Electric Reliability Improvement Program (ERIP) Update

City / UCNSB Joint Commission Workshop

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Electric System Reliability History and Goals

JB1

Reliability Improvement Program – Improve system wide electric reliability performance and customer experience to targeted levels aligned with FMPA and industry benchmarks

UCNSB 5 Year History Averages through 2020

- Frequency SAIFI 1.68, CAIDI 55 and SAIDI 92
- Outage Frequency SAIFI higher than desired
- Drives up related Duration SAIDI
- Restoration CAIDI is and has been excellent- maintain

Reduce average outage duration SAIDI ≤ 60 and supporting metrics for outage Frequency SAIFI≤ 1.0 and maintain restoration time CAIDI ≤ 55 minutes
If ***both*** SAIFI and CAIDI reduction targets are met, SAIDI would reach 55

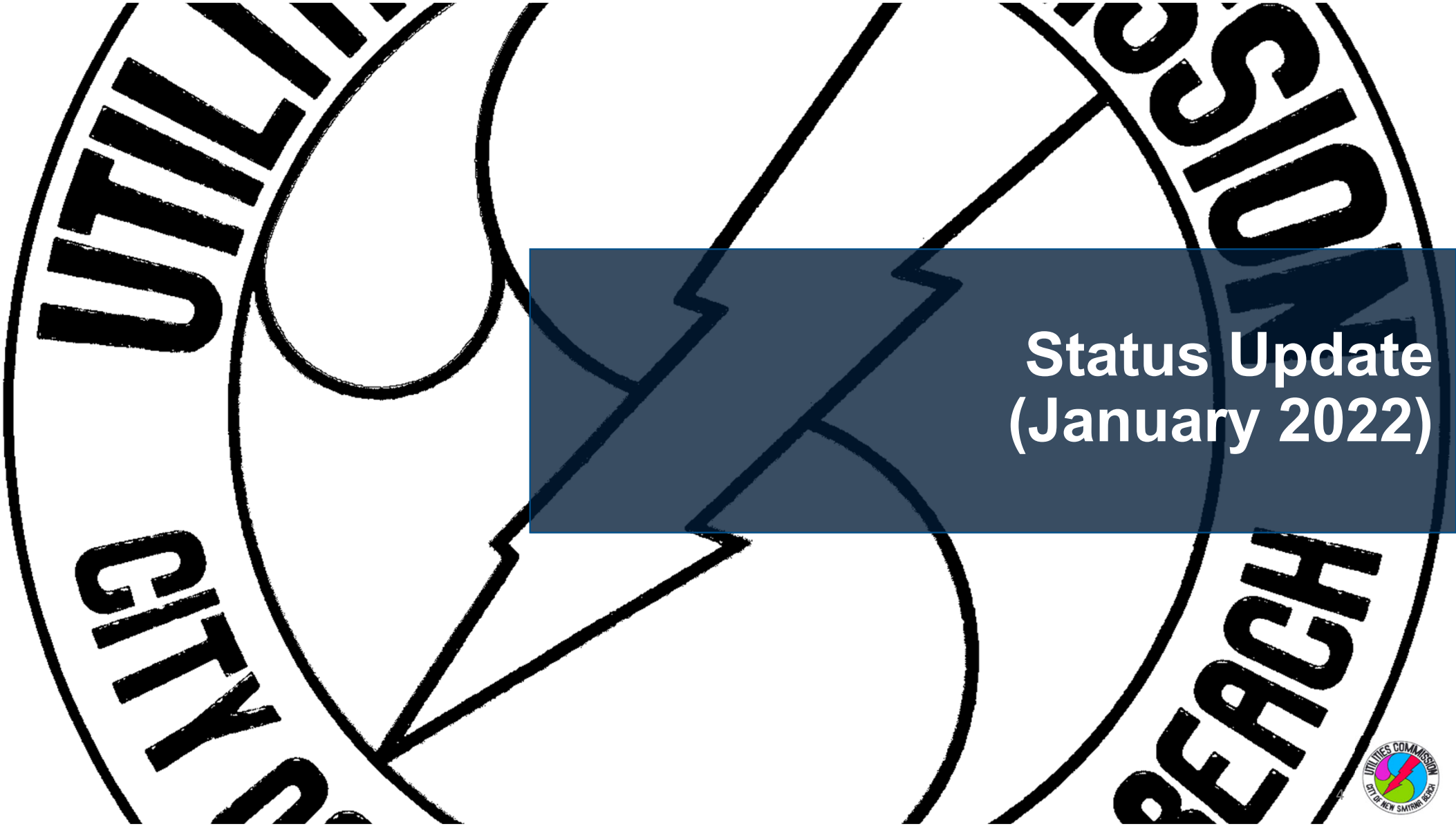
Three-year field implementation timeline FY21-23, and to achieve targets by FY24 to allow for follow on system upgrades and stabilization

Slide 2

JB1 Joseph Bunch, 9/30/2021

ERIP Program Scope

- Implementing system wide electric improvements across the UCNSB including four substations and fourteen feeder circuits
- Improvements include:
  - Transmission and Distribution Vegetation Management programs
  - Eliminate sub-standard pole backlog
  - Installation of sectionalizing devices across distribution feeders
  - Standardized fuse sizing and device coordination plans
  - New Feeder installations and reconfigurations
  - Implementing new standardized equipment and design standards
  - Standardized maintenance plans, tracking and reporting
  - Automation of sectionalizing devices as part of Smart Grid/AMI implementation
  - Other Planned Projects



Status Update (January 2022)

ERIP Programs Status Update

- New Transmission & Distribution Vegetation Management Programs Established Mid-Year FY20
  - Distribution Line Trimming/Clearing
    - 60% Trimmed/Cleared FY21, Remaining 40% planned for FY22
    - Transition to 3-year maintenance cycle in FY23
    - Improvements being realized in both reduction of sustained and momentary outages
  - Transmission Line Trimming/Clearing
    - Phase 1 – Clear Cutting, Trimming and ROW Clearing (FY22/FY23)
    - Phase 2 – Annual Ongoing Maintenance Post Phase 1 Completion

Before

After

ERIP Programs Status Update

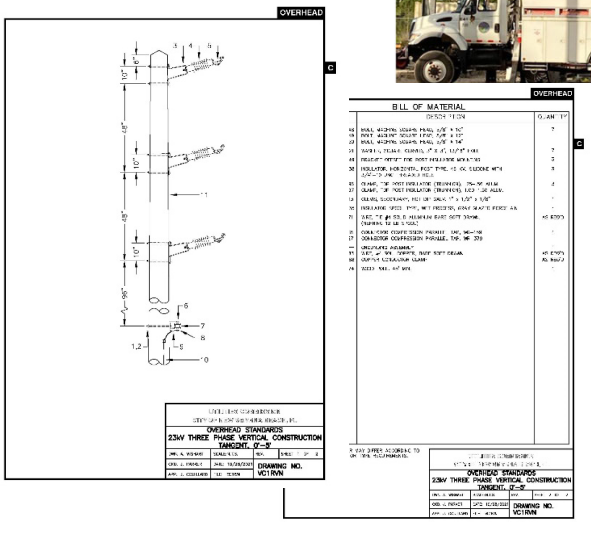
- Implemented Standardized Protection and Control device coordination across system to ensure equipment operates together in a coordinated and planned way
- Installation of Sectionalizing equipment to reduce outage impacts (150 total)
  - TripSavers are a single-phase device and are being placed on feeder laterals with >75 customers per industry best practices.
- Pole-mounted Reclosers on overhead feeder mains (18)
  - Reclosers are automatic, high-voltage electric switches. Like a circuit breaker on household electric lines, it shuts off electric power when trouble occurs, such as a short circuit. .
  - Generally, two or three main line reclosers will be installed on each feeder.

ERIP Programs Status Update

- New Feeder Configurations out of Smyrna Substation
  - Reducing total amount of customers per feeder
  - Three new feeders were installed in FY21

- Implementing new standardized equipment and design standards
  - Overhead design standards development – Completed FY21
  - Underground design standards development – FY22
  - Wildlife protection standards for substations and distribution lines - FY22
  - Substation Fencing Standards to include wildlife mitigation – Completed FY21

- T&D and Substation maintenance plans, tracking and reporting (FY22)



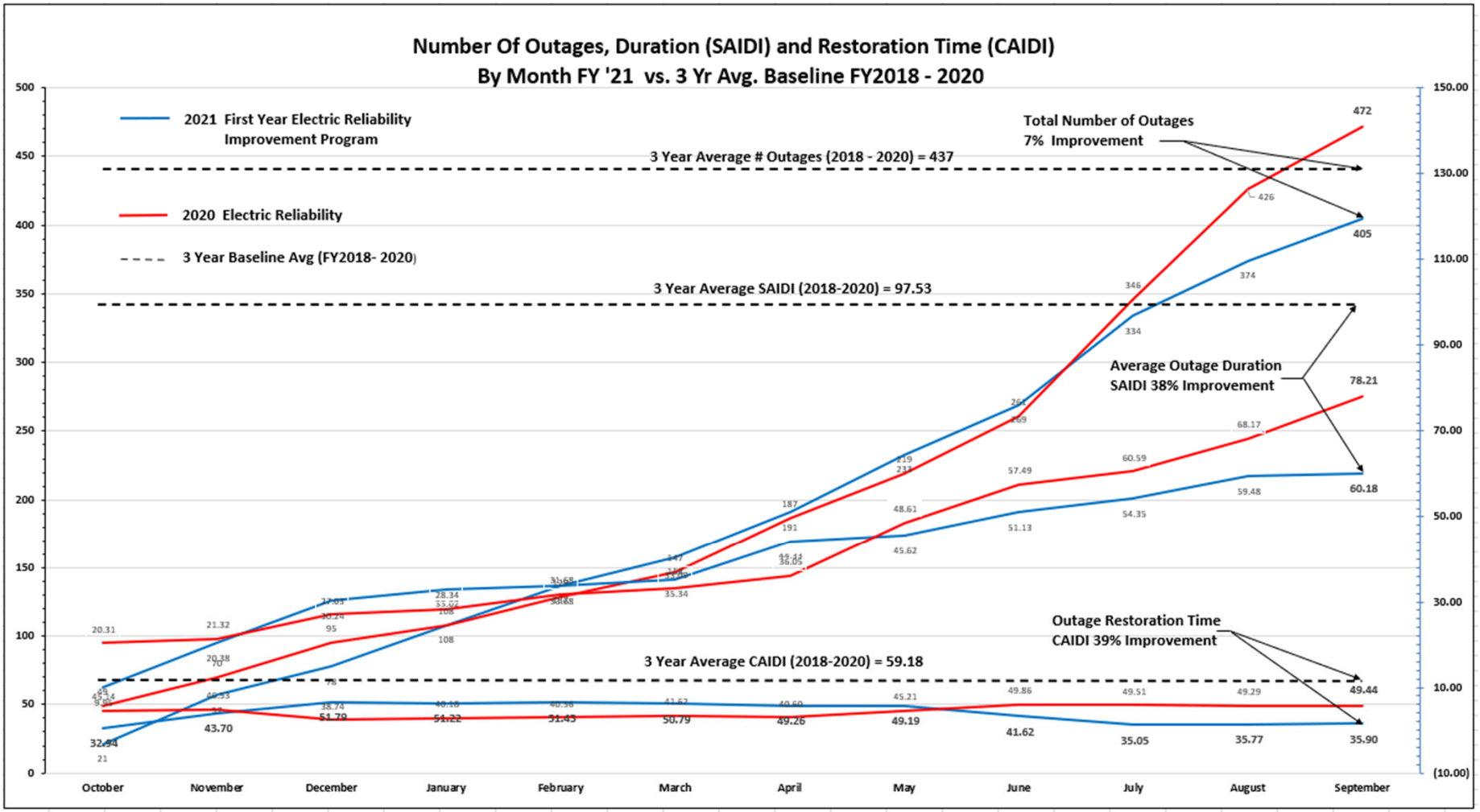
Electric Utility Standard Reliability Indices

- SAIFI (System Average Interruption Frequency Index) measures how often a customer can expect to experience an outage
  - SAIFI = Sum of outage Customers Interrupted / Total number of customers served
- SAIDI (System Average Interruption Duration Index) measures average outage duration per customer
  - SAIDI = Sum of outage Customer Minutes of Interruption / Total number of customers served
- CAIDI (Customer Average Interruption Duration Index) measures average outage duration if an outage is experienced, or average restoration time
  - CAIDI = Sum of outage Customer Minutes of Interruption / Sum of outage Customers Interrupted

Graph #1: Three Year Performance History and Improvement Targets

- CAIDI (average outage duration per customer)
  - CAIDI has improved 39% over the historical average
  - Improved technology (GIS) has been a contributing factor, allowing staff to estimate the location of the outage cause and more accurate customer counts. Our CAIDI value has remained consistently below our peers due to the responsiveness of staff and our relatively compact service area
- SAIDI (system average interruption duration)
  - Since SAIDI is the product of duration and the frequency, as the restoration time has fallen, SAIDI has seen a 38% improvement over historical values

Graph #1


Number Of Outages, Duration (SAIDI) and Restoration Time (CAIDI)
By Month FY '21 vs. 3 Yr Avg. Baseline FY2018 - 2020
2021 First Year Electric Reliability Improvement Program
2020 Electric Reliability
3 Year Baseline Avg (FY2018- 2020)
3 Year Average # Outages (2018 - 2020) = 437
3 Year Average SAIDI (2018-2020) = 97.53
3 Year Average CAIDI (2018-2020) = 59.18
Total Number of Outages
7% Improvement
Average Outage Duration
SAIDI 38% Improvement
Outage Restoration Time
CAIDI 39% Improvement
472
426
405
78.21
68.17
60.18
49.44
49.29
35.90
35.77
35.05
October
November
December
January
February
March
April
May
June
July
August
September

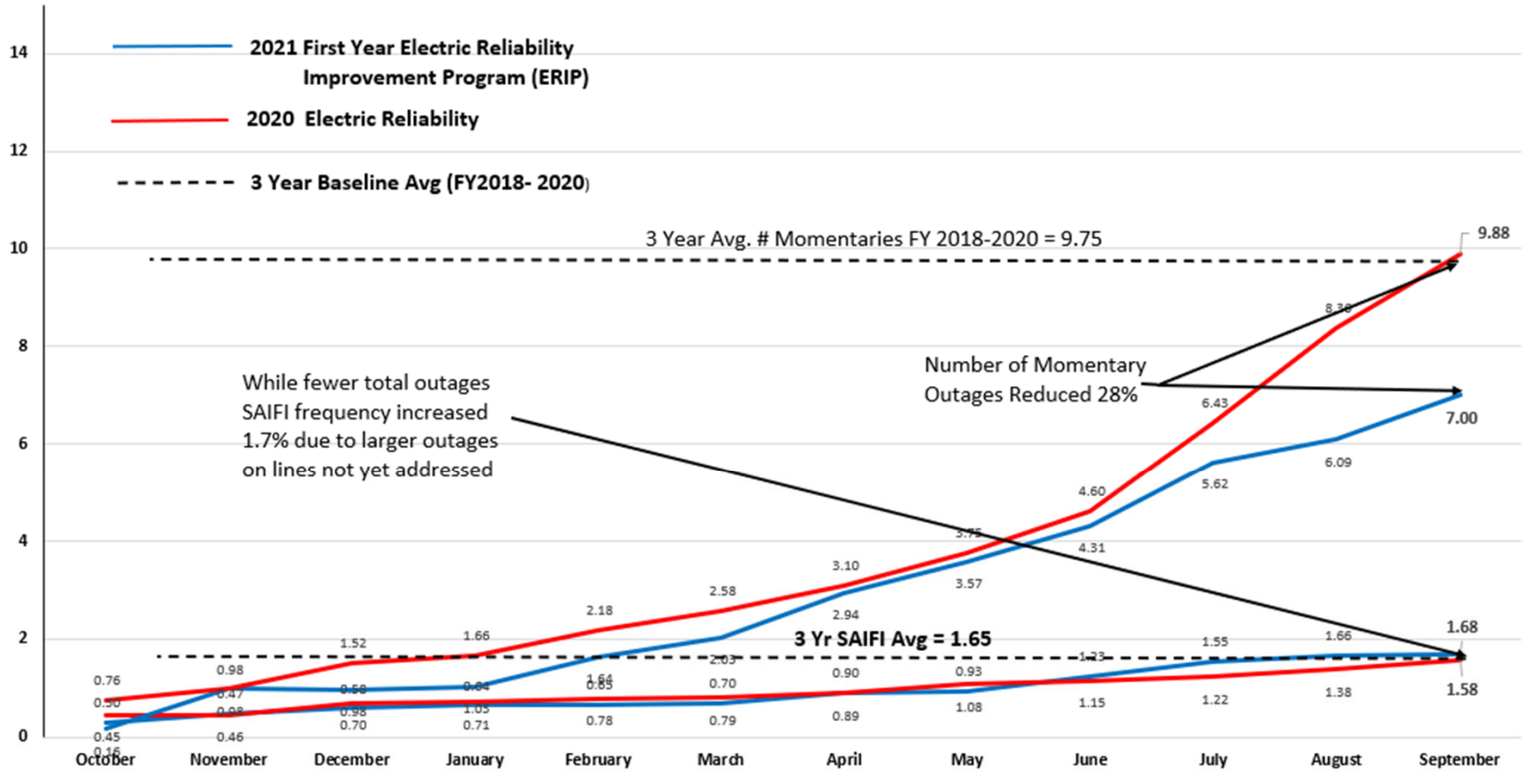
Graph #2: Three Year Performance History and Improvement Targets

- One of the major causes of momentary interruptions is tree contact on overhead lines. Since the start of the new vegetation management program in FY21, momentary interruptions have reduced by 28%

- The SAIFI value remains near previous years due to the large customer counts on the feeders. As TripSavers and Reclosers are installed, and additional feeders are added, the number of customers affected by outages will be reduced

Graph #2

SAIFI Frequency and MAIFIe Momentaries
FY '21 vs 3 yr. Avg. FY2018-2020



Additional Reliability Projects

In Planning, or Underway or Completed

- Two new feeders out of Smyrna Substation - crossing under I-95, moving East along the Transmission ROW along with Transmission Line Upgrade
- Complete Transmission Line Loop between 3 major substations
- Aging Asset Replacement/Upgrade Programs
- Load Transfer, Feeder Balancing and Feeder Tie reclosers installed to provide additional flexibility/optionality for restoration switching schemes
- Distribution Automation upgrades and integration of SCADA for improved remote monitoring and control . Tied with Automated Metering Infrastructure (AMI) and Modernization Strategies.

Additional Reliability Projects

System Hardening – In Planning, Underway or Completed

- Implement based upon Best Practice Industry Standards that apply to UCNSB location and System topology. Examples include:
  - Storm Hardening Standardization of Overhead Assets (T&D) - ***Completed***
    - Design Criteria Upgraded for Extreme Wind Loading (EWL) of 130 mph
    - Increase Pole Size/Strength standards
    - Utilize composite/concrete pole designs in strategic areas
    - Shorten span lengths
  - Targeted Undergrounding
    - Laterals and services
  - Flood Hardening (storm surge locations)
    - Substation design standards include flood mitigation
    - Submersible equipment installed in above ground vaults

Summary

- Electric Reliability Improvement is an on-going effort with the starting with a Three-year field implementation timeline FY21-23, and to achieve targets by FY24. After which, the UCNSB will has plans for additional system upgrades and stabilization

- Three-year Program Goals
  - Reduce average outage duration SAIDI ≤ 60 minutes
  - Frequency SAIFI≤ 1.0 and maintain restoration time CAIDI ≤ 55 minutes
  - If both SAIFI and CAIDI reduction targets are met, SAIDI would reach 55 minutes

- FY21 Metrics Performance
  - CAIDI has improved 39% over the historical average
  - SAIDI has seen a 38% improvement over the historical average
  - Momentary Interruptions 28% improvement

- Additional projects in the planning horizon include:
  - Additional feeders out of Smyrna Substation and Transmission Line Upgrade
  - Complete Transmission Line Loop
  - Aging Asset Replacement/Upgrade Programs
  - Load Transfer, Feeder Balancing and Feeder Tie reclosers
  - Distribution Automation

Questions?