



# **DATC Project ERCOT Independent Review Update**

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***Regional Planning Group Meeting  
August 19, 2014***



# Outline

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- DATC Proposal
- GINR Overview
- Panhandle Renewable Energy Zone Study
- ERCOT Independent Review Update
- Discussion and Next Steps

# DATC Project Status

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- Received at ERCOT System Planning: April 14, 2014
- Submitted to RPG for comment: April 15, 2014
- End of comment period: May 5, 2014
- End of study mode: Aug. 13, 2014
- End of ERCOT Independent Review: Nov. 11, 2014

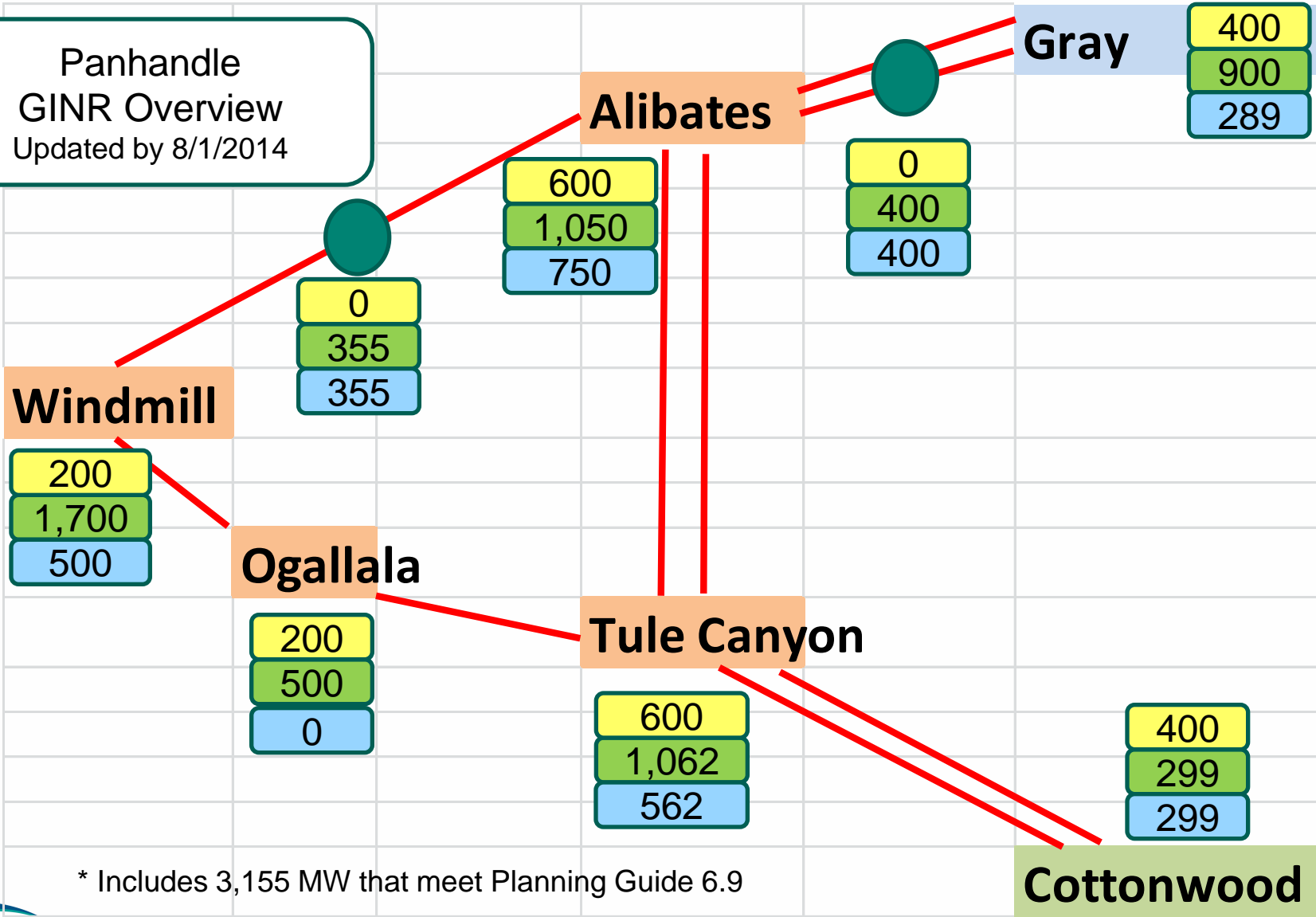


Initial Build  
(2,400 MW)

Interconnection Agreement  
(6,266 MW)\*

Meet Planning Guide 6.9  
(3,155 MW)

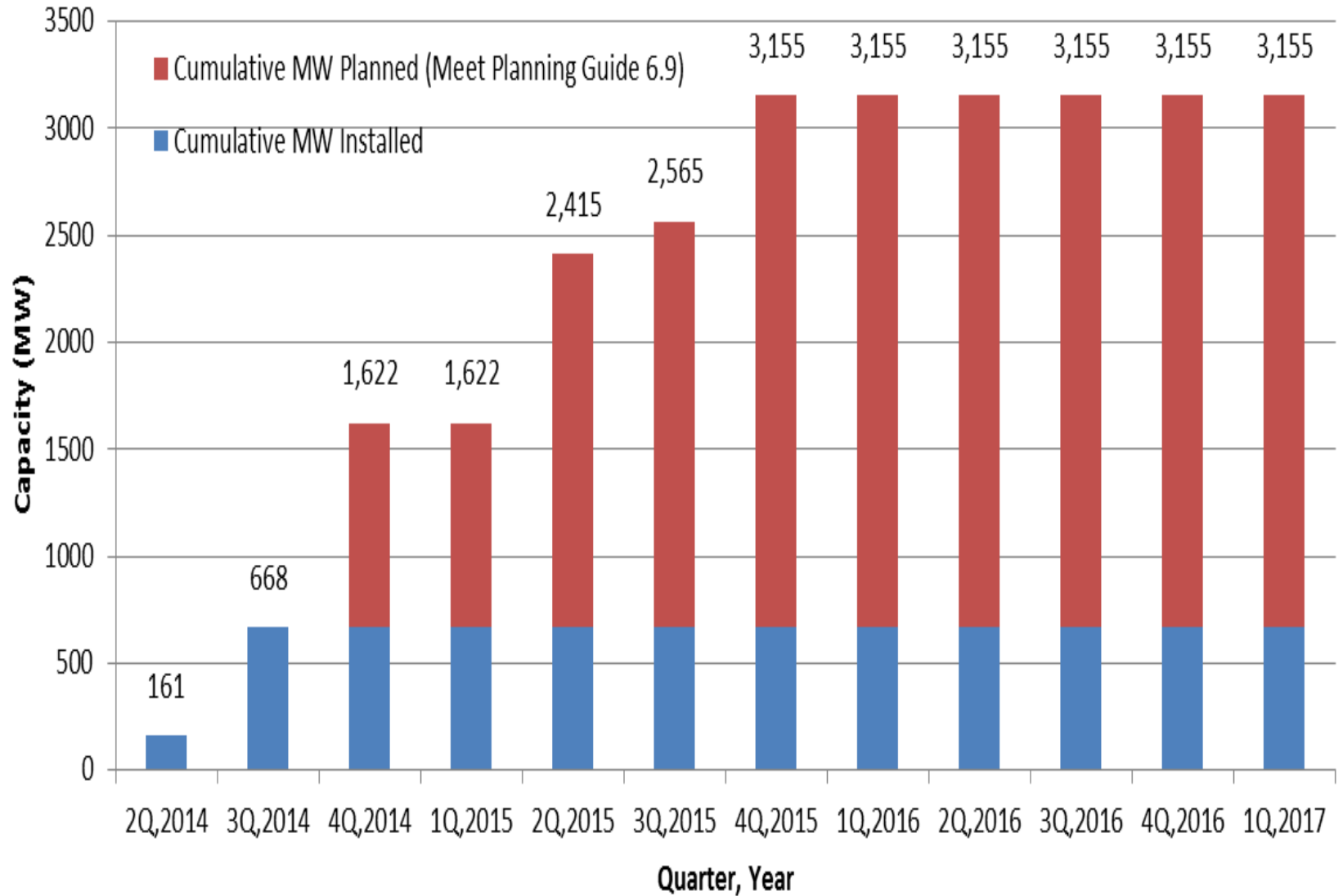
Panhandle  
GINR Overview  
Updated by 8/1/2014



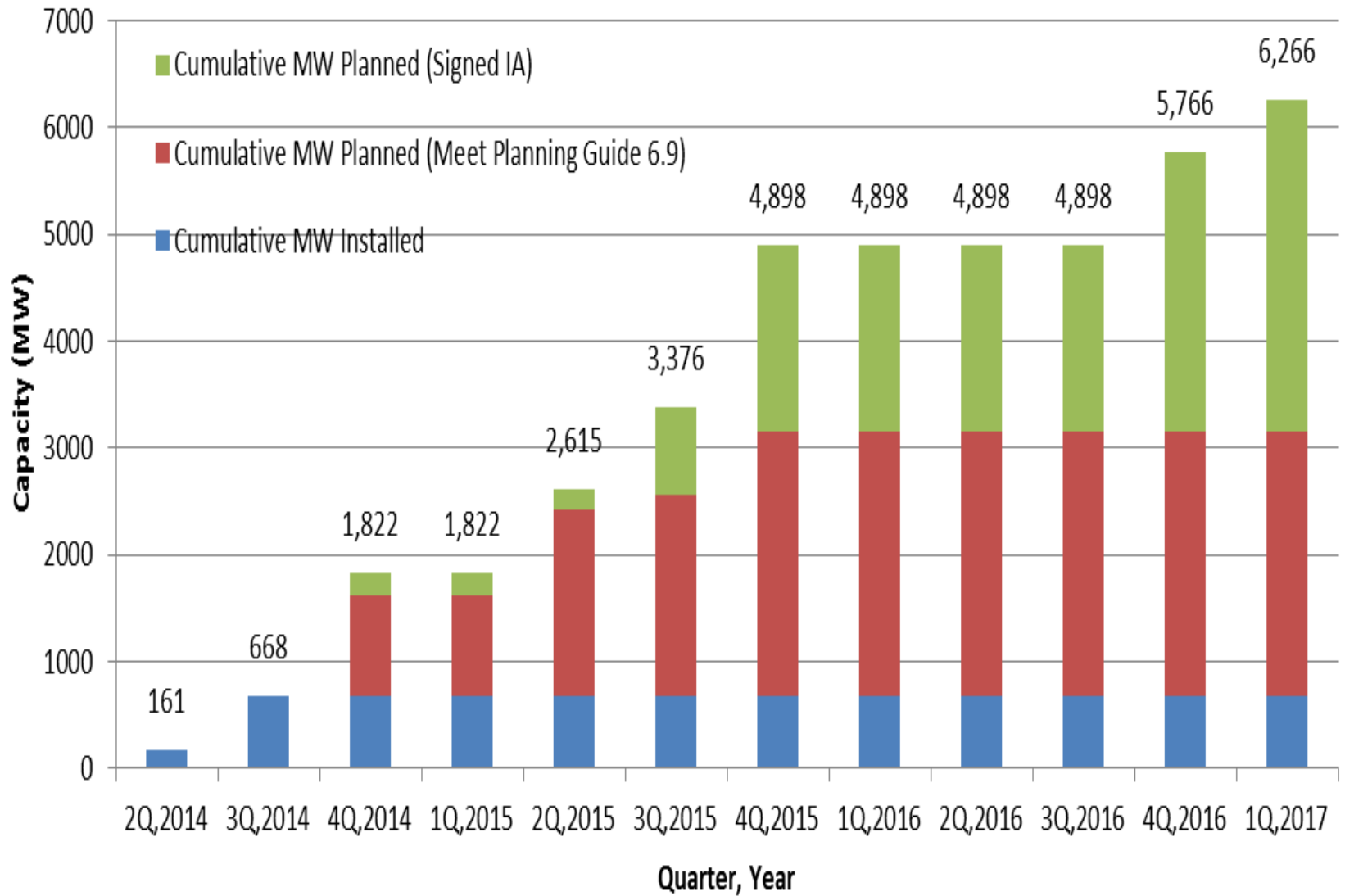
\* Includes 3,155 MW that meet Planning Guide 6.9



# Panhandle Wind Generation (As of 8/1/2014)



# Panhandle Wind Generation (As of 8/1/2014)



# Panhandle Renewable Energy Zone Study

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- ERCOT completed a PREZ study in April, 2014.
  - [Panhandle Renewable Energy Zone Study Report](#)
- Identified the challenges and needs to integrate large wind generation capacity in the Panhandle region.
- The results provide a roadmap to both ERCOT and TSPs that includes the upgrade needs and the associated triggers in terms of wind generation capacity in the Panhandle.



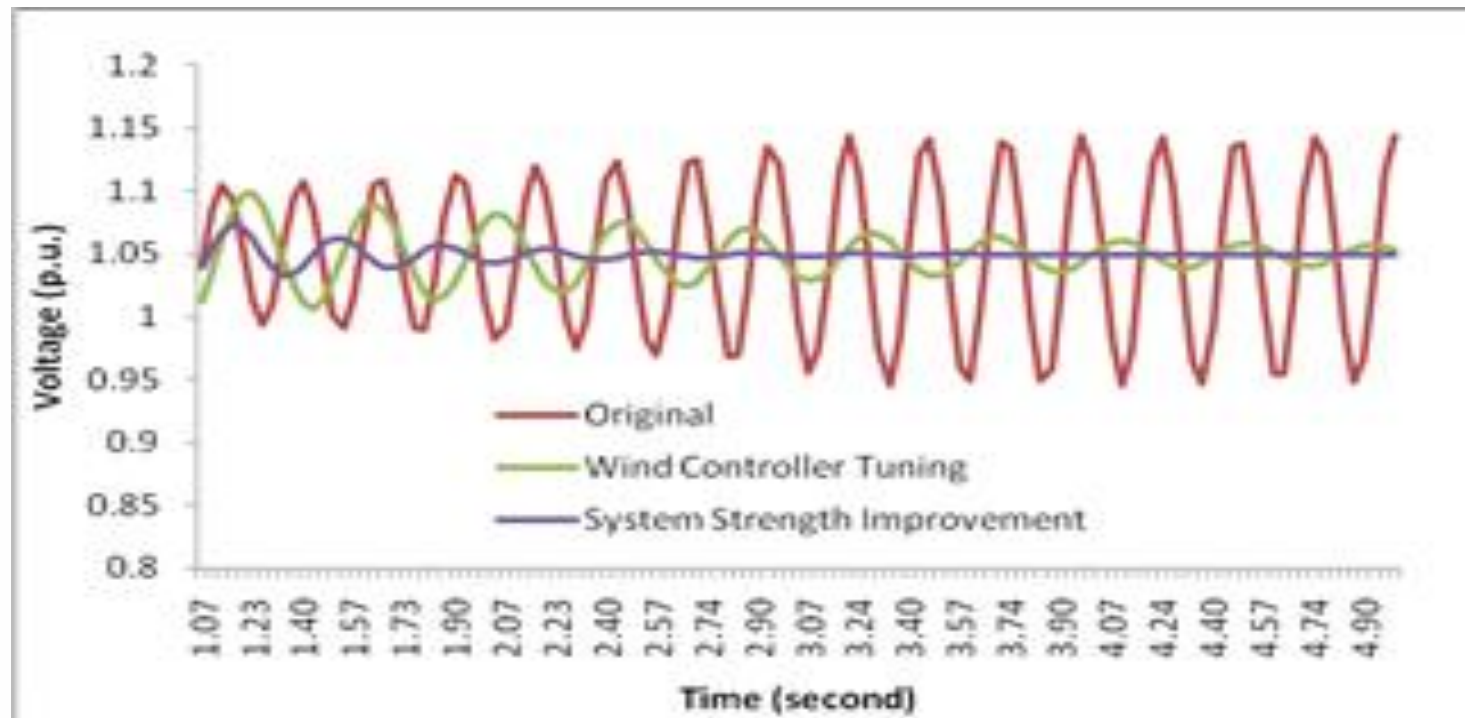
# Panhandle Renewable Energy Zone Study

- **Stability challenges** and **system strength** are identified as the significant constraints for Panhandle export.
- A Weighted Short Circuit Ratio of 1.5 is proposed as the system strength criteria for the Panhandle region.
  - No industry standard of short circuit calculation for a weak grid
- $WSCR = 1.5$  is determined based on
  - Operational experience
  - Information from various turbine manufactures
  - Stability study observations
  - Reliability margin
  - Subject to be revised with more operational experience



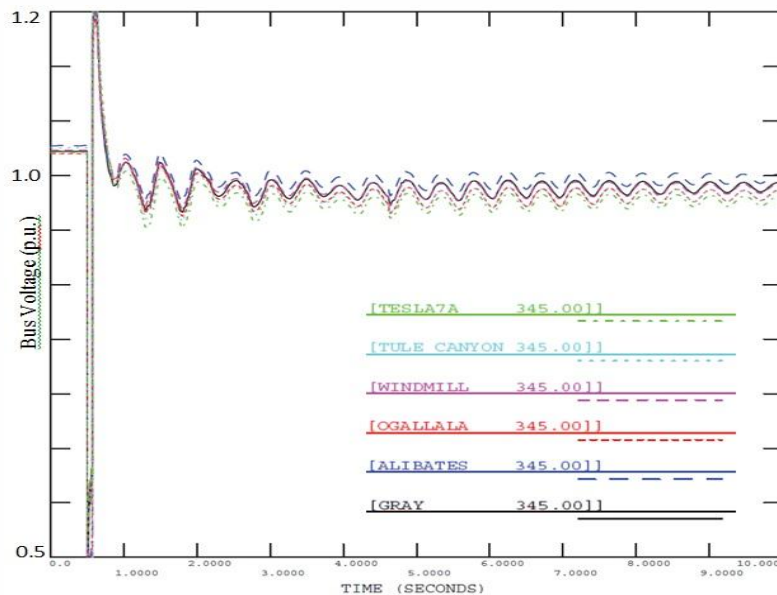
# Panhandle Renewable Energy Zone Study

- Actual operational experience: a single wind power plant connect to a weak grid in ERCOT.

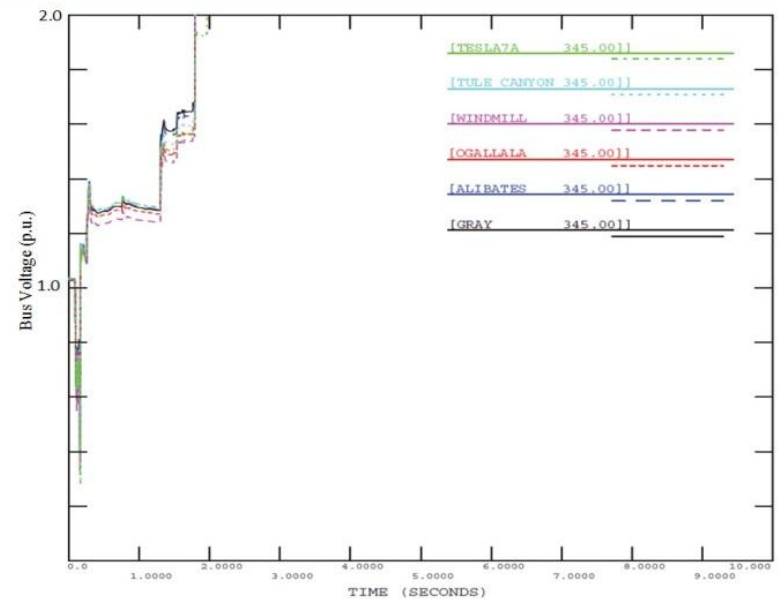


# Panhandle Renewable Energy Zone Study

- Planning study results: multiple thousands MW wind generation connect to the Panhandle



Oscillatory Response



Voltage Collapse

# Panhandle Renewable Energy Zone Study

- Upgrades for Panhandle region are considered as economic projects.
  - wind generation plants are expected to be re-dispatched to meet reliability criteria
- Upgrades were identified to provide the most effective system enhancement for both stability and system strength
- Stage 1 upgrades were identified in the PREZ to increase the Panhandle export to 3,500 MW
  - Add second circuit in the Panhandle loop
  - Synchronous condensers
  - Reactors

# ERCOT Independent Review Update

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- Study Case: 2016 High Wind Low Load
  - Include 3,155 MW wind generation projects in Panhandle
- Stability Analysis
- System Strength (Weighted Short Circuit Ratio)
- Economic Analysis
- Criteria
  - [ERCOT System Operating Limit Methodology](#)
  - WSCR = 1.5 for Panhandle



# Stability Analysis

- Study Condition
  - Existing transmission topology
  - Wind generation dispatch
    - 95% in Panhandle
    - 80% for rest of ERCOT
- Contingency: ~ 200 contingencies were tested
  - Normal Clearing Events and Breaker Failure Events
- Results:
  - Slightly higher amount of wind generation tripped without series capacitors in west Texas
  - Overall, acceptable response with/without series capacitors in west Texas

# System Strength

- Weighted Short Circuit Ratio:
  - Represent the system strength for Panhandle region
  - Using 100% wind generation capacity in the WSCR calculation
  - Criteria: WSCR  $\geq 1.5$

Panhandle Wind Generation Capacity (MW)	West Texas Series Capacitors Status	WSCR	Wind Output (%) for WSCR=1.5	Wind Output (MW) for WSCR=1.5
3,155	All In	1.41	94%	2,965
3,155	All Out	1.28	86%	2,713

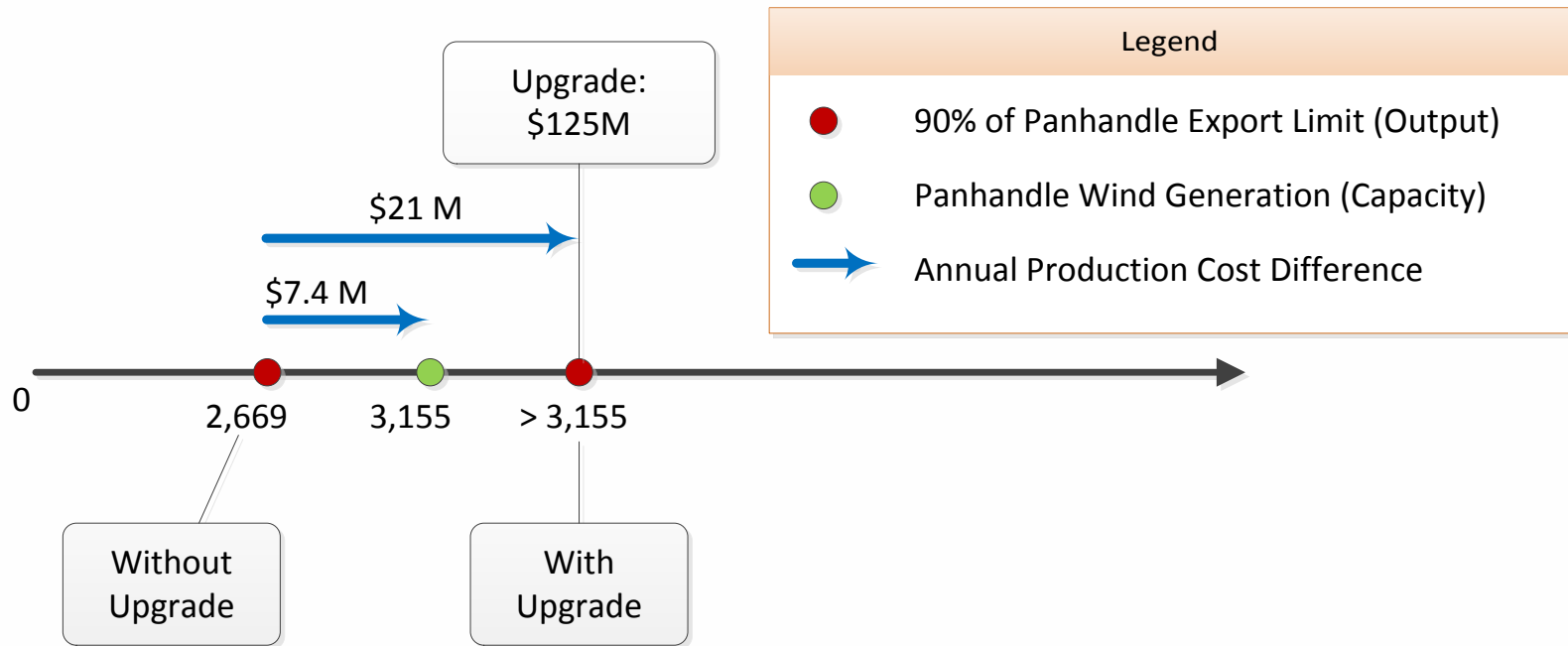
# Constraint and Needs

- Panhandle Export Constraint = 2,965 MW
  - 2,400 MW was used for the CREZ and PREZ
- Based on the PREZ results, elements in the table below are identified as the upgrade needs to reliably accommodate total of 3,155 MW wind generation capacity

Upgrade Element	Estimated Upgrade Cost (\$M)
<ul style="list-style-type: none"><li>• Add second circuits on the existing Panhandle grid</li><li>• Synchronous condenser</li><li>• Reactors</li></ul>	125

# Economic Analysis

- All west Texas series capacitors are in service.
- In the Operations horizon, the Panhandle export limit is assumed to be enforced at the 90% of the limit (90% of 2,965 MW).





# Discussion

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- Panhandle region is a weak grid with respect to the proposed amount of wind generation.
- Panhandle export constraint: 2,965 MW
- The preliminary results indicate the identified upgrade needs do not meet the economic project criteria in the ERCOT Protocol 3.11.2 (5)

# Next Step

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- ERCOT will finalize the analysis.
- ERCOT will continue monitor the generation interconnection activities in the Panhandle.

# Questions/ Comments?