



City of Vero Beach Electric Utility System Study

Presented by:



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Electric Utility System Study

Five major components:

1. Generating Plant Property Options
2. Resource Adequacy (Reliability)
3. Pole Attachment Agreement
4. Transmission and Distribution Planning
5. Other Optimization Strategies

Primary Focus:

Identify short and long term cost optimization

Electric Utility System Study

Process:

- Submitted Data Requests
- Interviewed Staff
- Interviewed Management
- Researched Publicly Available Materials / Matrix
- Utilized PowerServices' experience with Operations, Management, Acquisition of Electric Utility Systems by Electric Utilities

Generating Plant Property



Generating Plant Property

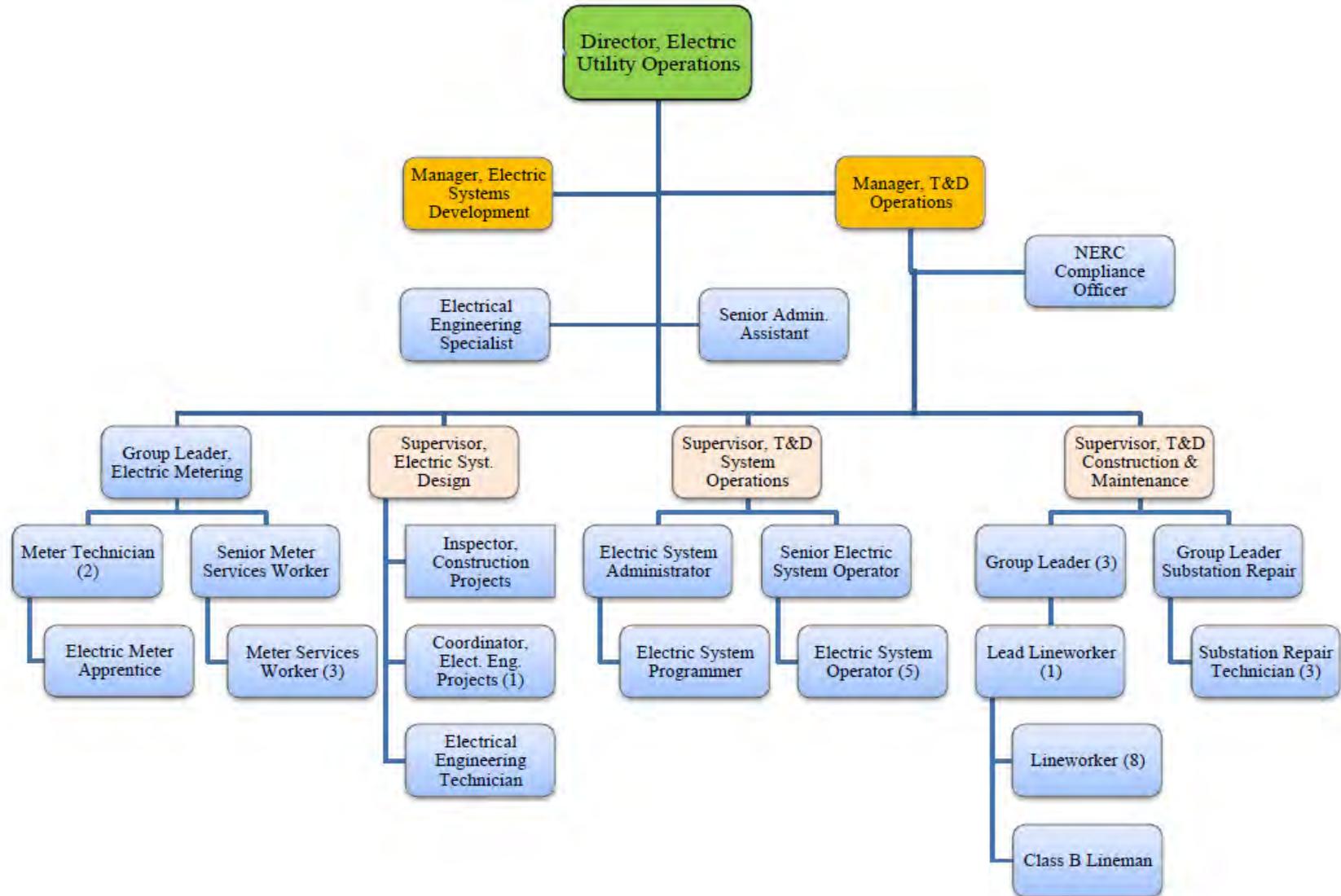
Current Status:

- City decommissioned plant and is proceeding with salvage and demolition
- Main building to be cleared of hazard material and equipment
- Building and substation initially remain in place for electric service continuity

RESOURCE ADEQUACY



Resource Adequacy



Resource Adequacy

Determine if Electric Department is effectively staffed

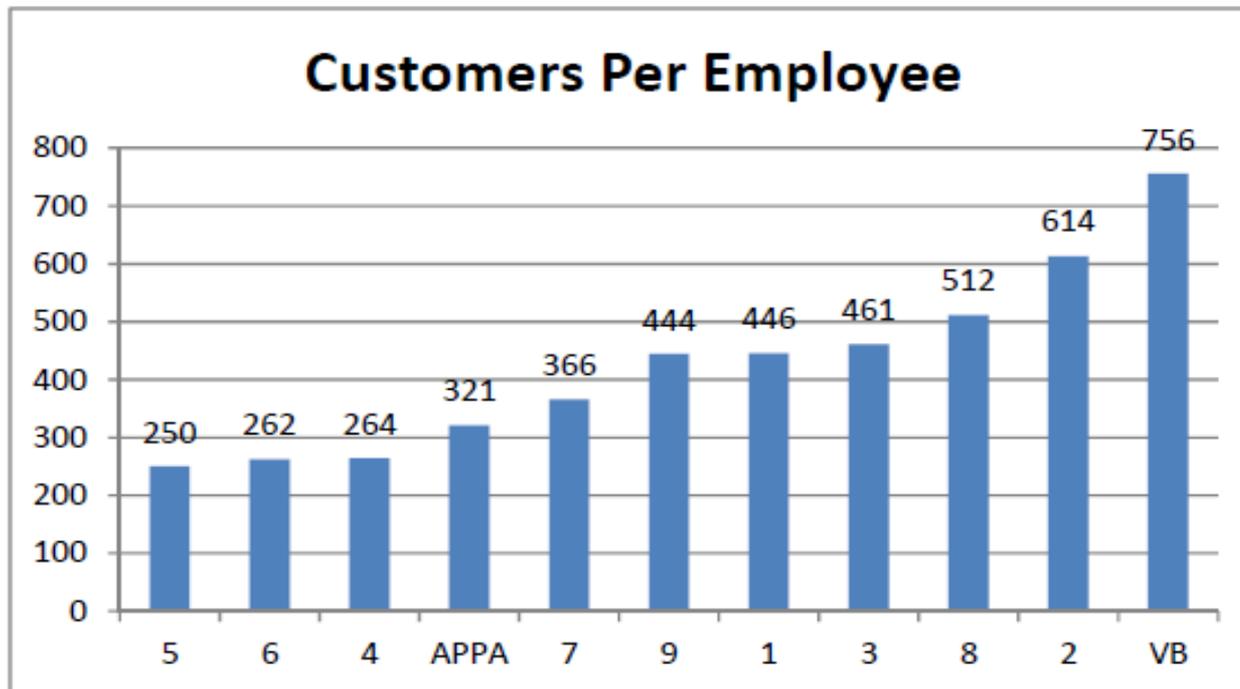
Process:

- Compared Transmission & Distribution (T&D) department against similarly sized municipalities in Florida and American Public Power Association members across the U.S.
- Analyzed City's budget and fund transfers
- Did not evaluate customer service or generation departments

Resource Adequacy (Staffing)

Findings:

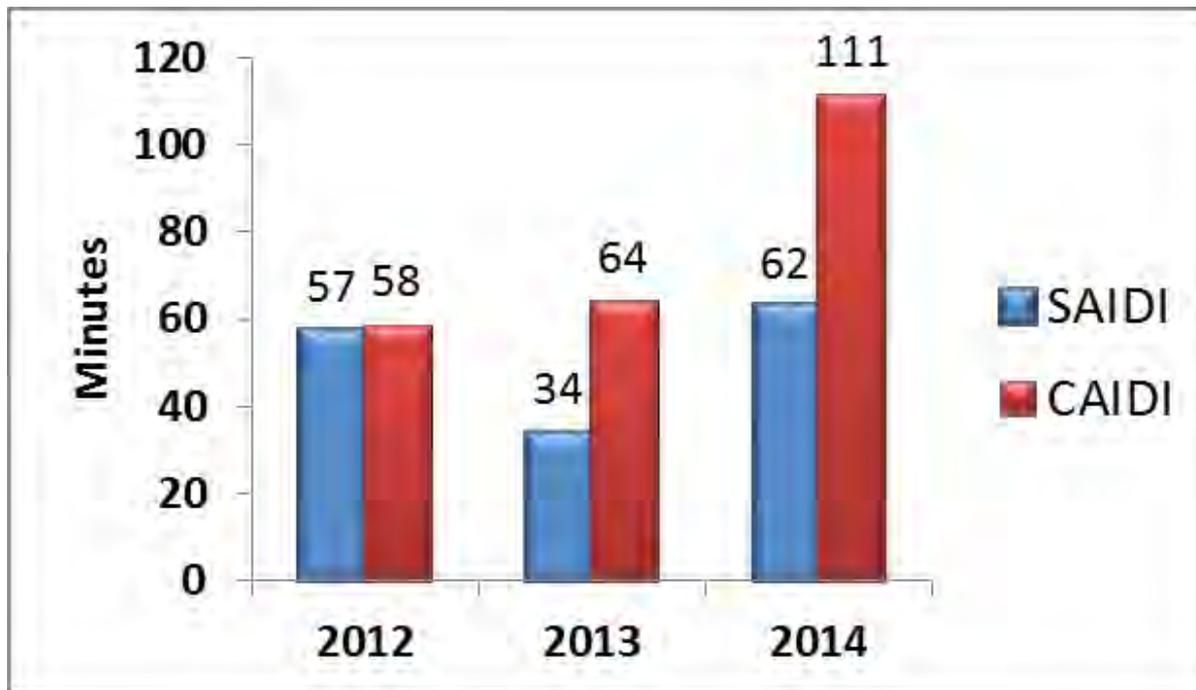
- T&D staffing levels were evaluated
- 45 positions identified at time of report



Resource Adequacy (Reliability)

Findings:

- Reliability trends indicate opportunities for improvement



Resource Adequacy

Findings:

- Based on possible sale of the electric system, routine and preventative maintenance may have suffered
- Local distribution costs (LDC) are higher than industry metrics, but consistent with Florida municipalities
 - 3.62¢ /kWh

Resource Adequacy

Recommendations:

- Create strategic plan and set goals
- Emphasize reliability
- Accelerate replacement of faulty underground cable
- Implement comprehensive meter testing program
- Evaluate staff vacancies and skillsets
- Leverage external contractors for short term support

Resource Adequacy

Current Status:

- Over the past two years, T&D department has refocused resources on preventative maintenance
- Improvements may not immediately evident
- City should invest in system and technology improvements identified in companion reports

Pole Attachment Agreements



Pole Attachment Agreements

Evaluate and recommend modernization, including safety and revenue enhancements

Process:

- Compared to recently executed agreements
- Calculated updated rates
- Considered state or local regulations

Pole Attachment Agreements

Findings:

- Agreements are outdated and do not enforce current engineering, construction, and safety standards
- Companies install facilities without permission
- City is not adequately protected and is receiving rates below costs

Pole Attachment Agreements

Recommendations:

- Implement an application and permit process; emphasize safety
- Perform an inventory
- Calculate updated rates
- Execute new agreements with both AT&T and Comcast

Current Status:

- City is working with FMPA to develop and negotiate new agreements
- Expect to execute by July 2016

20 - YEAR LONG RANGE PLAN (LRP)



20-Year Long Range Plan (LRP)

Guide orderly development of the transmission and distribution system to...

Stress the system

- Provide long-range service life
- Maintain adequate service reliability
- Mitigate early obsolescence
- Provide flexibility to adapt to growth patterns
 - Timing of growth

Evaluated three key areas:

- System Improvements
- Contingency
- System Condition

20-Year LRP - System Improvements

Process:

- Modeled and analyzed distribution system
- Estimated annual load growth rate of 2%
- Evaluated in 3 steps
 - 2016-2020 (five years)
 - 2021-2025 (five years)
 - 2026-2035 (ten years)
- Considered historical trends; current power requirements projections, and economic, environmental, and demographic factors with input from City management and engineering

20-Year LRP - System Improvements

Findings:

- Voltage and capacity issues identified throughout planning horizon (typical in LRP)
- Substation transformers overloaded
- Substation 1 is critical due to location on power plant site
 - *Emergency repair scheduled due to bus outage*

Recommendations:

- Multiple circuit upgrades and reconfigurations required
- Transformer replacements
- Majority of work scheduled in first five years

20-Year LRP - System Improvements

Item	Cost Estimate (2015 \$)			
	Step 1 2016-2020	Step 2 2021-2025	Step 3 2026-2035	Total LRP Cost
1 Line Changes	\$6,209,645	\$60,000	\$3,295,189	\$9,564,834
2 Capacitors	\$652,500			\$652,500
Total - DISTRIBUTION	\$6,862,145	\$60,000	\$3,295,189	\$10,217,334
3 Substation 7 Metalclad Switchgear	\$180,000			\$180,000
4 Substation 10 Transformer	\$1,570,000			\$1,570,000
5 Substation 1 Rebuild	\$5,544,950			\$5,544,950
6 Substation 9 Transformers		\$1,300,000		\$1,300,000
7 Substation 10 Transformer			\$650,000	\$650,000
8 Substation 11 Transformer			\$650,000	\$650,000
TOTALS	\$14,157,095	\$1,360,000	\$4,595,189	\$20,112,284

20-Year LRP - Single Contingency

Process:

- Utilize model to evaluate the worst case of a substation failure, loss of one transformer in a substation or loss of a transmission line segment
- Outcomes of various scenarios indicate where system will not meet voltage and capacity requirements

20-Year LRP - Single Contingency

Findings:

- System could be configured to serve the system demands through line backfeed
- Exception is loss of transmission between Substations 3 and 7
- The City's transmission loop and distribution switching capabilities are beneficial

Recommendations:

- Various distribution line work required
- Construct 69 kV transmission line
- Estimated cost: \$750 K

20-Year LRP - Condition Assessment

Process:

- Field visit to inspect substations and transmission
- Reviewed test records
- Identified areas that require immediate maintenance
- Separate assessment of 69 kV submarine cable

20-Year LRP - Condition Assessment

Findings and Recommendations:

O&M

- Most items may be addressed through the City's standard practices
- All work is recommended as soon as practicable, unless noted otherwise
- Estimated cost: \$177 K

69 KV submarine cable

- Cable is operating within its design capacity
- Predicted useful life is 40 years (2027)
- If future testing indicates deterioration, recommend replacing.
- Replacement cost: \$7.4 M (not in plan)

OTHER OPTIMIZATION

Flexible Communications Interface
Enabling Multiple Smart Grid Applications



Other Optimization

Determine if City is optimizing technology in current practices

Process:

- Evaluated City's current practices
- Reviewed data collection methods
- Determined technologies to be further pursued

Other Optimization

Findings:

- Many systems in place, but lack advanced capabilities
- City is pursuing an outage management system
- City has not installed advanced metering
- System is lacking in system automation and coordination
- Technology deployment requires comprehensive plan

Other Optimization

Recommendations:

- Create strategic planning approach for systematic deployment
- Deploy Advanced Metering Infrastructure (AMI)
- Evaluate Load Management and pre-paid customer programs
- Upgrade automated devices on worst performing feeders as pilot project
- Optimize transformer loading and purchase practices
- Perform a sectionalizing and coordination study (**priority**)



Cost/Benefit

<i>(\$ approximated)</i>	Investment/Cost	Annual Revenue Enhancement/Benefit
Resource Adequacy (Reliability)	\$60,000	\$100,000
Resource Adequacy (UG cable)	\$550,000	reliability
Pole Attachment	Legal/ consultation fees	\$100,000
Other Optimization	\$5,700,000	\$1,100,000
Total	\$6,310,000	\$1,300,000

Cost/Benefit

20-Year Long Range Plan	Cost Estimate
Improvements	\$20,112,284
Contingency	\$750,000
Maintenance	\$177,000
Total 20-year Long Range Plan	\$21,039,284



Questions?



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EXHIBIT F RECOMMENDED IMPROVEMENTS AND COST ESTIMATE BY STEP

City of Vero Beach Electric Distribution System 2016-2035 Long Range Plan Comprehensive Cost Estimate (2015 \$)													
Substation, Transmission, and Critical Equipment Assessment Projects (MAINTENANCE)		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026-2035	
1	Install battery room exhaust fan & control (Sub 5)	\$ 1,000											
2	Install battery room exhaust fan & control (Sub 7)	\$ 1,000											
3	Remove moisture from oil in Transformer T1 (Sub 8)	\$ 45,000											
4	Replace/remediate transformer T1 fans (Sub 9)	\$ 8,000											
5	Install battery room exhaust fan & control (Sub 9)	\$ 1,000											
6	Remove moisture from oil in Transformer T1 LTC (Sub 10)	\$ 10,000											
7	Replace surge arresters (Sub 10)	\$ 9,000											
8	Install battery room exhaust fan & control (Sub 10)	\$ 1,000											
9	Install battery room exhaust fan & control (Sub 11)	\$ 1,000											
10	Miscellaneous Substation O&M (see Appendix 5)	O&M											
11	Miscellaneous Transmission O&M (see Appendix 6)	O&M											
12	Test submarine cable (Line 69-0609) (Appendix 7)											\$ 100,000	
ANNUAL MAINTENANCE BUDGET:		\$ 77,000										\$ 100,000	
STEP 1 (2015-2019)		STEP 1					STEP 2					STEP 3	
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026-2035	
LRP IMPROVEMENTS													
13	Replace Metalclad Switchgear (Substation 7)	\$ 180,000											
14	Add Second Transformer (Substation 10 -20/37 MVA)		\$ 1,570,000										
15	Line Construction & Circuit Reconfiguration (Substations 9 & 10)		\$ 3,963,487										
16	Rebuild Substation 1 (2-30/56 MVA Transformers)			\$ 1,108,990	\$ 1,108,990	\$ 3,326,970							
17	Line Construction & Circuit Reconfiguration (various substations)					\$ 2,246,158							
18	Line capacitors (various locations)					\$ 652,500							
ANNUAL TOTAL STEP 1:		\$ 180,000	\$ 5,533,487	\$ 1,108,990	\$ 1,108,990	\$ 6,225,628							
TOTAL STEP 1:							\$ 14,157,095						
STEP 2 (2020-2024)													
19	Replace Transformers (Substation 9 - (2) 20/37 MVA)								\$ 1,300,000				
20	Line Construction & Circuit Reconfiguration (various substations)										\$ 60,000		
ANNUAL TOTAL STEP 2:							\$ -	\$ -	\$ 1,300,000	\$ -	\$ 60,000		
TOTAL STEP 2:											\$ 1,360,000		
STEP 3 (2025-2034)													
21	Replace Transformers (Substation 11 - 20/37 MVA)											\$ 650,000	
22	Replace Transformers (Substation 10 - 20/37 MVA)											\$ 650,000	
23	Line Construction & Circuit Reconfiguration (various substations)											\$ 3,295,189	
TOTAL STEP 3:												\$ 4,595,189	
TOTAL LRP IMPROVEMENTS												\$ 20,112,284	
LRP CONTINGENCY													
24	Transmission Line (1.4 miles - Substation 5 to Line 69-069)					\$ 750,000							
ANNUAL CONTINGENCY:		\$ -	\$ -	\$ -	\$ -	\$ 750,000	\$ -	\$ -	\$ -	\$ -	\$ -		
TOTAL CONTINGENCY:												\$ 750,000	
BUDGET SUMMARY		STEP 1					STEP 2					STEP 3	
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026-2035	
2016-2035 ANNUAL MAINTENANCE BUDGET		\$ 77,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000	
2016-2035 ANNUAL LRP BUDGET		\$ 180,000	\$ 5,533,487	\$ 1,108,990	\$ 1,108,990	\$ 6,975,628	\$ -	\$ -	\$ 1,300,000	\$ -	\$ 60,000	\$ 4,595,189	
2016-2035 LRP & MAINTENANCE BUDGET BY STEP		\$14,984,095					\$1,360,000					\$4,695,189	
GRAND TOTAL 2016-2035 MAINTENANCE & LONG-RANGE PLAN							\$21,039,284						