



Solar Penetration Study

RPG Meeting
August 18, 2015

Introduction

- ❑ As of July 27, 2015, 9971.4 MW of solar projects are going through the generation interconnection process in ERCOT
- ❑ The majority of the projects are concentrated in the West and Far West weather zones where the transmission system is relatively weak
- ❑ 2014 LTSA identified potential for over 16 GW of solar generation in ERCOT by 2029
- ❑ The objective of the solar penetration study is to assess the impacts of the solar projects on ERCOT's current transmission system and get a high level understanding of the needed transmission upgrades to accommodate the solar projects should they come online as planned

Solar Projects by Weather Zone and Commercial Operation Date (COD)

- ❑ The 9971.4 MW of solar projects are primarily located in the West and Far West Weather zones. The breakdown of the solar projects by weather zone is summarized below.

Weather Zone	MW Capacity	Percentage
Far West	7542.4	75.64%
West	1123	11.26%
North	911	9.14%
South	250	2.51%
South Central	145	1.45%

- ❑ The projected COD of the solar projects range from 12/15/2015 to 12/31/2017.

COD Year	MW Capacity	Percentage
2015	102.4	1.03%
2016	6921	69.41%
2017	2948	29.56%

Solar Projects by Status

- The breakdown of the solar projects by status are shown in the following table:

Meet 6.9 Requirements?	IA?	FIS Complete?	MW Capacity	Percentage
Yes	Yes	--	572.4	5.74%
No	Yes	--	630	6.32%
No	No	Yes	150	1.50%
No	No	No	8916	86.44%

Study Case

- ❑ Since the majority of the solar projects are located in the West and Far West weather zones and all of the solar projects are projected to be online by the end of 2017, the latest 2018 West/Far West summer peak case from the 2015 Regional Transmission Plan (RTP) will be used as the base case for the study.
- ❑ All solar projects in the West, Far West and North weather zones will be included in the study. The solar projects in the South and South Central weather zones (395 MW in total) will not be analyzed in this study.
- ❑ For the solar penetration study, the wind generation in the West and Far West weather zones will be set at the CDR summer level.

Study Procedure

- ❑ Remove duplicate projects:

Some solar projects were identified as duplicates because the developers were either studying the same project with different capacities or the same project with different point of interconnections. The total capacity of the duplicated projects is 597 MW. These projects will be excluded from the study.

- ❑ The remaining projects (8979.4MW) will be included in the study.

Study Procedure

- ❑ Study the remaining projects in three stages:

The rest of the projects are grouped into three study stages based on the project status. Projects in stage 1 will be studied first. After that projects in stage 2 will be studied and finally the projects in stage 3 will be studied.

Meet 6.9 Requirements?	IA?	FIS Complete?	Stage 1	Stage 2	Stage 3
Yes	Yes	--	Yes	Yes	Yes
No	Yes	--	Yes	Yes	Yes
No	No	Yes	Yes	Yes	Yes
No	No	No	No	50% of the capacity	Yes
Total MW Capacity in the Stage			1352.4	5165.9	8979.4

Contingencies and Criteria

- ❑ NERC TPL-001-4 Contingency categories P0, P1, P3, P6 and P7 will be studied.

- ❑ Criteria
 - For thermal,
 - » Monitor all transmission lines and transformers (excluding generator step-up transformers) 60-kV and above in the study region
 - » Rate A under pre-contingency conditions
 - » Rate B under post-contingency conditions
 - For voltage,
 - » Monitor all buses 100-kV and above in the study region to ensure that they do not exceed their pre-contingency and post-contingency limits.
 - » Monitor the post-contingency voltage deviation for all buses 100-kV and above in the study region

Other Studies

- ❑ Based on the outcome of the reliability study, the following studies may be carried out:
 - Economic analysis
 - Voltage analysis
 - System strength analysis

Deliverables

- Identification of transmission projects to address issues found for each stage of solar projects
- ERCOT will summarize the findings in a report
 - Target Q1 2016
- At this time ERCOT does not plan to recommend any specific projects from the study findings. Rather, the study will be used to inform future planning studies

Questions?