AMI METER DATA

Challenges and Opportunities

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Business and Customer Operations

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btutilities.com

Bryan Texas Utilities

- 4th largest municipally owned utility in Texas
  - Not-for-profit rates
  - Local control
  - No shareholders
- Vertically integrated
  - Generation
  - Transmission
  - Distribution
- Historical load of over 320 megawatts at peak

  - Two distribution systems one City and one Rural
- Diverse generation portfolio
  - Coal
  - Gas
  - Wind
  - Solar
- *Two time RP3 Diamond Award Winner—American Public Power Association*

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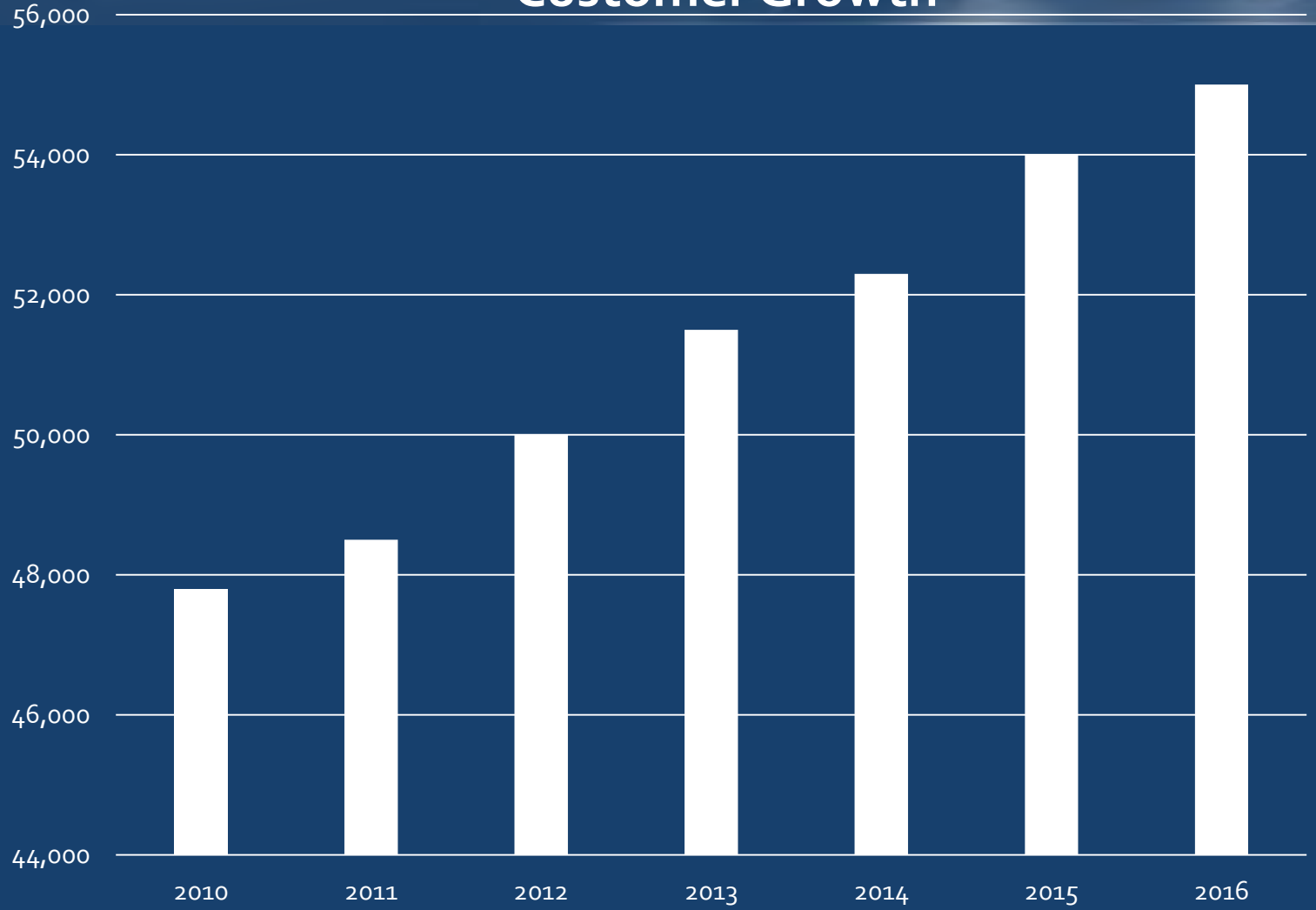
Customer Growth



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BTU Before AMI

Moving to an Automated Metering Infrastructure system was an obvious choice.

- Prior to 2012 BTU had interval data on only a few large Commercial/Industrial customers. This data was not used for billing, but rather in load analytics.
- BTU utilized SCADA , transformer and load profile information for load growth modeling, but realized that in order to position the system for the future we would need interval data by rate segment to improve business efficiencies.
- During past Cost-of-Service studies surrogate load-shape data had to be used to make assumptions on load curves by rate class and we knew that those assumptions had inherent flaws that needed to be corrected.
- Disconnect and reconnect was an onerous manual task that created long lags for both Cut for Non-Pay (CNP) and in handling the large number of Move-In and Move-Outs (MI/MO) during our "student rush" periods for rental properties being used by college students.

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AMI Project

- Formed a cross functional evaluation team of managers and technical staff
- Went through an RFP evaluation and selection process lasting about 18 months
- Vendor selection
  - Sensus AMI
  - Meter Sense MDMS
  - Meter Selections
  - Mass Meter Change-out

- Installation of meters, software integration, *test-test-and retest* ..... 18 months

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Goals for AMI

- The collection of clean, accurate and reliable meter data for billing
- Consumer Dashboard for website
- Outage Management System capabilities
- Minimization of business processes for CNP and MI/MO – Remote Disconnect & Reconnect
- Collect data for the analytics of the BTU T&D system and for use in rate design for COS

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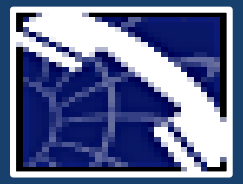
PORCHE IVR



Calls Manager

AMI

Cayenta

CIS

WindMil EA

Automatic Vehicle Location

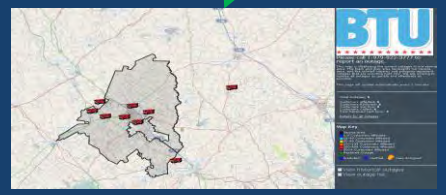
CLEVEST

Survalent Technology

SCADA

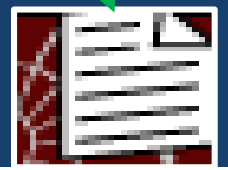
Crew Manager

DisSPatch®

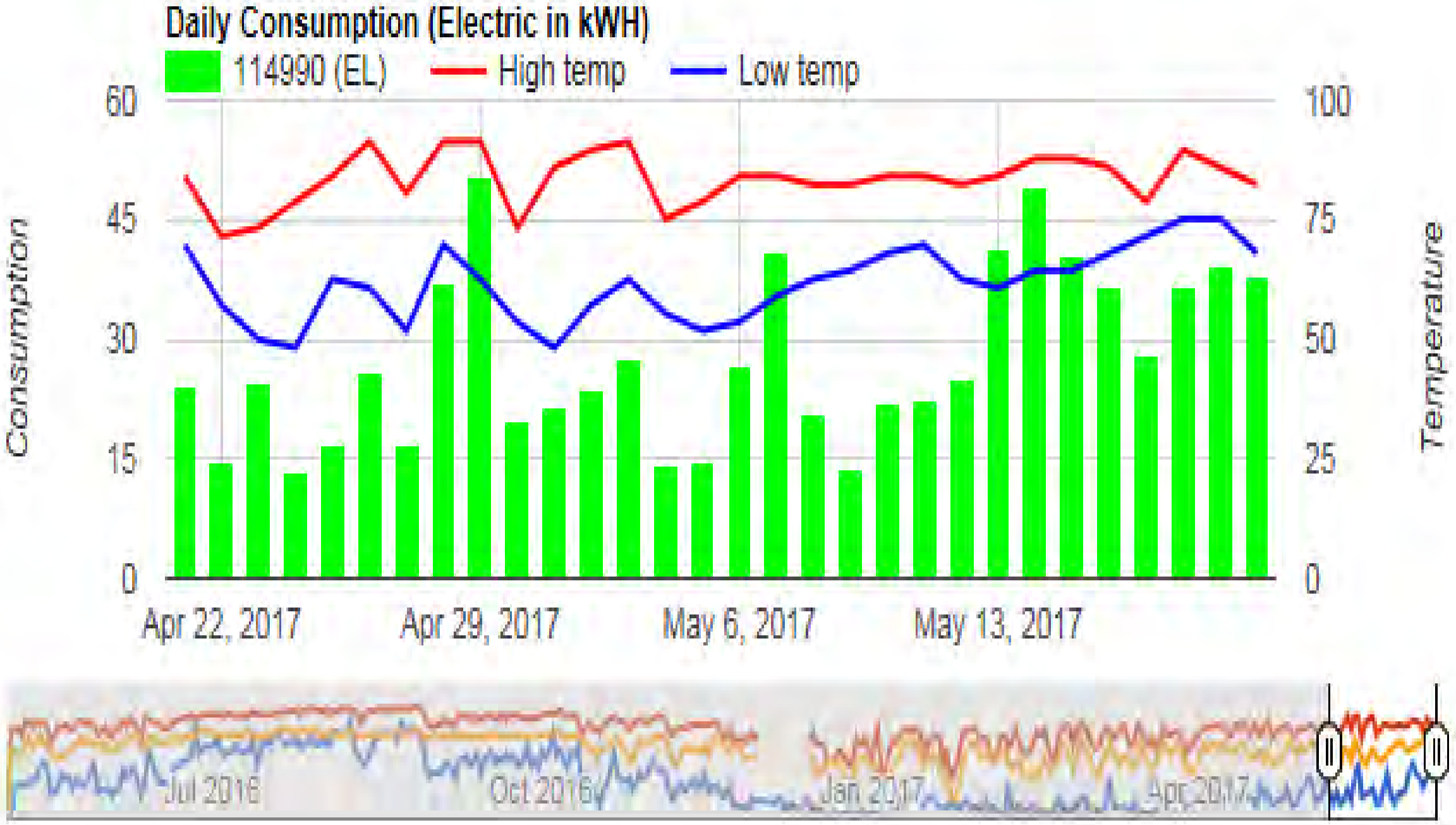


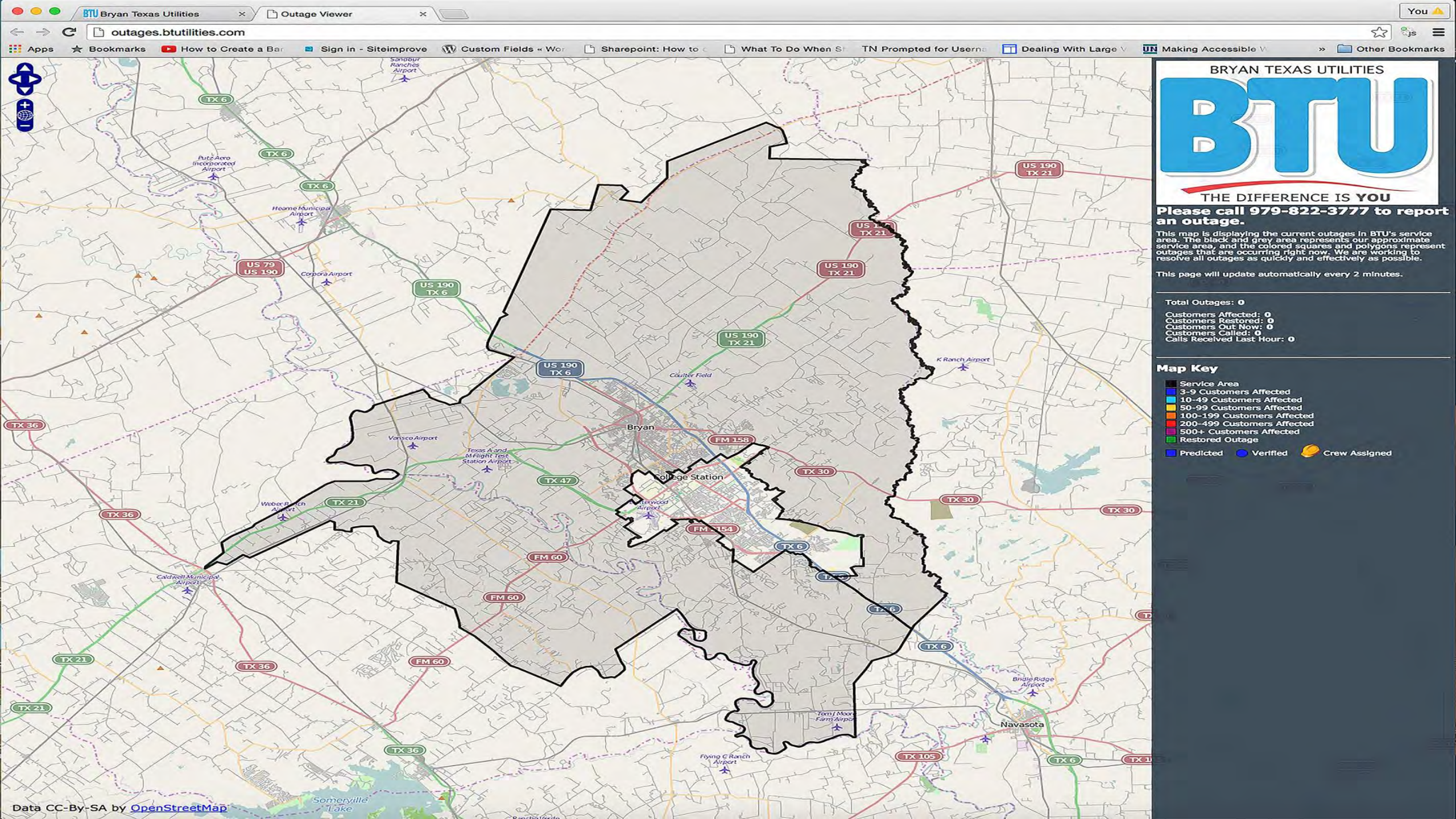
Outage Viewer

Outage Messenger



Outage Reports


Daily Consumption (Electric in kWH)
114990 (EL)
High temp
Low temp
Consumption
Temperature
60
45
30
15
0
100
75
50
25
0
Apr 22, 2017
Apr 29, 2017
May 6, 2017
May 13, 2017
Jul 2016
Oct 2016
Jan 2017
Apr 2017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Outage Viewer
outages.btutilities.com
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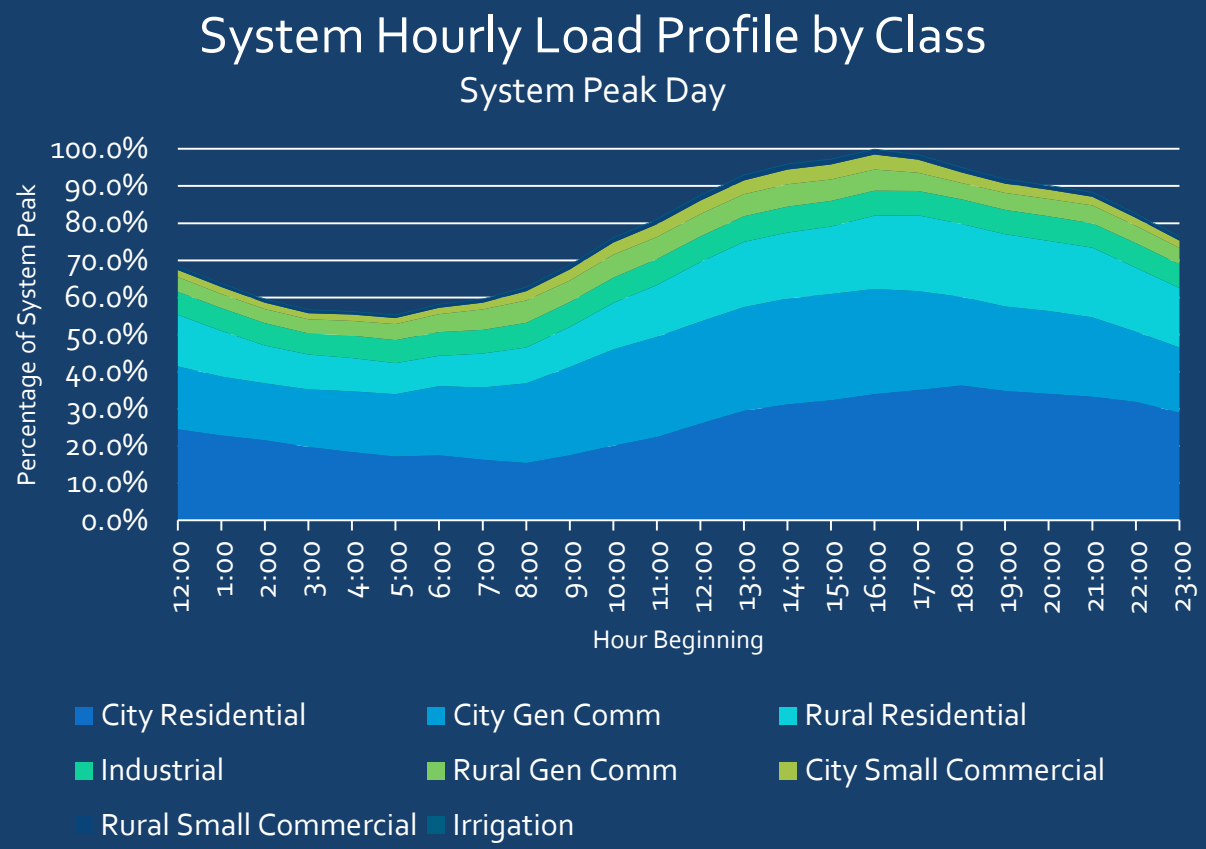
Please call 979-822-3777 to report an outage.
This map is displaying the current outages in BTU's service area. The black and grey area represents our approximate service area, and the colored squares and polygons represent outages that are occurring right now. We are working to resolve all outages as quickly and effectively as possible.
This page will update automatically every 2 minutes.
Total Outages: 0
Customers Affected: 0
Customers Restored: 0
Customers Out Now: 0
Customers Called: 0
Calls Received Last Hour: 0
Map Key
Service Area
3-9 Customers Affected
10-49 Customers Affected
50-99 Customers Affected
100-199 Customers Affected
200-499 Customers Affected
500+ Customers Affected
Restored Outage
Predicted
Verified
Crew Assigned
Bryan
College Station
Navasota
Somerville Lake
Data CC-By-SA by OpenStreetMap

INTERVAL DATA FOR RATE DESIGN

- Coincident Peak (CP)
- Costs incurred by system to provide services at peak demand are allocated on class contribution to CP
- Demand Related Power Costs
- Wholesale Costs
- Transmission System Costs
- **AMI data allows load research to be performed using actual class usage during system peak periods**



Billing Process Improvements

Before AMI

- 3-7 days from read collection to bill rendering
- 100 HILO tickets issued per cycle
- HILO took up to 2 hours per day
- Up to 5 tampers per week
- 5 Billing Representatives
- 11 Meter Readers and 4 Meter Techs
- Summer/Winter rate change was manually prorated by the number of days

After AMI

- 0-2 days from read collection to bill rendering
- No HILO tickets issued per cycle – VEE performed from MDMS data
- HILO is now reduced to 30 minutes per day
- Tampering tickets are now reduced to <5 per year
- 2 Billing Reps, 1 Collection Rep, 1 Business System Coordinator and 1 Meter Data Analyst
- No Meter Readers and 6 Meter Techs
- Summer/Winter rate change is now calculated by hourly interval in the CIS system

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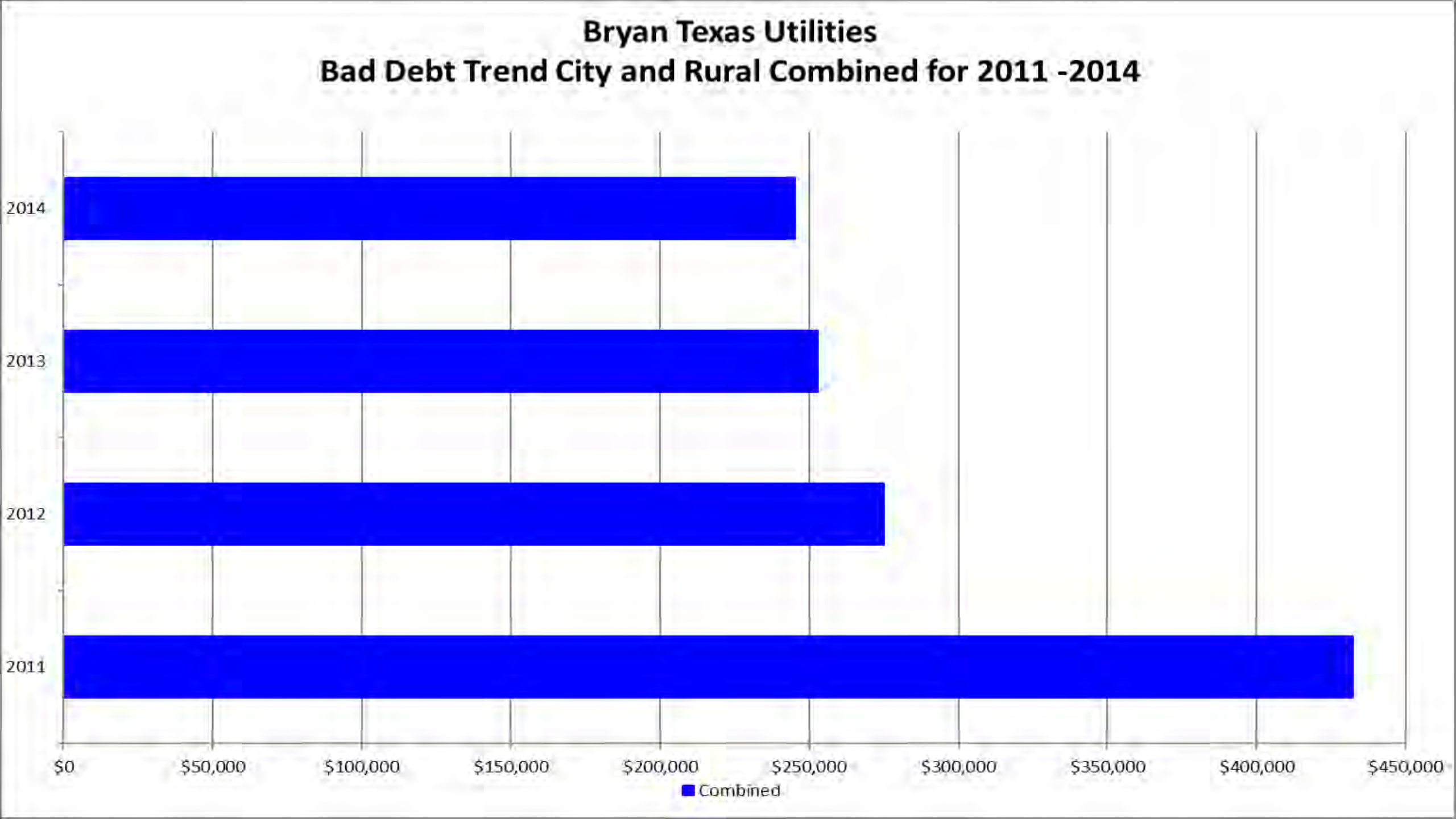
Bad Debt Trend City and Rural Combined for 2011 -2014



More Functionality with Interval Data

- Totalized Virtual Meters– One meter with the summation from multiple meters and multipliers integrated into one interval
- Distribution Power Loss - calculation by Interval by system, substation, or feeder
- Linked Meters—multiple locations and multiple meters adding or subtracting from the main billing meter
- System usage accuracy—spikes in usage and accuracy between register reads
- Demand Profile—Coincident Peak at 15 minute or 60 minute intervals
- Solar Generation—large customers measuring solar generation by interval

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AMI Data to the Cloud

Expectations in Action

- Remote connects/disconnects—file issued for CNPs processed within the first 20 minutes of the day.
- Service Order Dashboard—all service orders generated via automation
- Billing extract—specific to only ask for pass, validated reads—this is specific to running validations thru the MDMS
- Customer Dashboard—customers can obtain their daily usage layered with the daily temperatures
- Power loss—analytics based on distribution power loss, specific to area, territory, and interval data

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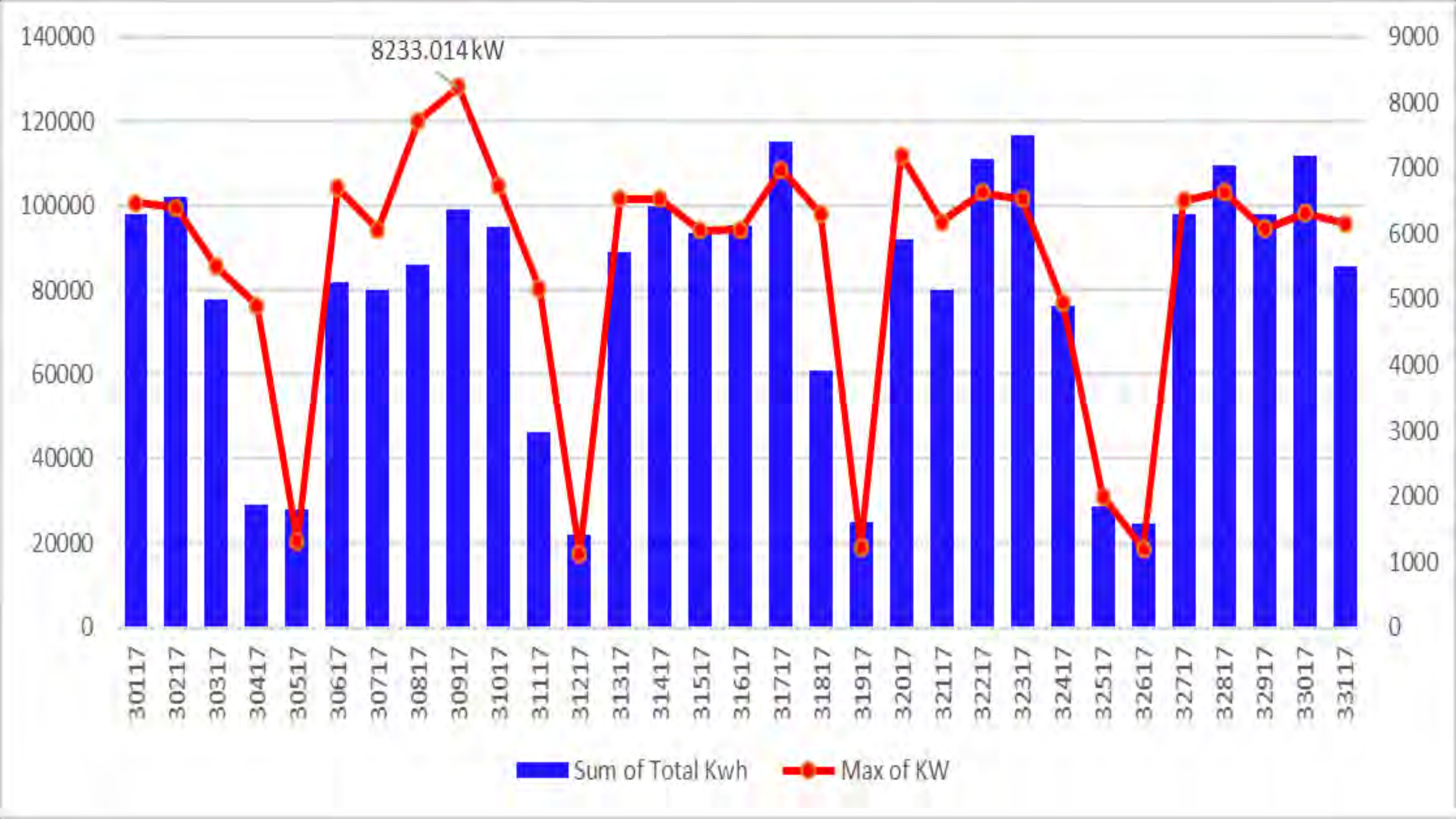
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120000
100000
80000
60000
40000
20000
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9000
8000
7000
6000
5000
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3000
2000
1000
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30117
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32217
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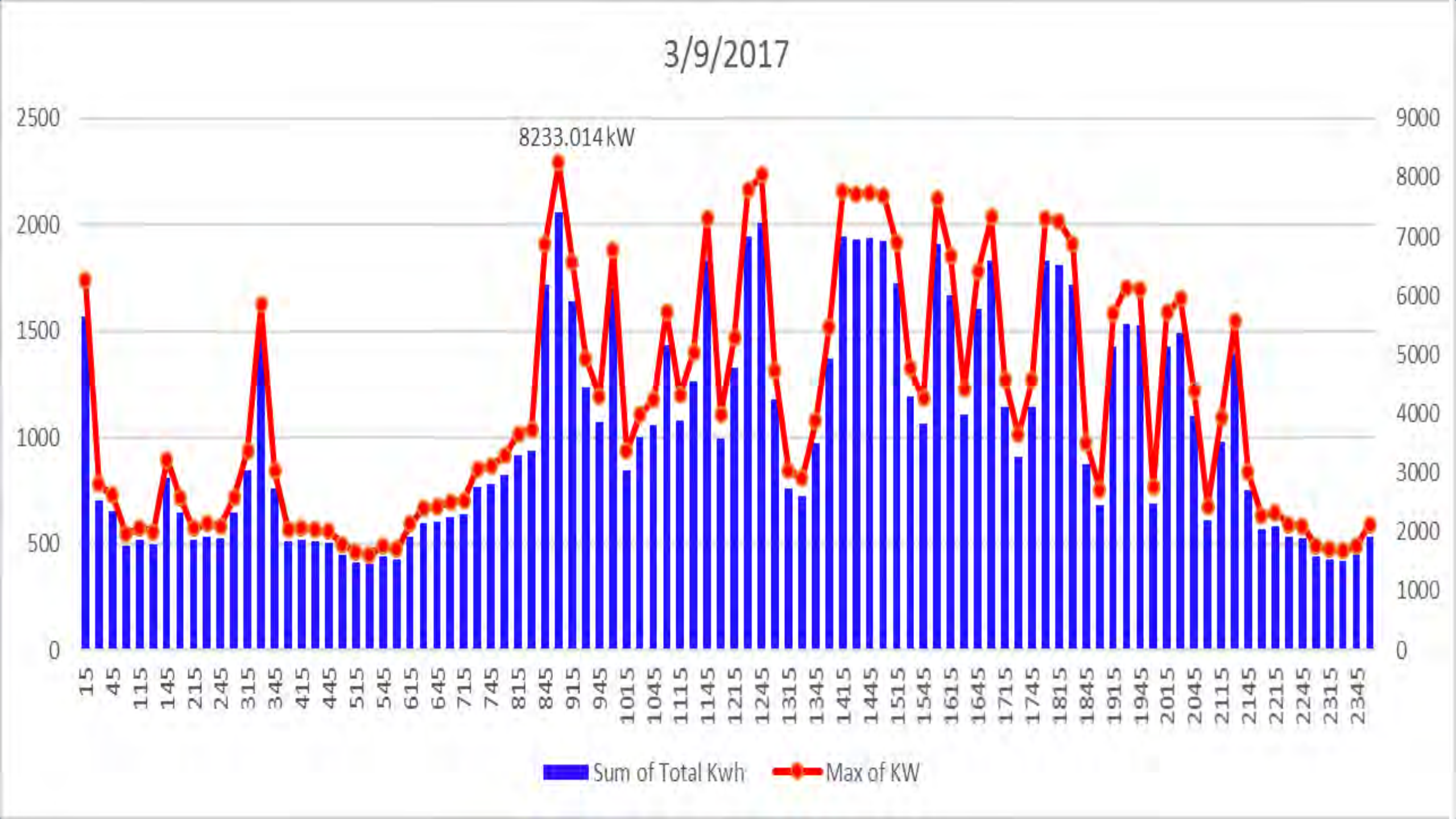
32817
32917
33017
33117
Sum of Total Kwh
Max of KW


3/9/2017
8233.014 kW
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1500
1000
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8000
7000
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745
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945
1015
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1545
1615
1645
1715
1745
1815
1845
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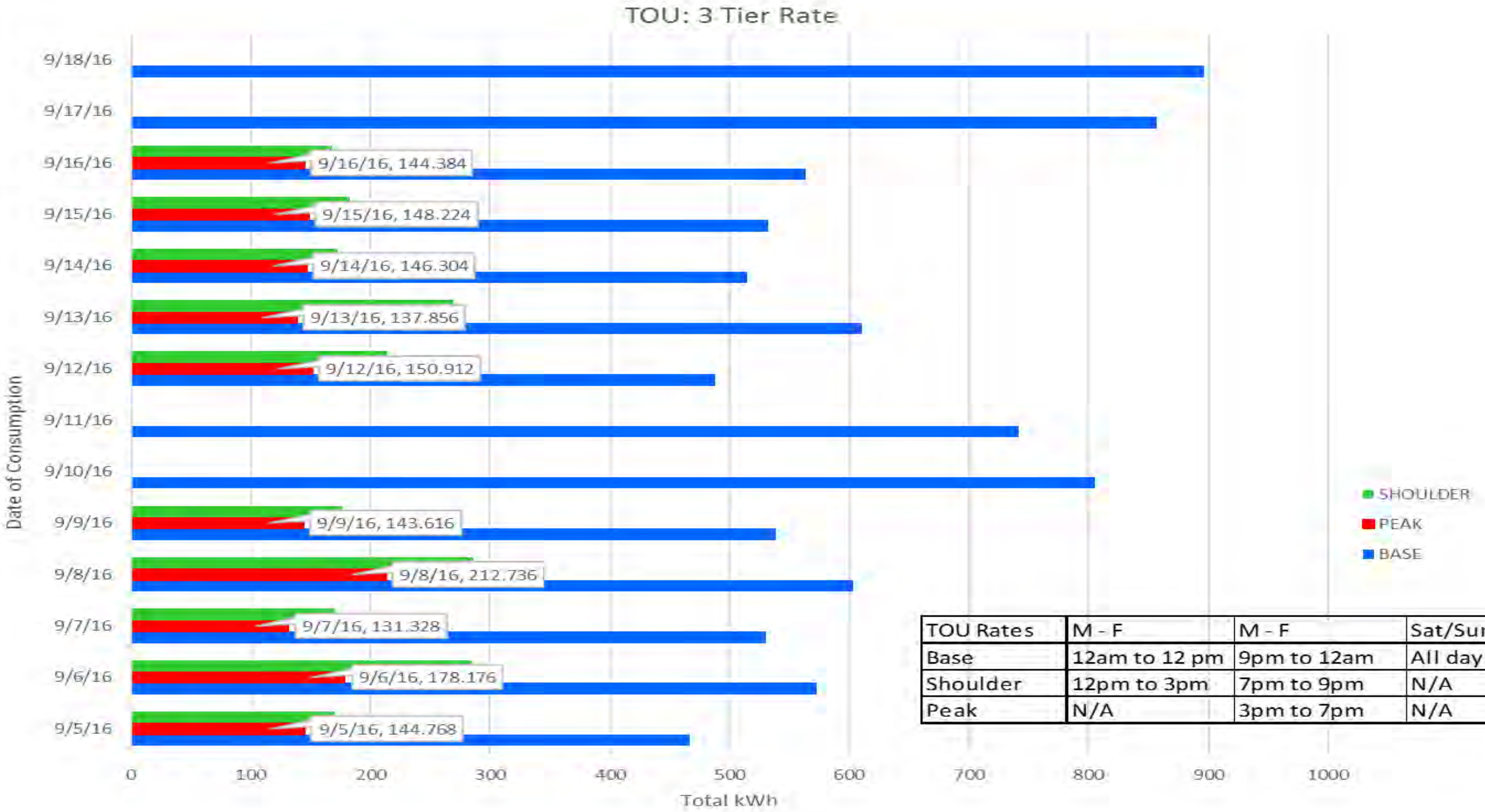
1945
2015
2045
2115
2145
2215
2245
2315
2345
Sum of Total Kwh
Max of KW



TOU Rates	M - F	M - F	Sat/Sun
Base	12am to 12 pm	9pm to 12am	All day
Shoulder	12pm to 3pm	7pm to 9pm	N/A
Peak	N/A	3pm to 7pm	N/A

Meter Data Management System

- Data is run through a Verification Editing and Estimation routine to validate
- Specific MDMS parameters based on utility policies and processes
- Validates that all interval data is in line with register data
- Capture within 1% of meter count:
  - BTU has a 99.83% capture of register reads
  - BTU has a 99.25-99.5% capture of interval reads
- Ability to monitor transformer loading, OMS integration, and GIS locations
- We can outline the data based on the data sync from our CIS
- The MDMS provides a visual tool of daily and interval usage for utility staff

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Future Expectations

- Distribution structure of data – based on customer profile
- Customer intelligence segmentation
- Voltage conservation analysis
- Electric energy efficiency
- Identifying sources of Unaccounted For Energy (UFE) loss by substation and feeder

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