Helping KUB Customers Stay Warm

- Established in 1983 by KUB and CAC
- Provides emergency heating assistance for low income customers
- Covers electricity, natural gas, propane, heating oil, wood, and coal
- 501(c)(3) charitable organization governed by a community member Board
Many Ways to Contribute

- Annual campaign with local partners
- Recurring monthly pledge with bill payment
- One-time contributions
  - KUB.org
  - Back of bill stub
  - Events
  - KUB Connections and bill stuffers
Community Partners Provide Support
Partnerships Lead to Successful Campaigns
## 2,700 Families Helped in Five Years

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Families Assisted</td>
<td>863</td>
<td>283</td>
<td>667</td>
<td>382</td>
<td>504</td>
</tr>
<tr>
<td>Project Help Funds Provided</td>
<td>$266,398</td>
<td>$87,743</td>
<td>$196,878</td>
<td>$109,397</td>
<td>$153,005</td>
</tr>
<tr>
<td>Average Per Household</td>
<td>$309</td>
<td>$310</td>
<td>$295</td>
<td>$287</td>
<td>$304</td>
</tr>
</tbody>
</table>
“Thank you for helping my family and I. We appreciate it more that you know! .... Thank goodness for agencies such as yours who still help. It helps the community become a better place.”

“Thank you so much for your helping. It means a lot to me and my two sons .... Thank you from my family from the bottom of our hearts!”
Electric Vehicles (EVs)

March 14, 2019

KUB
Transportation is a Major Source of Green House Gas Emissions

The average car generates 0.9 pounds of CO$_2$ for every mile driven.
EVs Reduce Emissions

- Replacing a single gasoline vehicle with 100% EV
  - Cuts CO$_2$ emissions 4 to 6 tons annually
  - Equal to planting 2,000 trees
EVs are Less Expensive to Operate

- Fuel cost about 60% less or about $650 per year fuel savings
- No oil changes
- Significantly less brake wear
# Automakers’ Plans Support EVs

<table>
<thead>
<tr>
<th>Automaker</th>
<th>Number of Electrified Vehicles</th>
<th>Number of All-Electric Vehicles</th>
<th>Year Promised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audi</td>
<td>20</td>
<td>10</td>
<td>2025</td>
</tr>
<tr>
<td>BMW</td>
<td>25</td>
<td>12</td>
<td>2025</td>
</tr>
<tr>
<td>Fiat Chrysler</td>
<td>One-half of vehicle lineup</td>
<td>Not specified</td>
<td>2022</td>
</tr>
<tr>
<td>Ford</td>
<td>40</td>
<td>16</td>
<td>2022</td>
</tr>
<tr>
<td>General Motors</td>
<td>20</td>
<td>Not specified</td>
<td>2023</td>
</tr>
<tr>
<td>Honda</td>
<td>Two-thirds of vehicle lineup</td>
<td>Not specified</td>
<td>2030</td>
</tr>
<tr>
<td>Jaguar Land Rover</td>
<td>One-half of vehicle lineup</td>
<td>Not specified</td>
<td>2020</td>
</tr>
<tr>
<td>Mercedes-Benz</td>
<td>Electrified equivalent of all new vehicles</td>
<td>Not specified</td>
<td>2022</td>
</tr>
<tr>
<td>Nissan/Mitsubishi/Renault</td>
<td>Electrified equivalent of all new vehicles</td>
<td>Not specified</td>
<td>2022</td>
</tr>
<tr>
<td>Porsche</td>
<td>One-half of global sales volume is plug-in vehicles</td>
<td>Not specified</td>
<td>2025</td>
</tr>
<tr>
<td>Toyota (and Lexus)</td>
<td>Electrified equivalent of all new vehicles</td>
<td>Not specified</td>
<td>2025</td>
</tr>
<tr>
<td>Volkswagen Group</td>
<td>All models electrified</td>
<td>15</td>
<td>2025</td>
</tr>
<tr>
<td>Volvo</td>
<td>Electrified equivalent of all new vehicles</td>
<td>Not specified</td>
<td>2019</td>
</tr>
</tbody>
</table>
EV Sales Expected to Climb

EEI/IEI Annual EV Sales Forecast, Percent of Total Vehicle Sales (2018-2030)
KUB Has Been Adopting EVs
KUB Support of EVs Consistent with Blueprint

- Enhances the environment
- Helps maintain affordable rates
- Supports economic development
KUB a Participant in Statewide EV Adoption Coalition

DRIVE ELECTRIC TENNESSEE STAKEHOLDERS

The following Key Contributors and participating organizations attended events and developed & reviewed key deliverables over the past several months.

Key Contributors:

- Department of Environment & Conservation
- Department of Transportation
- Oak Ridge National Laboratory
- TVA
- Tennessee Tech
- Tennessee Clean Fuels
- Knoxville Utilities Board
- MLGW
- CARTA
- EPB

Participants:

- Atlas Public Policy
- Bridgestone
- BYD
- CDE Lightband
- ChargePoint
- City of Nashville
- City of Knoxville
- City of Chattanooga
- Cummins Filtration
- Draft Agency
- General Motors
- Greenlots
- GRIDSMART
- Local Motors
- Nissan
- Schneider Electric
- Sierra Club
- SoftServe
- Southern Alliance for Clean Energy (SACE)
- Southeast Energy Efficiency Alliance
- Stantec
- Tennessee Automotive Association
- University of Tennessee – Knoxville
- Vanderbilt University
- Volkswagen
EV Range Anxiety

- 84% drive less than 50 miles per day
- Only 1% of trips exceed 70 miles
- Yet most say public charging is needed for range confidence
Types of EV Chargers

- **AC Level 1** (L1) 120v Standard found in every U.S. home or office. Adds range of 5-7 miles per hour charging.

- **AC Level 2** (L2) 240v Often used to power home clothes dryers. Adds 20 to 30 miles of range in an hour.

- **DC Fast Charging** (DCFC) 480v Often called Level 3. Charge EV in just 40 minutes.
New DC Fast Chargers at Walmart
Studying Additional EV Adoption Ideas

- Time-of-Use rates
  - Encourages system beneficial EV charging
  - Helps EV charging cost
- EV Charger Rebates
Change can Happen Very Fast

1900

Spot the car

1913

Spot the horse
Record-Setting Rainfall

- 2018 4th wettest fall on record
- Already more than 21 inches of rain in 2019
- Rainiest February on record
  - 13 inches of rainfall
  - 7.5 inches over 5-day period (February 19-23)
  - 5 inches on February 23 – twice the prior record
- Widespread flooding lasted for days
- Impacted waterways, public infrastructure, homes and businesses, plus utilities across the region
Limited Impact to Gas System

- Meters in low-lying areas were replaced
- Piping on bridge crossings were inspected
No drinking water quality issues

High turbidity in river - about 10x normal level
  - Doubled coagulant use
  - No filtration issues
  - No overtime required

No increase in main breaks
Increased Outages on Electric System

- 23,297 customers out at peak (noon February 24)
- Outages from early February 23 through late February 24
- Customer Minutes of Interruption (CMI) up 35% vs average February
- Response times were slowed due to floods
Sinkhole at Cherokee Trail Substation

- Sinkhole developed on Monday
- Substation partially switched out of service
- Evaluating extent of sinkhole and potential remediation methods this week
Widespread Flooding Significantly Impacted Wastewater System

Third Creek Greenway

Fountain City: Knox Road at Fair Drive (behind Kroger)
Significant Impact on Collection System

- Wastewater facilities located in low-lying areas
- 53 wet weather SSOs in February
- 3 pump stations flooded
- All 6 storage tanks filled at 34 MG

![Storage Tank Utilization Chart]

Chapman Highway Pump Station
Kuwahoe treated 55% more flow than an average February

Total production of all four wastewater plants set #2 and #3 records

25 total permit violations in February at all treatment plants
Sewer Rehabilitation on Target

- Replaced average 25 miles per year
  - 375 miles to date
  - 30% of system
- Nearly $600M invested to date
- Continue to evaluate and prioritize ongoing improvements
Maintaining Consent Decree Goals

- Increase pace of improvements
- Reduce overflows
- Eliminate blending at Kuwahee & Fourth Creek WWTPs
- Ensure sustainable programs to achieve positive results

“KUB has shown tremendous progress in controlling unpermitted discharges since entering into the consent decree...Each program, as presented, met or exceeded requirements outlined in the CD... [EPA] recommends continuing implementation as planned.” - EPA Inspection Report, November 28, 2018
KUB Employees Responded

- Dozens of employees worked through peak rainfall weekend
  - Overhead Construction
  - Underground Construction
  - Station Management Services
  - Wastewater Plants
- Over 2600 hours of overtime

Ellis Road Pump Station
Final Results

- State of Tennessee declared an emergency
- KUB estimates impact of ~ $500,000
- FEMA assessment underway
- KUB systems nearly back to normal
“It’s been an unusual rain event for the entire region - you are responding well and doing what you can…appreciate your efforts.” Tim Hill, Environmental Protection Specialist, TDEC

After months of saturation, Knoxville received widespread rainfall that exceeded the 50-year, 24-hour storm and in at least one watershed, the 100-year event. KUB has aggressively and effectively responded…” David Hagerman, PE, City Stormwater Engineer

“It probably goes without saying…extenuating circumstances are recorded …specifically, the storm and durations. Sounds like you all have been inundated with rain lately…EPA does not consider (stipulated penalties) for SSOs that would not have occurred had it not been for extreme weather events such as KUB has experienced.” Dennis Sayre, Acting Chief, Municipal and Industrial Enforcement Section, EPA Region 4