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PINELLAS COUNTY WATER SYSTEM ENERGY USE AND EFFICIENCY ASSESSMENT

Pinellas County

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AGENDA

- Background and Scope
- Commercial Power Rate Structures
- Energy Use Baseline
- Distribution System Efficiency
- Renewable Energy Potential
- Conclusions and Recommendations

PROJECT BACKGROUND AND SCOPE

- The 7 primary energy consuming facilities in the Pinellas water distribution system:
  1. S.K. Keller WTP
  2. Regional Treatment Facility
  3. North Water Booster Station
  4. Logan WBS
  5. Oakhurst WBS
  6. Capri WBS
  7. Gulf Beach WBS
- Review current Duke Energy rate schedules
- Evaluate energy use and efficiency of the facilities
- Identify potential to generate renewable energy

COMMERCIAL POWER RATE STRUCTURE ASSESSMENT

- **Reviewed current Duke Energy Rate Schedules:**
  - General Service - Time of Use (GSDT-1)
  - Interruptible Service - Time of Use (IST-2)
- **All facilities on GSDT-1 except Keller (IST-2)**

FACILITY	AVERAGE COST OF POWER ($/KWH)
S. K. Keller Water Treatment Plant	$0.066
Regional Treatment Facility	$0.086
North Water Booster Station	$0.099
Logan Water Booster Station	$0.092
Oakhurst Booster Station	$0.091
Capri Water Booster Station	$0.122
Gulf Beach Water Booster Station	$0.116

- **Opportunity for North WBS to use IST-2**
  - Potential savings of 20% / $90,000 annually
  - Risks of interruptible service must be considered

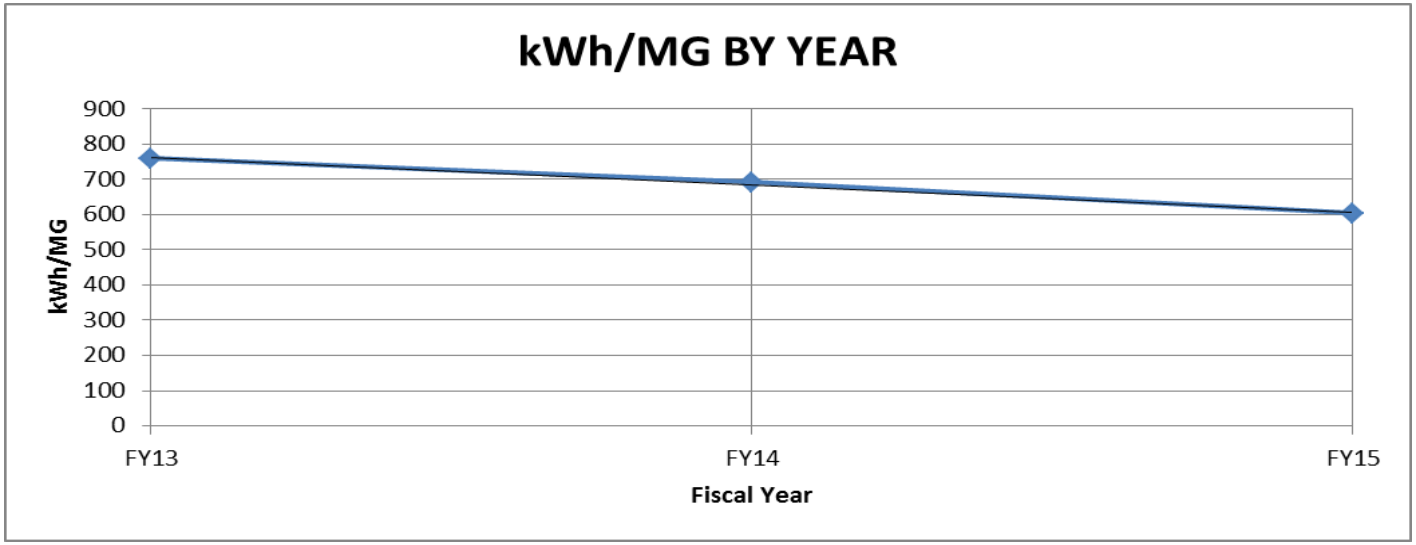
ENERGY USE BASELINE

- Comprehensive breakdown of current energy use, efficiency and cost at each facility by major equipment
- Supports identification of potential energy efficiency improvements
- Serves as baseline to measure future improvements against

System/Equipment (# of units)	Motor Size (HP) for Each Pump	Motor Efficiency (%)	Drive (Constant Speed or VFD)	Est. Avg. Operating Pump Efficiency (%)	Typical Operation	Average Operating Hours			Estimated Energy Demand (kW)		Estimated Energy Usage (kWh)		Estimated Annual Energy Cost ($)	Actual 2014 Energy Use (kWh)	Actual 2014 Energy Costs ($)
					Pumps (No.)	Hrs/Dy	Hrs/Mo	Hrs/Yr	Avg	Peak	Monthly	Annual			
580 BPS													$0.0948	**4,303,800**	**$397,445**
Booster pumps (3 pumps)	500	92%	VFD	80%	2	16	487	5,841	259	598	125,844	1,510,128	$143,160		
Repump pumps (2 pumps)	800	94%	VFD	80%	1	12	365	4,380	410	578	149,559	1,794,712	$170,139		
Tank mixers (4 mixers)	--	--	--	--	--	24	730	8,761	1	1	1,008	12,090	$1,146		
Building and Site Lighting and miscellaneous loads	--	--	--	--	--	24	730	8,761	74	148	54,026	648,311	$61,460		
Total for 580 BPS						**24**	**730**	**8,761**	**744**	**1,326**	**330,437**	**3,965,241**	**$375,905**	**0**	**$0**
Logan BPS													$0.0869	**1,641,000**	**$142,526**
Booster pumps (4 future VFD pumps)	250	92%	VFD	80%	1	24	730	8,761	154	308	112,361	1,348,329	$117,170		
Chlorine booster pump	3	--	CS	--	--	24	730	8,761	2	2	1,392	16,704	$1,452		
Tank mixers (2 mixers)	--	--	--	--	--	24	730	8,761	1	1	504	6,045	$525		
Building and Site Lighting and miscellaneous loads	--	--	--	--	--	24	730	8,761	17	34	12,411	148,936	$12,943		
Total for Logan BPS						**24**	**730**	**8,761**	**173**	**344**	**126,668**	**1,520,014**	**$132,089**	**0**	**$0**
Capri BPS													$0.1132	**325,520**	**$36,862**
75 HP Booster pumps (2 pumps)	75	90%	CS	65%	1	8	243	2,920	62	125	15,204	182,453	$20,654		
50 HP Booster pump (1 pump)	50	90%	CS	65%	1	5	152	1,825	43	43	6,479	77,750	$8,801		
Chlorine booster pump	3	--	CS	--	--	24	730	8,761	2	2	1,392	16,704	$1,891		
Tank mixers (1 mixer)	--	--	--	--	--	24	730	8,761	0	0	252	3,023	$342		
Building and Site Lighting and miscellaneous loads	--	--	--	--	--	24	730	8,761	12	24	8,761	105,132	$11,901		
Total for Capri BPS						**24**	**730**	**8,761**	**119**	**194**	**32,088**	**385,060**	**$43,589**	**0**	**$0**

HISTORIC AND CURRENT ENERGY USE

- **Energy use trended up between 2000 – 2012.**
  (Likely due to system operational changes required to improve water quality, fire flow, etc)
- **20% reduction in power consumption for every million gallons produced (kWh/MG) from FY13 to FY15.**
  (County's investment in water facility improvements have supported optimized operation of the water system)



ENERGY EFFICIENCY ASSESSMENT

- **Keller WTP:**
  - Significant efficiency improvement from 2015 project
  - Limited opportunity for additional efficiency improvements

- **Regional Treatment Facility:**
  - Limited energy use / Limited opportunities for improvement
- **North WBS:**
  - Energy use anticipated to continue a slight downward trend from recent improvements

- **Logan WBS:**
  - Significant energy reduction anticipated after current construction project is complete

ENERGY EFFICIENCY ASSESSMENT

- **Oakhurst WBS:**
  - Offline / to be decommissioned
- **Capri WBS:**
  - Current pump sizing is inefficient
  - New pumps and motors would support reduced energy use

- **Gulf Beach WBS:**
  - Current pump sizing is okay
  - Addition of VFD would support reduced energy use

- **Overall Distribution System:**
  - Potential for additional optimization of operating strategies to reduce energy use

RENEWABLE ENERGY POTENTIAL - SOLAR

- **Three Solar PV installation options:**
  - Ground array in open area
  - Roof/tank mounted array
  - Covered parking structure
- **Solar PV ground array at Keller WTP:**
  - Cost = $1M.
  - Payback = ~39 years (based on $0.07/kWh)
  - Produces 370,000kWh/yr (6% of use)

- **Solar roof/tank mounted array at North WBS: $320,000**
  - Cost = $320,000
  - Payback = ~27 years (based on $0.10/kWh)

Payback period could be reduced by obtaining grants, increases in energy costs, or decreases in solar PV costs.

RENEWABLE ENERGY POTENTIAL - OTHERS

- **Wind Turbine Energy Generation**
  - Average wind speed in Pinellas is lower than typical minimum threshold for considering wind turbines
  - Anticipated public concerns with turbines at facility sites (noise, visual intrusion)

- **In-conduit Hydropower Energy Generation**
  - Opportunities at locations where control valves are used to reduce pressure:
    - Madeira PRV
    - Fill valves at ground storage tanks.
  - Very low potential due to significant daily variations in flows and pressure at control valve locations

CONCLUSIONS AND RECOMMENDATIONS

- **20% improvements in energy efficiency achieved between 2013 to 2015**
- **Current North WBS and Logan WBS improvement projects are anticipated to further reduce energy use.**
- **Opportunities for additional improvements:**
  - New Capri WBS pumps and motors
  - Addition of VFD for Gulf Beach WBS pump
  - Energy optimization modeling to define optimized operating strategies for water distribution system
  - Addition of real time energy use and efficiency tracking on operator screens and management dashboards
  - Interruptible service rate structure at North WBS

CONSISTENCY WITH PINELLAS COUNTY'S STRATEGIC PLAN

5.2 - Be responsible stewards of the public's resources

5.3 – Ensure effective and efficient delivery of county services

3.1 - Implement green technologies and practices where practical

3.3 – Protect and improve the quality of our water, air and other natural resources

3.4 – Reduce/reuse/recycle resources including energy, water and solid waste

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