AMERICAN TRANSMISSION COMPANY®

Helping to keep the lights on, businesses running and communities strong®

# 2019 10-Year Assessment

## Preliminary Needs

Stakeholder and Customer Presentation
February 28, 2019
Curtis Roe & Scott Adams

# Purpose

- Solicit Input on Needs
  - Network Planning
    - Assumptions Review
    - Needs: Limitations
  - Asset Renewal
- Solicit Input on Public Policy Driven Needs
- Summarize Next Steps

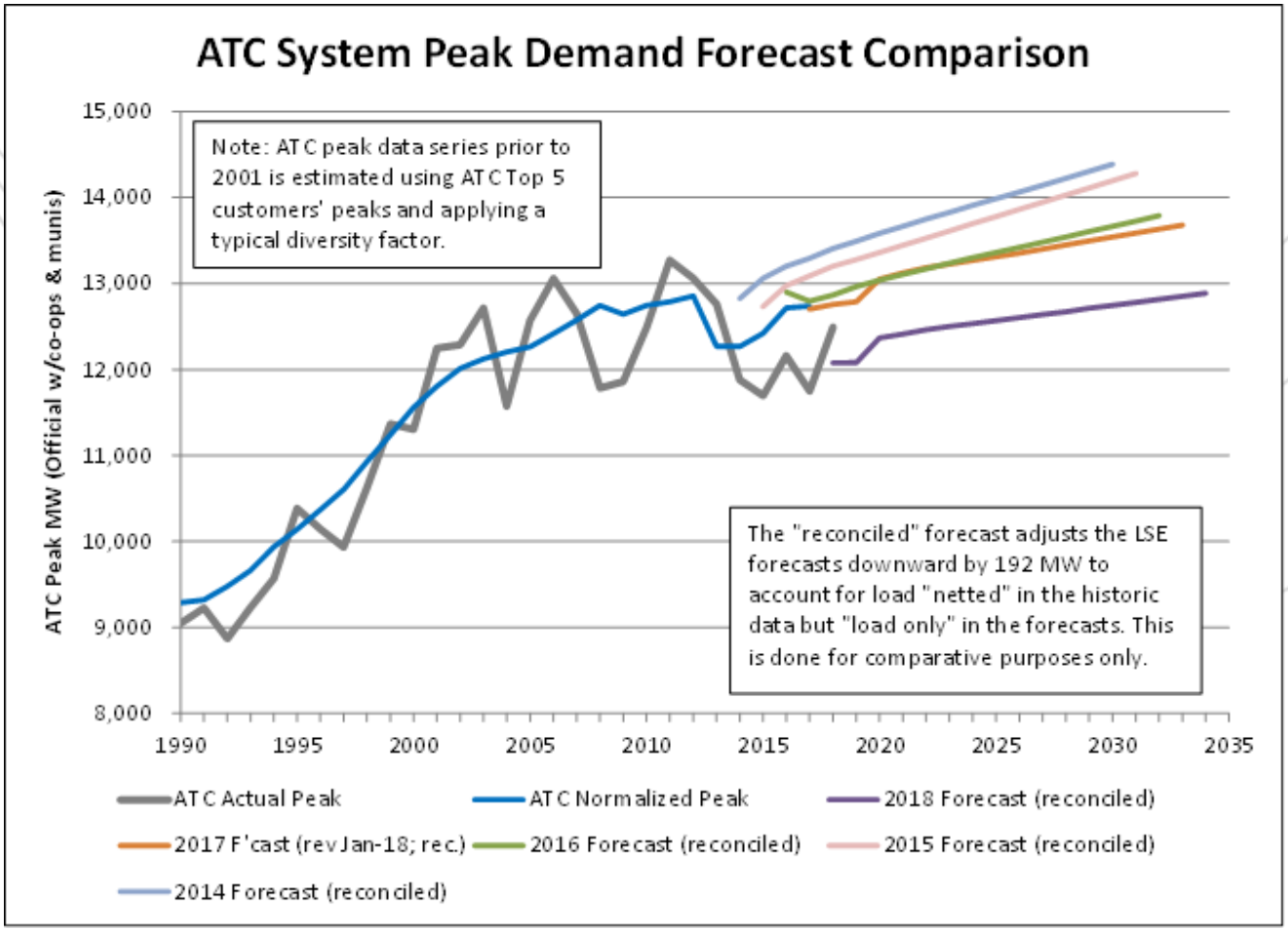
# Assumptions Review

- Studies
- Load Forecast
- Generation/Imports/Flows

# Core Assessment Studies

| 2018 TYA | | 2019 TYA | |
|---|---|---|---|
| ***Model*** | ***Years Studied*** | ***Model*** | ***Years Studied*** |
| Summer Peak | 2019, 2023, 2028 | Summer Peak | 2020, 2024, 2029 |
| Shoulder | 2023, 2028 | Shoulder | 2024, 2029 |
| 40% Minimum Load | 2019, 2023 | 40% Minimum Load | 2020, 2024 |

# Load Forecast Trends




| Forecast Year | 10-Year Average Growth Rate |
|---|---|
| 2018 | 0.50% |
| 2017 | 0.53% |
| 2016 | 0.52% |
| 2015 | 0.66% |
| 2014 | 0.68% |

# Load Forecast Trends, Continued

| Model | ATC Load (MW) | | |
|---|---|---|---|
| | 2017 Assessment | 2018 Assessment | 2019 Assessment |
| Year 1 Summer Peak | 13,070 | 13,010 | 12,610 |
| Year 5 Summer Peak | +320 | +440 | +160 |
| Year 10 Summer Peak | +640 | +660 | +340 |
| Year 5 Shoulder | 9,530 | 9,360 | 9,050 |
| Year 10 Shoulder | +230 | +160 | +120 |

# Off-Peak Load Forecasts

- Shoulder
  - 70% of summer peak in Zones 1, 3, southern 4, and 5
  - 80% of summer peak in northern Zone 4
  - 90% of summer peak in Zone 2

- Minimum
  - 40% of summer peak for all Zones
  - Power factors: historical minimum for a Local Balancing Authority

# Generation Dispatch Changes Compared to the 2018 Assessment

- Retirements
  - Lakefront D2: 5.1 MW
- Additions
  - J557: 0.9 MW solar farm at Garden City
- Changes
  - J711: 135 MW wind farm at new Silver River Substation GIA Withdrawn since 2018 TYA
  - Mackinac HVDC setting changed from 20 to 5 MW from North to South

# Generation Dispatch Changes Compared to the 2018 Assessment, Continued

- ATC Net Interchange

| Model | ATC Net Interchange | | |
|---|---|---|---|
| | 2018 Assessment | 2019 Assessment | Difference |
| Year 1 Summer Peak | -88 | -60 | 28 |
| Year 5 Summer Peak | -129 | -52 | 77 |
| Year 10 Summer Peak | -363 | -51 | 312 |
| Year 5 Shoulder | -259 | -209 | 50 |
| Year 10 Shoulder | -258 | -209 | 49 |

# Flow Changes Compared to 2018 Assessment

- Potential Causes
  - Interchange variation
  - Variation in dispatching generation outside of ATC

| Model | ATC Western Interface Flow | | ATC Southern Interface Flow | |
|---|---|---|---|---|
| | 2018 Assessment | 2019 Assessment | 2018 Assessment | 2019 Assessment |
| Year 1 Summer Peak | -700 | -795 | 595 | 732 |
| Year 5 Summer Peak | -399 | -617 | 252 | 562 |
| Year 10 Summer Peak | -677 | -414 | 297 | 359 |
| Year 5 Shoulder | -767 | -861 | 488 | 649 |
| Year 10 Shoulder | -406 | -605 | 131 | 394 |

# Needs: Limitations

| Model | Planning Zone | Monitored Facility | Category | Possible Mitigation |
|---|---|---|---|---|
| 2020 Peak | 3 | Portage B2 to Columbia 138-kV line | P12 & P32 | Transitional Ratings |
| 2020 Peak | 3 | Portage to Columbia 138-kV line | P12 & P32 | Transitional Ratings |
| 2024 Peak | 3 | Portage B2 to Columbia 138-kV line | P12 & P32 | Portage - Columbia 138-kV line rebuild X-13 |
| 2024 Peak | 3 | Portage to Columbia 138-kV line | P12 & P32 | Portage - Columbia 138-kV line rebuild X-20 |
| 2029 Peak | 3 | Portage B2 to Columbia 138-kV line | P12 & P32 | Portage - Columbia 138-kV line rebuild X-13 |
| 2029 Peak | 3 | Portage to Columbia 138-kV line | P12 & P32 | Portage - Columbia 138-kV line rebuild X-20 |
| 2029 Peak | 4 | Lost Dauphin to Red Maple 138-kV line | P32 | HVDC Adjustment 10 South to North |
| 2029 Peak | 4 | Point Beach to Kewaunee 345-kV line | P32 | Fox Generation Redispatch |

# Needs: Near Miss

| Model | Planning Zone | Monitored Facility | Category | Possible Mitigation |
|---|---|---|---|---|
| 2029 Peak | 3 | Bass Creek to Town Line Road 138-kV line | P11 | Emergency Rating not Exceeded |
| 2020 Peak | 3 | Columbia 138/69-kV Transformer | P13 & P33 | Columbia: Replace Breaker |
| 2029 Peak | 3 | Columbia 345/138 kV-transformer | P23 | Columbia: Replace Breaker |
| 2024 Peak | 3 | Sheepskin to Stoughton 69-kV line | P32 | Emergency Rating not Exceeded |
| 2029 Peak | 3 | Stage Coach to West Middleton 69-kV line | P13 | West Middleton - Stagecoach 69 kV line rebuild 6927 |
| 2029 Peak | 3 | Timberlane Tap to West Middleton 69-kV line | P32 & P33 | West Middleton - Stagecoach 69 kV line rebuild 6927 |
| 2029 Peak | 4 | Fox to North Appleton 345-kV line | P32 | Emergency Rating not Exceeded |
| 2024 Peak | 4 | Glory Road to De Pere 138-kV line | P11 | Emergency Rating not Exceeded |
| 2029 Peak | 4 | Glory Road to De Pere 138-kV line | P11 | Emergency Rating not Exceeded |
| 2024 Peak | 4 | Lost Dauphin to Red Maple 138-kV line | P32 | Emergency Rating not Exceeded |
| 2029 Peak | 4 | Lost Dauphin to Red Maple 138-kV line | P32 | Emergency Rating not Exceeded |
| 2024 Peak | 4 | Point Beach to Kewaunee 345-kV line | P32 | Emergency Rating not Exceeded |
| 2029 Peak | 4 | Point Beach to Kewaunee 345-kV line | P32 | Emergency Rating not Exceeded |

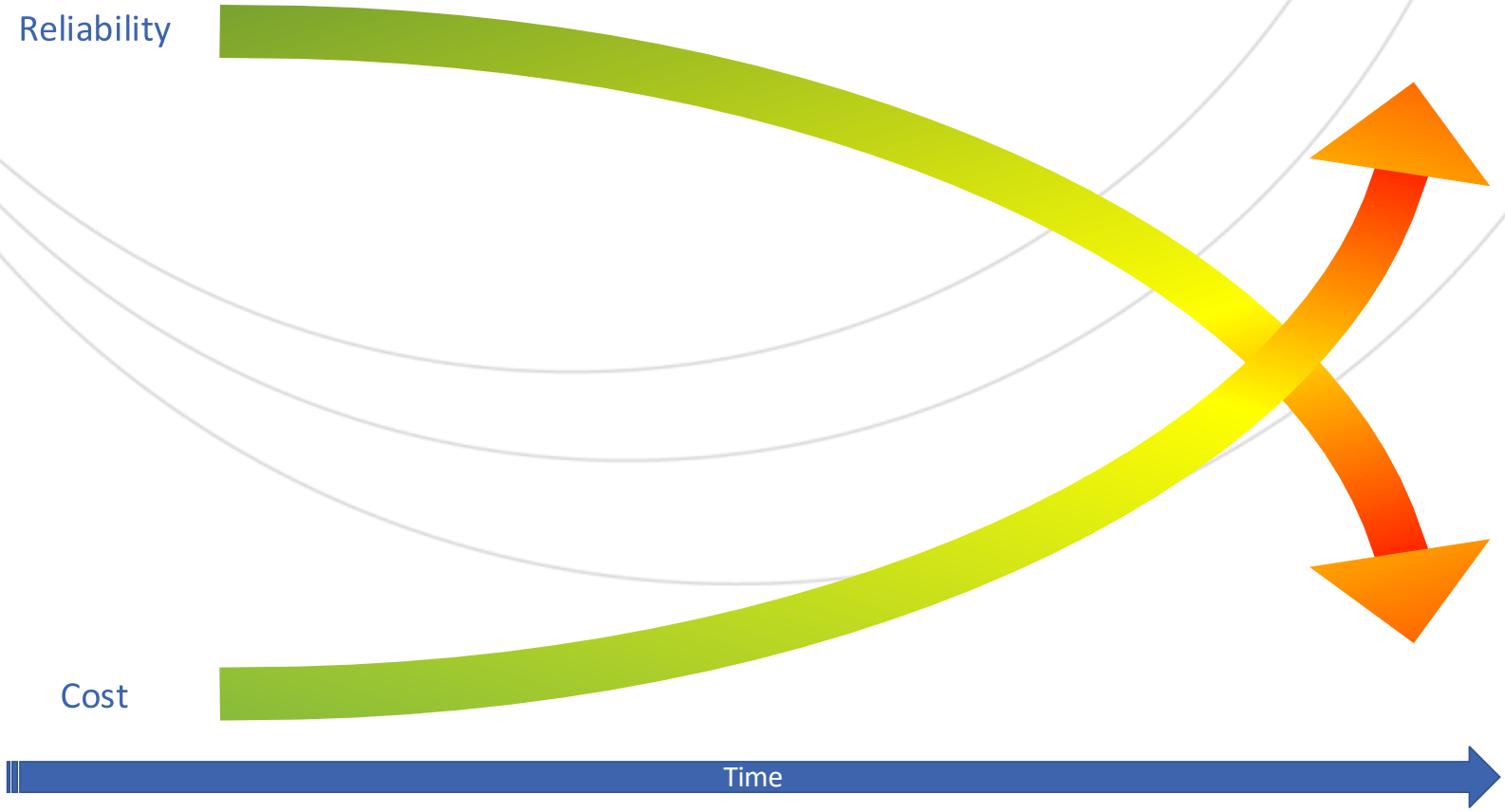
# Asset Renewal Program Objectives

- Safety – public and worker
- Minimize total life cycle cost (NPV from customer cost/rate perspective)
- Compliance
- Manage risk
- Reliability performance improvements
- Environmental performance improvements
- Coordination with Stakeholders

# Asset Renewal Program Criteria

| •Condition | •Obsolescence | •Reliability | •Compliance,<br>•Safety,<br>•Environmental |
|---|---|---|---|
| •O&M Cost savings<br>•Health indexing<br>•Performance and projected deterioration | •Manufacturer and Field technical support<br>•Spare parts availability<br>•Application<br>•Analog phone circuit elimination | •Industry failure rates<br>•Known design issues<br>•Single element failure and testing exposure<br>•Outage reduction<br>•Poor lightning performance<br>•Relay system misoperations, security, dependability<br>•Human performance issues | •Ratings methodology (FAC-008)<br>•NESC clearance from grade and other structures<br>•NESC working clearances in control houses<br>•NESC structure strength<br>•Environmental impacts<br>•Operational risk |

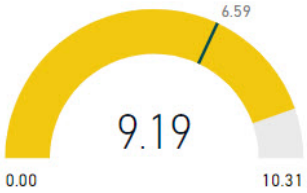
# Customer Cost versus Reliability



# Reliability Performance: January - December 2018

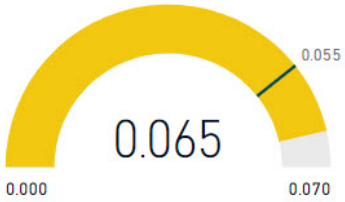
## Customer Impact

TSAIDI



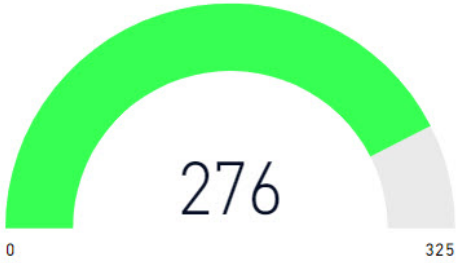

The 9.19 minute T-SAIDI YTD has exceeded our YE five year average of 6.59 minutes.

TSAIFI




The 0.065 T-SAIFI YTD has exceeded our YE five year average of 0.055.

Total Forced Outages




2018 Top impacting outages:

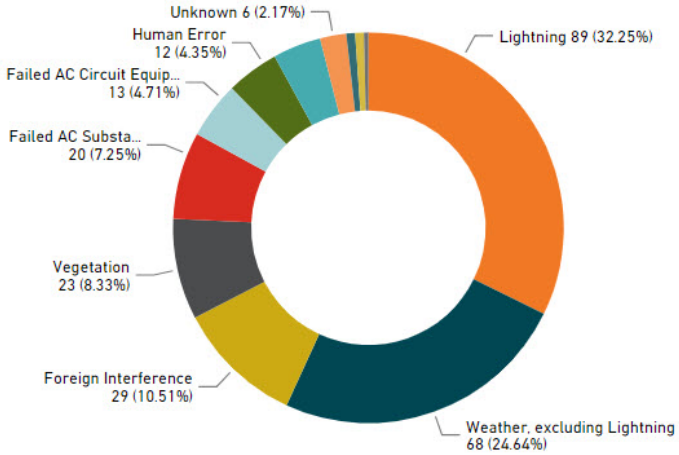
January 3: Albers SS - Failed Substation Equipment (18,885 customers, 1.37 min. T-SAIDI).

April 14 & 15 Ice Storm: 36 circuit outages (26,862 customers, 0.010 T-SAIFI).

August 28: EF-2 Tornado: 23 structures down (11,330 customers, 1.89 min. T-SAIDI) and failed distribution communication antenna (6,771 customers, 0.83 min. T-SAIDI).

Sept. 21: Conductor damage from live off ROW tree fall in on radial circuit accounted for 1.09 minutes of T-SAIDI.

Total Circuit Outages by Cause Code



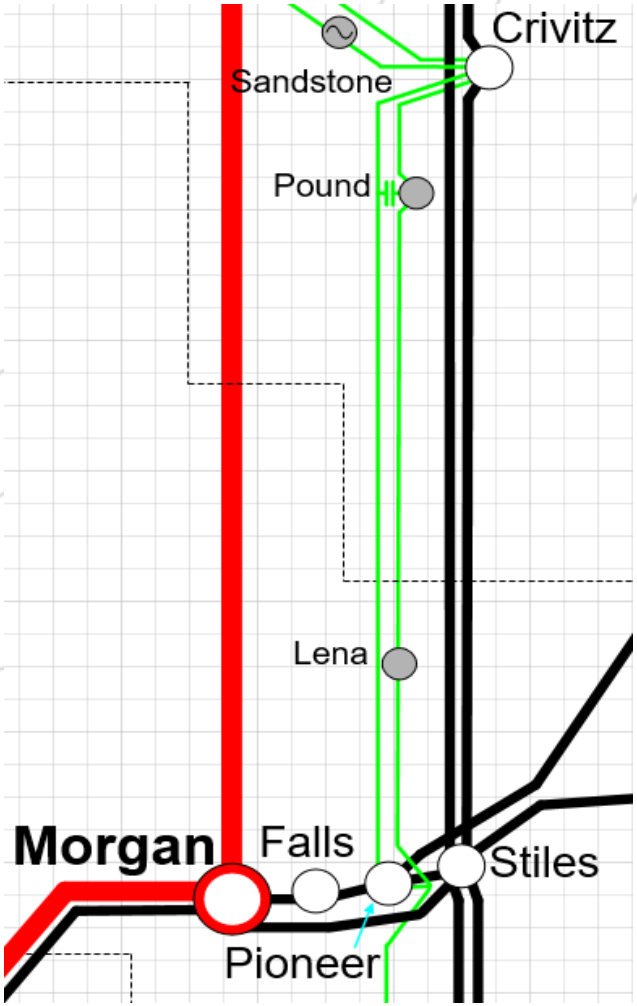
# Coordinated Asset Renewal Process

- Objective: Optimize efficiency and reduce project costs
  - Collaborate on schedules, priorities and work load leveling
  - Provide internal coordination between Planning, Operations, Maintenance, Construction, Engineering and Asset Management
  - Stakeholder input through ATC Customer Relations
  - Track Program ISD and specific Project Deferrals
  - Provide a 10 year forecast for internal and external stakeholders

# Crivitz to Pioneer E-83/B-2 T-Line Conversion Project

- ATC team and affected distribution provider assessed area needs

- Found potential for full or partial retirement
  - Preferred alternative: move substations nearby existing 138 kV lines
  - Existing 69 kV lines fully retired



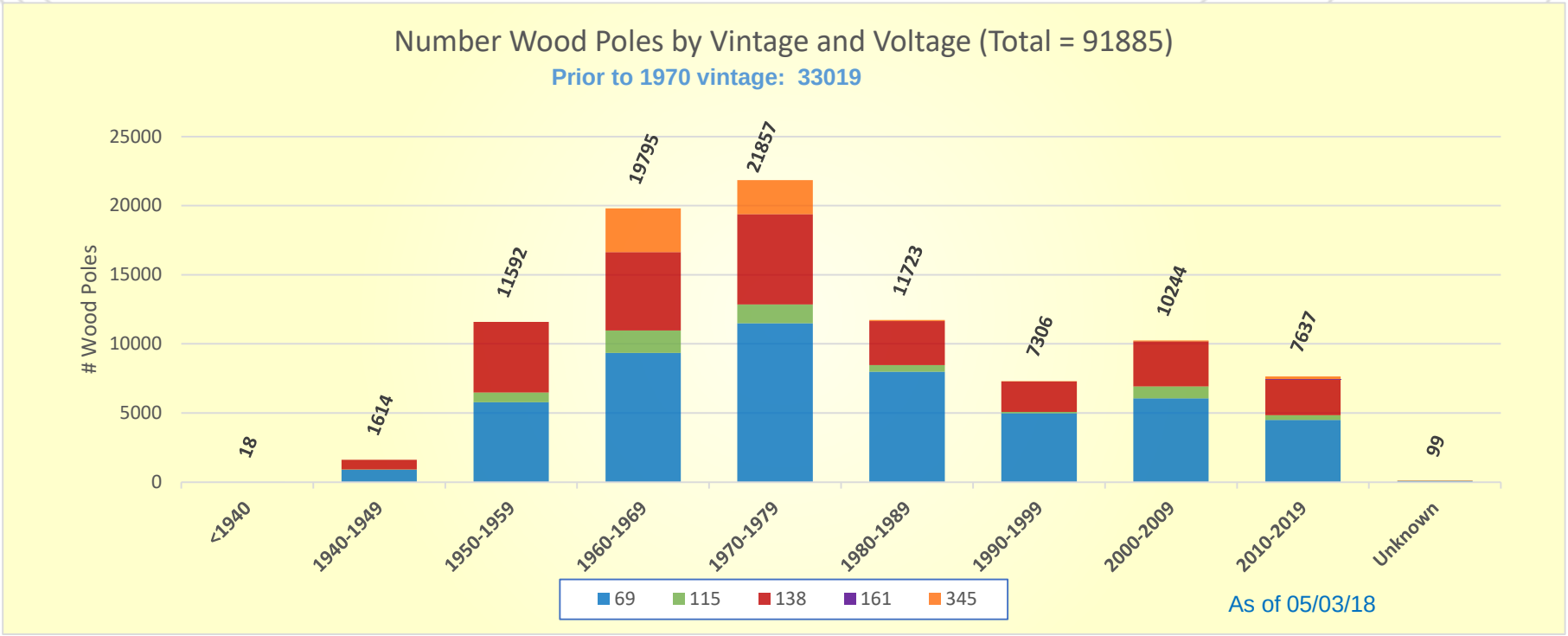
# Asset Renewal – Preliminary 10 Year Forecast Equipment Quantity

**Asset Renewal Equipment Quantities Forecast by Asset Type - 2023-2032**

| Row Labels | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arresters | 54 | 8 | 18 | | 9 | | 9 | | | 3 | 101 |
| Batteries and Chargers | 17 | 28 | 20 | 22 | 12 | 24 | 16 | 14 | 13 | 12 | 178 |
| Breakers and Switchers | 44 | 21 | 26 | 5 | 27 | 8 | 36 | 19 | 5 | 9 | 200 |
| Capacitor Banks | | | 2 | 1 | 2 | 3 | 5 | 7 | 2 | 3 | 25 |
| Control Houses | 2 | 2 | 5 | 2 | | 3 | 5 | 4 | 1 | 3 | 27 |
| Instrument Transformers | 22 | 43 | 17 | 18 | 61 | 47 | 109 | 50 | 28 | 79 | 474 |
| Power Transformers | 11 | 10 | 9 | 4 | 7 | 8 | 5 | 4 | 1 | 5 | 64 |
| Reactors | | 3 | 2 | | | 3 | 1 | | | | 9 |
| Relays | 210 | 105 | 180 | 295 | 284 | 245 | 440 | 333 | 169 | 291 | 2552 |
| SCADA | 21 | 22 | 16 | 29 | 39 | 29 | 40 | 32 | 30 | 54 | 312 |
| Switches | 150 | 65 | 72 | 67 | 70 | 33 | 68 | 48 | 14 | 70 | 657 |
| **Grand Total** | **531** | **307** | **367** | **443** | **511** | **403** | **734** | **511** | **263** | **529** | **4599** |

# Asset Management Renewal Plans - T-Line

- Objective is to manage condition and preserve reliability and safety as these assets reach end of life.
- Pre-1970 vintage wood poles will need replacement in the next 20 years.



# Asset Management Renewal Plans - T-Line

•Over next twenty years ATC will need to build approximately 100 miles per year.

| Voltage Class | Mono Wood Poles | Multi - Wood Pole Structures* | Number of Wood Poles on Multi-Wood Pole Structures | Grand Total Number of Wood Poles | Grand Total Number of Wood Structures | Average Span Length (ft.) | Number of Miles per Year Next 20 Year |
|---|---|---|---|---|---|---|---|
| 69 | 14374 | 703 | 1532 | 15906 | 15077 | 300 | 43 |
| 115 | 3 | 1182 | 2434 | 2437 | 1185 | 650 | 7 |
| 138 | 991 | 5047 | 10533 | 11524 | 6038 | 650 | 37 |
| 345 | | 1532 | 3152 | 3152 | 1532 | 950 | 14 |
| **Grand Total** | **15368** | **8464** | **17651** | **33019** | **23832** | | **101** |

* Multi - Wood Pole Structure is comprised of two (H-Frame) or more wood pole structures

| Continuing Asset Renewal Condition Need | Projected Need Year | Project Status | Planning Zone | MISO MTEP Appendix Status | MTEP PRJiD | MTEP Cost (M$) |
|---|---|---|---|---|---|---|
| North Lake – Greenstone 69kV line (NLKY11) Rebuild | 2023 | Provisional | 2 | -- | -- | 10-25 |
| Portage - 9 Mile 69kV lines (6901/ESE_6902) Re-insulate | 2023 | Provisional | 2 | -- | -- | <10 |
| Gwinn- KI Sawyer 69kV line (Sawyer) Re-insulate | 2023 | Provisional | 2 | -- | -- | <10 |
| Chandler-Delta (UPPCO) 69kV line (Delta 1) Partial Rebuild | 2023 | Provisional | 2 | -- | -- | <10 |
| Academy - Columbus 69kV line (Y21) Rebuild | 2023 | Provisional | 3 | B | 10590 | <10 |
| Danz Ave – University (WPS) 69-kV line (O-15) Underground Transmission Section | 2023 | Provisional | 4 | Target A, MTEP19 | 15924 | 10-25 |
| South Beaver Dam - Horicon 69kV line (Y134) Rebuild | 2026 | Provisional | 3 | -- | -- | 10-25 |
| Conover-Mass 69kV line (6530) Partial Rebuild | 2025 | Provisional | 2 | Target B, MTEP19 | 16495 | <10 |
| 9 Mile SW STA - Pine River 69kV lines (6921/23) Partial Rebuild | 2025 | Provisional | 2 | Target B, MTEP19 | 16496 | <10 |
| Blaney Park SW STA – Mich. Limestone Quarry Tap 69kV line (6914) Partial Rebuild | 2025 | Provisional | 2 | -- | -- | <10 |
| Replace East Krok 138/69 kV T1 Transformer | 2025 | Provisional | 4 | -- | -- | <10 |
| University-Whitewater 138kV line (UNIG51) Rebuild | 2027 | Provisional | 5 | -- | -- | 10-25 |
| University - Mukwonago 138kV line (UNIG52) Rebuild | 2027 | Provisional | 5 | -- | -- | >25 |
| Darlington – Rock Branch 69kV line (Y109) Rebuild | 2026 | Provisional | 3 | -- | -- | 10-25 |
| Retire Lone Rock 69-kV Phase Shifter | 2026 | Provisional | 3 | -- | -- | <10 |

# Public Policy Requirements – Comments?

- Any public policy driven needs that may not be covered by the Assessment process?

# Assessment Status

- Next Steps
  - Needs comments – due March 22
  - Finalize needs – end of March
  - Preliminary solutions meeting/presentation – May 2
  - Finish sensitivity studies – May
  - Develop new or revised scope and cost estimates – June
  - Complete multiple outage study – June
  - Draft study write-up – July
  - ATC internal review/approval – August
  - 2019 Assessment publication – September

# Questions?

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