CORAL GABLES SUSTAINABILITY MASTER PLAN

OCTOBER 26, 2015

RS&H

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ACKNOWLEDGEMENTS

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MESSAGE FROM CATHY SWANSON-RIVENBARK, CITY MANAGER

Nearly 100 years ago, George Merrick planned Coral Gables as a cosmopolitan city in harmony with the lush South Florida landscape. As the City approaches its centennial, we are reminded of the importance of sustaining this uniquely beautiful and culturally rich community for present and future generations.

As caretakers of the City's storied legacy and champions of its bright future we are deeply committed to our prosperity, our people and our place. We intend to lead by example by ensuring our operations are low-impact, efficient and responsive. In the process of developing this project-driven Sustainability Management Plan we thoroughly evaluated our practices and have made a ten-year commitment to improve our performance.

We are reducing the city's water use by over 20 million gallons per year through innovations that will pay themselves off in less than 3 years. A cross departmental team has identified energy conservation measures that will cut the city's utility bills by almost one million dollars annually while reducing greenhouse gas emissions by 20%. We are also providing new services for residents and businesses to lessen the City's environmental footprint. Our trolley program has reduced parking demand and increased economic activity. It will be expanded to increase connectivity and reduce pollution from vehicles. Our network of bike and pedestrian paths will be quadrupled, enhancing the health and safety of our citizens. In the area of waste minimization, we are developing a program to reduce the number of garbage trucks we send to the landfill by 75% by 2025.

The City's vision of sustainability carries the ideals of our founder forward into the future. Now we are committed to getting to work on the actions we have identified. To succeed, we need the support and cooperation of everyone. The City's Sustainability Advisory Board, the Coral Gables Chamber of Commerce and our peer governments in the Southeast Regional Florida Climate Compact are just some of the partners we will continue collaborating with as we strive to achieve our sustainability goals over the next 10 years.

I thank the Mayor, the City Commission and our staff for their support of our collective efforts to build a better City. Our focus on sustainable operations can make a difference in the prosperity of our businesses, the wellbeing of our people and the environmental integrity of this beautiful place. As we grow and adapt with the times, sustainability will help continually renew Merrick's dream of the City Beautiful. I look forward to our continued progress in the years to come.

Sincerely,

Cathy Swanson-Rivenbark, ICMA-CM, AICP, CEcD
City Manager

EXECUTIVE SUMMARY

Our sustainability vision is to preserve Coral Gable's historic heritage, enhance local and global environmental quality, enrich our local economy and strengthen the health and well-being of our residents, businesses and visitors.

We intend to lead by example by operating a low-impact, efficient and responsive city government. Because sustainability is not achieved through a one-time effort. This plan establishes a system that we will manage over time to continually improve our performance.

The approach used to develop this Plan focuses measures the government's performance, builds capacity among staff and generates environmental and social benefits that yield measurable returns. These returns can then be reinvested into future efforts that sustain the unique beauty and cultural richness of the City Beautiful.

In developing this 10 year strategy we have been guided by a commitment to reduce energy, fuel and water consumption, minimize the waste we are disposing in landfills, cut greenhouse gas emissions, enhance transportation connections and land uses, empower employees and citizens and gather the resources necessary for success.

We have established ten goals across each of these areas to ensure that we are accountable for results.

CORAL GABLES GOVERNMENT OPERATIONS SUSTAINABILITY GOALS

#	Goal	Area
1.	Reduce electricity use 20% below 2013 levels by 2025	Energy
2.	Reduce water use 20% below 2013 levels by 2025	Water
3.	Divert single family residential and municipal operations solid waste 75% by 2020	Materials
4.	Reduce gasoline and diesel fuel use 20% below 2013 levels by 2025	Fleet
5.	Reduce greenhouse gas emissions 20% below 2013 levels by 2025	Climate
6.	Implement 100% of planned Climate projects by 2025	Climate
7.	Implement 100% of planned Transportation and Land Use projects by 2025	Land Use & Transportation
8.	Implement 100% of planned Outreach projects by 2025	Outreach
9.	Implement 100% of planned Funding projects by 2025	Funding
10.	Achieve targeted financial performance for the portfolio of planned projects by 2025.	Funding

The projects identified in this Sustainability Management Plan will produce significant environmental benefits for the City. They are also inspired by a commitment to improve the quality of life for our residents and to collectively generate positive net return on investment for the City and all of its stakeholders.

Coral Gables' portfolio of sustainability projects are summarized in Table 1.

As we implement our sustainability program, we will monitor our performance and continually improve our processes while remaining vigilant for new risks and opportunities. In less than 10 years, we anticipate our sustainable actions will enhance the vibrancy, inclusiveness and the natural and cultivated beauty of our community.

TABLE 1: CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN PROJECT PORTFOLIO

#	Project Name	Focus Area	% of Goal	ROI	NPV
M1	Diversion of Single Family Residence Garbage	Waste	31%	∞	$686,000
W2	Irrigation Efficiency	Water	61%	238%	$602,000
E2	Garage LED Lighting	Energy	35%	160%	$574,000
E3	LED Streetlights	Energy	44%	35%	$555,000
C2	Vulnerability Assessment & Adaptation Plan	Climate	50%	277%	$546,000
E1	Building Energy Efficiency	Energy	29%	153%	$473,000
E6	Utility Management and Control	Energy	26%	93%	$329,000
F1	Fuel Economy	Fleet	6%	494%	$294,000
E7	Information Technology Energy Efficiency	Energy	5%	∞	$148,000
W5	Non-Potable Water Irrigation	Water	35%	96%	$102,000
W1	Flow Fixtures	Water	3%	469%	$51,000
F3	Electric Vehicles & Infrastructure	Fleet	4%	40%	$30,000
F2	Fleet Size	Fleet	1%	∞	$17,000
O1	Employee Sustainability Training	Outreach	50%	24%	$6,000
W3	Flush Fixtures	Water	8%	22%	$6,000
E4	Solar Thermal Systems	Energy	2%	10%	$1,000
W4	Rain Water Harvesting	Water	4%	11%	$1,000
S1	Efficiency Revolving Fund	Funding	100%	∞	$0
O2	Seal of Sustainability	Outreach	50%	∞	$0
T1	Community Improvement District	Transportation & Land Use	50%	0%	$0
T2	Bicycle & Pedestrian Plan Implementation	Transportation & Land Use	50%	0%	$0
C1	Regional Partnerships	Climate Resilience	50%	-100%	($18,000)
E5	Photovoltaic System	Energy	5%	-55%	($233,000)
M2	Diversion of Single Family Residence Trash	Waste	70%	-42%	($3,210,000)
Subtotal of Projects w/ NPV > 0				28%	$4,421,000
Total				5%	$960,000

OUR SUSTAINABILITY VISION AND GOALS

The projects detailed in this master plan are founded on a commitment to understand and minimize our sustainable impacts and risks over time while increasing the social, economic and environmental benefits of our actions every day.

To achieve the productivity and quality of life benefits associated with sustainability each of our departments has participated in a top to bottom review of our operations to identify opportunities for continuous improvement. In developing this 10 year strategy we have been guided by a commitment to reduce consumption, minimize waste, cultivate community and ensure the availability of resources for the benefit of future generations.

The projects identified in this plan will yield significant environmental benefits for the City. They are inspired by a commitment to improve the quality of life for our residents and to collectively generate positive net return on investment for the City and its stakeholders. As we continue to implement our sustainability program, we will monitor our performance and continually improve our processes while remaining vigilant for new risks and opportunities. In less than 10 years, we anticipate our sustainable actions will enhance the vibrancy, inclusiveness and the natural and cultivated beauty of our community. We have established ten goals across each of these areas to ensure that we are accountable for results.

TABLE 2: CORAL GABLES GOVERNMENT OPERATIONS SUSTAINABILITY GOALS

Focus Area	Goal
Energy	Reduce electricity use 20% below 2013 levels by 2025
Water	Reduce water use 20% below 2013 levels by 2025
Materials	Divert single family residential and municipal operations solid waste 75% by 2020
Fleet	Reduce gasoline and diesel fuel use 20% below 2013 levels by 2025
Climate	Reduce greenhouse gas emissions 20% below 2013 levels by 2025
Climate	Implement 100% of planned Climate projects by 2025
Land Use & Transportation	Implement 100% of planned Transportation and Land Use projects by 2025
Outreach	Implement 100% of planned Outreach projects by 2025
Funding	Implement 100% of planned Funding projects by 2025
	Achieve targeted financial performance for the portfolio of planned projects by 2025.

To achieve the goals we have establish, we will be guided by a vision of sustainability that is unique to our City and expresses the importance of our people and the residents, businesses and visitors they serve:

TABLE 3: CITY OF CORAL GABLES GOVERNMENT OPERATIONS SUSTAINABILITY VISION

The City of Coral Gables government consists of dedicated people providing exceptional services to preserve our historic heritage, enhance local and global environmental quality, enrich our local economy and strengthen the health and well-being of our residents, businesses and visitors.

OUR PATH TO SUSTAINABILITY

To effectively preserve Coral Gable's historic heritage, enhance environmental quality, enrich our local economy and strengthen the well-being of citizens and stakeholders we committed to embarking on a journey towards sustainability.

As with any journey there is a time for planning, a time for experiencing and a time for recalling –. What went well? What can be improved upon in the future? In its simples terms this is the "Plan, Do, Check, and Act" cycle, a proven tool used in business and government operations to systematically move an organization towards its long term goals. Achievement requires an awareness of the conditions that exist now, defining a desired future and setting out a path to get there.

In 2014, we selected the firm RS&H to guide us through the initial steps of our sustainability journey and to help us craft our strategic approach for the next ten years. Before starting we identified those elements of the triple bottom line (i.e. people, planet and profit) that were pivotal to our day-to-day operations. A primary emphasis was the business case for sustainability –improving efficiency, decreasing waste and minimizing risks. The approach also considered the quality of life of our stakeholders and the care and cultivation of our natural environmental.

Coral Gables intends to lead by example by operating a low-impact, efficient and responsive city government. Because sustainability is not achieved through a one-time effort, this plan establishes an iterative process that we will manage over time to continually improve our performance. The process provides a framework for interaction across the City's complex systems and coordination between ourselves, elected officials, external stakeholders and the public.

FIGURE 1: THE CITY OF CORAL GABLES' SYSTEMATIC APPROACH TO SUSTAINABILITY MANAGEMENT

The approach used to develop this Plan measures the government's sustainability performance, builds capacity among staff and yields environmental and social benefits that generate economic returns (Figure 1). These returns can then be reinvested into future efforts that sustain the unique beauty and cultural richness of the City Beautiful.

Potential solutions to the City's sustainability challenges were identified through baseline assessment, forecast of future conditions and comparison with peers. Next, representatives from across City operations engaged collaboratively, established goals and developed a portfolio of impactful projects. Moving forward, we will implement the projects included in the following pages and evaluate progress towards goals over the next ten years.

This Sustainability Management plan is not designed to sit on a shelf. It is a living document of a "Plan, Do, Check, Act" cycle, in which the results of our actions will inform an ongoing process of identifying solutions and engaging stakeholders to achieve results.

SOLUTIONS

We established a baseline for government operations by thoroughly quantifying resource use for the focus areas and developing a greenhouse gas (GHG) inventory and forecast. Analysis of the City's diverse operational data resulted in a comprehensive picture of our current operations, resource expenditures and environmental impacts. This baseline revealed opportunities for improvement and will serve as a reference for measuring progress in the future. Interviews with City staff generated ideas and potential solutions. Comparing our performance to peer cities identified further strategies and projects with the potential to improve performance.

ENGAGEMENT

A plan without people is an empty promise. We reached out to representatives from across City government operations who drew on the solutions data to establish sustainability goals and develop a portfolio of cost-effective sustainability projects. Through collaborative meetings and workshops staff became familiar with the City's baseline performance and the achievements of peer cities. They were trained to forecast desired future performance and backcast the incremental steps necessary to achieve long-term goals. We established realistic goals for the eight focus areas: (i.e. Energy, Water, Materials, Fleet, Climate, Transportation & Use, Outreach and Funding. They concentrated staff on developing projects designed to achieve these goals. For each project, staff calculated expected reduction in resource use and its contribution towards goals. Required investment by phase and task were estimated for inclusion in the City's Capital Improvement Plan process. Benefits such as avoided costs or new revenues were projected, along with return on investment (ROI) and Net Present Value (NPV) to aid our decision makers with prioritization of limited resources. Individual project managers and tailored prospective schedules have been identified to ensure accountability throughout the project life.

RESULTS

This Sustainability Management Plan contains a portfolio of sustainability projects that will generate a net return of nearly $4.5 million, while expanding public services and enhancing environmental stewardship. The next step is to implement these projects through the City's administrative and legislative processes. This will require everyone's support. We plan to use media, meetings and other means to communicate the benefits of the Plan and achieve community-wide backing. Ultimately, we plan to extend our process to a planning effort that embraces the entire community. In the meantime, we will measure performance and report results. Lessons learned will be incorporated into periodic updates of the City's operational performance and greenhouse gas inventory. Goals will be revisited and new projects will be added to our portfolio in order to meet evolving expectations, take advantage of new technologies and foster growing partnerships. As expected financial returns are realized, we plan to reinvest in these new opportunities, while leveraging sources of external funding.

OUR FOCUS

The City's systematic approach to sustainability is inspired by a commitment to protect our beautiful community, improve our people's quality of life and generate positive returns on investment.

To fulfill our commitment, we have developed a portfolio of 24 sustainability projects across eight focus areas. Together, they have the potential to generate millions of dollars in net benefits to the City, while extending new services to our citizens and protecting the environment. These projects are summarized in Table 4.

In the pages that follow, we further detail the steps we are taking in each of the eight focus areas to improve our sustainability performance.

TABLE 4: CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN PROJECT PORTFOLIO

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Subtotal of Projects w/ NPV > 0				28%	$4,421,000
Total				5%	$960,000

For each focus area we restate our specific ten-year goals. We explain the importance of each focus area to our operations and provide a brief snapshot of our performance to date.

Next, we define the projects we will implement over the next ten years to achieve our goals. For each project, we estimate the net present value (NPV) and return on investment (ROI). NPV measures the difference between benefits and costs over time. It evaluates a project's profitability in terms of today's dollars. ROI measures the ratio of project's profitability to its cost. It helps assess the efficiency investing in a particular project – the higher the ROI, the better.

In addition to these financial metrics, we estimate how much each project will contribute to our specific goal. This is expressed as a percentage of 100% attainment of our goal.

Finally, we identify the lead department and project manager that will be responsible for implementing the project.

Following description of our planned projects, we preliminarily indicate next steps we might take to extend our plan into the future and continually improve our performance.

ENERGY

GOAL

Reduce electricity use 20% below 2013 levels by 2025

The distinctive, well-built buildings inspired by George Merrick's master plan tend to be efficient and enduring. Nevertheless, infrastructure old and new requires energy for our safety, comfort and productivity. That energy – primarily derived from, natural gas, nuclear, coal and oil – affects our pocketbooks, natural places and personal health. Pollution from using these resources increases risk of disease and destabilizes our climate.

In the face of dependence on risky resources, local, renewable energy sources provide a safe alternative. The cheapest, cleanest form of energy is the one we don't need as a result of conservation and efficiency.

The City of Coral Gables has begun to reduce our consumption and we aspire to produce our own energy in the future. Our goal is to reduce operational electricity acquisitions by 20% by 2025 from our 2013 baseline.

In 2013, we spent approximately $1.74 million on over 15,000 megawatt-hours (MWh) of electricity to power facilities and infrastructure. This represents nearly all non-fuel energy consumed by City operations. The good news is that between 2011 and 2013 our average unit cost (i.e. dollars per kilowatt-hour) declined by 6%. The bad news is that total consumption rose 2% over the same period and total cost increased by 3%.

In recent years we have undertaken several initiatives to reduce our energy consumption. These include lighting retrofits that use light-emitting diode (LED) technology. The Information Technology (IT) department has reduced server power demand and implemented management settings that reduce the energy use of networked devices utilized by city staff.

Moving forward we have identified seven energy projects aimed at reducing our dependence on expensive, polluting fuels. These projects are expected to yield a discounted net benefit of over $2 million over the next ten years, while exceeding our energy reduction goal. As we implement these projects, we expect to encounter additional opportunities to reduce consumption.

Projects

E1. BUILDING ENERGY EFFICIENCY

- **NPV: $473,000**
- **ROI: 153%**
- **Contribution to Goal: 29%**
- **Lead Department / Division: Public Works / Facilities Maintenance**
- **Responsibility: Ralph Rodriguez**

Energy expenditure and use in the city's buildings can be significantly reduced by identifying, designing and constructing cost-effective energy efficiency and conservation measures. City staff will evaluate major building systems (HVAC, lighting, building automation, water heating and building envelope) using design reviews, energy audits and/or retro-commissioning (RCx) for opportunities to implement cost-effective retrofits that further reduce energy consumption.

The City will conduct a pilot project at Facilities Maintenance Building 7. The pilot will install a sub-meter, implement low-cost / no-cost energy conservation measures identified via an in-house audit, and measure results. In addition, staff will

review designs for currently planned major renovation projects to incorporate cost-effective energy efficient technologies. Finally, the City will obtain professional services to conduct energy audits and/or retro-commissioning of the remainder of our major buildings. Based on findings, cost-effective recommended energy efficiency and conservation measures will be designed and constructed.

E2. GARAGE LED LIGHTING

- **NPV: $574,000**
- **ROI: 160%**
- **Contribution to Goal: 35%**
- **Lead Department / Division: Parking**
- **Responsibility: Kevin Kinney**

Rapid changes in the availability and cost of light-emitting diode (LED) lighting have resulted in the potential to significantly reduce the energy intensity of certain lighting applications, such as parking garages. In addition, LEDs permit a wider array of lighting controls, such as bi-level output, which uses occupancy sensors to reduce light levels when the space around the fixture is unoccupied.

Coral Gables has already piloted LED lighting in the Public Safety Building parking garage. With this project, it will replace 100% of existing lighting fixtures and lamps at Parking Garage #6 and the Museum Parking Garage with bi-level LED fixtures.

E3. LED STREETLIGHTS:

- **NPV: $555,000**
- **ROI: 35%**
- **Contribution to Goal: 44%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Jessica Keller**

LED technology also can result in significant savings in street lighting.

The City has utilized exterior LED lighting on a pilot project basis. Now our target is to replace all of our approximately 4,500 streetlights with LED fixtures or lamps.

The City will explore traditional and public-private partnership project delivery methods and use the procurement process to specify LED technologies, design retrofits and construct upgrades. The new fixtures will feature similar aesthetics and performance to existing lighting.

E4. SOLAR THERMAL SYSTEMS

- **NPV: $1,000**
- **ROI: 10%**
- **Contribution to Goal: 2%**
- **Lead Department / Division: Public Works**
- **Responsibility: Ernesto Pino**

Replacing electric or natural gas powered water heaters with solar water heaters can be cost effective in applications where the demand for hot water is high.

Fire stations are often good candidates for solar thermal systems, since they are staffed around the clock and equipped with full bathrooms and kitchens. Fire stations across Florida, including Jacksonville and Boynton Beach, have installed

solar thermal systems to provide a large fraction of total hot water demand.

The City will incorporate solar thermal systems into the renovations of Fire Station #2 and the design of a new Fire Station #1. In addition, Fire Station #3 will be retrofitted. The City will work with designers and installers to appropriately size the systems to provide a substantial portion of hot water throughout the year.

E5. PHOTOVOLTAIC SYSTEM

- **NPV: ($233,000)**
- **ROI: -55%**
- **Contribution to Goal: 5%**
- **Lead Department / Division: Public Works**
- **Responsibility: Ernesto Pino**

The cost and efficiency of photovoltaic (PV) systems, which cleanly generate electricity by collecting abundant solar energy, continues to decrease. At present, cost-effectiveness in the State of Florida is limited by regulatory barriers. Nevertheless, demonstrating this important technology in the Sunshine State can raise awareness and encourage policy and business innovation.

With the help of its municipal utility, the City of Orlando has installed a large (420kW) solar PV array on the roof of its fleet garage. Like Orlando, we have several potentially suitable locations for roof-mounted PV arrays. The Youth Center was identified as a suitable place to demonstrate solar power.

As part of a planned renovation, which includes installation of a new roof, the City will evaluate the feasibility of a roof-mounted PV system. Preliminary evaluation suggests that a 140 kW system, enough to provide about 13% of the building's annual electric use could be developed.

E6. UTILITY MANAGEMENT & CONTROL

- **NPV: $329,000**
- **ROI: 93%**
- **Contribution to Goal: 26%**
- **Lead Department / Division: Information Technology**
- **Responsibility: Raimundo Rodolfo**

Integrating utilities (electric, water and other commodity billings) into a unified, automated, modular database can track, trend and report on utility use and help verify results from energy efficiency investments. Combined with Building Automation Systems (BAS), which monitor, schedule and operate building cooling, heating and lighting systems via a network of sensors and mechanical actuators, utility management solutions can reduce facility energy use by 10% or more.

Over the years, the City has used careful accounting of utility billing to close unused accounts and resolve costly billing errors. This effort will be expanded with procurement of new software. BAS will be installed at City Hall, the City Hall Annex, the Maintenance Facility, the Youth Center and the Public Safety complex. The City's IT department will explore options to tie software and hardware solutions into an enterprise utility management and control framework.

E7. IT ENERGY EFFICIENCY

- **NPV: $148,000**
- **ROI: ∞**
- **Contribution to Goal: 5%**
- **Lead Department / Division: Information Technology**
- **Responsibility: Raimundo Rodolfo**

Information technology (IT) equipment – from computers and monitors to network devices and servers – are more integral to the City's daily business than ever.

As technology improves, so do opportunities for more efficient use. The city's IT department has already begun to cut the energy demand of the City's equipment by using equipment power management features and virtualizing servers, among other measures.

This project involves establishing a plan to ensure that 100% of qualifying IT equipment meets the ENERGY STAR® standard (or equivalent) for energy efficiency. It also includes continuing the IT Department's efforts to implement server virtualization and cloud computing to reduce the overall number of physical servers and computers. Finally, the Department will utilize curtains, rack panel inserts and other techniques to improve cooling efficiency in computer rooms, telecommunication closets, warehouses and machine rooms.

Next Steps

The City plans to continue to identify opportunities to cost-effectively use energy more efficiently and generate energy from renewable resources. Some initial directions for future projects include:

- **Pump / Motor Efficiency:** The city operates several pump / lift stations at a cost of over $100,000 per year. Use of premium efficiency motors standardized by the National Electrical Manufacturers Association as replacements for older models can increase efficiency by three to six percent, resulting in significant savings for motors with large load factors.
- **High Performance New Construction, Major Renovation and O&M Standards:** Several cities have established minimum energy and sustainability performance standards for new construction, major renovation and/or operations and maintenance of municipal buildings based on third party standards. Such standards are also increasingly available for non-building infrastructure. The City is exploring applying such standards to its operational facilities and infrastructure.
- **Indoor Air Quality Management:** Improved indoor environmental quality (IEQ) can boost employee satisfaction and productivity. For every 10% decrease in IEQ dissatisfaction, productivity may increase by as much as 1%. Proactively improved IEQ can also reduce the risk of liability from cases of alleged sickness resulting from IEQ issues (e.g. mold, asbestos, etc.). IEQ can be improved by surveying occupants, systematically surveying IEQ conditions and implementing cost-effective solutions.

WATER

GOAL

Reduce water use 20% below 2013 levels by 2025

From our Coral Gables Waterway to Biscayne Bay, one of the defining characteristics of Coral Gables is our water. Keeping our waterways clean and healthy is a priority. Meanwhile our drinking water resources, like the rest of South Florida, are increasingly stressed by population growth, saltwater intrusion and changing precipitation levels.

Conserving drinking water resources and managing stormwater can cut costs and meet demand without compromising natural systems. Our goal is to reduce operational water use 20% by 2025 from our 2013 baseline.

The City spent just over half million dollars on approximately 100 million gallons of water in 2013. Of this total, about two thirds was for outdoor use (i.e. irrigation) and a third was for indoor use (i.e. potable). The cost of water increased by 7% between 2011 and 2013 (3% for outdoor uses; 15% for indoor uses). During this time, the City's use of and expenditure for both potable and irrigation water increased.

We have taken action to reduce water use by upgrading irrigation systems, flow and flush fixtures and eliminating unnecessary accounts. We plan to double-down on our water initiatives with five new projects forecast to net more than a quarter million dollars of savings over ten years, while exceeding our water reduction goal.

Meanwhile, several directions for future efforts have already been identified and will be incorporated into the Plan over time.

Projects

W1. FLOW FIXTURES

- **NPV: $51,000**
- **ROI: 469%**
- **Contribution to Goal: 3%**
- **Lead Department / Division: Public Works / Facilities Maintenance**
- **Responsibility: Ralph Rodriguez**

High-efficiency plumbing fixtures or fittings can be easily incorporated into existing buildings. While replacement of fixtures is sometimes necessary, in most cases reduced-flow accessories (e.g. flow restrictors, flow regulators, aerators, and laminar flow devices) can be added to existing fixtures. For lavatory and kitchen faucets, fixtures or accessories specified with a maximum flow of about 0.5 and 2.2 and gallons per minute (gpm), respectively, will save water relative to standard fixtures. For showers, 1.5 gpm fittings will be specified. Lower-flow fixtures and fittings are also available and may be appropriate in certain cases. Reducing flow rates of fixtures that supply hot water will also save energy required to heat water.

The City is already opportunistically upgrading our fixtures. This project aims to systematically upgrade fixtures at all major city facilities. Staff will accomplish this by incorporating low-flow devices into designs for upcoming major renovations. Fixtures in remaining facilities will be audited and a schedule for replacement will be developed. As part of these efforts, a design standard for water fixtures in city facilities will be developed.

W2. IRRIGATION EFFICIENCY

- NPV: $602,000
- ROI: 238%
- Contribution to Goal: 61%
- Lead Department / Division: Public Works / Landscape Services
- Responsibility: Brook Dannemiller

Irrigation is the City's primary potable water use. Efficient sprinkler heads, weather- or sensor-based irrigation controls and properly maintained systems can substantially cut irrigation use.

While the City has begun using low-flow irrigation equipment, this project will implement a comprehensive program to replace all 125 irrigation systems with more efficient sprinkler heads and sensor-based controls that will allow centralized monitoring, scheduling and operation. These measures will allow for more efficient operation and maintenance of the City's irrigation systems, ensuring potentially costly issues are addressed proactively.

These actions target a 20% cut in irrigation water use.

W3. FLUSH FIXTURES

- NPV: $6,000
- ROI: 22%
- Contribution to Goal: 8%
- Lead Department / Division: Public Works / Facilities Maintenance
- Responsibility: Ralph Rodriguez

Indoor water use may be significantly reduced by utilizing high efficiency toilets and urinals. At minimum, 1.2 – 1.6 gallons per flush (gpf) models for toilets and 1.0 or less gpf models for urinals replace 3.5 gpf fixtures / bowls and valves. While retrofits are usually less effective than replacement, retrofits may be made to toilets that allow a "dual flush" mode.

As with flow fixtures, the City has opportunistically implemented upgrades to about 5% of total equipment. This systematic program will upgrade fixtures at all major city facilities. Staff will accomplish this by incorporating low-flow devices into designs for upcoming major renovations. Fixtures in remaining facilities will be audited and a schedule for replacement will be developed. As part of these efforts, a design standard for water fixtures in city facilities will be developed.

W4. RAIN WATER HARVESTING

- NPV: $1,000
- ROI: 11%
- Contribution to Goal: 4%
- Lead Department / Division: Public Works
- Responsibility: Ernesto Pino

Irrigation expenditures can be reduced by substituting potable water with rainwater collected at city facilities. This has the added benefit of reducing stormwater runoff, including non-point source pollution of the aquifer and area water bodies, erosion and the costs of sewer services. Rainwater harvesting typically involves collecting water from a building roof into a cistern, which supplies irrigation systems.

The City of North Miami Beach installed a 30,000 gallon above-ground cistern that is supplying up to 40,000 gallons per month for irrigation and other non-potable uses. This project plans to demonstrate rainwater harvesting at the Youth Center.

As part of a planned renovation, which includes installation of a new roof, the City will evaluate the feasibility of a system that collects stormwater runoff from the roof and stores the water in a cistern. The water will be used replace about a third of existing potable water irrigation of the Youth Center athletic fields, which are irrigated

year round. If the concept is proved, developing a larger rainwater harvesting project at the Youth Center (e.g. capturing runoff from surrounding hardscapes) or at the Biltmore may be explored.

W5. NON-POTABLE WATER IRRIGATION

- **NPV: $102,000**
- **ROI: 96%**
- **Contribution to Goal: 35%**
- **Lead Department / Division: Public Works / Landscape Services**
- **Responsibility: Brook Dannemiller**

Currently, the City irrigates predominantly with potable water provided by the Miami-Dade water system. Utilizing non-potable shallow well water where feasible can significantly reduce use of drinking water resources.

This project targets replacing about 8% of current potable irrigation water by retrofitting several irrigation systems to rely on non-potable water from shallow aquifer wells. Staff will conduct feasibility assessments to identify suitable locations and procure well construction services and retrofit irrigation systems.

Next Steps

Several other opportunities to economically reduce our water use and lessen the City's impact on water supplies exist. Some initial directions for future projects include:

- **Leak Detection:** Water losses from leaks add up over time. Leaks in toilets, irrigation systems or broken distribution lines can range from 0.5 - 15 gpm and cost hundreds to tens of thousands of dollars per year. A program to detect and repair leaks – reading meters during off-peak hours with water services turned off, reading meters monthly for anomalous values, or installing sensors – can avoid these consequences. A program is currently being implemented to identify leaks. However, the forecast reduction in water use from this program cannot be prospectively estimated.

- **HVAC Condensate Harvesting:** Water vapor condenses when it comes in contact with cooling coils in HVAC equipment. Water is drained from the equipment to prevent corrosion and often plumbed to the sewer. Approximately 10 gallons per day per 1,000 ft^2 of conditioned space can be captured. At the city, as much as a million gallons of condensate water (after filtration and disinfection) may be available for capture annually for irrigation and other appropriate uses, while reducing sewer flows.

- **Process Water Efficiency:** The city utilizes water for processes like vehicle washing, food service (e.g. ice-machines, dish-washing, food disposals) and pools (e.g. filtration). Water reclamation systems hold potential for saving water used in vehicle washing. In the food service sector, various water efficiency technologies are available including pre-rinse spray valves. In pools, evaporation and filtration are areas for potential savings.

- **Native and Drought-Tolerant Landscaping:** Native, drought-tolerant landscaping can reduce or eliminate irrigation needs, curtail stormwater runoff, and lower building energy costs. Through its NatureScape program, Broward County has certified 88 Florida-friendly landscapes at its facilities. They have increased the tree canopy and selected native plant species to reduce irrigation. As a result, the County has achieved reductions in electricity use and GHG emissions.

- **Low Impact Development (LID):** LID maximizes green space and promotes natural

stormwater management. The use of plants and permeable materials minimize stormwater runoff velocity and reduce surface temperatures. Examples of LID practices include bioretention facilities, rain gardens, vegetated rooftops, rain barrels and permeable pavement. Often LID design ends up being less costly than traditional hardscape design and stormwater control. It also results in better aesthetics and recreational opportunities.

MATERIALS

GOAL

Divert single family residential and municipal operations solid waste 75% by 2020

In addition to the waste generated by our government operations, the city provides garbage, trash and recycling collection services for single family residences. Other residents and businesses are served by private contractors. Presently, the majority of this material is deposited in area landfills where undeveloped lands are consumed and GHG emissions are increased. Diverting the city's waste from area landfills through strategies such as source reduction, reuse (including waste-to-energy) and recycling cuts pollution and avoids harmful pollution.

The City of Coral Gables is committed to meeting Florida's waste reduction goals. Like the statewide goal, our goal is to divert 75% of both single family residential waste and our own waste from city operations by 2020.

The City has great potential to improve diversion rates. Based on annual collection data, single family residences generated 9,449 tons of garbage (all waste excluding garden waste and large items), 32,769 tons of trash (garden waste and large items), and 2,190 tons of recycling in 2013. Though not yet directly tracked, City facilities have the capacity to collect an estimated 1,810 tons of solid waste and an estimated 242 tons of recycled material each year. Based on these values, the current diversion rates for single family residence garbage and trash is 20% and the rate for City facilities is 12%

We will implement two projects to boost waste diversion rate and better manage our materials. While they come at a cost, they will help us meet our 75% diversion goal by 2025. They will also provide a financial motive to continue expansion of and participation in the City's recycling and reuse initiatives, several of which have been preliminary identified as next steps for the near future.

Projects

M1. DIVERSION OF OPERATIONS AND SINGLE FAMILY RESIDENCE GARBAGE

- **NPV: $686,000**
- **ROI: ∞**
- **Contribution to Goal: 31%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Jessica Keller**

Single family residence garbage includes all waste excluding garden waste and large items. Currently, about 75% of single family garbage is diverted from landfills. About 18% is diverted through recycling with the remainder (57%) diverted through incineration. This project aims to boost the garbage diversion rate to 87% through increased recycling.

The strategy to achieve this goal is to boost the City's education and outreach efforts with proven techniques such as Community Based Social Marketing. Similar techniques will be used to boost recycling within City operations. We will also investigate renegotiating our current recycling contract to maintain current terms, which may result in no additional costs for recycling, or obtain additional value for the recyclables it collects. Under present terms recycling waste avoids disposal costs, leading to a rapid return on the City's investment in expanded outreach efforts.

M2. DIVERSION OF OPERATIONS AND SINGLE FAMILY RESIDENCE TRASH

- **NPV: ($3,210,000)**
- **ROI: -42%**
- **Contribution to Goal: 70%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Jessica Keller**

The City currently sends all trash, which consists mostly of yard waste, to area landfills. By sending this waste instead to a local waste-to-energy facility, the City could boost trash diversion to over 70%. While currently more expensive than landfilling, waste-to-energy can help the City meet the statewide goals for waste diversion.

Waste-to-energy also has the potential to significantly reduce greenhouse gas emissions from waste management by both reducing methane releases from landfills and displacing use of fossil fuels for electricity generation.

This project is designed to ramp up diversion to the waste-to-energy facility by about 10% a year for 10 years to control costs and retain flexibility.

Next Steps

As we move forward to boost single family residential garbage and trash recycling, several strategies can be added to reduce the commodities we are placing in our waste stream, divert wastes from landfills and enhance education and outreach efforts.

- **Perform a Waste Characterization Study:** A waste characterization study quantifies the various commodities and other materials in a waste stream, uncovering opportunities to improve waste diversion rates, reduce GHG emissions, and lower disposal costs. Performing a waste audit is an essential first step to identifying markets for recyclables and realizing cost avoidance associated with waste diversion.

- **Track Waste Management Performance:** Since the waste stream, and as a result the waste management program, varies between the different community sectors, it is common to develop a single city-wide waste diversion goal and to monitor this goal for each community sector (i.e. commercial/industrial, single family residences, multi-family residences, and community spaces). Monitoring by sector allows for prioritization of diversion and reduction initiatives.

- **Establish Waste Management Policies:** Policies, programs, and plans need to be identified and developed to drive waste management toward the goal. To support their goal of zero waste by 2026, Boulder, Colorado adopted a Zero Waste resolution, along with an approved master plan for achieving zero waste. To fund zero waste initiatives, Boulder initiated a trash tax which currently generates $1.8 million per year.

- **Optimize Single Family Residential Waste Services:** Opportunities exist to evaluate, update, and optimize this service. Potential areas to evaluate include collection method, frequency of collection, hauling equipment, collection routes, and efficient use of work hours. Below is a list of examples from peer cities.

  Wheeled carts: Carts facilitate collection of materials within residences and standardizes the collection process. With the use of carts, collection routes can employ fully automated collection or rear-loading vehicles. This standardization increases the safety and efficiency of the collection route. Miami-Dade

County and the City of Miami use carts for automated collection of garbage and recycling.

Reduced collection frequency: Miami-Dade County uses blue, 65-gallon wheeled carts collected every other week for their curbside recycling program. The City of Miami uses blue, 96-gallon wheeled recycle carts collected once every other week.

Pay-as-you-throw: For garbage, Palo Alto has a "mini-can" initiative. The mini-can is a 20-gallon garbage container with a lower unit cost.

Yard waste/food scrap composting: Boulder's curbside compost program accepts compostable paper, food scraps, and yard waste. Palo Alto's yard trimmings program recently added food scrap collection. Scraps are collected in compostable bags and placed in the yard trimming cart. The city offers free compost and mulch to residents.

FLEET

GOAL

Reduce gasoline and diesel fuel use 20% below 2013 levels by 2025

Fossil fuel from foreign countries powers much of our nation's transportation and poses risks to national security, our economy and environment. Coral Gables' extensive fleet of administrative vehicles, police cars, refuse trucks and trolleys is no different. Even when sourced domestically, gasoline and diesel pollute the air, toxify soil and waterways and contribute to climate change.

A leaner fleet, comprised of more fuel efficient, alternatively fueled vehicles will reduce dependence on volatile-priced gasoline and diesel, while reducing noise and nuisance.

The City of Coral Gables is already managing the vehicle fleet to maximize efficiency and control costs. Our goal is to reduce fossil fuel use (i.e. gasoline and diesel) by 20% from our 2013 baseline by 2025.

The City spent approximately $1.5 million on gasoline and diesel fuel in 2013 to support over 4 million miles of travel and 3,226 hours of operation. There were 575 vehicles in the city's fleet in 2013, with an average age of just under 10 years.

Despite fuel costs increasing 35% between 2011 and 2013, fuel costs per mile have increased by only 17%. This is due, at least in part, to a 17% increase in fuel economy. We have also begun taking steps to eliminate underutilized vehicles from our fleet.

With this Sustainability Management Plan, we are committing to further fleet efficiency measures, including three projects that will produce about $0.3 million in discounted net benefits between now and 2025. While these efforts are currently projected to leave us short of our 20% gasoline and diesel reduction goal, the City is already tracking several initiatives capable of creating cost-effective cuts to our current fuel budget and will strive to incorporate such opportunities into our Sustainability Management Plan.

Projects

F1. FUEL ECONOMY

- **NPV: $294,000**
- **ROI: 494%**
- **Contribution to Goal: 6%**
- **Lead Department / Division: Public Works / Fleet**
- **Responsibility: Steve Riley**

New vehicles are more fuel efficient than ever before. Procuring new, high-efficiency models to replace older vehicles can reduce fuel use and save money. Replacing larger vehicles with compact alternatives, where appropriate can increase these benefits.

The City will target 49 light duty vehicles scheduled for replacement. They will be replaced over five years with cars that will more than double fuel efficiency. These smaller cars will cost less than replacing existing vehicles with like models, leading to an immediate return on investment.

F2. FLEET SIZE

- **NPV: $17,000**
- **ROI: ∞**
- **Contribution to Goal: 1%**
- **Lead Department / Division: Public Works / Fleet**
- **Responsibility: Steve Riley**

The City of Coral Gables has identified fleet vehicles that are underutilized. Under the right circumstances, these vehicles may be permanently removed from the fleet without significantly affecting City services.

Over two years, we will remove nine vehicles from our fleet, reducing fuel and maintenance expenditures. To manage a smaller fleet, the City will develop a program that reimburses City employees for short trips using personal vehicles. For longer trips, City policy already requires use of a fleet pool vehicle or rental cars.

Over time the City will continue to evaluate vehicle use patterns to identify additional opportunities to down-size.

F3. ELECTRIC VEHICLES & INFRASTRUCTURE

- **NPV: $30,000**
- **ROI: 40%**
- **Contribution to Goal: 4%**
- **Lead Department / Division: Public Works / Fleet**
- **Responsibility: Steve Riley**

Electric vehicles (EVs) have a substantially lower fuel cost per mile than gasoline vehicles. Meanwhile, the purchase price of EVs continues to decrease. They are now available to the City via a statewide procurement contract. As a result, EVs are good choices for replacing light duty cars with high annual mileage or fuel consumption.

EVs require electric vehicle support equipment (EVSE) to keep vehicles charged. The City is already moving forward with plans to install publicly-accessible EVSE in its parking garages. To support 18 new EVs procured over the next three years, the City will install dedicated EVSE at its maintenance facility.

Next Steps

Opportunities to conserve fuel and boost the efficiency of fleets are developing rapidly. In order to achieve our goals, we will monitor these trends and prudently pursue cost-effective solutions as they mature. Future projects may include:

- **Natural Gas Vehicles:** New sources of domestic natural gas have led to wider availability of compressed natural gas (CNG) at prices competitive with diesel. The fuel is best suited for heavy duty vehicles with high fuel consumption and low fuel economy, such as transit buses and sanitation trucks.

  At the tailpipe CNG is cleaner than diesel, but natural gas is not without environmental impacts. Production creates contaminated wastewater. Leakage along the natural gas supply chain may result in more greenhouse gas emissions than standard fuels.

  The City will continue to evaluate costs and benefits of using CNG vehicles, including the opportunity to share fueling infrastructure proposed for the Miami-Dade Transit facility adjacent to Coral Gables' fleet maintenance facility.

- **Propane Vehicles:** Propane (Autogas) is a domestic fuel that is cost-competitive with gasoline and diesel. It has environmental benefits relative to those fuels and is widely available.

Currently, Autogas vehicles are best suited for mid-duty applications, such as cargo vans and maintenance trucks. The relatively low incremental cost of such vehicles and the ability to finance on-site fueling stations through long-term fuel purchase agreements, makes Autogas a potential solution for the City's fleet in the future.

- **Biofuels:** Biofuels include biodiesel and ethanol. These fuels are sourced from plant or animal-based feedstocks, such as soybeans, corn, waste vegetable oils or animal fats, which result in less pollution than gasoline or diesel.

  Biofuels can often be procured in bulk quantities via negotiated contracts at a price equivalent to diesel or gasoline. While the city cannot expect fuel cost or use savings via biofuels, they can be utilized in many vehicles with little or no modification.

- **Anti-Idling:** The U.S. Department of Energy estimates idling vehicles burn from a quarter to a whole gallon of fuel per hour for a total of 2 billion gallons of fuel per year nationwide. Many municipalities in the U.S. have enacted anti-idling policies as an effective, low-cost way to save money and fuel and reduce engine wear, emissions, and noise.

  In some cases mission-critical applications, such as electronics and climate control in a police K9 unit, require vehicles to idle. Auxiliary Power Units (APUs) can solve this problem via a battery backup system.

- **VMT Reduction:** Reducing the vehicle miles travelled (VMT) of fleet vehicles can save fuel, reduce maintenance expenditures and limit environmental impacts. VMT may be reduced by consolidating the routes of service vehicles to eliminate duplication of trips. Scheduling and routing of service vehicles may be optimized. Carpooling or use of shuttle services for high-use routes can have a similar effect. Trips may be eliminated via teleconferencing. Incentivizing city employees to utilize transit, where feasible, can reduce the need for fleet vehicles.

CLIMATE

GOALS

- **Reduce greenhouse gas emissions 20% below 2013 levels by 2025**
- **Implement 100% of planned Climate projects by 2025**

South Florida is uniquely vulnerable to the forecasted effects of a changing climate. Rising seas, salt water intrusion, more intense storms and temperature extremes all threaten the area now and in the future. However, the region has proven its resilience to environmental challenges in the past and is taking the lead in mitigating and adapting to climate change.

We can join the ranks of South Florida governments responding to the risks and rewards of a changing climate. Working collaboratively with our regional peers, while focusing on streamlining our internal operations, Coral Gables can lead-by-example and do our part to protect George Merrick's vision of a city in harmony with its world.

Greenhouse gas (GHG) emissions from our energy use, transportation, waste and other activities are fueling climate change. We aim to reduce GHG emissions 20% by 2025, primarily through energy, water, materials and fleet projects. In addition, the City plans to play a larger role in regional climate change efforts, while taking steps to better understand our ability to adapt to an uncertain future.

The City completed an inventory of its GHG emissions (See Appendix) in 2014. Our operations were responsible for over 13,750 metric tons of carbon dioxide equivalents in the 2013 base year. The City's commitment to reducing its emissions dates to 2007 when the city adopted the U.S. Mayor's Climate Protection Agreement (USMCPA). The city has emergency preparedness, response and recovery plans in place, as well as plans for post-disaster recovery. Local building codes address the risks of building in high hazard areas.

We will begin realizing the promise of these early efforts with the results of the projects included in this Sustainability Management Plan. Over ten years the combined portfolio of energy, water, materials, fleet, transportation & land use and outreach projects will cut more than 2,600 metric tons of greenhouse gas emissions, achieving the majority of our 20% reduction goal, while bringing nearly $4.5 million dollars in net benefits to the City (Table 5).

In addition, to mitigating our contributions to climate change, we will also move to adapt to some of the unavoidable consequences of climate change, such as sea level rise, through adaptation projects and initiatives. Our priority is to preserve the classic heritage of the City, while safeguarding the health and prosperity of our citizens.

TABLE 5: ESTIMATED ANNUAL POTENTIAL GHG EMISSIONS REDUCTIONS FROM PROJECTS

#	Solution	GHG Reductions (mtCO2e)*	Contribution to Goal
E1	Building Energy Efficiency	481	17.5%
E2	Garage LED Lighting	572	20.8%
E3	LED Streetlights	728	26.5%
E4	Solar Thermal Systems	27	1.0%
E5	Solar Photovoltaics	90	3.3%
E6	Utility Control and Management	428	15.5%
E7	IT Energy Efficiency	84	3.0%
F1	Fuel Economy	50	0.1%
F2	Fleet Size	5	2.7%
F3	Electric Vehicles & Infrastructure	20	0.4%
W1	Flow Fixtures	4	0.0%
W2	Irrigation Efficiency	74	0.9%
W3	Flush Fixtures	12	1.8%
W4	Rain Water Harvesting	1	0.2%
W5	Non-Potable Water Irrigation	26	0.7%
O1	Employee Sustainability Training	2	0.1%
Total		*2,605*	*95%*

**Electricity GHG reductions calculated using FRCC Grid emissions factors. Fleet GHG reductions calculated using U.S. Dept. of Energy Alternative Fuels Data Center estimate of 37.9% reduction for electric cars vs. conventional models. Water savings reductions based on Miami-Dade County estimate of 1.03 MT CO2e to produce 1 million gallons potable water. Does not include additional reductions from eliminating pumping and wastewater treatment. Due to many unknown variables, the GHG emissions reduction of waste diversion measures was not quantified.*

Projects

C1. REGIONAL PARTNERSHIPS

- **NPV: ($18,000)**
- **ROI: -100%**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Matt Anderson**

South Florida is a global leader in regional efforts to respond to climate change. Coral Gables will join these efforts by participating in the Southeast Florida Regional Climate Compact (SFRCC).

The compact is a partnership of Palm Beach, Broward, Miami-Dade and Monroe Counties formed to coordinate climate mitigation and adaptation in the region. The SFRCC has completed a regional GHG inventory, a climate action plan and a survey of the 108 municipalities in South Florida to compile their climate-related actions. Working with the SFRCC will allow us to share BMPs and resources with peers in the region.

The City will also consider working with other local, regional and national partners, such as the University of Miami, South Florida Water Management District, South Florida Regional Planning Council, South Florida Clean Cities Coalition, Florida Department of Environmental Protection, Florida Department of Economic Opportunity, Resilient Communities for America, and the Institute for Sustainable Communities, among others.

C2. VULNERABILITY ASSESSMENT AND ADAPTATION PLAN

- **NPV: $546,000**
- **ROI: 277%**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Matt Anderson**

In order to thrive in the future, the City must understand its vulnerabilities as a result of climate change and choose options to mitigate and adapt to changing conditions.

A vulnerability assessment and adaptation plan will identify risks to City buildings, infrastructure, habitats and connections to vital services and resources such as transportation networks, schools, hospitals, landfills, utilities and groundwater based on data-driven heat and flood elevation scenarios.

Risks will be analyzed and prioritized based on likelihood, cost, spatial extent and time horizon. Through a planning effort, potential adaptation and mitigation measures will be identified and screened via criteria including feasibility and cost, as well as social and environmental factors.

The resulting plan will help the City manage resources and investments to optimize business continuity and minimize future risk. More immediately, it has the potential to reduce the flood insurance premiums paid by residents.

Next Steps

As we begin to successfully manage our GHG emissions and plan for the effects of climate change, opportunities will arise to build on our accomplishments.

- **Implement Adaptation Strategies:** Once the City has completed a vulnerability and adaptation plan, we will evaluate steps to implement actions and capital improvements that can significantly reduce risk. Examples include taking steps to reduce the number of homes below code standards, the percentage of residents living in designated high risk areas, and to protect city infrastructure from potential flood and storm hazards, saltwater intrusion, and other climate change risks.
- **Update Disaster Planning:** As the City's understanding of climate change risks develops, we must ensure climate risks and sustainability considerations are incorporated into emergency management and post-disaster redevelopment plans. Doing so will help ensure economic recovery in the event of a natural disaster.

TRANSPORTATION & LAND USE

GOAL

Implement 100% of planned Transportation and Land Use projects by 2025

Our City is a beautiful, historic and prosperous community well regarded as a place to live and work. Much of this traces back to the high quality of George Merrick's 1925 master plan, and the consistency with which his vision has been carried out by successive generations.

Today's Coral Gables has many characteristics that are inherently sustainable, such as a classic development that stands the test of time, compact urban environments that increase walkability and open space for conservation and recreation.

The City has established a tradition of thorough, effective regulation of a built environment. Several strong sustainable land use policies are included in the City's Comprehensive Master Plan and it has established a free trolley service along Ponce de Leon Avenue. Success within this tradition will focus on connecting the City's lush, cosmopolitan places via a variety of transportation modes.

We will capitalize on our City's strengths by implementing two projects that will increase mobility choices and forge new connections for commerce and community. These projects are expected to pay for themselves via mutually-beneficial partnerships.

By implementing these projects we will meet our plan's goals. But we won't lose sight of additional opportunities on the horizon to knit our City closer together with intelligent transportation and land use strategies that accentuate Coral Gable's cosmopolitan, small city character.

Projects

T1. COMMUNITY IMPROVEMENT DISTRICT

- **NPV: $0**
- **ROI: 0%**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Parking Department**
- **Responsibility: Kevin Kinney**

The Coral Gables Trolley serves mobility needs along the Ponce de Leon Avenue, an important regional business corridor. Enhancing this service by providing reduced headways, extended hours of operation and weekend service can boost ridership to two million annually, while reducing daily vehicle traffic in the central business district (CBD) by an additional 750 cars per day. Reduced congestion in the CBD will reduce pollution and noise and increase its attractiveness and accessibility to visitors.

These expanded transit services can be funded by establishing a community improvement district along Ponce de Leon Boulevard. Commercial properties along the trolley route support transit services through an annual assessment tied to property value. The City intends to study options for an equitable assessment program through economic analysis and extensive outreach to the City's businesses.

T2. BICYCLE AND PEDESTRIAN PLAN IMPLEMENTATION

- **NPV: $0**
- **ROI: 0%**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Jessica Keller**

In 2014, Coral Gables completed a bicycle and pedestrian plan to increase the convenience and safety of using these transportation modes throughout our City. Doing so can reduce dependence on automobiles and help mitigate the congestion, pollution and noise that over-dependence on automobiles bring.

The plan envisions increasing the City's bicycle and pedestrian infrastructure by more than 400% by constructing more than 34 miles of bike lanes, bike boulevards, shared-use paths and complete streets by 2025

The City envisions collecting revenue from a 10% increase in the City's parking fee to fund design and construction of this network. Extensive analysis and outreach will support development of a proposal to raise revenue and program expenditures.

To support new bicycling and pedestrian infrastructure, the City also contemplates several educational actions, such as educating motorists and bicyclists about rights and responsibilities and educating residents about new facility types.

Next Steps

The form and function of cities is constantly changing. As Coral Gables' streets and spaces evolve, new opportunities will arise to foster development and mobility options that benefit the economy, citizens and nature. Some potential directions for future transportation and land use initiatives include:

- **Update the Comprehensive Plan:** The Sustainability Master Plan can be incorporated into the City's next Comprehensive Plan update. Currently, the City's CMP includes a separate "Green" section. Eliminating this section and incorporating the City's sustainability goals and strategies throughout the document will align Coral Gables' CMP with leading peers.

- **Enhance Codes and Permitting Process:** A sustainable built environment can be incentivized through the City's zoning code. Examples include outdoor public-space, prioritization of build-to lines over setbacks, and shared parking arrangements. Overlay zoning can influence outcomes in specific areas, such as prevention of property damage from floods.
- Density bonuses, expedited permitting and rebates can be used to encourage building design and construction that conserves energy, water and other natural resources.

- **Calibrate Aesthetic Criteria for Sustainability:** Aesthetic criteria can limit wide adoption of renewable energy technologies such as solar energy and water heating. Solar technologies are more compatible with traditional architecture than is widely understood. In the 1930s and 1940s roof-top solar water heating was common. Today technologies are increasingly efficient and smaller with better engineered mounts. In addition the visual impact of rooftop solar panels can be mitigated with other architectural and landscape details.

- **Business and Economics in the Comprehensive Plan:** A Comprehensive Plan Element that emphasizes growth and diversity

of businesses compatible with nearby land uses can acknowledge potential impacts on the community, such as traffic, parking and walkability. Such an Element can assess growth management strategies, and ensure that economic prosperity is balanced with acceptable impacts on community character.

Other policy guidance can include recognizing outstanding entrepreneurship and innovation, diversifying the retail mix through business retention and attraction, and supporting businesses that offer sustainable products and services.

- **Green Parks:** The City's Parks and Recreation Department operates 42 facilities, including several buildings. Sustainability strategies can be incorporated into planning, design, construction, operations and maintenance of facilities and grounds. Examples include on-site management of storm water, rainwater harvesting, compost and mulching of yard waste, conversion to native plant communities, and using Florida Friendly landscape and green building certifications.

- **Strengthen Farmers' Market:** The City currently sponsors a Farmer's Market on the corner of Miracle Mile and Le Jeune Road. Such a market does more than bring farm-to-table – it also provides an important community social gathering space for cultural arts, education and outreach activities. Expanding the scope to sustainable handmade arts and crafts, native plants and other products can underscore the City's commitment to a balanced economy, community and environment.

OUTREACH

GOALS

Implement 100% of planned Outreach projects by 2025

The success of our Sustainability Master Plan depends on the commitment and support of our staff and the public it serves.

Well-developed education and outreach projects will help communicate the challenges we face and the value of investing time and money in responding to them. We share a deep pride in the beauty and diversity of Coral Gables and it is important for all to realize the role of sustainability in preserving these values for future generations.

Coral Gables strives to educate and reach out internally and within the community. Our Sustainability Advisory Board has been counselling City officials and raising public awareness of environmental issues for several years. We sponsor events such as the "Water is Life" exhibition at the Coral Gables Museum, Earth Day at Merrick Park and Park(ing) Day on the Miracle Mile. Our website provides an expanding resource for those interested in learning more about our initiatives.

Two projects have been developed as part of this plan. Both are low- or no-cost, but are expected to have a large effect on the City's culture. They will empower employees to make government more efficient and inform citizens and visitors of Coral Gables' responsive sustainability initiatives.

Outreach is an ongoing activity that includes all of the City's stakeholders, including vendors. The City is currently investigating methods to influence sustainability through its purchasing decisions. Our next steps may involve adding such initiatives to the Sustainability Management Plan.

Projects

O1. EMPLOYEE SUSTAINABILITY TRANING

- **NPV: $6,000**
- **ROI: 24%**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Matt Anderson**

A sustainable organization is defined by its culture. Currently, City of Coral Gables employees have different levels of experience and expertise with respect to sustainability. Training for all employees and new hires will develop a common understanding of the City's goals and the actions it is taking to achieve them. Employees will not only understand how to help implement the City's sustainability vision, but will be empowered to apply their own creativity to identifying solutions. .

Initially, training will focus on orienting employees to the City's sustainability vision and communicating its efforts to date. It will also emphasize actions employees can take at work and home to save energy, water, and reduce waste.

Benefits of feedback, education and awareness campaigns have been shown to produce energy savings of up to 10% with comparable benefits in the City's other focus areas. This project assumes just a fraction of such savings are achieved from greater employee awareness of the city's resource consumption.

O2. SEAL OF SUSTAINABILITY

- **NPV: $0**
- **ROI: ∞**
- **Contribution to Goal: 50%**
- **Lead Department / Division: Public Works / Sustainability**
- **Responsibility: Matt Anderson**

The Coral Gables Seal of Sustainability program will highlight the City's "green" initiatives, programs and projects under a single, attractive brand. The portfolio of projects branded with the City's Seal of Sustainability will represent a clearinghouse of best practices, costs and benefits of sustainable government operations.

For projects with a sustainability component, City project managers will seek the Seal during capital budgeting process or at completion. Projects meeting the program's criteria will be communicated via newsletters, email blasts, Commission meeting agenda, the City's website and app, project signage, events, etc.

The program will demonstrate the City's commitment to "green" operations and foster a culture of eco-efficiency.

Next Steps

Outreach is crucial for building a culture of continual improvement at the City of Coral Gables.

We will foster sustainable behavior among the City's stakeholders through commitments, prompts, norms and incentives. Some initial areas for effective communications as we take our next steps include:

- **Management and Purchasing:** Sustainability may be embedded in City's organizational culture through hiring and retention practices. Incorporating sustainability into procurement through "green purchasing" can also raise employee awareness. Palo Alto's new employee orientation procedures include training on its Zero Waste program and the city's sustainability commitment. Its environmental purchasing policy is tracking the effect of employee purchases on greenhouse gas emissions.

- **Green Events:** New policies can reduce the environmental impact of City meetings and events. Incorporating sustainability messaging into events can communicate the City's commitments and progress. Policies to reduce waste, conserve resources, and encourage alternate transportation at city events demonstrate Coral Gables' commitment to sustainability. Palo Alto and Boulder's Zero Waste policies extend to city events, and both cities also host events designed to build awareness of their sustainability efforts.

FUNDING

GOALS

- **Implement 100% of planned Finance projects by 2025**
- **Achieve targeted financial performance for the portfolio of planned projects by 2025.**

Sustaining sustainability requires investment. By focusing on quick wins with big returns, we can leverage our success and prove that low-impact, efficient and responsive government makes financial sense.

The City has already begun investing in cost-effective solutions that will reap long term economic, social and environmental rewards. These include multi-year funding for energy-efficient building upgrades and new vehicles.

We will use our success to attract external resources, such as low-interest loans, grants and incentives from federal, state, local and private sources. Many of this Plan's projects are eligible for such support. Examples are included in Table 6.

Our goal is to achieve the financial performance we've projected for the portfolio of projects included in this plan. We also plan to establish new internal mechanisms for ensuring that they have the required resources to move forward.

Strategies

S1. EFFICIENCY REVOLVING FUND

- **NPV: $0**
- **ROI: ∞**
- **Contribution to Goal: 100%**
- **Lead Department / Division: Finance**
- **Responsibility: Diana Gomez**

Measures designed to save resources can be highly cost effective. However, they require sustained investment to fully realize benefits. A revolving fund is a method of providing on-going access to capital for "green" projects.

A revolving fund is "seeded" with capital. Sources include savings from existing projects, rebates, grant funds and budget appropriations. The fund invests in resource conservation projects with repayments from savings going back into the fund and helping finance new projects.

We will establish an Efficiency Revolving Fund (ERF). An ERF Management Committee (ERFMC) will develop and administer policies and procedures for fund management, including criteria for eligible energy and water efficiency projects and financial performance. At minimum, the fund will require projects with a simple payback period of seven years or less and require return of 100% of project savings for the duration of the payback period. Project performance will be monitored and verified.

Next Steps

Fleet Investment Revolving Fund: As with facilities and infrastructure, measures designed to save fuel or utilize alternative fuels in our fleet can be highly cost effective. However, they require sustained investment to fully realize benefits. A revolving fund that takes advantage of ongoing efforts to sustainably manage City vehicles may also be a method of providing on-going access to capital for alternative fuel or vehicle efficiency projects.

TABLE 6: POTENTIAL EXTERNAL FUNDING SOURCES FOR THE CITY'S PORTFOLIO OF SUSTAINABILITY PROJECTS

Funding Source	Project ID											
	E1	E2	E3	E4	E5	E6	E7	W1	W2	W3	W4	W5
Emergency Management Preparedness and Assistance Competitive Grant Program												
Energy Performance Contracting	■	■	■									
Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance Grant Program												
Federal Highway Administration (FHWA) Moving Ahead for Progress in the 21st Century (MAP 21) Surface Transportation Program												
Federal Transit Authority Urbanized Area Formula Program												
FEMA Pre-Disaster Mitigation Grant Program												
FHWA MAP 21 Transportation Alternatives Program.												
Florida Department of Agriculture and Consumer Services Qualified Energy Conservation Bonds	■	■	■		■							
Florida Department of Economic Opportunity Small Cities Community Development Block Grant												
Florida Department of Environmental Protection Coastal Partnership Initiative												
Florida Energy Efficient Retrofits for Public Facilities Grant Program	■											
Florida Power and Light Business Energy Efficiency Rebates	■											
Florida Power and Light Net Metering					■							
Florida Power and Light Solar Rebate Program					■							
National Oceanic and Atmospheric Administration Broad Agency Announcement												
South Florida Water Management District Cooperative Funding Program								■	■	■	■	■
U.S. Department of Transportation's Transportation Investment Generating Economic Recovery ("TIGER") Grant												
Wells Fargo Environmental Solutions for Communities Grant Program	■	■	■									
Wildlife Conservation Society Climate Adaptation Fund												

TABLE 5, CONT.: POTENTIAL EXTERNAL FUNDING SOURCES FOR THE CITY'S PORTFOLIO OF SUSTAINABILITY PROJECTS

Funding Source	Project ID											
	M1	M2	F1	F2	F3	C1	C2	T1	T2	O1	O2	S1
Emergency Management Preparedness and Assistance Competitive Grant Program							■					
Energy Performance Contracting												
Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance Grant Program							■					
Federal Transit Authority Urbanized Area Formula Program									■			
FEMA Pre-Disaster Mitigation Grant Program							■					
Florida Department of Environmental Protection Coastal Partnership Initiative							■					
Florida Energy Efficient Retrofits for Public Facilities Grant Program												
Florida Power and Light Business Energy Efficiency Rebates												
Florida Power and Light Net Metering												
Florida Power and Light Solar Rebate Program												
Florida Department of Economic Opportunity Small Cities Community Development Block Grant									■			
Federal Highway Administration (FHWA) Moving Ahead for Progress in the 21st Century (MAP 21) Surface Transportation Program									■			
FHWA MAP 21 Transportation Alternatives Program.									■			
National Oceanic and Atmospheric Administration Broad Agency Announcement							■					
Florida Department of Agriculture and Consumer Services Qualified Energy Conservation Bonds												
South Florida Water Management District Cooperative Funding Program						■						
U.S. Department of Transportation's Transportation Investment Generating Economic Recovery ("TIGER") Grant									■			
Wells Fargo Environmental Solutions for Communities Grant Program					■							■
Wildlife Conservation Society Climate Adaptation Fund							■					

IMPLEMENTATION

Our Sustainability Management Plan contains 24 projects in eight focus areas to reduce our government's environmental footprint and expand services over the next ten years. The most robust have the potential to generate a return of nearly $4.5 million. The next step is to manage, schedule and commit to realizing these projects. In some instances, the City may have to implement policy reforms to ensure that our Plan is a success.

MANAGEMENT

For each project, we have developed a detailed management strategy. These define the project objective, targets, strategies, actions and schedules. The projects' effect on City resources and contribution towards goals has been estimated. Required investment has been projected for inclusion in the City's Capital Improvement Plan, along with avoided costs, revenues and measures of life-cycle economic performance. The Project Manager and lead City department have been identified and will be accountable for results. Sustainability Project Management Forms containing this information are included in the Appendix (Project Management Forms).

SCHEDULE

The figures below depict the prospective schedule for implementation of this plan's projects within each focus area. Each project's expected year of completion is shown along with its contribution to goals.

FIGURE 2: ENERGY PROJECTS PROSPECTIVE IMPLEMENTATION SCHEDULE

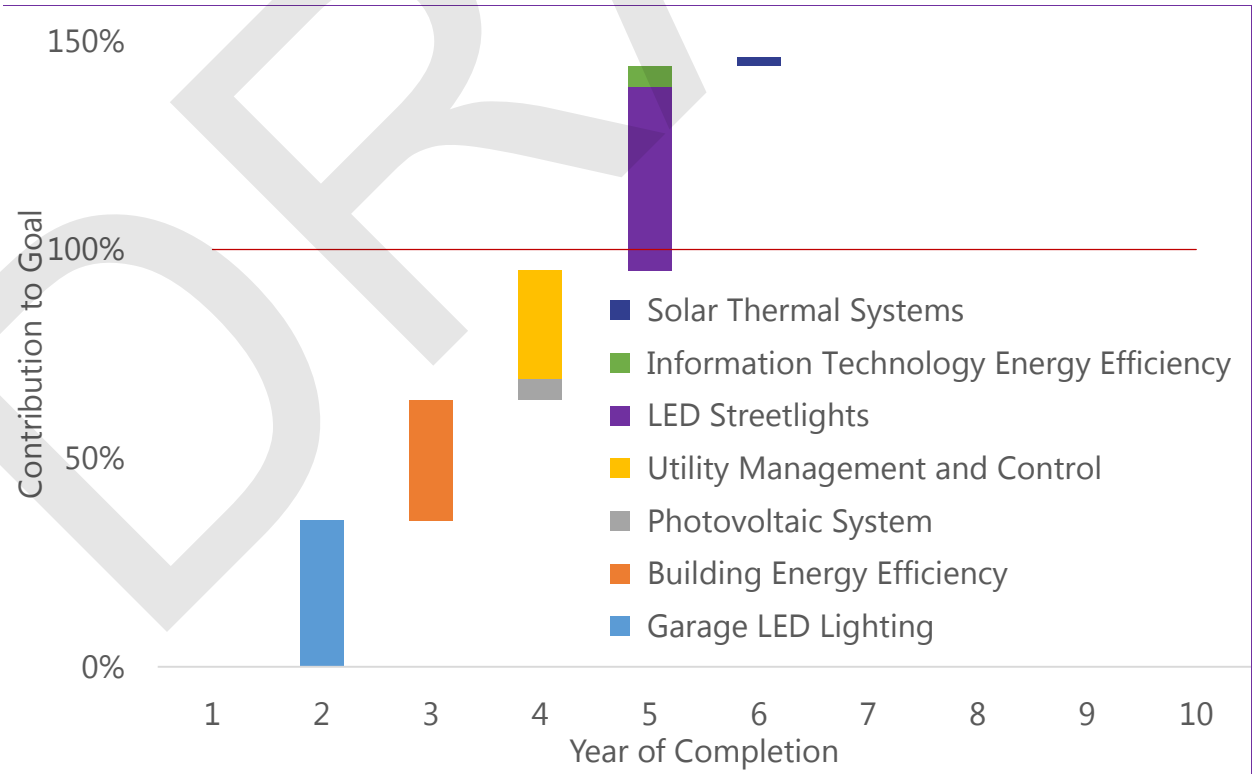


FIGURE 3: WATER PROJECTS PROSPECTIVE IMPLEMENTATION SCHEDULE

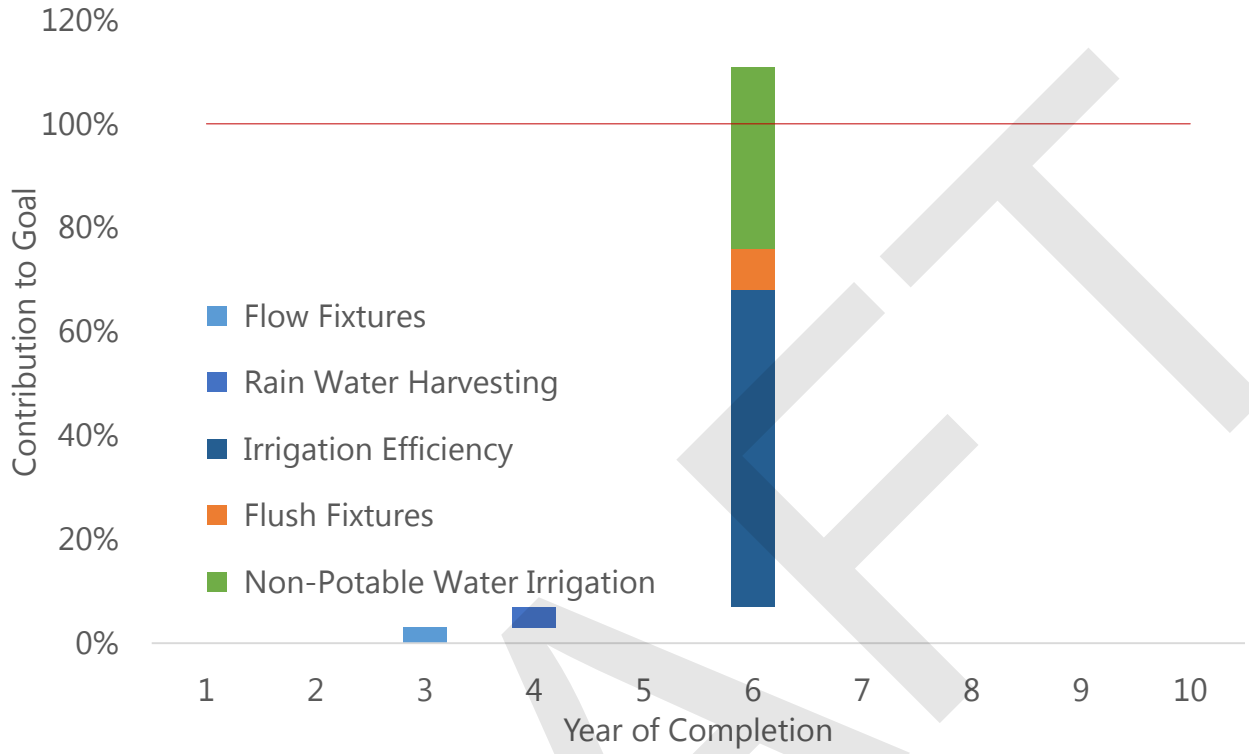


FIGURE 4: MATERIALS PROJECTS PROSPECTIVE IMPLEMENTATION SCHEDULE

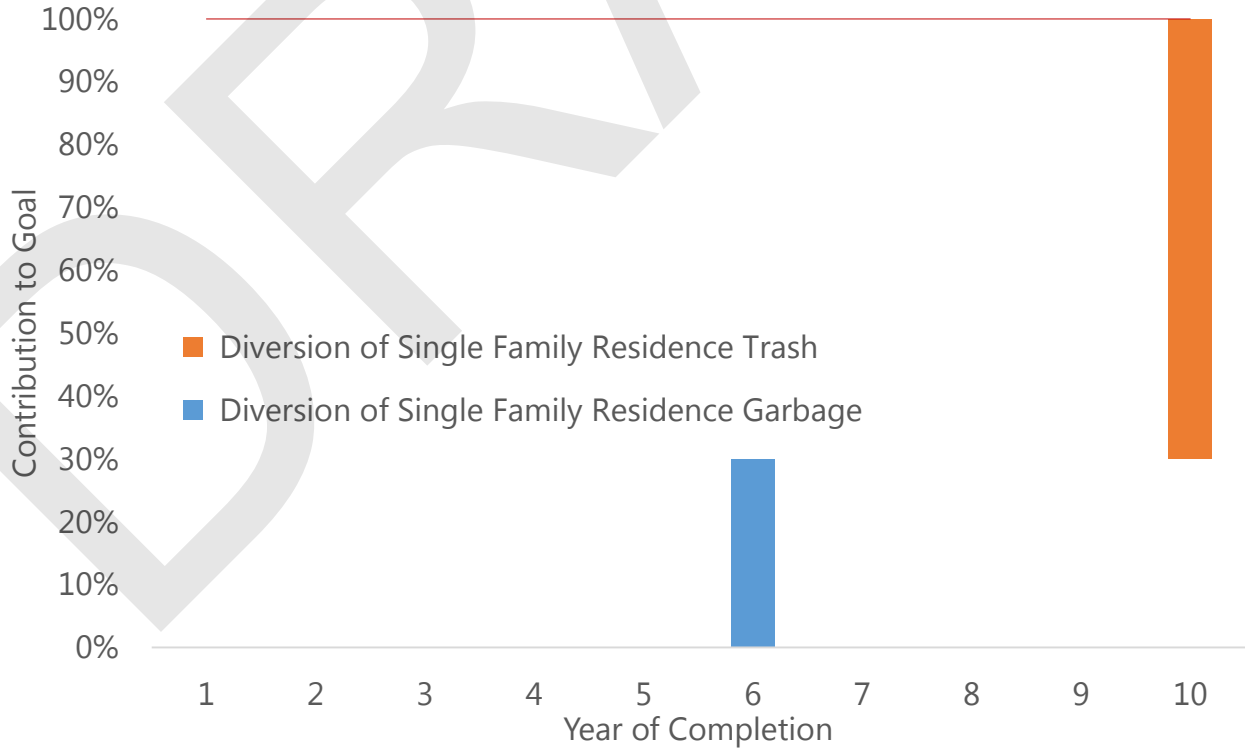


FIGURE 5: FLEET PROJECTS PROSPECTIVE IMPLEMENTATION SCHEDULE

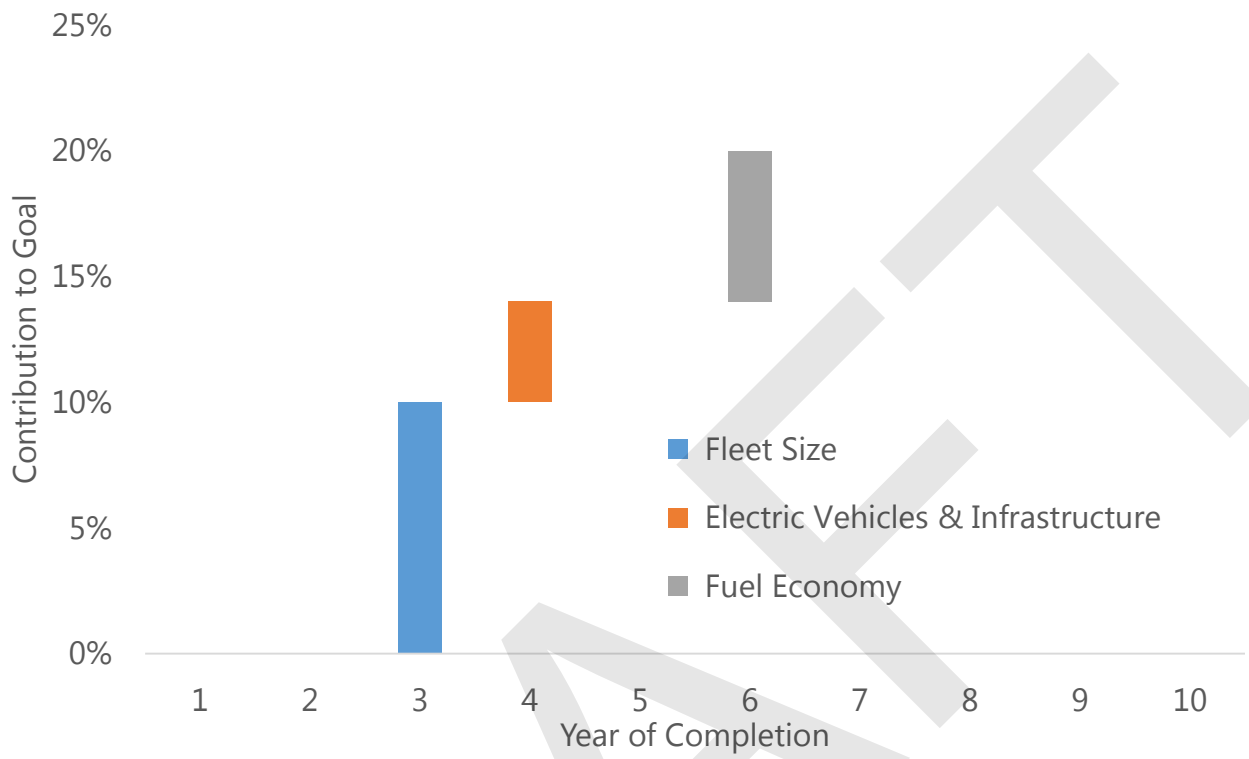
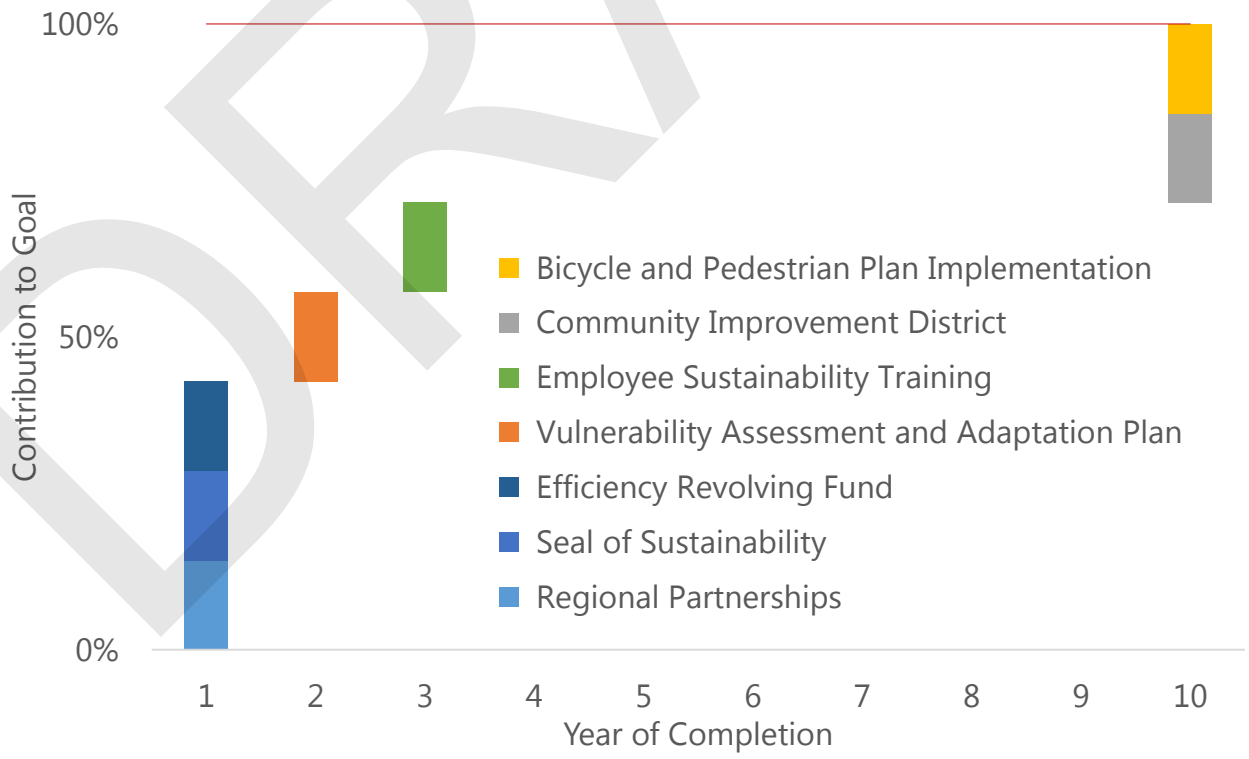


FIGURE 6: CLIMATE, TRANSPORTATION & LAND USE, OUTREACH AND FUNDING PROJECTS PROSPECTIVE IMPLEMENTATION SCHEDULE



POLICY

In addition to incorporating this Plan's projects into the City's Capital Improvement Plan, amending our Comprehensive Plan and Code of Ordinances provides opportunities to underscore our commitment to implementation.

For each project, as well as potential next steps, revisions to existing objectives, goals and policies have been suggested (See Appendix). In some instances, the addition of entirely new Elements (Comprehensive Plan) or Chapters, Articles or Sections (Code of Ordinances) is recommended. Refining the City's policies to bolster the goals and objectives of this plan will help ensure that the City's vision of sustainability carries the ideals of George Merrick forward into the future.

COMMITMENT

This plan is the result of contributions from over 40 City of Coral Gables employees representing over two dozen divisions of government.

Together we are committed to implementing this plan and sustaining our uniquely beautiful and culturally rich City for present and future generations. By focusing on the sustainability of our operations, we will make a lasting difference in prosperity of our City's businesses, the wellbeing of our people and the environmental integrity of our natural places.

We subscribe to the City's Sustainability Vision: our government consists of dedicated people providing exceptional services to preserve our historic heritage, enhance local and global environmental quality, enrich our local economy and strengthen the health and well-being of our residents, businesses and visitors.

The 24 projects across eight focus areas included in the City of Coral Gables Sustainability Management Plan have the potential to generate millions of dollars in net benefits to the City, while extending new services to our citizens and protecting the environment. Through diligent implementation we will strive to fulfill this potential and reach our sustainability goals:

- Reduce electricity use 20% below 2013 levels by 2025
- Reduce water use 20% below 2013 levels by 2025
- Divert single family residential and municipal operations solid waste 75% by 2020
- Reduce gasoline and diesel fuel use 20% below 2013 levels by 2025
- Reduce greenhouse gas emissions 20% below 2013 levels by 2025
- Implement 100% of planned Climate projects by 2025
- Implement 100% of planned Transportation and Land Use projects by 2025
- Implement 100% of planned Outreach projects by 2025
- Implement 100% of planned Funding projects by 2025
- Achieve targeted financial performance for the portfolio of planned projects by 2025.

Our Sustainability Management Plan carries the ideals of our City's founding forward into the future. We are dedicated to working on the actions we have identified and collaborating with all of the City's stakeholders to get the job done.

We the undersigned commit to successful implementation of the City's Sustainability Management Plan.

APPENDICES

GREENHOUSE GAS INVENTORY AND FORECAST

GREENHOUSE GAS INVENTORY

CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN

MAY 18, 2015

RS&H

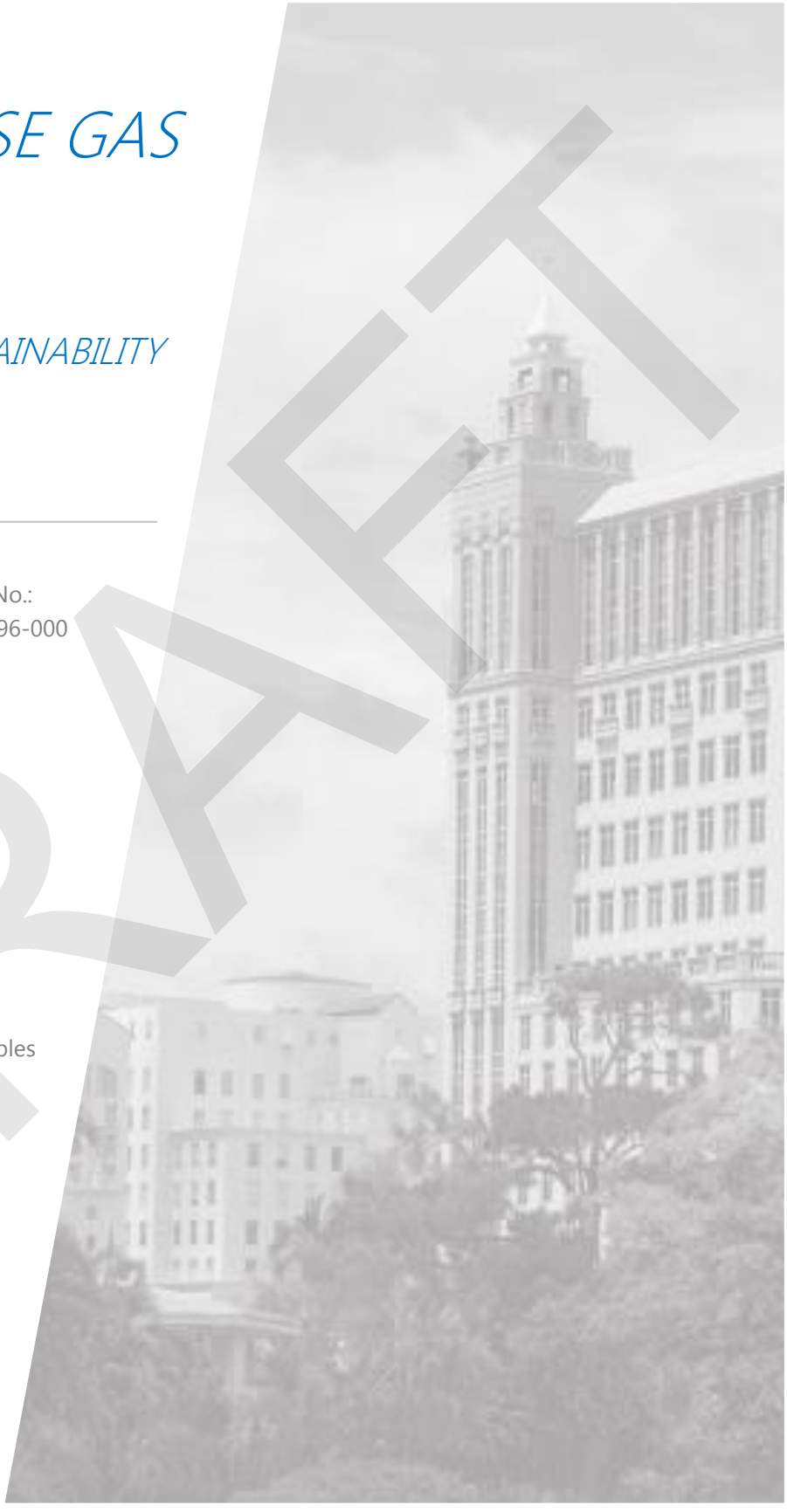
GREENHOUSE GAS INVENTORY

CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN

May 18, 2015
Jacksonville, FL

RS&H No.:
111-0096-000

Prepared by RS&H, Inc. at the
direction of the City of Coral Gables



RS&H

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1. EXECUTIVE SUMMARY

In 2014, the City of Coral Gables undertook a Sustainability Master Planning Process. As part of this process, RS&H prepared the first Greenhouse Gas (GHG) emissions inventory and forecast for the city's Local Government Operations (LGOP) as well as for the community as a whole (Community). This inventory establishes a 2013 baseline for the city's GHG emissions.

This report details results of the LGOP and Community GHG emissions inventory and provides an emissions baseline to evaluate the city's progress towards its GHG emissions reduction goals. Coral Gables' city limits serve as the physical boundaries for the inventory accounting effort.

The report also includes a business-as-usual (BAU) forecast of the city's emissions from the present until 2030. This forecast was developed using the results of the 2013 inventory as the baseline, or starting point.

Together, the inventory and forecast allow the local government to understand present and future emissions trends. The inventory and forecast also provides the information needed to begin setting emissions reduction targets. These targets can inform policy-makers as they design and implement strategic measures to reduce and mitigate greenhouse gas emissions.

This inventory and forecast uses 2013 as the base year of assessment. In 2013, the community's total estimated emissions were 771,972 metric tons of carbon dioxide equivalents ($mtCO_2e$)[1], with the Commercial sector contributing the largest single source at 39% of the total emissions. The Transportation and Residential sectors also contributed significantly at 31% and 27% of the total, respectively.

Within this community-wide total, the city's LGOP Inventory found that local government operations (i.e. operations related to facilities, vehicles, and infrastructure directly owned and/or controlled by the city) were responsible for emitting 13,762 metric tons of CO_2e in the 2013 base year, with city-owned buildings and facilities contributing 50% of this total. The city's vehicle fleet operation and city streetlights also contributed significantly to the total LGOP emissions, at 23% and 13% of the total, respectively.

[1] CO_2e refers to carbon dioxide equivalent (CO_2e), a measure that describes how much warming a given type and amount of a greenhouse gas may cause, using the functionally equivalent amount of carbon dioxide (CO_2) as the reference.

2. INTRODUCTION

As an ICLEI member and signatory to the U.S. Mayors Climate Projection Agreement, Coral Gables has pledged to take a leadership role in promoting public awareness in the community about the causes and impacts of climate change. This inventory supports the city's long-term efforts to reduce emissions and is critical to clearly understanding the city's contribution and path toward addressing the problem of climate change.

This report presents an estimate of GHG emissions in Coral Gables for the calendar year 2013 for each emissions-producing activity that takes place in the city. It establishes a GHG emissions baseline that will allow Coral Gables to evaluate future GHG emissions levels and demonstrate progress in achieving emissions reductions.

Coral Gables, along with more than 1,200 local governments, including over 600 in the United States, is a member of ICLEI – Local Governments for Sustainability. ICLEI is an association for local governments to share knowledge and successful strategies toward increasing local sustainability. ICLEI members represent forward-thinking local governments who are working to make their communities more livable, prosperous, equitable, and environmentally sound. The network is a source of continual technical and local innovative thinking designed to help local governments achieve the vision of a truly sustainable community.

ICLEI supports its members with tools and resources that strengthen their commitment to sustainability, including the LGOP and Community Protocols and the ClearPath cloud-based software used to prepare this inventory.

ICLEI USA provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions reduction target;
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

FIGURE 1: ICLEI MILESTONES

This report represents the completion of the local government operations (LGOP) and community-wide emissions inventory, part of ICLEI's Climate Mitigation Milestone One. It provides a strong foundation for future work to reduce GHG emissions in Coral Gables.

3. METHODOLOGY

3.1 General Approach

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline levels and sources of emissions in the community. A standardized approach is necessary to quantify GHG emissions in a way that is useful to local governments and their communities.

The Community portion of the inventory was completed under ICLEI's U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.1, published July 2013. The LGOP portion of this inventory was completed under ICLEI's Local Government Operations Protocol, Version 1.1, published May 2010. Both inventories were entered into ICLEI's ClearPath GHG emissions reporting platform to facilitate future updates, reporting, and integration with the software's planning, monitoring, and forecasting tools.

GHG emissions were quantified using calculations to determine emissions based on activity data and emission factors. The basic equation used is: *Activity Data X Emission Factor = Emissions*.

Activity data measure the energy use, fuel consumption or other indicators of emissions generating processes. Emission factors corresponding to emissions per unit of activity data (e.g. metric tons CO_2/kWh of electricity) were used to convert activity data into associated emissions quantities.

Since GHG emissions are not typically measured at the source, they must be estimated from data on emissions-generating activities, such as fuel consumption. Emissions estimates include numerous assumptions, and are limited by the quality and availability of related data. With this in mind, it is useful to think of emissions estimates as indicators of reality, rather than exact values.

Emissions results in this inventory are presented in $mtCO_2e$, or metric tons of carbon dioxide equivalent units. Because various greenhouse gases have differing global warming potentials, they are commonly converted to equivalent units of CO_2 to allow comparison of their global warming effects.

3.2 Scope of Inventory

Coral Gables' city limits serve as the physical boundary for this inventory and calendar year 2013 is the timeframe for which emissions were calculated.

4. COMMUNITY

4.1 Community Inventory Overview

The community-scale inventory represents the total amount of greenhouse gas (GHG) emissions associated with the community within its jurisdictional boundary during calendar year 2013. This total includes emissions from municipal government operations and activities. As result the LGOP inventory may be considered a subset of the community inventory.

In 2013, community-wide emissions from Coral Gables totaled **771,972** metric tons CO2e. Table 1 shows community sectors, activities, and estimated emissions included in this total. Figure 2 shows the percentage of the total contributed by each sector.

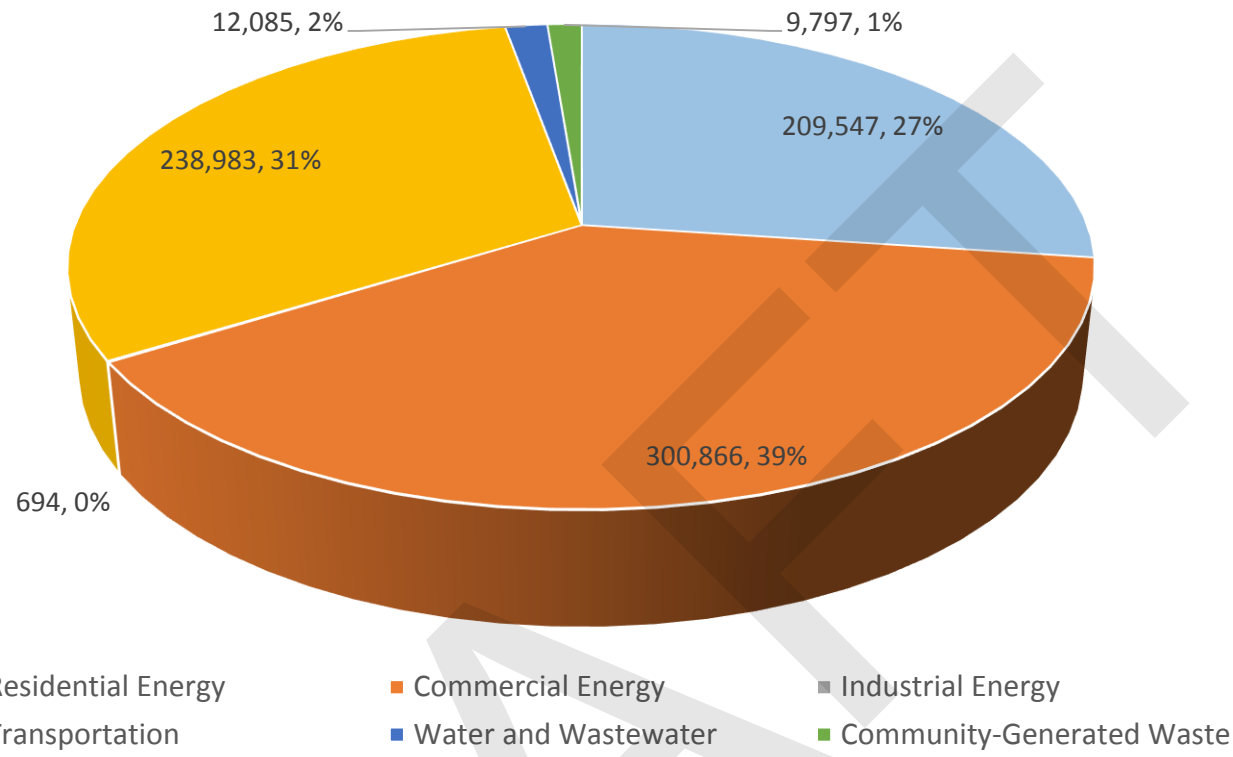
TABLE 1: COMMUNITY INVENTORY SECTORS, ACTIVITIES, AND EMISSIONS

Sector	Activities	Emissions (CO2e)
Residential	Electricity consumption Natural gas consumption Propane consumption	209,547
Commercial	Electricity consumption Natural gas consumption	300,866
Industrial	Electricity consumption	694
Transportation	Gasoline vehicles VMT Diesel vehicles VMT	238,983
Water and Wastewater	Potable water supply Wastewater collection and treatment Septic system fugitive emissions WWTP process emissions (CH4)	12,085
Agriculture	*Not occurring in the community*	NO*
Community-generated Waste	Solid waste generation Solid waste transportation	9,797
Process and Fugitive Emissions	*Not estimated – no data available*	NE**
Upstream Impacts of Activities	*Not estimated – no data available*	NE**
Consumption-Based Emissions	*Not estimated – no data available*	NE**
Total		*771,972*

*NO = Not Occurring. The source or activity does not occur or exist within the community.

**NE = Not Estimated. Emissions occur but have not been estimated or reported (e.g., data unavailable, effort required not justifiable).

FIGURE 2: 2013 COMMUNITY-WIDE EMISSIONS



4.2 Community Inventory Data Sources and Methods

This section details data sources and methods used to complete the emissions estimates for each sector.

Where opportunities exist to refine the inventory estimate with additional information, they are presented in italics. This information is provided for the city's use in reviewing the Preliminary GHG Inventory; it will not be included in the Final Inventory Report.

Emissions in the Residential, Commercial and Industrial sectors are related to purchased electricity (Scope 2 emissions) and the combustion of fuels for heating or industrial processes. Data to calculate electricity and natural gas emissions was provided by Florida Power and Light (FPL) and Florida City Gas. Propane emissions were estimated using ICLEI method BE1.2 based on data from the Energy Information Agency (EIA) and the American Community Survey (ACS).

Transportation emissions estimates were developed using vehicle miles travelled (VMT) data within the city limits interpolated from the Southeast Regional Planning Model.

Water and wastewater related emissions were calculated using data from the city's Public Works department and Miami-Dade Water and Sewer Department (WASD). WASD provided emissions totals for the water and wastewater plants serving the city and the city's contribution to these totals was estimated using a ratio approach. Since a majority of city residents use septic systems, emissions from these sources

were estimated using a population-based approach. *This estimate can be further refined if the city provides an accurate inventory of septic systems in the city.*

Since there is little to no agriculture occurring in Coral Gables, this category was omitted from the inventory.

Solid Waste related emissions were estimated based on data from the city's public works, Miami-Dade County, and Waste Management of Dade County (WMDC). Coral Gables' solid waste management system is complex. Single-family waste (i.e. "garbage") is picked up by the city's Public Works Department and transferred to the North Dade landfill (7.1%), South Dade Landfill (18.9%) or the Resource Recovery Facility (72.9%)[2]. The Resource Recovery Facility (RRF) recycles some waste, and burns the rest to produce energy. All three facilities are located outside of Coral Gables. A ratio approach was used to calculate the city's contribution to emissions from these facilities using EPA Mandatory Reporting Rule (MRR) data on reported GHG emissions totals. ICLEI method SW.1 was used to estimate emissions at N. Dade and S. Dade landfills, and method SW.7 was used for the RRF. WMDC picks up waste from multi-family residences and commercial buildings within the city. For the purposes of this analysis, it was assumed that WMDC disposes of waste in a landfill with landfill gas collection in place. *This estimate could be improved with additional information on the landfill(s) where WM disposes of solid waste.*

Due to a lack of available information, the categories Process and Fugitive Emissions, Upstream Impacts of Activities, and Consumption-Based Emissions have been excluded from the 2013 baseline inventory. Although emissions related to these activities occur, they are not estimated at this time.

[2] Percentages reported by Miami-Dade for 2013

5. LOCAL GOVERNMENT OPERATIONS

5.1 LGOP Inventory Overview

The local government operations (LGOP) inventory allows city operations to understand its own impact on the community's emissions and to effectively plan to reduce those emissions over which it has significant influence or direct control. It represents the total amount of greenhouse gas (GHG) emissions associated with local government operations for calendar year 2013.

In 2013, LGOP emissions from Coral Gables totaled 13,762 metric tons CO2e. Table 2 shows local government sectors, activities, and estimated emissions included in this total. Figure 3 shows the percentage of the total contributed by each sector.

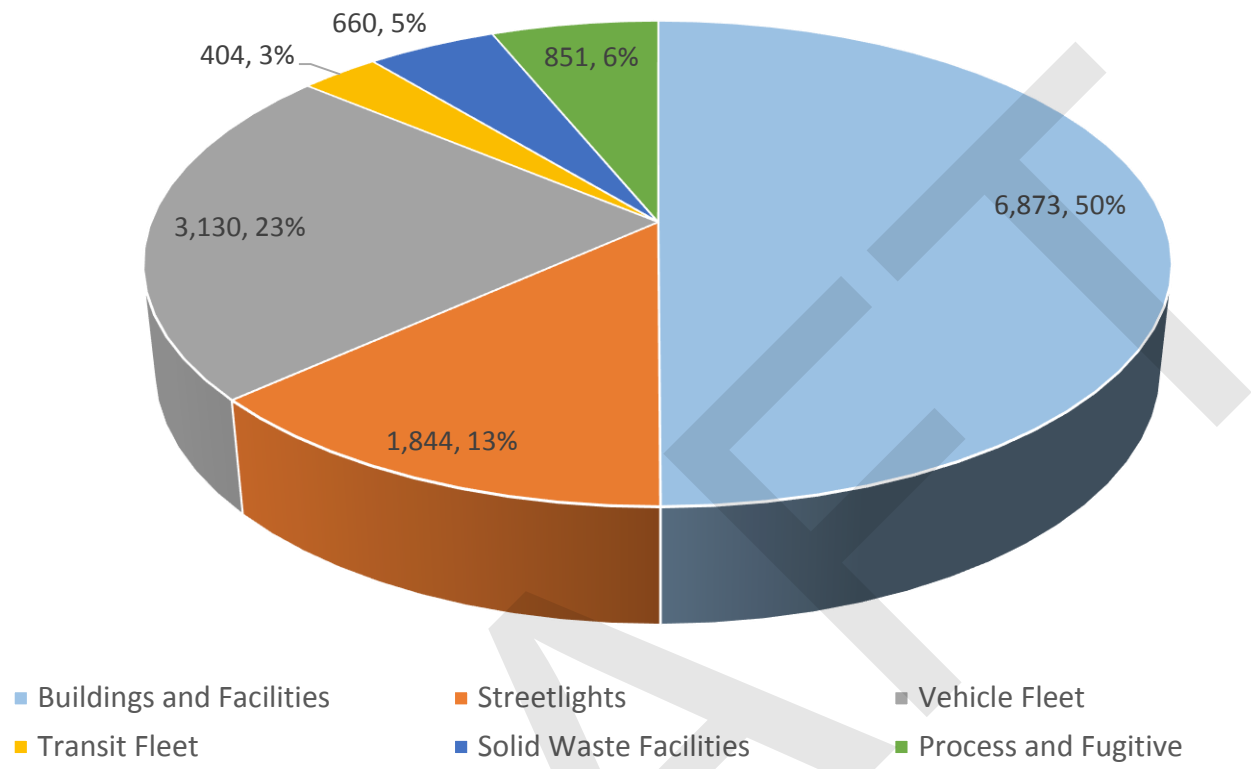
TABLE 2: LGOP INVENTORY SECTORS, ACTIVITIES, AND EMISSIONS

Sector	Activities	Emissions (CO2e)
Buildings / Facilities	Electricity consumption Electric Power T&D losses Stationary fuel combustion *Not estimated, no information available.*	6,873
Streetlights	Electricity consumption (Streetlights)	1,844
Port / Airport Facilities	*Not occurring – there are no city-owned Port/Airport facilities*	NO
Vehicle Fleet	Fleet vehicle emissions Off-highway vehicle emissions	3,130
Transit Fleet	Transit Fleet vehicle emissions (Trolley)	404
Employee Commute	*Not estimated, no information available*	NE
Solid Waste Facilities	Waste generation at city facilities	660
Water and Wastewater Treatment Facilities	*Not occurring – there are no city-owned Water/Wastewater Treatment facilities*	NO
Power Generation	*Not estimated – there are no city-owned power generation facilities other than generators. No generator information was available.*	NO
Fugitive Emissions	Fugitive emissions related to HVAC systems	851
Total		*13,762*

*NO = Not Occurring. The source or activity does not occur or exist within the community.

**NE = Not Estimated. Emissions occur but have not been estimated or reported (e.g., data unavailable, effort required not justifiable).

FIGURE 3: 2013 LGOP EMISSIONS



5.2 LGOP Inventory Data Sources and Methods

This section details data sources, methods and sources used to complete the emissions estimates for each sector.

Where opportunities exist to refine the inventory estimate with additional information, they are presented in italics. This information is provided for the city's use in reviewing the Preliminary GHG Inventory; it will not be included in the Final Inventory Report.

Buildings and Facilities emissions estimates were calculated based on the city's utility records. This category also includes infrastructure such as pump and lift stations. *The city was unable to provide utility bills for stationary fuel combustion (i.e. natural gas or propane) although this is an activity that occurs to a limited extent in city fire stations. The city was also unable to provide data needed to calculate fugitive emissions from HVAC systems and fire suppression equipment. This information should be included in future inventories if possible.*

Streetlight emissions were calculated based on the city's utility billing data. Streetlight records were entered into ClearPath individually by FPL account number to facilitate tracking the performance of each group.

Port and Airport Facilities were omitted from the inventory, since none are owned or operated by the city, or located within its jurisdiction.

Vehicle Fleet and Transit Fleet (i.e. the city's Trolley service) emissions were calculated based on fuel purchase records supplied by the city's Public Works Department.

Employee Commute related emissions were omitted from the inventory since the city did not have sufficient information on this activity to support an emissions estimated. *Since inclusion of this activity is required by the LGOP Protocol, it is recommended that the city complete an employee commuting survey or coordinate with RS&H regarding alternate methods of estimating employee commute-related emissions such as through a GIS analysis.*

The Solid Waste Facilities emissions estimate was based on waste generation data for city facilities. To calculate waste tonnages, a conversion factor of 150 pounds of waste per cubic yard of dumpster space was applied following EPA guidance (the middle of the accepted range)[3]. *The city supplied service-level data to support this estimate; in future tracking the exact volumes or tonnages disposed would allow a more accurate emissions calculation and also support waste minimization efforts.*

Water and Wastewater Treatment Facilities were omitted from the inventory, since none are owned or operated by the city, or located within its jurisdiction.

The city does not own or operate utility-scale power plants or any other significant power generation sources. *The city was unable to provide information on fuel use by stationary generators. While this information would help refine the inventory, generators are typically used only when tested and in emergencies or power outages. As a result, generator emissions are likely de minimus compared to the inventory total (i.e., less than 2%).*

[3] US-EPA "Standard Volume-to-weight Conversion factors", accessed 3/9/15 at http://www.epa.gov/osw/conserve/tools/recmeas/docs/guide_b.pdf

6. GHG EMISSIONS FORECAST

6.1. Forecast Methodology

While establishing an emissions baseline lays the groundwork for measuring and reporting emissions, it is also useful to forecast emissions over time to see how projected rates of population growth and energy consumption would affect emissions under a business-as-usual (BAU) scenario.

RS&H prepared BAU forecasts for both the LGOP and Community scale over a 15-year time horizon. The forecast end date of 2030 corresponds to the first key planning horizon highlighted in the Southeast Florida Regional Climate Action Plan (2012).

A review of GHG emissions forecasts performed by ICLEI members revealed a wide range of methods and growth rate indicators. In the interest of simplicity and reproducibility, two growth rate indicators were used to develop the city's BAU forecast. Population growth projections for Miami-Dade County, prepared by the Florida Office of Economic and Demographic Research, were used for the majority of emissions-generating activities.[4] For categories related to energy use (e.g. transportation and facilities energy consumption) the U.S. Energy Information Agency (EIA) Annual Energy Outlook 2014 total energy projection for the southeast region was used.[5] In both cases, projections were used as a basis for calculating compound annual growth rates for the 5-year date ranges in ClearPath.

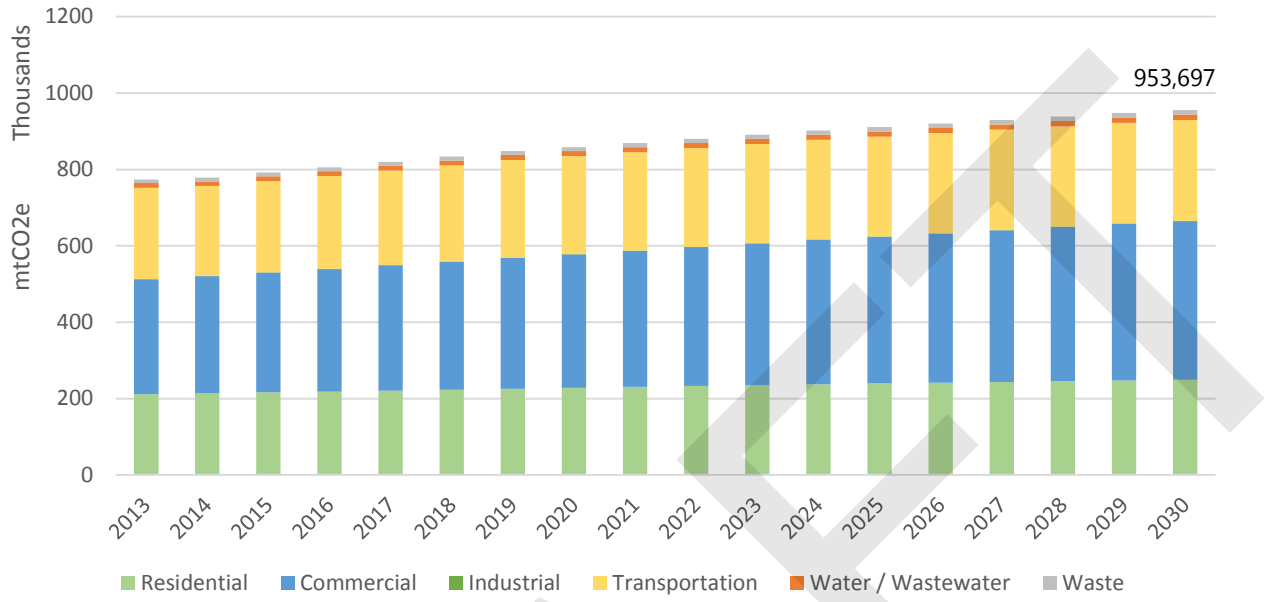
6.2. Community Inventory Forecast Results

The Community GHG Emissions forecast indicates growth in the commercial energy sector, along with residential energy use and transportation, will result in GHG emissions gradually increasing to 953,697 mtCO2e by 2030 under a BAU scenario. Increases in Water/wastewater treatment and solid waste related emissions are less significant since they make up a small proportion of the inventory total.

[4] "Medium Projections of Florida Population by County, 2015-2040", accessed February 19, 2015 at http://edr.state.fl.us/Content/population-demographics/data/Medium_Projections.pdf

[5] "Energy Consumption by Sector and Source, South Atlantic, Reference case- 2014 update", accessed February 19, 2015 at http://www.eia.gov/forecasts/aeo/supplement/suptab_5.xlsx

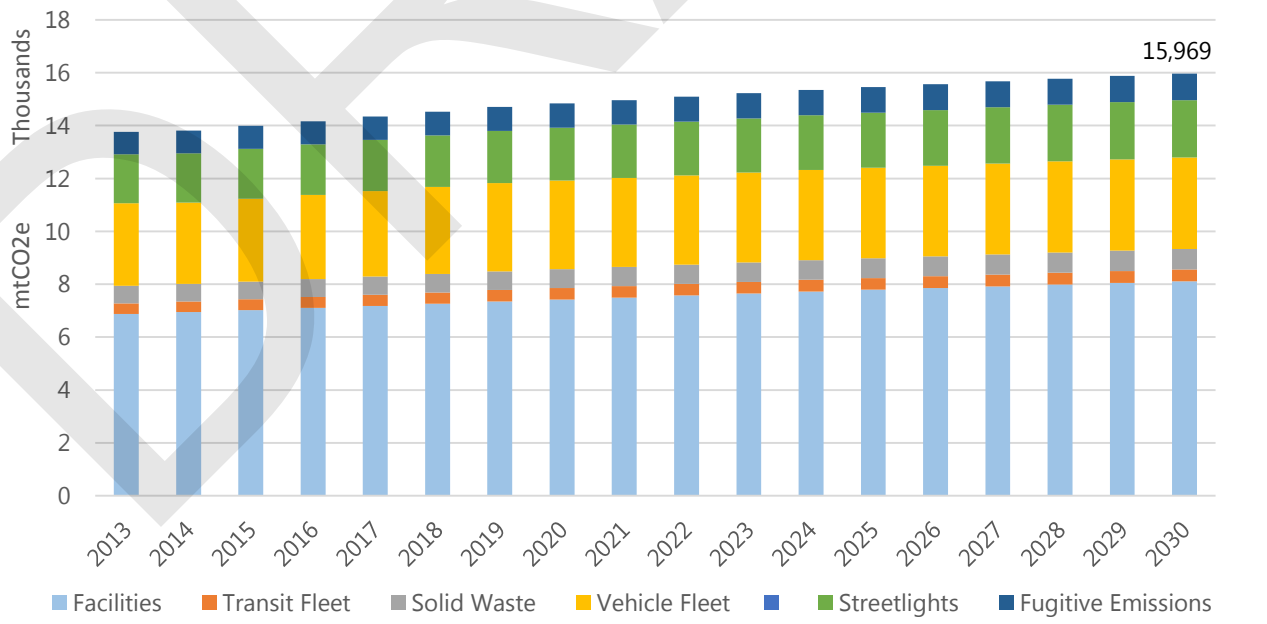
FIGURE 4: CORAL GABLES COMMUNITY EMISSIONS FORECAST, 2013 - 2030



6.3. LGOP Inventory Forecast Results

The LGOP GHG Emissions forecast assumes that city facilities will need to be expanded to provide services as the city's population continues to grow. Since facilities energy consumption is the largest single emissions source for Government operations, this source represents the majority of emissions increases to 2030. Under a BAU scenario, LGOP emissions would total approximately 15,969 mtCO2e by 2030.

FIGURE 5: CORAL GABLES LGOP EMISSIONS FORECAST, 2013 - 2030



7. EMISSIONS REDUCTION TARGETS

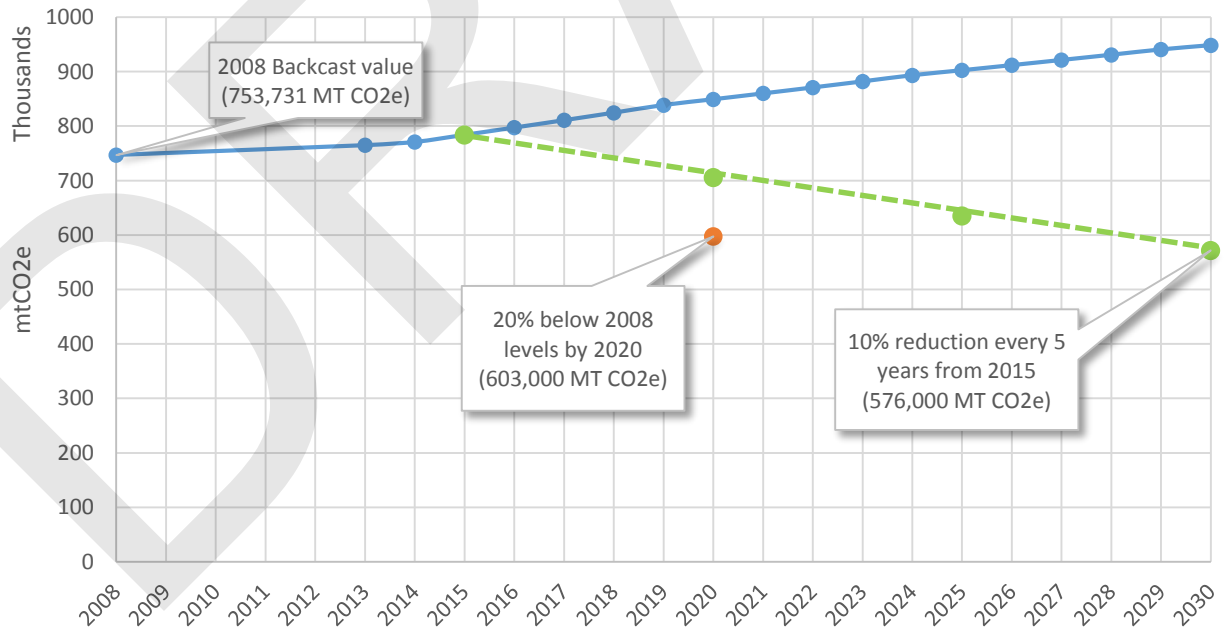
7.1. Community GHG Emissions Reduction Targets

Miami-Dade and other SE FL Climate Compact counties follow the GHG emissions reduction goals set by the U.S. Cool Counties Climate Stabilization Declaration in 2008. These targets include an 80 percent emissions reduction by 2050 from 2008 levels. In order to achieve this goal, Miami-Dade County set interim targets of 20% emissions reduction from 2008 levels by 2020 and a 10% reduction over every 5 year period through 2050.

RS&H recommends Coral Gables align its emissions reduction goals as much as possible with those set by other local governments in the south Florida region. To facilitate comparison with regional goals, a backcasting approach was used to estimate 2008 emissions totals. This 2008 estimate is 753,731 mtCO2e for the Coral Gables community as a whole.

Meeting the regional goal of 20% below 2008 levels by 2020 would require the city to reduce community emissions by 24% from 2015 to 2020, to approximately 603,000 mtCO2e. This would require an ambitious effort to reduce emissions at a rapid pace throughout the community. Another option would be to target 10% emissions reductions every 5 years until 2030. This would result in community-wide emissions of about 576,000 mtCO2e in 2030.

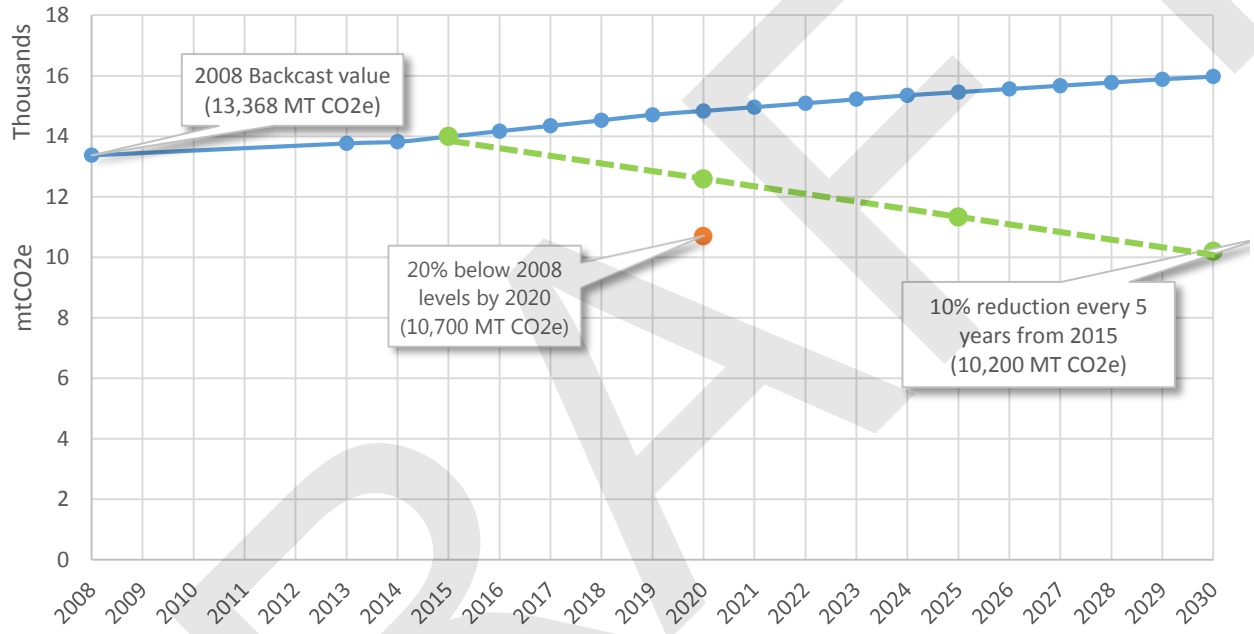
FIGURE 6: COMMUNITY BAU FORECAST AND EMISSIONS REDUCTION TARGETS



7.2. LGOP GHG Emissions Reduction Targets

Estimated 2008 GHG emissions for Coral Gables government operations are 13,368 mtCO2e. Achieving the regional goal of 20% below 2008 levels by 2020 would require the city to reduce operational emissions by 25% from 2015 to 2020. Measures identified in the Solutions Memorandum have the potential to achieve sufficient emissions reductions to meet this goal if implemented beginning in 2015. While achievable, this target would likely require substantial planning and investment, and may not be practical within the 5-year time frame. Another option would be to target 10% emissions reductions every 5 years until 2030. The latter option would result in LGOP emissions of about 10,200 MT CO2e in 2030.

FIGURE 7: LGOP BAU FORECAST AND EMISSIONS REDUCTION TARGETS



APPENDIX A: INVENTORY SCOPING AND REPORTING CHECKLISTS

Coral Gables Community-wide GHG Emissions Inventory ***Scoping and Reporting Tool (2013 Inventory)*** Emissions Type		Source or Activity?	FINAL REPORTING - INCLUDED / EXCLUDED							FINAL REPORTING DATA	
			Included, Required Activities	Included, under possible reporting frameworks: SI	CA	HC	Other	Excluded (IE, NA, NO, or NE)	Explanatory Notes	Acct Method Used	Acct Method Notes
Built Environment											
Use of fuel in residential and commercial stationary combustion equipment		Source AND Activity	☑						Included- data from FL Gas (natural gas); Propane Emissions estimated using Method BE.1.2	Method BE.1.2	
Industrial stationary combustion sources		Source						NO	Little to no industrial activity		
Electricity	Power generation in the community	Source						NE	City could not provide generator data; no large-scale generation		
	Use of electricity by the community	Activity							Included- data from FPL		
District Heating/ Cooling	District heating/cooling facilities in the community	Source						NO			
	Use of district heating/cooling by the community	Activity						NO			
Industrial process emissions in the community		Source						NO			
Refrigerant leakage in the community		Source						☑	RS&H estimate		
Transportation and Other Mobile Sources											
On-road Passenger Vehicles	On-road passenger vehicles operating within the community boundary	Source						IE			
	On-road passenger vehicle travel associated with community land uses	Activity	☑						Included- based on RS&H VMT Estimate		RS&H VMT estimate
On-road Freight Vehicles	On-road freight and service vehicles operating within the community boundary	Source						IE			
	On-road freight and service vehicle travel associated with community land uses	Activity					☑		Included- based on RS&H VMT Estimate		RS&H VMT estimate
On-road transit vehicles operating within the community boundary		Source					☑		Included- based on RS&H VMT Estimate		RS&H VMT estimate
Transit Rail	Transit rail vehicles operating within the community boundary	Source						NE			
	Use of transit rail travel by the community	Activity						NE			
Inter-city passenger rail vehicles operating within the community boundary		Source						NE			
Freight rail vehicles operating within the community boundary		Source						NE			
Marine	Marine vessels operating within the community boundary	Source						NE			
	Use of ferries by the community	Activity						NE			
Off-road surface vehicles and other mobile equipment operating within the community boundary		Source						NE			
Use of air travel by the community		Activity						NE			
Solid Waste											
Solid Waste	Operation of solid waste disposal facilities in the community	Source						NO			
	Generation and disposal of solid waste by the community	Activity	☑						Included - data from Miami-Dade County.	SW.1 and SW.7	

Notation Keys for Excluded Emission Sources and Activities:
IE – Included Elsewhere; NE – Not Estimated;
NA – Not Applicable; NO – Not Occurring

Coral Gables Community-wide GHG Emissions Inventory ***Scoping and Reporting Tool (2013 Inventory)*** **Emissions Type**		**Source or Activity?**	**FINAL REPORTING - INCLUDED / EXCLUDED**							**FINAL REPORTING DATA**	
			Included, Required Activities	**Included, under possible reporting frameworks:**				**Excluded (IE, NA, NO, or NE)**	**Explanatory Notes**	**Acct Method Used**	**Acct Method Notes**
				SI	**CA**	**HC**	**Other**				
Water and Wastewater											
Potable Water - Energy Use	Operation of water delivery facilities in the community	Source					☑		Pump station emissions included (as info item)		
	Use of energy associated with use of potable water by the community	Activity	☑						Used % WTP reported emissions for 2013 attributable to Coral Gables		
Use of energy associated with generation of wastewater by the community		Activity	☑						Used ICLEI Method WW.15 to estimate	Method WW.15	
Centralized Wastewater Systems - Process Emissions	Process emissions from operation of wastewater treatment facilities located in the community	Source						NO			
	Process emisisons associated with generation of wastewater by the community	Activity					☑		Population-based estimate		
Use of septic systems in the community		Source AND activity					☑		ClearPath population based calculation		
Agriculture											
Domesticated animal production		Source						NO	Little to no agriculture in CG		
Manure decomposition and treatment		Source						NO	Little to no agriculture in CG		
Upstream Impacts of Community-Wide Activities											
Upstream impacts of fuels used in stationary applications by the community		Activity						NE			
Upstream and transmission and distribution (T&D) impacts of purchased electricity used by the community		Activity						NE			
Upstream impacts of fuels used for transportation in trips associated with the community		Activity						NE			
Upstream impacts of fuels used by water and wastewater facilities for water used and wastewater generated within the community boundary		Activity						NE			
Upstream impacts of select materials (concrete, food, paper, carpets, etc.) used by the whole community		Activity						NE			
Independent Consumption-Based Acccounting											
Household Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all households in the community)		Activity						NE			
Government Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all governments in the community)		Activity						NE			
Life cycle emissions of community businesses (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all businesses in the community)		Activity						NE			

Notation Keys for Excluded Emission Sources and Activities:
IE – Included Elsewhere; NE – Not Estimated;
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Coral Gables Local Government Operations Emissions Inventory (2013)

Inventory Data Checklist

Sector	Sub Sector	Potential Data Needs	Included (Yes/No)	Staff or External Contact Responsible for Providing Data (Name, Title, Contact Information)	Excluded (IE, NA, NO, or NE)	Status (In-process, Complete)	Notes
Facilities Sources							
Buildings and Other Facilities	Utility-Derived Power	Electricity	Yes	Ray Vorsteg, Public Works	--	Data finalized	
		Natural Gas	No		NE		Data not provided, minimal use of natural gas
		Diesel (Back-up Generators)	No		NE		Data not provided, minor emissions may occur
		Gasoline (Back-up Generators)	No		NE		Data not provided, minor emissions may occur
		Propane (Back-Up Generators)	No		NO		
	Back-Up & Off-Grid Power	Other Fuels (see notes)	No		NO		
	Direct Access Power	Electricity	No		NO		
		Natural Gas	No		NO		
	District Heating and Cooling	Purchased Cooling	No		NO		
		Purchased Steam	No		NO		
	Combined Heat and Power	Purchased Steam	No		NO		
Streetlight and Traffic Signals	Utility-Derived Power	Electricity	Yes	Ray Vorsteg, Public Works	--	Data finalized	
		Natural Gas	No		NO		
	Back-Up & Off-Grid Power	Diesel (Back-up Generators)	No		NO		
		Gasoline (Back-up Generators)	No		NO		
		Propane (Back-Up Generators)	No		NO		
		Other Fuels (see notes)	No		NO		
	Direct Access Power	Electricity	No		NO		
		Natural Gas	No		NO		
Water Transport (inlcuding sewage and storm water)	Utility-Derived Power	Electricity	Yes	Ray Vorsteg, Public Works	--	Data finalized	Pump Station Elect. Use included in Facility section
		Natural Gas	No		NO		
	Back-Up & Off-Grid Power	Diesel (Back-up Generators)	No		NO		
		Gasoline (Back-up Generators)	No		NO		
		Propane (Back-Up Generators)	No		NO		
		Other Fuels (see notes)	No		NO		
	Direct Access Power	Electricity	No		NO		
		Natural Gas	No		NO		

Notation Keys for Excluded Emission Sources and Activities:
IE – Included Elsewhere; NE – Not Estimated;
NA – Not Applicable; NO – Not Occurring

RS&H

Coral Gables Local Government Operations Emissions Inventory (2013)

Inventory Data Checklist

Sector	Sub Sector	Potential Data Needs	Included (Yes/No)	Staff or External Contact Responsible for Providing Data (Name, Title, Contact Information)	Excluded (IE, NA, NO, or NE)	Status (In-process, Complete)	Notes
Mobile Sources							
Vehicle Fleet and Mobile Equipment	Vehicle Fleet (passenger vehicles, AFVs, sanitation and street sweeping equipment, aircraft and maritime	Mobile Combustion (consumption) of Fuels	Yes	Steve Riley, Public Works (Fleet)	--	Data finalized	
		Incomplete Combustion (VMT)	No		NE		
		Fugitive Emissions-Leaked Refrigerants	No		NE		Data not tracked/not available
	Transit Fleet (buses, trains, etc used for transit)	Mobile Combustion (consumption) of Fuels	Yes	Steve Riley, Public Works (Fleet)	--		
		Incomplete Combustion (VMT)	No		NE		
		Fugitive Emissions-Leaked Refrigerants	No		NE		Data not tracked/not available
	Mobile Equipment (groundskeeping equipment, etc)	Fuel Combustion (consumption)	Yes	Steve Riley, Public Works (Fleet)	--	Data finalized	
Employee Commute	Employee Commute Emissions	Mobile Combustion (consumption) of Fuels	No		NE		Data not available; recommend completing employee commuting survey
		Incomplete Combustion (VMT)	No		NE		
Other Sources							
Refrigerants and Fire Suppressants	Buildings and Facilities (offices, airports, marinas, landfill facilities, wastewater facilities, power generation facilities, etc.)	Fugitive Emissions-Leaked Refrigerants	Yes	RS&H estimate based on sq footage	--	Data finalized	Estimated using WRI method based on building heated/cooled area
		Fugitive (Leaked) Fire Suppression Emissions	No		NE		Data not tracked/not available
	Vehicle Fleet (all fleet vehicle air conditioning or refrigeration equipment)	Fugitive Emissions-Leaked Refrigerants	No		NE		Data not tracked/not available
	Transit Fleet (buses, trains, etc used for transit)	Fugitive Emissions-Leaked Refrigerants	No		NE		Data not tracked/not available
Contracted Services	Various Facilities or Mobile Sources (e.g., trash collection, snow removal, mowing/landscaping services)	Gasoline	No		NE		Data not tracked/not available
		Diesel	No		NE		Data not tracked/not available
		Electricity	No		NE		Data not tracked/not available
		Natural Gas	No		NE		Data not tracked/not available
Government-Generated Solid Waste	***See below for further questions***	Fugitive Methane Emissions	Yes	Jessica Keller, Public Works	--	Data finalized	Estimated based on service-level collection data for facilities

Notation Keys for Excluded Emission Sources and Activities:
IE – Included Elsewhere; NE – Not Estimated;
NA – Not Applicable; NO – Not Occurring

SOLUTIONS MEMORANDUM

SOLUTIONS MEMORANDUM

CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN

MAY 15, 2015

RS&H

SOLUTIONS MEMORANDUM

CORAL GABLES SUSTAINABILITY MANAGEMENT PLAN

May 15, 2015
Jacksonville, FL

RS&H No.:
111-0096-000

Prepared by RS&H, Inc. at the direction of the City of Coral Gables

Photo by D. Ahren

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1. EXECUTIVE SUMMARY

This draft Solution Memorandum (Solutions Memo) establishes a baseline for city operations, benchmarks performance against peer cities, and begins to identify potential solutions to improve performance in city operations. When finalized, this memo will serve as a map to guide integration of sustainability into the city's operations.

The Solutions Memo addresses energy use in city facilities and infrastructure, fleet operations, waste management and diversion, water use in city operations, the city's operational control of community land use and transportation, sustainability education, outreach and climate resiliency.

Based on an analysis of baseline conditions and benchmark comparisons to peer municipalities 15 potential actions in four sectors have been assessed for their impact on city operations. These rough-order-of-magnitude business cases have the potential to produce about $10 million in direct benefits to the city (e.g. via avoided resource expenditures and new revenues) with a 10-year return on investment of 99%. (*Table 1: Preliminary Summary of Business Case* Measures).

TABLE 1: PRELIMINARY SUMMARY OF BUSINESS CASE MEASURES

#	Solution	10-Year Svgs.	Investment	SPP*	10-Yr. ROI**
F1	Increase Fuel Economy	$131,132	$0	0.0	∞
F2	Reduce Fleet Size	$48,016	$0	0.0	∞
W1	Upgrade Flow Fixtures	$84,568	$16,914	1.5	400%
E1	Upgrade Building Energy Efficiency	$939,735	$318,492	3.4	195%
F3	Procure Electric Vehicles	$1,028,542	$375,000	3.6	174%
W2	Increase Irrigation Efficiency	$814,943	$324,403	4.0	151%
E2	Convert Garage Lighting to LED	$858,733	$447,829	5.2	92%
W4	Harvest Rainwater	$111,380	$60,000	5.4	86%
R1	Increase Diversion of Single Fam. Res. Waste	$1,924,495	$1,100,000	5.7	75%
F4	Procure Natural Gas Vehicles	$744,863	$440,000	5.9	69%
W3	Upgrade Flush Fixtures	$95,524	$57,314	6.0	67%
E3	Convert Streetlights to LED	$2,535,195	$1,695,106	6.7	50%
E4	Install Solar Thermal Systems	$55,610	$50,965	9.2	59%
F5	Procure Autogas Vehicles	$57,517	$68,000	11.8	-15%
E5	Install Solar Photovoltaics	$181,828	$421,900	23.2	-57%
Subtotal of Measures w/ SPP < 10		*$9,372,921*	*$4,886,022*	*5.2*	*92%*
Total		*$9,612,921*	*$5,375,922*	*5.6*	*79%*

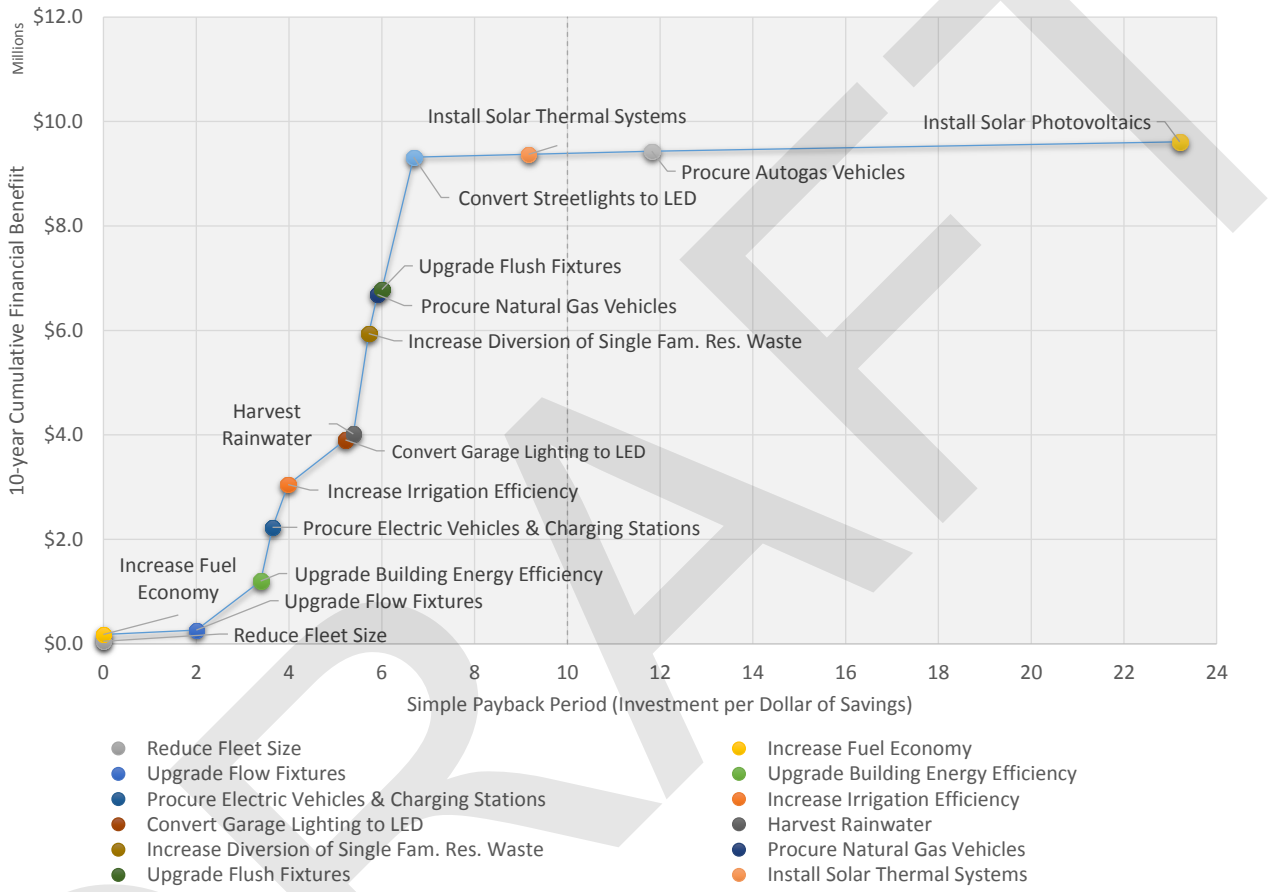
*SPP: Simple payback period (i.e. investment / annual savings)

**ROI: Return on investment (i.e. [annual savings · years] − investment] / investment)

Figure 1: Potential Cumulative Savings vs. Cost-effectiveness of Business Case Measures prioritizes these measures in terms of their relative savings potential and cost-effectiveness (i.e. simple payback period).

Where feasible the potential greenhouse gas (GHG) reductions associated with these measures has been calculated. Full implementation has the potential reduce city operations emissions up to 25% (over 10,000 metric tons of carbon dioxide equivalents) over a ten year period.

FIGURE 1: POTENTIAL CUMULATIVE SAVINGS VS. COST-EFFECTIVENESS OF BUSINESS CASE MEASURES



In addition, 50 measures representing best management practices in all sectors considered have been identified. While business case assessments were not presently feasible for these measures, they also have the potential to significantly improve the city's sustainability performance. (Table 2).

TABLE 2: SUMMARY OF BEST MANAGEMENT PRACTICE MEASURES

Measure	Sector	Solution
E6	Energy	Pump / Motor Efficiency Upgrades
E7	Energy	Building Utility Tracking and Benchmarking
E8	Energy	High Perf. New Construction, Major Renovation and O&M Standards
E9	Energy	Energy Efficiency Investment Revolving Fund
E10	Energy	Indoor Air Quality Management
F6	Fleet	Right-size Fleet

TABLE 2: SUMMARY OF BEST MANAGEMENT PRACTICE MEASURES, CONTINUED

Measure	Sector	Solution
F7	Fleet	Anti-idling Policy and Auxiliary Power Units
F8	Fleet	VMT Reduction
F9	Fleet	Utilize Biofuels
F10	Fleet	Fleet Investment Revolving Fund
F11	Fleet	Participate in Southeast Florida Clean Fuels Coalition
R2	Waste	Waste Audit
R3	Waste	Set Waste Reduction Goals
R4	Waste	Establish Waste Management Metrics
R5	Waste	Track Waste Management Performance
R6	Waste	Establish Waste Management Policies
R7	Waste	Optimize Single Family Residence Waste Services
W5	Water	Leak Detection
W6	Water	HVAC Condensate Harvesting
W7	Water	Process Water Efficiency
W8	Water	Building Utility Tracking and Benchmarking
W9	Water	Native and Drought-Tolerant Landscaping
W10	Water	Low Impact Development
W11	Water	High Perf. New Construction, Major Renovation and O&M Standards
W12	Water	Water Efficiency Investment Revolving Fund
L1	Land Use	Update the Comprehensive Plan
L2	Land Use	Enhance the Zoning Code
L3	Land Use	Incentivize Green Infrastructure
L4	Land Use	Calibrate Aesthetic Impact Criteria for Sustainability
L5	Land Use	Include a Business and Economics Element in the CMP
L6	Land Use	Green Parks Facilities and Create Urban Forests
L7	Land Use	Pursue Sustainability Partnerships with the University of Miami
L8	Land Use	Strengthen Farmers' Market Concept
T1	Transportation	Implement Complete Streets Program
T2	Transportation	Improve the Trolley System
T3	Transportation	Electric Vehicle Charging Stations
T4	Transportation	Implement Bike Sharing
T5	Transportation	Support the Underline Project
C1	Climate Resilience	Expand Regional Partnerships
C2	Climate Resilience	Establish GHG Reduction Targets
C3	Climate Resilience	Prepare a Vulnerability Assessment
C4	Climate Resilience	Prepare a Climate Adaptation Plan
C5	Climate Resilience	Increase Resiliency
C6	Climate Resilience	Update Disaster Planning
E1	Education & Outreach	Integrate Sustainability into Management Practices

TABLE 2: SUMMARY OF BEST MANAGEMENT PRACTICE MEASURES, CONTINUED

Measure	Sector	Solution
E2	Education & Outreach	Engage Employees
E3	Education & Outreach	Develop "Green Event" Policies
E4	Education & Outreach	Incorporate Sustainability into Marketing
E5	Education & Outreach	Survey the Community
E6	Education & Outreach	Track and Document Results

Measures identified for their potential to improve the city's sustainability operations were based on a baseline assessment of the city, including a greenhouse gas inventory of city operations, and a benchmark comparison to peer cities. Peer cities included, but were not limited to, Boulder, CO; Chapel Hill, NC; and Palo Alto, CA, due to their similarities to Coral Gables and documented sustainability accomplishments. These exercises indicate that Coral Gables is at the early stages of its progress towards sustainable operations in the areas examined relative to its peers. However, as this memo indicates, it exhibits significant potential to cost-effectively integrate sustainability into its operations.

2. INTRODUCTION

This Solutions Memo represents an important step in a 10-month sustainability master-planning process involving a collaboration between the City of Coral Gables, RS&H, and sub-consultants Zyscovich, Inc. and Erin L. Deady, P.A. It establishes a baseline for city operations, benchmarks performance against peer cities, and begins to identify potential solutions to improve performance.

The document is intended as a basis for discussion and collaboration between city staff and project consultants. Coral Gables employees ultimately have the greatest knowledge of the city's operations. Their input is essential for designing solutions to advance the city's sustainability program. Following review by the city, then discussion and refinement of the potential solutions during collaborative workshops and additional interactions between project consultants and city staff, a prioritized list of solutions will be incorporated into the Government Operations Project-driven Sustainability Master Plan (SMP).

The memo is focused on government operations only. Engaging the community in sustainability and beginning to plan community-scale sustainability solutions will be considered in later deliverables including the Community Assessment, Community Sustainability Workshops, Community Sustainability Vision Document, and Marketing and Communications Plan.

The Solutions Memo addresses energy use in city facilities and infrastructure (Energy), fleet operations (Fleet), waste management and diversion (Waste), water use in city operations (Water), the city's operational control of Coral Gables land use and transportation (Land Use and Transportation), Climate Resilience and sustainability Education And Outreach. These sections correspond to the focus areas and sustainable elements identified in the scope of work (SOW).

Each section has three components: 1) Baseline, 2) Benchmark and 3) Improve. These components are intended to aid understanding of the current state of sustainability performance in the city, place performance in context via comparison with peer cities and introduce potential solutions for improving performance. Methods utilized to develop these components are summarized in Appendix 10.1.

The baseline component quantitatively and qualitatively defines the city's current position relative to sustainability. It establishes a starting point for measuring progress towards the city's sustainability goals. It also allows comparisons between the city's efforts and other municipalities. The baseline effort included development of a local government operations GHG inventory, as well as an inventory of community-wide emissions.

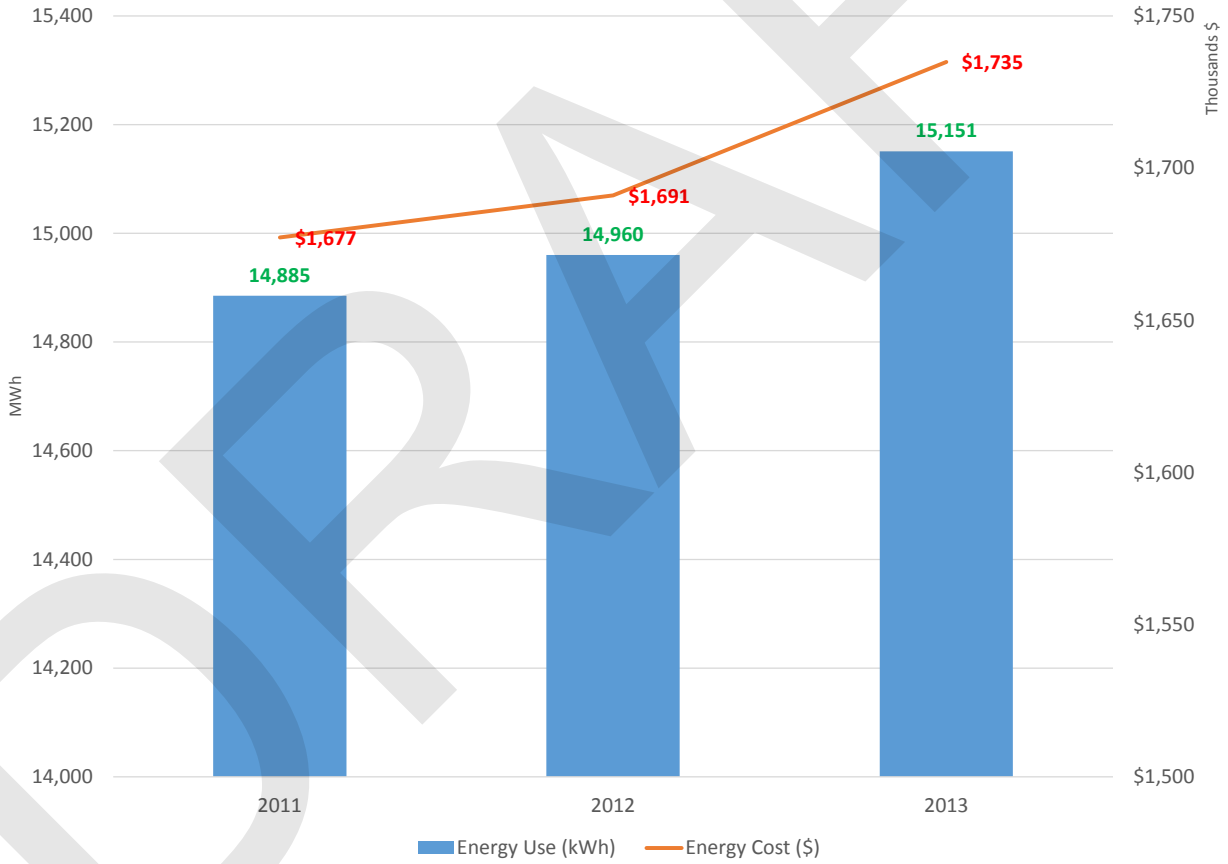
The benchmarking component provides a systematic comparison of performance metrics, processes and policies with those of other municipalities. The process also identifies best management practices (BMPs) that have helped peers achieve positive results. In collaboration with the city, three peer cities have been selected as the basis of benchmarking: 1) Boulder, CO; 2) Chapel Hill, NC, and 3) Palo Alto, CA. These cities were selected for their similarities to Coral Gables, as well as their record of sustainability achievement. Where possible, BMPs from other cities are also included.

3. ENERGY

3.1 BASELINE

The City spent approximately $1.74 million on over 15,000 megawatt-hours (MWh) of electricity to power facilities and infrastructure in 2013. This represents nearly all non-fuel energy consumed by City operations.[1] Despite the average unit cost (dollars per kilowatt-hours) of electricity decreasing by 6% between 2011 and 2013, both the total and the intensity (dollars per square foot) of electricity expenditure on city facilities and infrastructure has increased by 3%. Similarly, electricity use has increased by 2%. See *Figure 2: City Operations Energy Use (MWh) and cost (Thousands of dollars), 2011* - 2013 below.

FIGURE 2: CITY OPERATIONS ENERGY USE (MWH) AND COST (THOUSANDS OF DOLLARS), 2011 - 2013

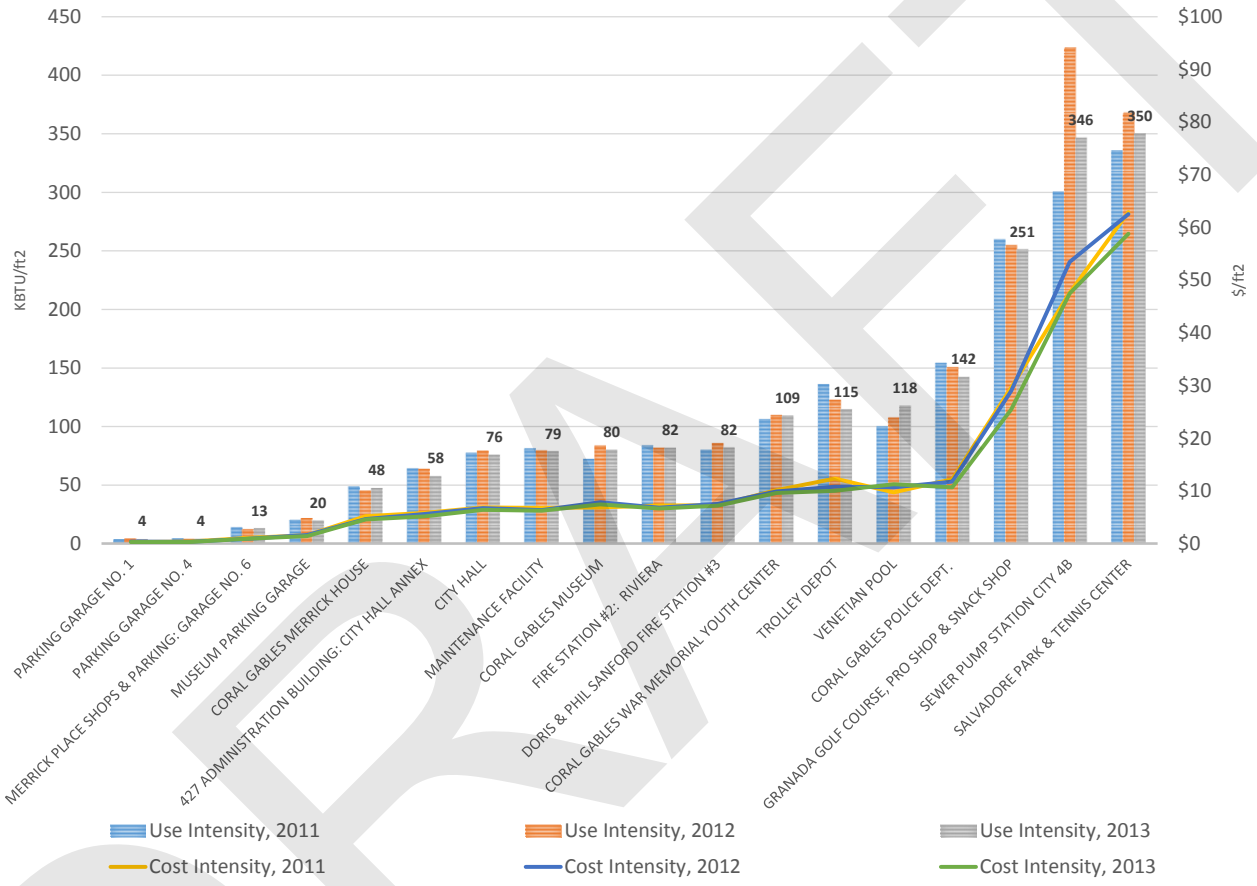


The City operated 175 electric service accounts during 2011 - 2013. All accounts are billed by Florida Power and Light (FPL). These accounts are grouped into 28 "City Numbers", which generally correspond to facilities or categories of city infrastructure, such as lighting, lift/pump stations and fountains. The largest single

[1] During the kick-off meeting, some use of utility-delivered (natural gas) or decentralized (e.g. propane, kerosene, fuel oil, etc.) energy was preliminarily identified. However, no data has been obtained on use of these energy sources. The City does not currently generate electricity (e.g. from renewable resources such as solar photovoltaics).

grouping of electric expenditures is composed of 15 street / decorative lighting accounts (City No. 5302450590.4310) totaling over $660,000 and 2,869 MWh in 2013. Other large accounts include the Police Department, Youth Center, Maintenance Facility and a grouping of accounts associated with lift / pump stations (City No. 5302150590.4310). *Figure 3* charts energy use and cost intensity for the city's buildings, including parking garages, 2011 - 2013. It indicates the most expensive buildings to operate.

FIGURE 3: ENERGY USE (KBTU/FT²) AND COST ($/FT²) INTENSITY BY FACILITY, 2011 - 2013²



In recent years the city has undertaken initiatives to reduce energy consumption in its facilities, including lighting retrofits that involve utilizing light-emitting diode (LED) technologies. The city's Information Technology (IT) department has enabled power management settings that reduce the energy use of networked devices utilized by city staff. The city has also taken steps to eliminate inactive FPL accounts and associated fees. This has been made possible by robust accounting for electric utility billings from at least 2002 through the present.

Beyond these initiatives, no ordinances, resolutions, directives, policies or other formal measures currently exist that promote energy efficiency in the design, operations or maintenance of the city's facilities and infrastructure. This is also the case for use of renewable energy resources. No city facilities have achieved

[2] Energy use intensity is often measured in thousand British Thermal Units per square foot (kBTU/ft²). Since energy use correlates strongly with floor area, this metric allows energy use in buildings of different sizes to be compared.

third party certification of energy or sustainability performance, such as the ENERGY STAR®, Leadership in Energy and Environmental Design (LEED) or Green Globes designations. However, the city plans to construct a new a LEED-certified building for its trolley maintenance operations and a LEED-certified major renovation of the Coral Gables Museum.

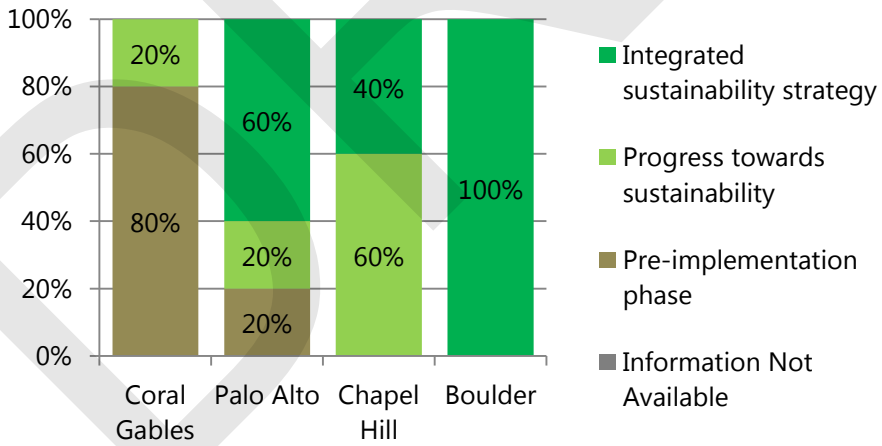
3.2 BENCHMARK[3]

Benchmarking indicates that the city's operational energy use intensity is likely higher than Boulder, CO; Chapel Hill, NC; or Palo Alto, CA by a variety of measures, including greenhouse gas (GHG) emissions per full-time equivalent employee ($mtCO_2e$/FTE), GHG emissions per 1,000 square feet and energy expenditures per 1000 square feet, among others.

Facility GHG emissions, which are typically a function of energy use, per FTE among the three cities are 19.8, 5.1 and 5.4 $mtCO_2e$/FTE, respectively.[4] Coral Gables facility emissions per FTE are 8.7. While the following metrics were not available for all peer cities, facility emissions per 1,000 square feet are 9.5 $MtCO_2e$ in Chapel Hill and 8.2 in Coral Gables. In Chapel Hill, the average energy use intensity is 60.2 thousand British Thermal Units (kBTU) per square foot, while in Coral Gables the average value is 61 kBTU/ft^2. Boulder spends $1,480 per 1,000 ft^2 for energy. Coral Gables spends $1,043. These metrics are affected significantly by differing climates, carbon-intensity of electricity supply and electricity rates.

Figure 4 compares the city's ordinances, resolutions, directives, policies and other measures related to energy efficiency (including energy efficiency projects), renewable energy, high-performance buildings, and facilities operations and maintenance to its peers. Boulder, Chapel Hill and Palo Alto all demonstrate a relatively high degree of engagement in these focus areas. The figure suggests that Coral Gables trails its peers in implementation of sustainable energy projects and policies in its facilities and infrastructure.

FIGURE 4: QUALITATIVE BENCHMARK OF ENERGY OPERATIONS



[3] Data permitting a direct comparison between energy use associated with the city's facilities and infrastructure and its peers is not available. Further, due to differences in operations, data availability, methodology and the time frame, among many additional factors, indirect comparisons must be interpreted with caution.

[4] Note that Boulder receives its electricity from an unusually carbon-intensive source.

3.3 IMPROVE

Based on baseline history and benchmarking, several initial measures for improving the energy performance of the city's facilities and infrastructure have been identified. Rough order of magnitude (ROM) business cases for five of these measures (E1 – E5) have been developed to illustrate the potential benefits and costs of improving energy performance. The business cases will be refined as sustainability planning advances. *Table 3* summarizes the potential savings, investment and economic performance of these measures. With the exception of E4 and E5, estimates of potential investment do not include financial incentives that may be available from sources such as FPL. These will be included, as applicable, for those measures the city wishes to include in its SMP.

Five additional measures (E6 – E10) have been preliminarily identified and are presented below. While businesses cases have not been developed for these best management practices due to data limitations and other constraints, they also have the potential to enhance the city's energy performance.

TABLE 3: ENERGY ROUGH-ORDER-OF-MAGNITUDE (R.O.M.) SAVINGS BUSINESS CASES

#	Solution	10-Year Savings	Investment	SPP*	10-Year ROI**
E1	Upgrade Building Energy Efficiency	$939,735	$318,492	3.4	195%
E2	Convert Garage Lighting to LED	$858,733	$447,829	5.2	92%
E3	Convert Streetlights to LED	$2,535,195	$1,695,106	6.7	50%
E4	Install Solar Thermal Systems	$55,610	$50,965	9.2	59%
E5	Install Solar Photovoltaics	$181,828	$421,900	23.2	-57%
	Total	*$5,273,358*	*$4,623,977*	6.2	56%

*SPP: Simple payback period (i.e. investment / annual savings)

**ROI: Return on investment (i.e. [annual savings · years] − investment] / investment)

E1. Upgrade Building Energy Efficiency: Energy expenditure and use in the city's buildings can be significantly reduced by identifying cost-effective conservation measures. Typically these measures include upgrades to HVAC, lighting, building automation, water heating and building envelope systems, among others. Measures are typically identified via energy audits or re-/retro-commissioning process.

The City of Orlando recently implemented a successful pilot program that consisted of performing energy audits at 28 facilities responsible for about half a million dollars of annual energy expenditure. Audits revealed a suite of building automation, HVAC, lighting and water heating upgrades that reduced energy use by over 20% in the first year. Based on the success of the pilot, the city is now increasing its effort tenfold. The cities of Boulder, Chapel Hill and Palo Alto have all implemented similar programs.

Potential benefits and costs of improving the energy efficiency of the City of Coral Gables buildings are summarized in *Table 3*. Based on a comparison with national indices (e.g ENERGY STAR®, Commercial Buildings Energy Consumption Survey, etc.), the potential for energy savings at 14 city buildings has been conservatively estimated at an average of 11%. This value has been applied to the city's three-year average energy expenditures. Costs are assumed to average $0.30 per avoided kilowatt-hour (kWh), exclusive of service costs and utility rebates that may be applicable.

E2. Convert Garage Lighting to LED: Rapid changes in the availability and cost of light-emitting diode (LED) lighting have resulted in the potential to significantly reduce the energy intensity of certain lighting applications, such as parking garages. In addition, LEDs permit a wider array of lighting controls, such as bi-level output. (Bi-level LED fixtures utilize occupancy sensors to reduce light levels when the space around the fixture is unoccupied).

The City of Sacramento replaced 175 Watt (W) metal halide fixtures with 70 W bi-level LED fixtures at its 180,000 ft^2 downtown parking garage. Per fixture energy use was cut by 88% with a simple payback of less than two years. Utility bill savings totaled $34,000 per year. Chapel Hill has implemented a similar initiative.

Potential benefits and costs of utilizing LEDs at the city's parking garages is summarized in *Table 3*. The city's two parking facilities not slated for demolition/replacement were analyzed for potential savings by comparing estimated current lighting intensity (W/ft^2) based on utility billing history to the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standard 90.1-2007 for parking garages and various case studies. Results indicated an average potential savings of about 70% at a cost of about $0.40 per avoided kWh. Savings do not include potential maintenance savings, which may be significant due to the long life of LED fixtures (typically 2-5 times longer than typical fixtures).

E3. Convert Streetlights to LED: As with measure E3, LED technology can result in significant savings in street lighting. However, use of controls such as bi-level fixtures, which are a major source of potential savings, are usually not advisable in this application. Further, the relationship between the City of Coral Gables and FPL will be a significant factor in the success of this measure.

The City of Coral Gables has utilized exterior LED lighting on a pilot project basis. Currently, it is investigating options for retrofit of its streetlights to LED. Asheville utilized bond financing to fund $3.6 million in LED replacements, cutting its lighting costs in half ($635,000 in annual utility savings) and realizing a 5.1 payback. The project was predicated on an arrangement between the City of Asheville and its utility Progress Energy Carolinas (now Duke Energy) that resulted in creation of a new rate structure for street lights that allowed the city to own the LED fixtures installed on the utility-owned arm and pole.

Potential benefits and costs of utilizing LED street lighting at the City of Coral Gables buildings are summarized in *Table 3* and indicate a potential 10-year savings of over $2.5 million with a simple payback period of 6.7 years. These values assume a savings potential of 40% for all of the city's exterior lighting accounts (City No. 5302420590.4310, 53024590.4310, 5302670590.4310 and 5302890590.4310) at a cost per fixture of about $400. These savings estimates are very similar to preliminary estimates conducted by the city for retrofit of over 3,500 exterior fixtures to LED. Estimated costs are based on the Asheville case study, adjusted for decreases in LED lamp pricing since 2011.

E4. Install Solar Thermal Systems: Replacing electric or natural gas powered water heaters with solar water heaters can be cost effective in applications where the demand for hot water is high. This is particularly so in South Florida, where freeze-protection features may not be required. Within

municipalities, fire stations are often good candidates for solar thermal systems, since they are typically staffed around the clock and equipped with full bathroom(s) and kitchen(s).

Fire stations in Jacksonville and Boynton Beach, Florida have installed solar thermal systems to provide a large fraction of total hot water demand.

Potential benefits and costs of solar thermal at the city's three fire stations are summarized in *Table 3* and indicate a potential 10-year savings of over $55,000 with a simple payback period of 9.2 years. The measure assumes approximately 1 occupant per 1,000 ft^2 and utilizes the Federal Energy Management Program (FEMP) Solar Hot Water System Calculator to estimate energy savings. Investment is conservatively estimated based on similar installations in North Florida, which require freeze-protection and considers financial incentives potentially available from FPL.

E5. Install Solar Photovoltaics: The cost and efficiency of solar photovoltaics, utilized to generate electricity by collecting solar energy, continues to decrease year after year. Nevertheless, its applicability in the State of Florida is limited by regulatory barriers. Further, many of the financial incentives provided by the federal government to encourage adoption of solar technologies are not available to tax-exempt entities like the City of Coral Gables. Nevertheless, innovative financing and ownership models that have been utilized in the state may enable the city to pilot use of renewable energy in the form of solar power.

Boulder, Chapel Hill and Palo Alto all have significant solar power initiatives, enabled in part by more favorable regulatory environments in their respective states. The City of Orlando has installed a large (420kW) solar PV array on the roof of its fleet garage. The project was enabled via a power purchase agreement (PPA) with its municipal utility, whereby the utility leases city roof area and installs, operates and owns the PV array. The city pays the utility only for the solar power produced by the roof-top array at a fixed rate over an extended period of time.

The City of Coral Gables has several potentially suitable locations for roof-mounted PV arrays, including its Maintenance Facility, the War Memorial Youth Center and the Police Department complex. Table 3 includes an estimate of the benefits and costs of installing a 143 kW system at the Youth Center. The estimate assumes that the city will own, install and operate the system and utilize incentives available from FPL to defray installation costs. Accordingly, the economic performance of this measure is marginal (23.2 year SPP). The economic performance of PV arrays at the Maintenance Facility and Police Department, which were also evaluated, produced higher SPPs. Should the city decide to pursue a solar power pilot project, alternative delivery methods, such as PPAs, should be investigated to improve financial performance.

E6. Pump / Motor Efficiency Upgrades: The city operates several pump / lift stations at a cost of over $100,000 per year. Use of premium efficiency motors (standardized by the National Electrical Manufacturers Association) as replacements for older models can increase efficiency by three to six percent, resulting in significant savings for motors with large load factors. Older, general-purpose, low-voltage motors between 10 and 500 horsepower and in service more than 25% of the time are good candidates for replacement upon repair or failure.

E7. Building Utility Tracking and Benchmarking: The city maintains detailed utility billing records going back ten years or more. However, this data has not been clearly attributed to facilities and infrastructure, nor has it systematically been paired with key attributes of these facilities and infrastructure or external variables that influence utility expenditure (e.g. occupancy, floor area, weather, etc.). Integrating electric (as well as natural gas, water, sewer and other commodity billings) into a unified, automated, modular database system can result in energy savings (ranging from less than 1% to 10%). Such systems can also aid with measurement and verification of results from energy efficiency investments. Increasingly, such systems are available as hosted, web-based enterprises. ENERGY STAR® Portfolio Manager is one such system that is free-of-charge. Customized systems may be scaled from existing building automation systems allowing direct control of facility systems in addition to utility tracking and benchmarking. In recent years, Charlotte County, Miami-Dade County, Orange County and the Cities of Jacksonville and Tampa have procured systems for tracking and monitoring utility usage and expenditures.

E8. High Performance New Construction, Major Renovation and O&M Standards: Boulder, Chapel Hill and Palo Alto have all established minimum energy and sustainability performance standards for new construction, major renovation and/or operations and maintenance of municipal buildings. Standards are based on the LEED system, which establishes flexible performance criteria that are verified by a third party. Other third party standards are used widely, including the ENERGY STAR® standard for energy efficient buildings. In many cases, municipalities have established thresholds of performance within LEED, ENERGY STAR® or their equivalent, in order to attain specific energy-savings goals. Third party standards also exist for non-building infrastructure. Miami-Dade County has developed a Sustainable Capital Improvement Guide that establishes high performance new construction and major renovation standards for its buildings and also identifies recommendations for similar standards in its parks, public works and transit operations, among others.

E9. Energy Efficiency Investment Revolving Fund: Measures designed to save or generate energy can be highly cost effective. However, they require sustained investment over several years in order to fully realize benefits. Revolving funds are a method of providing on-going access to capital. Revolving funds are initially "seeded" with capital, which is then disbursed to recipients. Repayments go back into the fund and are disbursed to new recipients. Mechanisms such as fees, interest rates, or other charges are used to cover the administrative costs of operating the fund. As an internal mechanism, revolving funds provide an attractive alternative to the regular appropriations process for planned projects, projects with a long payback period or to cover gaps in project financing. Seed capital may be sourced from appropriations, grants, or avoided costs from previous energy projects.

The City of Orlando established an internal revolving fund using $1 million received from the federal Energy Efficiency and Conservation Block Grant (EECBG). It has since expanded its fund via a $17.5 million bond issue. Recipients of funds must return 100 percent of verified energy cost savings during the payback period of the project, plus one additional year. Instead of tracking and returning savings over the life of the project, a fund established by Alameda County, California assesses an internal utility surcharge

on all County utility bills. Departments that implement energy projects keep 100 percent of realized savings. The surcharge also funds a full-time County-wide energy manager and four additional FTEs.

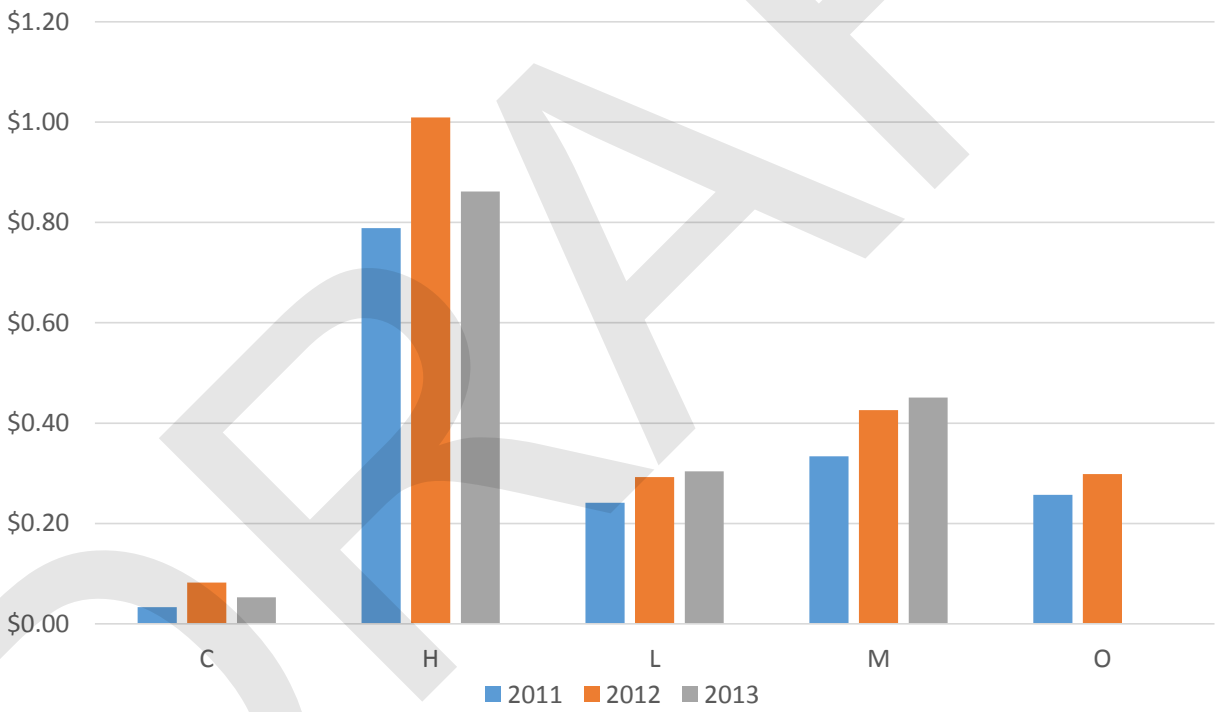
E10. Indoor Air Quality Management: Anecdotes derived from discussions with city staff indicate that several of the city's building may exhibit signs of poor indoor environmental quality (IEQ). Cleaning chemicals and methods, off-gassing of furniture and office supplies, inadequate ventilation, excessive moisture and noise among other factors may reduce IEQ and adversely affect occupants. Conversely, improved IEQ can boost employee satisfaction and productivity. For every 10% decrease in IEQ dissatisfaction, productivity may increase by as much as 1%. Proactively improved IEQ can also reduce the risk of liability from cases of alleged sickness resulting from IEQ issues (e.g. mold, asbestos, etc.). IEQ can be improved by surveying occupants, systematically surveying IEQ conditions and implementing cost-effective solutions. IEQ is very effectively paired with efforts to improve energy efficiency due to the central role of HVAC systems and the building envelope in both areas.

4. FLEET

4.1 BASELINE

The City spent approximately $1.5 million on 249,066 gallons of gasoline and 187,040 gallons of diesel fuel in 2013. In this year the fleet travelled over 4 million miles and logged 3,226 hours of operation.[5] Despite fuel costs increasing 35% between 2011 and 2013, fuel costs per mile have increased by only 17% over the same period. This is due, at least in part, to a 17% increase in fuel economy (miles per gallon). Another factor is a significant year-over-year increase in vehicle miles travelled. In 2013 city vehicles travelled 27% more miles than in 2011. See *Figure 5: Average Fuel Cost per Mile by Vehicle Type, 2011 – 2013* below.

FIGURE 5: AVERAGE FUEL COST PER MILE BY VEHICLE TYPE, 2011 – 2013*



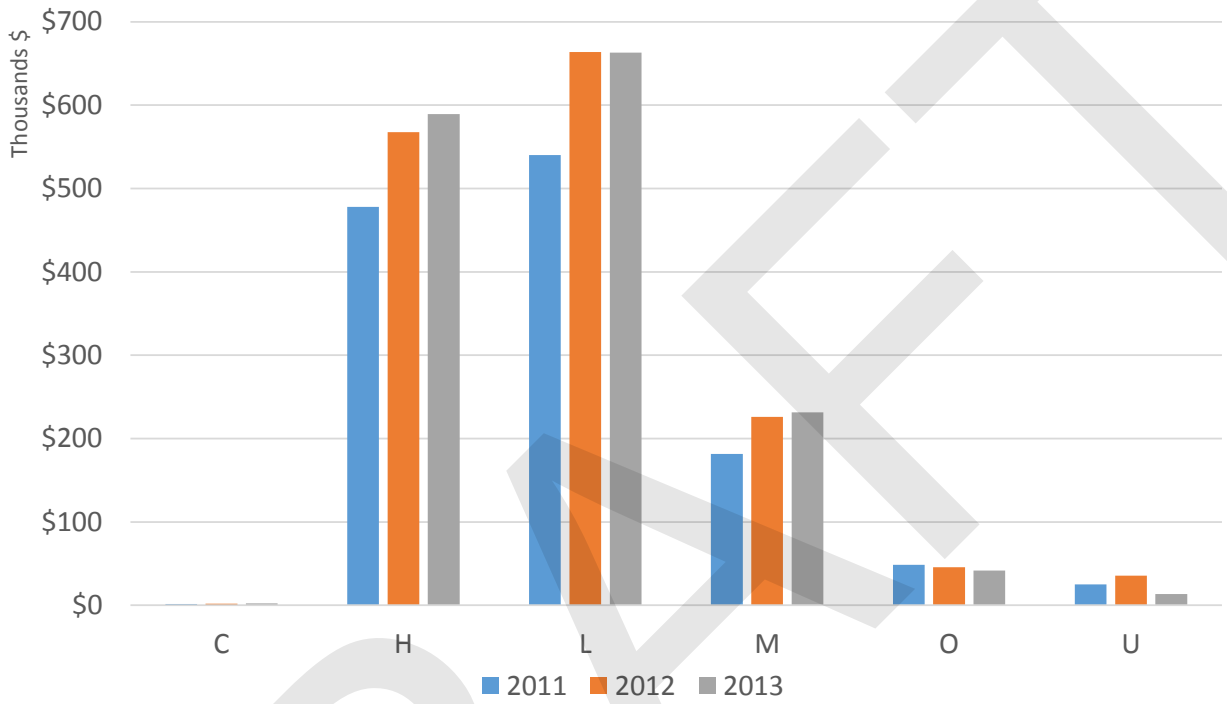
*Vehicle Types: C = Motorcycles, H = HDVs, L = LDVs, M = MDVs, O = Off-road vehicles

The city's fleet consisted of 575 vehicles in 2013, up 4% over 2011. The majority of vehicles (54%) are light-duty vehicles (LDVs), followed by medium-duty (21%) and heavy duty (17%) vehicles. Motorcycles and off-road vehicles / equipment make up 7%[6]. Despite the predominance of LDVs, which were responsible for $663,037 in fuel expenditures in 2013, heavy-duty vehicles (HDVs) account for nearly as much fuel expenditure ($589,319). Medium-duty (MDV) vehicles account for less than half of the

[5] Fleet data indicates that city vehicles are either metered to measure miles travelled or hours of operation, but not both.
[6] Information on the remaining 1% of entries in the city's fleet data was insufficient to accurately categorize them.

expenditure of either LDVs or HDVs. The majority of gasoline used within the city's fleet is consumed by LDVs (76%) and MDVs (21%). Diesel is primarily used by HDVs (88%) and MDVs (8%). *Figure 6* graphs fuel expenditure by vehicle type from 2011 to 2013.

FIGURE 6: FUEL EXPENDITURE BY VEHICLE TYPE, 2011 – 2013*



*Vehicle Types: C = Motorcycles, H = HDVs, L = LDVs, M = MDVs, O = Off-road vehicles

The average age of the fleet in 2013 was just under 10 years, increasing by 11% relative to 2011. The average vehicle has logged between about 59,000 and 67,000 miles.

Despite recent improvement in metrics, no ordinances, resolutions, directives, policies or other formal measures have been identified that promote fuel efficiency or vehicle miles reduction within the city's fleet. The city does not utilize any alternative fuels, such as ethanol, biodiesel, electricity, natural gas, hydrogen or propane. Accordingly, it is not presently utilizing alternative fuel vehicles.[7]

4.2 BENCHMARK[8]

Benchmarking results indicate that the city's performance is slightly lower than Boulder, CO; Chapel Hill, NC; or Palo Alto, CA. *Figure 7: Municipal Fleet GHG Emissions Intensity* compares the cities on a per FTE and per vehicle basis, indicating higher intensity for the City of Coral Gables' fleet than its peers.

[7] The small percentages of ethanol permitted to be added to gasoline and biodiesel added to diesel under ASTM standards are not considered to constitute use of alternative fuels by the U.S. Department of Energy's Clean Cities program.
[8] Data permitting a direct comparison between the city's fleet performance and its peers is not available. Further, due to differences in operations, data availability, methodology and the time frame, indirect comparisons must be interpreted with caution.

FIGURE 7: MUNICIPAL FLEET GHG EMISSIONS INTENSITY ($MTCO_2E$)

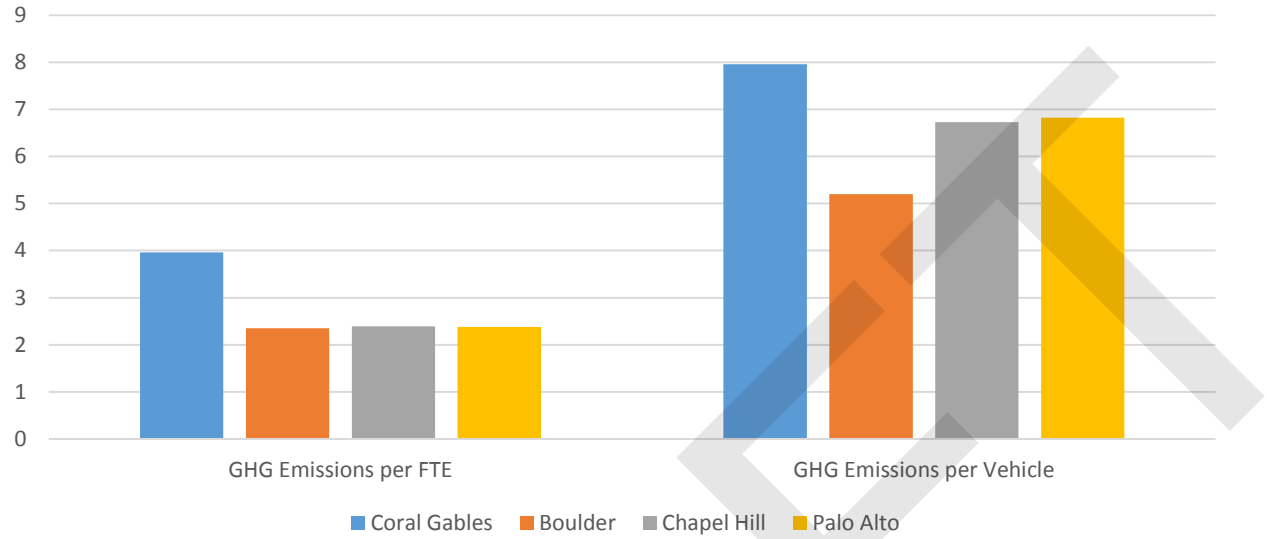
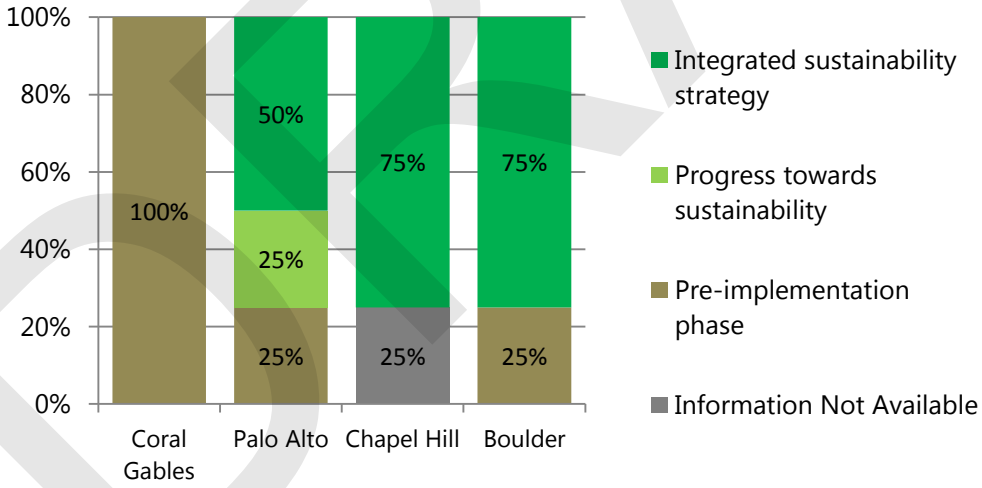


Figure 8 compares the city's ordinances, resolutions, directives, policies or other measures related to alternative fuels, electric vehicles, fuel conservation policies and vehicle fugitive emission to its peers. Boulder, Chapel Hill and Palo Alto all demonstrate a relatively high degree of engagement in these focus areas. The figure suggests that Coral Gables significantly trails its peers in implementation of projects and policies to promote fuel conservation and alternatives in its fleet.

FIGURE 8: QUALITATIVE BENCHMARK OF FLEET OPERATIONS



4.3 IMPROVE

Based on baseline history and benchmarking, several initial measures for improving the performance of the city's fleet have been identified. Rough order of magnitude (ROM) business cases for five of these measures (F1 – F5) have been developed to illustrate the potential benefits and costs of improving fleet performance. *Table 4* summarizes the potential savings, investment and economic performance of these

measures. Potential investment does not include financial incentives that may be available from the State of Florida, for example. These will be included, as applicable, for those measures the city wishes to include in its SMP.

Five additional measures (F6 – F10) have been preliminarily identified and are discussed below. While businesses cases have not been developed for these best management practices due to data limitations and other constraints, they also have the potential to enhance the city's fleet performance.

TABLE 4: FLEET SAVINGS R.O.M. BUSINESS CASES

#	Solution	10-Year Savings	Investment	SPP*	10-Year ROI**
F1	Increase Fuel Economy	$131,319	$0	0.0	∞
F2	Reduce Fleet Size	$48,016	$0	0.0	∞
F3	Procure Electric Vehicles	$1,028,542	$375,000	3.6	174%
F4	Procure Natural Gas Vehicles	$744,863	$440,000	5.9	69%
F5	Procure Autogas Vehicles	$57,517	$68,000	11.8	-15%
	Total	$2,010,254	$883,000	4.4	128%

*SPP: Simple payback period (i.e. investment / annual savings)

** ROI: Return on investment (i.e. [annual savings · years] − investment] / investment)

F1. Increase Fuel Economy: While the fuel-economy of municipal fleets tends to be low due to specific uses within a relatively small boundary of travel, procuring new, high-efficiency models in favor of the least efficient vehicles in the fleet, implementing anti-idling policies and adding fuel-economy as an explicit goal of vehicle maintenance policies and procedures can improve efficiency and save money.

Ann Arbor has established fuel efficiency targets for various vehicle classes (26 mpg for compact cars, 15 mpg for trucks, etc.). Chapel Hill's "Green Fleets Policy" requires purchase or lease of the most energy efficient vehicles meeting the city's operational needs. It has modified fleet procurement standards, anti-idling policies and re-examined fleet maintenance practices to support this goal. The city has credited this program with reducing fuel use by 9% over a three year period and has been recognized with the "North Carolina Smart Fleet" Award.

Potential benefits and costs of improving fleet fuel economy are summarized in Table 4, indicating potential 10-year savings of $131,319 at no additional cost to the city. Benefits are premised upon replacing the 16 least fuel efficient LDVs and 10 least efficient MDVs having total 2013 mileage greater than 65,000. These vehicles are assumed to be replaced with vehicles with fuel economy at least 50% better than the average for those categories (18 mpg and 13 mpg, respectively). Such vehicles are assumed to be no more expensive than standard models, given the increase in corporate average fuel economy in recent years.

F2. Reduce Fleet Size: Fleets often contain vehicles that are under-utilized. The most under-utilized vehicles may be eliminated from the fleet under appropriate circumstances, eliminating fuel cost and use, as well as maintenance expenditure.

Ann Arbor, MI has established a comprehensive fleet policy that includes provisions for eliminating LDVs using less than 200 gallons per year (gpy) or greater than seven years old. HDVs older than 10 years are also earmarked for removal over a multi-year period. Discretion is given to the fleet manager and specialized functions regarding exceptions to the removal policy. The policy specifies that no vehicles may be purchased to replace removed vehicles.

Table 4 summarizes the potential benefits and costs of fleet reduction. To estimate the potential of fleet reduction, distributions of annual vehicle miles travelled (VMT) by vehicle type were plotted for 2013. Twenty-two LDVs and ten MDVs with annual mileage less than one standard deviation (less than 813 mpy and 445 miles per year, respectively) from the average were identified as candidates for removal. Together these vehicles account for only 1,373 gallons of fuel use (an average of 43 gallons per vehicle per year). While these particular vehicles may not be appropriate for removal, the method suggests that about $48,016 in fuel expenditure alone could be saved over ten years. Further it is assumed that this measure would not have any significant cost (the resale / salvage value of the vehicles could potentially generate revenue for the city).

F3. Procure Electric Vehicles: Electric vehicles (EVs) have a substantially lower fuel cost per mile than gasoline vehicles. In recent model years, EVs are available from most auto manufacturers. In addition the incremental cost of EVs has dropped significantly. As a result, EVs are good choices for replacing LDVs with high annual VMT or fuel consumption values. EVs require electric vehicle support equipment (EVSE) to keep vehicles charged.

Boulder, Chapel Hill and Palo Alto all utilize EVs in their fleets and have installed several electric vehicle charging stations both for operational and public use. The City of Charlotte, NC procured 12 EVs in 2012 and paired them with 6 charging stations at a municipal garage. The stations are supported by a solar photovoltaic array that supplies power to the charging stations during the day.

Table 4 summarizes the business case for electric vehicles and EVSE at the City of Coral Gables. The measure assumes that the city could replace approximately 25 of its most used LDVs having 2013 mileage greater than 65,000 with EVs. These vehicle all have annual mileage greater than two standard deviations from the mean, or approximately 12,000 mpy. While care must be exercised to determine that the daily range of vehicles identified for replacement is within the capabilities of EVs with access to EVSE within the city, approximately $1,028,542 in fuel expenditures may be avoided with an investment of about $375,000 – a ten year return of 174%. Investment assumes that EVs cost $10,000 more than comparable non-electric models. It also assumes installation of 12-13 Level 2 electric vehicle charging stations with the capability of simultaneously charging two vehicles. The EVSE is estimated to cost $10,000 per unit.

F4. Procure Natural Gas Vehicles: New sources of domestic natural gas resources have led to wider availability of compressed natural gas (CNG) at prices that are very competitive with diesel. From an end-use perspective, the fuel is also less carbon-intensive, less toxic and results in less air and climate pollution relative to diesel. However, from a supply-side perspective, domestic natural gas is not without environmental impacts. Hydraulic fracturing (i.e. "fracking") is an important factor in the increased availability of natural gas. The process has the potential to contaminate drinking water supplies in

proximity to drilling locations. Further, the process produces large volumes of contaminated wastewater, which can also affect local water quality. In addition, because of the high global warming potential of the main constituent of natural gas (i.e. methane), there is concern that leakage along the natural gas supply chain could substantially reduce the climate benefit of natural gas relative to other fossil fuels. Leakage rates are currently poorly understood and are the topic of considerable interest among researchers and the natural gas industry.

Due to the incremental cost of CNG vehicles relative to diesel counterparts, CNG is best suited for heavy duty vehicles with high levels of fuel consumption and low fuel economy. Transit and sanitation vehicles are often good candidates for CNG use.

Fleets meeting these criteria throughout the state are converting to natural gas. Miami-Dade County is currently in the process of procuring several CNG stations, as well as compatible CNG vehicles for its fleet. Transit fleets in Tampa, Orlando and Jacksonville are converting to CNG. Waste Pro is one refuse hauler that has converted vehicles to CNG throughout its Florida territory. Palo Alto and Chapel Hill also utilize CNG vehicles.

The costs and benefits of utilizing CNG vehicles is summarized in Table 4. It indicates potential ten-year savings of $744,863 supported by an investment of $440,000. The measure assumes that the city replaces its 11 highest fuel using diesel vehicles that are 9 years or older (i.e. Model Year 2006 or before). These are primarily refuse trucks and trolleys. The measure assumes that the city will be able to utilize a CNG fueling station installed by a 3rd party (a CNG fueling station is planned for the Miami-Dade Transit facility adjacent to the Coral Gables Maintenance Facility). Accordingly, potential investment assumes that the city must pay (or finance) the incremental cost of CNG vehicles, estimated at $40,000. At this time, the measure does not include substantial incentives that have been available from the State of Florida for procurement of natural gas vehicles.

F5. Procure Autogas Vehicles: Propane (Autogas) is also a domestic fuel (sourced as a byproduct of natural gas or oil refining) that is cost-competitive with gasoline or diesel fuel. It also has environmental benefits relative to those fuels. The fuel is widely available and has lower incremental vehicles and fueling infrastructure costs than natural gas. For these reasons, it can be a cost-effective alternative fuel for MDVs.

Boulder utilizes Autogas vehicles. Fort Worth, TX operates over 100 original equipment manufacturer (OEM) propane trucks. Several municipalities are using propane in police fleets. In 2011 Raleigh, NC converted 20 Ford Crown Victoria police cruisers to propane. With an initial investment of $116,820, the city documented $86,400 in annual fuel savings. Thirty additional cruisers were identified for conversion in 2013.

Table 4 shows potential savings and costs from utilizing Autogas vehicles. The projected ten-year savings of $57,517 at an initial investment of $68,000 indicate the project may not be cost effective. The measure identified MDVs with annual fuel consumption above 4,500 gpy and a model year of 2007 or earlier. Only four Ford K9 Expedition met this criteria. It was also assumed that a propane fueling system would be installed at the city at a cost of $20,000. This cost may be amortized by a local propane marketer if the city

enters into a long term agreement to purchase a sufficient amount of propane. The measure did not include potential incentives available from the state for Autogas vehicles and infrastructure. It also did not evaluate use of propane in the city's police fleet, due to insufficient information.

F6. Right-size Fleet: The concept of "right-sizing" the city's fleet expands from the notion of reducing the size of the fleet by eliminating unnecessary / underutilized vehicles (See measure V1). The process begins by developing a baseline fleet profile similar to the one prepared as part of this Solutions Memo. It may be supplemented by user surveys and a study of mission requirements of the city's various functional units. Next, metrics for vehicle requirements to complete the various missions must be calculated and utilized to assess utilization. Metrics can be utilized to assess if vehicles in the current fleet are well suited to their assignment. Based on this analysis, vehicles may be eliminated, replaced with rentals, pooled, reassigned, etc. Criteria for employee transportation, cargo hauling, seasonal uses, police and fire vehicles, and vehicle assignment can be developed based on metrics. The results of this process can be incorporated into an acquisition plan that ensures that, over time, the right vehicle is matched to the right use while the overall size of the fleet is decreased.

F7. Anti-Idling Policy and Auxiliary Power Units: The U.S. Department of Energy estimates idling vehicles burn from a quarter to a gallon of fuel per hour, and that unnecessary vehicle idling consumes up to 2 billion gallons of fuel per year nationwide. Many municipalities in the U.S. have enacted anti-idling policies as an effective, low-cost way to save money and fuel and reduce engine wear, emissions, and noise. Minneapolis adopted an anti-idling policy in 2008 that restricts idling by all gasoline or diesel powered motor vehicles to three consecutive minutes in a one hour period. In 2010, this policy saved $158,000, approximately 15% of total fuel spending, in the Police Department alone. Palo Alto, Chapel Hill, and Boulder have all enacted anti-idling policies. In some cases there may be mission-critical needs which require vehicles to idle, for instance to maintain climate control and run electronics in a police K9 unit. Auxiliary Power Units (APUs) can solve this problem by maintaining vehicle systems through a battery backup system while reducing idling. The City of Columbus installed APUs that automatically turn off the engine once charged in 90 police vehicles, and expects to save about $14,000 in fuel costs per vehicle over their lifespan.

F8. VMT Reduction: Reducing the vehicle miles travelled of fleet vehicles can save fuel, reduce operations and maintenance expenditures and reduce the fleet's environmental impact. VMT may be reduced by consolidating the routes of service vehicles to eliminate duplication of trips. Scheduling and routing of service vehicles may be optimized using tools like GPS. Carpooling or use of shuttle services for high-use routes can have a similar effect. Trips may be eliminated via teleconferencing or by utilizing demand-responsive (versus fixed route) transit systems. Incentivizing city employees to utilize transit, where feasible, can reduce the need for fleet vehicles. Many VMT reduction strategies would not entail additional cost to the city.

F8. Utilize Biofuels: Biofuels include biodiesel and ethanol, among others. These fuels are sourced from first or second generation plant or animal-based feedstocks, such as soybeans, corn, waste vegetable oils or animal fats. Typically, they are available in blends with diesel or gasoline. B20 is a blend of 20% biodiesel and 80% diesel. E85 is an 85% ethanol and 15% gasoline mixture. They can often be procured (in

bulk quantities, via negotiated contracts) at a price equivalent to diesel or gasoline on a diesel gallons equivalent (DGE) or gasoline gallon equivalent (GGE) basis.

While the city cannot expect fuel cost or use savings via biofuels, B20 can be utilized in most diesel vehicles with little or no modification. E85 may be used in "flex fuel" vehicles, which are widely available at no incremental cost. These blends are environmentally preferable to petroleum-based diesel or gasoline. Both Chapel Hill (100,000 gallons of biodiesel in 2013) and Boulder (over 250 vehicles running on biofuels) are using significant amounts of biodiesel and/or ethanol. The Cities of Greenville and Rock Hill, SC utilizes biodiesel in 100% of their fleet vehicles. There are several biodiesel distributors in South Florida. Ethanol is dispensed at several fueling stations in South Florida.

F9. Fleet Investment Revolving Fund: As with energy, measures designed to save fuel or utilize alternatives can be highly cost effective. However, they require sustained investment over several years in order to fully realize benefits. Revolving funds may also be a method of providing on-going access to capital for water conservation or supply projects. (See measures E9 and W12).

F10. Participate in the Southeast Florida Clean Cities Coalition: The Southeast Florida Clean Cities Coalition works with vehicle fleets, fuel providers and other stakeholders reduce dependence of petroleum fuels. Housed within the South Florida Regional Planning Council, the group promotes alternative fuels and fuel economy strategies in the region. It is one of the oldest members of a nationwide network supported by the U.S. Department of Energy.

A recent effort of the coalition was to develop a community-based EV infrastructure readiness plan. The coalition can help the city partner with fuel providers, vehicle suppliers and other public or private fleets to support initiatives that reduce the city's dependence on petroleum-based fuels. Boulder and Chapel Hill are both active participants in their local Clean Cities coalitions. Members of the South Florida coalition include several of Coral Gables neighboring municipalities including Miami, Miami-Dade County and North Miami.

5. WASTE

5.1 BASELINE

Waste Management of Dade County (WMDC) provides solid waste and recycling services within the city for multi-family residences and commercial properties. Government facilities are also serviced by WMDC. The city does not incur fees for waste or recycling services. However, the value of this service is estimated to be approximately $300,000 based on WMDC's rate structure. Based on facility containers and level of service, city facilities have an estimated diversion rate of 12%. City facilities have the capacity to collect 24,138 cubic yards (estimated 1,810 tons) of solid waste and 3,224 cubic yards (estimated 242 tons) of recycled material each year. *Table 5* summarizes waste management under the operational control of the city.

TABLE 5: WASTE MANAGEMENT SUMMARY, 2013

Metric	Government Facilities	Single Family Residences
Trash (tons)*	0	32,769
Garbage (tons)**	1,810	9,449
Recycling (tons)	242	2,190
Diversion Rate	12%	5%
Service Costs	$0.00	$10,060,000
Revenue	$0.00	$8,646,000
City subsidies	$0.00	$1,414,000

* Trash includes household refuse (i.e. metal, rubber, and small furniture) and yard waste.
** Garbage includes food scraps and all materials unsuitable for recycling.

The city provides garbage, trash, and recycling collection services for single family residences (SFRs). *Table 6* summarizes materials collected and quantities and frequencies of pick up. The array of materials collected for recycling is broad and includes mixed paper, magazines, catalogs, newspaper, cardboard, paperboard, chip board, aseptic drink boxes, gable top containers, mixed rigid plastics (bottles, tubs, caps and containers labeled with #1-7), metals (aluminum, tin, steel, aerosol cans, metal cookware), and glass. Red recycling bins are provided by the City and residents are allowed an unlimited quantity of bins per pickup. Yard waste is collected as part of trash collection and sent to a disposal facility where it is used as landfill cover. Yard waste is not composted. The City's waste collection fleet includes seven (7) garbage packers, 11 trash cranes, 17 trash dump trucks, and four (4) recycle trucks. The majority of the fleet was acquired in 2006 or earlier.

TABLE 6: SINGLE FAMILY RESIDENTIAL WASTE COLLECTION SERVICE SUMMARY

Service	Material Collected	Quantity	Frequency
Garbage	Food Scraps All materials unsuitable for recycling	2, 30-gallon containers	Twice per week
Trash	Household refuse Garden Waste	1 cubic yard	Once per week
Recycling	Paper, Plastic, Metal, Glass, etc.	Unlimited, 14-gallon bins	Once per week

The city charges an annual fee of $729 per residence and services over 11,000 residences for annual revenues of $8,646,000. The service costs the City approximately $10,060,000. This cost includes such items as tipping fees for trash and garbage, equipment maintenance, and employee salaries and benefits. The City's general fund subsidizes SFRs waste management services by $1,414,000.

Based on annual collection data, the diversion rate for Coral Gables SFRs is 5%. SFRs generated 9,449 tons of garbage, 32,769 tons of trash, and 2,190 tons of recycling in the baseline year. The city incurred average tipping fees of $31.30 and $64.66 for trash and garbage, respectively, for a total cost of $1,636,611. The city did not incur tipping fees nor receive revenue for recycled materials.

Public Works Motor Pool collects used motor oil for recycling. A recycler pays $1.00 per gallon for the used motor oil and all revenue is returned to the city's general fund. The Motor Pool also recycles used oil filters. Data on quantity of motor oil and oil filters recycled and total revenue received was not available.

The city has an IT asset recycling and remarketing program. Decommissioned electronic equipment and e-waste are collected by a certified IT asset recycling company once per quarter. The recycling companies used by the city are certified for environmental requirements, chain of custody best practices, and data destruction and security compliance. The city receives a fair market value return for the collected equipment (approximately $4,000 per year).

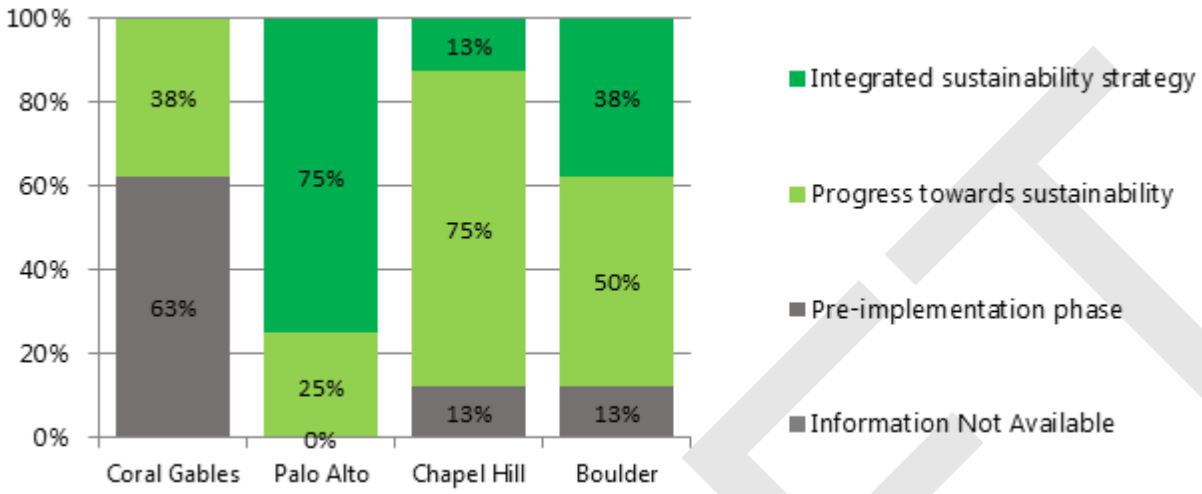
5.2 BENCHMARK[9]

Benchmarking results indicate that the city's performance is below Boulder and Palo Alto. In 2013 community-wide waste diversion rates were 33% (54% for SFRs) in Boulder and 78% in Palo Alto.

Figure 9 compares the city's ordinances, resolutions, directives, policies, or other measures related to waste management, including waste diversion (i.e. recycling, composting, etc.) and waste reduction (i.e. source reduction), to its peers. Boulder, Chapel Hill and Palo Alto all demonstrate a relatively high degree of engagement in these focus areas. The figure suggests that Coral Gables trails its peers in implementation of projects and policies to promote waste diversion and reduction for both its facilities and overall community performance

[9] For all three peer cities, no data was publically available on waste diversion rates for government facilities. Limited data on community-wide diversion was available.

FIGURE 9: QUALITATIVE BENCHMARK OF WASTE OPERATIONS



5.3 IMPROVE

Based on baseline history and benchmarking, several initial measures for improving the performance of the city's waste management operations have been identified. A rough order of magnitude (ROM) business case for increasing the diversion rate of the city's SRFs services (R1) has been developed to illustrate the potential benefits and costs of improving performance. Table 7 summarizes the potential savings, investment and economic performance of this measure. Five (R2 – R6) additional measures have been preliminarily identified. While business cases have not been developed for these best management practices due to data limitations and other constraints, they also have the potential to enhance waste management at the city.

TABLE 7: WASTE SAVINGS R.O.M. BUSINESS CASES

#	Solution	10-Year Savings	Investment	SPP*	10-Year ROI**
R1	Increase Diversion of SFR Waste	$1,924,495	$1,100,000	5.7	75%

*SPP: Simple payback period (i.e. investment / annual savings)

**ROI: Return on investment (i.e. [annual savings · years] – investment] / investment)

R1. Increase Diversion of SFR Waste: *Table 7* summarizes the potential savings, investment and economic performance of increasing the diversion rate of SFR waste services to 50%. It indicates the potential to realize ten year savings of over $1.9 million with a 75% return on investment.

According to a 2010 Miami-Dade County (MDC) waste study, garbage and recycling account for 82% of the SFR waste stream. Focusing solely on these categories, Coral Gables SFRs generated 11,639 tons in the baseline year with an associated recycling rate of 19%. The MDC waste study suggests that a recycling rate of 30% would be feasible under the existing SFR recycling program. The MDC study further indicates that a recycling rate of 50% would be feasible if the single family residence recycling program was upgraded to include composting and other measures.

Implementing the goal for SFRs of a 30% recycling rate within 5 years (i.e. a 3% increase the first year and 2% increase each successive year) would result in a cost avoidance based on the current tipping fees for garbage. If the city could negotiate with their recycling facility for receipt of recycling revenues, there is the potential to earn revenue over the 5-year period. The estimate of potential revenue is based on an average return of $30 per ton of recycled material. The only investment assumed to be necessary to reach a 30% recycling rate would be an education and awareness campaign. Significantly greater improvements have been documented using the Community Based Social Marketing approach developed by Doug McKenzie-Mohr. Implementing a 50% recycling rate within an additional 5 years after achieving the 30% goal necessitates the development of a local composting facility (e.g. via a public-private partnership or a local government cooperative). Based on data from Boulder, implementing a food waste composting program would require a $300,000 investment the first year and $200,000 for each subsequent year. Tipping fees are also assumed to apply.

Note that this business case does not yet incorporate the City of Coral Gables current physical and labor-related waste hauling capacity. These factors should be included if the city intends to pursue higher SFR diversion rates.

R2. Perform a Waste Characterization Study: A waste characterization study, also known as a waste audit, identifies and quantifies the various materials in an organization's waste stream, and reveals common waste practices. Characterizing waste uncovers opportunities to improve waste diversion rates, increase recycling, reduce GHG emissions, and lower disposal costs. Waste audits RS&H conducted for the Defense Commissary Agency (DeCA) in 2011 revealed opportunities to divert recyclables and organic material from DeCA's waste stream with potential cost savings of more than $3.5 million annually. A waste audit report prepared for Palo Alto in 2012 found that 70% of the city's waste stream could potentially be diverted through either recycling or composting. Performing a waste audit is an essential first step to identifying markets for recyclables and realizing cost avoidance associated with waste diversion.

R3. Set Waste Reduction Goals: The starting point for most waste management programs is to develop a waste diversion and/or waste reduction goal. A common long-term goal is zero waste.[10] In 2005, Palo Alto established a long-term goal to be zero waste by 2021. The city defined zero waste as a 90% diversion rate and set the intermediate goals of 68% by 2008 and, 77% by 2011. Palo Alto set these goals starting from a 2004 baseline of a 62% diversion rate. Similarly, in 2006, Boulder established a goal to be zero waste by 2025, and defined zero waste for the city as an 85% diversion rate. Boulder worked from a baseline of a 30% diversion rate in 2004. In 1997, Chapel Hill adopted a solid waste reduction goal of 61% per capita compared to a baseline of 1.36 tons per capita. Florida has established a statewide recycling goal of 75% by 2020 (§403.7032, Fla. Stat. (2008)). In 2014, the interim goal was 50%. The Florida Department of

[10] According to the Zero Waste International Alliance, Zero Waste is a goal where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.

Environmental Protection reported in 2013 that the state's current recycling rate is 49%, led by 14 counties with rates between 51 and 73%.[11]

R4. Establish Waste Management Metrics: The most commonly used waste management performance metric is diversion rate or recycling rate, which is the percentage of the waste stream diverted (e.g. recycled, composted, etc.) from landfill disposal. Boulder and Palo Alto use diversion rate as their performance metric. Along with diversion rate, cities are also using a per capita performance metric to monitor overall waste reduction (i.e. source reduction). Chapel Hill monitors per capita waste reduction as tons of waste landfilled divided by total population. Both Boulder and Palo Alto are transitioning to use of the per capita performance metrics (i.e. pounds of solid waste per person per day). Solid waste as defined in this metric includes all waste generated, including recycling and composting, not just waste landfilled.

R5. Track Waste Management Performance: Since the waste stream, and as a result the waste management program, varies between the different community sectors, it is common to develop a single city-wide waste diversion goal and to monitor this goal for each community sector (i.e. commercial/industrial, single family residences, multi-family residences, and community spaces). Monitoring by sector allows for prioritization of diversion and reduction initiatives. For example in Boulder, business and industry accounts for 65% of the city's waste stream, compelling the city to develop several zero waste initiatives aimed at businesses. The city offers assistance to businesses in the form of a free zero waste advising program, three months of free recycling collection, a zero waste start-up rebate (up to $250) on recycling/compost collection infrastructure, and a zero waste certification program. Boulder is also drafting a business zero waste ordinance.

R6. Establish Waste Management Policies: Once a city-wide goal has been established, then supporting policies, programs, and initiatives need to be identified and developed to drive waste management toward the goal. To support their goal of zero waste by 2025, Boulder adopted a Zero Waste resolution in 2006, along with an approved master plan for achieving zero waste. To fund zero waste initiatives, Boulder initiated a trash tax which currently generates $1.8 million per year. The current trash tax rates are $3.50 per month for households and $0.85 per cubic yard of trash for businesses and multifamily units. To support their goal of zero waste by 2021, Palo Alto developed a Zero Waste Operational Plan. The City conducted a waste composition study in 2013 to identify the materials in the disposed waste stream. Palo Alto also identified zero waste block leaders (neighborhood experts) and developed a green business program.

R7. Optimize SFR Waste Services: Opportunities exist to evaluate, update, and optimize this service. Potential areas to evaluate include collection method (containers used and pickup location), frequency of collection, hauling equipment, collection routes, and efficient use of work hours. Below is a list of examples from peer cities and other local municipalities related to single family residences waste services.

- *Contractors:* Chapel Hill is the only peer city whose Public Works department undertakes waste services for single family residences. Both Boulder and Palo Alto contract out residential waste and recycling

[11] The counties include Hillsborough (73%), Lee (70%), Hendry (68%), Pasco (67%), Pinellas (62%), Broward (60%), Collier (60%), Sarasota (57%), Palm Beach (56%), Martin (56%), Monroe (55%), Alachua (54%), Brevard (54%), Manatee (51%).

services. Boulder uses several contractors for the curbside garbage, recycling, and compost pickup program. Palo Alto uses a single contractor for curbside waste and recycling services. The contractor provides once per week collection of recyclables, yard trimmings, and garbage.

- *Wheeled carts:* An overall trend for curbside programs is the use of wheeled carts. These carts facilitate the collection of materials within the residences and also standardize the collection process. This standardization increases the safety and efficiency of the collection route. Chapel Hill, Palo Alto, Miami-Dade County, and the City of Miami use carts for the collection of garbage and recycling. Palo Alto also uses carts for the collection of yard and food waste. With the use of carts, collection routes can employ fully automated collection or rear-loading vehicles. Chapel Hill uses rear-loading vehicles. Miami-Dade County and the City of Miami use fully automated collection vehicles.

- *Reduced collection frequency:* Miami-Dade County uses blue, 65-gallon wheeled carts collected every other week for their curbside recycling program. The City of Miami uses blue, 96-gallon wheeled recycle carts collected once every other week. Chapel Hill, Boulder, and Palo Alto all offer once per week recycling and garbage collection.

- *Pay-as-you-throw:* For garbage, Palo Alto has a "mini-can" initiative. The mini-can is a 20-gallon garbage container with a lower unit cost. The mini-can costs $13.79 per month compared to $101.96 for a 96-gallon cart, $67.84 for a 64-gallon cart, and $31.64 for a 32-gallon cart.

- *Innovations in single-stream recycling:* Palo Alto's single-stream curbside recycling program accepts uncommon items such as plastic film (must be bagged) and electronics.

- *Yard waste/food scrap composting:* Boulder's curbside compost program accepts compostable paper, food scraps, and yard waste. Palo Alto's yard trimmings program recently added food scrap collection after the conclusion of a one year pilot project (April 2013 to March 2014). Food scraps are collected in compostable bags and placed in the yard trimming cart. The city offers free compost and mulch to residents. Chapel Hill's collected yard waste is chipped into mulch and offered for sale at the landfill.

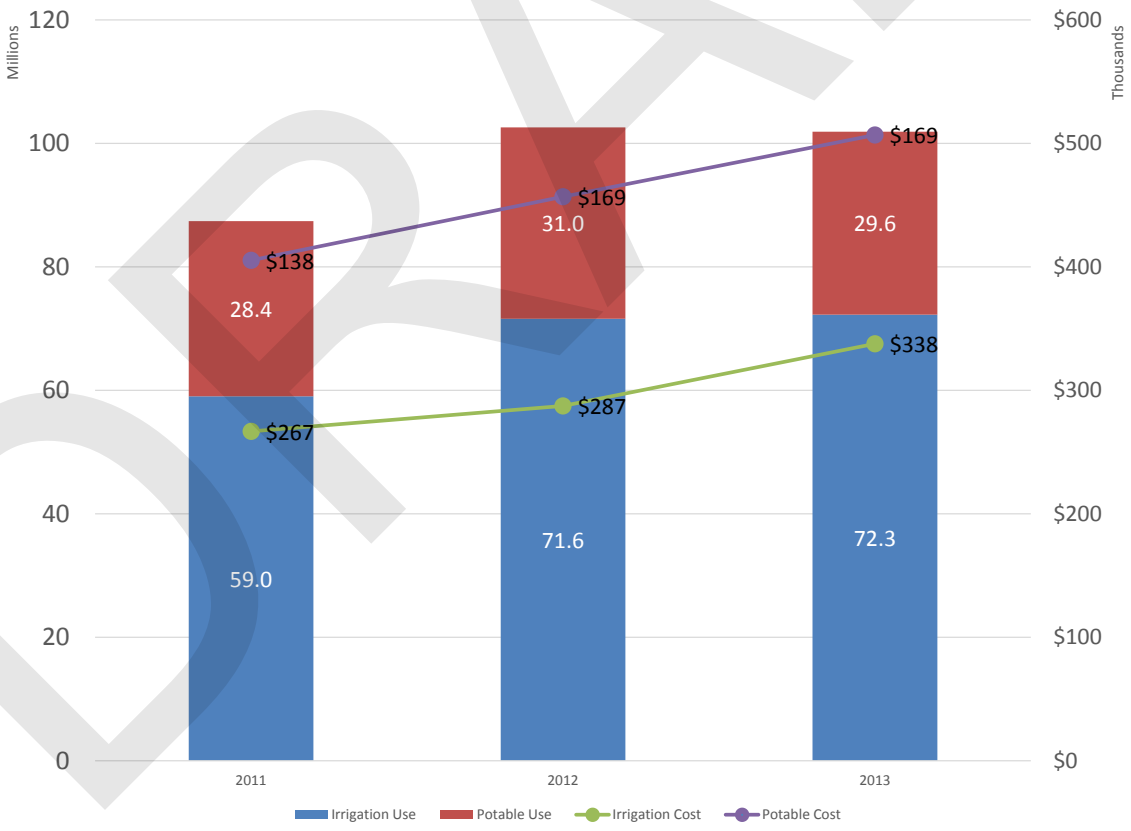
6. WATER

6.1 BASELINE

The city spent just over half million dollars on approximately 101.9 million gallons of water in 2013[12]. Of this total, 67% by cost was for outdoor (i.e. irrigation) and 33% by cost was for indoor use (i.e. potable), respectively. The average unit cost of water increased by 7% between 2011 and 2013 (3% for outdoor uses; 15% for indoor uses). Likely due to these rate increases, the cost of water increased both in total and intensity ($/ft^2) from 2011 to 2013.

The total volume of water used by the city, both total and intensity (i.e. gal/ft^2) decreased slightly from 2012 to 2013 due to lower potable water use in 2013. The overall trend from 2011-2013 shows an increase in the use of and expenditure for both potable and irrigation water. *Figure 10: City Operations Water Use (millions of gallons) and Cost (Thousands of dollars), 2011 - 2013* summarizes water expenditure and use patterns at the City of Coral Gables.

FIGURE 10: CITY OPERATIONS WATER USE (MILLIONS OF GALLONS) AND COST (THOUSANDS OF DOLLARS), 2011 - 2013

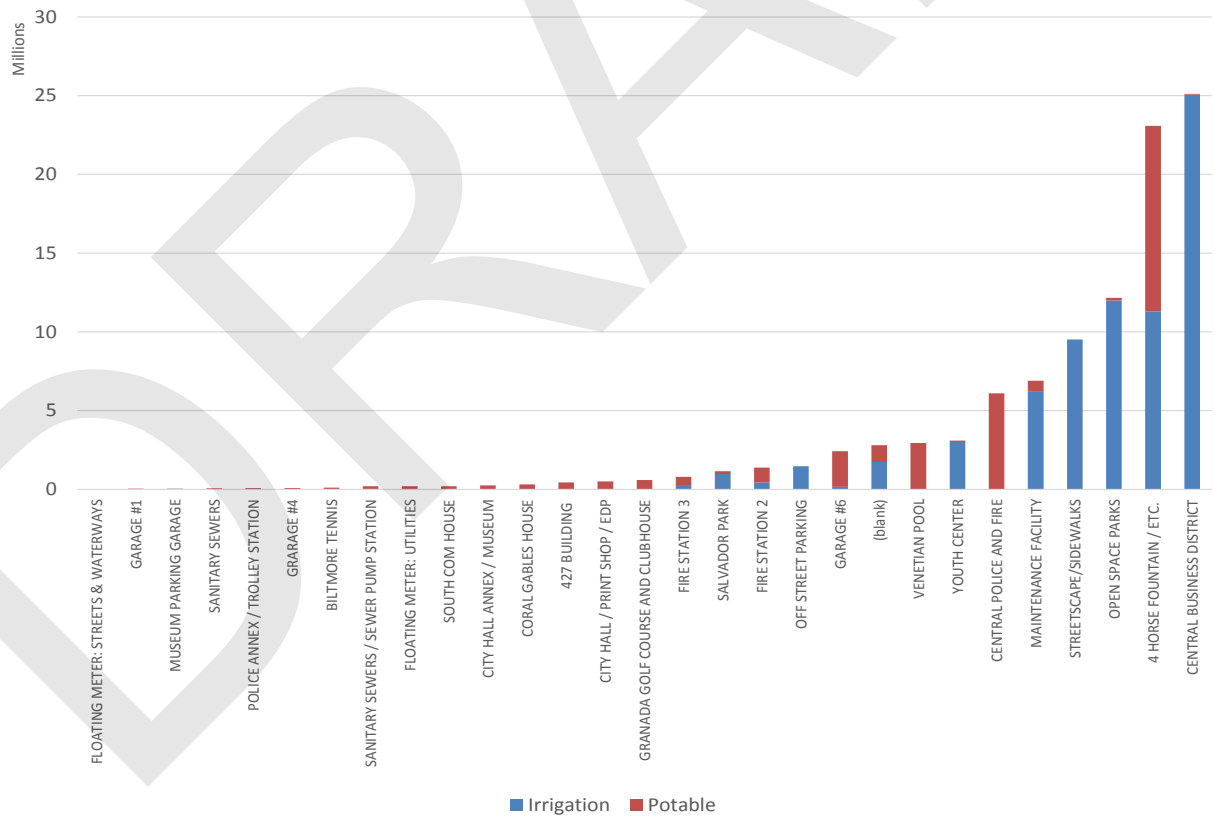


[12] Despite the distinction between irrigation (i.e. outdoor) and "potable" (i.e. indoor) uses, all water used by the city is potable (i.e. no form of reclaimed water is assumed to be used by the city).

The city operated 372 accounts during 2011 – 2013. All accounts are billed by the County's Water and Sewer Department (WASD). Accounts are grouped into 30 "City Numbers" corresponding to facilities or categories of city infrastructure (e.g. parks and fountains). The largest two groupings of accounts are associated with "Central Business District" (City No. 5302420590.4350) and "4 Horse Fountain / Fountains, Plazas, Water Tower / Sanitary Sewers" (City No. 5302410590.4350). These each consume over 23 million gallons and cost the city about $134 and $123 thousand dollars in 2013, respectively. Other significant groupings include the city's parks, streetscapes / sidewalks, the Maintenance Facility, the Police complex, Youth Center, Venetian Pool, and Garage #6, with expenditures between $10,000 and $50,000 annually.

The majority of this use is categorized as irrigation in the city's dataset, however, significant uses exist among groupings not identified as irrigation. Largest among these are the "4 Horse Fountain" grouping noted above, the Police complex, Venetian Pool and Garage #6. Among the city's buildings, these latter three are the largest users. However, in terms of intensity of use, 427 Building, Venetian Pool, Salvador Park, Granada Golf Course and Clubhouse, and the Police Complex are the most significant non-irrigation water using facilities, with intensities ranging from over 250 to 100 gallons per ft^2. *Figure 11: Water use by Facility (Gal) by Type of Use, 2013* summarizes the city's water use by facility, depicting the relative share of use dedicated to irrigation and/or potable water use at each account grouping / facility.

FIGURE 11: WATER USE BY FACILITY (GAL) BY TYPE OF USE, 2013[13]



[13] Several city water accounts are not associated with any City Number grouping (i.e. the City Number field is left blank in the city's utility billing history. These accounts are identified as "(blank)" on the X-axis of Figure 11.

In addition, the city paid $2.3 million to WASD for acceptance and disposal of waste water from the city's combined sewer and stormwater system. WASD's billings reflect a flow rate of close to 1 million per 1,000 gallons in 2013. Significant opportunities may exist in optimizing the city's infrastructure to reduce flows and associated charges.

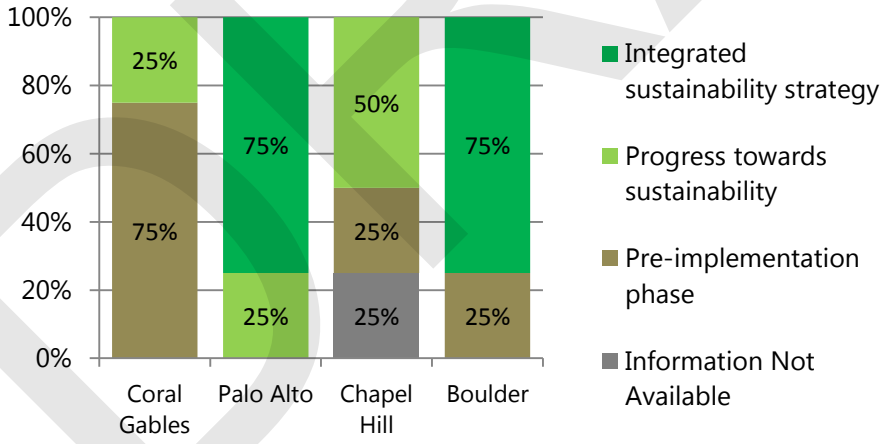
The city has upgraded irrigation systems in recent years. It has also made efforts to eliminate unnecessary accounts. No ordinances, resolutions, directives, policies or other measures have been identified that promote indoor or outdoor water efficiency at city facilities or infrastructure. This is also the case for use of alternative sources of water, such as rainwater harvesting. To date no city facilities have achieved third party certification of sustainability performance, such as LEED designations, which involve achievement of water conservation criteria. However, the city has plans for a LEED-certified Trolley Maintenance Building.

6.2 BENCHMARK[14]

Benchmarking results indicate that the average water intensity of the city's buildings – about 23 gal/ft^2 (down from 27 in 2011) – is higher than the national average for offices (about 13 gal/ft^2) reported by the EPA in 2012.

Figure 12 compares the city's ordinances, resolutions, directives, policies or other formal measures related to water use, irrigation, low-impact development (LID) and stormwater to its peers. While the figure suggests that Coral Gables trails its peers in implementation of projects and policies to promote water efficiency and alternative sources of supply at its facilities and infrastructure, it also reflects a variety of levels of engagement. For instance, Chapel Hill has undertaken far fewer water initiatives than Palo Alto or Boulder.

FIGURE 12: QUALITATIVE BENCHMARK OF WATER OPERATIONS



[14] Data permitting a direct or indirect comparison between water use associated the city's facilities and infrastructure and the cities of Boulder, Chapel Hill and Palo Alto is not available.

6.3 IMPROVE

Based on baseline history and benchmarking, several initial measures for improving the water performance of the city's facilities and infrastructure have been identified. Rough order of magnitude (ROM) busines cases for four of these measures (W1 – W4) have been developed to illustrate the potential benefits and costs of improving water performance. Table 8 summarizes the potential savings, investment and economic performance of these measures. Potential investment does not include financial incentives that may be available. These will be included, as applicable, for those measures the city wishes to include in its SMP.

Eight additional measures (W5 – E12) have been preliminarily identified and are discussed below. While businesses cases have not been developed for these best management practices due to data limitations and other constraints, they also have the potential to enhance the city's water performance.

The benefits (and costs) of BMPs that address the city's combined storm- and wastewater system could be particularly large. While most preliminarily identified measures (in particular, W4, W6, W9 and W10) have the potential to reduce sewer and or waste water flows, a more systematic assessment of opportunities related to the city's combined waste- and storm-water system has not yet been included due insufficient premises. With additional input from the city, a systematic approach can be developed.

TABLE 8: WATER SAVINGS R.O.M. BUSINESS CASES

#	Solution	10-Year Savings	Investment	SPP*	10-Year ROI**
W1	Upgrade Flow Fixtures	$84,568	$16,914	1.5	400%
W2	Increase Irrigation Efficiency	$814,943	$324,403	4.0	151%
W3	Upgrade Flush Fixtures	$95,524	$57,314	6.0	67%
W4	Harvest Rainwater	$111,380	$60,000	5.4	86%
	Total	$1,106,415	$458,631	4.1	141%

*SPP: Simple payback period (i.e. investment / annual savings)

** ROI: Return on investment (i.e. [annual savings · years] − investment] / investment)

W1. Upgrade Flow Fixtures: High-efficiency plumbing fixtures or fittings can be easily incorporated into an existing building. While replacement of fixtures is sometime necessary, in most cases reduced-flow accessories (e.g. flow restrictors, flow regulators, aerators, and laminar flow devices) can be added to existing fixtures. For lavatory and kitchen faucets, fixtures or accessories specified with a maximum flow of about 0.5 and 2.2 and gallons per minute (gpm), respectively, will save water relative to standard fixtures. For showers, 1.5 gpm fittings should be specified. Lower-flow fixtures and fittings are also available and may be appropriate in certain cases. Reducing flow rates of fixtures that supply hot water will also save energy required for heat.

Boulder has systematically audited its flow and flush fixtures (see *W3* below) and retrofitted them with low-flow devices, resulting in savings of over 2.5 million gallons. Employing green building methods, such as those encouraged by LEED, Palo Alto has been able to demonstrate potable water use nearly 2 million gallons below the baseline established by the Uniform Plumbing Code and International Plumbing Code.

Potential benefits and costs of improving the efficiency of flow fixtures are summarized in *Table 8*. Use of efficient flow fixtures can reduce water use by 20%. Assuming 25% of the non-irrigation water used in 16 city buildings, approximately $84,568 in water expenditures may be avoided over a ten year period with a simple payback of 1.5 years.

W2. Increase Irrigation Efficiency: Measures aimed at increasing the efficiency of irrigation systems can cut water use by up to half. Measures include use of drip irrigation instead of traditional sprinklers, use of more efficient traditional sprinkler heads and use of weather and/or sensor-based irrigation controls in lieu of manual or timer controls. Proper maintenance also plays a significant role in irrigation water efficiency.

While the city tracks irrigation water use and has begun utilizing low-flow fixtures, it lacks a comprehensive program such as that implemented by Boulder, which includes drip systems, efficient sprinkler heads and weather-based controls in city parks. Boulder has documented improvements of up to 300%. Palo Alto has implemented a pilot project at a city park that involved upgrading the irrigation system, which has cut irrigation water use by over 66%. The University of Texas campus has implemented a $2 million overhaul of its irrigation systems utilizing principles similar to those employed in Boulder and Palo Alto. Its projected simple payback period is three years, with five year savings of nearly $1 million dollars.

Potential benefits and costs of improving irrigation efficiency are summarized in *Table 8*. Ten-year savings of $814,943 are projected with a simple payback period of four years. These values assume a 15% reduction of water use in 15 city account groupings associated with irrigation, at a cost of $0.03 per gallon saved.

W3. Upgrade Flush Fixtures: As with W1, indoor water use may be significantly reduced by utilizing high efficiency toilets and urinals. Replacing 3.5 gallon per flush (gpf) fixtures / bowls and valves with 1.2 – 1.6 gpf models for toilets and 1.0 or less gpf models for urinals can reduce water use by 20%. While retrofits are usually less effective than replacement, retrofits may be made to toilets that allow a "dual flush" mode. Very low-flow or waterless urinals require an assessment of compatibility with the existing plumbing design and its present condition.

Potential benefits and costs of improving the efficiency of flush fixtures are summarized in *Table 8*. Use of these fixtures can reduce water use by 20%. Assuming 75% of the non-irrigation water used in 16 city buildings, approximately $95,524 in water expenditures may be avoided over a ten year period with a simple payback of about 6 years.

W4. Harvest Rainwater: One method of reducing irrigation expenditures is to replace use of utility-supplied water with rainwater collected as stormwater runoff from city facilities. This has the added benefit of avoiding the negative consequences of stormwater runoff, including non-point source pollution of area water bodies, erosion, and the costs of sewer services. Rainwater harvesting typically involves collecting water from a building roof into a cistern, which supplies irrigation systems.

The City of North Miami Beach installed a 30,000 gallon above-ground cistern that is supplying up to 40,000 gallons per month for irrigation and build water truck needs. The project cost $30,000 with minimal on-going maintenance costs. The project received matching funding from the South Florida Water Management District.

Potential benefits and costs of rainwater harvesting are summarized in *Table 8*. The measure evaluates installing two cisterns with a total capacity of 60,000 gallons at the city's two major parking garages not slated for demolition based on the surface area of their top levels. The systems would be capable of supplying about 1.7 million gallons per year for irrigation or other suitable purposes (e.g. toilets and urinals, fountain make-up water, etc.). Potential 10-year savings could amount to more than $110,000 considering both avoided irrigation expenditures and avoided sewer charges. Costs are based on the experience of North Miami Beach and result in an estimated simple payback period of 5.4 years or a 10-year ROI of 86%.

W5. Leak Detection: Water losses from leaks can add up to significant volumes over time. Leaks in toilets, irrigation systems or broken distribution lines can range from 0.5 gpm to more than 15 gpm and cost hundreds to tens of thousands of dollars per year. A program to detect and repair leaks can avoid these consequences. Such a program involves reading meters during off-peak hours with water services turned off, reading meters monthly for anomalous values, or installing devices that detect anomalous increases in water flow at key points in the city's water system. Audits of indoor and outdoor water systems at the city's facilities on a periodic basis can also detect leaks.

W6. HVAC Condensate Harvesting: In addition to harvesting rainwater, as described in measure W4 above, water may be harvested (albeit in far lower volumes) from HVAC condensate. Water vapor condenses when it comes in contact with the cooling coils in HVAC equipment. The water is drained from the equipment in order to prevent corrosion and typically plumbed to the sewer. Approximately 10 gallons per day per 1,000 square feet of conditioned space can be produced by HVAC system. At the city, as much as a million gallons of condensate water (after filtration and disinfection) may be available for capture annually for irrigation and other appropriate uses. Capturing this water may also reduce sewer flows.

W7. Process Water Efficiency (HVAC Equipment, Vehicle Washing, Food Service): To the extent that the city utilizes significant amounts of water for processes such as HVAC equipment (e.g. water-cooled chillers, cooling towers), vehicle washing, food service (e.g. ice-machines, dish-washing, food disposals) and pools (e.g. filtration) opportunities for savings will exist. For HVAC equipment, retro-commissioning and controls can improve the efficiency of water-cooled chillers and various methods exist to reduce cooling tower blow down. Water reclamation systems hold the greatest potential for saving water used in vehicle washing. In the food service sector, various water efficiency technologies are available including pre-rinse spray valves. In pools, evaporation and filtration are the main areas for potential savings.

W8. Building Utility Tracking and Benchmarking: As noted in measure E7, integrating water (as well as electric, natural gas and other commodity billings) into a unified, automated, modular database system

can result in savings (in the case of energy, ranging from less than 1% to 10%) through benchmarking, awareness and improved response times. Such systems can also aid with measurement and verification of results from resource conservation investments. The city maintains detailed utility billing records going back several years that could be integrated into such a system.

W9. Native and Drought-Tolerant Landscaping: Native, drought-tolerant and climate-appropriate landscaping can reduce or eliminate irrigation water demand, reduce stormwater runoff, and even reduce building energy costs by providing shade. EPA's WaterSense program recommends selecting drought-tolerant turf, trees, shrubs, and ground cover; incorporating shade trees into landscape design; replacing turf with planted beds; avoiding installing small strips of grass; and using mulch to conserve moisture and reduce irrigation. Beginning in 2004, Broward County has obtained certification for 88 Florida-friendly landscapes at county facilities through its NatureScape program. Participating facilities have increased the amount of tree canopy and selected native plant species to reduce irrigation demand. The county has seen associated reductions in electricity consumption and in GHG emissions as these measures have reduced the amount of power needed to maintain building operations.

W10. Low Impact Development: Low Impact Development (LID) is development designed to maximize green space and promote natural stormwater management. The use of plants and permeable materials minimize stormwater runoff velocity and temperature, and reduce pollution. Examples of LID practices include the use of bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. In many instances, LID design ends up being less costly than traditional hardscape design and stormwater control. The EPA report "Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices" found that of 17 LID case studies analyzed, total capital costs associated with LID designs were 15% to 80% less than those for conventional development. Direct cost benefits are only part of the picture since LID typically results in ancillary benefits including better aesthetics, increased recreational opportunities, reduced stormwater runoff, decreased pollutant loads, and reduced risk of sewer overflows.

W11. High Performance New Construction, Major Renovation Standards and O&M Standards: As noted in measure E8 above, Boulder, Chapel Hill and Palo Alto have established performance standards for new construction, major renovation and/or operations and maintenance of municipal buildings based on LEED. In addition to performance standards for energy, LEED (and similar 3rd party standards) includes criteria for indoor and outdoor water. Based on such standards, municipalities, such as Miami-Dade County have established criteria for water use in the buildings (e.g. requiring low-flow fixtures). Third party standards that address water use in infrastructure such as parks also exist.

W12. Water Efficiency Investment Revolving Fund: As with energy and fleets, measures designed to save water or supply alternative resources can be highly cost effective. However, they require sustained investment over several years in order to fully realize benefits. Revolving funds may also be a method of providing on-going access to capital for water conservation or supply projects. (See measures E9 and F9)

7. LAND USE AND TRANSPORTATION

7.1 BASELINE

The City of Coral Gables is an attractive, historic and prosperous community, well regarded for its desirability as a place to live and work. Much of this traces back to the high quality of George Merrick's original development of the early 1920s, and the consistency with which his vision was carried out through the following decades. Not coincidentally, Coral Gables median home values are over 2.5 times the median value of homes in Miami-Dade County, and household income levels are 48% higher than the County median, and the average income is nearly double. At the same time, 24% of Coral Gables households earn less than $24,500 compared to 32.6% county-wide.

The population is approximately 50,000 residents in its 13.1 square mile area, for a population density of 3,800 people per square mile. According to demographic data compiled by the city (sourced from the Nielsen Company, 2013), it is expected to grow approximately 5% in the next 5 years, slightly less than the county's anticipated 6.5% rate. The daytime population increases by 33% as result of corporations, including multi-nationals, small businesses, the University of Miami (UM), as well as cultural attractions and shopping destinations.

The Coral Gables Comprehensive Master Plan (CMP), last updated in 2010, has begun the task of establishing a baseline of goals, objectives and policies that intend to incorporate environmental, economic and social sustainability principles into the core values of the city. The CMP areas of focus include a "Green" section. Under the leadership of the City Commission, with input from the city's Green Task Force, and with able support from various city departments, several sustainable land use and transportation policies and projects have been implemented in recent years, and are currently underway.

LAND USE:

Pioneer developer George Merrick's enterprise and vision created Coral Gables as one of the first "Planned Communities" in the US. The foundation of his work was a planning framework and ethic of using the land resources carefully and well. Many of the original elements put in place are now listed on the National Register of Historic Places and locally protected by the Historic Preservation Ordinance and Board. The city's Zoning Code and code enforcement are strong, and the Architectural Design Standards component is enforced by a Board of Architects that review construction projects in the city. Despite this tradition of thorough, effective regulation of the urban built environment and landscape, the integration of broader sustainable thinking across all city government departments and into the community is a relatively new development.

Several strong sustainable land use policies are in the Coral Gables CMP, and should be reinforced, promoted, and prioritized to move the sustainable agenda of the city forward (*Table 9: Selected Sustainable Land Use Policies within the City's Comprehensive Plan*).

TABLE 9: SELECTED SUSTAINABLE LAND USE POLICIES WITHIN THE CITY'S COMPREHENSIVE PLAN

Policy	Description
FLU 1.7.1.	Encourage effective and proper high quality development of the Central Business District, the Industrial District and the University of Miami employment centers which offer potential for local employment in proximity to protected residential neighborhoods.
FLU 1.9.1.	Encourage balanced mixed use development in the central business district and adjoining commercial areas to promote pedestrian activity and provide for specific commitments to design excellence and long term economic and cultural vitality.
FLU 1.9.2.	Encourage the detailed planning of downtown, which is defined as the central business district, to establish sound economic, aesthetic and land use principles for effective utilization of both public and private resources.
FLU 1.9.3.	The city in conjunction with business and property owners shall implement the Miracle Mile Improvement Plan which provides the following: Create a more pedestrian friendly environment by widening sidewalks and narrowing roadway pavement; Reduce speed limits along Miracle Mile; Encourage a mix of uses with unique shopping and cultural opportunities; Encourage shopping for neighboring residents; and, Improve parking.
HOU 1.1.2.	The utilization of federal, state, and local housing subsidy programs is recognized as a means to provide affordable/attainable housing opportunities for low income persons and families, where appropriate. The city shall include principles and criteria for locating affordable/attainable housing that promotes access to a broad range of housing opportunities with a full complement of urban services through cooperation and coordination with the private sector, surrounding local governments and Miami Dade County. Such principles shall include: Accessible to public transit. Close proximity or readily accessible to employment centers, medical services, retail centers, social services, and/or governmental services. Accessible to public parks, recreation areas, and/or open space systems.
HOU 1.5.1.	Encourage the development of diverse housing types such as smaller, more affordable units within the downtown area and mixed use development overlay area.
HOU 1.5.2.	Encourage residential mixed use as a means of increasing housing supply within the Downtown/Central Business District/Mixed Use Development Overlay Area, thereby promoting increase in commercial and retail activity, increased use of transit, reduction of auto dependency, in association with minimizing visual and physical impacts of nearby lower density areas.
NAT 1.6.2.	Require site plan review and approval of all proposed development and redevelopment to prevent unnecessary destruction or inappropriate use of existing natural resources and natural sites
NAT 1.6.4.	Continue to utilize the best available technical criteria and information for the formulation of regulations and ordinances to ensure that future development is compatible with the functioning of existing natural systems and resources conservation.

NAT 1.6.5.	Explore strategies for promoting environmentally sensitive development, such as the U.S. Green Building Council's "Leadership in Energy and Environmental Design (LEED)" certification.
NAT 1.7.1.	Ensure the preservation of trees during development or redevelopment wherever possible, and consistent with the tree preservation ordinance and landscape ordinance. Where trees approved for removal as a last resort, require that they be replaced with quality trees of equal or greater canopy.
NAT 2.3.2.	Specific and cumulative impacts of development or redevelopment upon wetlands; water quality, water quantity, wildlife habitat, living marine resources, and shoreline systems shall be limited by strictly regulating land alteration activities likely to result in erosion and sedimentation, or long term water quality degradation and habitat loss.
NAT 2.3.3.	Protect existing natural shoreline areas, establish construction standards which minimize the impact of manmade structures on shoreline systems, and restore altered shorelines within the city's jurisdiction.
NAT 3.1.1.	Encourage improved groundwater recharge by requiring all new construction projects to consider providing the following: Greater pervious open and green space. Pervious pavements. French drains, slab covered trenches or drainage wells, and limit overflows. Allow direct overland flow discharge to surface waters (canals or bay) only when no other practical or effective method of storm water discharge is possible. Allow positive drainage discharges to surface waters only when other methods are impractical or impossible, and only when adequate pollution control (grit and grease) is provided.
HIS 5.1.2.	The city shall continue its current use and documentation of Transfer of Development Rights (TDRs) to provide for the preservation and protection of historic landmarks, properties or areas. The city shall examine the possible expansion of the TDR district or creation of other TDR districts and possible amendments to the program to provide for additional incentives to promote historic and cultural preservation.
SAF 2.1.2.	Limit public expenditures that subsidize development permitted in coastal areas as defined herein except for restoration or enhancement of natural resources.
SAF 2.3.1.	Update the Post Disaster Development Plan annually. The plan shall address land use, public safety, infrastructure, and public investment concerns. The plan shall include policies to distinguish between immediate repair and cleanup actions needed to protect public health and safety and long term repair and redevelopment activities; and the removal, relocation, or structural modification of damaged infrastructure and unsafe structures. The plan should also ensure all redevelopment shall reduce or eliminate the exposure of human life and public and private property to natural hazards.

The Coral Gables CMP includes "Green" as its final section. It was a positive first step toward sustainable action to put this section in the CMP, although many of the provisions of this section are written with non-committal terms (e.g. "will strive to…", "will aspire to…", and "the city will encourage…"). Key positive directions already established in the Green section of the CMP that relate to land use and transportation that can be activated and made more effective are summarized in *Table 10*.

TABLE 10: SELECTED SUSTAINABLE POLICIES FROM THE GREEN ELEMENT OF THE CITY'S COMPREHENSIVE PLAN

Policy	Description
GRN 1.1.1.	The city will aspire to be recognized by the Florida Green Building Coalition as a certified "Green city" awarded to local governments that provide environmental best practices for all government functions.
GRN 1.1.2.	The city will adopt a "Go Green Initiative" to implement strategies to reduce greenhouse gas emissions within the city's borders.
GRN 1.2.1.	The city shall enact awards and recognitions programs, and/or city certification programs upon implementation of a "green" program.
GRN 1.3.1.	The city will establish a policy to conserve energy at all city owned buildings and facilities, by any means possible, including turning off computers and lights when not needed. The city will also conserve water at all city owned buildings and facilities by replacing and renovating old water toilets and fixtures with new low flow options.
GRN 1.3.2.	All new development proposals shall include designated safe pedestrian paths of travel within the site and provides pedestrian access to and from the public right of way to encourage walkability.
GRN 1.3.3.	By 2011, the city will research and develop provisions within Zoning Code that will encourage development of LEED (or similar) certified buildings.
GRN 1.3.4.	By 2011, in addition to required standards, the city shall examine incentives/bonuses to further encourage higher standards of levels of green building LEED (or similar) certified buildings compliance for public and private buildings.
GRN 1.3.5.	The city will encourage private and public sector employers to promote fewer work based vehicle trips including the following: Incentives for carpooling, bicycling and public transit use. Promote video conferencing or conference calls.
GRN 1.4.1.	The city will review the existing landscape standards to incorporate Florida Friendly landscaping principals described in the Florida Green Building Coalition Green Home Standards...
GRN 1.4.2.	The city shall continue its current program to increase the tree canopy throughout the city and will develop policies which will conserve water for landscaping purposes.
GRN 1.4.7.	Encourage water conservation through irrigation best practices which may include promotion and use of greywater for irrigation.
GRN 1.8.1.	Large scale Comprehensive Plan and future land use map amendments shall be supported by data and analysis to demonstrate how the amendment is based upon energy efficient land use patterns and greenhouse gas reduction strategies.
GRN 1.9.1.	As a long term plan, the city will seek to adopt Leadership in Energy and Environmental Design (LEED) Neighborhood Development standards and create funding for educating the public about green development principles.

TRANSPORTATION:

Coral Gables is committed to sustainable transportation initiatives such as the trolley loop and streetscape improvements for pedestrians and bicycles. The city has recently implemented a Bicycle Master Plan for the city, and hopes to initiate projects related to the plan. However the city's residents and workforce are still

strongly reliant on the automobile. According to the U.S. Census American Community Survey, 2009-2013, 75% of Coral Gables residents drove alone to work.

There are policies within the CMP to promote mixed use development to provide housing and commercial services near employment centers, and locating higher density development along transit corridors and near multimodal stations, thereby reducing the need to drive. There are policies to focus on the details of transportation-oriented development, such as improving amenities within public spaces, streets, alleys and parks to include the following improvements: seating; art; architectural elements (at street level); lighting; bicycle parking; street trees; improved pedestrian crossing with bulb-outs, small curb radii, on-street parking along sidewalks, pedestrian paths and bicycle paths to encourage walking and cycling with the intent of enhancing the feeling of safety.

CMP policies to make the Trolley system more successful and sustainable have not yet been completely achieved, although a Trolley Master Plan was completed in 2013. Policies to increase ridership so far have not come to fruition. The plan included a goal to achieve a daily ridership of 7,500. However, it remains around 5,000 per day. The Trolley Master Plan did evaluate expansion of the current trolley system to the north as well as a connection with UM. The Trolley Master Plan did not quantify the level of ridership required to achieve the CMP mobility goal of reducing the number of downtown parking spaces by 750. The CMP also included a policy that called for adoption of a payment-in-lieu of parking system, which would allow the development community to reduce parking requirements where alternatives exist.

Other existing Coral Gables CMP policies promote effective transition toward sustainable mobility. The CMP advocates for minimizing through traffic in neighborhoods and incorporating traffic management and calming measures to promote safety within the transportation network. The CMP calls for strengthen existing land development regulations to require placement of landscaping within rights-of-way to expand existing tree canopy; screen potentially objectionable uses; serve as visual and sound buffers; provide a comfortable environment for pedestrians and other activities, etc.

PARKS AND GREEN BUILDING:

Coral Gables provides and maintains an extensive network of community services including 42 facilities that are operated by the Parks Department. These include the historic Venetian Pool and the tennis center. Both the Venetian Pool and Youth Center are among Parks facilities implementing recycling, bike parking, etc. LED lighting has been installed at the Venetian Pool. Staff is involved in paper reduction and reducing energy use at these facilities. There are several other historic buildings and sites, and landscaped boulevards and plazas maintained by Public Works, Facilities Management. The historic buildings are energy-inefficient, and no advanced renewable energy systems are being used by the city. There is a move to use low-VOC paints and carpeting in city facilities, and most plumbing fixtures are being converted to low-flow over time. The Coral Gables Museum is LEED Certified. However, no unified green building design and construction programs, green building maintenance programs, building energy management practices, building retro-commissioning, integrated pest management strategies, landscape composting and mulching, or other sustainable practices have been identified as being applied on an institution-wide basis.

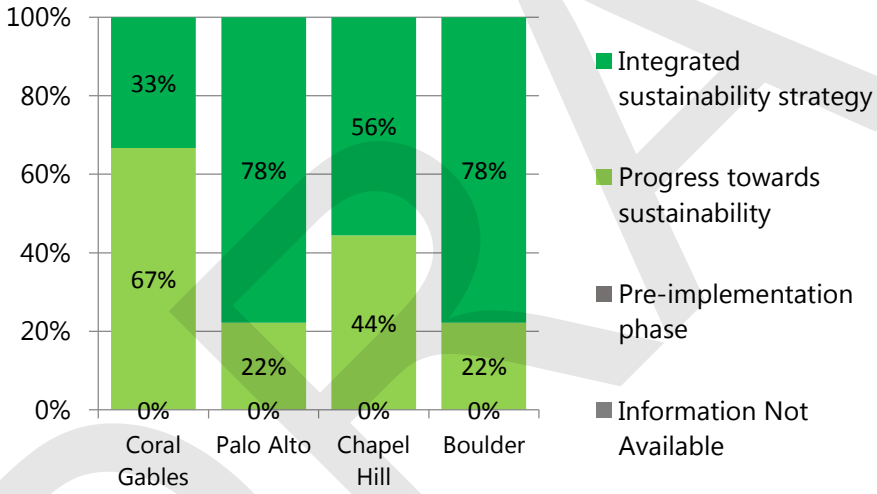
7.2 BENCHMARK

Coral Gables is behind Boulder, CO; Chapel Hill, NC; and Palo Alto, CA with respect to demonstrating a commitment to planning for sustainability in land use and transportation.

While incorporation of sustainability metrics into land use decision-making are behind the other benchmark communities in some areas, there is a strong foundation of quality and permanence rooted in the city's traditions that can be directed toward sustainability without a major change in values. With respect to transportation, due to a long dependence on automobiles, there is significant work to be done over the coming decades.

Coral Gables is also denser compared to benchmark cities[15]. Contrary to newer cities like Fort Myers (1,600 psm), where there is significant land for new growth, Coral Gables is already relatively built-out. As a result, sustainability opportunities exist less with reducing suburban sprawl and more with creating sustainable urban infill and complete streetscapes with urban transportation solutions that reduce automobile dependence.

FIGURE 13: QUALITATIVE BENCHMARK OF LAND USE AND TRANSPORTATION OPERATIONS



7.3 IMPROVE

Based on baseline history and benchmarking, several areas to improve sustainability have been identified. These include eight land use measures (L1 – L8) and five transportation measures (T1 – T5).

L1. Update the Comprehensive Plan: Benchmark cities (e.g. Palo Alto) and many others across the US are engaged in updates to their Comprehensive Plans. In planning for the update, the results of the Sustainability Master Plan should be incorporated into the CMP update. We also suggest that the separate "Green" section be eliminated and sustainability be incorporated in all sections. In the other benchmark

[15] Coral Gables is denser than Boulder (3,500 psm), Chapel Hill (2,700 psm) and Palo Alto (2,500 psm), but not as dense as Fort Lauderdale FL (4,200 psm)

cities, sustainability is incorporated into core values, often included in the name of the comprehensive plan itself.

L2. Enhance the Zoning Code: Incentives for desired sustainable outcomes could be evaluated for incorporation into the code, such as high performance design (e.g. green building), incorporation of non-conditioned and outdoor public-space into designs, prioritization of build-to lines over setbacks, and shared parking arrangements. Chapel Hill strongly encourages use of renewable energy when considering re-zoning applications. It has also established an overlay zoning district that aims to protect stream corridors and prevention of property damage from floods. Boulder utilizes a "Green Points" program to incentivize green building via the permitting process.

In conjunction with a code update, a "Build Out" study could evaluate the urban fabric under a scenario in which the city were built out under current zoning, as well as alternatives. Chapel Hill utilized a "CommunityViz" model of "build out" conditions with population increases that could be present in the future that is influencing the city's visioning processes. It is also engaged in efforts to comprehensively manage citywide access and parking strategies as part of this process.

L3: Incentivize Green Infrastructure: The city's land use regulatory authority (e.g. via zoning, land development code, permitting, etc.) provides opportunities for incentivizing green building and infrastructure. Examples include density bonuses, expedited permitting and rebates. Boulder's "Green Points" program encourages the use of sustainable remodeling and building methods and technologies to conserve energy, water and other natural resources. The Green Points Program applies to all new residential construction and additions and remodels larger than 500 square feet. It requires applicants to earn "points" by selecting green building measures in order to receive a building permit. In Chapel Hill, applicants seeking approval of conditional use rezoning with accompanying special use permits will demonstrate site planning, landscaping, and structure design which maximize the potential for energy conservation and use of renewable energy by reducing the demand for artificial heating, cooling, ventilation, and lighting, and facilitating the use of solar and other energy resources. In Jacksonville, FL commercial buildings earning a LEED certification can apply for a $1,000 rebate from the city's Environmental Protection Board. The incentive is funded from fines assessed by the Board for environmental infractions.

L4. Calibrate Aesthetic Impact Criteria for Sustainability: Criteria can limit renewable energy projects, for example. Solar hot water systems are often a cost-effective option for homes and small businesses. Solar PV is expected to become more cost effective. Such technologies can enhance the city's post-disaster resilience by allowing occupants access to hot water and/or power after a hurricane outage without (or with less) reliance on fossil fuel generators.

Solar technologies are also more compatible with traditional architecture than is widely understood. In terms of tradition, in the 1930s and 1940s a preponderance of roofs in South Florida had solar hot water panels on them. In terms of aesthetics, technologies are becoming more efficient, panel sizes are becoming smaller and mounts are better designed and engineered. In addition, the visual impact of rooftop solar panels can be mitigated with other architectural and landscape details.

L5. Include a Business and Economics Element in the Comprehensive Plan: The Palo Alto Comprehensive Plan Update includes a Business and Economics Element. The Element offers policies that emphasize diversity, growth, and flexibility of businesses, as well as compatibility with adjacent and nearby land uses, including residential neighborhoods.

This section can acknowledge that revenue generation and other positive effects of business growth have the potential to be offset by impacts on the community, especially concerning traffic and parking but also including loss of community character if not properly addressed. Palo Alto's Element calls for modest economic growth in balance with preservation of residential neighborhoods. For instance, Palo Alto's Element recognizes the important role that Stanford University plays in the local economy as the largest employer in Palo Alto and as an incubator of new technologies that have helped make Palo Alto a global leader in innovation. The Element supports Stanford Research Park as a thriving employment district and seeks to sustain Stanford Shopping Center as a major regional commercial attraction. Such an Element can assess growth management strategies, and ensure that economic prosperity does not result in unconstrained growth and unacceptable impacts on neighborhoods.

Other policy guidance can include recognizing outstanding entrepreneurship and innovation, diversifying the retail mix through business retention and attraction, developing positive parking solutions for businesses in downtown and other commercial nodes and support for creation of an on-line business registry.

L6. Green Parks Facilities and Create Urban Forests: The Parks and Recreation Department operates 42 facilities, including several buildings. A Parks Master Plan is under development in 2015. Sustainability strategies should be incorporated into this document in a meaningful way, including planning, design, construction, operations and maintenance of facilities and grounds. Examples include on-site management of storm water, rainwater harvesting, compost and mulching of yard waste, conversion to native plant communities, and use Florida Friendly landscape and LEED or other Green Building certifications. Parks and streetscapes also offer opportunities to create urban ecosystems or even forests, with their obvious beneficial effects. Community non-profit groups can be enlisted in this activity, and grants can be leveraged. Finally, a major education component can be incorporated into these processes. Boulder is currently engaged in a parks master planning process. The opportunity to safely access parks by walking or biking is a focus area of the Plan.

L7. Pursue Sustainability Partnerships with University of Miami: Other benchmark cities take advantage of the relationships with their local universities' sustainability efforts. UM architecture school, engineering school, environmental sciences and public health are just some of the degree programs that are engaged in sustainability that may welcome opportunities to work with the city on special projects. Coordinating Campus Shuttles and city Trolleys would be a productive effort. The UM Director of Sustainability should be a standing member of the city's Green Task Force.

L8. Strengthen Farmers' Market Concept: The city should continue and possibly expand the tradition of a farmer's market. Such a market does more than bring farm-to-table – it also provides an important community social gathering space that can be combined with modest cultural arts activities to enliven a Saturday. Expanding the scope to sustainable handmade arts and crafts, native plants, et cetera, could enhance the sustainability theme. Boulder has made access to food production an important metric in its sustainability planning efforts.

T1. Implement Complete Streets Program: There should be a broad urban design emphasis on "complete streets." Complete streets are streets where pedestrians, bikes, sustainable transit and vehicles can coexist. The City of Fort Lauderdale's Complete Streets Policy and Hillsborough County (Tampa) Metropolitan Planning Organization's Resolution 2012-1 are exemplary. Chapel Hill and Palo Alto have also implemented complete streets projects. There are many economic benefits to complete streets that derive from separating traffic from pedestrians and bicyclists, promoting health, taking some vehicle trips off the roads, and putting eyes on the streets. Projects should be identified based on need and ability to leverage resources. One area of concern is the lack of sidewalks and a safe bicycle path between the University of Miami and the Biltmore continuing into Downtown. According to the National Complete Streets Coalition, the University of Miami is the only certified "Bike Friendly" college campus in Florida.

T2. Improve the Trolley System: Both the routes and operating hours of the trolley could be extended. As indicated by the Trolley Master Plan, other destinations such as the University of Miami, Fairchild Tropical Garden, and a downtown loop could increase ridership. Saturdays and weekday evenings are typically relatively busy times for downtown Coral Gables, but the trolley does not run at those times. As residents and visitors who use shops and restaurants become more regular users of the trolley system, these expanded hours would become more important. Chapel Hill implemented a fare-free bus service for students of the University of North Carolina. The service is a partnership between the city and the university. As part of system expansion, a switch to more fuel efficient, low emitting vehicles could also be considered. Likely fuel sources would be propane, natural gas or bio-diesel, which are powering an ever-increasing number of transit fleets across the nation. See measures F4, F5, and F8.

T3. Electric Vehicle Charging Stations: Coral Gables could provide electric vehicle charging stations to the public at high-profile locations. Sales of electric vehicles are increasing rapidly in the U.S. Tri-Rail stations are designing additions of electric charging stations to their facilities. The City of Chapel Hill, as part of a pilot demonstration project, installed four electric vehicle charging stations in October, 2014. Parking stalls have been painted with appropriate electric vehicle insignias and "Electric Vehicle Parking Only" signage has been posted. See measure F3.

T4. Implement Bike Sharing: As complete streets and traffic calming projects begin to come into place, the timing may be appropriate for a commercial bike sharing program. Recently downtown Miami installed several racks of bike-share bikes. Boulder has 150 operational bike-share bikes and Palo Alto has 100. The bikes will offer an alternative to short vehicular trips around downtown. Visitors to the city can see Coral Gables at a leisurely pace, riding from downtown to the Biltmore and Venetian Pool and back, for instance. Another benefit of the bike-share stations is that the stations provide a reminder in the urban streetscape that the city values and encourages bicycling.

T5. Support the Underline project: The Underline provides an opportunity for the city to benefit from a mobility corridor that integrates transit, car, biking and walking. The vision of this exciting project is to transform the underutilized land below Miami's MetroRail, from the Miami River to the Dadeland South Station, into an iconic linear park, world-class urban trail and living art destination. The project runs through Coral Gables and will connect the city with other communities. At the same time, it will improve pedestrian and bicyclist safety, and create over a dozen of acres of new green space with restored natural habitats. Other benefits include encouraging a healthy lifestyle, providing a canvas for artistic expression, attracting development along US1, and generating significant economic impact.

8. EDUCATION AND OUTREACH

8.1. BASELINE

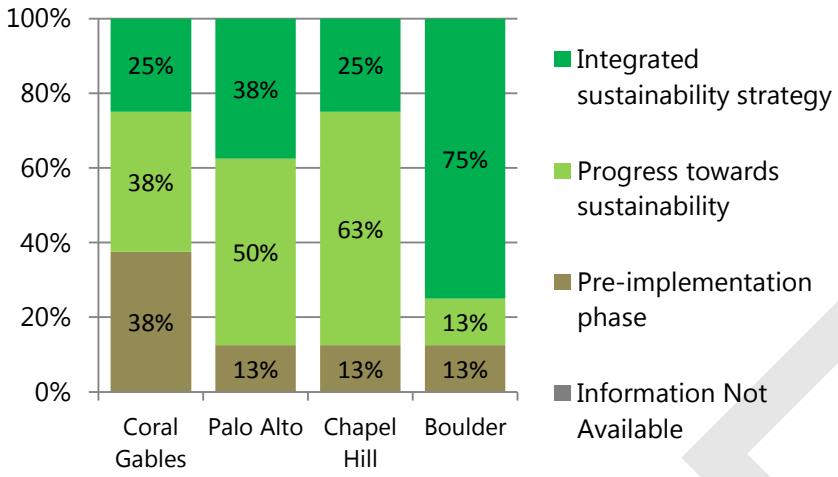
Coral Gables has made some efforts towards sustainability-oriented education and outreach internally and within the community. Coral Gables' Green Task Force advises city officials on environmental issues that support a sustainable community by making recommendations related to city programs, services, equipment, and facilities, and helping increase environmental awareness and participation. The city has a section of its website dedicated to sustainability, and has sponsored green or sustainability-themed events such as the "Water is Life" exhibition at the Coral Gables Museum. Given its history and architectural legacy, the city has done an excellent job of preserving cultural heritage, enhancing neighborhood viability, and promoting a sense of place. The city has begun to engage employees in sustainability decision through green purchasing. The IT department is voluntarily attempting to procure items that meet various standards for environmental performance.

The ongoing sustainability master planning process will include a Sustainability Tools for Assessing and Rating Communities (STAR) assessment of the community, public involvement plan, and a marketing and communications plan which will be significant steps towards greater awareness of the city's sustainability efforts. To date, beyond a recently introduced program to encourage recycling in the workplace, the city has no significant employee training, engagement or hiring and retention practices, and no comprehensive strategy for public outreach related to sustainability. The city has made initial efforts to market itself as a green or sustainable destination for visitors or businesses, for instance, collaborating with the local Chamber of Commerce on its green-themed annual awards.

8.2. BENCHMARK

Figure 14 compares the city's ordinances, resolutions, directives, policies or other measures related to education and outreach to its peers. Coral Gables' performance in this category is similar to Chapel Hill's. Chapel Hill's Office of Sustainability works to engage employees and its Sustainability Operations and Services employee team works on employee advocacy, employee health, waste reduction and sustainable behavior. Boulder is a leader in this focus area with sustainability integrated into almost all city departments and communications. Boulder hosts many sustainability events; forms local, regional, and national partnerships; has programs to encourage energy conservation by employees; and performs community outreach on carbon reduction efforts. Both Palo Alto and Boulder require all events held on city property to be zero-waste events. Boulder also conducts substantial outreach to local businesses; for instance by offering free waste audit services to help businesses increase their recycling rates. Boulder, Chapel Hill and Palo Alto all have or are in the process of development or evaluating green purchasing policies.

FIGURE 14: QUALITATIVE BENCHMARK OF EDUCATION AND OUTREACH OPERATIONS



8.3. IMPROVE

Six measures (E1 – E6) have been preliminarily identified to improve sustainability education and outreach at the city. While business cases have not been developed for these best management practices due to data limitations and other constraints, they have the potential to enhance the city's awareness efforts.

Note that recommendations to enhance education and outreach will be more fully addressed in the Public Involvement Plan and/or Marketing and Communications plan, which are part of this scope of work.

E1. Integrate Sustainability into Management Practices: Seek to embed sustainability into the city's organizational culture by including it in employee hiring, retention, and training practices. Incorporating sustainability into procurement through "green purchasing" can also raise employee awareness. The city's IT department has voluntary begun this process. Palo Alto's new employee orientation procedures include training on its Zero Waste program and the city's sustainability commitment. Similarly, Boulder's PowerED program endeavors to change employee behavior in support of a goal to reduce energy consumption in city facilities by at least 10 percent. Palo Alto's environmental purchasing policy is tracking the effect of its employees purchasing decisions on greenhouse gas emissions.

E2. Engage Employees: Collaboration workshops with city staff engage employees by soliciting their ideas and involving them in the sustainability master-planning effort. Coral Gables can engage employees through workshops and training, signage, the city's intranet site, newsletters and other means. The city can most effectively engage its employees by developing a clear vision and strategy, demonstrating senior management support and connecting with values they find personally meaningful. Friendly competitions between different departments and integrating sustainability into recognition and reward programs can also be powerful tools for engagement.

E3. Develop "Green Event" Policies: Develop policies to reduce the environmental impacts of city events and incorporate sustainability messaging into events. Policies to reduce waste, conserve resources, and encourage alternate transportation at city events demonstrate Coral Gables' commitment to

sustainability. Palo Alto and Boulder's Zero Waste policies extend to city events, and both cities also host many events designed to build awareness of sustainability in their communities.

E4. Incorporate Sustainability into Marketing: Incorporate sustainability success stories into business development and tourism efforts. Business and tourists increasingly demand proactive efforts to protect the environment, adapt to changing conditions and incorporate new and improved technologies and ideas. In addition, business can be a powerful partner in supporting sustainability programs. Palo Alto's Green Business program recognizes small and medium sized businesses that operate using environmentally sound practices and help the city meet its environmental goals. Chapel Hill's economic development plan includes a goal to welcome green and ecologically sound business and development. The City of Coral Gables Chamber of Commerce hosts an annual "Green Means Green Awards Luncheon." The event recognizes sustainability achievement and innovation in several categories, including large and small businesses, hospitality-focused organizations, design and construction firms, community institutions etc. The Chamber's program presents a good partnership opportunity for the city as its engagement in sustainability efforts expands.

E5. Survey the Community: Survey community members to benchmark attitudes and behaviors concerning climate change action and sustainability. Palo Alto helped create a Community Environmental Action Partnership (CEAP), a collaborative citywide initiative that engages the various segments of the community to identify opportunities to create and implement sustainable environmental solutions. Surveying community members can help identify common concerns, raise awareness, and identify sustainability champions who will support the city's effort to go green.

E6. Track and Document Results: Tracking education and outreach efforts will help the city gauge the effectiveness and response of those efforts, allowing sustainability messaging to be improved over time. The City of Denton, TX tracks its efforts on sustainability education, communication and community involvement alongside other key performance indicators using its D-Smart software tool. The city's goals include evaluating community educational opportunities, expanding hands-on workshops, and increasing public engagement activities while also involving the business community through education and recognition for green businesses.

9. CLIMATE RESILIENCE

9.1. BASELINE

As part of Coral Gables' ongoing sustainability master planning process, a Greenhouse Gas Inventory for the city's local government operations (LGOP) was developed. This inventory, provided in Appendix 10.2, establishes a 2013 baseline for the city's GHG emissions. Findings indicate LGOP emissions totaled 13,762 mtCO2e in the 2013 base year.

RS&H evaluated Coral Gables' qualitative performance on climate mitigation, adaptation, and resiliency by reviewing the city's ordinances, resolutions, directives or policies for sustainable practices or behaviors related to greenhouse gases, as well as any programs already in place to reduce emissions or adapt to climate change impacts. The city's performance was then benchmarked against peers to determine BMPs and areas for improvement.

Coral Gables' commitment to reducing GHG emissions dates to 2007 when the city adopted the U.S. Mayor's Climate Protection Agreement (USMCPA). The city has made progress towards sustainability by joining Local Governments for Sustainability (ICLEI), initiating a sustainability master planning process and completing a GHG Inventory for 2013. While some energy-efficiency measures were completed prior to the GHG Inventory effort, carbon reduction benefits were not quantified for those initiatives. The city is in the process of establishing targets for GHG reduction and is beginning to plan and implement projects to reduce emissions rates.

The city has emergency preparedness, response and recovery plans in place, as well as plans for post-disaster recovery. Local building codes address the risks of building in high hazard areas. While benefitting from its relationship with Miami-Dade County, which has done substantial work on climate mitigation and adaptation, Coral Gables has done little adaptation or resiliency planning to date and has not conducted a comprehensive vulnerability study or assessed climate-related risks. The city participates in the Federal Emergency Management Agency (FEMA) Community Rating System and presently has a score of 7.

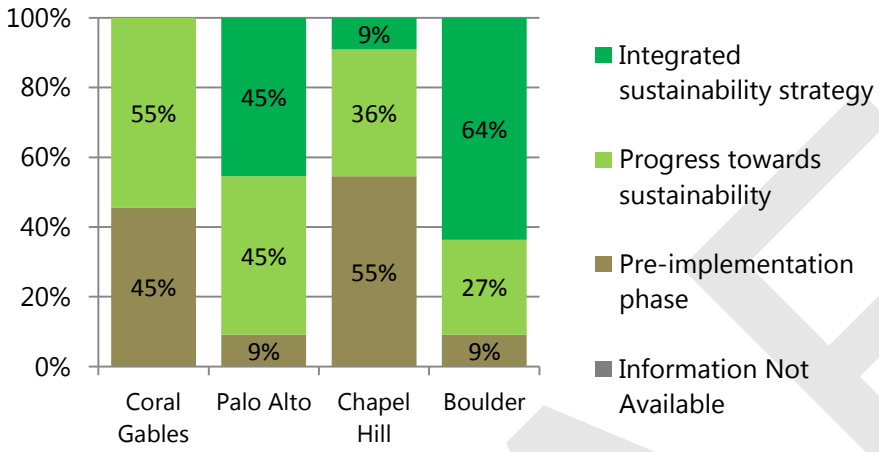
9.2. BENCHMARK

Miami-Dade County (MDC) and other southeast Florida Climate Compact counties have established a goal of 80% emissions reductions from 2008 levels by 2050. To achieve this goal, MDC has interim targets of 20% emissions reduction from 2008 levels by 2020 and a 10% reduction over every 5 year period through 2050. Meeting this target would require Coral Gables to reduce operational emissions by 24% from 2015 to 2020. While ambitious, similar results have been achieved by other cities, for example, Palo Alto reduced LGOP GHG emissions by 53% over an 8-year period from 2005 to 2013.

Figure 15: Qualitative Benchmark of Climate Mitigation, Adaptation and Resiliency Operations compares the city's ordinances, resolutions, directives, policies or other measures related to climate resilience to its peers. Compared to the peer cities reviewed, Coral Gables is in the early stages of climate mitigation. Like Coral Gables, Palo Alto, Chapel Hill and Boulder are all signatories to the USMCPA. The Town of Chapel Hill has

established a preliminary goal of reducing CO_2 emissions from municipal operations by 60 percent by the year 2050 and begun to implement projects to achieve this goal. Chapel Hill's Worthwhile Investments Save Energy program offers subsidies for residents to conduct energy assessments and complete home improvements, with the goal of reducing energy consumption and GHG emissions.

FIGURE 15: QUALITATIVE BENCHMARK OF CLIMATE MITIGATION, ADAPTATION AND RESILIENCY OPERATIONS



Peer cities Palo Alto and Boulder have completed substantial climate mitigation efforts with demonstrated emissions reductions. Both have begun to integrate resiliency into their strategic sustainability planning. Palo Alto has a Carbon Neutral Electric Resource Plan that commits the city to using a carbon neutral electric supply. It has made substantial investments to reduce the carbon intensity of its municipal utility. It has invested in energy efficiency measures and purchases carbon offsets to compensate for unavoidable emissions. Boulder has a carbon tax in place and uses revenues to fund climate action planning, energy efficiency measures, renewable energy projects, and efforts to reduce VMT. Boulder also has a grant-funded Chief Resilience Officer to coordinate resilience efforts in the community as part of its membership in the 100 Resilient Cities program.

9.3. IMPROVE

Table 11 below shows the potential GHG emissions reduction benefits of selected initiatives highlighted in this document. Emissions reduction estimates are conservative, but results show that implementing the selected initiatives below could potentially achieve about a 25% reduction from the 2013 baseline, resulting in annual LGOP emissions of approximately 10,365 mtCO2e.

Increasing solid waste diversion and other BMPs listed in this memo have the potential to further lower the city's carbon footprint. Quantifying emissions reductions from these initiatives requires a more detailed level of analysis dependent on specific project design variables that are undefined at this time.

TABLE 11: ESTIMATED ANNUAL POTENTIAL GHG EMISSIONS REDUCTIONS

#	Solution	GHG Reductions (mtCO2e)*
E1	Upgrade Building Energy Efficiency	579
E2	Convert Garage Lighting to LED	654
E3	Convert Streetlights to LED	797
E4	Install Solar Thermal Systems	36
E5	Install Solar Photovoltaics	462
F1	Reduce Fleet Size	12
F2	Increase Fuel Economy	134
F3	Procure Electric Vehicles & Charging Stations	181
F5	Procure Autogas Vehicles	55
F4	Procure Natural Gas Vehicles	461
W1	Upgrade Flow Fixtures	1
W2	Increase Irrigation Efficiency	9
W3	Upgrade Flush Fixtures	12
W4	Harvest Rainwater	4
	Total	*3397*

*Electricity GHG reductions calculated using FRCC Grid emissions factors. Fleet GHG reductions calculated using U.S. Dept. of Energy Alternative Fuels Data Center estimate of 37.9% reduction for electric cars vs. conventional models, and California Energy Commission estimate of 11% reductions for CNG heavy vehicles vs. diesel models. Water savings reductions based on Miami-Dade County estimate of 1.03 MT CO2e to produce 1 million gallons potable water. Does not include additional reductions from eliminating pumping and wastewater treatment.

In addition to the measures detailed in previous section and quantified in terms of potential GHG abatement in *Table 11*, additional measures (C1 – C7) have been preliminarily identified. While business cases have not been developed for these best management practices due to data limitations and other constraints, they have the potential to enhance the city's greenhouse gas management efforts.

C1. Expand Regional Partnerships: Expand regional sustainability partnerships, beginning by engaging with the Southeast Florida Regional Climate Compact (SFRCC) and its members. SFRCC is a partnership of Palm Beach, Broward, Miami-Dade and Monroe Counties formed to coordinate climate mitigation and adaptation in the region. The SFRCC has completed a Regional GHG Inventory and Climate Action Plan, and is surveying 108 municipalities in South Florida to compile their climate-related ordinances, resolutions, regulations and administrative policy information. Working with the SFRCC will allow Coral Gables to share BMPs and resources with peers in the region. The city should also consider working with other local, regional and national partners engaging with issues related to climate adaptation, such as the University of Miami, South Florida Water Management District, South Florida Regional Planning Council, South Florida Clean Cities Coalition, Florida Department of Environmental Protection, Florida Department of Economic Opportunity, Resilient Communities for America, and the Institute for Sustainable Communities, among others.

C2. Establish GHG Reduction Targets: Adopt specific targets for GHG emissions reductions both for government operations and the community at large. Align its emissions reduction goals as much as possible with those set by other local governments in the South Florida region. Miami-Dade and other

SFRCC counties follow the GHG emissions reduction goals set by the U.S. Cool Counties Climate Stabilization Declaration in 2008. These targets include an 80 percent emissions reduction by 2050 from 2008 levels. In order to achieve this goal, Miami-Dade County set interim targets of 20% emissions reduction from 2008 levels by 2020 and a 10% reduction over every 5- year period through 2050.

C3. Prepare a Vulnerability Assessment: Prepare a vulnerability assessment that considers stakeholders, organizational goals and the consequences and probability of their interaction with climate change impacts (e.g. sea level rise; increased drought; increased storminess and warmer temperatures). The vulnerability assessment should identify organizational risks to stakeholders, historically vulnerable areas, and city infrastructure and assets that could be imperiled by climate change impacts.

C4. Prepare a Climate Adaptation Plan: Develop a Climate Adaptation Plan for the city that systematically achieves the objectives of prioritized adaptation actions and includes provisions for continual improvement to respond to changing conditions. The plan should address adaptation actions to lower risks and increase resiliency. The plan should address water supply, management and infrastructure, natural systems, business and economic concerns, community sustainability, and planning. It should identify specific strategies and potential measures for implementation.

C5. Increase Resiliency: Implement actions and capital improvements identified through the SMP and potential Climate Adaptation Plan to increase resiliency in city operations and the community at large. The city should take steps to reduce the number of homes below code standards and the percentage of residents living in designated high risk areas, and to protect city infrastructure from potential flood and storm hazards, saltwater intrusion, and other climate change risks. Efforts to increase resiliency can improve the city's standing within the FEMA Community Rating System (CRS), which has the potential to reduce flood insurance premiums community-wide. The CRS now includes point categories relative to improved elevation data and sea level rise modeling.

C6. Update Disaster Planning: Ensure climate risks and sustainability considerations are incorporated into the city's risk reduction and emergency management planning and in post-disaster redevelopment plans to ensure economic recovery in the event of a natural disaster, including projects in the Local Mitigation Strategy. Improved pre- and post-disaster planning and incorporation of climate risks into the post-disaster redevelopment plan will increase resilience of the city and community and build on existing strengths in emergency management and response. It will also provide great opportunities for future project implementation.

10. *APPENDICES*

10.1 METHODOLOGY

RS&H prepared a quantitative baseline for Coral Gables by reviewing energy, water, fleet and waste focus areas. The review included analysis of energy and water consumption, fleet management and waste and recycling metrics provided by the city. Data provided was consolidated, converted to standard units, and normalized as necessary to provide standard metrics for evaluating performance allowing identification of trends and comparison with other municipalities.

To establish a baseline for GHG emissions, RS&H prepared a GHG Inventory for government operations following ICLEI's Local Government Operations Protocol version 1.1. A detailed description of methodology for the GHG Inventory is provided in section 3 of the GHG Inventory Report located in Appendix 10.2.

Quantitative benchmarking of Coral Gables' performance was accomplished by comparing quantitative metrics to those for the three peer cities identified (Palo Alto, Chapel Hill, and Boulder), among others. Where appropriate, comparisons were also made with local governments such as Miami-Dade and Broward Counties. These comparisons must be considered in light of regional differences in climate, utility energy mixture, density of development, et cetera. While it is difficult to make direct comparisons between municipalities, benchmarking provides context for the baseline effort.

RS&H developed screening-level, rough-order of magnitude business cases for proposed solutions in the areas of energy, water, fleet and waste. These business cases are based on best available data and standard engineering approaches and are intended to promote discussion and evaluation at collaboration workshops planned with Coral Gables' staff. While ROI's presented are consistent with RS&H's experience based on prior projects, returns and pay back periods may vary depending on project design and specifications. Before selecting and implementing specific initiatives, business case projections should be refined incorporating more detailed cost estimates and the local expertise of city staff.

RS&H conducted a qualitative analysis to establish a baseline for Coral Gables' sustainability performance, identifying strengths to build on and areas for improvement. The process involved reviewing the City's regulatory mechanisms, ordinances, strategies, policies, procedures, and programs for each of the Focus Areas and Sustainable Elements identified in the project scope. This review was based on information provided by the City in response to a detailed data request, as well as that obtained from staff interviews and independent research. For the purposes of the analysis, RS&H assumed that if no information was provided by the City regarding a given element, the city does not have policies or programs addressing that element. This assumption was confirmed with the city's project lead prior to the baseline effort.

Using the qualitative analysis as a starting point, RS&H benchmarked Coral Gables' sustainability performance against publicly available information obtained from three peer cities: Palo Alto, California; Chapel Hill, North Carolina; and Boulder, Colorado. Peer cities were chosen based on similar

characteristics to Coral Gables, including median income, median home prices, daytime population, and proximity to a university. Since environmental and political conditions, available resources, priorities and other factors differ for each location, benchmarking results are best considered in context of the unique characteristics of each municipality. For instance, despite ambitious and far-reaching efforts to reduce GHG emissions, Boulder has the highest per capita GHG emissions of the cities evaluated. This result is not due to a lack of effective policy or investment, but rather to a cold climate and the predominance of coal in the region's energy mix.

To compare Coral Gables' performance to its peers, sustainable elements were evaluated according to a four tier system. Under this system, the dark green tier indicates the element has been integrated into an overall sustainability strategy, or significant investments have been made towards sustainability; the light green tier indicates progress towards sustainability has been achieved, and the brown tier indicates sustainability programs have not yet been implemented. The gray tier indicates insufficient information was available to evaluate sustainability performance.

Detailed information including supporting analyses, underlying baseline assessments, benchmarking and business cases has been retained in the project files.

PROJECT MANAGEMENT FORMS

Coral Gables Sustainability Master Plan Project Management Forms: Summary

Col	Project Name	Focus Area	NPV	ROI	% of Goal*	Department	Project Manager
M1	Diversion of Single Family Residence Garbage	Materials	$686,000	Infinite	31%	Public Works / Sustainability	Jessica Keller
W2	Irrigation Efficiency	Water	$602,000	238%	61%	Public Works / Landscape Services	Brook Dannemiller
E2	Garage LED Lighting	Energy	$574,000	160%	35%	Parking Department	Kevin Kinney
E3	LED Streetlights	Energy	$555,000	35%	44%	Public Works / Sustainability	Jessica Keller
C2	Vulnerability Assessment and Adaptation Plan	Climate	$546,000	277%	50%	Public Works / Sustainability	Matt Anderson
E1	Building Energy Efficiency	Energy	$473,000	153%	29%	Public Works / Facilities Maintenance	Ralph Rodriguez
E6	Utility Management and Control	Energy	$329,000	93%	26%	Information Technology	Raimundo Rodolfo
F1	Fuel Economy	Fleet	$294,000	494%	6%	Public Works / Fleet	Steve Riley
E7	Information Technology Energy Efficiency	Energy	$148,000	Infinite	5%	Information Technology	Raimundo Rodolfo
W5	Non-Potable Water Irrigation	Water	$102,000	96%	35%	Public Works / Landscape Services	Brook Dannemiller
W1	Flow Fixtures	Water	$51,000	469%	3%	Public Works / Facilities Maintenance	Ralph Rodriguez
F3	Electric Vehicles & Infrastructure	Fleet	$30,000	40%	4%	Public Works / Fleet	Steve Riley
F2	Fleet Size	Fleet	$17,000	Infinite	1%	Public Works / Fleet	Steve Riley
O1	Employee Sustainability Training	Outreach	$6,000	24%	50%	Public Works / Sustainability	Matt Anderson
W3	Flush Fixtures	Water	$6,000	22%	8%	Public Works / Facilities Maintenance	Ralph Rodriguez
E4	Solar Thermal Systems	Energy	$1,000	10%	2%	Public Works	Ernesto Pino
W4	Rain Water Harvesting	Water	$1,000	11%	4%	Pubilic Works	Ernesto Pino
S1	Efficiency Revolving Fund	Funding	$0	Infinite	100%	Finance	Diana Gomez
O2	Seal of Sustainability	Outreach	$0	Infinite	50%	Public Works / Sustainability	Matt Anderson
T1	Community Improvement District	Transportation & Land Use	$0	0%	50%	Parking Department	Kevin Kinney
T2	Bicycle and Pedestrian Plan Implementation	Transportation & Land Use	$0	0%	50%	Public Works / Sustainability	Jessica Keller
C1	Regional Partnerships	Climate	($18,000)	-100%	50%	Public Works / Sustainability	Matt Anderson
E5	Photovoltaic System	Energy	($233,000)	-55%	5%	Public Works	Ernesto Pino
M2	Diversion of Single Family Residence Trash	Materials	($3,210,000)	-42%	70%	Public Works / Sustainability	Jessica Keller
Subtotal of Projects w/ NPV > 0			$4,421,000	28%			
Total			$960,000	5%			

**Percentage of Focus Area Goal*

Coral Gables Sustainability Master Plan Project Management Forms: Budget

Expenditures

#	Project Name	NPV>0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
M1	Diversion of Single Family Residence Garbage	1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
W2	Irrigation Efficiency	1	($151,500)	($84,000)	($39,000)	($16,500)	($16,500)	$0	$0	$0	$0	$0	($307,500)
E2	Garage LED Lighting	1	($448,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($448,000)
E3	LED Streetlights	1	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($187,000)	($1,870,000)
C2	Vulnerability Assessment and Adaptation Plan	1	($250,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	($250,000)
E1	Building Energy Efficiency	1	($70,000)	($324,000)	$0	$0	$0	$0	$0	$0	$0	$0	($394,000)
E6	Utility Management and Control	1	($177,000)	($115,000)	($123,000)	($5,000)	($6,000)	($6,000)	($6,000)	($6,000)	($6,000)	($6,000)	($456,000)
F1	Fuel Economy	1	$9,000	$10,000	$17,000	$17,000	$16,000	$0	$0	$0	$0	$0	$69,000
E7	Information Technology Energy Efficiency	1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
W5	Non-Potable Water Irrigation	1	($11,000)	($13,000)	($15,000)	($17,000)	($19,000)	($10,000)	($11,000)	($11,000)	($11,000)	($11,000)	($129,000)
W1	Flow Fixtures	1	($4,000)	($9,000)	$0	$0	$0	$0	$0	$0	$0	$0	($13,000)
F3	Electric Vehicles & Infrastructure	1	($142,000)	($90,000)	($95,000)	$0	$0	$0	$0	$62,000	$40,000	$41,000	($184,000)
F2	Fleet Size	1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
O1	Employee Sustainability Training	1	($9,000)	($9,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($34,000)
W3	Flush Fixtures	1	($11,000)	($12,000)	($12,000)	($12,000)	($12,000)	$0	$0	$0	$0	$0	($59,000)
E4	Solar Thermal Systems	1	$0	$0	($34,000)	$0	($17,000)	$0	$0	$0	$0	$0	($51,000)
W4	Rain Water Harvesting	1	$0	($6,000)	($55,000)	$0	$0	$0	$0	$0	$0	$0	($61,000)
S1	Efficiency Revolving Fund	1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
O2	Seal of Sustainability	1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
T1	Community Improvement District	1	($30,000)	($569,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($600,000)	($5,399,000)
T2	Bicycle and Pedestrian Plan Implementation	1	$0	$0	($1,176,000)	($1,202,000)	($1,229,000)	($1,257,000)	($1,285,000)	($1,314,000)	($1,344,000)	($1,374,000)	($10,181,000)
C1	Regional Partnerships	0	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($20,000)
E5	Photovoltaic System	0	$0	($47,000)	($375,000)	$0	$0	$0	$0	$0	$0	$0	($422,000)
M2	Diversion of Single Family Residence Trash	0	($161,000)	($330,000)	($495,000)	($660,000)	($825,000)	($990,000)	($1,154,000)	($1,319,000)	($1,484,000)	($1,649,000)	($9,067,000)
	Total	($25,245,379)	($1,644,500)	($1,787,000)	($3,193,000)	($2,686,500)	($2,899,500)	($3,054,000)	($3,247,000)	($3,379,000)	($3,596,000)	($3,790,000)	($29,276,500)

Coral Gables Sustainability Master Plan Budget

Revenues / Avoided Costs

#	Project Name	NPV>0		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
M1	Diversion of Single Family Residence Garbage		1	$25,000	$41,000	$58,000	$76,000	$95,000	$97,000	$99,000	$101,000	$104,000	$106,000	$802,000
W2	Irrigation Efficiency		1	$45,000	$69,000	$94,000	$104,000	$115,000	$117,000	$120,000	$123,000	$125,000	$128,000	$1,040,000
E2	Garage LED Lighting		1	$55,000	$113,000	$115,000	$118,000	$121,000	$123,000	$126,000	$129,000	$132,000	$135,000	$1,167,000
E3	LED Streetlights		1	$227,000	$232,000	$238,000	$243,000	$248,000	$254,000	$260,000	$265,000	$271,000	$278,000	$2,516,000
C2	Vulnerability Assessment and Adaptation Plan		1	$0	$0	$86,000	$88,000	$90,000	$92,000	$94,000	$96,000	$196,000	$200,000	$942,000
E1	Building Energy Efficiency		1	$0	$55,000	$75,000	$116,000	$118,000	$121,000	$124,000	$126,000	$129,000	$132,000	$996,000
E6	Utility Management and Control		1	$32,000	$66,000	$90,000	$92,000	$95,000	$97,000	$99,000	$101,000	$103,000	$106,000	$881,000
F1	Fuel Economy		1	$3,000	$8,000	$17,000	$25,000	$34,000	$35,000	$36,000	$37,000	$38,000	$39,000	$272,000
E7	Information Technology Energy Efficiency		1	$12,000	$15,000	$16,000	$17,000	$17,000	$18,000	$18,000	$19,000	$19,000	$20,000	$171,000
W5	Non-Potable Water Irrigation		1	$6,000	$11,000	$18,000	$24,000	$31,000	$31,000	$32,000	$33,000	$33,000	$34,000	$253,000
W1	Flow Fixtures		1	$0	$3,000	$6,000	$9,000	$9,000	$9,000	$9,000	$9,000	$10,000	$10,000	$74,000
F3	Electric Vehicles & Infrastructure		1	$16,000	$23,000	$35,000	$36,000	$37,000	$38,000	$39,000	$20,000	$13,000	$0	$257,000
F2	Fleet Size		1	$1,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$19,000
O1	Employee Sustainability Training		1	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$5,000	$5,000	$42,000
W3	Flush Fixtures		1	$0	$1,000	$4,000	$6,000	$8,000	$10,000	$10,000	$11,000	$11,000	$11,000	$72,000
E4	Solar Thermal Systems		1	$0	$0	$5,000	$5,000	$7,000	$7,000	$8,000	$8,000	$8,000	$8,000	$56,000
W4	Rain Water Harvesting		1	$0	$0	$8,000	$8,000	$8,000	$8,000	$9,000	$9,000	$9,000	$9,000	$68,000
S1	Efficiency Revolving Fund		1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
O2	Seal of Sustainability		1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
T1	Community Improvement District		1	$0	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$5,400,000
T2	Bicycle and Pedestrian Plan Implementation		1	$0	$0	$1,176,000	$1,202,000	$1,229,000	$1,257,000	$1,285,000	$1,314,000	$1,344,000	$1,374,000	$10,181,000
C1	Regional Partnerships		0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
E5	Photovoltaic System		0	$0	$0	$22,000	$22,000	$23,000	$23,000	$24,000	$24,000	$25,000	$25,000	$188,000
M2	Diversion of Single Family Residence Trash		0	$85,000	$174,000	$266,000	$361,000	$461,000	$563,000	$670,000	$781,000	$896,000	$1,016,000	$5,273,000
	Total			$511,000	$1,417,000	$2,935,000	$3,158,000	$3,352,000	$3,506,000	$3,668,000	$3,812,000	$4,073,000	$4,238,000	$30,670,000
			$26,206,114											

Coral Gables Sustainability Master Plan Budget

Net Benefits / Costs

Discount Rate: *2.5%*

#	Project Name	NPV	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
M1	Diversion of Single Family Residence Garbage	$686,000	$25,000	$41,000	$58,000	$76,000	$95,000	$97,000	$99,000	$101,000	$104,000	$106,000	$802,000
W2	Irrigation Efficiency	$602,000	($106,500)	($15,000)	$55,000	$87,500	$98,500	$117,000	$120,000	$123,000	$125,000	$128,000	$732,500
E2	Garage LED Lighting	$574,000	($393,000)	$113,000	$115,000	$118,000	$121,000	$123,000	$126,000	$129,000	$132,000	$135,000	$719,000
E3	LED Streetlights	$555,000	$40,000	$45,000	$51,000	$56,000	$61,000	$67,000	$73,000	$78,000	$84,000	$91,000	$646,000
C2	Vulnerability Assessment and Adaptation Plan	$546,000	($250,000)	$0	$86,000	$88,000	$90,000	$92,000	$94,000	$96,000	$196,000	$200,000	$692,000
E1	Building Energy Efficiency	$473,000	($70,000)	($269,000)	$75,000	$116,000	$118,000	$121,000	$124,000	$126,000	$129,000	$132,000	$602,000
E6	Utility Management and Control	$329,000	($145,000)	($49,000)	($33,000)	$87,000	$89,000	$91,000	$93,000	$95,000	$97,000	$100,000	$425,000
F1	Fuel Economy	$294,000	$12,000	$18,000	$34,000	$42,000	$50,000	$35,000	$36,000	$37,000	$38,000	$39,000	$341,000
E7	Information Technology Energy Efficiency	$148,000	$12,000	$15,000	$16,000	$17,000	$17,000	$18,000	$18,000	$19,000	$19,000	$20,000	$171,000
W5	Non-Potable Water Irrigation	$102,000	($5,000)	($2,000)	$3,000	$7,000	$12,000	$21,000	$21,000	$22,000	$22,000	$23,000	$124,000
W1	Flow Fixtures	$51,000	($4,000)	($6,000)	$6,000	$9,000	$9,000	$9,000	$9,000	$9,000	$10,000	$10,000	$61,000
F3	Electric Vehicles & Infrastructure	$30,000	($126,000)	($67,000)	($60,000)	$36,000	$37,000	$38,000	$39,000	$82,000	$53,000	$41,000	$73,000
F2	Fleet Size	$17,000	$1,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$19,000
O1	Employee Sustainability Training	$6,000	($5,000)	($5,000)	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$3,000	$3,000	$8,000
W3	Flush Fixtures	$6,000	($11,000)	($11,000)	($8,000)	($6,000)	($4,000)	$10,000	$10,000	$11,000	$11,000	$11,000	$13,000
E4	Solar Thermal Systems	$1,000	$0	$0	($29,000)	$5,000	($10,000)	$7,000	$8,000	$8,000	$8,000	$8,000	$5,000
W4	Rain Water Harvesting	$1,000	$0	($6,000)	($47,000)	$8,000	$8,000	$8,000	$9,000	$9,000	$9,000	$9,000	$7,000
S1	Efficiency Revolving Fund	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
O2	Seal of Sustainability	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
T1	Community Improvement District	$0	($30,000)	$31,000	$0	$0	$0	$0	$0	$0	$0	$0	$1,000
T2	Bicycle and Pedestrian Plan Implementation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
C1	Regional Partnerships	($18,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($2,000)	($20,000)
E5	Photovoltaic System	($233,000)	$0	($47,000)	($353,000)	$22,000	$23,000	$23,000	$24,000	$24,000	$25,000	$25,000	($234,000)
M2	Diversion of Single Family Residence Trash	($3,210,000)	($76,000)	($156,000)	($229,000)	($299,000)	($364,000)	($427,000)	($484,000)	($538,000)	($588,000)	($633,000)	($3,794,000)
		$961,000	($1,133,500)	($370,000)	($258,000)	$471,500	$452,500	$452,000	$421,000	$433,000	$477,000	$448,000	$1,393,500

1. Project Identification

Project Name	E1. Building Energy Efficiency	*Focus Area*	Energy
Location	City Buildings (specific locations to be determined)	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective is to reduce energy consumption of city facilities through identification, design and construction of cost-effective energy efficiency and conservation measures.

b. Targets: b. The target is to reduce selected buildings' annual electricity consumption 12% from the implementation year through 2025.

c. Strategy to Achieve Targets: c. The strategy is to evaluate major building systems (HVAC, lighting, building automation, water heating and building envelope) using design reviews, energy audits or retro-commissioning (RCx) techniques for opportunities to implement cost-effective retrofits that reduce energy consumption.

d. Actions to Achieve O & T: d. The actions to achieve the specified objective and target are in two phases. Phase 1 includes conducting a 3 month pilot project at FAC Building 7. The pilot project would entail installing a sub-meter; conducting an in-house energy assessment; identifying low-cost / no-cost energy conservation measures, including, but not limited to: LED lighting, lighting controls (e.g. occupancy sensors), removal of portable heaters, automatic door closers, blinds, etc.); implementing identified measures; and conducting post-measurement measurement and verification after a 12 month period. This phase will also include reviewing designs for currently planned major renovation projects to incorporate energy efficient technologies, where cost effective. This design review process is currently contemplated for the following facilities: Merrick House, City Hall Annex, Trolley Depot, Fire Station #2, Fire Station #3 and the Youth Center. Phase 2 of the project will entail 2) obtaining professional services to conduct energy audits and/or retro-commissioning of the following city buildings (Maintenance, Museum, City Hall, Venetian Pool, Public Safety, Granada Golf Course & Pro Shop and Salvadore Park). Based on results of audits and/or RCx, design (as-applicable) cost-effective recommended energy efficiency and conservation measures and construct / install those measures.

e. Cost(s) & Benefit(s): e. Phase 1 costs include $10,000 to complete the in-house pilot project. These costs include materials. Phase 1 costs also include $15,000 for design reviews and $90,100 to implement any projects suggested by these reviews. Phase 2 costs include professional services to complete energy audits / RCx. Professional services are estimated at $0.33 per square foot ($0.33 * 290,000 ft2), and design and construction costs. These costs are estimated at $0.33 per saved kWh saved, with 10% of total costs allocated to design work and the rest to construction. Benefits are based on reducing baseline electric consumption (~9,005,000 kWh) in selected City buildings by about 12% on average at an avoided resource cost rate of $0.10 / kWh, projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. First year benefits are estimated at $0 on the assumption that efficiency upgrades will take one year to complete. Second year benefits assume that half of contemplated energy efficiency projects are complete by the beginning of the year. Third year benefits assume three quarters of projects are complete by the beginning of the year.

f. Education / Outreach: f. The education and outreach required for this project is to be determined. However, Phase 1 will entail a pilot of methods to raise awareness of staff in FAC bldg. 7. Supervisors will communicate to staff regarding energy saving techniques (e.g. turning lights off, using blinds, keeping exterior doors closed, utilizing power saving features of electronics and prohibiting the use of personal HVAC equipment, etc.).

g. Finance: g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Facilities Maintenance
Project Manager	Ralph Rodriguez

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	153%	Return on Investment
	$473,000	Net Present Value
Goal Performance	29%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
			Ten-Year Estimate										
*-other	Ernesto Pino	Prof. Svcs.: Design Review	$ (15,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (15,000)
*-other	Ernesto Pino	Prof. Svcs.: Energy Audits	$ -	$ (66,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (66,000)
2-design	Ernesto Pino	Design building retrofits	$ (4,500)	$ (25,800)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (30,300)
3-constr	Ernesto Pino	Construct building retrofits	$ (50,500)	$ (232,200)									$ -
		Total	$ (70,000)	$ (324,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (394,000)

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	kWh per year, selected facility accounts	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	90,050,000
Percent Conserved	% resource to be conserved vs. baseline	0.0%	6.0%	8.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Resource Use Reduction	Electricity use reduction (kWh)	0	540,300	720,000	1,081,000	1,081,000	1,081,000	1,081,000	1,081,000	1,081,000	1,081,000	8,827,300
Resource Cost Projection	Projected Electricity Rate ($ per kWh)	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditures ($)	$ -	$ 55,000	$ 75,000	$ 116,000	$ 118,000	$ 121,000	$ 124,000	$ 126,000	$ 129,000	$ 132,000	$ 996,000
	Net Benefit / (Cost)	$ (70,000)	$ (269,000)	$ 75,000	$ 116,000	$ 118,000	$ 121,000	$ 124,000	$ 126,000	$ 129,000	$ 132,000	$ 602,000

1. Project Identification

Project Name	E2. Garage LED Lighting	*Focus Area*	Energy
Location	Parking Garage #6 and Museum Parking Garage	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective is to reduce energy consumption of parking garage lighting by replacing existing lamps and fixtures with light-emitting diode (LED) lamps and fixtures.

b. Targets: b. The target is to replace 100% of existing lighting fixtures and lamps at Parking Garage #6 and the Museum Parking Garage with LED fixtures and lamps.

c. Strategy to Achieve Targets: c. The strategy is to design / engineer appropriate replacement of existing lighting with LEDs and install fixtures and lamps. LED fixtures shall be bi-level, operating at full power when activated by sensors that indicate occupancy and at a reduced power level when sensors do not indicate occupancy.

d. Actions to Achieve O & T: d. Actions involve design and construction of LED lighting and controls.

e. Cost(s) & Benefit(s): e. Costs are assumed to be $450,000 based on an expected cost of $0.40 per kWh saved. Benefits include avoided electricity consumption associated with the existing less-efficient fixtures and lamps. A savings of 60-70% is projected, including bi-level controls, and using an initial resource conservation value of $0.10/kWh. The avoided cost rate is projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Avoided maintenance costs are not presently included in this measure. Significant maintenance cost reductions may be expected relative to current fixtures due to the longer life of LED lamps (2 to 5 times longer). First year savings are estimated at one-half of subsequent years', on the assumption that project installation is completed within 6 months.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Parking Department
Project Manager	Kevin Kinney

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	160%	Return on Investment
	$574,000	Net Present Value
Goal Performance	35%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
2-design	Kevin Kinney	Design/Engineer/Permit Lighting	$ (45,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (45,000)
3-constr	Kevin Kinney	Install Lighting	$ (403,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (403,000)
													$ -
													$ -
		Total	$ (448,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (448,000)

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	kWh per year, selected accounts	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	1,698,000	16,980,000
Percent Conserved	% resource to be conserved vs. baseline	32.5%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	
Resource Use Reduction	Electricity use reduction (kWh)	552,000	1,104,000	1,104,000	1,104,000	1,104,000	1,104,000	1,104,000	1,104,000	1,104,000	1,104,000	10,488,000
Resource Cost Projection	Projected electricity rate ($ per kWh)	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditures ($)	$55,000	$113,000	$115,000	$118,000	$121,000	$123,000	$126,000	$129,000	$132,000	$135,000	$ 1,167,000
	Net Benefit / (Cost)	$ (393,000)	$ 113,000	$ 115,000	$ 118,000	$ 121,000	$ 123,000	$ 126,000	$ 129,000	$ 132,000	$ 135,000	$ 719,000

1. Project Identification

Project Name	E3. LED Streetlights	*Focus Area*	Energy
Location	City-wide	*Year Established*	2016

2. Project Description

a. Project Objective
a. The objective is to reduce energy consumption of city street lighting by replacing existing lamps and fixtures with light-emitting diode (LED) lamps and fixtures.

b. Targets
b. The target is to replace 100% of approximately 4,300 streetlights associated with the following accounts: Miracle Mile Lights (City #5302420590), Street / Decorative Lighting (2302450590), Street / Park Lighting (5302670590) and Parking Lot Lights (5302890590).

c. Strategy to Achieve Targets
c. The strategy is to specify replacement of existing streetlights with LEDs with similar aesthetics and performance and install fixtures and lamps. The delivery method must be determined (e.g. design/bid/build; performance contract, etc.). The city could procure the upgrades through traditional delivery methods (e.g. design / bid / build) or design-build methods. For purposes of estimation, this project is currently modeled as a ten year performance contract in which the City is assessed a monthly fee for LED lighting services over a 120 month period (i.e. 10 years) in lieu of an upfront capital expenditure. The monthly fee includes principal and interest of upfront capital costs, as well as maintenance fees and the developer's profit.

d. Actions to Achieve O & T
d. Actions involve design, procurement and construction of LED street lighting. Selection of project delivery method is to be determined.

e. Cost(s) & Benefit(s)
e. For purposes of estimation, costs are assumed to be $505 per fixture at 3,696 fixtures, based on a 3rd party bid received by the City. These values are an average cost and include the cost of project finance and the developer's profit. It is assumed that retrofits occur in year one. Benefits include avoided electricity consumption associated with the current, less efficient fixtures and lamps. An average project savings of 65% is projected, based on values provided in a third party bid. Average savings are assumed to occur in years 1 - 10. Savings include avoided maintenance costs. The resource rate cost ($0.17/kWh) is an average rate that includes electricity and maintenance costs. The costs for design / bid / build or design-build project delivery are expected to be equal to or less than the estimate provided for a performance contract.

f. Education / Outreach
f. The education and outreach required for this project is to be determined.

g. Finance
g. The source of funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Jessica Keller

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	35%	Return on Investment
	$555,000	Net Present Value
Goal Performance	44%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
								Ten-Year Estimate					
*-other	Ernesto Pino	Enter into 10 year LED lighting service contract	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (1,870,000)
													$ -
													$ -
													$ -
		Total	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (187,000)	$ (1,870,000)

Resource Cost Rate: $0.17 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Annual energy use of exterior lighting accounts	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	2,055,939	20,559,390
Percent Conserved	% resource conserved vs. baseline	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%	
Resource Use Reduction	Electricity use reduction	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	1,336,360	13,363,604
Resource Cost Projection	Projected average rate (electricity and maintenance)	$0.17	$0.17	$0.18	$0.18	$0.19	$0.19	$0.19	$0.20	$0.20	$0.21	
Avoided Expenditure / Revenue	Avoided electricity expenditures ($)	$ 227,000	$ 232,000	$ 238,000	$ 243,000	$ 248,000	$ 254,000	$ 260,000	$ 265,000	$ 271,000	$ 278,000	$ 2,516,000
	Net Benefit / (Cost)	$ 40,000	$ 45,000	$ 51,000	$ 56,000	$ 61,000	$ 67,000	$ 73,000	$ 78,000	$ 84,000	$ 91,000	$ 646,000

1. Project Identification

Project Name	E4. Solar Thermal Systems	*Focus Area*	Energy
Location	Fire Stations #1 (Police and Fire), #2 (Riviera) and #3 (Doris and Phil Sanford Fire Station)	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective is to reduce energy consumption at three city fire stations by supplying a large fraction of hot water demand through solar thermal systems.

b. Targets: b. The target is to reduce targeted buildings' annual energy consumption by approximately 1.8% annually after installation, resulting in approximately $313,000 in annual cost savings.

c. Strategy to Achieve Targets: c. The strategy is to design, procure and construct roof-mounted solar thermal systems at the three fire stations. Based on the current schedule of capital improvements, Stations #2 and #3 may be expected to be installed by Year 3. Station #2 is being renovated during this time frame. The strategy is to include solar thermal in the design. Addition of a system to #3 would be a retrofit. Station #1 is being decommissioned and rebuilt, potentially by Year 5. The strategy is is to include solar thermal in the design.

d. Actions to Achieve O & T: d. The actions to achieve the specified objective and target include obtaining services to design and construct a solar thermal system at each fire station.

e. Cost(s) & Benefit(s): e. Costs include professional services to complete the system design, and construction costs. These costs are estimated at $70,300 with 10% of total costs allocated to design work and the rest to construction. A rebate of $30 / 1,000 BTUh/day offered by FPL is applied to this cost (estimated at $19,000). Ten-year benefits of approximately $80,000 are based on reducing electric consumption in the 3 fire stations by about 2% on average, at an avoided cost rate of $0.10 / kWh. Benefits beyond year 10 are not captured. However, the life of the systems is beyond 10 years and may be expected to continue accruing to the City after Year 10.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. The source of financing / funding for this project is to be determined. Federal incentives of 30% are included in the analysis.

3. Responsible Party

Lead Department / Division	Public Works
Project Manager	Ernesto Pino

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	10%	Return on Investment
	$1,000	Net Present Value
Goal Performance	2%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
							Ten-Year Estimate						
2-design	Ernesto Pino	Obtain design services for solar thermal systems*	$ -	$ -	$ (4,667)	$ -	$ (2,333)	$ -	$ -	$ -	$ -	$ -	$ (7,000)
3-constr	Ernesto Pino	Construct systems*	$ -	$ -	$ (42,000)	$ -	$ (21,000)	$ -	$ -	$ -	$ -	$ -	$ (63,000)
*-other	Ernesto Pino	FPL Solar Thermal Rebate	$ -	$ -	$ 12,667	$ -	$ 6,333	$ -	$ -	$ -	$ -	$ -	$ 19,000
													$ -
		Total	$ -	$ -	$ (34,000)	$ -	$ (17,000)	$ -	$ -	$ -	$ -	$ -	$ (51,000)

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	kWh per year, selected accounts	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	3,813,000	38,130,000
Percent Conserved	% resource to be conserved vs. baseline	0.0%	0.0%	1.2%	1.2%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	
Resource Use Reduction	Electricity use reduction (kWh)	0	0	45,000	45,000	67,000	67,000	67,000	67,000	67,000	67,000	492,000
Resource Cost Projection	Projected electricity rate ($ per kWh)	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditures ($)	$ -	$ -	$ 5,000	$ 5,000	$ 7,000	$ 7,000	$ 8,000	$ 8,000	$ 8,000	$ 8,000	$ 56,000
	Net Benefit / (Cost)	$ -	$ -	$ (29,000)	$ 5,000	$ (10,000)	$ 7,000	$ 8,000	$ 8,000	$ 8,000	$ 8,000	$ 5,000

1. Project Identification

Project Name	E5. Photovoltaic System	*Focus Area*	Energy
Location	Youth Center (or other location to be determined)	*Year Established*	2016

2. Project Description

a. Project Objective
a. The objective is to provide renewable, low-carbon energy at a city facility through installation of a solar photovoltaic (PV) array. The Youth Center was analyzed as a potential location to house a solar PV array due to its 14,000 square foot available roof area; however other locations may also be suitable. (The Maintenance Facility and Public Safety Complex were also evaluated and had similar or slightly worse economic performance).

b. Targets
b. The target is to offset about 13% of the Youth Centers' annual average electricity consumption.

c. Strategy to Achieve Targets
c. The strategy is to evaluate the Youth Center, and other potential locations, to determine the best solar PV site and configuration. The Youth Center will be evaluated as part of an on-going project to design a major renovation for the facility. The evaluation will include a feasibility assessment and ultimately incorporate the project into the renovation design. It is expected that procurement will be traditional (e.g. design / bid / build). However, potential alternative financing mechanisms, such as those proposed by GoSolarFL, should be investigated.

d. Actions to Achieve O & T
d. The actions to achieve the specified objective and target include obtaining professional services to model solar potential, evaluate sites, design the system, and install it. In the case of the Youth Center, these activities are expected to be incremental to the renovation project.

e. Cost(s) & Benefit(s)
e. Costs are estimated at $475,000, offset by a $50,000 FPL incentive for an adjusted cost of $425,000, with 10% of total costs allocated to design work and the rest to construction. Benefits are based on avoided electricity expenditures of about $21,000 based on an annual renewable generation of 207,000 kWh, or approximately 13% of the Youth Center's annual electricity demand. Benefits are calculated using an avoided resource cost rate of $0.10 / kWh, projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Cost and benefits are expected to be incurred in Year 3 (e.g. 2017), coinciding with completion of the Youth Center renovation project.

f. Education / Outreach
f. The education and outreach required for this project is to be determined.

g. Finance
g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works
Project Manager	Ernesto Pino

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	-55%	Return on Investment
	($233,000)	Net Present Value
Goal Performance	5%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
2-design	Ernesto Pino	Professional services - design solar PV system*	$ -	$ (47,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (47,000)
3-constr	Ernesto Pino	Installation of solar PV system*	$ -	$ -	$ (425,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (425,000)
*-other	Ernesto Pino	FPL Solar PV Incentive			$ 50,000								$ 50,000
													$ -
		Total	$ -	$ (47,000)	$ (375,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (422,000)

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	kWh per year, selected accounts	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	1,543,000	15,430,000
Percent Conserved	% resource use offset by renewable generation	0%	0%	13%	13%	13%	13%	13%	13%	13%	13%	
Resource Use Reduction	Electricity use offset by renewable generation (kWh)	0	0	207,000	207,000	207,000	207,000	207,000	207,000	207,000	207,000	1,656,000
Resource Cost Projection	Projected Electricity Rate ($ per kWh)	$0.10	$ 0.10	$ 0.10	$ 0.11	$ 0.11	$ 0.11	$ 0.11	$ 0.12	$ 0.12	$ 0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditures ($)	$ -	$ -	$ 22,000	$ 22,000	$ 23,000	$ 23,000	$ 24,000	$ 24,000	$ 25,000	$ 25,000	$ 188,000
	Net Benefit / (Cost)	$ -	$ (47,000)	$ (353,000)	$ 22,000	$ 23,000	$ 23,000	$ 24,000	$ 24,000	$ 25,000	$ 25,000	$ (234,000)

1. Project Identification

Project Name	E6. Utility Management and Control	*Focus Area*	Energy
Location	City-wide	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective of this project is to utilize software tools to manage the city's utility bills on a monthly basis, including auditing bills, benchmarking facility performance, tracking the results of energy savings projects, analyze trends and report on performance. In addition, the project aims to utilize digital building automation controls at the City's largest buildings.

b. Targets: b. The target for this project is to save an average of 10% of building energy use for the five buildings for which building automation systems (BAS) are installed.

c. Strategy to Achieve Targets: c. The strategy to achieve this target is to procure and/or select/design, configure, interface, populate and training staff to operate software to manage utilities. The solution should have the ability to accurately track, trend and report on utility use and expenditure, while controlling for factors such as weather, floor area, occupancy and other parameters associated with utility use. The solution should interface with ENERGY STAR Portfolio Manager and result in a fully functional portfolio of City facilities in that software. Optionally, the

d. Actions to Achieve O & T: solution should interface with the City's asset management and billing systems and accept the industry standard format for electronic utility billing data transfer. In addition, BAS shall be installed at City Hall, the City Hall Annex, the Maintenance Facility, the Youth Center

e. Cost(s) & Benefit(s): and the Public Safety complex. Building Automation Systems will schedule, monitor and operate building HVAC and lighting systems based on sensor data according to a programmed sequence of operations.

f. Education / Outreach: d. The preferred method of obtaining a utility management solution must be identified (software solutions may be developed in-house, obtained a no cost (e.g. ENERGY STAR Portfolio Manager), procured "off the shelf," or procured via a customized solution). Once identified, the solution must be implemented and managed by staff. BAS can be procured via competitive bid for professional services.

g. Finance: e. The costs to procure an "off the shelf" utility management solution implemented by a vendor is estimated to include approximately $55,000 for implementation and configuration, customization / interfaces and training. An annual software licensing / service fee is estimated at $5000 per year. The estimated cost for BAS is $1.7 per square foot. Costs are escalated by the average CPI for the period 2015 - 2025 as published by the CBO. Benefits are expected to result from a reduction in city-wide utility expenditures. For the purposes of this estimate, estimated savings are limited to average 10% of annual expenditures in the five buildings where BAS are installed.

f. Education and outreach for this measure are to be determined.

g. Funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Information Technology
Project Manager	Raimundo Rodolfo

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	93%	Return on Investment
	$329,000	Net Present Value
Goal Performance	26%	of Focus Area Goal

6. Implementation

a. Costs

Ten-Year Estimate

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
1-acquis	Raimundo Rodolfo	Professional Software Services	$ (55,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (55,000)
*-other	Raimundo Rodolfo	Software Licensing	$ (5,000)	$ (5,000)	$ (5,000)	$ (5,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (56,000)
1-acquis	Raimundo Rodolfo	Professional Building Automation Services	$ (117,000)	$ (110,000)	$ (118,000)								$ (345,000)
													$ -
		Total	$ (177,000)	$ (115,000)	$ (123,000)	$ (5,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (6,000)	$ (456,000)

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Annual electric utility expenditure, 2013	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	150,000,000
Percent Conserved	% reduction from utility management	2.2%	4.3%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	
Resource Use Reduction	Avoided electricity use from util. mgmt.	324,000	644,000	860,000	860,000	860,000	860,000	860,000	860,000	860,000	860,000	7,848,000
Resource Cost Projection	Average electric utility rate, 2013	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditure from util. mgmt.	$ 32,000	$ 66,000	$ 90,000	$ 92,000	$ 95,000	$ 97,000	$ 99,000	$ 101,000	$ 103,000	$ 106,000	$ 881,000
	Net Benefit / (Cost)	$ (145,000)	$ (49,000)	$ (33,000)	$ 87,000	$ 89,000	$ 91,000	$ 93,000	$ 95,000	$ 97,000	$ 100,000	$ 425,000

1. Project Identification

Project Name	E7. Information Technology Energy Efficiency	*Focus Area*	Energy
Location	City-wide	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective of this project is to increase the energy efficiency of the city's information technology assets and infrastructure, including electronic and networked devices, servers and supporting facilities.

b. Targets: b. The target is to reduce energy use of select information technology assets and infrastructure by 20%

c. Strategy to Achieve Targets: c. The strategies to achieve the target include: 1) procure ENERGY STAR (or equivalent) electronics and electronic office products and establish a plan for replacing existing equipment with compliant appliances / equipment, 2) continue implementing server virtualization and cloud computing where appropriate to reduce the number of physical servers and computers, 3) improve HVAC efficiency in computer rooms, telecommunications closets, warehouses and machine rooms with techniques such as curtains, rack panel inserts, etc.

d. Actions to Achieve O & T: d. Actions include inventorying all electronics / office equipment (audio recorders, servers, network devices, VOIP phones, client PCs, smartphones, storage, TVs, multifunction devices and personal printers) to compliance with ENERGY STAR (or equivalent) standards. The City's IT department will utilize the EPEAT assessment tools to validate compliance. The City's Procurement department will ensure that IT's equipment energy standards are incorporated into purchasing policies and processes. For example, this measure includes benefits from a new agreement the city has entered into with a printer / multifunction device company that specifies all provided equipment meet ENERGY STAR standards). IT will update hardware lifecycle plans to incorporate energy performance standards. IT will evaluate opportunities for additional server virtualization / cloud computing and implement projects as appropriate.

e. Cost(s) & Benefit(s): e. Costs and benefits of this project are currently limited to procurement activities (i.e. they do not include server virtualization / cloud computing). Estimated costs are $0, since ENERGY STAR qualified models are generally available at no incremental cost. The project is modeled to phase in over 4 years. Costs and benefits assume that 66% of the City's inventory is already compliant with ENERGY STAR standards.

f. Education / Outreach: f. Education and outreach efforts are to be determined.

g. Finance: g. Funding is to be determined.

3. Responsible Party

Lead Department / Division	Information Technology
Project Manager	Raimundo Rodolfo

4. Goals

1. Reduce electricity use	3,030,209	kWh	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	15,151,043	kWh			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*Infinite*	Return on Investment
	$148,000	Net Present Value
Goal Performance	5%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
1-acquis	Raimundo Rodolfo	Procure ENERGY STAR electronics & office equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
													$ -
													$ -
													$ -
		Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Resource Cost Rate: $0.10 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	kWh per year, selected facility accounts	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	9,005,000	90,050,000
Percent Conserved	% resource conserved vs. baseline	1.3%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	
Resource Use Reduction	Avoided electricity use from ENERGY STAR equip.	116,192	150,770	150,787	159,911	159,911	159,911	159,911	159,911	159,911	159,911	1,537,126
Resource Cost Projection	Project electric rate ($/kWh)	$0.10	$0.10	$0.10	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	
Avoided Expenditure / Revenue	Avoided electricity expenditure from ENERGY STAR equip.	$ 12,000	$ 15,000	$ 16,000	$ 17,000	$ 17,000	$ 18,000	$ 18,000	$ 19,000	$ 19,000	$ 20,000	$ 171,000
	Net Benefit / (Cost)	$ 12,000	$ 15,000	$ 16,000	$ 17,000	$ 17,000	$ 18,000	$ 18,000	$ 19,000	$ 19,000	$ 20,000	$ 171,000

1. Project Identification

Project Name	F1. Fuel Economy	*Focus Area*	Fleet
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective	a. The objective of this project is to improve the average fuel economy of the city's fleet by procuring high-efficiency vehicles to replace less efficient vehicles.
b. Targets	b. The target is to replace at least 49 LDVs with models that have an average annual fuel economy at least 100% greater.
c. Strategy to Achieve Targets	c. The strategy is to identify fuel-inefficient vehicles scheduled for replacement and replace them with higher-efficiency models available via the current Florida DMS contract (e.g. Motor Vehicles 25100000-15-1) such as the Toyota Yaris or Nissan Versa. In order to preserve the planned rate of fleet replacement and account for purchase of electric vehicles, 7 vehicles are replaced in 2016, 7 in 2017, 12 in 2018, 12 in 2019 and 11 in 2020.
d. Actions to Achieve O & T	d. Actions include identifying the least fuel-efficient vehicles scheduled for replacement, specifying replacement vehicles and procuring new replacement vehicles that meet or exceed the establish fuel efficiency targets.
e. Cost(s) & Benefit(s)	e. A negative price premium of about ($1,300) for specified models is expected relative to the average cost of comparable compact vehicles available via the state contract. Benefits result in a reduced cost per mile for replaced vehicles. Fuel cost per mile data sources include historic Coral Gables data and values published by the EPA for the Yaris/Versa. This reduced fuel cost per mile includes factors additional to avoided fuel expenditure (e.g. reduced maintenance, etc.). Avoided fuel use is based on an estimated fuel economy of 30 miles per gallon for replacement vehicles. The fuel cost rate is projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. The project life is assumed to be 10 years. Vehicles are assumed to have a 10 year life. As a result, salvage value is not included in this assessment.
f. Education / Outreach	f. The education and outreach required for this project is to be determined.
g. Finance	g. Capital costs are assumed to be covered under planned replacement schedules.

3. Responsible Party

Lead Department / Division	Public Works / Fleet
Project Manager	Steve Riley

4. Goals

1. Reduce fossil fuel use	87,221	gallons	(or)		20%	by 2025 relative to base value
2. -	-	-	(or)	-		by 2025
Base Year	2013					
Base Value	436,106	gallons				

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*494%*	Return on Investment
	$294,000	Net Present Value
Goal Performance	6%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
								Ten-Year Estimate					
1-acquis	Steve Riley	Inc. Savings of Vehicles Relative to Standard	$ 9,000	$ 10,000	$ 17,000	$ 17,000	$ 16,000	$ -	$ -	$ -	$ -	$ -	$ 69,000
													$ -
													$ -
													$ -
		Total	$ 9,000	$ 10,000	$ 17,000	$ 17,000	$ 16,000	$ -	$ -	$ -	$ -	$ -	$ 69,000

Resource Cost Rate: $2.50 per gallon Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Gasoline (gallons)	1,368	3,443	6,558	10,113	13,469	13,469	13,469	13,469	13,469	13,469	102,299
Percent Conserved	% Reduction	52.2%	55.7%	60.0%	55.4%	54.7%	54.7%	54.7%	54.7%	54.7%	54.7%	
Resource Use Reduction	Gasoline (gallons)	714	1,919	3,937	5,602	7,374	7,374	7,374	7,374	7,374	7,374	56,414
Resource Cost Projection	-	-	-	-	-	-	-	-	-	-	-	-
Avoided Expenditure / Revenue	Avoided Fleet Cost Per Mile Expenditures	$ 3,000	$ 8,000	$ 17,000	$ 25,000	$ 34,000	$ 35,000	$ 36,000	$ 37,000	$ 38,000	$ 39,000	$ 272,000
	Net Benefit / (Cost)	$ 12,000	$ 18,000	$ 34,000	$ 42,000	$ 50,000	$ 35,000	$ 36,000	$ 37,000	$ 38,000	$ 39,000	$ 341,000

1. Project Identification

Project Name	F2. Fleet Size	*Focus Area*	Fleet
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective of this project is to remove underutilized vehicles from the city's fleet where operationally feasible.

b. Targets: b. The target is to remove at least 5 underutilized LDVs in 2016 and 4 in 2017.

c. Strategy to Achieve Targets: c. The strategy is to evaluate under-utilized vehicles to determine those that can be removed from the fleet without significantly affecting city operational requirements. Designation of under-utilized vehicles for removal shall be at the fleet manager's discretion, but no new vehicles should be purchased to replace those removed. To mitigate removal of underutilized vehicles from the fleet, the City will investigate development of a program for reimbursement of employee-owned vehicles for trips less than 100 miles at the published IRS rate ($0.575 per mile in 2015). Trips greater than 100 miles would be subject to City Rule 28, which specifies use of city-owned vehicles for travel within the State of Florida and rental cars.

d. Actions to Achieve O & T: d. Actions include identifying under-utilized vehicles, developing a schedule for their removal from the fleet, and selling / auctioning them as appropriate. Action also include developing a mileage reimbursement policy for short trips.

e. Cost(s) & Benefit(s): e. Cost / Benefit of this analysis will evaluate the fuel costs avoided by not operating the underutilized vehicles. Avoided maintenance costs are not included in the analysis. The fuel cost rate is projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Revenues associated with the sale of the under-utilized vehicles are not included in the estimate, but are assumed to cover any administrative costs of the project. The project life is assumed to be 10 years.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. There are no capital costs / finance requirements associated with this measure.

3. Responsible Party

Lead Department / Division	Public Works / Fleet
Project Manager	Steve Riley

4. Goals

1. Reduce fossil fuel use	87,221	gallons	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	436,106	gallons			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*Infinite*	Return on Investment
	$17,000	Net Present Value
Goal Performance	1%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
*-other	Steve Riley	Remove underutilized vehicles	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
													$ -
													$ -
													$ -
		Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Resource Cost Rate: $2.50 per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Gasoline (gallons)	219	540	540	540	540	540	540	540	540	540	5,079
Percent Conserved	% Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Resource Use Reduction	Gasoline (gallons)	219	540	540	540	540	540	540	540	540	540	5,079
Resource Cost Projection	-	-	-	-	-	-	-	-	-	-	-	-
Avoided Expenditure / Revenue	Avoided Fleet Cost Per Mile Expenditures	$ 1,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 19,000
	Net Benefit / (Cost)	$ 1,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 19,000

1. Project Identification

Project Name	F3. Electric Vehicles & Infrastructure	*Focus Area*	Fleet
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective of this project is to replace the most utilized administrative vehicles with electric vehicles (EV) or plug-in electric hybrid (PHEV) vehicles where operationally feasible.

b. Targets: b. The target is to replace vehicles and to provide charging infrastructure.

c. Strategy to Achieve Targets: c. The strategy is to develop an annual procurement and operations & maintenance plan to replace 8 vehicles in 2015, 5 vehicles in 2016 and 5 vehicles in 2017. Vehicles will be replaced with the Chevy Volt, Nissan Leaf or equivalent. The plan will also include selecting and procuring the most appropriate electric vehicle support equipment (EVSE) for charging the vehicles. Purchasing vs. leasing the vehicles will be evaluated and a determination regarding the most favorable method will be made. Vehicles will be decommissioned from the fleet after 7 years and salvaged.

d. Actions to Achieve O & T: d. Actions include procuring vehicles, procuring EVSE, and training technicians on PHEV maintenance, as necessary.

e. Cost(s) & Benefit(s): e. Cost / Benefit of this analysis will evaluate the incremental cost of PHEVs and the costs associated with designing, procuring and installing EVSE. The incremental cost is conservatively assumed to be the difference in procurement cost for a Chevy Volt or Nissan Leaf and an average "compact vehicle" as defined by the current Florida DMS contract (e.g. Motor Vehicles 25100000-15-1). Based on the current contract, this value is approximately $15,750. The installed cost of EVSE is assumed to be $2,000 per charge point, per quotes previously received by the city. Cost are offset by an estimated $6,500 salvage value after 7 years. Cost and benefits are projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. The benefits include avoided gasoline usage. Benefits also include reduced cost per mile of fleet vehicles. The project life is assumed to be 10 years. This does not include fuel or cost per mile savings in years 11 - 14. Nor does it include any salvage value of vehicles in years 8 - 14.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. The project will be financed with funds previously dedicated to fleet vehicle replacement.

3. Responsible Party

Lead Department / Division	Public Works / Fleet
Project Manager	Steve Riley

4. Goals

1. Reduce fossil fuel use	87,221	gallons	(or)	20%	by 2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	436,106	gallons			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	40%	Return on Investment
	$30,000	Net Present Value
Goal Performance	4%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
1-acquis	Steve Riley	Procure EV / PHEV	$ (126,000)	$ (80,000)	$ (84,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (290,000)
1-acquis	Steve Riley	Procure EVSE	$ (16,000)	$ (10,000)	$ (11,000)								$ (37,000)
*-other	Steve Riley	Salvage Vehicles at 7 Years	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 62,000	$ 40,000	$ 41,000	$ 143,000
													$ -
		Total	$ (142,000)	$ (90,000)	$ (95,000)	$ -	$ -	$ -	$ -	$ 62,000	$ 40,000	$ 41,000	$ (184,000)

Current Resource Conservation Rate: per mile

Escalation Factor: 2.25% per year

b. Benefits

Existing Resource Use	Gasoline Use of Vehicles	750	1,116	4,225	4,225	4,225	4,225	4,225	4,225	4,225	4,225	35,668
Percent Conserved	% of Gasoline Displaced by Electricity	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Resource Use Reduction	Displaced Gasoline Use	750	1,116	4,225	4,225	4,225	4,225	4,225	4,225	4,225	4,225	35,668
Resource Cost Projection	Not Applicable	-	-	-	-	-	-	-	-	-	-	-
Avoided Expenditure / Revenue	Fuel Cost Per Mile Savings from Electric Vehicles	$16,000	$23,000	$35,000	$36,000	$37,000	$38,000	$39,000	$20,000	$13,000	$0	257,000
	Net Benefit / (Cost)	$ (126,000)	$ (67,000)	$ (60,000)	$ 36,000	$ 37,000	$ 38,000	$ 39,000	$ 82,000	$ 53,000	$ 41,000	$ 73,000

1. Project Identification

Project Name	M1. Diversion of Single Family Residence Garbage	*Focus Area*	Materials
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective	a. The objective is to avoid garbage disposal costs by increasing the city's single family residential garbage diversion rate.
b. Targets	b. The project target is to increase the single family residence garbage diversion rate to 87% within the first 5 years and maintain this level during the subsequent 5 years. Diversion rates are based on the State of Florida definition, which includes incineration as a diversion strategy.
c. Strategy to Achieve Targets	c. The strategy is to utilize education and outreach to boost recycling among the city's single family residents. It also includes renegotiating the city's existing recycling contract to maintain a cost of $0/ton to recycle, or obtain revenue for recycling commodities.
d. Actions to Achieve O & T	d. Actions include implementing an educational campaign, and renegotiating the recycling contract.
e. Cost(s) & Benefit(s)	e. The estimated project cost is incidental to an education and outreach campaign. Costs are subject to further validation. Benefits are based on solid waste disposal cost avoidance of $66 per ton.
f. Education / Outreach	f. Education and outreach associated with the project are to be determined, however an educational/awareness campaign would be needed to assure public participation in increasing the SFR diversion rate.
g. Finance	g. The source of financing / funding for this project is to be determined. Further research is required to determine if the project is eligible for any available incentives.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Jessica Keller

4. Goals

1. Divert city operations waste	33,321	-	(or)	75% by 2025
2. Divert single family waste	-	-	(or)	75% by 2025
Base Year	-			
Base Value	44,428	-		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*Infinite*	Return on Investment
	$686,000	Net Present Value
Goal Performance	30.6%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten-Year Estimate Total
*-other	Jessica Keller	Renegotiate recycling contract	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
*-other	Jessica Keller	Increase diversion rate though education and outreach	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
													$ -
													$ -
		Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Landfill / Incineration Cost Rate:	$66.34	per ton	Escalation Factor 2.25% per year
Recycling Revenue :	$0.00	per ton	

b. Benefits

Existing Resource Use	Garbage generation in 2013	11,659	11,659	11,659	11,659	11,659	11,659	11,659	11,659	11,659	11,659		116,590
Percent Conserved	Single-family Residence garbage diversion rate	79%	81%	83%	85%	87%	87%	87%	87%	87%	87%		
Resource Use Reduction	a. Tons of garbage incinerated	6,696	6,696	6,696	6,696	6,696	6,696	6,696	6,696	6,696	6,696		
Avoided Expenditure / Revenue	b. Tons garbage recycled	2,565	2,798	3,031	3,264	3,498	3,498	3,498	3,498	3,498	3,498		
	c. Tons of garbage composted	0	0	0	0	0	0	0	0	0	0		
Resource Cost Projection	a. Projected solid waste cost avoidance per ton	$66	$68	$69	$71	$73	$74	$76	$78	$79	$81		
	b. Projected recycling revenue per ton	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
Avoided Expenditure	Avoided annual disposal costs	$ 25,000	$ 41,000	$ 58,000	$ 76,000	$ 95,000	$ 97,000	$ 99,000	$ 101,000	$ 104,000	$ 106,000	$	802,000
	Net Benefit / (Cost)	$ 25,000	$ 41,000	$ 58,000	$ 76,000	$ 95,000	$ 97,000	$ 99,000	$ 101,000	$ 104,000	$ 106,000	$	802,000

1. Project Identification

Project Name	M2. Diversion of Single Family Residence Trash	*Focus Area*	Materials
Location	Throughout Residential Coral Gables	*Year Established*	2016

2. Project Description

a. Project Objective	a. The objective of this project is to increase the City's diversion rate as defined by the State of Florida by incinerating single family residence trash that is currently landfilled
b. Targets	b. The target for this project is to divert 71% of trash from the landfill to incineration. This target in addition to the target for diversion of single family residence garbage via increased recycling and composting will result in a total waste diversion rate (as defined by the State of Florida) of 75% by year 10.
c. Strategy to Achieve Targets	c. The strategy is to divert trash presently sent to the Kimmins landfill to the Resource Recovery incineration facility.
d. Actions to Achieve O & T	d. Action to acheive objectives and targets is to negotiate terms with the Resource Recovery facility and transport trash to this facility. To control costs, diversion will be phased, increasing by 10% each year until 71% of total trash is diverted to the Resource Recovery facility.
e. Cost(s) & Benefit(s)	e. Costs include an increased rate of $64.85 per ton for incineration (vs. $31.73 for landfill). This is offset slightly by a reduced distance from Coral Gables to the disposal site (18.2 miles vs. 19.4 miles). Costs increase by 10% annually as the volume of trash incinerated is increased. Costs are also inflated 2.25% each year, based on the average projected consumer price index from 2015 - 2025. Costs are offset by avoided landfill fees. These avoided landfill fees increase over time as the volume of diverted trash increases. Avoided landfill fees are also inflated by the CPI. While there is a net cost to this project, it helps the City comply with the State of Florida 75% diversion requirement. Further, it is likely that the project will significantly reduce the community's greenhouse gas emissions, since incineration is often less greenhouse gas intensive than landfills.
f. Education / Outreach	f. Education and outreach required for this project is to be determined.
g. Finance	g. The funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Jessica Keller

4. Goals

1. Divert city operations waste	33,321	-	(or)	75% by 2025
2. Divert single family waste	-	-	(or)	75% by 2025
Base Year	-			
Base Value	44,428	-		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	-42%	Return on Investment
	($3,210,000)	Net Present Value
Goal Performance	70%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
*-other	Jessica Keller	Divert Trash from Landfill to Incinerator	$ (161,319)	$ (329,827)	$ (494,775)	$ (659,653)	$ (824,602)	$ (989,551)	$ (1,154,429)	$ (1,319,378)	$ (1,484,255)	$ (1,649,204)	$ (9,066,993)
													$ -
													$ -
													$ -
		Total	$ (161,000)	$ (330,000)	$ (495,000)	$ (660,000)	$ (825,000)	$ (990,000)	$ (1,154,000)	$ (1,319,000)	$ (1,484,000)	$ (1,649,000)	$ (9,067,000)

Landfill Cost Rate:	$32	per ton	Escalation Factor 2.25% per year
Incineration Cost Rate:	$65	per ton	

b. Benefits

Existing Resource Use	Trash generation in 2013	32,769	32,769	32,769	32,769	32,769	32,769	32,769	32,769	32,769	32,769	327,690
Percent Conserved	% of trash incinerated	7.1%	14.1%	21.2%	28.3%	35.4%	42.4%	49.5%	56.6%	63.7%	70.7%	
Resource Use Reduction	Trash diverted to incineration	2,318	4,635	6,953	9,270	11,588	13,906	16,223	18,541	20,858	23,176	
Avoided Expenditure / Revenue	Landfill cost rate projection	$32	$32	$33	$34	$35	$35	$36	$37	$38	$39	
Avoided Expenditure	Avoided landfill fees	$ 85,000	$ 174,000	$ 266,000	$ 361,000	$ 461,000	$ 563,000	$ 670,000	$ 781,000	$ 896,000	$ 1,016,000	$ 5,273,000
	Net Benefit / (Cost)	$ (76,000)	$ (156,000)	$ (229,000)	$ (299,000)	$ (364,000)	$ (427,000)	$ (484,000)	$ (538,000)	$ (588,000)	$ (633,000)	$ (3,794,000)

1. Project Identification

Project Name	W1. Flow Fixtures	*Focus Area*	Water
Location	City Buildings (specific locations to be determined)	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective is to reduce water consumption at 16 or more city facilities through replacing flow fixtures with modern, high-efficiency fixtures.

b. Targets: b. The target is to reduce targeted buildings' annual water consumption by at least 20% by 2025.

c. Strategy to Achieve Targets: c. The strategy is to conduct a design review of plumbing design in facilities currently slated for major renovations (Merrick House, City Hall Annex, Trolley Depot, Fire Stations #2 and #3, Youth Center), and audit flow fixtures in Maintenance, Museum, City Hall, Venetian Pool, Public Safety, Granada Golf Course & Pro Shop and Salvadore Park to identify opportunities for replacement with low flow fixtures. As part of these two main strategies, develop a city-wide specification for flow fixtures for use in all future design efforts.

d. Actions to Achieve O & T: d. The actions to achieve the specified objective and target include conducting design reviews and auditing flow fixtures at city buildings. Based on results of design reviews incorporate water efficient fixtures into the final design and commission construction. Based on results of audits develop a schedule of flow fixtures to be replaced, source cost-effective, high efficiency replacement fixtures, and install the new fixtures. Develop a standard specification for flow fixtures in city facilities.

e. Cost(s) & Benefit(s): e. The cost of design reviews and audits is assumed to be captured in Measure E1. Implementation costs are estimated at $13,000 with about 10% of total costs allocated to design work and the rest to construction. Benefits are based on reducing water consumption in the City's buildings by about 20% on average at an avoided cost rate of $4 per 1000 gallons (kgal) and $0.10 per avoided kilowatt hour (water heating savings are estimated at 60 kWh / year per 1000 gallons avoided). The avoided cost rates are projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Year one assumes no benefits are realized due to time required to construct improvements. Year two assumes that approximately 1/3 of projects are completed. Year three assumes the remaining 2/3 of projects are completed.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Facilities Maintenance
Project Manager	Ralph Rodriguez

4. Goals

1. Reduce water consumption	20,379	kgal	(or)	20%	2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	101,893	kgal			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	469%	Return on Investment
	$51,000	Net Present Value
Goal Performance	3%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten-Year Estimate Total
*-other	Ernesto Pino	Prof. Svcs.: Design Review	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1-acquis	Ernesto Pino	Prof. Svcs.: Water Audits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2-design	Ernesto Pino	Design/specify replacement fixtures	$ (112)	$ (557)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (669)
3-constr	Ernesto Pino	Install replacement fixtures and/or upgrade existing	$ (3,627)	$ (8,073)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (11,700)
		Total	$ (4,000)	$ (9,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (13,000)

Water Resource Conservation Value: $4.00 per 1000 gallons

Energy Resource Conservation Value: $0.10 per kWh

Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Water use in 1,000 gallons (kgal) per year	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000		40,000
Percent Conserved	% water to be conserved vs. baseline	0%	7%	13%	20%	20%	20%	20%	20%	20%	20%		
Resource Use Reduction	Water use reduction (kgal)	0	264	528	800	800	800	800	800	800	800		6,392
Avoided Expenditure / Revenue	Projected Water Rate ($ per kgal)	$4.00	$ 4.09	$ 4.18	$ 4.28	$ 4.37	$ 4.47	$ 4.57	$ 4.67	$ 4.78	$ 4.89		
	Project Electric Rate ($ / kWh)	$0.10	$ 0.10	$ 0.10	$ 0.11	$ 0.11	$ 0.11	$ 0.11	$ 0.12	$ 0.12	$ 0.12		
Avoided Expenditure	Avoided water expenditures ($)	$ -	$ 3,000	$ 6,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 10,000	$ 10,000	$	74,000
	Net Benefit / (Cost)	$ (4,000)	$ (6,000)	$ 6,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 10,000	$ 10,000	$	61,000

1. Project Identification

Project Name	W2. Irrigation Efficiency	*Focus Area*	Water
Location	City Buildings (specific locations to be determined)	*Year Established*	2016

2. Project Description

a. Project Objective	a. The objective is to conserve water by increasing the efficiency of city irrigation systems.
b. Targets	b. The project target is to save 20% of water use in 15 accounts associated with irrigation, vs. 2013 baseline usage.
c. Strategy to Achieve Targets	c. The strategy is to increase efficiency of irrigation systems by converting sprinklers to drip irrigation, using more efficient sprinkler heads, using weather and/or sensor-based irrigation controls, and properly maintaining irrigation systems.
d. Actions to Achieve O & T	d. Actions include procuring and installing higher-efficiency equipment to replace existing equipment for all of the City's 125 irrigation systems.
e. Cost(s) & Benefit(s)	e. Implementation costs are estimated at $3,600 installed, per system on average. Benefits are based on avoided water charges, estimated at $7.50 per thousand gallons (kgal) saved, projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. The project is expected to be completed over five years, with 40% of the expenditure and savings in Year 1, 25% in Year 2, 15% in Year 3 and 10% in Years 4 and 5.
f. Education / Outreach	f. The education and outreach required for this project is to be determined.
g. Finance	g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Landscape Services
Project Manager	Brook Dannemiller

4. Goals

1. Reduce water consumption	20,379	kgal	(or)	20%	2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	101,893	kgal			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	238%	Return on Investment
	$602,000	Net Present Value
Goal Performance	61%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
								Ten-Year Estimate					
1-acquis	Brook Dannemiller	New Equipment and Installation	$ (180,000)	$ (112,500)	$ (67,500)	$ (45,000)	$ (45,000)	$ -	$ -	$ -	$ -	$ -	$ (450,000)
*-other	Brook Dannemiller	Miami-Dade County Irrigation Retrofit Program Revenue	$ 28,500	$ 28,500	$ 28,500	$ 28,500	$ 28,500	$ -	$ -	$ -	$ -	$ -	$ 142,500
													$ -
													$ -
		Total	$ (151,500)	$ (84,000)	$ (39,000)	$ (16,500)	$ (16,500)	$ -	$ -	$ -	$ -	$ -	$ (307,500)

Resource Conservation Value: $7.50 per 1000 gallons Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	1000 gallons (kgal) per year	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	720,000
Percent Conserved	% resource to be conserved vs. baseline	8.0%	13.0%	16.0%	18.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	
Resource Use Reduction	Water use reduction (kgal)	6,000	9,000	12,000	13,000	14,000	14,000	14,000	14,000	14,000	14,000	124,000
Resource Cost Projection	Projected Water Rate ($ per kgal)	$7.50	$7.67	$7.84	$8.02	$8.20	$8.38	$8.57	$8.76	$8.96	$9.16	
Avoided Expenditure / Revenue	Avoided water expenditures ($)	$ 45,000	$ 69,000	$ 94,000	$ 104,000	$ 115,000	$ 117,000	$ 120,000	$ 123,000	$ 125,000	$ 128,000	$ 1,040,000
	Net Benefit / (Cost)	$ (106,500)	$ (15,000)	$ 55,000	$ 87,500	$ 98,500	$ 117,000	$ 120,000	$ 123,000	$ 125,000	$ 128,000	$ 732,500

1. Project Identification

Project Name	W3. Flush Fixtures	*Focus Area*	Water
Location	City Buildings (specific locations to be determined)	*Year Established*	2016

2. Project Description

a. Project Objective: a. The objective is to reduce water consumption at 16 or more city facilities through replacing flush fixtures with modern, high-efficiency fixtures.

b. Targets: b. The target is to reduce targeted buildings' annual water consumption by at least 19% by 2025. The target assumes that approx. 5% of flush fixtures have already been upgraded to low-flow fixtures.

c. Strategy to Achieve Targets: c. The strategy is to conduct a design review of plumbing design in facilities currently slated for major renovations (Merrick House, City Hall Annex, Trolley Depot, Fire Stations #2 and #3, Youth Center), and audit flush fixtures in Maintenance, Museum, City Hall, Venetian Pool, Public Safety, Granada Golf Course & Pro Shop and Salvadore Park to identify opportunities for replacement with low flow fixtures. As part of these two main strategies, develop a city-wide specification for flush fixtures for use in all future design efforts. The city has been retrofitting flush fixtures opportunistically over the past few years and estimates that about 5% of eligible fixtures have been retrofitted to date.

d. Actions to Achieve O & T: d. The actions to achieve the specified objective and target include conducting design reviews and auditing flush fixtures at city buildings. Based on results of design reviews incorporate water efficient fixtures into the final design and commission construction. Based on results of audits develop a schedule of flush fixtures to be replaced, source cost-effective, high efficiency replacement fixtures, and install the new fixtures. Develop a standard specification for flush fixtures in city facilities.

e. Cost(s) & Benefit(s): e. The cost of design reviews and audits is assumed to be captured in Measure E1.. Implementation costs are estimated at $57,000, with 10% of total costs allocated to design work and the rest to construction. Benefits are based on reducing water consumption in the City's buildings by about 20% on average at an avoided cost rate of $4.00 per 1000 gallons (kgal). The avoided cost rate is projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Costs and benefits are phased over a five year period. First year benefits are estimated at zero, to account for construction, with full benefits realized in Year 6.

f. Education / Outreach: f. The education and outreach required for this project is to be determined.

g. Finance: g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Facilities Maintenance
Project Manager	Ralph Rodriguez

4. Goals

1. Reduce water consumption	20,379	kgal	(or)	20%	2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	101,893	kgal			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	22%	Return on Investment
	$6,000	Net Present Value
Goal Performance	8%	of Focus Area Goal

6. Implementation

a. Costs

			Ten-Year Estimate										
Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
*-other	Ernesto Pino	Prof. Svcs.: Design Review	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
*-other	Ernesto Pino	Prof. Svcs.: Water Audits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2-design	Ernesto Pino	Design/specify replacement fixtures	$ (1,140)	$ (1,166)	$ (1,192)	$ (1,219)	$ (1,246)	$ -	$ -	$ -	$ -	$ -	$ (5,962)
3-constr	Ernesto Pino	Install replacement fixtures and/or upgrade existing	$ (10,260)	$ (10,491)	$ (10,727)	$ (10,968)	$ (11,215)						$ (43,401)
		Total	$ (11,000)	$ (12,000)	$ (12,000)	$ (12,000)	$ (12,000)	$ -	$ -	$ -	$ -	$ -	$ (59,000)

Resource Conservation Value: $4.00 per 1000 gallons Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	1000 gallons (kgal) per year	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	120,000
Percent Conserved	% resource to be conserved vs. baseline	0%	3%	7%	11%	15%	19%	19%	19%	19%	19%	
Resource Use Reduction	Water use reduction (kgal)	0	360	840	1,320	1,800	2,280	2,280	2,280	2,280	2,280	15,720
Resource Cost Projection	Projected Water Rate ($ per kgal)	$4.00	$ 4.09	$ 4.18	$ 4.28	$ 4.37	$ 4.47	$ 4.57	$ 4.67	$ 4.78	$ 4.89	
Avoided Expenditure / Revenue	Avoided water expenditures ($)	$ -	$ 1,000	$ 4,000	$ 6,000	$ 8,000	$ 10,000	$ 10,000	$ 11,000	$ 11,000	$ 11,000	$ 72,000
	Net Benefit / (Cost)	$ (11,000)	$ (11,000)	$ (8,000)	$ (6,000)	$ (4,000)	$ 10,000	$ 10,000	$ 11,000	$ 11,000	$ 11,000	$ 13,000

1. Project Identification

Project Name	W4. Rain Water Harvesting	*Focus Area*	Water
Location	War Memorial Youth Center	*Year Established*	2016

2. Project Description

a. Project Objective
a. The objective is to conserve potable water and reduce stormwater runoff at the Youth Center and establish the concept for rainwater harvesting at the Biltmore.

b. Targets
b. The project target is to save about 1000 kgal per year, roughly equivalent to 1/3 of the center's annual irrigation demand. This is based upon capturing the rainwater associated with the surface area of the roof of the Youth Center.

c. Strategy to Achieve Targets
c. The strategy is capture stormwater at the Youth Center as a pilot / demonstration project. The water will be used replace about 33% of existing potable water irrigation of the Youth Center athletic fields, which are irrigated year round. If the concept is proved, developing a larger rainwater harvesting project at the Youth Center (e.g. capturing runoff from surrounding hardscapes) or the Biltmore should be explored. The roof area of the Biltmore alone may represent about 5,000,000 gallons per year of water that could be used to irrigate the adjacent golf course. Surrounding hardscapes (e.g. parking lots, streets) could provide additional capacity.

d. Actions to Achieve O & T
d. Actions include designing and constructing a stormwater capture and distribution system at the Youth Center. Subsequently, the scope / conceptual design of additional rainwater harvesting systems could be developed (e.g. an expanded project at the Youth Center or a new project at the Biltmore could be developed).

e. Cost(s) & Benefit(s)
e. The estimated project cost is based on a similar project installed at the City of North Miami Beach and is subject to further validation. This project involved capturing runoff from a roof and storing in an above ground 30,000 storage cistern. Ten percent of the total project cost is reserved for design services. Benefits are based on blended average avoided water and sewer charges of $6.4 per 1,000 gallons (kgal) associated with captured and re-used storm water. Benefits calculations include a 2.25% annual escalation based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Available incentives are not presently included in the costs / benefits. Further research is required to determine if the project is eligible for any available incentives. The project is assumed to be completed in Year 3, in conjunction with planned renovation of the Youth Center. This affects the 10 year Return on Investment and Net Present Value negatively. The project is estimated to pay for itself in less than eight years (Year 10). However, benefits beyond year 10 are not included in this analysis.

f. Education / Outreach
f. Education and outreach associated with the project are to be determined.

g. Finance
g. The source of financing / funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Pubilic Works
Project Manager	Ernesto Pino

4. Goals

1. Reduce water consumption	20,379	kgal	(or)	20%	2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	101,893	kgal			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	11%	Return on Investment
	$1,000	Net Present Value
Goal Performance	4%	of Focus Area Goal

6. Implementation

a. Costs

Ten-Year Estimate

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
2-design	Brook Dannemiller	Design water catchment system	$ -	$ (6,135)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (6,135)
3-constr	Brook Dannemiller	Install water catchment system	$ -	$ -	$ (55,215)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (55,215)
													$ -
													$ -
		Total	$ -	$ (6,000)	$ (55,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (61,000)

Resource Conservation Value: $6.40 per 1000 gallons Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Current potable irrigation to be displaced (kgal)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	11,000
Percent Conserved	% resource to be conserved vs. baseline	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	
Resource Use Reduction	Captured rainwater for irrigation use (kgal)	0	0	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	8,800
Resource Cost Projection	Projected Water Rate ($ per kgal)	$6.40	$6.54	$6.69	$6.84	$7.00	$7.15	$7.31	$7.48	$7.65	$7.82	
Avoided Expenditure / Revenue	Avoided water expenditures ($)	$ -	$ -	$ 8,000	$ 8,000	$ 8,000	$ 8,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 68,000
	Net Benefit / (Cost)	$ -	$ (6,000)	$ (47,000)	$ 8,000	$ 8,000	$ 8,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 7,000

1. Project Identification

Project Name	W5. Non-Potable Water Irrigation	*Focus Area*	Water
Location	City-wide	*Year Established*	2016

2. Project Description

a. Project Objective: a. The project objective is to avoid use of municipal potable water for irrigation of city maintained landscapes by utilizing non-potable water.

b. Targets: b. The target is to replace approximately 8% of current potable water use for irrigation with non-potable water sources.

c. Strategy to Achieve Targets: c. The strategy for achieve the target is to identify current municipal potable water irrigation accounts for replacement with shallow aquifer well systems. Preliminarily, 10 accounts have been identified with an annual water use between 650 and 1200 CCF/year. These accounts should be investigated further to verify feasibility. Accounts with usage below about 500 CCF/year are not likely cost-effective, given the current cost and benefit assumptions (described below). Additional accounts with a higher annual water use may also be good candidates for replacement with a well system, although capital and O&M costs may be higher than presently assumed, and should be investigated on a case by case basis.

d. Actions to Achieve O & T: d. Actions to achieve objective and targets include performing feasibility due diligence for identified accounts (and other accounts, as applicable) and procuring services to construct wells. The existing irrigation system may also have to be modified for compatibility.

e. Cost(s) & Benefit(s): e. Estimated costs include an estimated well construction cost of $4,500 based on discussions with Coral Gables landscape services, an estimated annual electric cost of about $80 (based on a 2 hp motor, an electric rate of $0.10, and a weekly run time of 10 hours) and an annual maintenance cost of $850 (20% of capital expenditure). Benefits include avoided municipal potable water charges based on an average rate for the targeted accounts of $3.11 per CCF. It is assumed that investment and associated benefits are phased in over a five year period. Costs and benefits are escalated annually using the average Consumer Price Index for the period 2015-2025 as published by the Congressional Budget Office.

f. Education / Outreach: f. The education / outreach for this measure is to be determined.

g. Finance: g. The funding for this measure is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Landscape Services
Project Manager	Brook Dannemiller

4. Goals

1. Reduce water consumption	20,379	kgal	(or)	20%	2025 relative to base value
2. -	-	-	(or)	-	by 2025
Base Year	2013				
Base Value	101,893	kgal			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	96%	Return on Investment
	$102,000	Net Present Value
Goal Performance	35%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
								Ten-Year Estimate					
3-constr	Brook Dannemiller	Install non-potable shallow acquifer well	$ (9,000)	$ (9,000)	$ (9,000)	$ (9,000)	$ (9,000)	$ -	$ -	$ -	$ -	$ -	$ (45,000)
*-other	Brook Dannemiller	Annual pump energy (electricity)	$ (150)	$ (320)	$ (490)	$ (660)	$ (850)	$ (870)	$ (890)	$ (910)	$ (930)	$ (950)	$ (7,020)
*-other	Brook Dannemiller	Annual operations and maintenance	$ (1,700)	$ (3,500)	$ (5,300)	$ (7,300)	$ (9,300)	$ (9,500)	$ (9,700)	$ (9,900)	$ (10,200)	$ (10,400)	$ (76,800)
													$ -
		Total	$ (11,000)	$ (13,000)	$ (15,000)	$ (17,000)	$ (19,000)	$ (10,000)	$ (11,000)	$ (11,000)	$ (11,000)	$ (11,000)	$ (129,000)

Resource Cost Rate: $3.11 per CCF Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Potable Water Use for 10 Accounts	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	90,000
Percent Conserved	% of potable water use replaced w/ non-potable	20.0%	40.0%	60.0%	80.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Resource Use Reduction	Non-potable irrigation water use	1,800	3,600	5,400	7,200	9,000	9,000	9,000	9,000	9,000	9,000	72,000
Resource Cost Projection	Municipal potable water	$3.11	$3.18	$3.25	$3.32	$3.40	$3.48	$3.55	$3.63	$3.72	$3.80	
Avoided Expenditure / Revenue	Avoided municipal potable water	$ 6,000	$ 11,000	$ 18,000	$ 24,000	$ 31,000	$ 31,000	$ 32,000	$ 33,000	$ 33,000	$ 34,000	$ 253,000
	Net Benefit / (Cost)	$ (5,000)	$ (2,000)	$ 3,000	$ 7,000	$ 12,000	$ 21,000	$ 21,000	$ 22,000	$ 22,000	$ 23,000	$ 124,000

1. Project Identification

Project Name	T1. Community Improvement District	*Focus Area*	Transportation & Land Use
Location	Ponce de Leon Corridor between W. Flagler & S. Dixie Highway	*Year Established*	2016

2. Project Description

a. Project Objective	a. The purpose of this project is to generate funding to increase transit service, improving the quality of life in the commercial corridor and potentially to provide the transit support for the creation of an Eco-district in the heart of Coral Gables.
b. Targets	b. The project target is to utilize approximately $600,000 in annual revenues to increase ridership on the Trolley System to 2,000,000 annually reducing daily vehicle traffic in the CBD by an additional 750 cars per day.
c. Strategy to Achieve Targets	c. The strategy is to establish a community improvement district along Ponce de Leon Boulevard. Commercial properties within 500 feet of the Trolley route along this corridor would participate in supporting City transit services through an annual assessment tied to property value. Design of the assessment will be determined via a third party study. Funds generated by the assessment would be used to enhance transit service by reducing headways, increasing hours of service and providing weekend service.
d. Actions to Achieve O & T	d. Actions include designing the assessment program and the regulatory framework for valuation, exemptions and exceptions. A legislative package will be developed for Commission consideration.
e. Cost(s) & Benefit(s)	e. Costs associated with developing the program and drafting legislation of regulations are estimated at $30,000. Benefits include reduced vehicle miles traveled, reduced vehicular pollution, improved public health, etc. While expected to be significant, these benefits are not quantified due to their indirect nature. Financial benefits will be estimated as part of the third party study and will be reflected in the special assessment.
f. Education / Outreach	f. Developing this program would require extensive outreach to the impacted assessment zone (all commercial businesses within 500 feet of the Trolley Route). This would include public meetings, creation of assessment rolls, and evaluation of the incremental value added by the Trolley Service.
g. Finance	g. This project would be self-funding.

3. Responsible Party

Lead Department / Division	Parking Department
Project Manager	Kevin Kinney

4. Goals

1. Of total land use projects, implement*	-	-	(or)	100% by 2025
2. Of total transportation projects, implement*		- -	(or)	100% by 2025
Base Year		2015		
Base Value		- -		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	0%	Return on Investment
	$0	Net Present Value
Goal Performance	0%	of Focus Area Goal 1
	50%	of Focus Area Goal 2

6. Implementation

a. Costs

Ten-Year Estimate

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
*-other	Kevin J Kinney	Professional services to support design of district	($30,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (30,000)
*-other	Kevin J Kinney	Trolley Service Enhancements		$ (569,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (5,369,000)
													$ -
													$ -
		Total	$ (30,000)	$ (569,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (5,399,000)

Resource Cost Rate: Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	*Not Applicable*											0
Percent Conserved	*Not Applicable*											
Resource Use Reduction	*Not Applicable*											0
Resource Cost Projection	*Not Applicable*											
Avoided Expenditure / Revenue	Annual revenue from district	$ -	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 5,400,000
	Net Benefit / (Cost)	$ (30,000)	$ 31,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000

1. Project Identification

Project Name	T2. Bicycle and Pedestrian Plan Implementation	*Focus Area*	Transportation & Land Use
Location	City	*Year Established*	2016

2. Project Description

a. Project Objective: a. The project objective is to increase the convenience and safety of pedestrian and bicycle travel within Coral Gables in order to reduce the negative financial, social and environmental impact of over-dependence of automobiles.

b. Targets: b. The Target for this project is to increase the length of the existing bicycle network by at least 400% by adding at least 34 miles of bicycle lanes, bicycle boulevards, shared-use paths and complete streets to the existing 10.5 mile network.

c. Strategy to Achieve Targets: c. The project strategy is to implement the bicycle and pedestrian capital improvement projects recommended by the Coral Gables Bicycle / Pedestrian Plan ("The Plan").

d. Actions to Achieve O & T: d. Actions include designing and constructing the improvements identified in The Plan. The Plan developed phases of implementation. It is assumed that Phase 1, which includes design and construction of bike lanes and shared use paths along the "Salzedo/University/Riviera Route," will begin in Year 3 and end in Year 4. Phase 2 (bike lanes, boulevards and routes along the "Riviera/Alhambra/Sevilla/Galiano Route") will begin in Year 5 and end in Year 6. Phase 3 ("on going" bike lane, bike boulevard, shared-use path and complete street projects) are assumed to begin in Year 7 and end after Year 10.

e. Cost(s) & Benefit(s): e. Estimated costs are as follows: Phase 1: $2.2 Million, Phase 2: $2.2 Million, Phase 3: $5 Million. Costs are inflated by the average Consumer Price Index for the period 2015-2025 in the year in which they occur. Benefits include reduced vehicle miles traveled, reduced vehicular pollution, improved public health, etc. While expected to be significant, these benefits are not quantified due to their indirect nature. Revenue from a proposed 10% increase in the City's parking fee are included as project revenue. This revenue source is assumed to remain constant through the duration of the project life, but are inflated by the average Consumer Price Index for the period 2015-2025 in the year in which they occur. All revenue is spend on the projects scope until it is completed beyond Year 10.

f. Education / Outreach: f. The Plan recommends several educational actions, including educating motorists and bicyclists about rights and responsibilities, educating residents about new facility types, partnering with the city's schools via the "Safe Routes to Schools" program, certify 3 city employees as American Bicyclists League Instructors and developing new bicycle-related communication channels.

g. Finance: g. The project may be funded via a 10% increase in the City's parking fee. The expected revenue from the increase is $1,100,000 per year, adjusted for inflation.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Jessica Keller

4. Goals

1. Of total land use projects, implement*	-	-	(or)	100% by 2025
2. Of total transportation projects, implement*		- -	(or)	100% by 2025
Base Year		2015		
Base Value		- -		

5. Performance

Project Life	10	Years	
Project Discount Rate	2.5%		
Economic Performance	0%	Return on Investment	
	$0	Net Present Value	
Goal Performance	0%	of Focus Area Goal 1	50% of Focus Area Goal 2

6. Implementation

a. Costs

Ten-Year Estimate

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
2-design	Jessica Keller	Bicycle Route Design	$ -	$ -	$ (117,593)	$ (120,239)	$ (122,945)	$ (125,711)	$ (128,539)	$ (131,431)	$ (134,389)	$ (137,412)	$ (1,018,000)
3-constr	Jessica Keller	Bicycle Route Construction	$ -	$ -	$ (1,058,340)	$ (1,082,152)	$ (1,106,501)	$ (1,131,397)	$ (1,156,854)	$ (1,182,883)	$ (1,209,498)	$ (1,236,711)	$ (9,164,000)
													$ -
													$ -
		Total	$ -	$ -	$ (1,176,000)	$ (1,202,000)	$ (1,229,000)	$ (1,257,000)	$ (1,285,000)	$ (1,314,000)	$ (1,344,000)	$ (1,374,000)	$ (10,181,000)

Resource Cost Rate: per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Existing Distance of Bicycle Infrastructure (miles)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	11
Percent Conserved	Percent Increase in Bicycle / Pedenstrian Infrastructure	100%	100%	142%	240%	278%	306%	335%	363%	392%	421%	
Resource Use Reduction	Additional Distance of Bicycle Infrastructure (Miiles)	10.5	10.5	14.9	25.2	29.1	32.1	35.1	38.2	41.2	44.2	44
Resource Cost Projection	*Not Applicable*											
Avoided Expenditure / Revenue	Revenue from Parking Fee Increase	$ -	$ -	$ 1,176,000	$ 1,202,000	$ 1,229,000	$ 1,257,000	$ 1,285,000	$ 1,314,000	$ 1,344,000	$ 1,374,000	$ 10,181,000
	Net Benefit / (Cost)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

1. Project Identification

Project Name	O1. Employee Sustainability Training	*Focus Area*	Outreach
Location	Citywide (all employees)	*Year Established*	2016

2. Project Description

a. Project Objective: a. The City of Coral Gables employees all have different levels of understanding with regards to what the term sustainability means. In order to get everyone speaking the same "sustainability language", staff is proposing the creation of an in person or web based 'Sustainability 101" training class.

b. Targets: b. The target is to train all 815 full-time budgeted positions, 96 regular part time employees, and all new hires. The program can also be eventually expanded externally to residents interested in sustainability and the city's sustainability efforts.

c. Strategy to Achieve Targets: c. Strategies to achieve targets include making the training required to employees through the Human Resources Department.

d. Actions to Achieve O & T: d. The class would be a short 1-2 hour session that all employees would be required to complete (either in person or on their computer). If done in person, the sessions would be recorded to be shared with new employees, emergency personal that are unavailable to attend, and potentially external customers (residents, businesses, etc.).

e. Cost(s) & Benefit(s): e. The program is modeled after the City of Fort Lauderdale's employee training. Working with the CLEO Institute, the City of Fort Lauderdale estimated that it costs $20 per employee to conduct the training in person. That amount can be lowered significantly if the decision is made to make the training web based. The content of the class would be a brief introduction to sustainability, climate change, etc. Then focus in on actions that employees can take at home and at work in their everyday operations to help achieve the energy, water, and waste reduction goals set forth in the Sustainability Master Plan. The training would also highlight the city's latest sustainability efforts. The program encourages all departments, divisions and employees to reevaluate their efforts to meet the three pillars of sustainability (people, planet, profit). Benefits of feedback, education and awareness campaigns have been shown to produce savings (e.g. on utility expenditures) of 0 to 10%. This measures assumes just 0.1% savings from greater employee awareness of the city's use of electricity, water and fuel and their impact on expenses, the environment and the community.

f. Education / Outreach: f. The training would be marketed to employees through internal newsletters, email blasts from Human Resources, at Department Director meeting, staff meetings, new employee orientation, etc. If the program expands to external customers such as residents, business owners, etc. the training can be marketed through the website, city app, external newsletters, outreach events, etc.

g. Finance: g. The source of funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Matt Anderson

4. Goals

1. Of total projects, implement*	-	-	(or)	100%	by 2025
2. -		- -	(or)	-	by 2025
Base Year		2015			
Base Value		- -			

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	24%	Return on Investment
	$6,000	Net Present Value
Goal Performance	50%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten-Year Estimate Total
2-design	Matt Anderson	Develop class (content, structure, etc)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
*-other	Matt Anderson	Begin Training Current Employees (cost if in person)	$ (9,100)	$ (9,100)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (18,200)
*-other	Matt Anderson	Continue ongoign training to employees (new hires, refresher)	$ -	$ -	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (16,000)
													$ -
		Total	$ (9,000)	$ (9,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (34,000)

Resource Cost Rate: - Escalation Factor 2.25% per year

b. Benefits

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten-Year Estimate Total
Existing Resource Use	Annual electricity, fuel and water expenditures	3,740,000	3,824,150	3,910,193	3,998,173	4,088,132	4,180,115	4,274,167	4,370,336	4,468,668	4,569,214	41,423,147
Percent Conserved	% of ann. expenditures saved via increased awareness	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	
Resource Use Reduction	Ann. avoided utility expenditure via increased awareness	$ 3,700	$ 3,800	$ 3,900	$ 4,000	$ 4,100	$ 4,200	$ 4,300	$ 4,400	$ 4,500	$ 4,600	$ 41,500
Resource Cost Projection	*Not applicable*	-	-	-	-	-	-	-	-	-	-	-
Avoided Expenditure / Revenue	See Above	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 5,000	$ 5,000	$ 42,000
	Net Benefit / (Cost)	$ (5,000)	$ (5,000)	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 3,000	$ 3,000	$ 8,000

1. Project Identification

Project Name	O2. Seal of Sustainability	*Focus Area*	Outreach
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective
a. The Coral Gables Seal of Sustainability program identifies and highlights the City's qualifying green programs, initiatives and projects under a single brand. It also allows staff access to a clearinghouse of information (cost, benefits, etc.) on sustainability projects.

b. Targets
b. Approve 100% of the past and current sustainability related projects. Going forward, certify 100% of the projects being implemented as a part of the Sustainability Master Plan.

c. Strategy to Achieve Targets
c. Share the approval form (once developed) with all department directors, the city clerk and city manager's office. The goal is to make it a standard operating procedure to complete the form when filling out the capital budget form or at the completion of a project that has a sustainability component. At the end of each fiscal year, provide recognition to project managers who complete projects with a seal.

d. Actions to Achieve O & T
d. Once a project is approved, place the seal on any marketing materials/website of approved sustainability projects, bumper stickers for electric/alternative fuel vehicles in the city fleet, highlight in internal and external articles, work with city clerk's office and department directors to use seal on agenda items, and add to a webpage dedicated to sharing information on all completed and upcoming sustainability projects

e. Cost(s) & Benefit(s)
e. The primary cost of this program staff time / labor. Time and labor consist of creating, implementing, and marketing at its inception. This staff / time labor is assumed to be part of current job duties. As a result, the incremental cost is $0. After its creation, cost would be incidental, including marketing materials for the program and continued staff time to review and approve project form submissions. These incremental costs are also assumed to be $0. The program demonstrates to the public our government's commitment to sustainable operations and helps spread the culture of sustainability. The program offers agencies an opportunity to have a unified branding message with regards to the sustainability portion of their projects. The program encourages all departments, divisions and employees to think about how their efforts meet the three pillars of sustainability (people, planet, profit). It also focuses in on everyday operations to help achieve energy, water, and waste reduction goals set forth in the Sustainability Master Plan. While indirect, benefits will include eco-efficiencies included in projects that may otherwise not include them. More projects with eco-efficiencies may be implemented due to their increased visibility. Because benefits are indirect, they are not estimated.

f. Education / Outreach
f. The program would be marketed to employees through internal newsletters, email blasts, at Department Director meeting, staff meetings, new employee orientation, etc. External marketing can be done to residents, business owners, etc. through the website, city app, external newsletters, outreach events, etc. The advantage of a program like this is once the Seal of Sustainability program grows and people see the emblem on brochures, websites, vehicles, signs, etc. the program in essence markets itself.

g. Finance
g. The source of funding for this project is to be determined. The advantage of this program is it is very low cost to implement and continue operating.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Matt Anderson

4. Goals

1. Of total projects, implement*	-	-	(or)	100% by 2025
2. -		- -	(or)	- by 2025
Base Year		2015		
Base Value		- -		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*Infinite*	Return on Investment
	$0	Net Present Value
Goal Performance	50%	of Focus Area Goal

6. Implementation

a. Costs

			Ten-Year Estimate										
Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
*-other	Matt Anderson	Project Administration and Collateral	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
													$ -
													$ -
													$ -
		Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Resource Cost Rate: per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	*Not Applicable*											0
Percent Conserved	*Not Applicable*											
Resource Use Reduction	*Not Applicable*											0
Resource Cost Projection	*Not Applicable*											
Avoided Expenditure / Revenue	*Not Applicable*											$ -
	Net Benefit / (Cost)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

1. Project Identification

Project Name	C1. Regional Partnerships	*Focus Area*	Climate
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective	a. The project objective is to expand effective sustainability partnerships and collaborative efforts by joining the Southeast Florida Regional Climate Change Compact (SFRCC).
b. Targets	b. The project target is to partner with others to mitigate the causes of and adapting to the consequences of climate change.
c. Strategy to Achieve Targets	c. The strategy is to join the Southeast Florida Regional Climate Change Compact as a Municipal Partner.
d. Actions to Achieve O & T	d. Actions include organizational membership, event/symposium attendance, and attendance / participation in the Annual Southeast Florida Climate Leadership Summit.
e. Cost(s) & Benefit(s)	e. There is no cost to become a Municipal Partner (only a Mayors' Climate Action Pledge is required). Costs for event attendance and participation are estimated to be approximately $2,000 per year. Cost are projected to increase by 2.25% on average based on the CBO's Economic Projections for 2015 - 2025 for the Consumer Price Index. Benefits are unquantifiable at present. However, participation in the SFRCC will build the capacity of Coral Gables staff, develop partnerships with peer municipalities, and lead to grant opportunities, among other potential benefits.
f. Education / Outreach	f. Education and outreach benefits associated with this project are to be determined, however, by becoming a Municipal Partner of the Southeast Florida Regional Climate Change Compact, the City of Coral Gables can publicly demonstrate its commitment to sustainability and environmental issues.
g. Finance	g. The source of funding for this project is to be determined.

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Matt Anderson

4. Goals

1. Reduce greenhouse gas emissions	2,752	mtCO2e	(or)	20% by 2025 relative to base value
2. Of total adaptation projects, implement*	-	-	(or)	100% by 2025
Base Year	2013			
Base Value	13,762	mtCO2e		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	-100%	Return on Investment
	($18,000)	Net Present Value
Goal Performance	0%	of Focus Area Goal 1
	50%	of Focus Area Goal 2

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
						Ten-Year Estimate							
*-other	Matt Anderson	Meeting Attendence / Event Participation	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (20,000)
													$ -
													$ -
													$ -
		Total	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (20,000)

Resource Cost Rate: per kWh Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use											0
Percent Conserved											
Resource Use Reduction											0
Resource Cost Projection											
Avoided Expenditure / Revenue											$ -
Net Benefit / (Cost)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (2,000)	$ (20,000)

1. Project Identification

Project Name	C2. Vulnerability Assessment and Adaptation Plan	*Focus Area*	Climate
Location	City-wide	*Year Established*	2016

2. Project Description

a. Project Objective
a. The objective of this project is to identify, analyze and prioritize risks to City of Coral Gables buildings, infrastructure, tree cover, habitat and connectivity related to flooding and extreme temperatures that are being exacerbated by climate change and to identify options to mitigate and adapt to identified risks. The effort will scope a City planning effort to prepare for near-term events (e.g. storms) and mitigate / adapt to long-term changes in climate (e.g. sea level rise).

b. Targets
b. The target for this project is to complete a vulnerability study by 2016.

c. Strategy to Achieve Targets
c. The strategies for this project include developing a vulnerability assessment. A vulnerability assessment will include the following components: identification of risks, analysis of risks and prioritization of risks. The assessment will provide a basis for planning to mitigate or adapt to vulnerabilities related to climate change. Risks will be identified for City buildings, infrastructure, habitats (e.g. coastal wetlands, watersheds, etc.) and connections to vital services and resources such as transportation networks, schools, hospitals, landfills, utilities and groundwater, among others. Heat and flood elevation scenarios will be developed to identify risks. Risks will be analyzed and prioritized based on likelihood, consequence (including potential cost), spatial extent and time horizon. Through a planning effort, potential adaptation (and mitigation) measures will be identified and screened via criteria including but not limited to feasibility, cost, social and environmental factors.

d. Actions to Achieve O & T
d. Actions to achieve the objective and targets include: collecting available data (e.g. elevation certificates; elevation data; mapping resources, including City GIS, Miami-Dade County WASD data, FEMA data, real estate data, etc.); developing a GIS model of inundation scenarios for buildings, infrastructure, habitats and connections to key services and resources; identifying, assessing and prioritizing risks based on data analysis and engagement with stakeholders; developing preliminary recommendations for risk mitigation / adaptation; assessing recommendations and developing a implementation strategies.

e. Cost(s) & Benefit(s)
e. The cost of a vulnerability assessment and adaptation plan is estimated at $200,000. Benefits, while difficult to quantify, include reduced risk exposure. Reductions in risk exposure may be reflected in lower insurance premiums for the City's businesses and residents via a change in the City's rating in the FEMA Community Rating System (CRS). Currently, CRS considers improved elevation data, sea level rise modeling and adaptation projects and policies in its assessment of communities. (For reference, Coral Gables current CRS class is 7, while Miami-Dade County's class is 5, associated with increased discounts of 5% to 10% for flood insurance in the County). Benefits are estimated based on an estimate of the number of flood insurance policies in Coral Gables (about 2,300) based on a ratio of its population to the County's population (there were about 122,000 flood insurance policies in Miami-Dade County in 2013). The average flood insurance premium was $700 in 2015. This premium is inflated annually by the average CPI for the period 2015-2025, as published by the CBO. An improvement in the City's CRS score from 7 to 6 and 6 to 5 would reduce premiums by 5% and 10%, respectively, according to FEMA. The actual value of an improvement in the City's CRS score can be calculated in consultation with FEMA representatives. The measure assumes it takes one year for the improvement in the City's score to take effect following completion of the plan in 2016. After five years of maintaining a CRS score of 6, the measure assumes the score is improved to 5.

f. Education / Outreach
f. The education and outreach required for this project are to be determined.

g. Finance

3. Responsible Party

Lead Department / Division	Public Works / Sustainability
Project Manager	Matt Anderson

4. Goals

1. Reduce greenhouse gas emissions	2,752	mtCO2e	(or)	20% by 2025 relative to base value
2. Of total adaptation projects, implement*	-	-	(or)	100% by 2025
Base Year	2013			
Base Value	13,762	mtCO2e		

5. Performance

Project Life	1	Years	
Project Discount Rate	2.5%		
Economic Performance	277%	Return on Investment	
	$546,000	Net Present Value	
Goal Performance	0%	of Focus Area Goal 1	50% of Focus Area Goal 2

6. Implementation

a. Costs

Ten-Year Estimate

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
*-other	Matthew Anderson	Procure / conduct vulnerability assessment	$ (250,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (250,000)
													$ -
													$ -
													$ -
		Total	$ (250,000)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ (250,000)

Resource Cost Rate: $700 Annual Premium Escalation Factor 2.25% per year

b. Benefits

Existing Resource Use	Estimated Annual Flood Premiums in Coral Gables	1,640,000	1,680,000	1,720,000	1,760,000	1,800,000	1,840,000	1,880,000	1,920,000	1,960,000	2,000,000	18,200,000
Percent Conserved	% decrease in SFHA Premiums from improved CRS score	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	10.0%	10.0%	
Resource Use Reduction	-	-	-	-	-	-	-	-	-	-	-	0
Resource Cost Projection	-	-	-	-	-	-	-	-	-	-	-	
Avoided Expenditure / Revenue	Estimated Flood Premium Savings	$ -	$ -	$ 86,000	$ 88,000	$ 90,000	$ 92,000	$ 94,000	$ 96,000	$ 196,000	$ 200,000	$ 942,000
	Net Benefit / (Cost)	$ (250,000)	$ -	$ 86,000	$ 88,000	$ 90,000	$ 92,000	$ 94,000	$ 96,000	$ 196,000	$ 200,000	$ 692,000

1. Project Identification

Project Name	S1. Efficiency Revolving Fund	*Focus Area*	Funding
Location	Citywide	*Year Established*	2016

2. Project Description

a. Project Objective
a. The objective of this project is to establish a stable, long term source of funding for sustainability projects involving city facilities and infrastructure.

b. Targets
b. The target of this measure is establishment of an Efficiency Revolving Fund (ERF). The fund will be capitalized to support sustainability projects with prescribed financial benefits. A portion of these benefits will be reinvested into additional projects over time.

c. Strategy to Achieve Targets
c. The strategy includes: 1) Identification of "seed money" for the ERF. 2) It includes creation of a ERF Management Committee (ERFMC) responsible for developing and administering policies, and procedures for the management and implementation of the fund. At minimum this committee will include the city's Sustainability Specialist, Assistant Director for Sustainability, Management and Budget Director and Finance Director (or their designees). 3) It includes criteria for eligible project types and project financial performance to be developed by the ERFMC. At minimum, they will require the simple payback period for projects to not exceed 7 years and require 100% of project cost savings tol be paid back into the fund for the duration of the project payback period. The ERFMC will be responsible for developing policies and procedures for exceptions to these criteria. 5) It includes criteria for project approval and monitoring based on documented analyses such as energy audits and measurement and verification protocols to be developed by the ERFMC. 6) It includes accounting and financial procedures.

d. Actions to Achieve O & T
d. Action to achieve this measure include approval from the city manager to form the ERFMC. The ERFMC must develop policies and procedures for approval by the City Commission.

e. Cost(s) & Benefit(s)
e. This measure assumes that labor and time associated with administration and implementation of the fund is included in current staff duties. Benefits consist of a greater volume of projects that improve the city's economic, social and environmental performance than would otherwise have been realized as a result of access to dedicated funding. While the incremental benefits of increased access to funding are expected to be significant, for the purposes of this measure, they are conservatively assumed to be zero.

f. Education / Outreach
f. The ERFMC will be responsible for communicating policies and procedures regarding the fund, its management and implementation to department heads.

g. Finance
g. Sources of funding for the ERF may include but are not limited to: savings from existing (i.e. currently funded) energy projects, utility and other rebates for existing and future projects, grant funds and budgetary allocations approved by the City Commission (e.g. bond funds, investment earnings, etc.).

3. Responsible Party

Lead Department / Division	Finance
Project Manager	Diana Gomez

4. Goals

1. Of total projects, implement*	-	-	(or)	100% by 2025
*2. Achieve targeted financial performance of projects**		- -	(or)	- Annually
Base Year		2015		
Base Value		- -		

5. Performance

Project Life	10	Years
Project Discount Rate	2.5%	
Economic Performance	*Infinite*	Return on Investment
	$0	Net Present Value
Goal Performance	100%	of Focus Area Goal

6. Implementation

a. Costs

Phase	Responsibility	Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
													$ -
		Total	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Ten-Year Estimate

Resource Cost Rate: per kWh Escalation Factor per year

b. Benefits

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Avoided Expenditure / Revenue											0
Percent Conserved											
Resource Use Reduction											0
Resource Cost Projection											
Avoided Expenditure											$ -
Net Benefit / (Cost)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

POLICY RECOMMENDATIONS

CORAL GABLES SUSTAINABILITY POLICY RECOMMENDATIONS

OCTOBER 26, 2015

RS&H

ERIN L. DEADY, P.A.

CORAL GABLES SUSTAINABILITY POLICY RECOMMENDATIONS

Draft

Prepared by Erin L. Deady, P.A.
On behalf of RS&H, Inc.
At the direction of the City of Coral Gables

10/26/2015

RS&H

ERIN L. DEADY, P.A.

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EXECUTIVE SUMMARY

This document provides preliminary recommendations for revising the City of Coral Gables Comprehensive Plan or Code of Ordinances to support the projects and potential next steps of its Sustainability Management Plan.

To develop recommendations, the following documents were reviewed:

- Solutions Memorandum: Coral Gables Sustainability Management Plan dated May 15, 2015;
- Draft Final Coral Gables Sustainability Master Plan Project Portfolio;
- City of Coral Gables' Comprehensive Plan dated 2010; and
- City of Coral Gables' Code of Ordinances ("Code") and Land Development Regulations ("LDRs") (accessed through Municode).

These documents were reviewed to identify places where the projects and recommended next steps could be incorporated into the existing Comprehensive Plan and Code of Ordinances.

For implementation purposes, revisions to existing objectives, goals and policies have been suggested. However, in some instances, the addition of entirely new Elements (Comprehensive Plan) or Chapters, Articles or Sections (Code of Ordinances) have been recommended.

Note that these revisions are recommended for the Comprehensive Plan in its current form.

The Solutions Memorandum recommends eliminating the Green Element from the Comprehensive Plan and incorporating sustainability into all other elements. Recommendations provided for Green Element Objectives and Policies can be incorporated into the other Comprehensive Plan elements if the Green Element is phased out in the next Comprehensive Plan update.

POLICY RECOMMENDATIONS

The following comprehensive plan revisions are recommended to support implementation of the City's Sustainability Management Plan (Table 1).

For implementation purposes, revisions to existing objectives, goals and policies have been suggested. However, in some instances, the addition of entirely new Elements (Comprehensive Plan) or Chapters, Articles or Sections (Code of Ordinances) have been recommended.

Note that these revisions are recommended for the Comprehensive Plan in its current form.

The Solutions Memorandum recommends eliminating the Green Element from the Comprehensive Plan and incorporating sustainability into all other elements. Recommendations provided for Green Element Objectives and Policies can be incorporated into the other Comprehensive Plan elements if the Green Element is phased out in the next Comprehensive Plan update.

TABLE 1: RECOMMENDED COMPREHENSIVE PLAN REVISIONS

ID	Type	Project Name	Recommended Comprehensive Plan Revisions
E1	Project	Building Energy Efficiency	Update to Policy GRN-1.3.1 in the Green Element to specifically include energy reduction targets.
E2	Project	Garage LED Lighting	Update to Policy GRN-1.3.1 in the Green Element to specifically include replacement of equipment with more energy efficient fixtures and energy reduction targets.
E3	Project	LED Streetlights	Update to Policy GRN-1.3.1 in the Green Element to specifically include replacement with more energy efficient fixtures and energy reduction targets.
E4	Project	Solar Thermal Systems	New Policy under GRN-1.3 in the Green Element to establish renewable energy targets for City-owned facilities.
E5	Project	Photovoltaic System	New Policy under GRN-1.3 in the Green Element to establish renewable energy targets for City-owned facilities.
E6	Project	Utility Management and Control Systems	New Policy under Objective GRN-1.3 in the Green Element to include utility bill/energy consumption tracking in City-owned buildings.
E7	Project	Information Technology Energy Efficiency	New Policy under GRN-1.3 in the Green Element to include requirement to purchase EnergyStar products/equipment.
W1	Project	Flow Fixtures	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets for fixture replacements.
W2	Project	Irrigation Efficiency	Update to Policy COM-2.1.14 or COM-5.1.4 in the Community Facilities Element or Policy GRN-1.4.7 in the Green Element to include water conservation targets for City irrigation.
W3	Project	Flush Fixtures	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets for fixture replacements.
W4	Project	Rain Water Harvesting	New Objective in the Landscaping/Natural Resources Section in the Green Element to include goal to increase rainwater harvesting for irrigation purposes at City facilities.

W5	Project	Non-Potable Water Irrigation	Update to Policy GRN-1.4.7 in the Green Element to include non-potable conversion targets for City irrigation.
M1	Project	Diversion of Single Family Residence Garbage	New Policy under Objective COM-3.1 in the Community Facilities Element or Update to Objective GRN-1.5 in the Green Element to quantify targets for waste reduction and increased recycling within the City.
M2	Project	Diversion of Single Family Residence Trash	New Policy under Objective GRN-1.5 in the Green Element to quantify targets for incineration and waste reduction within the City.
F1	Project	Fuel Economy	Update to Policy GRN-1.3.9 in the Green Element to include specific targets for vehicle replacement and required fuel economy.
F2	Project	Fleet Size	Update to Policy GRN-1.3.9 in the Green Element to include specific fleet reduction targets.
F3	Project	Plug-in Hybrid Electric Vehicles & Infrastructure	Update to Policy GRN-1.3.9 in the Green Element to include specific targets for vehicle replacement.
C1	Project	Regional Sustainability Partnerships	Update to GRN-1.1 in the Green Element to include Southeast Florida Regional Climate Change Compact.
C2	Project	Vulnerability Assessment and Adaptation Plan	New Goal or Policy in the New Coastal Management Element[1] and new Section in the Green Element with goals and policies to address Climate Change and Sea Level Rise vulnerability.
T1	Project	Community Improvement District	Updates to Future Land Use Element and Mobility Element to include new district.
T2	Project	Bicycle and Pedestrian Plan Implementation	Update to Policy MOB-2.3.4 in the Mobility Element to reflect new Bicycle and Pedestrian Master Plan.
O1	Project	Employee Sustainability Training	Update to Policy ADM-1.1.5 in the Administration Element and new Objective under the General section in the Green Element to specifically include sustainability training for City employees.
O2	Project	Coral Gables Seal of Sustainability	Update to Objective GRN-1.2 in the Green Element to include this new program.
S1	Project	Efficiency Revolving Fund	Update to Funding Section in the Green Element to include Efficiency Revolving Loan Fund.
E10	Next Steps	Indoor Air Quality Management	New Policy under Objective GRN-1.3 in the Green Element to specifically address improving indoor air quality.
E8	Next Steps	Pump / Motor Efficiency Upgrades	Update to Policy GRN-1.3.1 in the Green Element to specifically include replacement of equipment with more energy efficient fixtures.
E9	Next Steps	High Perf. New Construction, Major Renovation and O&M Standards	Update to Policy GRN-1.3.1 in the Green Element to specifically include replacement of equipment with more energy efficient fixtures and energy reduction targets.
W10	Next Steps	Low Impact Development	Update to Future Land Use Element to include low impact development as an alternative to regular development. Low Impact Development Policies should be added to Objective COM-4.1 in the Community Facilities Element, Objective GRN-1.4 in the Green Element and Policy FLU-1.10.2 in the Future Land Use Element.
W6	Next Steps	Leak Detection	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets.

W7	Next Steps	HVAC Condensate Harvesting	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets.
W8	Next Steps	Process Water Efficiency	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets.
W9	Next Steps	Native and Drought-Tolerant Landscaping	Update to Policy GRN-1.3.1 in the Green Element to include water conservation targets.
M3	Next Steps	Waste Audit	New Policy under Objective GRN-1.5 in the Green Element to require waste audit at select intervals.
M4	Next Steps	Track Waste Management Performance	New Policy under Objective GRN-1.5 in the Green Element to require tracking of City's waste management performance.
M5	Next Steps	Establish Waste Management Policies	New and expanded Policies under Objective GRN-1.5 in the Green Element. Policy could include waste reduction targets and a zero waste goal.
M6	Next Steps	Optimize Single Family Residence Waste Services	New Policy under Objective GRN-1.5 in the Green Element requiring the optimization of single-family residence waste services.
F6	Next Steps	Utilize Biofuels	Update to Policy GRN-1.3.7 in the Green Element to include specific utilization and expansion targets.
F7	Next Steps	Anti-idling Policy and Auxiliary Power Units	New Policy under Objective NOB-1.1 in the Mobility Element to restrict idling of all gasoline or diesel powered motor vehicles to a maximum allowable time.
F8	Next Steps	VMT Reduction	Update to Policy GRN-1.3.8 in the Green Element to include specific vehicle miles travelled reduction targets.
C3	Next Steps	Implement Adaptation Strategies	New Goal or Policy in the New Coastal Management Element[3] and new Goal or Policy in Capital Improvements Element.
C4	Next Steps	Update Disaster Planning	Update to Policy SAF-1.4.1 in the Public Safety Element to require consideration of climate change, sustainability and sea level rise in emergency preparedness planning activities.
T3	Next Steps	Update the Comprehensive Plan	
T4	Next Steps	Enhance the Zoning Code	
T5	Next Steps	Calibrate Aesthetic Impact Criteria for Sustainability	
T6	Next Steps	Include a Business and Economics Element in the CMP	New Business Economics Element.
T7	Next Steps	Green Parks Facilities and Create Urban Forests	Update to Policy REC-1.1.5 and REC-1.1.10 in the Recreation and Open Space Element to include 2015 Parks Master Plan. New Policies in the Recreation and Open Space Element to green existing park facilities and create urban forests.
T8	Next Steps	Strengthen Farmers' Market Concept	
O3	Next Steps	Management and Purchasing	
O4	Next Steps	Green Events	
S2	Next Steps	Fleet Investment Revolving Fund	Update to Funding Section in the Green Element to include Fleet Investment Revolving Fund.

The following code of ordinances and / or land development regulation revisions are recommended to support implementation of the City's Sustainability Management Plan (Table 2).

TABLE 2: RECOMMENDED CODE OF ORDINANCES AND LAND DEVELOPMENT REGULATIONS REVISIONS

ID	Type	Project Name	Recommended Code of Ordinance/Land Development Regulation Revisions
E1	Project	Building Energy Efficiency	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
E2	Project	Garage LED Lighting	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
E3	Project	LED Streetlights	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
E4	Project	Solar Thermal Systems	
E5	Project	Photovoltaic System	
E6	Project	Utility Management and Control Systems	
E7	Project	Information Technology Energy Efficiency	
W1	Project	Flow Fixtures	New Section in LDR, Chapter 105, Article II on water conservation standards for new construction and substantial renovations.
W2	Project	Irrigation Efficiency	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations for City and private development projects. Consider potential to create incentives in the development review process.
W3	Project	Flush Fixtures	New Section in LDR, Chapter 105, Article II on water conservation standards for new construction and substantial renovations.
W4	Project	Rain Water Harvesting	New Section in LDR, Chapter 105, Article II on water conservation standards for new construction and substantial renovations.
W5	Project	Non-Potable Water Irrigation	New Section in LDR, Chapter 105, Article II on water conservation standards for new construction and substantial renovations.
M1	Project	Diversion of Single Family Residence Garbage	
M2	Project	Diversion of Single Family Residence Trash	
F1	Project	Fuel Economy	
F2	Project	Fleet Size	
F3	Project	Plug-in Hybrid Electric Vehicles & Infrastructure	
C1	Project	Regional Sustainability Partnerships	

C2	Project	Vulnerability Assessment and Adaptation Plan	New Article in LDR Chapter 109 or 113 on Climate Change and Sea Level Rise Vulnerability. Ultimately this may include stormwater and other infrastructure design criteria.
T1	Project	Community Improvement District	New Ordinance creating the Community Improvement District. Language to be included in Chapter 58.
T2	Project	Bicycle and Pedestrian Plan Implementation	New Section in LDR, Chapter 105, to include transportation related design criteria.
O1	Project	Employee Sustainability Training	
O2	Project	Coral Gables Seal of Sustainability	
S1	Project	Efficiency Revolving Fund	New Ordinance adding Efficiency Revolving Fund. Language to be included in Code Chapter 2, Article VII.
E10	Next Steps	Indoor Air Quality Management	
E8	Next Steps	Pump / Motor Efficiency Upgrades	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
E9	Next Steps	High Perf. New Construction, Major Renovation and O&M Standards	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
W10	Next Steps	Low Impact Development	Update to LDR Chapters 105 (Section 105.227) and 113 to include Low Impact Development.
W6	Next Steps	Leak Detection	
W7	Next Steps	HVAC Condensate Harvesting	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
W8	Next Steps	Process Water Efficiency	New Section in LDR, Chapter 105, Article II on energy and water conservation standards for new construction and substantial renovations.
W9	Next Steps	Native and Drought-Tolerant Landscaping	
M3	Next Steps	Waste Audit	
M4	Next Steps	Track Waste Management Performance	
M5	Next Steps	Establish Waste Management Policies	New waste management policies in Code Chapter 54.
M6	Next Steps	Optimize Single Family Residence Waste Services	
F6	Next Steps	Utilize Biofuels	
F7	Next Steps	Anti-idling Policy and Auxiliary Power Units	Adopt an anti-idling Ordinance to restrict idling by all gasoline or diesel powered motor vehicles to a maximum allowable time. Language to be included in Code Chapter 74, Article III.
F8	Next Steps	VMT Reduction	
C3	Next Steps	Implement Adaptation Strategies	New Article in LDR Chapter 109 or 113 on Climate Change and Sea Level Rise Vulnerability. Ultimately this may include stormwater and other infrastructure design criteria.
C4	Next Steps	Update Disaster Planning	
T3	Next Steps	Update the Comprehensive Plan	
T4	Next Steps	Enhance the Zoning Code	
T5	Next Steps	Calibrate Aesthetic Impact Criteria for Sustainability	New Ordinance or Land Development Regulation (Chapter 105) establishing aesthetic impact criteria.

T6	Next Steps	Include a Business and Economics Element in the CMP	
T7	Next Steps	Green Parks Facilities and Create Urban Forests	New Ordinance to green park facilities and create urban forests included in Code Chapter 42.
T8	Next Steps	Strengthen Farmers' Market Concept	
O3	Next Steps	Management and Purchasing	
O4	Next Steps	Green Events	New Article in LDR Chapter 109 on Sustainability.
S2	Next Steps	Fleet Investment Revolving Fund	