National Scores

- G.P.A.: C-
- Energy: C-
- Drinking Water: C-
- Wastewater: D+
In Memphis, residents in the city of 650,000 were told for nearly a week to boil water...

...at least 7 million Texans were told to boil their water

In Shreveport, where about 200,000 people were being told to boil their water, Mayor Adrian Perkins pointed to “old, aging infrastructure, just like most American cities.”

Mayor Chokwe Antar Lumumba (Jackson, MS) said close to $2 billion is required to modernize its water system...Monday was the first time in a week that residents could line up for water outside of Madonna Manor, a 13-floor apartment complex for seniors and people with disabilities. People brought laundry pails, bowls, buckets and wastebaskets.
Overview

- Century II
  - Purpose
  - History
  - Evolution
  - Accomplishments

- Major upcoming projects and programs

- Electric budget does not include broadband (separate)
**Electric System**

**Customers:** 211,812

**Service Territory:** 688 square miles

**Electric Lines:** 5,417 miles
- Distribution Overhead: 4,052 miles
- Distribution Underground: 1,099 miles
- Transmission: 266 miles

**Infeed Substations:** 9

**Substations:** 63

**System Capacity:** 3,029,500 kVA

**Peak Hourly Demands:**
- Winter: 1,332 MW (Feb. 2015)
- Summer: 1,235 MW (Aug. 2007)
Electric Century II Focuses on Reliability

- Data driven
- Requires investments in maintenance, infrastructure and technology
- System maintenance
  - Vegetation – 63% of outages
  - Inspection
- Century II infrastructure replacement
- Grid modernization and system automation

FY20 Outage Causes

- Vegetation Out of Zone 45%
- Vegetation In Zone 18%
- Unknown 9%
- Lightning 3%
- Equipment Failure 2%
- Damage By Others 8%
- Animals 15%
- Equipment Failure 2%
Century II for Electric Began in 2011

- **Substation Transformers:**
  - Prioritized upgrades
  - 65% had contingency capacity

- **Transmission Lines:** improve links between substations

- **Poles:** 50-year cycle

- **UG Cable:** initial focus on direct buried cable

- **Downtown Network:** began with vault upgrades

![KUB Wood Poles by Installation Decade](Source: 2008 Comprehensive Assessment)
Century II Electric Has Evolved

- Poles: 2,600 annual replacement target modified based on evolution of data and planning
  - Initial work replaced oldest, worst poles
  - Circuit based approach considers pole condition, conductor size, vegetation needs, etc.
  - Prioritize circuits by outages (customer interruptions)

- Substations: comprehensive evaluation extended replacement timeline from 10 to 20 years
Century II Accomplishments

- Substations: +50 percent upgraded
- Poles: +23,000 poles replaced
  - First cycle replaced 2,600 poles/year
  - Current LRP replacement rate 1,400/year
  - Future rate based on upcoming pole assessment
- Underground Cable: 90 percent direct buried replaced; cable in conduit next
- Transmission Lines and Fiber Optic Cable: 145 of 265 miles complete, remainder by FY30
- Grid modernization and distribution automation maturing
Grid Modernization Investments Necessary to Improve Reliability, Reduce Outage Time

- Outages and minutes improving this FY
- Century II + Grid Modernization
  - Substation upgrades
  - Transmission, distribution circuit rebuilds
  - Distribution automation
  - Vegetation management
Vegetation Causes Over 60 Percent of Outages

- Ramping up to $14M/year ($11.9M FY22)
- Returning to historic trim levels ~ 1000 miles/year
- Hazardous tree removal outside trim zone
- Strategic insourcing
  - Foresters
  - Vegetation crew
New Western Avenue Infeed Substation

- Adds capacity and resiliency
- Allows operational flexibility for transmission line and substation upgrades
- Partnering with TVA
  - TVA lines cross property
  - TVA building adjacent switching station
- $17M in FY21 – FY23 ($3.5M FY22)
Other Major Upcoming Projects FY22

- Transmission Lines: $12.8M
  - Millertown Pike area
  - Morrell Road area
  - Cunningham Road / Halls area

- Distribution Lines: $9.6M
  - Outage prioritization for circuits
  - Includes distribution automation

- Pole Inspection: $1.5M
  - Paused during pandemic
  - Completion date Dec 2021

- Community Solar: $1.5M
Knoxville’s First Community Solar Project

- $1.5M investment
- Up to 700 kW of solar on City-owned site
- Provides option for customers to invest in local solar
- In partnership with City of Knoxville and TVA
- Green Invest solar purchase (502 MW; $1.6M annually)
Grid Modernization Investments Growing

- New and higher expectations of electric grid
- Fiber is key to modernizing KUB electric facilities
  - Provides instant, reliable communication platform
  - Supports system reliability, load management, efficiency
- Future applications
  - Wider adoption of electric vehicles
  - Expansion of solar utilization
  - Home batteries
  - Next generation of advance metering
Industry Recognition for Electric System

- Reliable Public Power Provider (RP3) Diamond Level Designation
- Tree Line USA
Customers: 105,382

Service Territory: 293 square miles

Mains: 2,517 miles
Distribution
Steel: 154 miles
Plastic (MDPE): 2,288 miles
Higher pressure
Steel: 69 miles
Plastic (HDPE): 6 miles

Gate Stations: 3

Regulator Stations: 48

System Capacity: 157,381 dth

Peak Demand: 140,204 dth (Jan. 2018)
Customer Demand Growing

Annual New Services

Linear (Annual New Services)
Natural Gas Century II Supports Growth

- Pipeline extensions provide customer choice
  - Choto community
  - Northern expansion to Raccoon Valley
  - Hardin Valley
- Connect to Comfort
Century II for Natural Gas Began in 2012

- Newest system
- Original priority: replacement of cast iron / ductile iron pipe
- Distribution Integrity Management Program (DIMP) now drives Century II investments

![Pie chart showing percentages of newer and older types of pipes.]

**Newer Types:**
- Polyethylene: 90%
- Low-pressure Steel: 7%
- High-pressure Steel: 3%

**Older Types:**
- Low-pressure Steel: 90%
Distribution Integrity Management Program Drives Century II Investments

**DIMP Objectives**
- Know your system
- Identify risk
- Evaluate and rank priorities
- Identify and implement measures
- Measure and evaluate performance for effectiveness
- Evaluate and improve if needed
- Report results

**DIMP Programs**
- Low Pressure Steel Replacement
- Resiliency Program
- Leak survey
- Cathodic protection
- Records management
Major System Projects

- Low-Pressure Steel ($2.3M)
  - Crestwood Hills ($1M)
  - Belmont West ($800K)
- John Sevier Hwy ($2.5M)
  - $2.2M for construction in FY22
- Downtown West ($2.8M)
  - $2.4M for construction in FY22
- Lovell Rd Ph 1 ($11.4M)
  - Knox Co Hwy project
  - $600K for design, easements in FY22
Industry Recognition for Gas System

Prepared by Kimley-Horn (2020)
- Operations
- Regulatory
- System Integrity

Reinforced current priorities

Provides strategic considerations for longer-term system resiliency

“Overall, it was shown that KUB operates a very robust natural gas system and incorporates the best industry practices into its operations.”

“KUB’s system is currently in excellent operational condition.”

- Michael Alexander, P.E.

American Public Gas Association System Operational Achievement Recognition

Silver Award 2018
Awaiting 2021 application
Honors excellence in:
- System integrity
- System improvement
- Employee safety
- Workforce development
Customers: 72,505

Service Territory: 243 square miles

Treatment Plants: 4

Lift Stations: 63

Collection Mains: 1,318 miles

Storage Capacity: 34 MG

Plant Maximum Capacity: 173 MGD

Average Flow: 45.62 MGD

Consent Decree: 2005 – 2021
Focus on Reducing Overflows at Manholes

- Wastewater plants
  - Finalizing Consent Decree
  - Modernizing treatment disinfection methods
- Collection system
  - Continuing to upgrade lines
  - Expanding and
History of PACE10 and Century II for WW

- PACE10 started in 2004
  - EPA Consent Decree
  - $530M for 134 collection system projects
  - $120M for upgrades at two WWTPs
  - Inspections/monitoring programs

Now incorporated into Century II
Century II for Wastewater Has Evolved

- Consent Decree projects near completion
- Plant inspections formalized
- Tank and pump station prioritized by modeling and inspections
- Focus on areas with repeat manhole (MH) overflows
- Utilize hydraulic modeling for solutions
Century II Improves Wastewater System

- 35% of system upgraded
- Reduced older pipe types from 75% to 40%
- 83% of pump stations upgraded
- Installed 6 storage tanks
- Invested $120M in plant improvements
- Significant reduction in MH overflows

Manhole Overflows Reduced by 70%

Miles of Pipe

- 420 Miles Replaced
- 2004: 1180 mi
- 2020: 1221 mi
- 75% Older Pipe Types
- 40% Older Pipe Types
- Plastic
- Lined
- Ductile Iron
- Clay/Concrete

Pipe Types

- Plastic
- Lined
- Ductile Iron
- Clay/Concrete

Dry
- 306 mi
- 460 mi
- 536 mi

Wet
- 850 mi
- 61 mi
- 164 mi

Manholes
- Reduced by 70%

Graphs showing the reduction in manhole overflows from 2003 to 2020.
Sustainable Pace of Century II Sewer Rehab

**Original Target**
- 25 mi/yr
- 2% of system
- 50-yr life cycle

**Average 16.5 mi/yr in LRP**
- 1.4% of system
- 73-yr life cycle

**New Target 20 mi/yr**
- 1.6% of system
- 60-yr life cycle

CII Average FY04-FY21

<table>
<thead>
<tr>
<th>Year</th>
<th>Miles per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY22</td>
<td>10</td>
</tr>
<tr>
<td>FY23</td>
<td>12</td>
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<tr>
<td>FY24</td>
<td>15</td>
</tr>
<tr>
<td>FY25</td>
<td>12</td>
</tr>
<tr>
<td>FY26</td>
<td>12</td>
</tr>
<tr>
<td>FY27</td>
<td>12</td>
</tr>
<tr>
<td>FY28</td>
<td>12</td>
</tr>
<tr>
<td>FY29</td>
<td>12</td>
</tr>
<tr>
<td>FY30</td>
<td>12</td>
</tr>
</tbody>
</table>
Closing Out the Consent Decree

- Complete final CD project
- Incorporate programs into O&M Manual
  - Inspection of system
  - Blockage Abatement
  - Flow-monitoring
- Formally finalize CD with EPA
- Reduced reporting requirements
- Budget decreases and levels out
- Commitment to Century II remains

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwahee WWTP CCP Phase I</td>
<td>$51M</td>
<td>✔️</td>
</tr>
<tr>
<td>Fourth Creek WWTP CCP Phase I</td>
<td>$20M</td>
<td>✔️</td>
</tr>
<tr>
<td>134 Collection System Projects</td>
<td>$530M</td>
<td>✔️</td>
</tr>
<tr>
<td>Fourth Creek WWTP CCP Phase II</td>
<td>$4.7M</td>
<td>✔️</td>
</tr>
<tr>
<td>Kuwahee WWTP CCP Phase II</td>
<td>$48M</td>
<td>75%</td>
</tr>
</tbody>
</table>
Major Upcoming Projects

- Wastewater pipe upgrades $11.6M FY22 - $166M LRP
- Jones Street Pump Station & Force Main $14.2M FY21-22
- Kuwahee Primaries Deck $6.1M FY21-23
- Fourth Creek Disinfection $3.4M FY21-23
- Loves Creek Electrical $5.1M FY21-23
- Walker Springs Pump Station & Force Main $5.5M FY23
Positive Relationship with Regulators

- All CD requirements nearly complete
  - Budget of $650M on track
  - Final project in progress
- 54 plant operational awards from National Association of Clean Water Agencies in past 15 years
- Maintained Platinum level Biosolids Reuse Program

“KUB has shown tremendous progress in controlling unpermitted discharges since entering into the Consent Decree.”
- Dennis Sayre, EPA Acting Chief Municipal and Industrial Enforcement Branch, 2018
Customers: 81,225

Service Territory: 188 square miles

Treatment Plant: 1

Pump Stations: 26

Storage Facilities: 28

Distribution Mains: 1,410 miles

Plant Capacity: 62.9 million gallons/day (MGD)

Reservoir Capacity: 36.9 million gallons

Treated Water: 12.7 billion gallons annually
Water: Focus on Resiliency

- MBW Water Plant
  - Single source of water for community
  - Multi-year plan to provide dual treatment train

- Distribution system
  - Building system resiliency
History of Century II for Water

- Developed in 2006 due to increase in main breaks
- Modeled after PACE10
- Review of assets with focus on pipe
- Pipe prioritization based on available data
  - Repair history by pipe type
  - Pipe size, type, and age
  - Industry pipe life expectancy

![Annual Repairs per mile (2000 – 2005)]
Century II for Water Has Evolved

- Water Supply Master Plan developed
- Tanks and pump stations prioritized by data
- Expanded valve inspections
  - Distribution 5-yr cycle
  - Transmission 2-yr cycle
- Inspections by KUB vs contractor
- New programs for pipe prioritizations
  - District Metering Areas
  - Find and Fix successful pilot
Century II Improves Water System

- Upgraded 200 miles of pipe
  - System composed of 64% newer pipe vs 50% in 2006
  - Galvanized nearly eliminated
- Pipe repairs down by 57%
  - Enhanced data-driven replacement of pipe
Temporary Reduction in Pace of Pipe Upgrades

Miles per Year

- Average 11.4 mi/yr in LRP
- 0.8% of system
- 125-yr life cycle

- Target 14 mi/yr
- 1% of system
- 100-yr life cycle
Major Upcoming Projects

- **Filters**
  - Six new filters provide 38 MGD treatment capacity
  - Cost estimate: $50.6M
  - Bid this summer
  - Construction in FY22 – FY24

- **Century II pipe replacement**
  - Complete galvanized by FY24
  - Increased data drives cast iron and cement pipe replacement
  - $4M FY22 - $76M LRP

### Process Cost Estimate Timeframe

<table>
<thead>
<tr>
<th>Process</th>
<th>Cost Estimate</th>
<th>Timeframe</th>
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</thead>
<tbody>
<tr>
<td>High Service Main</td>
<td>$2.2M</td>
<td>FY17 – FY18</td>
</tr>
<tr>
<td>Ph 1 EL upgrades</td>
<td>$2.3M</td>
<td>FY17 – FY18</td>
</tr>
<tr>
<td>Generators</td>
<td>$12.9M</td>
<td>FY19 – FY21</td>
</tr>
<tr>
<td>Filters</td>
<td>$50.6M</td>
<td>FY22 – FY24</td>
</tr>
<tr>
<td>Raw Water Main</td>
<td>$6.8M</td>
<td>FY24 – FY25</td>
</tr>
<tr>
<td>Ph 2 EL upgrades</td>
<td>$3.2M</td>
<td>FY25 – FY26</td>
</tr>
<tr>
<td>High Service Pump Station and Clearwell</td>
<td>$23.3M</td>
<td>FY26 – FY29</td>
</tr>
<tr>
<td>Source Water Resiliency</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**Complete**  **Design Complete**  **Planning Phase**
Industry Recognition for Water System

- **TDEC Inspection**
  - 2019 score was 99.8%
  - Next inspection in 2021

- **Water Quality Lab**
  - Perfect scores on past 2 inspections (every 3 years)
  - Certified for more tests than any other public water system in Tennessee
Our Mission

Our mission is to act as good stewards of our communities’ resources: utility assets, customers dollars, and the environment. We work to safeguard those resources and enhance their value for the people of the communities we serve and generations to come.
Our Financial Strategy Supports Our Mission

- Debt
- Rates
- Cost Management
- Customer Growth
Budgeting Approach & Background

• Divisions are financially independent
• Balanced Approach
  o Maintenance and Replacement of Assets
  o Rates and Debt
• Consent Decree impacts
• Century II programs address aging infrastructure
KUB’s Capital Needs Increased with Consent Decree & Century II

- Wastewater capital spending accelerated in 2005 with Consent Decree
- Century II programs for electric, gas, and water fully implemented in FY 12
Debt Levels Have Increased to Help Fund Capital Requirements

Outstanding Bonds - Millions ($)

Year: 2000 to 2020

- Electric
- Gas
- Water
- Wastewater

Graph shows a significant increase in outstanding bonds, particularly in Wastewater and Electric sectors.
<table>
<thead>
<tr>
<th>Current Bond Ratings</th>
<th>S&amp;P</th>
<th>Moody’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>AA</td>
<td>Aa2</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>AA</td>
<td>Aa2</td>
</tr>
<tr>
<td>Water</td>
<td>AAA</td>
<td>Aa1</td>
</tr>
<tr>
<td>Wastewater</td>
<td>AA+</td>
<td>Aa2</td>
</tr>
</tbody>
</table>

“Based on S&P’s financial management assessment, we view KUB to be ‘1’ on a scale of 1-6, with ‘1’ being the strongest.”
— Standard & Poor’s

“KUB has a long-standing history of well-managed operations, sound fiscal planning, and well-developed asset management plans.”
— Moody’s Investors Service
Rates Instrumental in Funding Consent Decree & Century II

- Two large wastewater rate increases in 2005 and 2007, with smaller increases every other year through 2012
- Small, annual rate increases beginning 2011 for electric and water; 2014 for gas and wastewater
- No rate increases in FY 21 – eliminated or deferred due to Pandemic
Customer Growth Supports Finances

- 2019 highest level since 2008
- Steady during pandemic
- Business growth
  - Fresenius
  - Lifetime Products
  - Town of Dandridge
  - Carpenter Creek
  - Duracap Asphalt
Focus on Cost Management

- $65M saved since 2005
- Staffing savings
- Medical plan savings
- Operating efficiencies
  - Workforce mix
  - Improved processes
  - Technology
- Debt refinancing
- Project deferrals
**Proposed FY22 Budget: $934M**

<table>
<thead>
<tr>
<th></th>
<th>Electric</th>
<th>Gas</th>
<th>Water</th>
<th>Wastewater</th>
<th>Total</th>
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<tbody>
<tr>
<td><strong>Energy Cost</strong></td>
<td>$406.1</td>
<td>$57.5</td>
<td>$ ---</td>
<td>$ ---</td>
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<tr>
<td><strong>O&amp;M</strong></td>
<td>$70.3</td>
<td>$24.1</td>
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<td>$167.1</td>
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<tr>
<td><strong>Capital</strong></td>
<td>$73.2</td>
<td>$30.1</td>
<td>$26.9</td>
<td>$47.5</td>
<td>$177.7</td>
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<tr>
<td><strong>Debt Service</strong></td>
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<td>$10.9</td>
<td>$14.3</td>
<td>$34.1</td>
<td>$84.2</td>
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<tr>
<td><strong>Taxes and Equivalents</strong></td>
<td>$21.5</td>
<td>$8.8</td>
<td>$5.1</td>
<td>$6.2</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>$131.4</strong></td>
<td><strong>$78.9</strong></td>
<td><strong>$127.9</strong></td>
<td><strong>$934.2</strong></td>
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## Major Expenditures

<table>
<thead>
<tr>
<th></th>
<th>O&amp;M</th>
<th>Capital</th>
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</thead>
<tbody>
<tr>
<td>Vegetation Management</td>
<td>$11.9M</td>
<td></td>
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<tr>
<td>Utilities</td>
<td>$8.8M</td>
<td></td>
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<tr>
<td>MBW Water Plant Filter Project</td>
<td></td>
<td>$10.7M</td>
</tr>
<tr>
<td>Jones Street WW Pump Station</td>
<td></td>
<td>$9.7M</td>
</tr>
<tr>
<td>Kuwahee WW Plant Clarifiers</td>
<td></td>
<td>$4.7M</td>
</tr>
</tbody>
</table>
Funding FY 22 Budget

Budget = $934M

- Wholesale Energy = 50%
- O&M = 18%
- Capital = 19%
- Debt Service = 9%
- Taxes and Equivalents = 4%

Funding = $934M

- System Revenues = 93%
- Bonds = 3%
- Cash on Hand = 4%
## Pandemic Rate Response

<table>
<thead>
<tr>
<th>Rate Increases*</th>
<th>FY21</th>
<th>-</th>
<th>FY22</th>
<th>-</th>
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<tbody>
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<td></td>
<td>Planned</td>
<td>Actual</td>
<td>Planned</td>
<td>Proposed</td>
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<tr>
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<td>0%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Natural Gas</td>
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<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Water</td>
<td>5%</td>
<td>0%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Wastewater</td>
<td>2.25%</td>
<td>0%</td>
<td>2.25%</td>
<td>0%</td>
</tr>
</tbody>
</table>

*As projected to KUB’s Board fall 2019
Water Rate Increase Supports Resiliency

• 2% rate increase effective summer 2021
• Approximately 65 cents on residential bill based on usage
• Supports Century II and Water Resiliency projects suspended in pandemic
• No water rate increases since summer 2019
Water Residential Bill Comparison

Monthly Bill ($)

- FUD: $19
- NEKUD: $26
- WKUD: $27
- KUB: $28
- KUB projected: $29
- Knox-Chap: $42
- HPUD: $44