

Oncor West Texas Dynamic Line Rating (DLR) Project

ERCOT RPG Overview

March 26th, 2013



Dynamic Line Rating

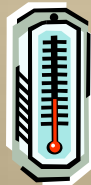
Transmission Line Ratings are governed by:

- Current flowing in the conductor
- Conductor size and resistance
- Conductor clearance to ground
- Ambient weather conditions:

AMPS



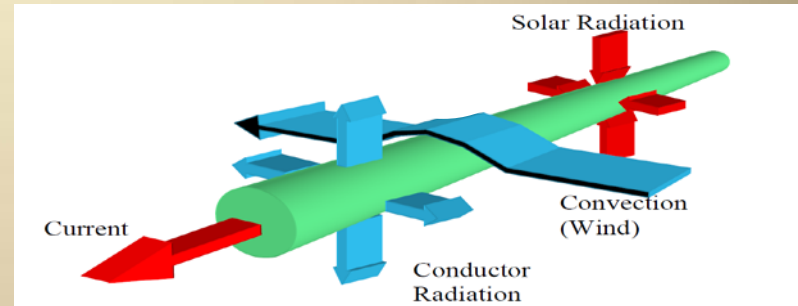
- Temperature



- Wind speed and direction



- Solar radiation



Ambient Temperature:
3.6° F, 2°C change → +/- 2%

Solar Radiation:
Cloud shadowing → +/- a few

Wind increase 3.2 ft/sec (2.2 mph):
45 angle → + 35%
90 angle → + 44%

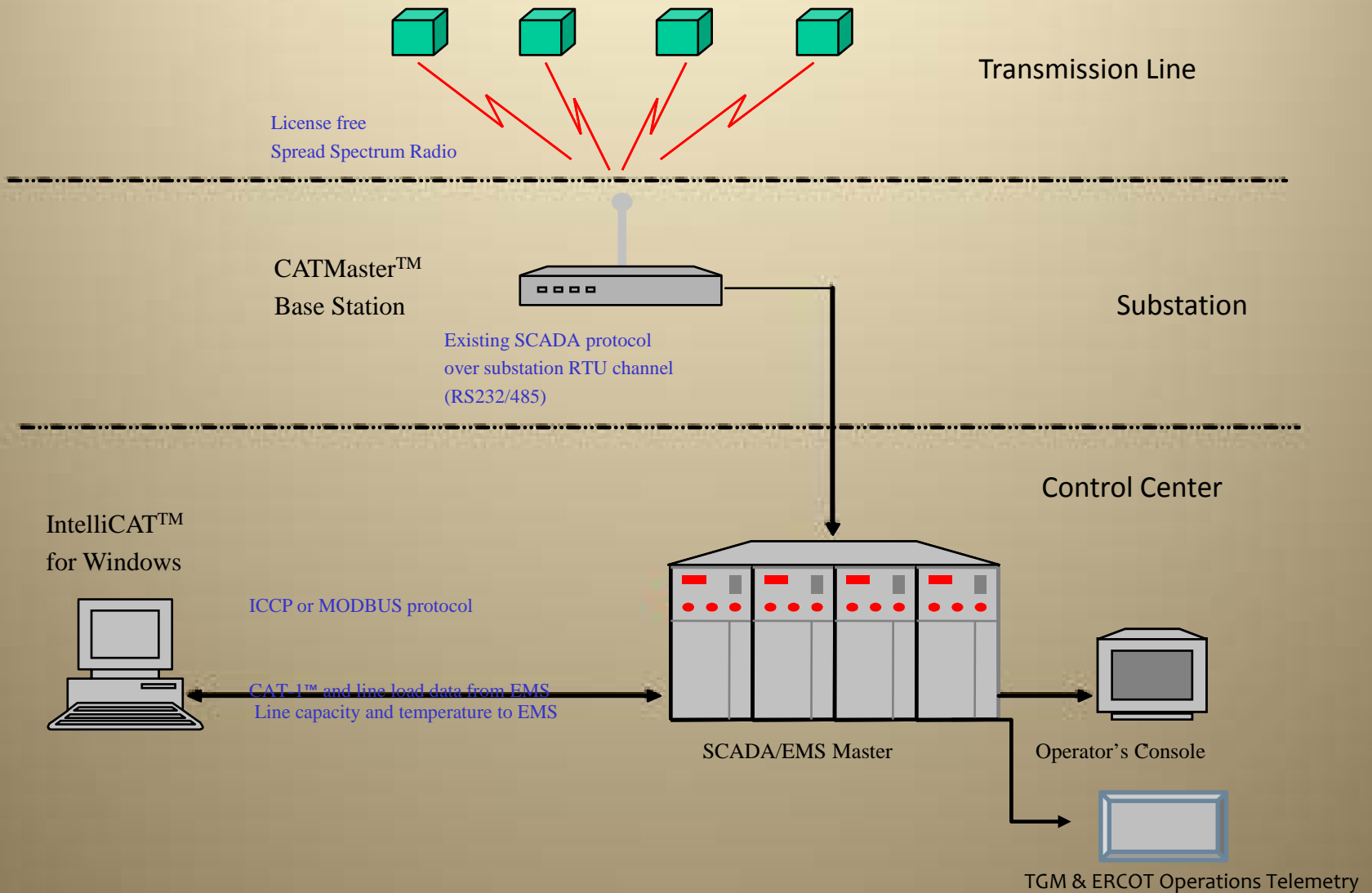
Line Ratings Terminology

Static Rating – based on prescribed ambient conditions, i.e., full sun mid-day, 104°F, 2 foot per second wind

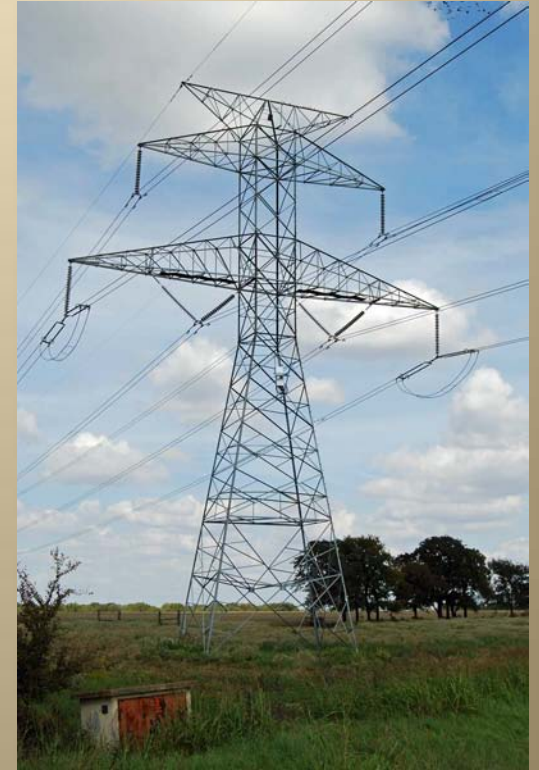
Ambient Adjusted Rating (AAR) – adjusted for ambient temperature other than Static Rating base temperature

Dynamic Line Rating (DLR) – adjusted rating based on actual measured ambient conditions

Integrated DLR System

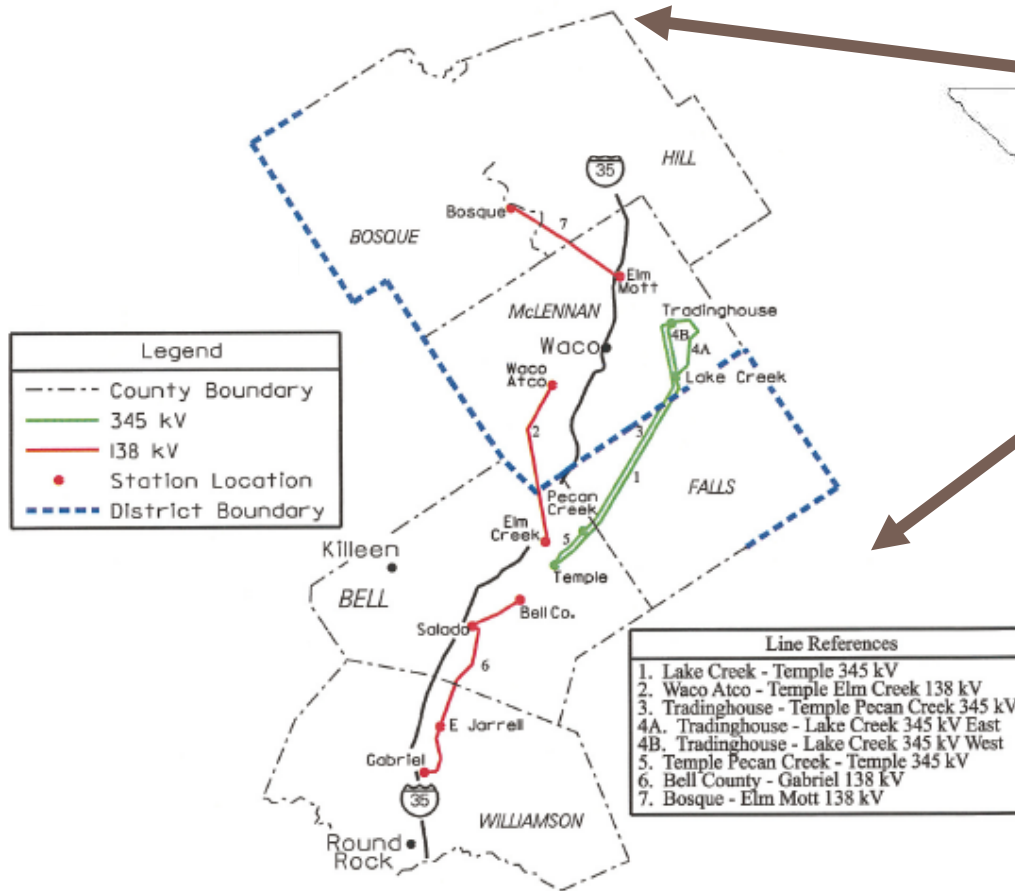
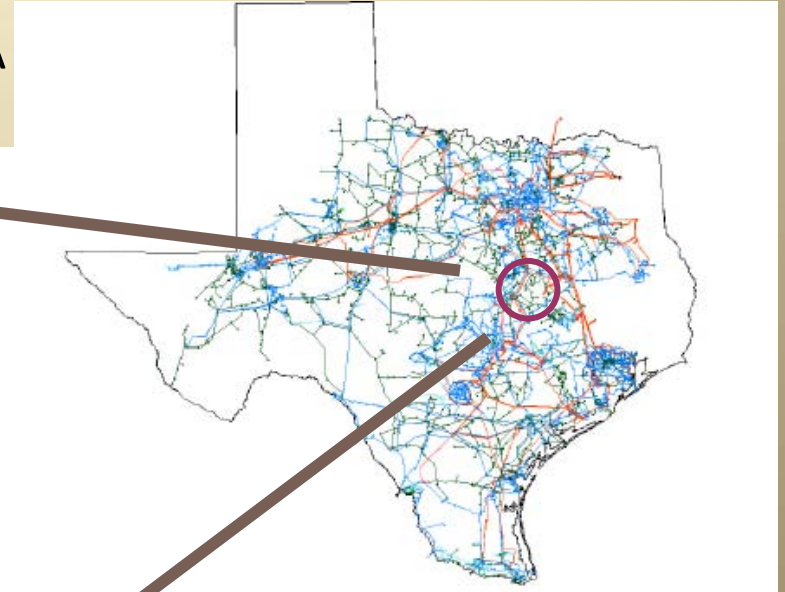


DOE DLR Project Description



LOCATION OF INSTRUMENTED CIRCUITS

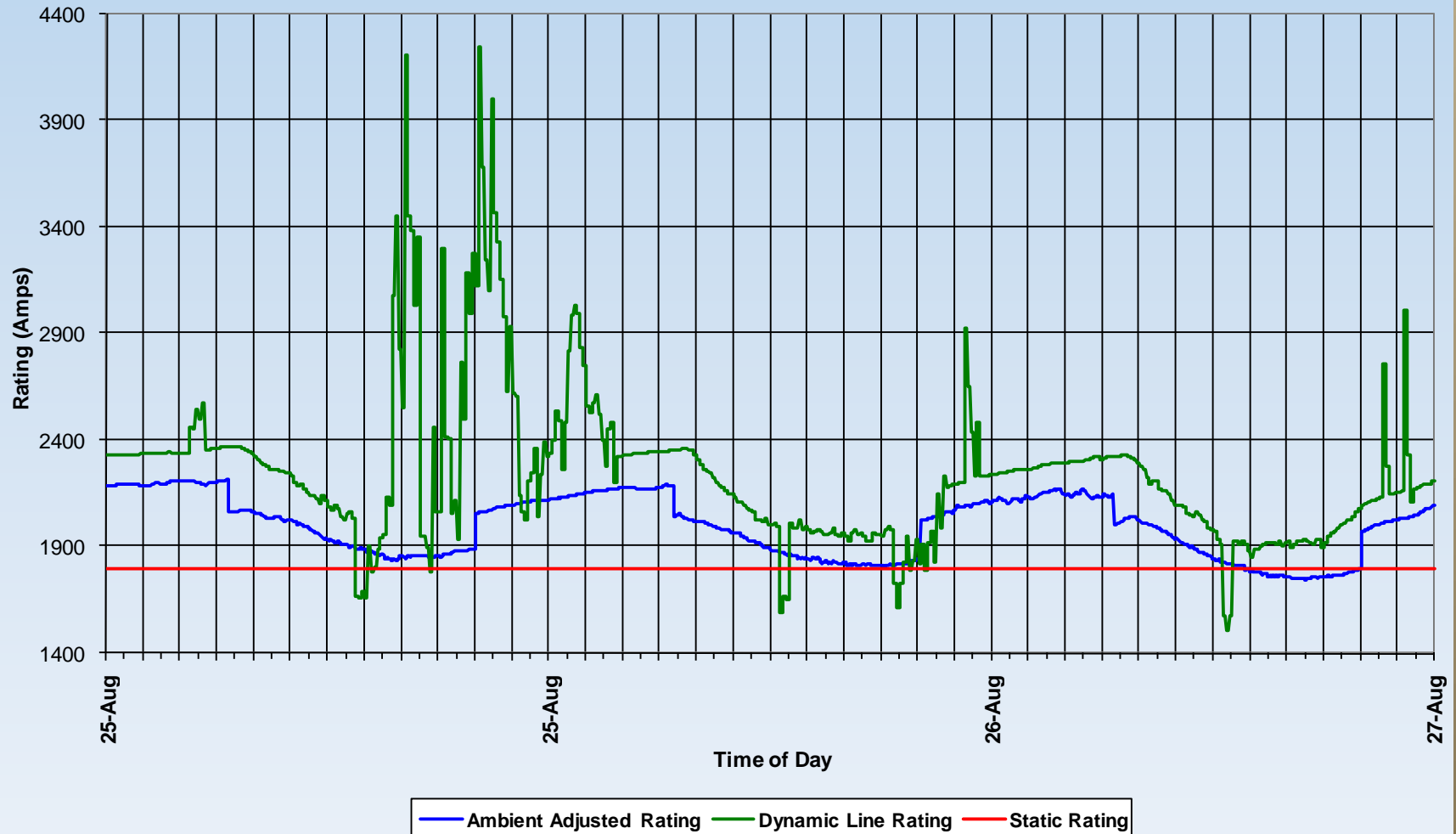
- Study Area in Critical Congestion Zone
 - 42 Loadcell Tension Monitors
 - 8 Master Locations Feeding into SCADA



Example of Capacity Chart

Static, Ambient-Adjusted & DLR Ratings

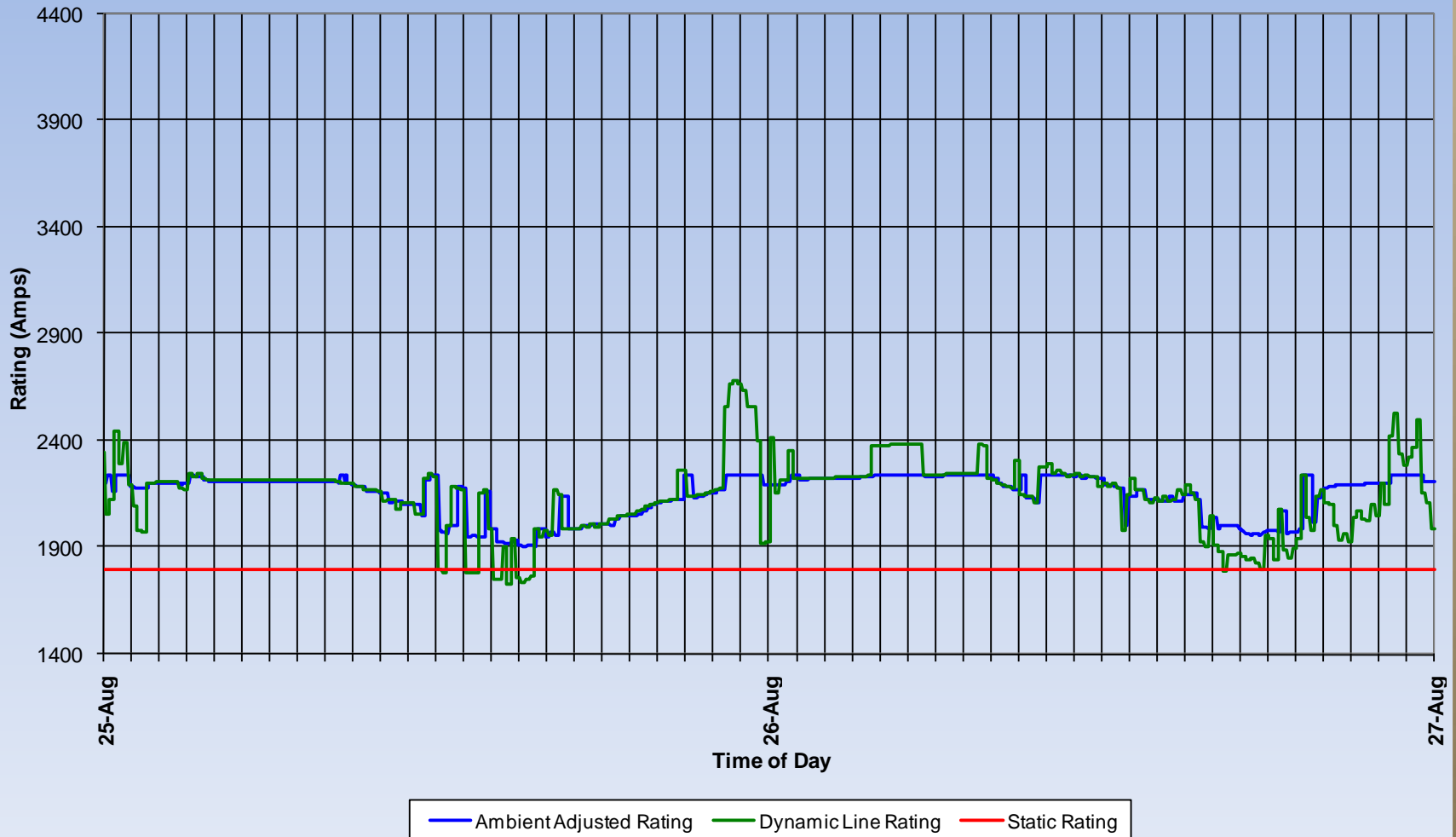
Dynamic Line Ratings and Ambient Adjusted Ratings
Tradinghouse-Temple Pecan Creek, August, 2011
Time Series



Example of Capacity Chart

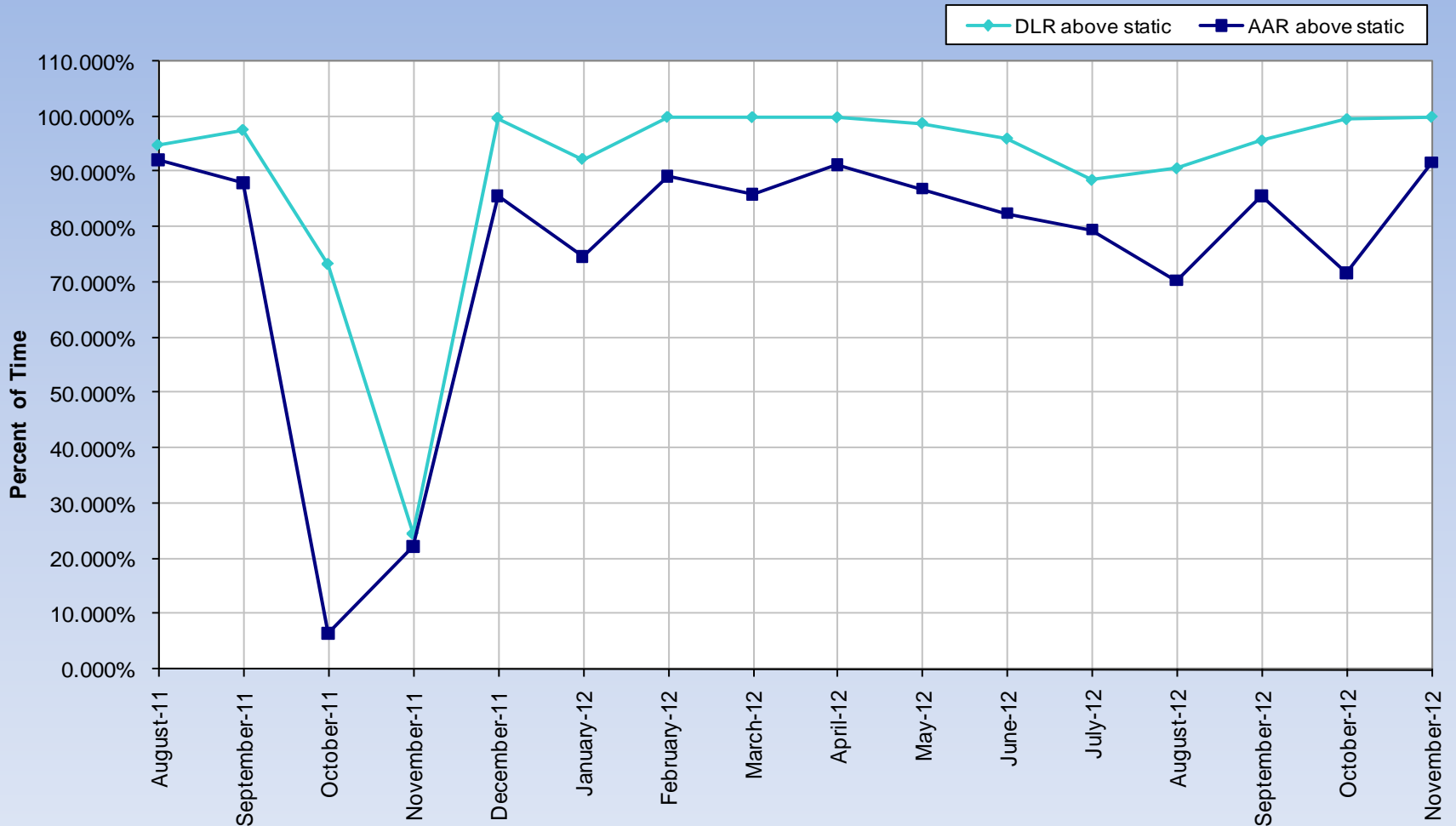
Static, Ambient-Adjusted & DLR Ratings

Dynamic Line Ratings and Ambient Adjusted Ratings
Tradinghouse-Temple Pecan Creek, August, 2012
Time Series



Percent Time Above Static

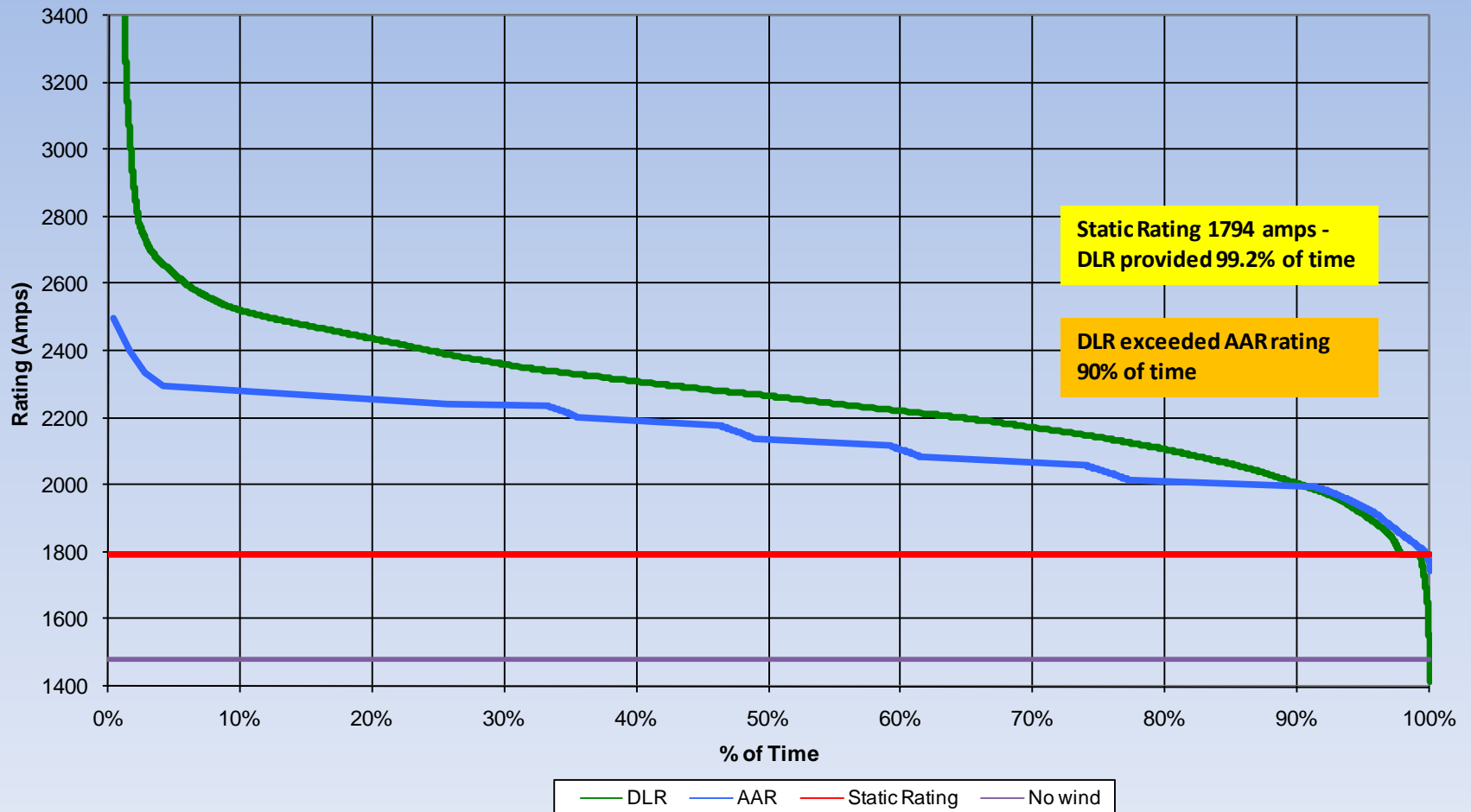
Lake Creek -Temple 345 kV
DLR & AAR Percent of Time Above Static



Annual Probability Distribution

Cumulative Probability Distribution

August 2012 - December 2012



DLR Congestion Mitigation

- Target Lines – can significantly mitigate congestion toward \$0; with +5 to +10% DLR;
- Peripheral Lines – radiate from one of the target endpoint substations – see additional relief
- Ripple effect – some additional congestion impacts distant from target lines
 - Some mitigation
 - Some increases
 - Grid flexibility
 - System awareness increased

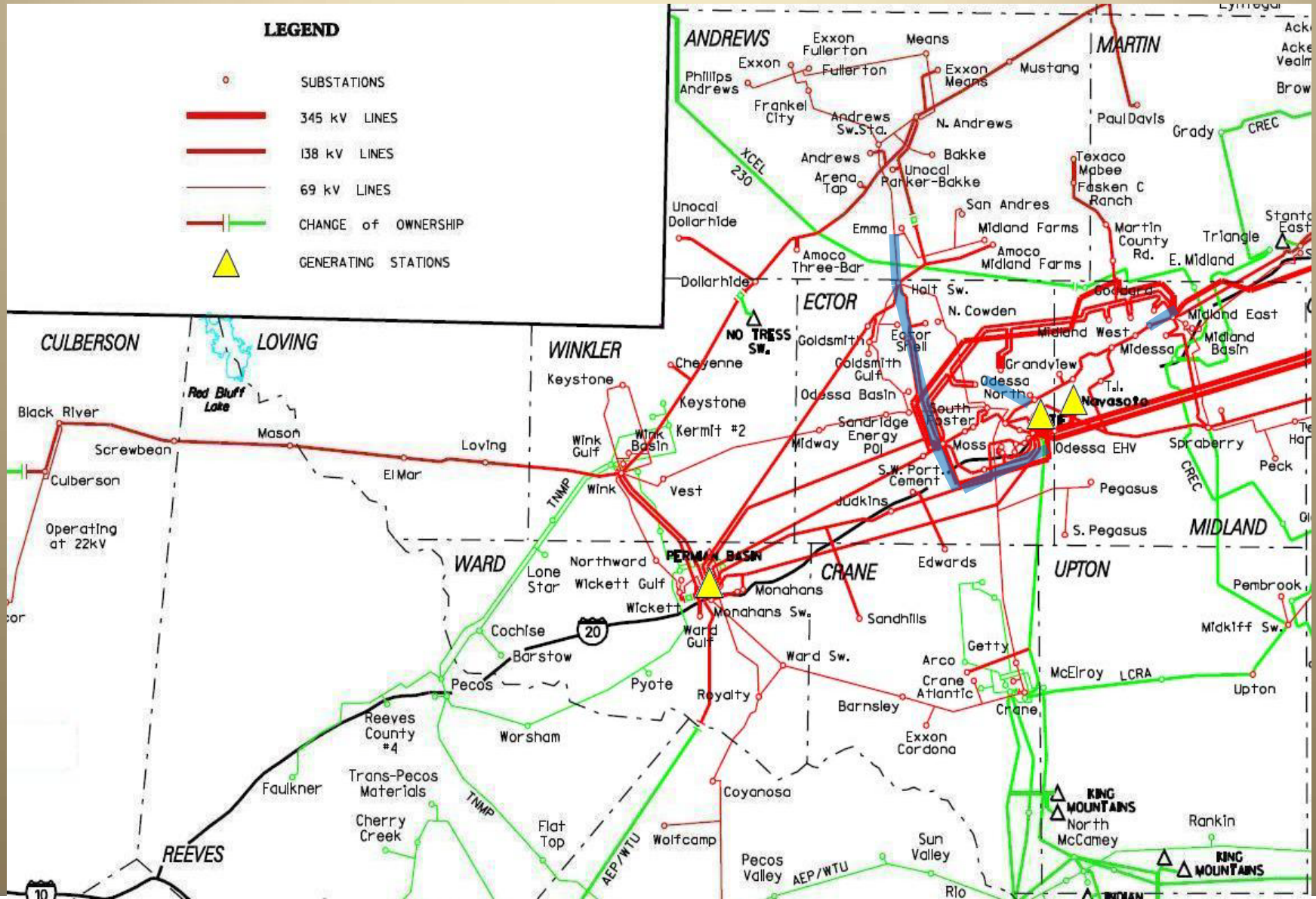
West Texas DLR Project

DLR Applied to 5 Target Lines:

- ❖ Odessa – Odessa North 138 kV (4)
- ❖ Moss – Amoco Cowden North – Holt 138 kV (3)
- ❖ Holt – Emma Tap 69 kV (1)
- ❖ Moss – Odessa Southwest – Odessa EHV 138 kV (3)
- ❖ Midland East – Winwood 138 kV (1)

() Number of DLR units on target line

West Texas DLR Project



West Texas DLR Project

DLR Application in ERCOT Nodal System

- Ratings polled from Oncor server by ERCOT every 10 secs
- DLR Ratings updated every 10 minutes (remember time constant of conductor)
- Oncor posts
 - DLR rating (if passes quality and availability check)
 - or
 - AAR rating (default if DLR is not available)
- SCED operates on posted ratings every 5 minutes

West Texas DLR Project

DLR Installation Milestones

- Schedule line outages to install DLR loadcells starting March 18th
- Calibrate DLR ratings completed May 17th
- Post DLR ratings to ERCOT completed May 31st