

Energy Management Program Update

Sustainability Advisory Board

February 22, 2021



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PUBLIC WORKS DEPARTMENT



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Agenda

- Recap: Strategic Plan Alignment & Comprehensive Plan Goals
- Recap: Past Success Stories in Energy Management
- Recent Successes in Energy Management
 - Improved Analytics and Reporting Engine
 - Demonstration of Citywide Performance Dashboard
 - Feasibility Study for Resourcing Renewable Energy
- The Path to 20% Renewable Energy
 - Feasibility Study Summary and Findings
- Open Discussion/ Q&A



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Part of the City's Strategic Plan



PRESS PLAY
FORT LAUDERDALE
Our City, Our Strategic Plan 2024

Infrastructure Focus Area

- **Goal 1: Build a sustainable and resilient community.**
 - *Objective: Promote energy efficiency and the expansion of renewable energy sources*

Internal Support Focus Area





- **Goal 8: Build a leading government organization that manages all resources wisely and sustainably.**
 - *Objective: Integrate sustainability and resiliency into daily operations*



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Comprehensive Plan Energy Goals

The City's goals are aggressive and come with distinct challenges:

	Challenge: Population Growth = Services Growth = Emissions Increase		Challenge: Budgetary impacts due to COVID- 19 & other priorities
	Goal: 80% Reduction in City Ops. GhG Emissions by 2050		Goal: 20% Renewable Energy for City Ops. By 2030

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Past Success Stories

- Finalized City's first *Building Energy Efficiency Plan* in Spring 2020
- Provides first steps for investment:
 - Small-scale energy efficiency
 - Large efficiency capital projects
 - Small and large renewable energy
 - Sustainable behaviors

Building Energy Efficiency Plan

Reduction strategies for energy and emissions within municipal buildings



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Past Success Stories

- First pilot report finalized in Summer 2020
- Replacing these controls produced:
 - More precise temperature measurements
 - Faster response times
 - Less maintenance required
 - Data trends for analysis
 - Annual energy cost savings of ~\$33K

Smart Report: Programmable Thermostats



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New Successes

- Tableau Analytics Engine Implemented Fall 2020
 - Leverages inhouse database for greater collaboration and sharing
 - Dynamic functionality w/ nested information
 - Provides faster, more intuitive reporting
 - Citywide Performance

The dashboard includes several charts:

- Length of sessions:** A bar chart comparing session lengths (30 minutes or less, 1 hour, 1.5 hours, 2 hours, More than 2 hours) for 2016 and 2017.
- Most Popular Presentation Topic:** A bar chart showing the number of sessions for various topics like 'Energy Systems', 'Energy Storage', etc.
- Level of Attendees:** A bubble chart showing the distribution of attendees by education level: Undergraduate, Graduate, PhD, Faculty, and Others.
- Assessment:** A bar chart showing assessment results for different groups.

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New Successes

- Finalized first *Renewable Energy Feasibility Study* in Winter 2021
- Goal: Identify strategies for 20% renewable energy by 2030
 - City Operations only
 - Thirty-five (35) facilities studied
 - Focuses on solar photovoltaics
 - Examines market mechanisms and supplemental opportunities

The graphic features a large image of solar panels under a blue sky. Text overlaid on the image includes:

- Feasibility Study: Renewable Energy for City Operations**
- Strategies for sourcing a 20% renewable energy supply by 2030

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Slide 8

- NG4** Slight text adjustment related to caps and smalls
Nancy Gassman, 2/8/2021
- JB6** Adjusted globally, see comment on slide 3 for standard
Jason Bocchinfuso, 2/9/2021



Study: Summary and Findings

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Scope of Work

- Calculate what 20% renewable energy for City operations represents, based on current trends
- Examination of solar photovoltaic (PV) technology
- Examination of potential implementation mechanisms
- Identification of City facilities for quickest implementation of solar PV systems
- Design energy systems and calculate cost, savings, and power production estimates
- Examination and calculation cost of services using Florida Power and Light program
- Provision actionable next steps to initiate



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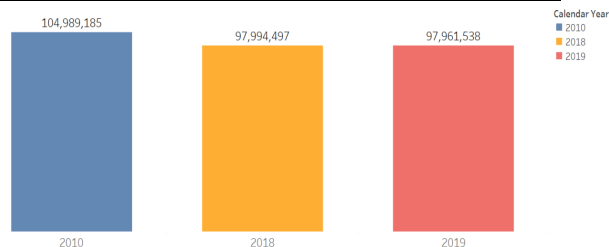


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What does 20% Represent?

- City operations average annual electricity consumption = 98M kWh
 - Assumes no growth/reduction in City services
 - Assumes no reduction from energy efficiency investments
 - Assumes no growth/reduction in building portfolio size

Chart: City Operations Annual Electricity Consumption, kWh



- 20% transition to renewable energy needed = 19.6M kWh/annual



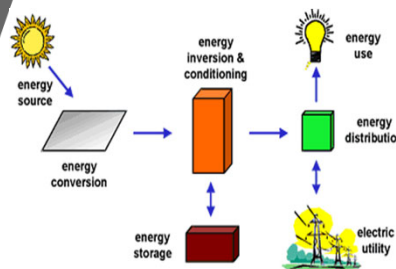
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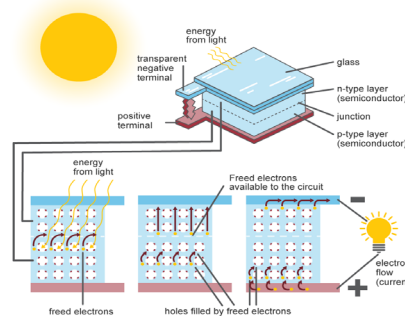
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What are Photovoltaics?

- Non-mechanical energy systems
- Use solar irradiance (photons) to produce electrons
- Low maintenance
- Excellent choice for resiliency, when paired with a battery
- Technology & efficiency continue to improve
- Costs continue to decline



Inside a photovoltaic cell



Source: U.S. Energy Information Administration

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Energy Market Mechanisms

- Florida remains a regulated electricity market → limits available options
- Capital construction retrofits chosen as first choice (quickest ROI)
- Utility-derived chosen as supplemental to achieve 20%

Table: Common Renewable Energy Procurement Options

Option	System Costs	Maintenance	Payment	Incentives	Permissibility
Capital Purchase	Owner	Owner	Cash or Financing	Owner	Regulated & Deregulated
Operating Lease	Developer	Owner	Recurring Fee	Developer	Regulated & Deregulated
Power Purchase Agreement (PPA)	Developer	Developer	Energy Usage	Developer	Deregulated Only
Energy Services Agreement (ESA)	Developer	Developer	Recurring Fee	Developer	Regulated & Deregulated
Property Assessed Clean Energy (PACE)	Owner	Owner	Property Tax Assessment	Owner	Regulated & Deregulated
Utility-Derived	Utility	Utility	Premium on Rate	Utility	Regulated & Deregulated


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Feasibility Analyses

- Conducted 35 individual analyses using Helioscope modeling software
- Each provides:
 - Design Layout
 - Energy and Power Production
 - Facility Impact
 - 20% Goal Impact
 - Emissions Reductions
 - Local Considerations
 - Financial Metrics


Riverland Park Recreation Center

Meter Address: 950 SW 27th Avenue
 Location: 26.110234, -80.17748
 Estimated Gross Square Footage: 3,380
 Average Annual Consumption: 331,272 kWh



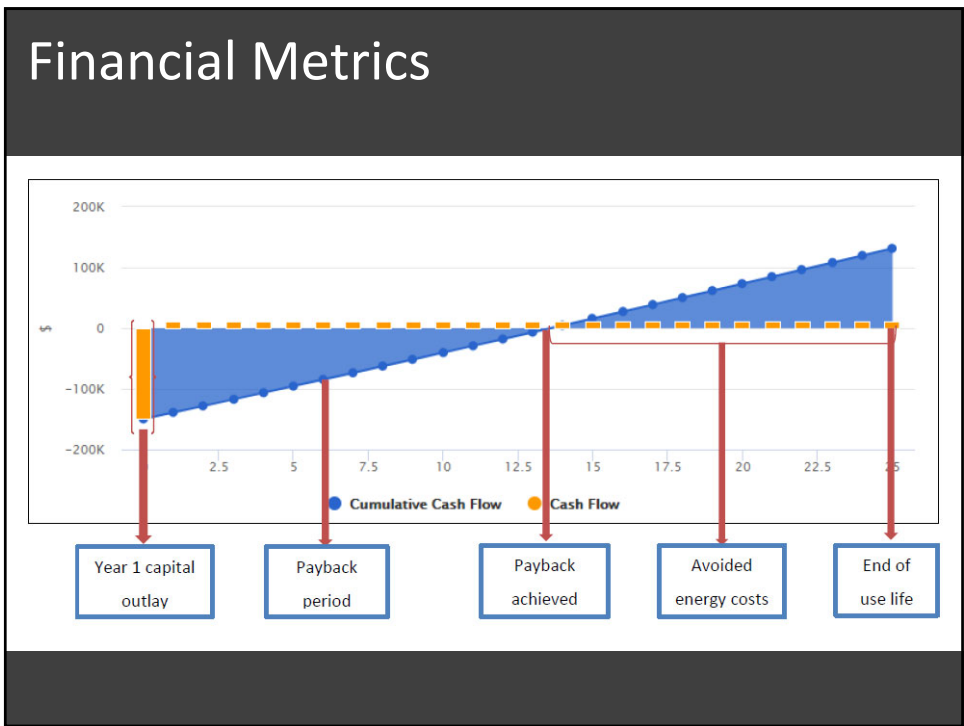
System Design	
Production Estimate:	346,700 kWh (annual) @ 224.3 kW (nameplate)
Project Cost Estimate:	\$560,625 (materials only)
Energy Cost Savings Estimate:	\$38,137 (annual)
Reduction to Facility's Energy Load:	101.4%
Contribution to City Operations 20% Goal:	0.35%
Greenhouse Gas Emissions Reduction:	245.12 metric tons (annual)
Notes:	Rooftop and Parking Canopy Arrays. Potential shading impacts from tree canopy; Potential roof replacement required; Minor loss to available parking; Net-zero (all accounts on site); ~1% grid export capacity

Financial Metrics



System Start	February 2021
Total Value of Energy	\$1,001,842.28
Lifetime Value (NPV)	\$153,295.30
Internal Rate of Return (IRR)	4.98%
Return on Investment (ROI)	178.70%
Payback Period	14.3 years
Levelized Cost of Energy	\$0.10 / kWh

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Analyses Results

- Chosen for ease of implementation
- Excluded water/wastewater from this first study
- Rooftop and/or parking canopies designed, where feasible
- 11 facilities capable of “net-zero”
- Materials cost estimated to be: \$6.2M
- Achieves 4% of the 20% goal

Table: City Properties for Renewable Energy Retrofits

Building Name	Size* (kW)	Est Project Cost**	Est Cost Savings	Payoff (years)	% to Goal	% Bldg Offset	GHG Offset (mt)
RIVERWALK CENTER GARAGE	322.1	\$805,188	\$58,408	13.4	0.54	83.5	375.42
LAS OLAS GARAGE AND PIERS	224.6	\$561,438	\$39,746	13.7	0.37	35.3	255.4
RIVERLAND PARK REC***	224.3	\$560,625	\$38,137	14.3	0.35	101.4	245.12
CNTRL MAINTENANCE SHOP	210	\$524,875	\$32,493	15.6	0.30	87.6	208.85
SOUTHIDE SCHOOL***	137.2	\$342,875	\$24,417	13.6	0.23	106.6	157
CROSSANT PARK REC CENTER	131.6	\$331,500	\$21,953	14.6	0.20	75.4	141.12
BUILDING SERVICES CENTER	128.1	\$320,125	\$22,943	13.6	0.21	25.8	147.48
FLOYD HULL PARK***	98.5	\$246,188	\$15,524	15.4	0.14	106.1	99.76
HOLIDAY PARK - ACTIVITY CTR	83.5	\$208,813	\$14,935	13.6	0.14	48.6	96.01
EXECUTIVE AIRPORT ADMIN	76.4	\$190,938	\$11,988	15.4	0.11	77.7	77.06
SUNSET MEMRL GARDENS***	72.2	\$180,375	\$11,784	14.8	0.11	108	75.2
OSSWALD PARK REC CNTR***	59.8	\$149,500	\$10,697	13.6	0.10	107.1	68.72
HOLIDAY PARK - GYM	58.5	\$146,250	\$10,374	13.7	0.10	30.9	66.67
CARTER PARK - GYM	56.6	\$141,375	\$10,144	13.5	0.09	26.8	65.19
FIRE STATION NO. 3	55.9	\$139,750	\$9,145	14.8	0.08	31.5	58.75
GEORGE ENGLISH REC***	55.3	\$138,125	\$8,757	15.3	0.08	109.9	56.28
ARTS & SCIENCE PARKING***	53.6	\$134,063	\$9,853	13.2	0.09	109.3	63.5
EXECUTIVE AIRPORT AES	46.8	\$117,000	\$7,314	15.5	0.07	87.7	47.02
PARKING ADMIN.	43.6	\$108,875	\$7,765	13.6	0.07	55.8	49.91
CARTER PARK REC CENTER***	40.3	\$100,750	\$7,193	13.6	0.07	104.7	46.24
BEACH COMMUNITY CENTER	37.7	\$94,250	\$6,336	14.4	0.06	28.8	40.72
FIRE STATION NO. 53	32.5	\$81,250	\$5,093	15.4	0.05	6.2	30.82
LAUDERDALE MANORS REC	29.3	\$73,125	\$5,203	13.7	0.05	22.1	33.44
FIRE STATION NO. 13	22.8	\$56,875	\$4,065	13.6	0.04	18.4	26.16
FIRE STATION NO. 29	21.8	\$54,438	\$3,864	13.7	0.04	11.8	24.82
FIRE STATION / ADMIN/NO 2	21.5	\$53,625	\$3,837	13.6	0.04	3.5	24.67
CITY HALL	20.5	\$51,200	\$3,650	13.6	0.03	1.38	23.24
FIRE STATION NO. 47	17.9	\$44,688	\$3,196	13.6	0.03	9.6	20.57
FIRE STATION NO. 49	16.3	\$40,625	\$2,885	13.7	0.03	10.1	18.52
FIRE STATION NO. 35	15.6	\$39,000	\$2,433	15.5	0.02	8.6	15.62
FIRE STATION NO. 46	15.6	\$39,000	\$2,789	13.6	0.03	11.2	17.96
WARFIELD PARK REC CENTER	15	\$37,375	\$2,677	13.6	0.02	18	17.18
SNYDER PARK ADMIN OFC***	14.6	\$36,563	\$2,528	14	0.02	107.5	16.26
CARTER PARK ANNEX***	14.3	\$35,750	\$2,577	13.5	0.02	106.8	16.54
COAST GUARD STATION***	10.4	\$26,000	\$1,853	13.6	0.02	103.1	11.88
Totals:	2485.70	\$6,212,392	\$426,556	N/A	4%	N/A	2739.10

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Supplementing with other Sources

- Identified PV capital construction retrofits can only achieve 4% of the 20% goal total.
- FPL's program provides customers w/ renewable-derived power
 - Requires monthly subscription premium
 - Requires capacity by FPL to meet City's needs

Table: Potential Scenarios for FPL SolarTogether Program to Achieve the 20% Goal

Scenario	FPL Contribution to 20% Goal	Power Allocation (kW)	Cost of Subscription
Retrofit/FPL 50-50 Split	10%	24,166.2	\$163,364
Identified from Study	16%	38,665.92	\$261,382
Total RE Goal	20% (Goal Met)	48,332.4	\$326,727
Total City Power Demand	20% (Goal Met)	241,662	\$1,633,635

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Suggested Path Forward:

- Determine the strategy balance
- Engage FPL and Establish a Working Group
- Finalize Project Siting and Conduct Assessments
- Qualify Market Providers and Begin Projects
- Outreach Campaign to the Community

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Open Discussion

Icebreaker Question: How can the SAB support and advance the City's renewable energy initiatives?

- Projects
 - Parks Bond for parks-specific facilities
 - Dedicated Commission funding for facilities identified in the study
- Policies
 - Incorporate solar into any new City facilities (or major roof rehabilitation)
 - Solar Parking Canopy for Public Parking Garages
- Ordinances
 - Solar-Ready Rooftops for New Construction



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Let's Chat!

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