PJM DLR Task Force

Advanced Line Monitoring for Reduced Cost, Increased Reliability, and Better Management
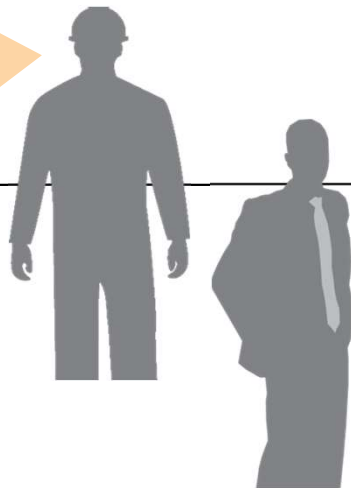
December 12, 2022

Why DLRs: Monitoring for ↑ Reliability, Affordability, Customer Benefits

Problem: Congestion on Lines cost customers $ / opportunity to improve reliability	Solution: Dynamic Line Ratings unlock additional capacity reducing congestion and ensures reliability
- A congested line prevents the most economic delivery leading to higher customer costs - Shifting generation assets demand a flexible grid to respond to changes in loading patterns - PJM identified as congested lines - Support reliability through determination of ratings based on real-time conditions	- Non-contact, tower-mounted technology for Dynamic Line Ratings (DLR) installed and managed by LineVision's team of data scientist and DLC - Real time and forecasted DLR's increase capacity, which leads directly to improved affordability for customers - DLR eliminate assumptions preventing ratings overestimation, ensuring reliability

It's very expensive to reconductor lines, is there any way we can avoid or defer that expense?

With increasing generation retirement and load shift, how are we assured the reliability of our transmission system?
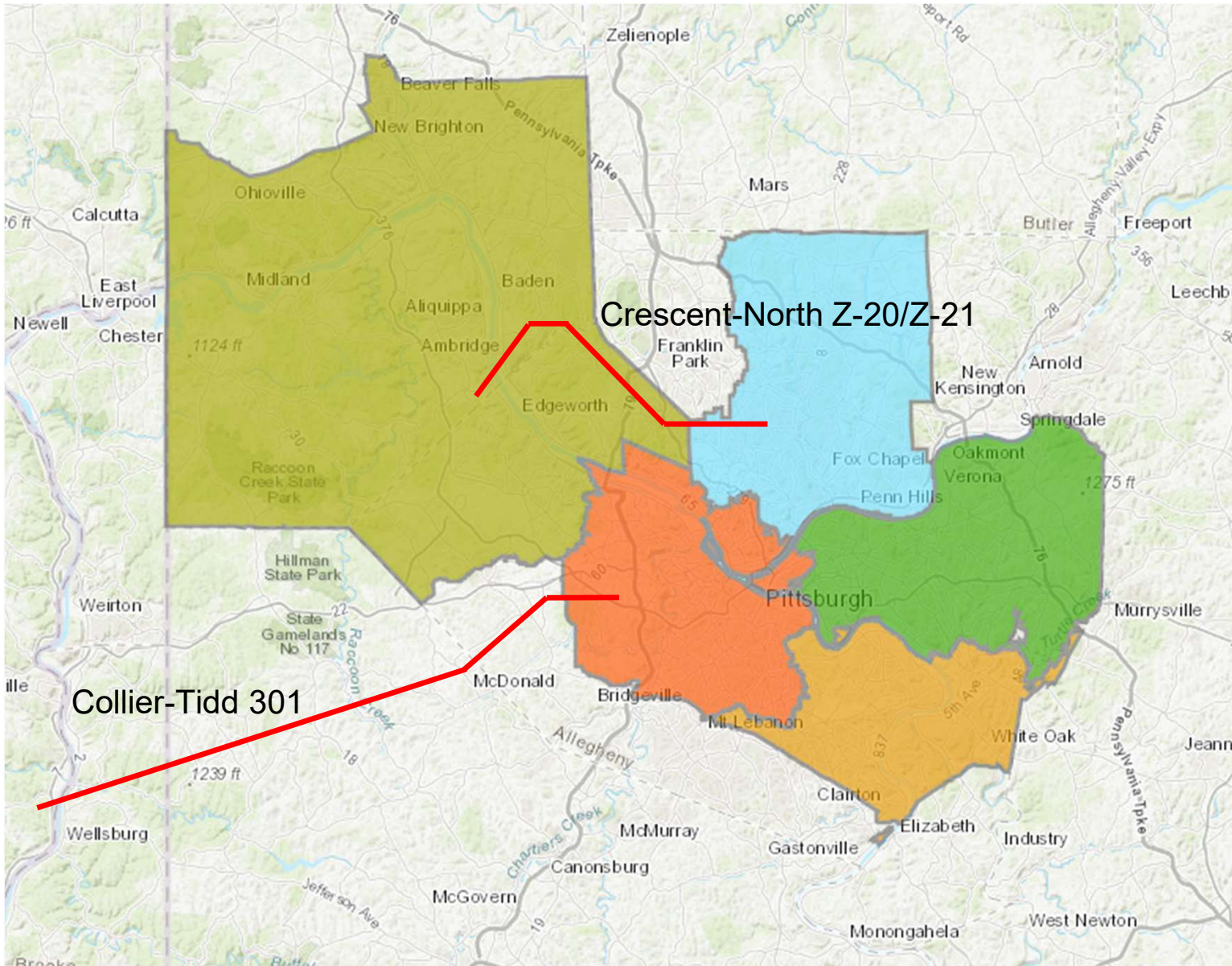
How do we achieve cost recovery to lower cost and reduce congestion?

DLC Pilot Installations: Lines 301 and Z-20/21

Crescent-North Z-20/Z-21

Collier-Tidd 301

DLC DLR Technology

LineVision Patented Technology
- Scanning Optical Sensor using LiDAR - continuously measures conductor position and motion
- Sensor data and machine learning combine to provide highly accurate ratings

LineVision Turnkey Process for Implementation
- No outages for installation
- No live line work, no special tools
- No destructive testing for conductor health
- Data on ALL conductor phases
- Any tower, any voltage, any geography

DLC Piloted Technology

LineRate Output
- ✓ Dynamic Line Rating
- ✓ Forecasted line ratings, hourly, 2-hour, 24-hour or other
- ✓ Short-term emergency ratings (STE), time-configurable
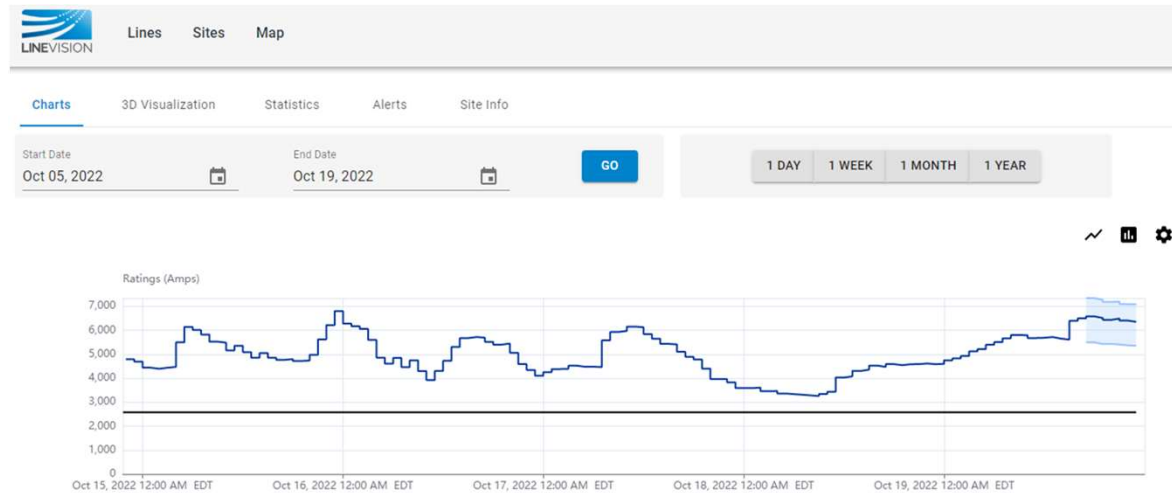
Working towards calculating forecasted line ratings which would be used for operations purposes.
- Customized for the monitored line segment
- Tuned/trained by LineVision real-time monitoring data
- Delivered with Exceedance Probabilities

Integrate real-time and forecasted DLR with system operations for congestion reduction and renewables integration.

DLC Operational Considerations

DLC is still working towards operationalizing the DLR. Many factors are being considered for implementation of this new technology:

- NERC Compliance – FAC-008/CIP considerations
- Data quality and validation
- Contingency planning for unavailability of DLR
- Integration into DLC Energy Management System (EMS) and operational tools
- Data transfer and integration into PJM Energy Management System (EMS) and PJM operational tools
  - Real-time and forecasted ratings
- Process, procedures, ratings methodology updates
- Training for Operating Personnel

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DLC Pilot Results: Collier – Tidd 301

Z-20/Z-21 is currently in the model training phase

Initial data show a ratings increase resulting in up to 25% additional capacity

- 12 LineVision V3 systems were installed on Collier – Tidd 301 and have been collecting data for over a year

- The data show an average increase in capacity of 25% or greater across each section of the line

- DLR exceeded the ambient adjusted rating at least 91% of the time

Line 301	Average AAR	Average DLR	% Increase	% time DLR < AAR
Site 1	2528	3236	28%	7%
Site 2	2543	3229	27%	7%
Site 3	2529	3224	28%	7%
Site 4	2531	3218	27%	7%
Site 5	2535	3208	27%	8%
Site 6	2535	3243	28%	7%
Site 7	2535	3203	27%	8%
Site 8	2530	3160	25%	9%
Site 9	2530	3154	25%	8%
Site 10	2528	3230	28%	7%
Site 11	2528	3233	28%	8%
Site 12	2528	3288	30%	6%

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Questions?

Elizabeth Cook, PhD
General Manager
Advanced Grid Solutions
ecook@duqlight.com

Michelle Antantis, PE
Senior Consulting Engineer
Grid Optimization and Strategy
mantantis@duqlight.com

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