



Establishing an Advanced Metering Infrastructure (AMI) Support Organization

Fayetteville Public Works Commission

Speaker

Corey Brown

- 17 years experience
- Utility Field Services, Meter Shops, and Supervision

Overview

- Best practices and organizational support required during and after an AMI deployment



Contents

- PWC and AMI
- Staffing
- Meters and Alerts
- Customer Engagement
- Utility and Contractor Installations
- Meter Data Management/RNI Department
- Meter Maintenance

Background

- Chartered as an independent public authority
- Commission appointed by city council
- 85,000 electric meters
- 100,000 water meters
- New IT platform 2014 (Oracle)
- Completed AMI electric & water meter deployment over a 3 year period (2014-2017)

AMI Project

- Connect Project
 - Selected Sensus as our AMI vendor
 - Completed change out of all electric and water meters in August 2017
 - 20 AMI base stations
 - Approximately 450 sq. miles covered under the network
 - 98.5% Read Interval Success (RIS) rate

AMI Benefits

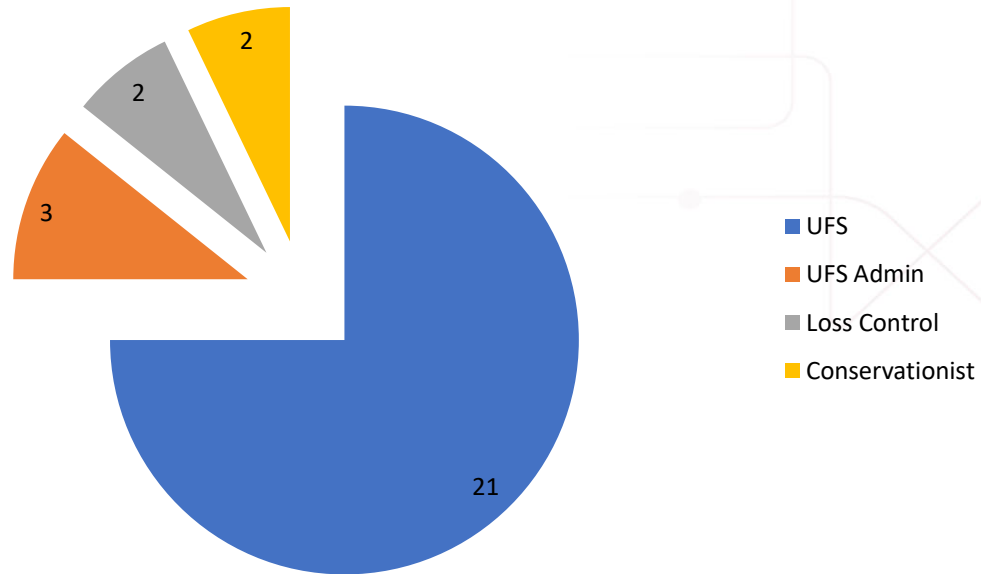
- 80% of customers have electric & water services
- Manual field disconnects reduced from 36,000 to 8,700 per year
- UFS overtime reduced by \$505,000
- Truck rolls reduced from 543,000 to 51,500
- Mileage reduced by 50% from 2014 to 2017
- Able to perform same day service at later times in the day
- Able to provide interval data to customers

Cross Training

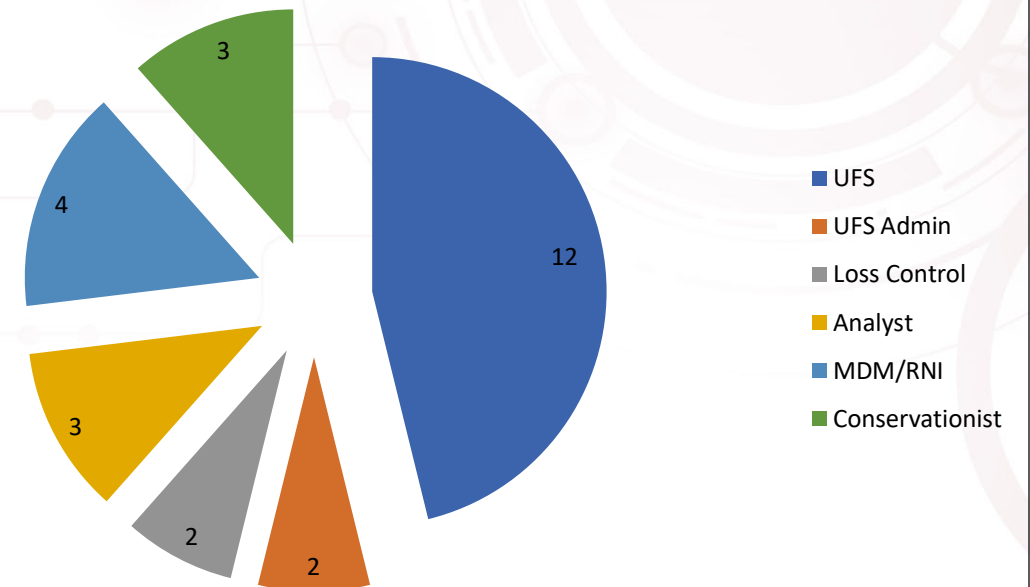
- Began cross training in 2013
 - Transferred the Electric UFS/Meter Shops Supervisor to the Connect Project
 - Transferred the Meter Reading/Water UFS Supervisor to the Electric UFS/Meter Shops
 - Promoted an interim supervisor to Meter Reading and Water UFS
 - Utility Field Services was reduced from 21 to 12 employees by 2017

Staffing Comparison

Employees Pre-AMI



Employees Post-AMI



Meter Configurations

- Determine correct meter configurations
 - Brownout/Overvoltage thresholds
 - Power fail/Restoration length
 - Is the kW read needed on all customers
 - Firmware versions
- Meter Display
 - Should the kW be shown on the display
 - On/Off status
 - Length of time for each screen

Meter Configurations

- First Article Meters
 - Be thorough with the testing
 - Ensure the meter program is performing as expected
 - If possible set them in the field and make sure the information received through the head end system is correct
 - Make sure that the alerts you receive from the meter meet your expectations and that you have a plan to handle them

Meter Alerts

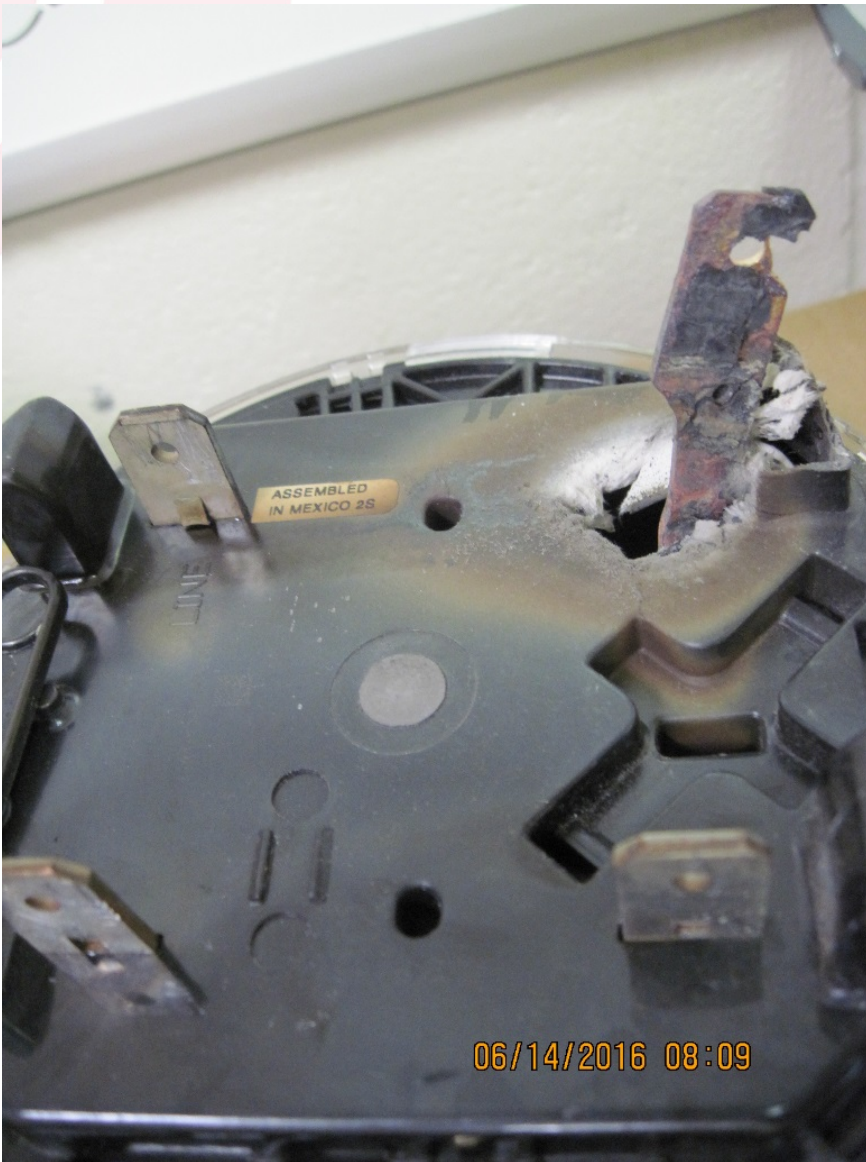
- Hot Socket
- Single Phase Fail
- Brownout
- Over Voltage
- Power Fail
- Tamper
- Low Loss Potential
- Meter Read Fail

Meter Alerts

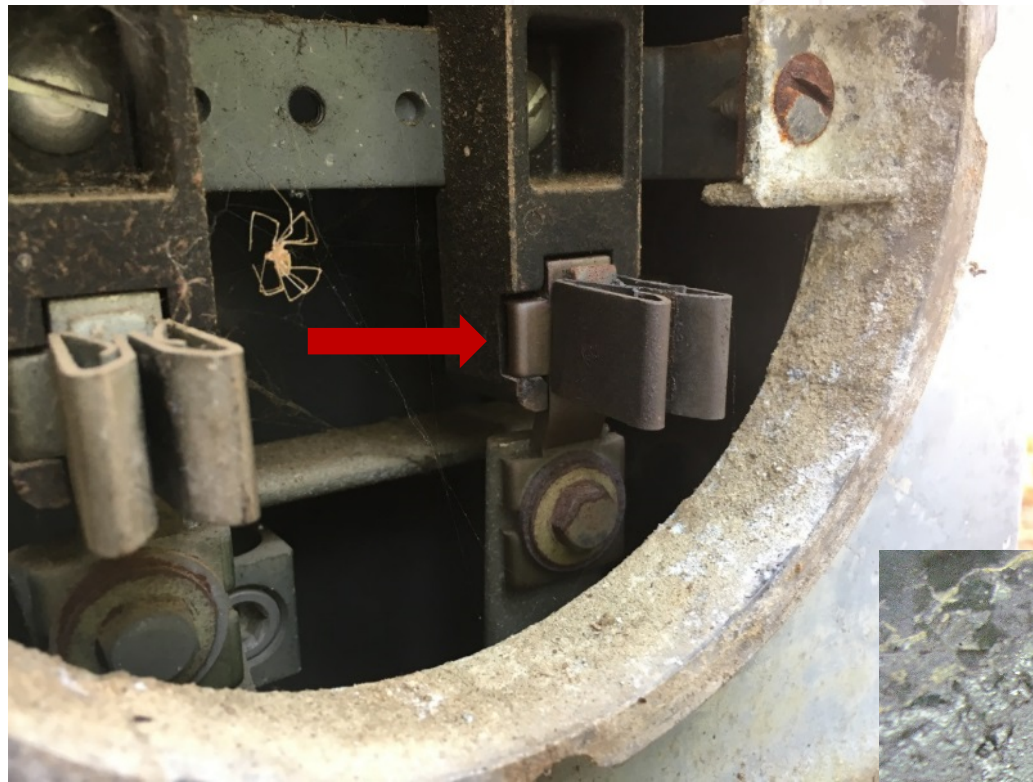
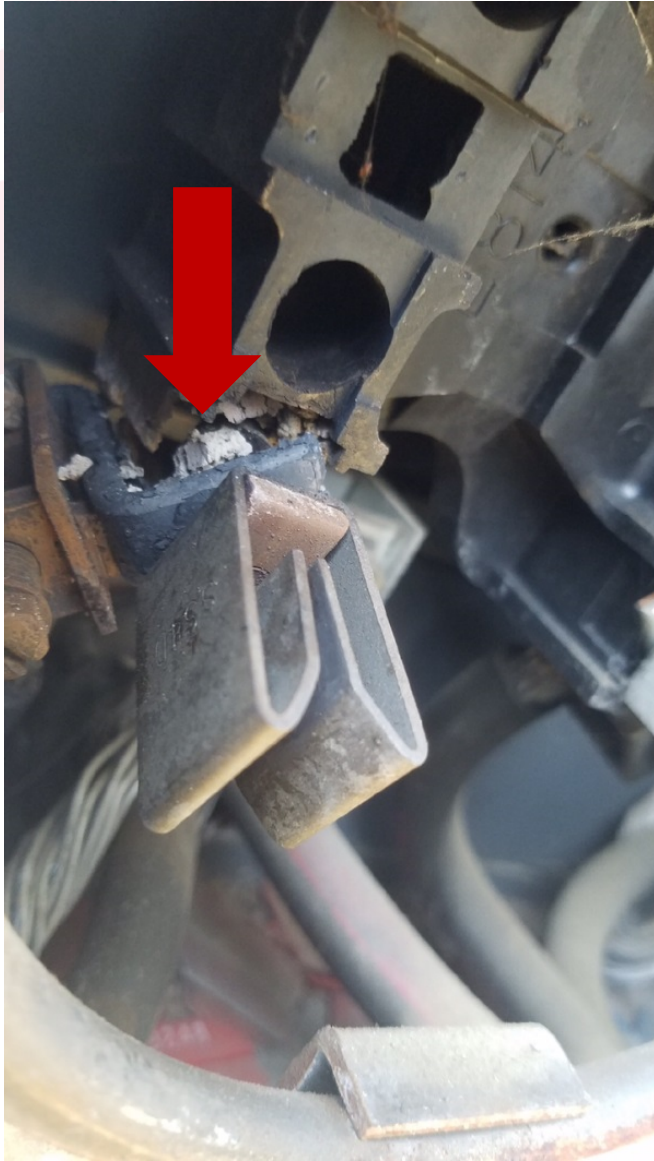
Alert	Device	FlexNet	Lifecycle Sta	City	Received
Meter Read Failure	281012	6504437	Installed	Fayetteville	12/17/2019 11:49
Over Current	503791	4183091	Installed	Fayetteville	12/17/2019 11:25
Power Fail	502006	4143323	Installed	Fayetteville	12/17/2019 10:29
Over Current	503538	4181387	Installed	Fayetteville	12/17/2019 10:10
Brown Out	249923	6466758	Installed	Fayetteville	12/17/2019 9:24
Over Current	503207	4171207	Installed	Fayetteville	12/17/2019 8:48
Brown Out	300249	6811660	Installed	Fayetteville	12/17/2019 7:00
Brown Out	209699	6351167	Installed	Fayetteville	12/17/2019 5:53
Configuration Error	503973	4182433	Installed	Fayetteville	12/16/2019 16:40
Over Current	219660	6392013	Installed	Fayetteville	12/16/2019 15:46
Over Current	502842	4156831	Installed	Fayetteville	12/16/2019 15:43
Power Fail	239805	4493786	Installed	Fayetteville	12/16/2019 13:34
Over Current	500882	4112361	Installed	Fayetteville	12/16/2019 13:34
Clock Error	273645	6510823	Installed	Fayetteville	12/16/2019 11:26
Clock Error	286671	6592615	Installed	Fayetteville	12/16/2019 11:24
Clock Error	253668	6475536	Installed	Fayetteville	12/16/2019 11:24
Over Current	501178	4124954	Installed	Fayetteville	12/16/2019 9:36
Over Current	502297	4141534	Installed	Fayetteville	12/16/2019 7:21
Over Current	502273	4141439	Installed	Fayetteville	12/16/2019 6:39
Over Current	503737	4182481	Installed	Fayetteville	12/15/2019 21:09
Over Current	503930	4181731	Installed	Fayetteville	12/15/2019 16:51
Over Current	505356	7516557	Installed	Fayetteville	12/15/2019 14:28
Brown Out	300227	6807793	Installed	Fayetteville	12/15/2019 12:15
Over Current	502243	4138445	Installed	Fayetteville	12/15/2019 10:37
Power Fail	247826	6451245	Installed	Fayetteville	12/15/2019 10:08
Clock Error	300083	6786812	Installed	Fayetteville	12/15/2019 9:23
Over Current	500657	4101010	Installed	Fayetteville	12/15/2019 8:36
Over Current	505284	7515462	Installed	Fayetteville	12/15/2019 7:51
Over Current	503423	4171621	Installed	Fayetteville	12/15/2019 5:01
Over Current	500010	4719786	Installed	Fayetteville	12/15/2019 3:13
Over Current	503763	4182046	Installed	Fayetteville	12/15/2019 0:55
Over Current	504235	4187153	Installed	Fayetteville	12/14/2019 21:28
Brown Out	300248	6807559	Installed	Fayetteville	12/14/2019 21:00
Brown Out	300251	6811754	Installed	Fayetteville	12/14/2019 20:03
Over Current	502995	4160282	Installed	Fayetteville	12/14/2019 18:13



Hot Sockets



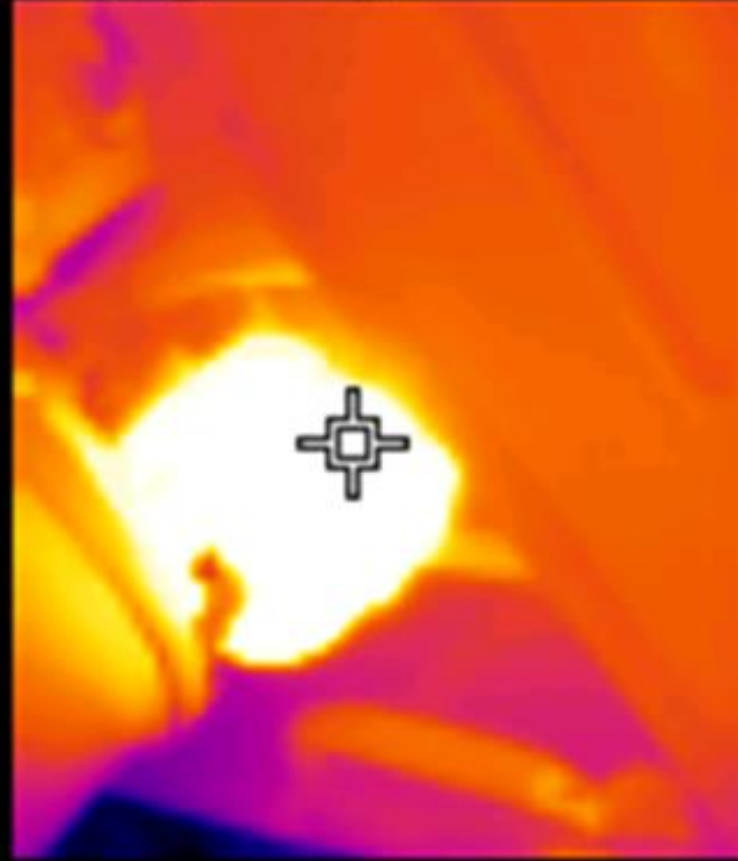
Hot Sockets



221.9 °F $\epsilon:0.95$



715.0 °F $\epsilon:0.95$



Hot Sockets



CONNECTIONS SUMMIT

Customer Communications

- Communicated with customers by mail before the meter exchange
- Proactively identified select customers and areas of the city to remove from the contractor
 - These exchanges were performed by PWC employees
- Educated customers at events with fliers, displays and one-on-one conversations
- Sent out bill inserts, radio ads, and posted on social media about the benefits of advanced metering



Opt Outs

- Different reasons for opting out
 - Fears of radiation poisoning
 - Invasion of privacy concerns
 - Security
 - Crime
- Allowed opt outs until the end of the project
 - 55-60 total customers
 - Only one customer refused to have the meter installed

Utility Liaison

- Single point of contact between utility and the installation contractor
 - Used a Field Service employee
 - Allowed him to use his discretion as needed when solving field issues
 - Assisted with inventory and transfers between PWC and the contractor
 - Worked on hard to access and other difficult installations

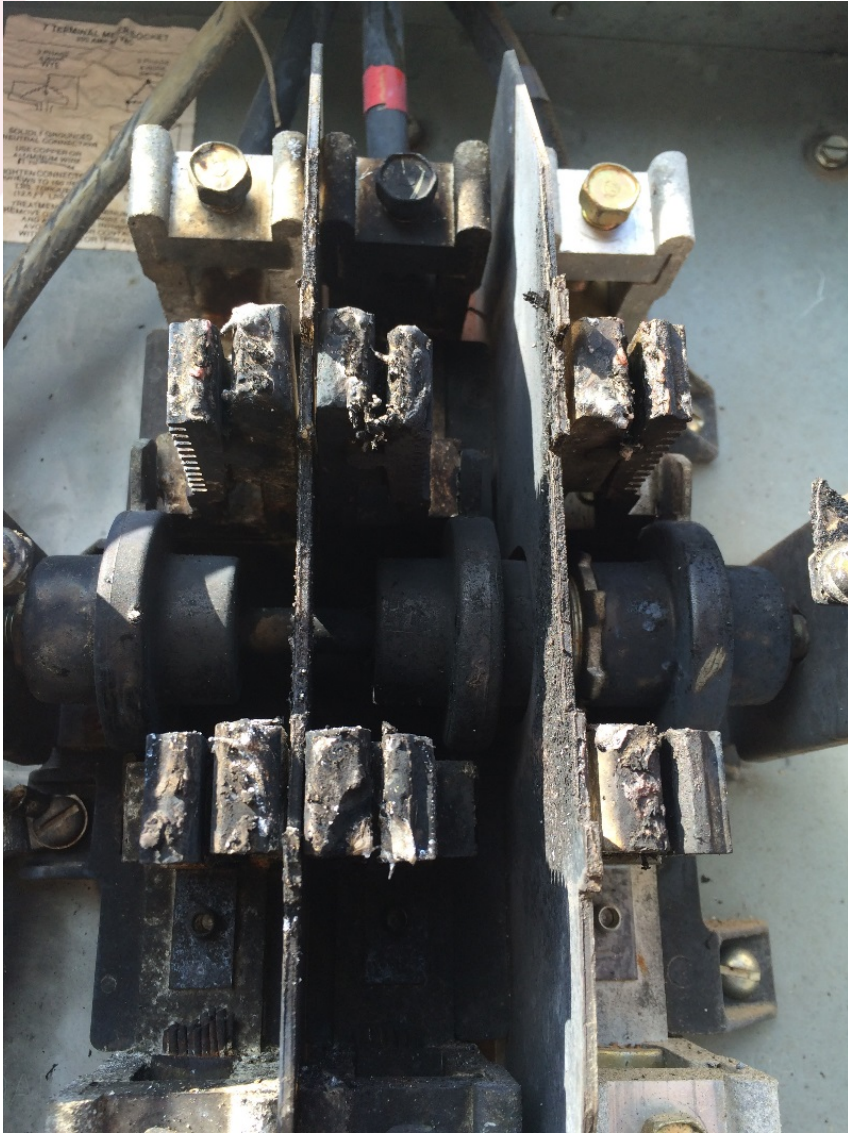
Installation Issues

- Damage at meter base
 - We chose to make repairs as we found them
 - Secured bases
 - Replaced terminals
 - Replaced meter bases
 - Replaced service line from the meter to customers panel box
- Contractor had two major installation issues
 - Installed 16s meter into the wrong base
 - Misaligned 7 terminal meter during installation

Damaged Base



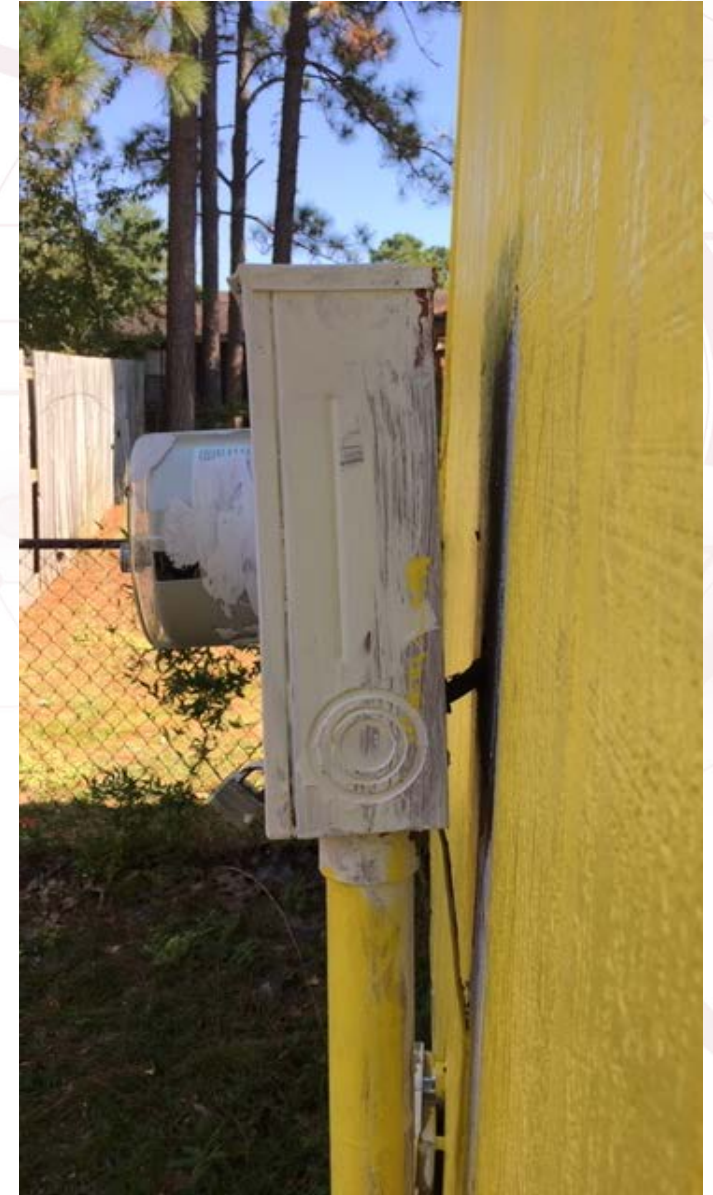
Damaged Base



Damage



Damage



Additional Issues

- Terminal pulls out of the base with the meter
- Base is open and meter missing
- Tampering/Jumpers
- Base comes off the wall
- Charred/Blackened service lines

Tampering



Recessed Meter Base



Contractor Installations

- Before and after photographs of meter exchange
 - Make sure meter number and readings are included on the photo
 - Required contractor to leave a door hanger notifying the customer that a meter change took place
 - Required a photo of the door hanger
 - Required photos if a meter could not be exchanged

Safety Hazards

- Dogs
 - Beware of aggressive dogs
 - Knock on the door
 - Make noise
- Arc Flash
 - Conditions behind the meter are unknown
 - PPE is a **MUST**
 - Proper procedures must be followed when removing and installing the new meter



Safety Hazards

- Wasps/Insects
 - Carry wasp spray
 - Look for nests before pulling the meter
 - Spray the nest and come back later
- Irrate customers
 - Train employees beforehand on how to diffuse situations
 - Leave the area
 - Contact supervision immediately



Billing Dates

- Black out dates
 - Meters needed to be scheduled for exchange outside of the billing window
 - Initially started with too short of a window
 - Meter Reading needed to be taken into consideration
 - How will you get readings into your billing system
 - File transfer times
 - Towards the end of the project this became less important

MDM/RNI Department

- MDM/RNI Department
 - 3 Customer Programs Specialists
 - Complete work between CIS, MDM, RNI Systems
 - 3 Customer Programs Analysts
 - Monitor and work through various reports
 - Add and remove meters from the RNI system
 - Adjust schedules for demand resets as needed
 - 1 MDM/RNI Supervisor

Meter Maintenance

► Meter Maintenance

- Thorough systematic meter inspection program
- Plan to visit every meter on a four-year cycle



Lessons Learned

- Payments
 - Be sure payments have posted prior to disconnecting services
- Clearly define processes for:
 - How to handle customers that pay after hours without speaking to anyone
 - Determine where responsibility lies for performing work after hours



The energy behind public power

www.electricities.com

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Connect Completed

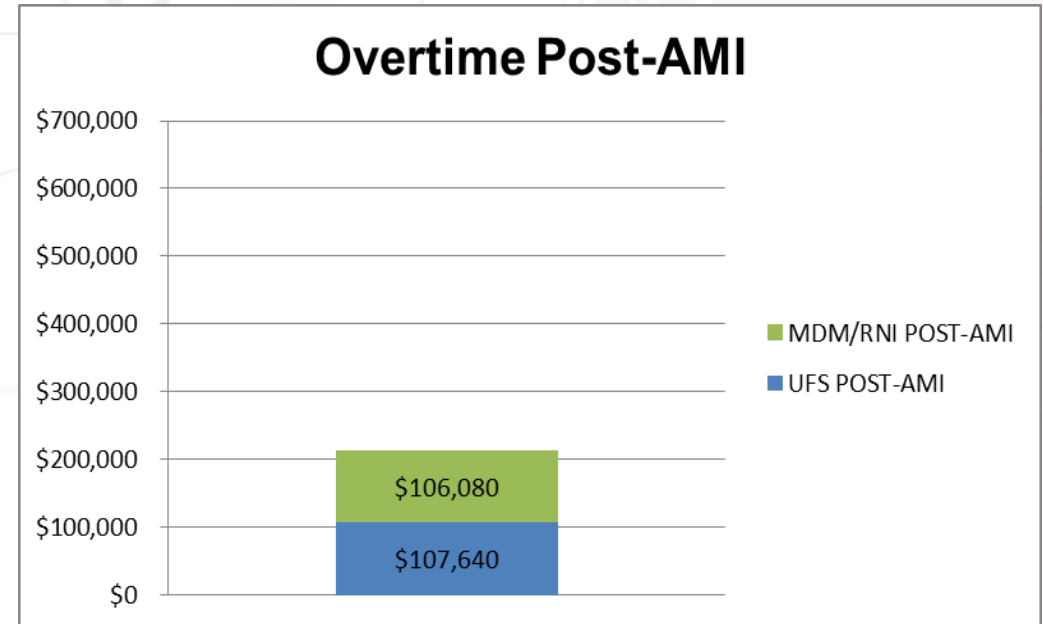
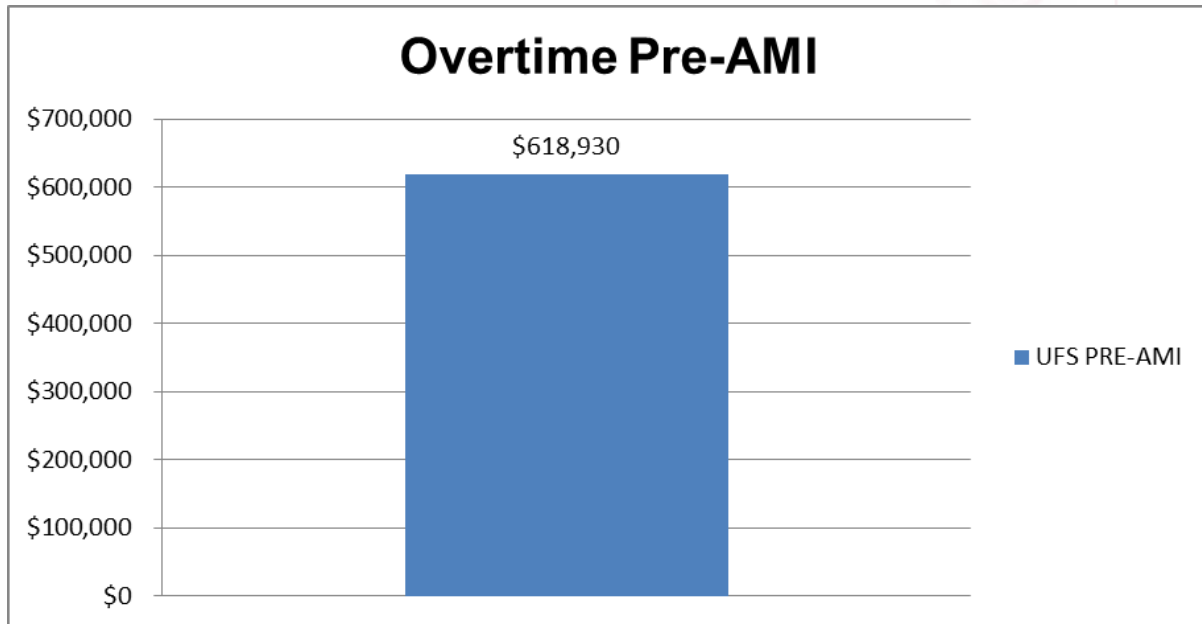


Future AMI Opportunities

- OMS (Outage Management System)
- DMS (Distribution Management System)
- System Wide Load Management
- Pressure/Temperature Monitoring
- Prepay Metering
- Monitor electric meters for high consumption

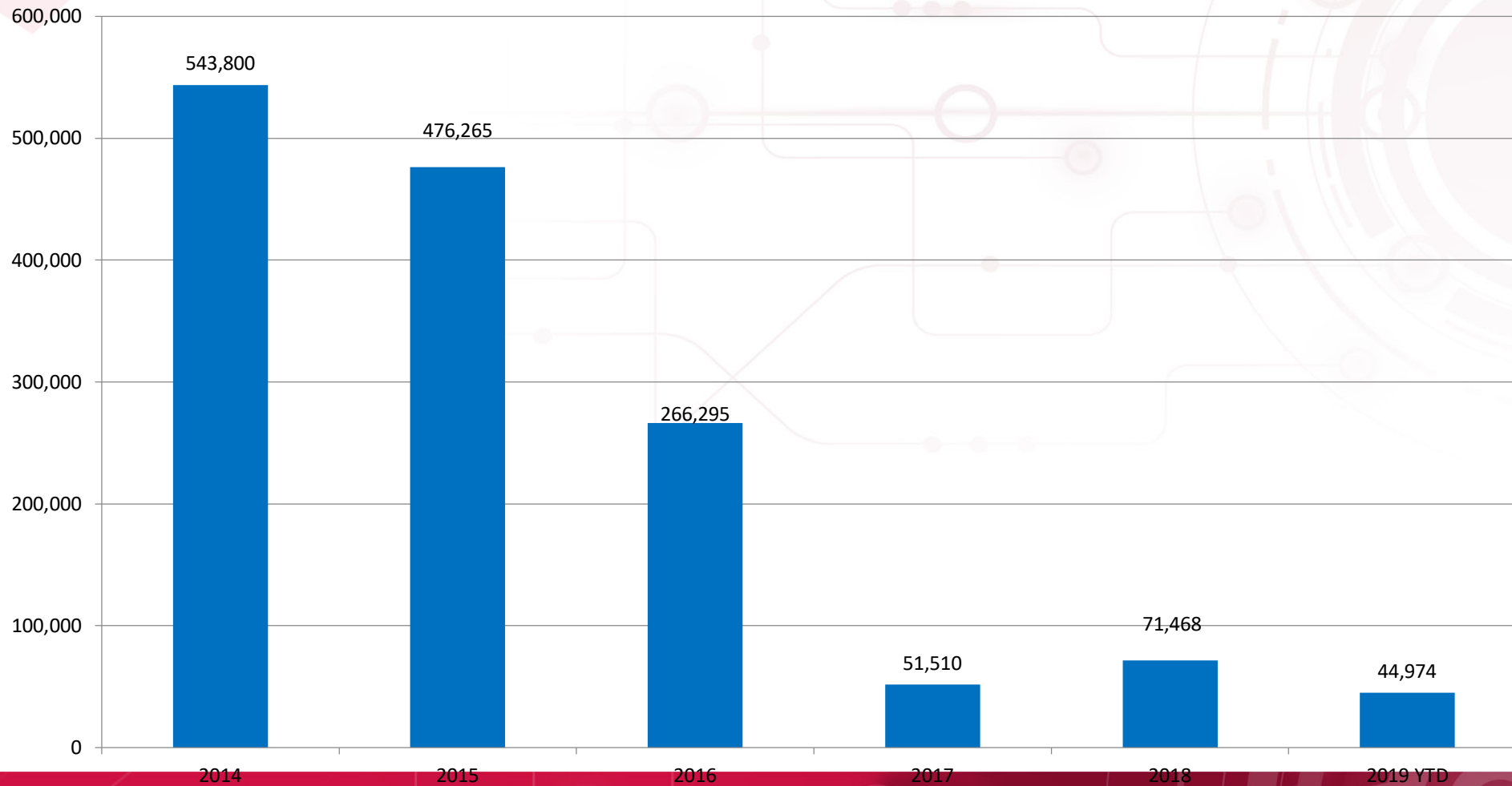
Reduced Overtime

UFS Overtime Reduction- \$505,000 per Year



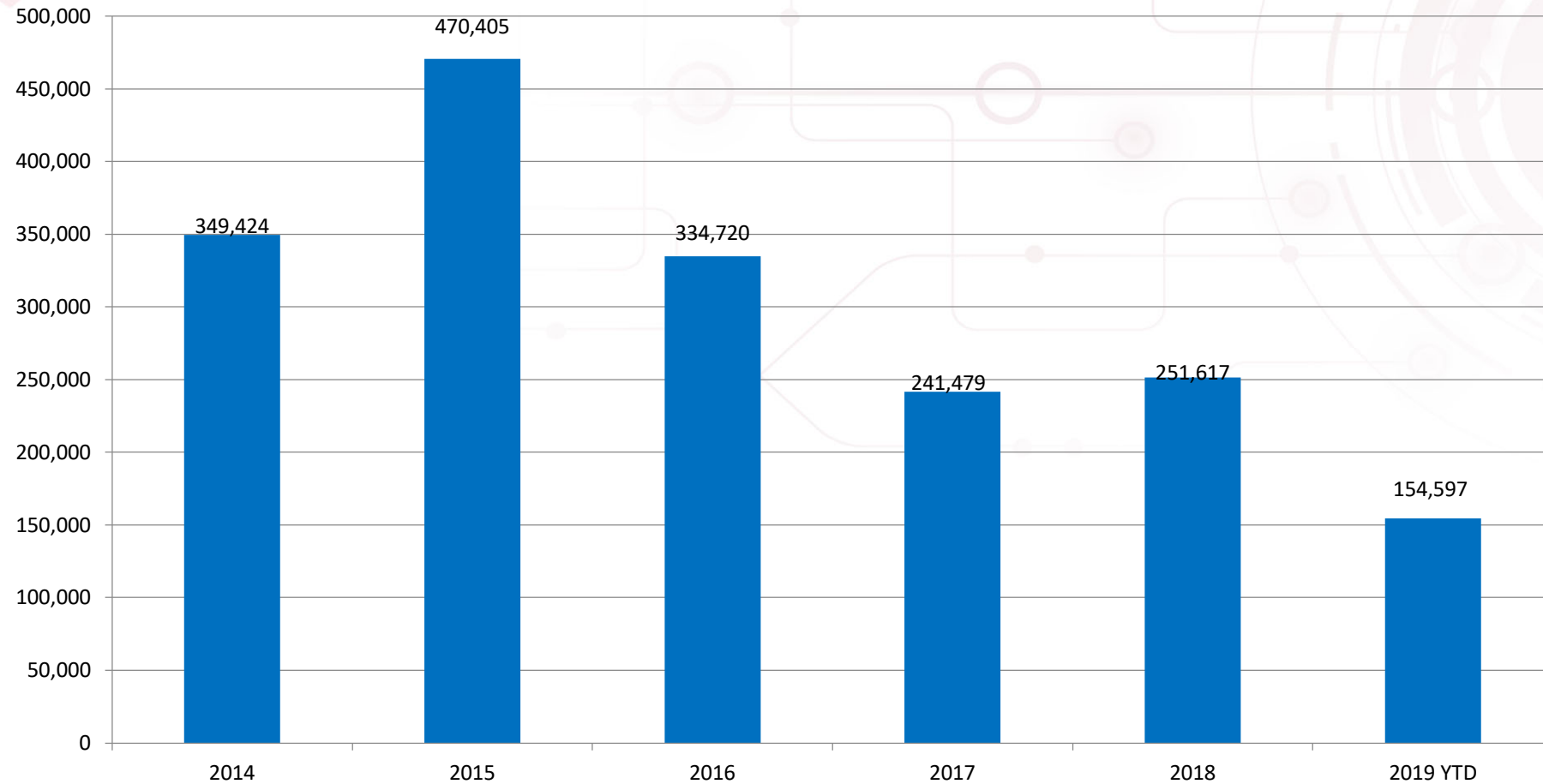
Truck Rolls Per Year

Truck Rolls



Truck Mileage

Mileage Per Year

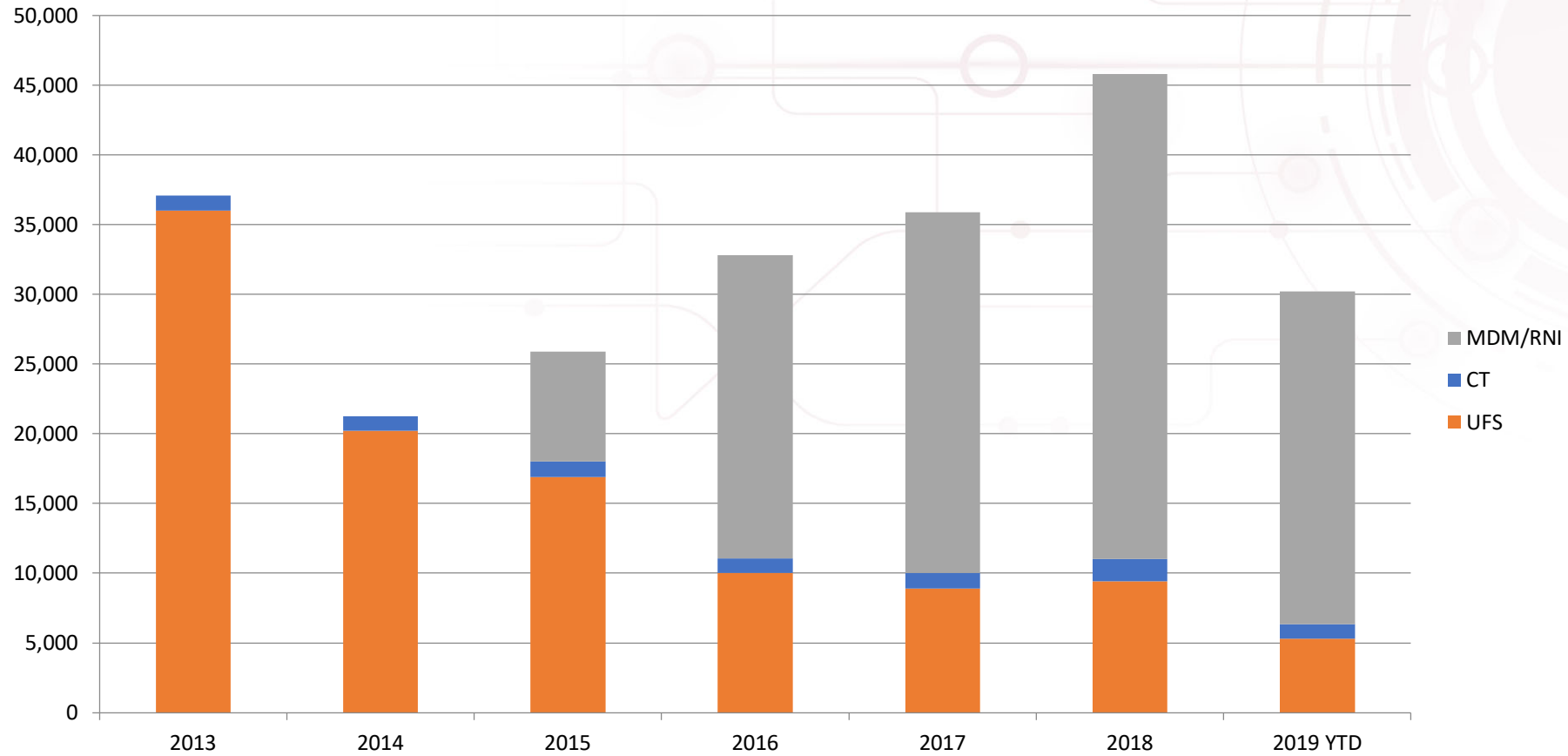


Non-pay Orders

- Pre-AMI - UFS
 - Disconnected approximately 3,000 meters per month
 - Disconnected electric and water meter
 - Depending on work load, may reconnect services as late as midnight
 - Average aging nineteen days
- Post-AMI – MDM/RNI Department
 - Disconnect approximately 3,500 electric meters per month
 - Disconnect electric meters only
 - Most reconnects completed by 5:30 PM
 - Average aging five hours
 - Stay within two days of cut off date

Non-pay Orders

Non-Pay Orders



Meter Testing

- Planned In-Service Meter Testing
 - Initial annual testing
 - 2% electric meters / 1700 electric meters
 - 1% water meters / 1,000 meters
 - Establish baseline results
- Test Results Used to Plan for Meter Replacement
 - Accuracy and battery life, key components
 - Technology enhancements may drive replacement

AMI Operational Benefits

- Outage Mapping Hurricanes Florence and Michael
- Improved Safety
 - Reduced electric meter removals
 - Reduced field service work after dark
 - Reduced fire risk due to hot sockets
- Claims Documentation
- Reduced Water and Wastewater Treatment