Smart Meter 2020 Vision

New Options for Customers to Save Money, Time and Energy

MLGW Committee Meeting
5/7/2013
Smart Meter Adoption Rates among TVA Distributors

• More than 37 million smart meters have been installed in the U.S.
• TVA distributors with smart meter deployments:
  – Chattanooga 170,000 smart meters, 100% of total meters
  – Gibson County Electric 35,000, 100% of total meters
  – Clarksville 31,000+, 100% of total meters
  – Bolivar Energy Authority 11,000+, 100% of total meters
  – Volunteer 112,000 meters, 99% of total meters
  – North Georgia 99,000 meters, 99% of total meters
  – Nashville 30,000 smart meters, 8% of total meters
  – Knoxville 6,000 smart meters
  – Huntsville preparing for summer deployment
• MLGW 1,200 smart meters, 0.2% of total meters
MLGW’s Journey to Smart Meters

- 10+ years of researching advanced meter technology, applicability to MLGW operations and customer benefits
- 1,000-meter Smart Grid Demo, 2010-12
- 2013 originally proposed budget included 6,000 additional smart meters
- City Council’s vision directed MLGW to revise the budget by expanding from 6,000 to 60,000 meters in 2013
**BENEFIT:** Outage Management and System Monitoring

- Minimize or eliminate outage hotline contract (~$250,000 annually)
- Expedite utility outage awareness and troubleshooting
- Reduce service restoration times
- Increase customer satisfaction through fewer and shorter outages
- Increase operational knowledge of MLGW electric, gas and water systems
**BENEFIT:** Labor and Transportation

- **Meter Reading stats**
  - 12.3 million reads annually (E,G,W)
  - 92 Meter Readers
  - Average 24 vacancies per year; 26% annual attrition rate

- **150-200 net positions could be cut through full-scale smart meter deployment due to improved operating efficiencies and reduced service requests**
  - Positions throughout Customer Care division, primarily Meter Reading and Field Operations
  - Reduction will be achieved through attrition, not layoffs
  - Associated vehicle, maintenance and fuel savings
  - Some new positions would be created
BENEFIT: Safety

• Meter Readers
  – Drive 500,000+ miles per year
  – 55 Meter Reader injuries in 2012
    • Vicious dog attacks (14)
    • Spider, bee and insect bites (10)
    • Slips, trips & falls (24)
    • Miscellaneous injuries (7)
  – Risk exposure to crime, hostility and severe weather
**BENEFIT: Billing**

- Reduce estimated reads/bills (~3%)
  - Meter access issues (locked gates, bad dogs)
  - Manpower (light duty, turnover, vacation)
  - Extreme weather (temps >100° or <32°)
- Reduce meter reading errors (<1%)
- Reduce billing inquiries and mistrust
- Identify and reduce utility theft
  - 11,000 resolved diversion cases
BENEFIT: Time-of-Use Rate Option

- Completely voluntary
- Provides financial incentive for customers to monitor and adjust electricity use during “on-peak” hours
  - **On-Peak**: Dec-Mar, weekdays, 4am-10am
    Jun-Sept, weekdays, 12pm-8pm
  - **Off-Peak**: All other hours, including every weekend; every day in April, May October and November; plus weekday observances of six designated holidays
- **87% of hours in the year are off-peak**
- Impact on electricity cost depends on customer’s willingness to modify use (conservation, energy efficiency and load shifting)
**BENEFIT: Customer Awareness**

- Average Annual Household Electric Use in Tennessee is 38% higher than national
- MLGW customer average is 32% higher
- Viewing daily, hourly and even 15-minute data enables customers to better identify when and how home uses electricity
- Water leak alerts, consumption alerts and bill-to-date alerts provide added awareness
Learn About Your Electricity Use in My Account at www.mlgw.com

View shows a customer on standard electric rate, with blue bars reflecting use.

ABOVE: Highest weekday use (74 kWh) occurred on 4/16

RIGHT: This shows 4/16 electricity use in 15-minute periods
Learn About Your Electricity Use in My Account at www.mlgw.com

View shows a customer on optional TOU Rate, with red bars indicating on-peak use and green bars representing off-peak use.

ABOVE: Highest weekday usage (35 kWh) occurred on 8/2, when average temperature was 88°.

RIGHT: This shows 8/2 electricity use in 15-minute periods.
**BENEFIT:** Customer Savings Opportunities: Reduce Energy and Water Usage

- Conservation—an *action* that results in the use of less energy or water
  - Adjusting thermostat, closing exterior doors, turning off lights in empty room, taking shorter showers
- Energy Efficiency—a *purchase* of a more energy-efficient item to replace a less efficient item
  - Replacing HVAC, installing attic insulation, using CFL or LED lights, replacing refrigerator (but only if you discard the old one!), repairing leaky faucet
- Voluntary Load Shifting—an *action* that delays the hour in which energy is used
  - In Summer: running dishwasher at 8:00pm instead of 7:00pm, drying clothes at 10:00am instead of 3:00pm, running pool pump overnight instead of during day
**BENEFIT:** Customer Savings Opportunities: Lower Service Fees

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Analog or Digital Meter</th>
<th>Smart Meter</th>
<th>Customer Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Service Connection, same day</td>
<td>$54.00</td>
<td>$25.21</td>
<td>$28.79</td>
</tr>
<tr>
<td>New Service Connection, next day</td>
<td>$44.00</td>
<td>$25.21</td>
<td>$18.79</td>
</tr>
<tr>
<td>Non-payment reconnect</td>
<td>$25.00</td>
<td>$11.44</td>
<td>$13.56</td>
</tr>
<tr>
<td>Reconnect with exception</td>
<td>$25.00</td>
<td>$20.44</td>
<td>$4.56</td>
</tr>
<tr>
<td>Additional deposits, per reconnect, beginning with second occurrence</td>
<td>$50.00</td>
<td>$0</td>
<td>$50.00 per occurrence</td>
</tr>
<tr>
<td>Special Trip Meter Reading Charge, monthly</td>
<td>$9.13</td>
<td>$0</td>
<td>$9.13 per month</td>
</tr>
</tbody>
</table>
BENEFIT: Community Impacts: Environmental

- Water leak detection alerts customers to problems before they may be noticeable, preserving water resources
- Improved air quality through reduced utility vehicle emissions and reduced power generation
- Avoided emissions from electricity use reductions equivalent to removing 59,000 to 89,000 vehicles from the road
Potential Avoided Emissions
(Smart Grid Demo Results Extrapolated to All Residential Customers)

<table>
<thead>
<tr>
<th>Study Group</th>
<th>Avoided kWh, Total Residential Customers</th>
<th>Carbon Dioxide (CO2) Lbs per Year</th>
<th>Sulfur Dioxide (SO2) Lbs per Year</th>
<th>Nitrogen Oxides (NOx) Lbs per Year</th>
<th>Equivalent to # Passenger Vehicles Removed from Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Smart Meter</td>
<td>403,794,897</td>
<td>577,343,423</td>
<td>1,368,959</td>
<td>433,645</td>
<td>59,354</td>
</tr>
<tr>
<td>Standard Rate, Smart Meter</td>
<td>392,011,849</td>
<td>564,927,435</td>
<td>1,339,519</td>
<td>424,320</td>
<td>57,622</td>
</tr>
<tr>
<td>Time of Use Rate, Smart Meter</td>
<td>608,410,913</td>
<td>875,327,125</td>
<td>2,075,518</td>
<td>657,462</td>
<td>89,430</td>
</tr>
</tbody>
</table>

Calculated using EPA's web calculators and 360,000 residential customers
BENEFIT: Community Impacts: Helping Impoverished Customers

• 27% poverty rate in Memphis (2012 U of M study)

• Smart meters
  – Reduce connect and re-connect fees
    • Potential savings: $1M to $2.1M annually
  – Provide opportunity to track usage and better control utility cost

• Smart meters with pre-pay service option (similar to cellphone offerings)
  – Eliminate and reduce fees
    • Potential savings: $5.3M to $10.6M
  – Eliminate need for deposit
    • Potential one-time impact: $3.7M to $7.5M
BENEFIT: Community Impacts: Job Creation

• Economic Impact Study (Younger Associates, May 2010)
  – $10 million in utility savings among customers would create 152 jobs through increased discretionary spending in community

• Smart Meter Demo results:
  – $30 million in potential annual utility savings
  – 456 new jobs
Upcoming Resolutions

• Elster contract, $10.15 million
• Aclara change order, $100,750
• Voluntary Time-of-Use Rate
Elster Contract

• $10.15 million maximum value
  – Smart meters
  – Telecommunications
  – Meter data management system
  – Pre-pay system
Elster Warranties/Equipment Life

• Elster products have solid warranties and performance
  – 24-month meter warranties
  – 20-year battery life
  – 25 to 30-year expected equipment life for electric and gas meters; 15-year life for water meters
60,000-meter Installation

- Approximately 24,000 households will receive smart meters
  - ~24,000 electric meters
  - ~20,000 gas meters
  - ~15,000 water meters
- Customers may opt-out and decline smart meter
60,000-meter Locations

- 80% in City, 20% in County
- Locations in each Council district
- Capitalizing on existing MLGW infrastructure
- Clustered by meter reading routes, eliminating 3 to 6 routes per billing cycle, daily
Aclara Contract Change Order

- Provider of web-based energy and bill analysis tools within My Account
- Adds email alert options
  - Weekly bill-to-date
  - Monthly threshold exceeded (based on customer-selected electric, gas and water usage or dollar amounts)
Voluntary Time-of-Use Rate

• Optional for any customer with electric smart meter
• Effective 10/1/2013
• Replaces existing TOU pilot rate, which expires 9/30/2013
• Item requires Council to convene as a rate-making body
Smart Meter
Myths & Realities
Myth: Smart Meters Emit Dangerous RF

- Every day, people use and keep near to them many devices that utilize radio frequency (RF) waves, including microwave ovens, cellular telephones and wireless home networks.
- The Federal Communications Commission (FCC) sets RF limits and requires that all radio communicating devices be tested to ensure that they meet federal standards.
- Smart meters emit less radio frequency energy than many other commonly-used wireless devices which, like smart meters, are safe and FCC-approved.
- Learn more at [www.mlgw.com/smartgrid](http://www.mlgw.com/smartgrid)

Exposure from Elster smart meter selected by MLGW if operating in constant communication mode (100% duty cycle). Normal smart meter duty cycle is near 1%, so actual exposure is far less than value shown.

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**Radio-Frequency Exposure Levels from Smart Meters***

*In Milli-Watts/Centimeter²*

- **Smart Meters**
  - High Range: 0.005
  - Low Range: 0.0001

- **Walkie-Talkie**
  - High Range: 42
  - Low Range: 1

- **Cellphone**
  - High Range: 10
  - Low Range: 1

- **Microwave Oven**
  - High Range: 5
  - Low Range: 1

- **WiFi**
  - High Range: 0.02
  - Low Range: 0.01

*Select Information from Richard Tell Associates, Inc*
Myth: Smart Meters Cause Fires

• Smart meters do not cause fires
  – As determined by Fire Marshal/Fire Department officials from around the world, including in Florida, Maryland, California, Canada and Australia
  – MLGW has had 0 fires from smart meters during demo and 0 fires from other electric meters

• Conditions in the customer-owned electric meter socket and wiring within the home can cause fires
  – Meter socket and electric wiring are installed by builder’s electrical contractor at time of construction and are property of building owner
  – MLGW will fund the repair or replacement of problematic meter sockets during smart meter installation
Meter Socket is Point of MLGW Service Delivery

Overhead Electric Service Lines: MLGW property

Weatherhead to Socket: Customer property

Electric Meter Socket: Customer property

Electric Meter: MLGW property
Inside an Electric Meter Socket

- Two hot wires
- One neutral wire
- The meter completes the circuit to the house
- The meter has 4 prongs that stab into slots
- Three wires exit meter box and go to breaker box
Myth: TOU Rate Forces Customers to Do Laundry at 2:00am

- Time-of-Use (TOU) electric rate is **optional**
- TOU rate gives customer the option of paying less for electricity use during off-peak periods (when electricity demand and generation costs are lower) and more for electricity use during on-peak periods (when demand and costs are higher)
- **87% of hours in a year are off-peak**
MLGW Customer Interest in Smart Meter Benefits

• 2009-2010 survey of new service opportunities
  – Internet
  – Community events
  – MLGW Community Offices

• 2,737 respondents, 95% confidence +/- 5

• All ZIP Codes represented
What Customers Said They Want

• 95% want MLGW to be notified automatically when power is out
• 91% want their MLGW bill to be based on actual readings, not estimates
• 88% want to know their bill amount as it grows during the month—with 22% interested in checking daily
• 86% want MLGW to make capital investments to improve system monitoring and control, which would reduce power outages
• 66% indicated they would be willing to consider reducing electricity use at certain times of day, while another 26% indicated they might

• …and these desired benefits/services can only be achieved by installing smart meters
What Demo Customers Said

• With a few simple changes, we made a significant reduction in our consumption. Stephen T
• Smart Meter offers an effective way to change homeowner's behavior by providing timely feedback on actual energy usage. For those interested in becoming involved in managing energy usage, this is a smart approach. Roosevelt A
• Saved a lot of money learning when to use appliances, LED usage and ceiling fan usage during summer and winter…It was actually fun to learn how to save. Brad & Carolyn D
• I think everyone should have a smart meter and the ability to look at their home’s energy graphs online. David B
• We love the SmartMeter and the data it provides. It has become a challenge in our house to reduce the energy consumption. The Time-of-Use rates are also a great benefit. David K
• Electricity is invisible, the meter helped me understand something I couldn't see. Iva D
• I learned how to monitor my energy resources more efficiently. Esther W
• I really liked the program. It was informative and beneficial to me. I welcome any opportunity to learn about my energy consumption and ways to reduce it. Anthony D
• I like this project. It has made me a better informed consumer. Pamela F
• It has changed the way we use power. Andrew I
• This project opened eyes and was very meaningful in that it caused me to look at energy usage, availability, conservation and technology in so many new and exciting ways. Tim F
MLGW’s Business Practice is Standard Service, with Options to Opt-Out

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>OPT-OUT OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Printed bill</td>
<td>1. eBilling</td>
</tr>
<tr>
<td>2. Bill for actual</td>
<td>2. Budget Billing</td>
</tr>
<tr>
<td>monthly usage</td>
<td>3. Net Pay</td>
</tr>
<tr>
<td>3. Cycle billing</td>
<td>4. AutoPay</td>
</tr>
<tr>
<td>4. Pay by mail/office</td>
<td>5. Potential payment</td>
</tr>
<tr>
<td>5. Pay bill in full</td>
<td>arrangements</td>
</tr>
</tbody>
</table>
Evolution of Technology

- Horse and buggy to car
- Typewriter to computer to tablet
- Operators to rotary phone to push button to smart phone
- Bank teller to ATM to mobile banking from smart phone
- Wooden cabinet TV to big screen to watching on smart phone
- Film camera to digital camera to smart phone
- Candle to light bulb

*Analog meter to digital meter to smart meter is just another technological advancement*
Smart Meters Deliver New Options for Customers to Save Money, Time and Energy