

## **Introduction and Purpose**

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By modeling Distributed Energy Resources (DER) and DER Management Systems (DERMS) in both production cost model (PCM) and power flow (PF) formats, this study will identify potential Bulk Power System (BPS) reliability risks related to a high DER penetration in the Western Interconnection in a 10-year period.

This study focuses on high DER penetration and lower thermal penetration to observe how DER is dispatched and how DER dynamically responds to contingencies.

## **Team Leadership**

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- Jon Jensen
- Nick Hatton
- Tom Carr—Integrated modeling of Bulk Electric System (BES) and distribution system

## **Reliability Risk Priorities**

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This study will address these Reliability Risk Priorities:

- Resource adequacy and performance;
- Changing resource mix; and
- Distribution system and customer load impacts on the transmission system.

## **Key Reliability Questions**

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- What effect could DER have on the resource flexibility and system stability of the BPS?
  - What amount of DER causes reliability concerns, and when does DER become a reliability concern?
- PCM—How is DER dispatched?
  - Build a modified 2030 Anchor Dataset (ADS) PCM case with high DER penetration and lower thermal penetration.
  - Run PCM case for a year 10 scenario
  - Analyze how DER is dispatched under these circumstances compared to a foundational year 10 case.

- Power Flow—How does DER dynamically respond to contingencies?
  - Steady State—Build a modified heavy-summer PF case with high DER penetration and lower thermal penetration.
  - Dynamics—How will DER respond considering a large system disturbance?
    - Smart inverter capability.
    - Typical inverters.
- Analyze various contingencies and how DER responds under these circumstances compared to a foundational year 10 case.

### Assessment Requirements

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- Tools—
  - PCM (GridView)—Use to simulate an 8,760 hour PCM on the model
  - Power flow (PSLF)—Use to simulate a power flow study on model
- Models—
  - Production cost model
  - Power flow
  - DER/DERMS models
- Data—
  - 2030 ADS PCM
  - 2030 ADS power flow
  - DER/DERMS data representation
  - Smart inverter representation

### Study Outline

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Study Task	Responsible Party	Duration
Scope the study in detail	DER/DERMS Advisory Group	11/11/20 – 1/27/2021
Research and develop DER PCM models	DER/DERMS Advisory Group	12/15/20 – 3/15/21
Research and develop DER PF models	DER/DERMS Advisory Group	12/15/20 – 3/15/21
Build the DER (PF) case and turn for DER study so motor will stall (HS2030)	DER/DERMS Advisory Group	3/15/21 – 5/15/21
Build case with DER model (2030 ADS/PCM)	DER/DERMS Advisory Group	3/15/21 – 5/15/21
Run PF case	WECC staff	5/15/21 – 6/4/2021
Run PCM	WECC staff	5/15/21 – 6/4/2021



## 2020-2021 Study Program Assessment Scope

Run PF dynamics/dynamic contingencies	WECC staff	6/4/21 – 7/4/21
Analyze the study	WECC staff	7/4/21 – 7/30/21
<b>Analysis Completion Period</b>		
Create study report (Work with communications team to develop findings, observations, and recommendations, and vet with executive team.)	WECC staff	7/30/21 – 9/15/21
Tech edit	Comms	9/15 – 9/30/21
<b>To be Presented</b>		
Update at RAC Steering Committee	WECC staff	Monthly through 2021
Update at RAC meetings	WECC staff	6/30/21, 10/20/21
Update at WIRAB	WECC staff	Monthly through 2021
Update at StS meetings	WECC staff	Bimonthly through 2021
Update MAC	WECC staff	Monthly through 2021
Update Board	WECC staff	3/17/21, 6/15/21, 9/8/21
Tentative—Board of Directors Technical Session	WECC staff	12/8/21
Present to other groups as needed	TBD	TBD

## Reporting Metrics

1. Resource mix
2. Unserved energy
3. Underfrequency load shedding (UFLS), Undervoltage load shedding (UVLS)
4. Fault/contingency analysis ride-through capability

