:

The Pumping System Assessment Tool (PSAT) is a free online software tool offered by The U.S. Department of Energy's (DOE's) Industrial Technologies Program (ITP) to help industrial users assess the efficiency of pumping system operations. PSAT offers a collection of software tools to help identify and analyze energy system savings opportunities along with the economics associated with upgrades and / or control adjustments to the pumping system. PSAT enables users to evaluate the energy efficiency opportunities of their pumping system using an unbiased approach. This, in turn, could lead to changes in operational control criteria, or further investigation by private sector detailed engineering analyses and design specifications with the goal of implementing identified energy-saving opportunities.

The PSAT Program's outputs will generally provide the following:

- Estimated pump and motor efficiencies and shaft powers for both existing and top-of-the-line commercially available equipment of "optimal" equipment
- Annual energy use and energy costs for existing and optimal equipment
- Potential annual energy savings
- Optimization rating, which is analogous to a grade (rating of 100 is consistent with top-of-the-line commercial equipment)

[As a technical program reference, PSAT uses achievable pump performance data from Hydraulic Institute standards and motor performance data from the DOE's

MotorMaster+ database to calculate potential energy and associated cost savings.]

The PSAT technician certification process is provided by DOE and offers a qualification program for pumping system specialists in the use of the PSAT software. Industry professionals who successfully complete a PSAT qualification workshop and exam receive recognition from DOE as Qualified Pump System Specialists. Then Specialists can apply this tool in their own plants to identify ways to improve pumping system efficiency.

Projected Energy Savings:

Considering that the City Plant sector uses over 25% of the gross City energy with most of that being used at a few, large pumping stations, it is easy to understand why this program can have such a significant impact, even with seemingly minor efficiency improvements.

Because of the complexities and differences between large pumping systems, estimating savings is difficult, although based on typical industry applications, ECM P-1 is expected to offer savings that range from 3% to over 15%, of course depending on the exact system parameters and the level of application to which the program is utilized by the staff personnel. However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 1.8% **of annual energy use in this sector,** realizing that the potential for much higher savings is certainly achievable.

2. ECM P-2: Staff Challenge Program -

Realizing that City plant personnel are those most familiar with the system, equipment, and areas for significant improvement, this ECM should be implemented to recognize & reward Plant Sector staff personnel for confirmed, cost-effective improvement suggestions. Because of the high operational costs associated with these systems, rewards should be commensurate of the savings realized (for example, a reward based on a percentage of 1st year savings, etc.).

Providing personnel with a structured program that clearly defines their role & rewards for participation & recognition, as well as training as to how to best search for, qualify, and quantify energy saving opportunities should be considered a critical component of the ECM p-2, Accordingly, this ECM should work in conjunction with the PSAT Program ECM P-1 for screening & evaluating staff savings suggestions. In addition, motivated

participating staff could become those personnel selected to become PSAT Program Certified. This overall, combined approach will provide a win-win atmosphere for both staff and the City.

Projected Energy Savings:

This ECM P-2 has wide reaching potential, especially because the operational staff is those most familiar with the system and its problematic areas. As with the PSAT program presented in ECM P-1, predicting savings is dependent on specific site conditions and the extent to which the city implements the program and supporting structure. That said, typical savings are estimated at 1% to 10%, although savings above 10% over a multi-year program implementation are certainly possible. **However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 0.6% of annual energy use in this sector.**

3. ECM P-3: Inflow and Infiltration (I&I) Initiative -

This ECM seeks to strategically reduce I&I through a combination of public awareness, system mapping, and high-leakage problematic area identification.

During heavy rain and storm conditions, rain and groundwater can mistakenly end up in the sanitary sewer, taking up valuable sewer capacity, which inflates the pumping and treating costs. Because this "Inflow and Infiltration" (I&I) tends to increase as the sewer infrastructure ages, the amount of I&I varies in various parts of the sewer system. In some areas there may be very little I&I while in other areas, I&I can be significant.

Generally, The City estimates that over 50% of their gross sewerage pumping & processing may be I&I related, causing significant costs to pump and treat this drainage. In addition, national studies indicate that approximately 50% of I&I comes from private property, such as roof and foundation drains that are connected to the sanitary sewer, leaky pipes or improper plumbing connections between buildings & homes and the sewer system. A public awareness program (i.e. direct mail flyers) can alert private property owners of these problems, while an active identification process can pinpoint cost effective repairs once problems have been noted.

Fixing I&I problems is generally a capital-intensive project, although by properly identifying specific high leakage areas, repair costs can be contained and prove a cost effective investment with rather quick paybacks. As such, costs associated with the implementation of this ECM should be evaluated on an "investment" basis rather than a simple capital outlay, with projects identified for repair meeting an acceptable ROI or simple-payback as set by the City.

Only through proper system monitoring and testing can high leakage areas be targeted for priority repairs. By "mapping" system flows (i.e. installation of flow meters installed at strategic locations around the City, providing a true measurement of the amount of wastewater being carried by the City collection system) against known rainfall times & amounts, high leakage areas can be generally isolated. Once these more problematic regional areas are identified, less expensive techniques such as smoke, dye, camera, and manual manhole inspection can further pinpoint specific high problem areas. This type of high-priority targeted repair process can provide maximum savings with minimum costs, while providing a very attractive investment.

NOTE: Reference Appendix for an attachment file example of an I&I program.

Projected Energy Savings:

ECM P-3 offers significant potential with typical system pumping savings ranging from 1% to well above 10% after the program is ongoing for a number of years. However, consistent with the savings methodology previously discussed (see page-5), our actual ERS program savings are being estimated at approximately 0.6% of annual energy use in this sector.

While very attractive, this ECM requires capital costs for making strategic, high payback repairs, which is a limiting factor. Even when attractive investment economics can be justified, the schedule to identify priority repairs and find appropriate funding sources can be lengthy. That said, the public awareness and strategic identification process components of this ECM can be accomplished within reasonable budgets and should provide the savings in the 0.6% range as claimed above.

Appendix

A. Attachments

The following documents are integral to this report and are provided as separate attachment files:

- **Polk County, Fla.'s Fleet 'Eco-Driving Program' Overview (WORD file)**
- **U.S. DOE PSAT Tool (Pumping) Program Fact Sheet (PDF File)**
- **Sample I&I Program Brochure (PDF File)**

B. Web Links

The following web-links are referenced in this report:

- **U.S. DOE's ENERGY STAR® "Portfolio Manager" Program:**

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

- **U.S. DOE's "Pumping Systems Assessment Tool" Program:**

http://www1.eere.energy.gov/industry/bestpractices/software_psat.html

- **Polk County, Fla.'s Fleet 'Eco-Driving Program':**

http://www.government-fleet.com/Article/Story/2011/01/Incentivizing-Drivers-to-Conserve-Fuel.aspx

C. Eliminated ECMs Because of High-Cost Budget Restrictions

High-Value, Higher-Cost ECM Considerations for the Building Sector:

- **Chiller Replacements with High Efficient Upgrades**
- **Lighting Upgrades & Lighting Control Applications**

High-Value, Higher-Cost ECM Considerations for the Plant Sector

- **Re-assess Application of VFDs for "Swing Load" Pumps**
- **Assess Utility Power Factor Improvements**