

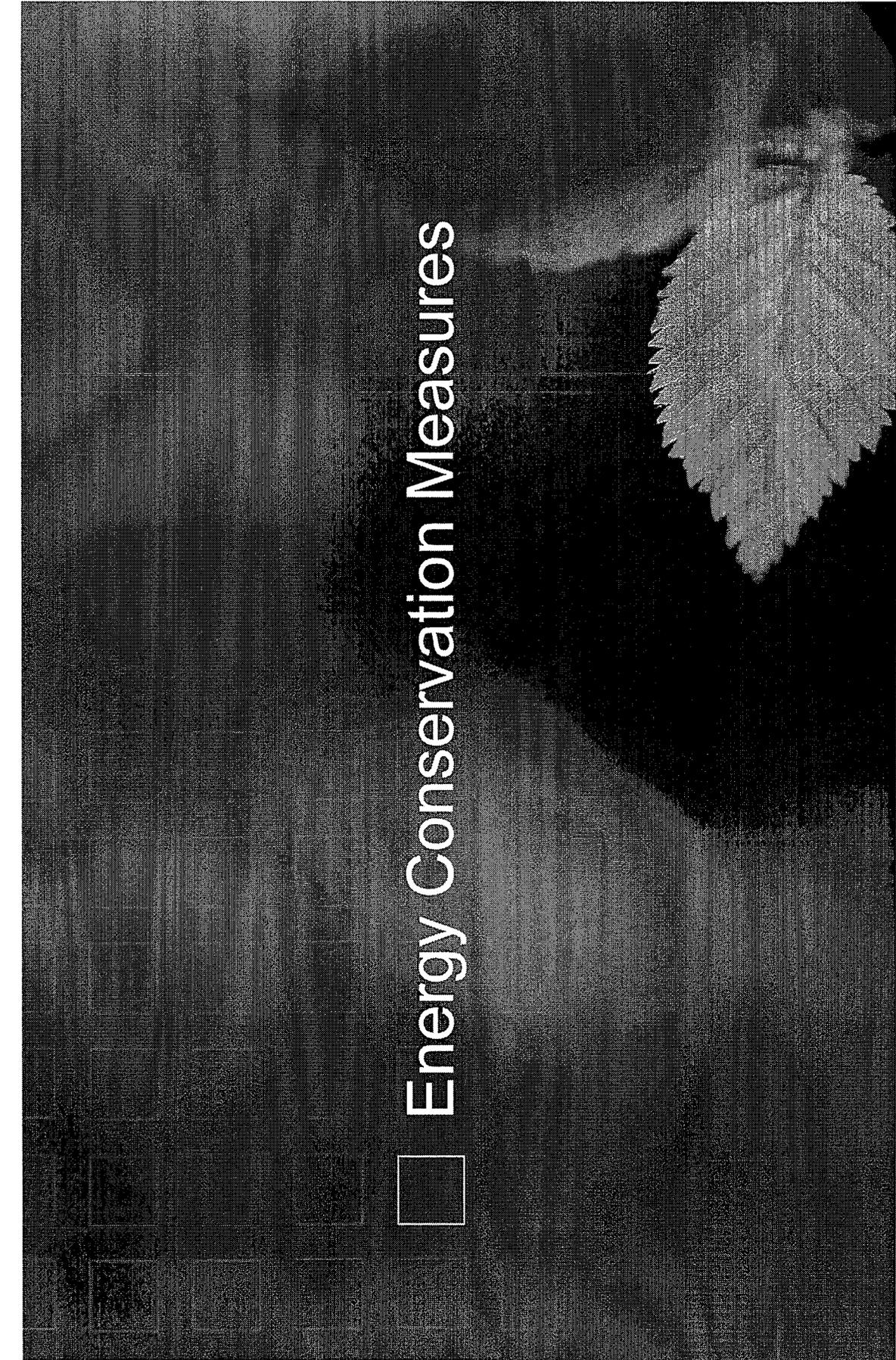
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City of Miami Beach Energy Conservation Opportunities

Preliminary Energy Assessment Summary Report

June 2, 2009



Energy Conservation Measures

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Customer Contribution Applied to Total				
ECM Number	ECM Title	Cost	Savings	ROI (yrs)
1	Facility Lighting and Lighting Control Upgrades	\$3,106,889	\$292,959	11
2	Street Lighting Upgrades	\$8,125,470	\$587,146	14
3	Domestic Water Conservation	\$518,493	\$104,800	5
4	Irrigation Water Conservation: Scalping Plant	\$6,990,000	\$413,724	17
5	HVAC Controls	\$1,097,730	\$156,736	7
6	Convention Center Upgrade and Expansion	\$5,606,358	\$263,328	21
7	Geothermal Cooling - Police Station	\$823,636	\$68,575	12
8	Ice Arena Cooling Savings	\$453,641	\$14,517	31
9	Wall Insulation - Scott Rakow Center	\$71,980	\$2,773	26
10	Power Transformer Replacement	\$1,570,577	\$108,624	14
11	Renewable Energy - Convention Center	\$430,005	\$3,871	111
12	Renewable Energy - Scott Rakow Center	\$484,151	\$7,882	61
13	Automated Meter Reading (AMR) Upgrade	\$12,033,450	\$300,000	40
14	Pump Stations	\$0	\$0	0
15	Other ECMs Considered	\$0	\$0	0
16	Solar Hot Water - Fire Stations	\$0	\$0	0
	Total	\$41,312,380	\$2,324,935	18

* Currently includes material and labor savings; efficiency and temperature setback savings will be added later.

** Currently includes labor savings; water savings will be added after meter testing.

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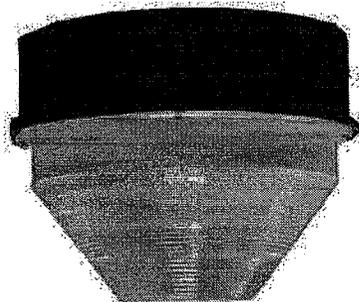
Conventional Energy Conservation Measures

ECM Number	ECM Title
1	Lighting & Lighting Controls
2	Street Lighting Upgrades
3	Domestic Water Conservation
5	HVAC Controls
10	Power Transformer Replacement

ECM -1: Facility Lighting and Lighting Control Upgrades

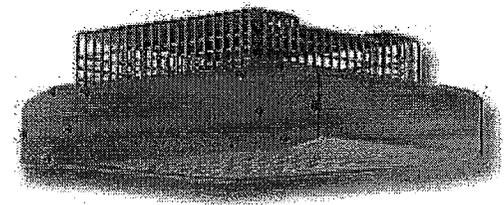
- Most facilities currently have high efficiency T8 lamps with standard electronic ballasts and compact fluorescent lighting fixtures
- Install more efficient 28 watt T8 lamps with high efficiency electronic ballasts
- Utilize high bay induction fixtures in parking garages, with photo sensors installed on perimeter fixture to make use of day lighting
- Utilize T5 linear fluorescent fixtures to replace high intensity discharge (HID) lamps in some gyms and recreation areas
- Replace incandescent exit signs at the Convention Center with new exit signs utilizing LED technology
- Install wall and ceiling mounted occupancy and photo sensors

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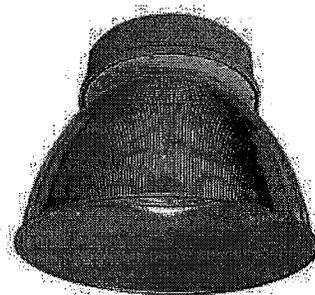


Model No.: LC-H511-120W

Garage Induction
Lighting



Edge Parking
Structure



Item No.: LC-S111HB-400W

High Bay Induction
Lighting

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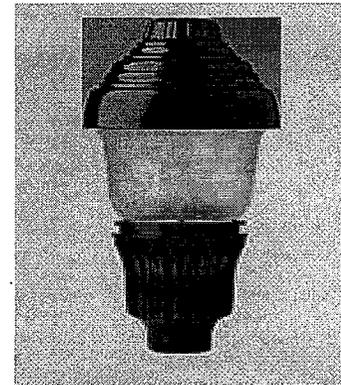
ECM - 2: Street Lighting Upgrades

- Benefit of induction lighting is extremely long lamp life - up to 80,000 hours versus 20,000 hours
- Reduce light pollution and provide “dark sky” compliant light fixtures
- Replace cobra head street lighting and decorative acorn top street lighting with induction lighting
- Replace shoe box street lighting and various other high intensity discharge (HID) lighting system with induction lighting
- Some HID fixtures will be retrofitted with a lower wattage metal halide or compact fluorescent lamp and ballast
- Depending on wattage and height of existing fixtures, replacement of retrofit may not be an option

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LED Street Pole
Lighting



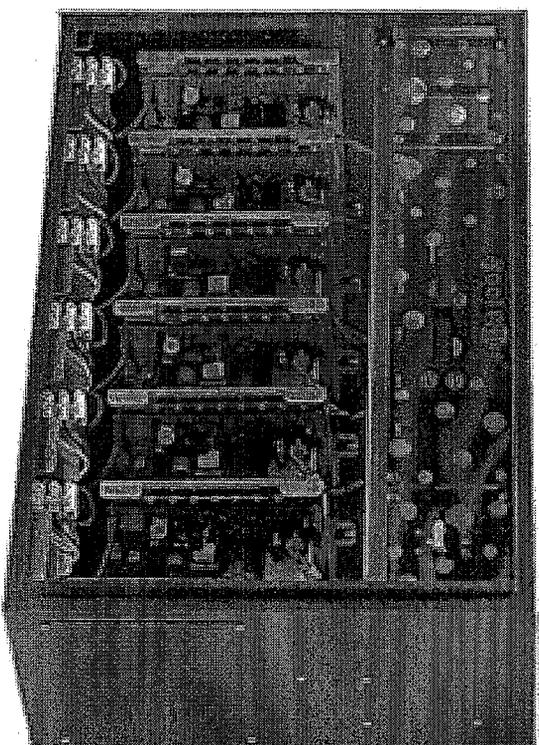
Acorn Street Light
(with example cap)

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ECM - 3: Domestic Water Conservation

- 1.28 gallons per flush toilets (existing is 2.5 and newer 1.6 gallons per flush toilets)
- 1.0 gallons per flush urinals for valve retrofit (existing averages around 1.6 gallons per flush)
- 0.5 gallons per minute sinks
- 1.75 gallons per minute showers
- An efficient counterflow heat exchanger unit will be added to the ice machines to pre-cool the supply water
- Replacement of laundry washers with more efficient top loading washers in City Hall, Jackie Gleason Theater and fire stations
- Salt chlorine generation to replace liquid chlorine for the three public pools

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Salt chlorine generation system

ECM - 5: HVAC Controls

- Install a new, web based energy management system (EMS) in seventeen buildings
- Integrate to existing control systems through EMS where possible
- Add energy savings strategies such as demand controlled ventilation and unoccupied setback
- Real-time monitoring of building conditions through EMS
- Install communicating, programmable thermostats to control packaged equipment in smaller buildings

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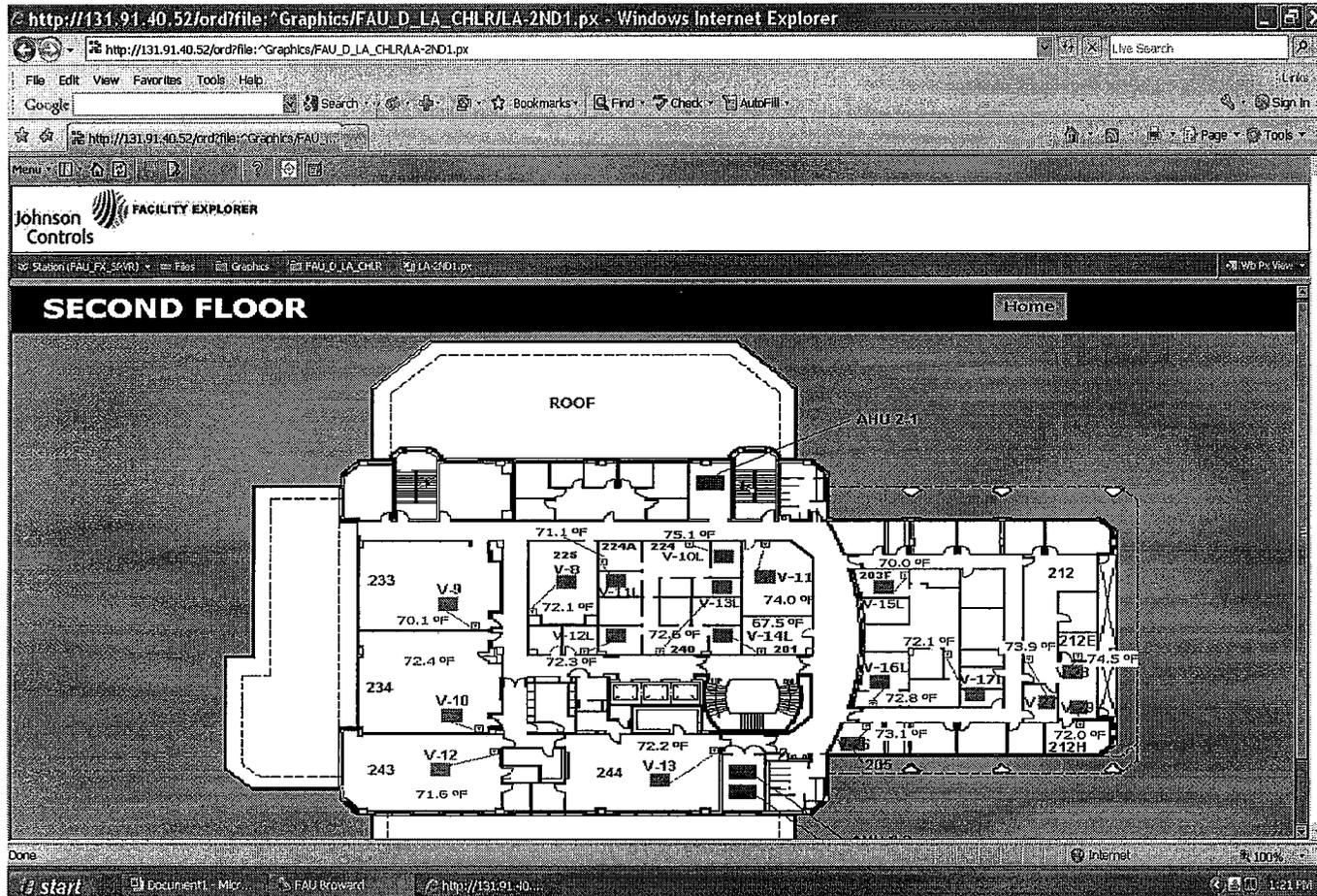
Sample EMS graphic

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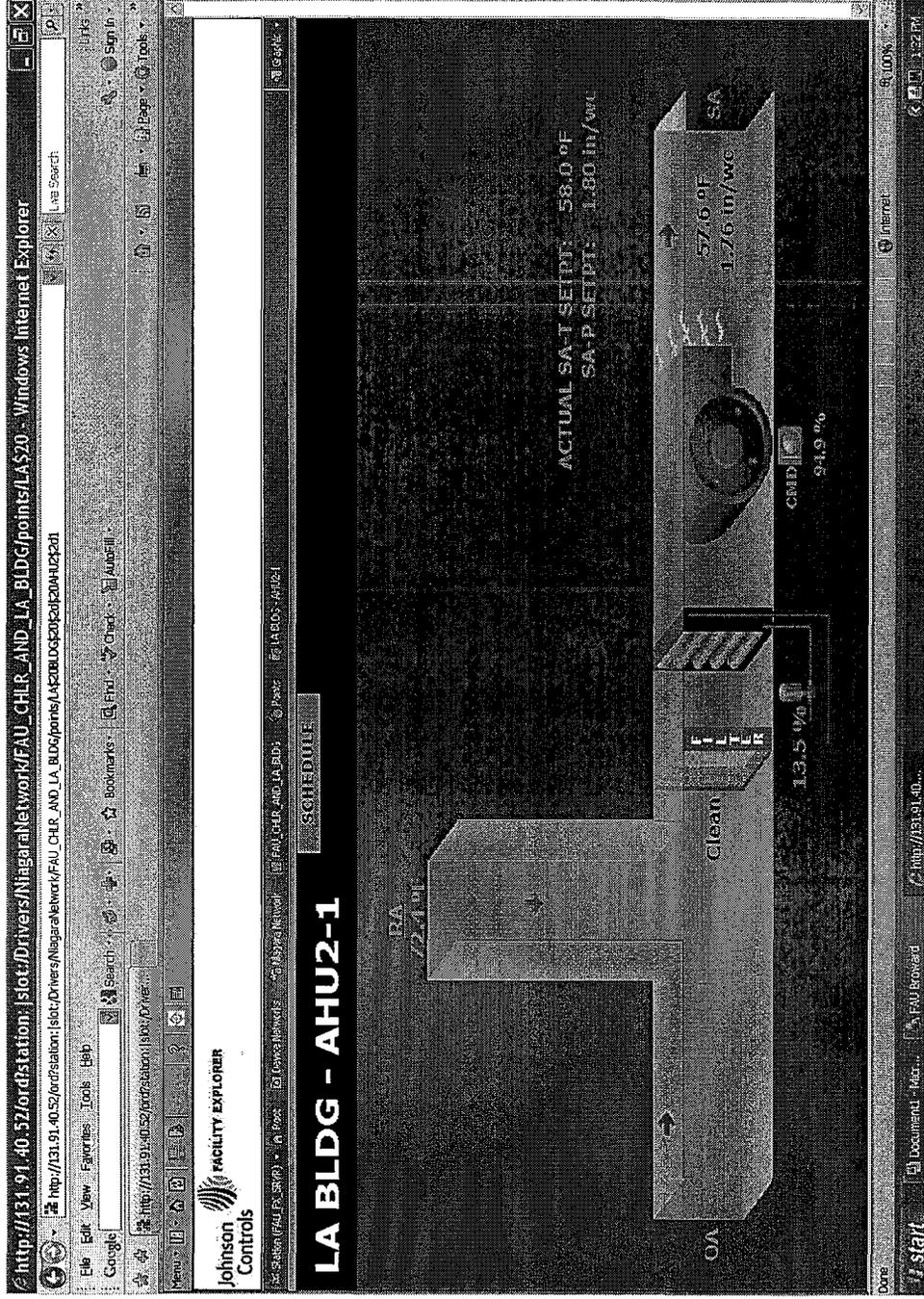
Sample EMS graphic

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Sample EMS graphic

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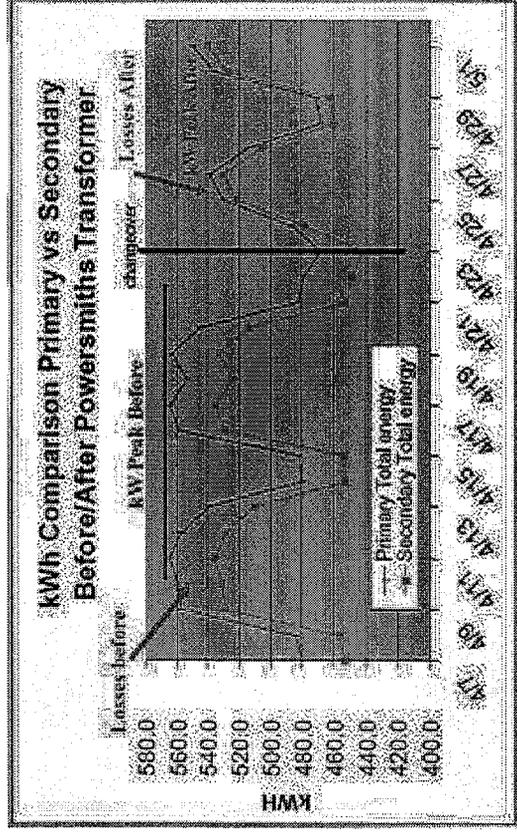


Sample EMS graphic

ECM - 10: Power Transformer Replacement

- Replacement of dry-type transformers with new high efficiency transformers
- 77 transformers have been identified for replacement ranging in size from 15 to 1000 kVA (40 transformers located at the Convention Center)
- These transformers step down power from 480 volts to 208Y/120 volts for lighting, computers, and other plug loads

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Transformer efficiency comparison

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Unconventional Energy Conservation Measures

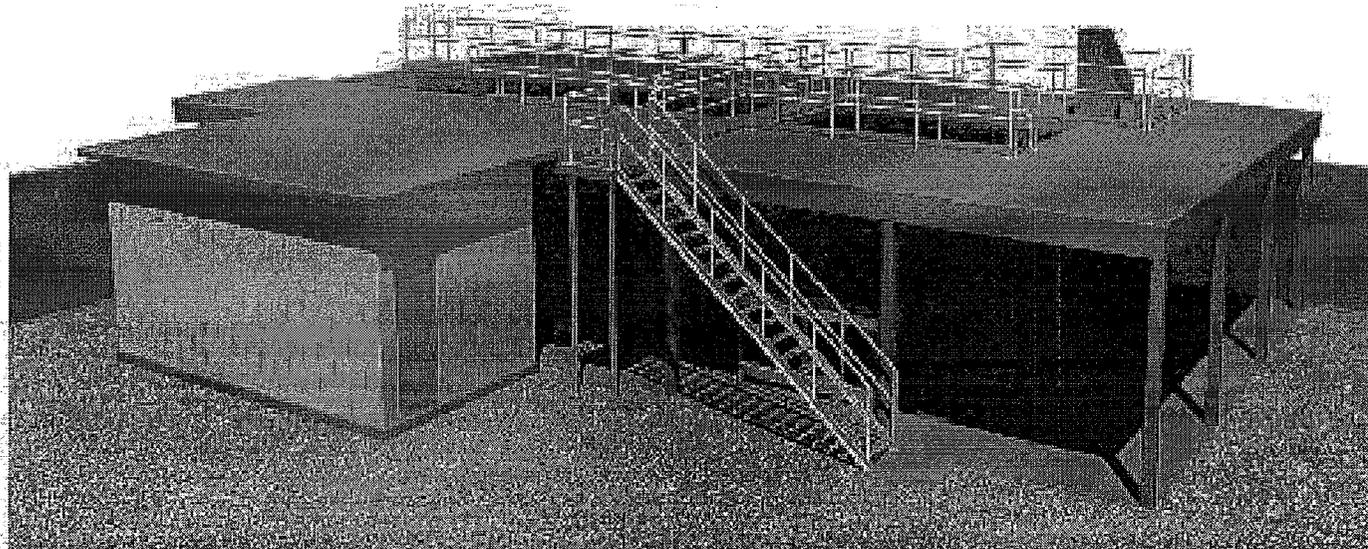
ECM Number	ECM Title
4	Irrigation Water Conservation - Scalping Plant
6	Convention Center Chiller Upgrade and Expansion
7	Geothermal Cooling - Police Station
8	Ice Arena Cooling Savings
9	Wall Insulation - Scott Rakow
11	Renewable Energy - Convention Center
12	Renewable Energy - Scott Rakow
13	Automated Meter Reading (AMR) Upgrade

ECM – 4: Irrigation Water Conservation: Scalping Plant

- 1,800 gallons per minute scalping plant – The plant will utilize bio-membranes technology to reduce water usage and sewage discharges
- This plant will be strategically located by the 28th Street Sewer Pump Station
- The plant will operate 24/7 and provide 600,000 gallons per day for use on the golf course and future clients
- This technology will utilize the existing golf course ponds for water storage

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ECM – 4: Irrigation Water Conservation: Scalping Plant



Example scalping plant rendering

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ECM – 4: Irrigation Water Conservation: Scalping Plant

PROPOSED LOCATION: A



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ECM – 4: Irrigation Water Conservation: Scalping Plant

PROPOSED LOCATION: B



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ECM – 4: Irrigation Water Conservation: Scalping Plant

PROPOSED LOCATION: C





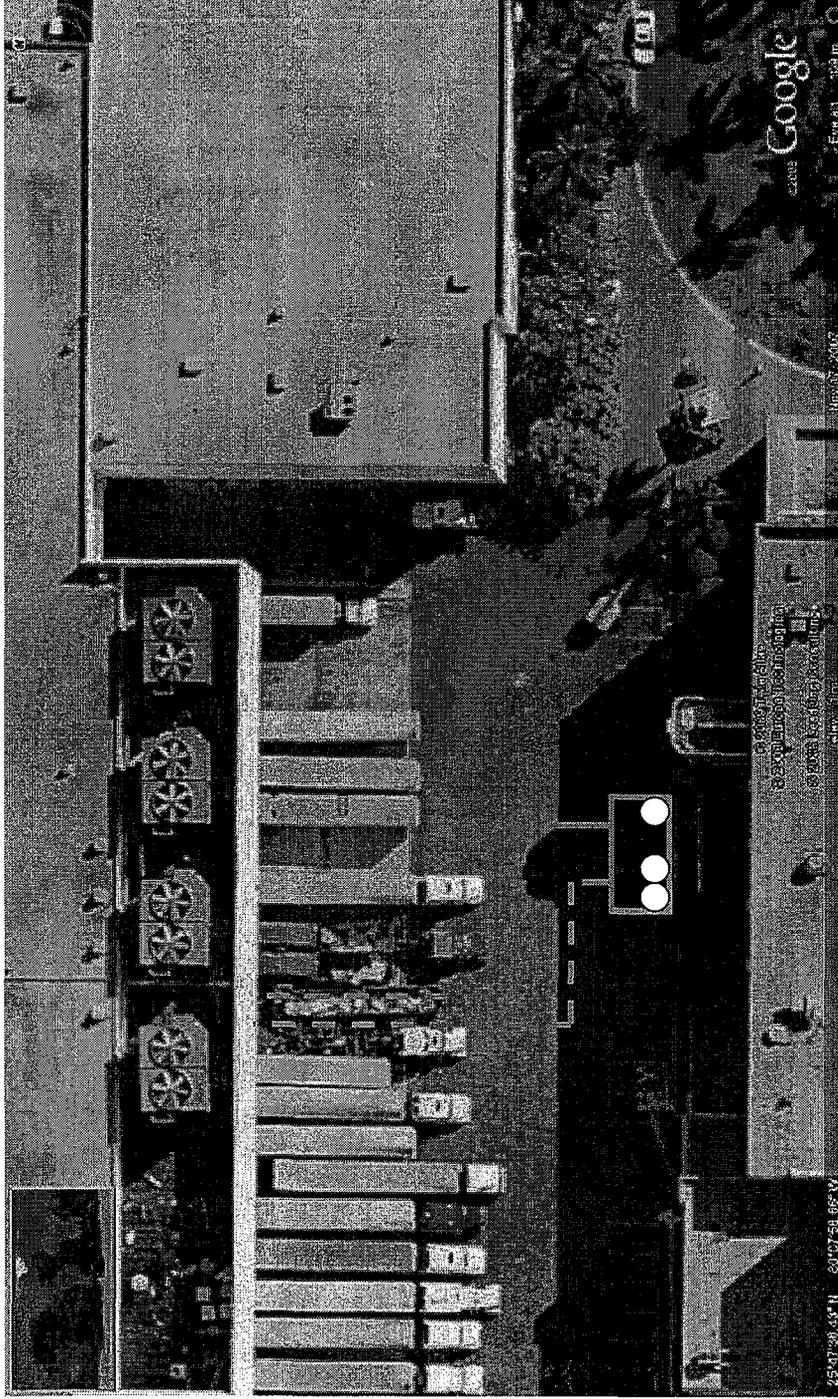
ECM - 6: Convention Center Chiller Upgrade and Expansion

- Currently the four Trane chillers at the Convention Center cool the Convention Center and the Jackie Gleason Theater
- Utilize high efficiency chiller plant with 50% of spare capacity to provide chilled water to surrounding buildings
- The plant will be able to serve the Convention Center, Jackie Gleason Theater, New Parking Garage, and the Miami Beach City Hall
- Convert chiller plant to variable primary design
- Employ adaptive control strategies to optimize overall plant performance

ECM - 6: Convention Center Chiller Upgrade and Expansion

- Install 4" bypass line with modulating chilled water valve and convert all 3-way air handling unit control valves to 2-way valves
- Interface to Johnson Controls (JCI) existing control system
- Currently the four Trane chillers at the Convention Center reject heat through four cooling towers on the roof
- The new design will use the cooler and stable ground water to improve the efficiency of the air conditioning, save potable water and provide greater reliability (geothermal system)
- The water temperature to the chillers will go from a weather dependant 85 degrees with the cooling towers to a fixed 80 degrees with geothermal cooling, which will increase cooling efficiency

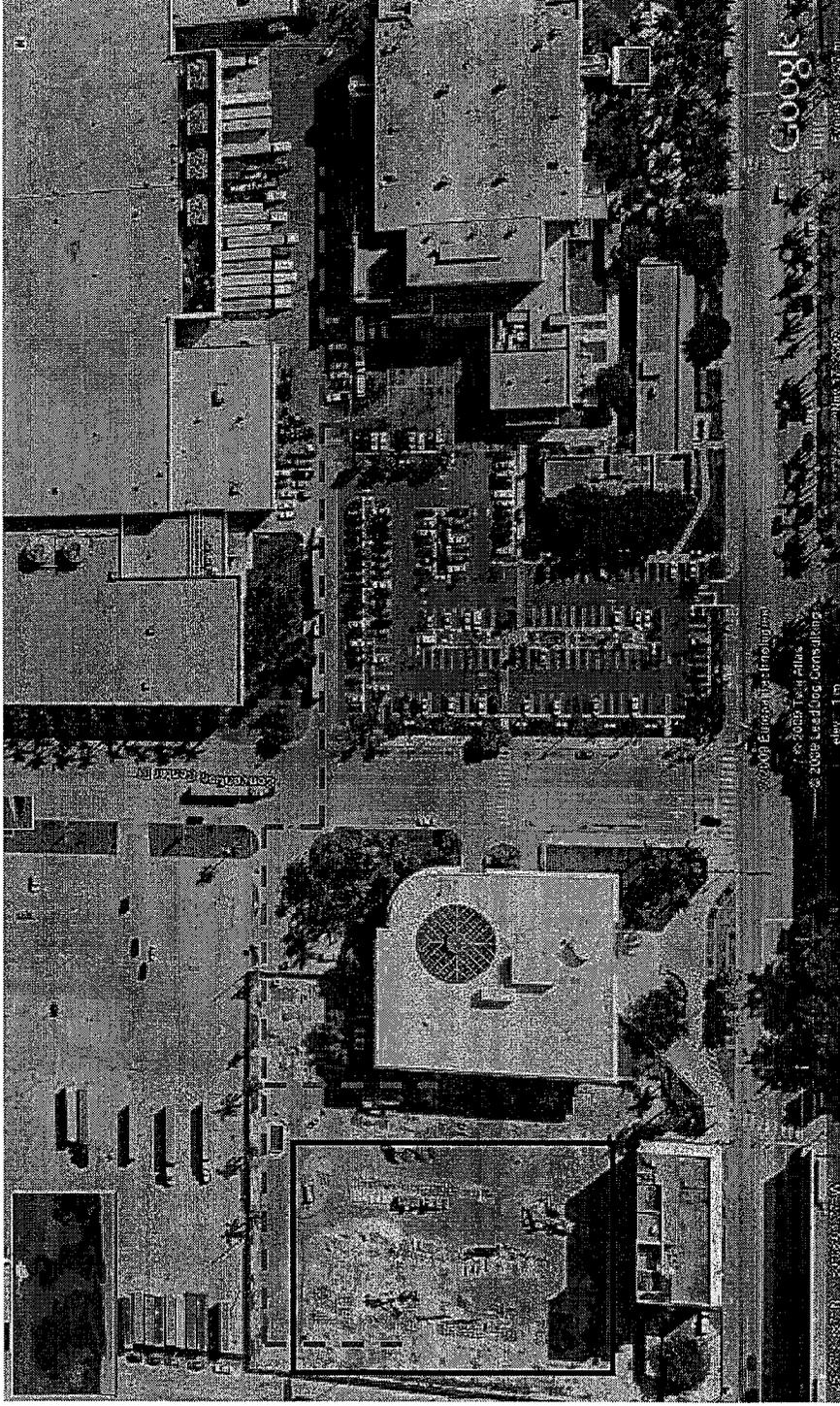
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Geothermal well location and piping

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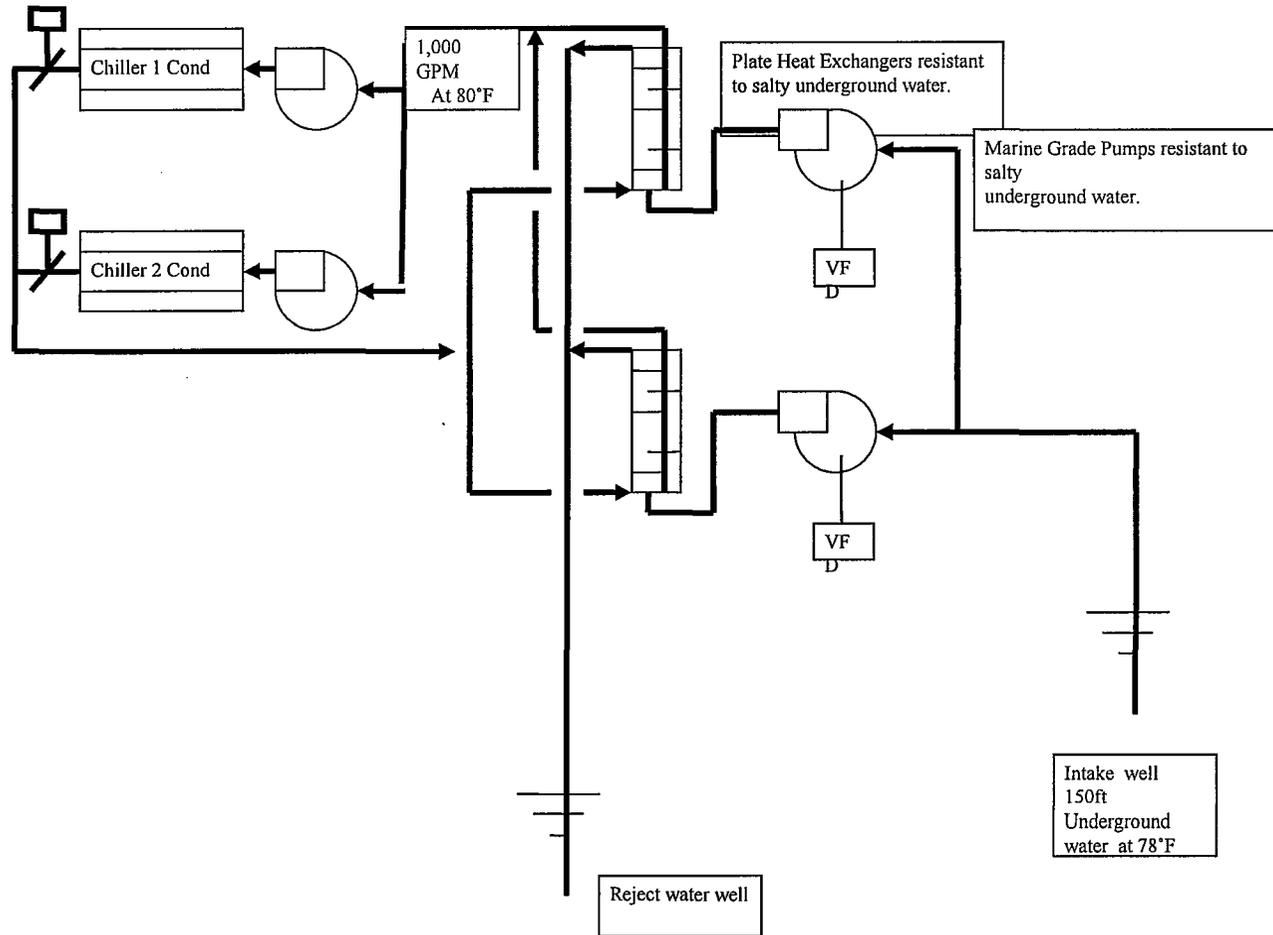
District cooling piping



ECM - 7: Geothermal Cooling – Police Station

- Currently the two water-cooled Trane chillers reject heat through a double cell cooling tower on the roof
- The new design will use the ground water to improve the efficiency of the air conditioning system and provide greater reliability
- The water temperature to the chillers will go from a weather dependant 85 degrees with the cooling towers to a fixed 80 degrees with geothermal cooling, which will increase cooling efficiency

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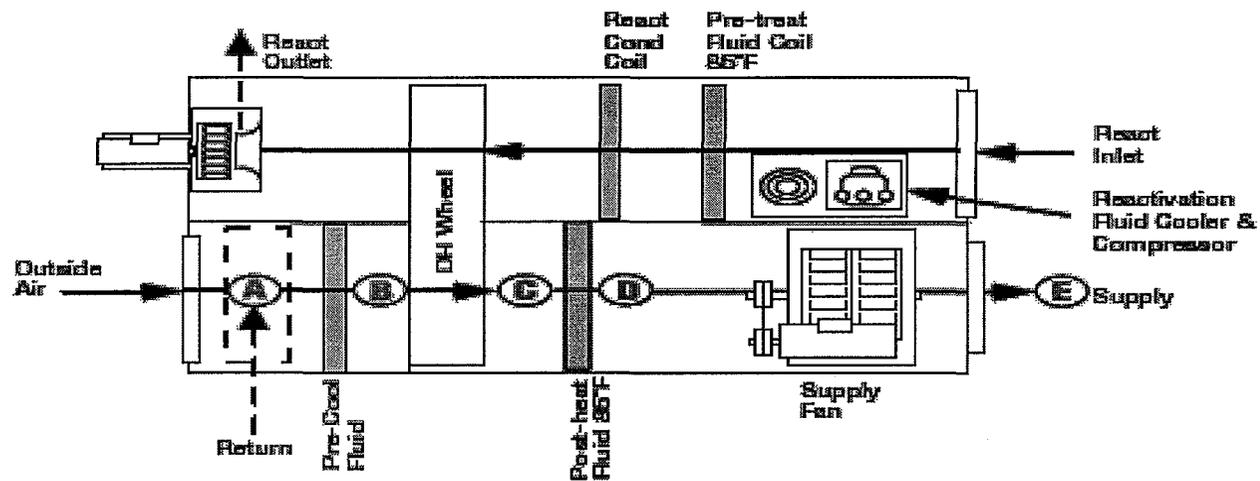
Geothermal system layout

ECM - 8: Ice Arena Cooling Savings

- This technology would allow use of current outside air modulation techniques to save energy and maintain compliance with the current code
- Relative humidity levels will be drastically reduced minimizing mold growth
- Condensation will be drastically reduced on the ice surface and on the protective Plexiglas panels by maintaining required RH
- This technology utilizes heat recovery as an efficient method to provide air conditioning to the space and greater comfort to the occupants
- Significant reduction in maintenance and operational costs

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IceAire Heat Pump Air Flow



		A	B	C	D	E
SUMMER	SCFM	9000	9000	9000	9000	9000
	DEGREES °F	58	36	48	77	79
	CR / LB	44	30	20	20	20
WINTER	SCFM	9000	9000	9000	9000	9000
	DEGREES °F	51	33	48	78	80
	CR / LB	36	28	10	10	10
NO DH	DEGREES °F	36	36	26	78	78

ECM - 9: Wall Insulation – Scott Rakow Center

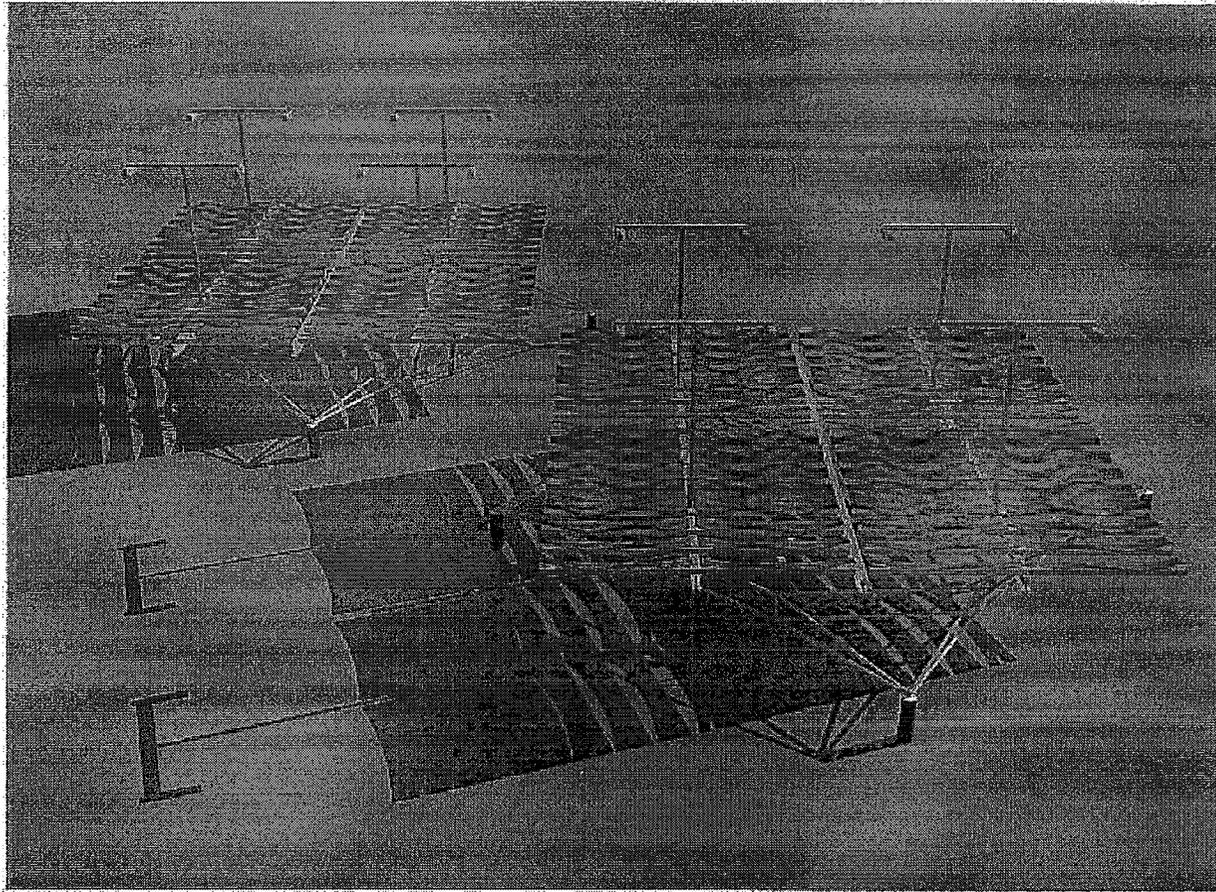
- The HVAC system serving the basketball court of the Scott Rakow facility is operated continuously at a low temperature to avoid ‘sweating’ on the common wall with the ice rink
- Ameresco proposes to install 2” of rigid foam insulation on the concrete wall with a hard cover
- The insulation will allow the space to achieve a temperature setback condition and avoid ‘sweating’ of the wall on the gymnasium side

ECM - 11: Renewable Energy – Convention Center

- Install a 25 kW solar photo-voltaic array on the west side of the roof at the Convention Center
- Install a 5 kW wind generation array on the southeast corner of the Convention Center
- Install a monitoring system to record solar and wind power generation for five years
- Display system information on monitors to serve as an educational and promotional tool

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ECM - 11: Renewable Energy – Convention Center



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ECM - 11: Renewable Energy – Convention Center

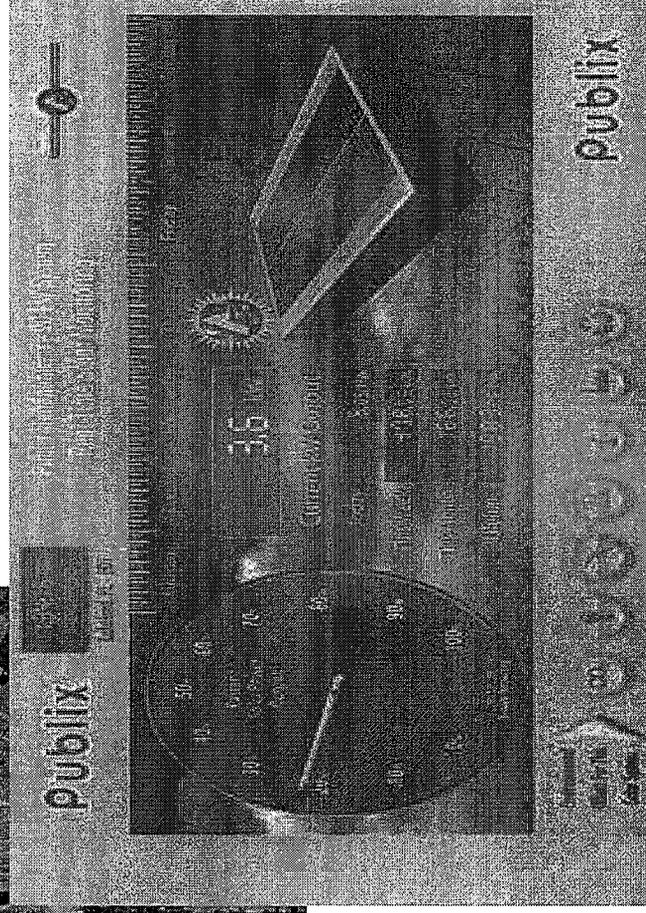
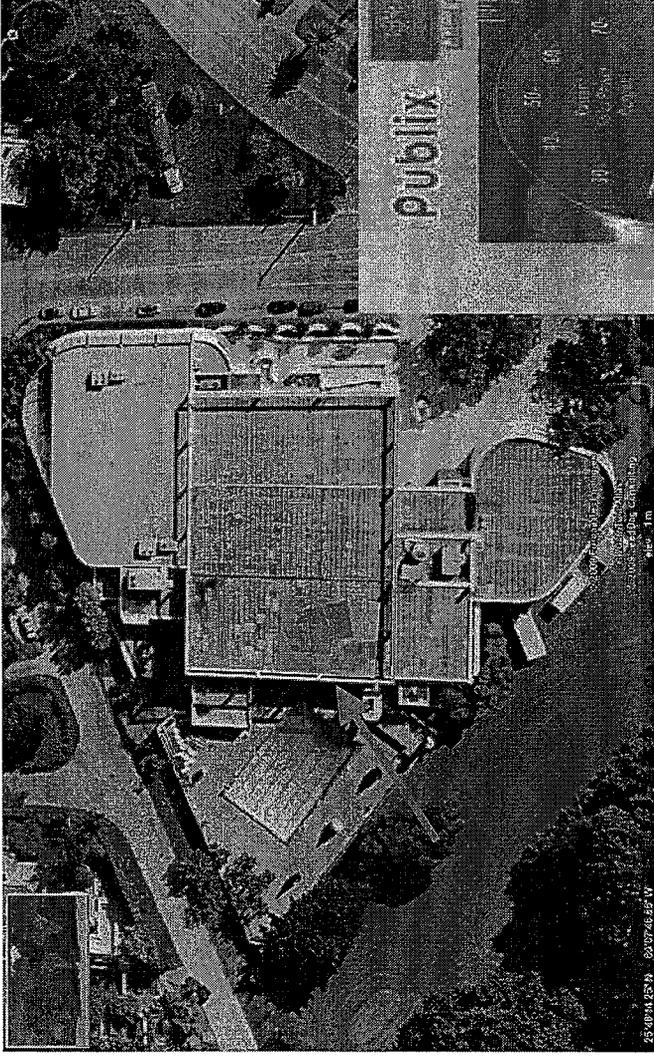


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ECM - 12: Renewable Energy - Scott Rakow Center

- Install a 25 kW solar photo-voltaic array combined with a 43 kW solar thermal system on the roof of the Scott Rakow building
- The photo-voltaic array will provide power to the electrical grid, while the thermal collection system will eliminate or minimize the pool heating system
- Install a monitoring system to record solar and wind power generation for five years
- Display system information on monitors to serve as an educational and promotional tool

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Rakow solar production

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ECM - 13: Automated Meter Reading (AMR) Upgrade

- Install an Automatic Meter Reading (AMR) system which will service residential, commercial, and public sectors of the community
- Enhanced billing capability, instantaneously detecting water theft or distribution leaks, or simply suspending the water service to delinquent accounts
- The data will be transmitted through the City's new Wi-Fi network, which has recently been approved by the City and will be commissioned in the near future

ECM - 15: Other ECMs Considered

ECM	BUILDING	STATUS	COMMENTS
<i>Sea Weed Bio-Mass Power Generation</i>	<i>Beach Front</i>	<i>NR</i>	<i>Based on Environmental Coalition of City of Miami Beach, sea weed is needed over the sand in order to maintain the proper balance of the soil, birds feeding, nesting, etc.</i>
<i>Wave to Energy</i>	<i>Beach Front</i>	<i>NR</i>	<i>Discussion were maintained with Swell Fuel about this potential ECM for City of Miami Beach. Nevertheless, after Swell Fuel's nalysis of the Ocean Fronts in South Florida, they recommended us to not pursue the ECM, based on the oceanic reports for the area. Waves not constantly strong enough and potential Utility reluctancy to participate in the project.</i>
<i>Ocean Water Desalination Plant</i>	<i>Coastal Front</i>	<i>NR</i>	<i>Initial analysis showed cost of water for City of Miami Beach to be \$3.88/kGal including pumping costs, while it would cost over \$4/kGal through ocean desalination process not including pumping associated costs.</i>
<i>Waste Management</i>	<i>City Wide</i>	<i>NR</i>	<i>Initial meeting with Al Zamora. Al informed that all waste must be disposed by contract into Dade County landfill. We discussed about potential waste "Baling" to reduce volume, but county charges are based on weight, not volume. We discussed about potential Bio Mass project, using organic waste, but he sent us to the city waste management companies. Discussions with WSI are still in place towards analyzing potential feasibility of this ECM. (See Bio Mass ECM).</i>

ECM - 15: Other ECMs Considered

ECM	BUILDING	STATUS	COMMENTS
<i>Roof Top Air Handling Replacement</i>	<i>North Shore Gym</i>	NR	<i>Electrical Bills from FP&L are suspicious, or not clear. Flat demand for several month, then increased. Demand kW suspiciously low compared to the capacity of the existing loads.</i>
<i>Cogeneration</i>	<i>City Wide</i>	NR	<i>No potential use of thermal heat recovery to reach competitive condition over utility.</i>
<i>Geo-Thermal Miami Ballet and Bass</i>	<i>Miami Ballet Bass Museum</i>	NR	<i>Data from FP&L has not been provided for Ballet.</i>
<i>District Cooling Plant</i>	<i>Convention Center</i>	NR	<i>Dropped buildings 555 and 777, since no maintenance/oper expenses available to Ameresco to add on savings side.</i>
<i>Thermal Storage Convention Center Chiller Plant</i>	<i>Convention Center</i>	NR	<i>Lack of Space for Ice or water storage tank(s) in this facility.</i>
<i>Irrigation Water Conservation Membrane Bio-Reactors Treatment</i>	<i>Flamingo Park</i>	NR	<i>Low flow on effluent lines does not allow an economically feasible project.</i>
<i>Pump Stations Operational Savings</i>	<i>Pump Stations</i>	NR	<i>The stations have been redone or are new within about two years and there is no opportunity there. The stations already are using up to date efficient technology and controls.</i>
<i>Fire Station Solar Hot Water System</i>	<i>Fire Stations</i>	NR	<i>Low hot water usage and high costs of equipment make this measure un favorable.</i>



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Q&A