

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

August 21, 2017 Solar Eclipse

UVIG Workshop Presentation Session #6

Nicole Segal, PhD
Reliability Assessments Department
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RELIABILITY | ACCOUNTABILITY



- Purpose:

To evaluate potential reliability consequences of the August 21, 2017 total solar eclipse on the BPS, with a focus on peak system operations.

- Main Objectives:

- Develop an extreme case using ideal weather conditions under peak system operations
- Scenario eclipse test case which includes hourly load data, forecasted photovoltaic generation with a built in range
- Identify and assess the eclipse test cases for any potential system reliability and/or operational impacts in areas with:
 - High penetration of utility photovoltaic (PV) resources (*nameplate capacity*)
 - High penetration of DER resources (*total aggregated nameplate capacity*)
 - Significant sunlight reduction due to the eclipse (*eclipse bands*)

Figure 1. U.S. Map showing direct normal irradiance by annual average (Wh/m²/day), eclipse bands and locations of transmission photovoltaic generators

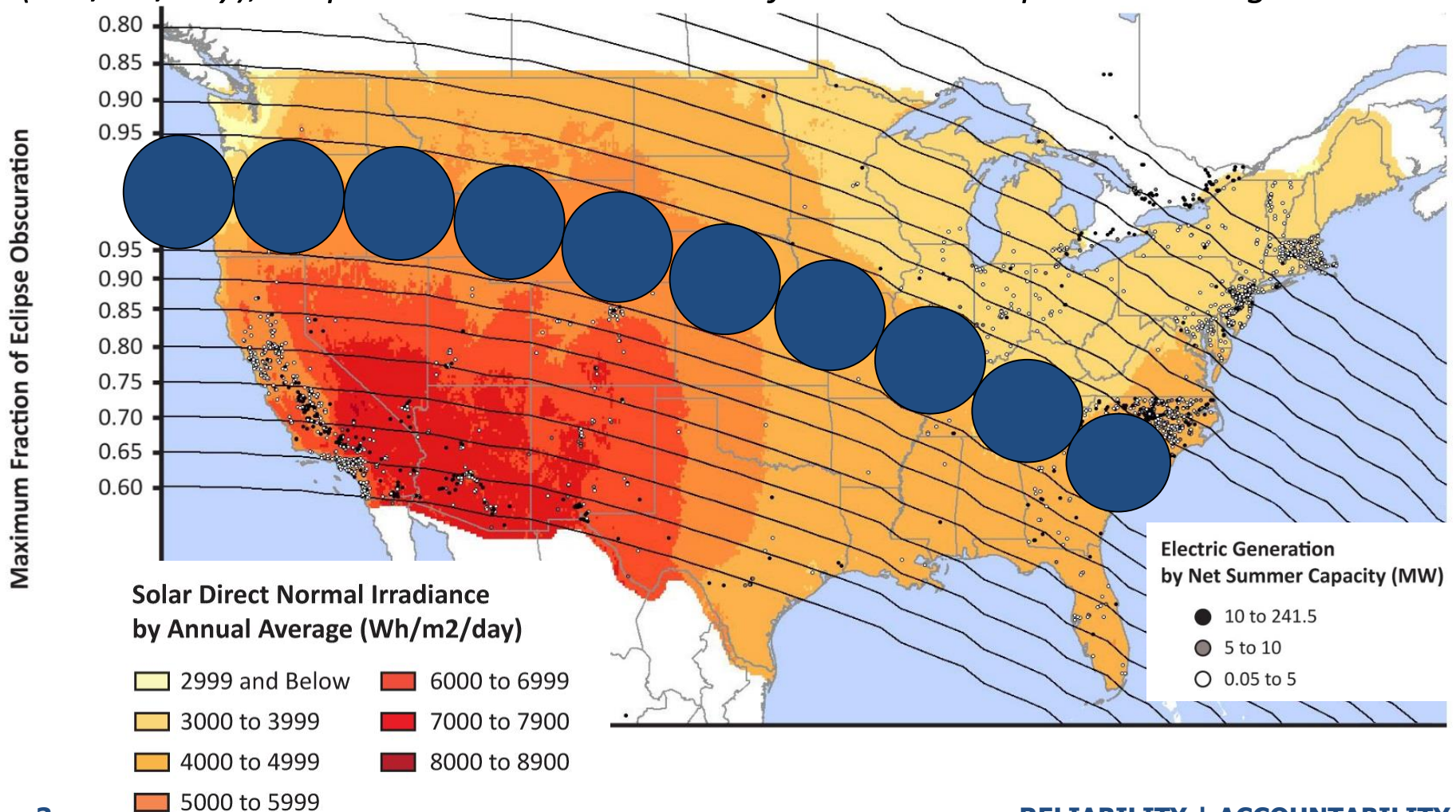
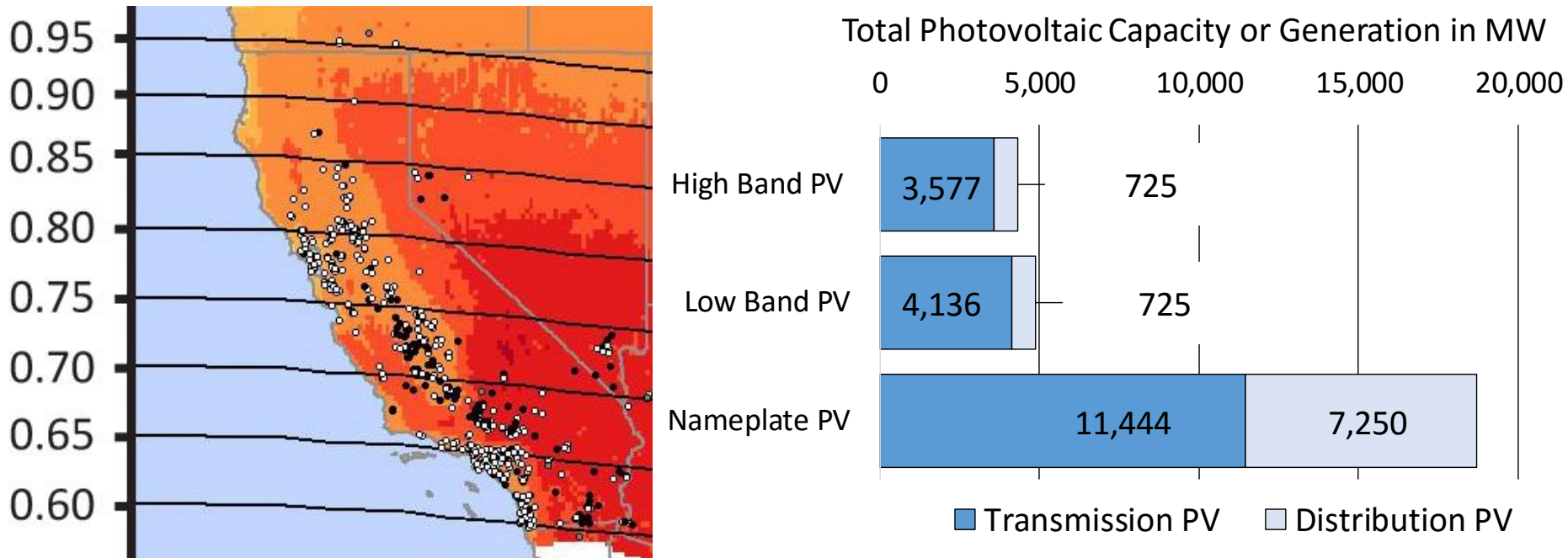


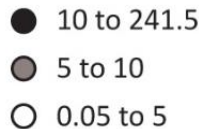
Figure 2. California Projected PV generation for high and low band PV scenarios in comparison to the total installed nameplate capacity



Solar Direct Normal Irradiance by Annual Average (Wh/m²/day)



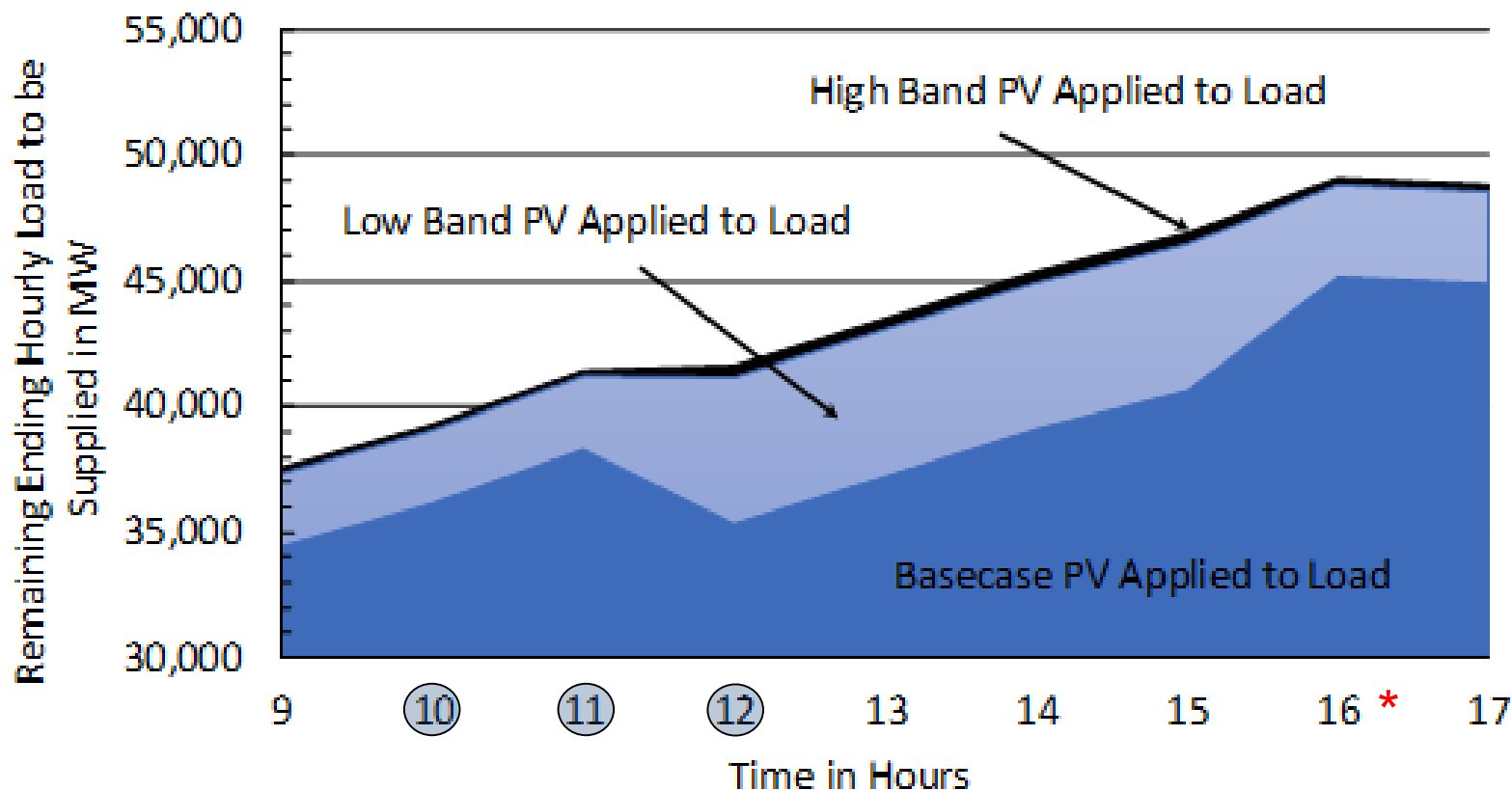
Electric Generation by Net Summer Capacity (MW)



- Forecasted peak load: 51,233 MW (4 PM)
- Eclipse Time ≈ 9:01 AM - 11:45 AM

- Results from the Assessment focused on an areas total system load:

Figure 3. California remaining ending hour load (MW) to be supplied by Non-PV resources for the basecase, low band PV and high band PV scenarios



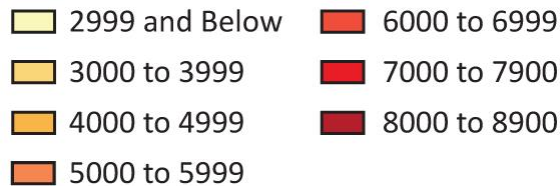
notes: * forecasted ending hour peak load: 51,233 MW (hour 16 or 4 PM)

● Hour ending for actual 2017 eclipse occurrence

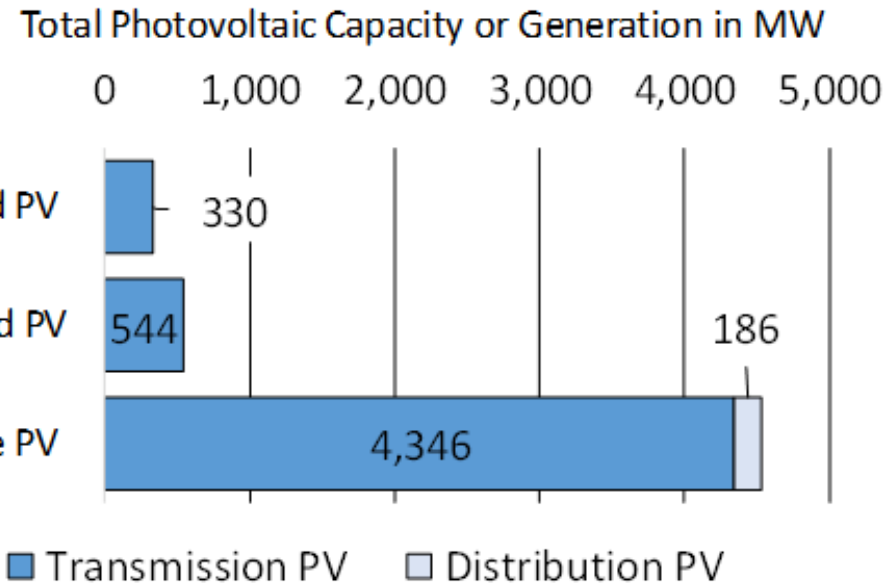
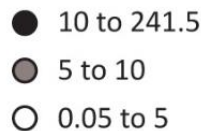
Figure 4. North Carolina Projected PV generation for high and low band PV scenarios in comparison to the total installed nameplate capacity



Solar Direct Normal Irradiance by Annual Average (Wh/m2/day)



Electric Generation by Net Summer Capacity (MW)

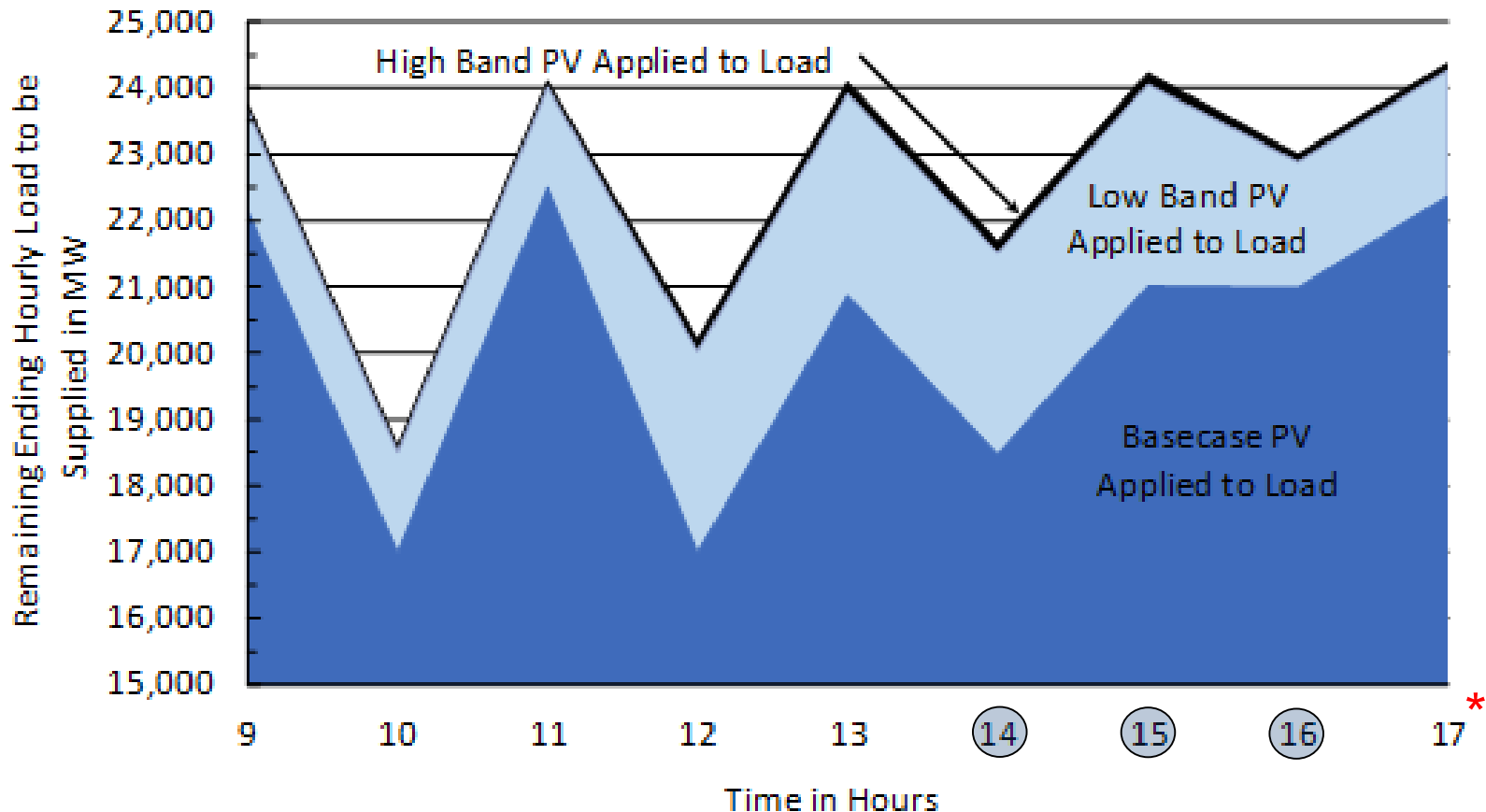


- Forecasted peak load: 24,539 MW (5 PM)
- Eclipse Time ≈ 1:05 PM - 4:07 PM

North Carolina Total System Load Increases During Eclipse

- Results from the Assessment focused on an areas total system load:

Figure 5. North Carolina remaining ending hour load (MW) to be supplied by Non-PV resources for the basecase, low band PV and high band PV scenarios

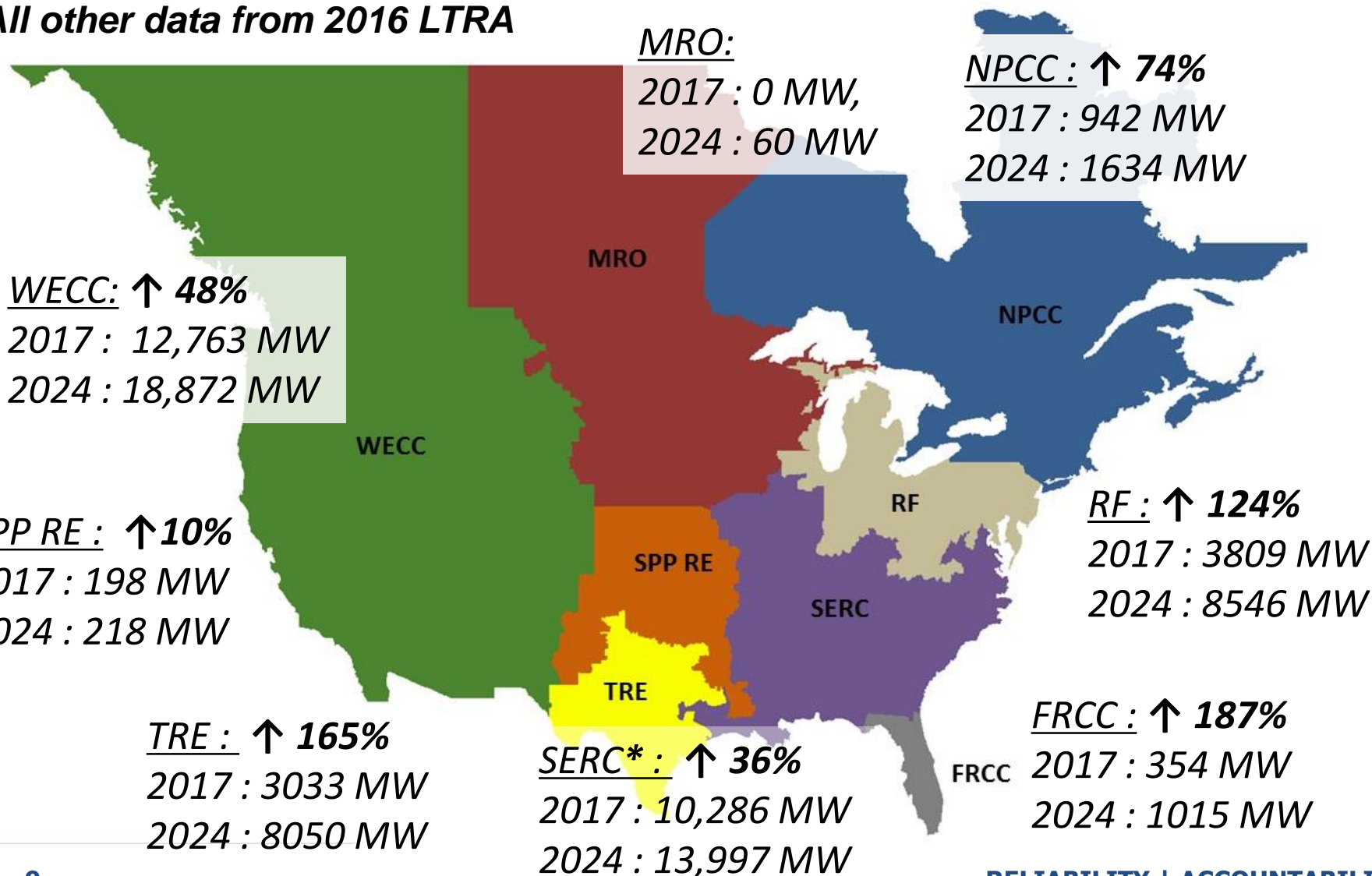


notes: * forecasted ending hour peak load: 23,158 MW (hour 17 or 5 PM)

7 ● Hour ending for actual 2017 eclipse occurrence

- Results of the total eclipse:
 - Showed no impacts to the reliability of BPS operations
 - Some states with a large amount of PV resources are expected to have:
 - Increased load
 - Possible ramping and balancing concerns
- General Recommendation:
 - Areas should secure Non-PV resources for eclipse system operations
 - Perform advance coordination with neighboring systems for transfers

**Data from ABB Velocity Suite Tool
All other data from 2016 LTRA*





Questions and Answers