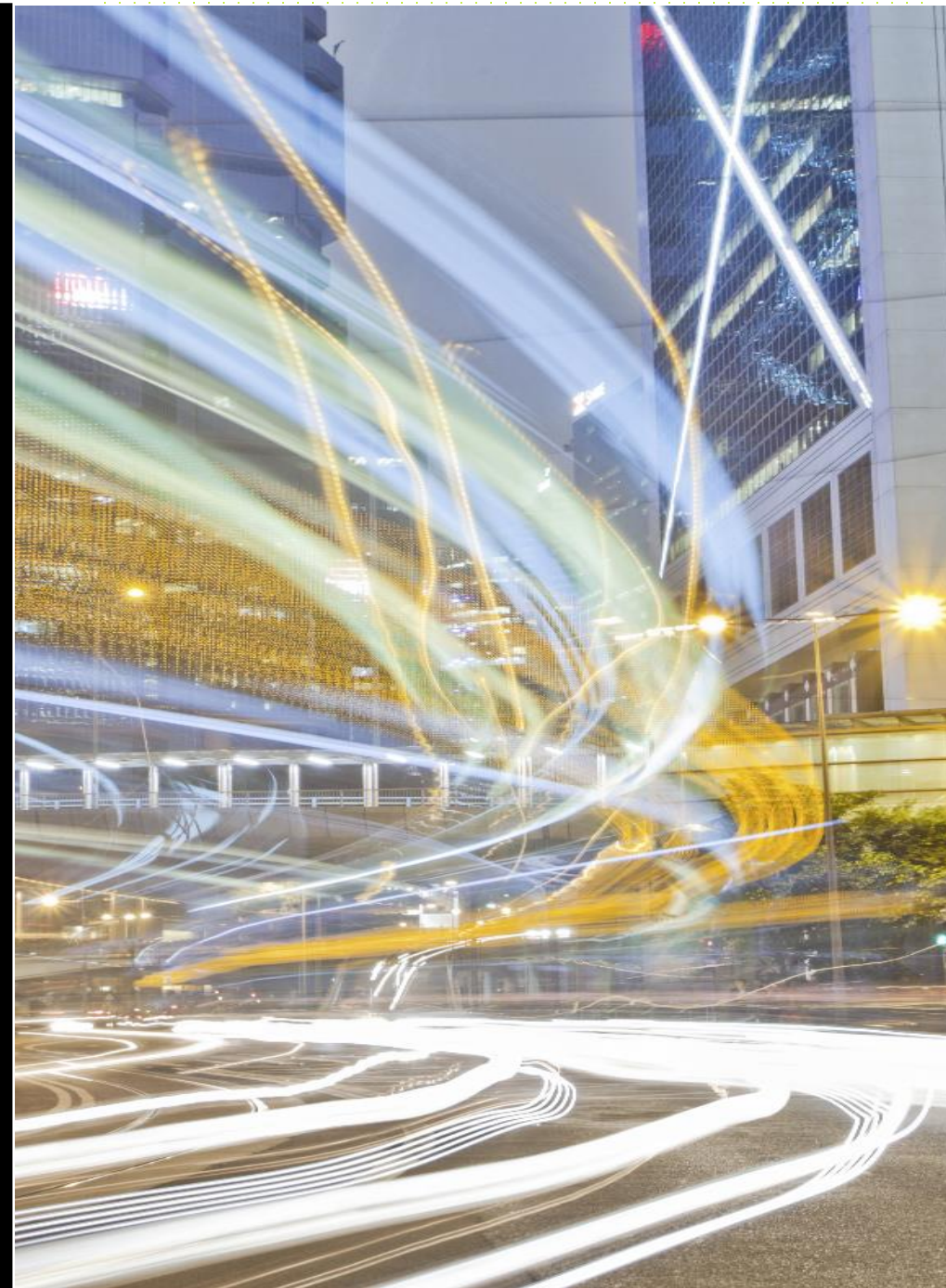


Memphis Light Gas and Water (MLGW) Operational and Organizational Assessment

City Council Presentation



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Baker Tilly and HDR

Baker Tilly and HDR have years of experience helping utilities and other public sector organizations with conducting infrastructure reviews and operational and organizational assessments. We are intimately familiar with best practices, effective use of technology and sound internal controls across utility departments.

Our utility client list includes:

- Black Hills Energy
- Detroit Water and Sewerage Department
- Duke Energy
- Grand River Dam Authority
- Gainesville Regional Utilities
- Lower Colorado River Authority
- New Orleans
- Orlando Utilities Commission
- Sacramento Municipal Utility District
- San Francisco Public Utilities Commission



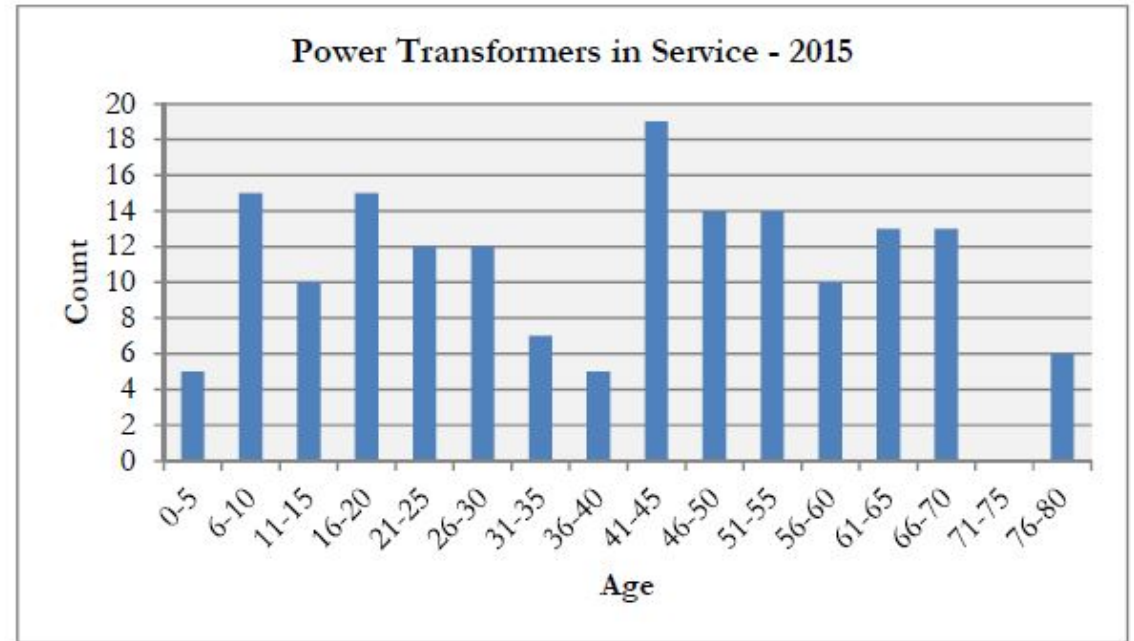
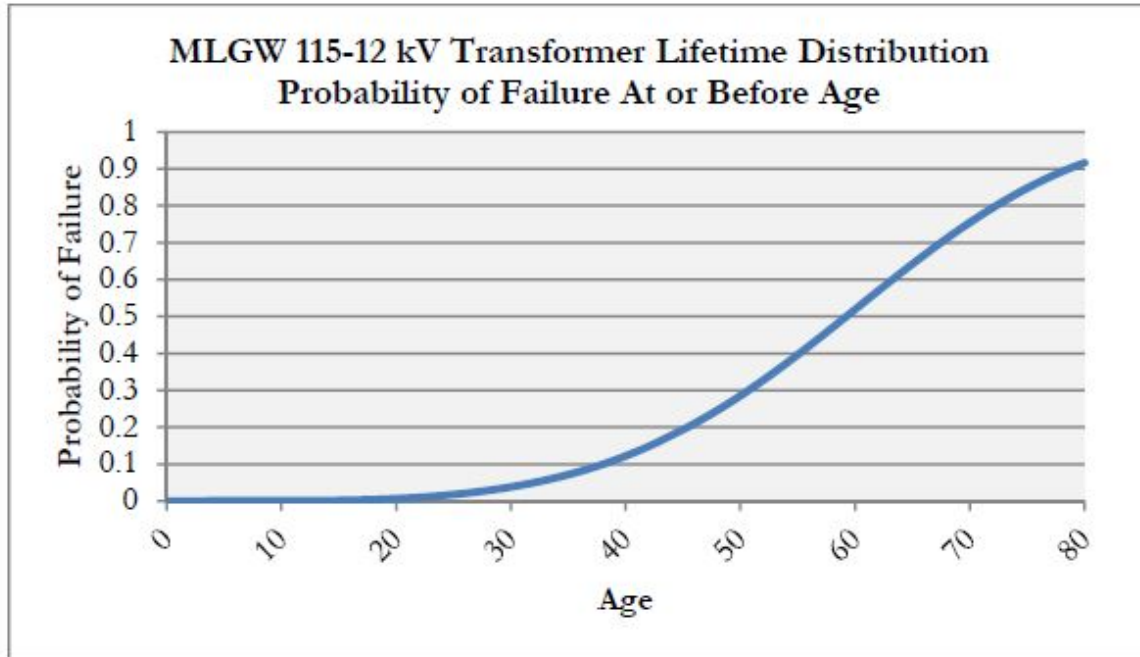
Key Project Takeaways

- We recommend MLGW and the City of Memphis take immediate action to implement infrastructure improvement programs; deferred infrastructure investment has created urgent needs in order to maintain reliable service.
- Further delay may result in:
 - Critical infrastructure failures leading to interruption in service
 - Increased implementation costs
 - Reduced ability to apply temporary fixes
- Operational improvements can be implemented with the intention to:
 - Realize cost savings
 - Enable effective implementation of infrastructure improvement programs

Electric Infrastructure Risk Register

Risk Statement	Probability	Impact	Exposure
Asset Affiliation	(1,2,3,4,5)	(1,2,3,4,5)	
	Probability of event (1 = lowest) .	Estimate severity of the risk.	Probability x Impact.
Condition Assessment Risks			
Transformer Capacity	2	4	8
Asset life	3	4	12
Open Wire Secondary	5	2	10
Wood Pole Replacement	5	2	10
Underground Replacement	5	2	10
Operational & Commissioning Risks			
Grid Modernization	2	5	10
Vegetation Management	4	3	12
Design Standard Risks			
Electronic Controls	3	4	12

Power Transformers



Vegetation



Gas Infrastructure Risk Register

Risk Statement	Probability	Impact	Exposure
Asset Affiliation	(1,2,3,4,5)	(1,2,3,4,5)	
	Probability the risk will occur (1 = lowest)	Estimate severity of the risk.	Probability x Impact
Condition Assessment Risk			
Regulator Stations	4	3	12
Vault Replacement	3	4	12
Rectifier and Anode Bed	3	5	15
Steel Service Replacement	4	3	12
Casing Replacement	4	4	16
PVC Replacement	5	3	15
Cast Iron Replacement	5	3	15
Operational Risks			
SCADA Communications	4	2	8
Pipeline Re-Classification	2	2	4
ILI Inspection	2	4	8
MAOP / Material Verification	2	4	8
Document Management	4	3	12
Safety Risks			
Lead Abatement	2	2	4

Obsolete Equipment





MASTER PLAN
MLGW's Natural Gas System



2020 - 2024



MASTER PLAN

Water Infrastructure Risk Register

Risk Statement	Probability	Impact	Exposure
Asset Affiliation	(1,2,3,4,5)	(1,2,3,4,5)	
	Probability of event (1 = lowest) .	Estimate severity of the risk.	Probability x Impact.
Condition Assessment Risks			
Pumping Stations	4	3	12
Pumping Stations	5	3	15
Pumping Stations	4	3	12
Facility Resiliency	4	3	12
Equipment Repair	4	3	12
Maintenance Tracking	3	3	9
Pumping Stations	3	3	9
Pumping Stations Electrical	4	2	8
Booster Pumping Stations	4	2	8
Operational Risks			
Well Capacity	4	4	16
Key Facility Resiliency	4	3	12
Growth Area Supplies	4	3	12
Standard Processes	4	2	8
Renewal Processes	3	2	6
Renewal Processes	3	2	6
Operational Approach	3	3	9
Operations Capacity	3	3	9

Water Infrastructure Risk Register (cont.)

Risk Statement	Probability	Impact	Exposure
Asset Affiliation	(1,2,3,4,5)	(1,2,3,4,5)	
	Probability of event (1 = lowest) .	Estimate severity of the risk.	Probability x Impact.
Safety Risks			
Electrical Safety	4	3	12
Operational Safety	3	3	9
Lead//Asbestos Safety	2	2	4
Structural Safety	1	5	5
Safety Assessment	2	4	8
Engineering / Design Risks			
VFD Designs	3	1	3
Pump Hydraulic	4	2	8
Model Refinement	4	3	12
Control Replacement	3	2	6
District Metering	2	3	6
Main Replacement	3	2	6
Asset Priority	3	2	6

MLGW System Resiliency Review



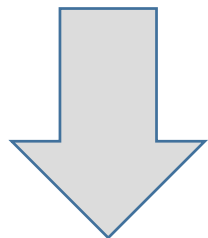
	PLANT DETAILS (MGD)									
	Mallory	Sheahan	Allen	Lichterman	Morton	Davis	McCord	Shaw	LNG	Palmer
AVG DAY	11.6	9.8	12.8	16.1	13.0	14.4	14.5	17.7	0.5	3.6
PEAK DAY	15.6	15.4	15.0	22.2	15.7	18.4	16.3	21.3	0.6	4.8
RATED PLANT CAPACITY	35.0	35.0	30.0	30.0	30.0	30.0	35.0	30.0	1.1	5.5
AVG DAY (%)	33.2	28.1	42.6	53.6	43.4	48.0	41.4	58.9	46.4	66.0
PEAK DAY (%)	44.6	44.1	50.2	73.9	52.4	61.4	46.5	71.1	58.4	86.4
WELL RELIABILITY CLASS 1-2	18.0	18.5	13.4	8.2	24.6	13.6	15.9	32.6	-	-
WELL RELIABILITY CLASS 3	7.4	16.4	7.4	21.2	-	6.6	7.0	-	2.4	5.1
ASSESSED WELL RELIABILITY	19.9	24.9	15.8	18.0	22.1	15.5	17.8	29.3	1.2	2.6
FILTER CAPACITY W/ OOS	35.0	35.0						22.5	1.2	5.5
HSP ON-LINE CAPACITY	35.0	15.0						21.0	1.1	5.5
FACILITY RELIABLE CAPACITY ³	19.9	15.0	15.8	17.6	22.1	15.5	15.0	21.0	1.1	2.6
RELIABILITY / RATED CAPACITY	0.6	0.4	0.5	0.6	0.7	0.5	0.4	0.7	1.0	0.5
AVG DAY (%)	58.4	65.5	80.9	91.4	58.9	92.8	96.5	84.1	46.4	139.6
PEAK DAY (%)	78.5	102.8	95.2	125.9	71.1	118.8	108.5	101.6	58.4	182.8

Rated System Capacity – 261 MGD
Reliable System Delivery – 146 MGD (56%)

Comparable Water Utilities

- Similar age of many key assets (production facilities were built around same time)
- Similarity of distribution network age and materials
- Regional compatibility from regulatory to economic factors
- Service area population

Utility	Production Capacity	2018 Water Delivered to Mains	2018 Average Daily Pumpage	2018 Maximum Daily Pumpage	No. of Customers	Service Area Size	2018 Operating Expense	2018 Water Revenue	2018 Capital Expenditures	Projected Capital Budget (\$000s)	
	MG	MG	MGD	MGD		(miles of main)	(\$000s)	(\$000s)	(\$000s)	2019	2020
Louisville Water	240	43,570	119	152	316,482	4,233	137,624	191,998	111,000	105,000	-
Cincinnati Water	260	44,184	121	157.2	240,336	3,176	75,980	147,519	83,790	85,864	89,063
City of St. Louis	380	43,500	119	-	92,188	-	50,036	55,779	-	-	-
New Orleans	250	54,140	146	-	135,000	1,834	106,761	\$109,900	72,487	48,343	115,000
Columbus	255	48,800	134	-	278,139	3,541	113,447	198,982	87,500	149,473	165,440
Memphis	261	43,500	119	144	254,000	3,943	50,600	103,000	32,340		



- Per customer revenue is lower than all comparable utilities
- Per customer operating and maintenance expenses are lower than all comparable utilities
- Capital investment as a percentage of revenue is lower than all comparable water utilities
- Capital investment as a percentage of customer base is lower than all comparable utilities

Operational Improvements and Cost Savings

- ❑ Reductions in staff: up to \$30M-\$35M
- ❑ Community office closures: up to \$7M
- ❑ FMLA process improvements: up to \$600K
- ❑ Meter opt-out cost recovery: up to \$2.5M
- ❑ Additional opportunities:
 - ❑ Workers' Comp reduction: up to \$70k
 - ❑ Commercial Residential Engineering cost recovery: up to \$55k



Operational Improvements with Potential Cost Savings

- Procurement process redesign and higher approval limits
- Enhanced inventory management and reduction in carrying costs
- IT portfolio management and strategic planning
- Remediation of system issues
- Cloud storage
- Improved fleet management
- Human capital management (classification and compensation, succession planning, etc.)

Low Priority Focus Areas

Due to the timeline of this engagement, the observations below could not be explored in detail; however, MLGW is encouraged to explore these observations further in cases where there may be additional cost reduction, revenue, risk mitigation, or strategy.

Customer Service Call Center Shifts	PPE Testing	Compensatory Time	Land Mapping	Dark Fiber Lease	Claims for Damaged Assets
Share the Pennies Program	Payment Kiosks	CNG Fuel Consumption	Oracle Helpdesk	IT Project Management	Enterprise Risk Management