



Hosting Capacity Criteria, Inputs, Thresholds – Wrap-Up Discussion

Stakeholder Workshop #3

June 30, 2020



2020 HCA WORKSHOP REFRESHER

Workshop 1 – June 2, 2020

- Demonstration of EPRI Distribution Resource Integration and Value Estimation (DRIVE) System and other HCA Tools (Xcel Energy)
- DRIVE System Overview and Available Methodologies (EPRI)

Workshop 2 – June 16, 2020

- Drivers of Feeder Model Updates for Hosting Capacity Analysis
- Inputs, Criteria and Threshold Values used in DRIVE





Chris Punt
DER Integration Manager

OBJECTIVES

Follow-Up from Workshop 2

- Minimum Penetration Increment for Analysis
- Feeder Remodeling
 - Generation change considerations
- Unintentional Islanding and Voltage Supervisory Reclosing (VSR)
 - Plan to address request for the potential to display in Heat Map pop-ups
- Max Tap Regulator Setting



Ed Shannon
Principal DER Engineer

Updates and Next Steps



Luther Miller
Distribution Planning Engineer



MINIMUM PENETRATION INCREMENT FOR ANALYSIS

- **Value currently set at 100kW**

- The increment at which simulated DER is added to a model in EPRI DRIVE in order to calculate limiting criteria

- **Relevant to the following Criteria:**

- Primary Over-Voltage
- Primary Voltage Deviation
- Regulator Voltage Deviation
- Thermal for Gen

- **Not relevant to the following Criteria:**

- Additional Element Fault Current
- Breaker Relay Reduction of Reach
- Unintentional Islanding
- Reverse Power Flow

- **Question from Workshop 2 – *Would it make sense to decrease this value?***

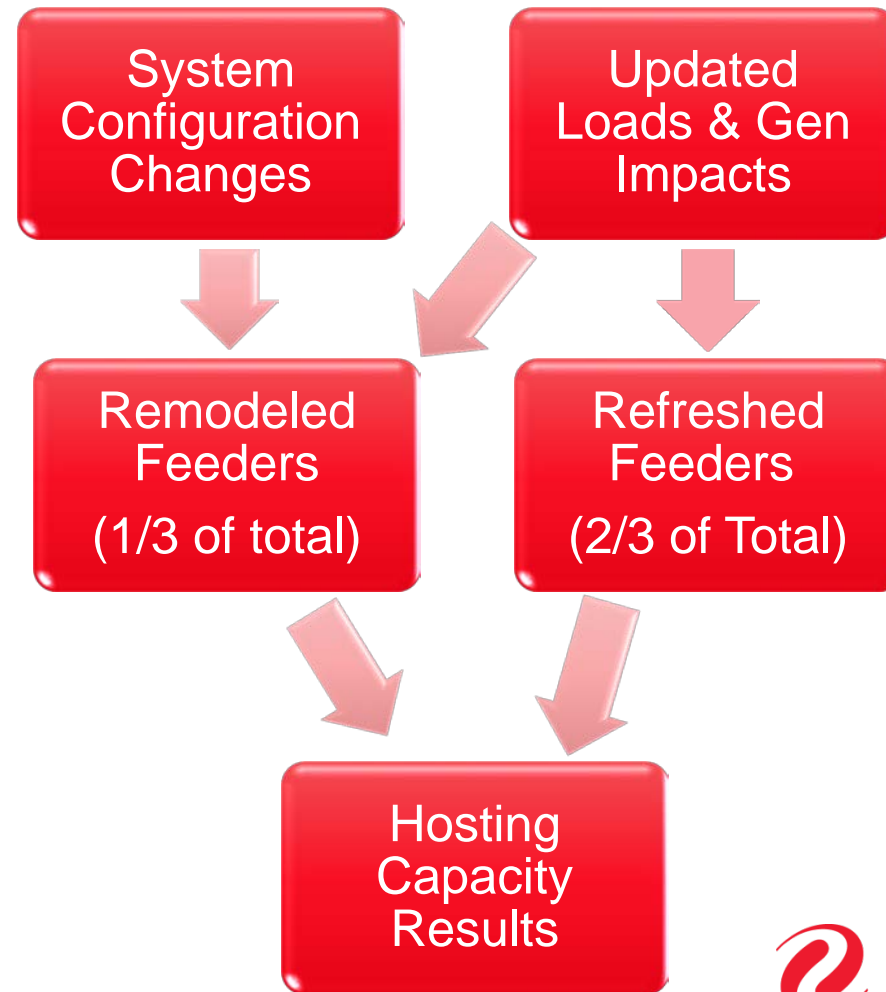
- Would provide more granular results for the relevant criteria, but –
 - Would increase simulation time, and
 - Would be inconsistent with current focus on large DER



FEEDER MODELING UPDATES

Remodeling Criteria

- Load deviations of 500kW
- The addition of a solar garden or other large generation: notably this includes solar gardens (1MW or less)
- Large capacity projects, feeder cuts, load transfers, etc.
- **We apply updated loads to all models before performing the analysis regardless of remodeling being required**



FEEDER MODELING UPDATES – *Generation Change Trigger Update*

- **Historical Data**
 - 30 Projects installed in 2019 from 100-500kW
 - None of these projects resulted in distribution system upgrades to the feeders they were on
- **Considering history, intend to generally use 500kW as the generation threshold that will trigger a feeder remodel**

VSR AND UNINTENTIONAL ISLANDING

Description: Power flow through specified elements not to be reduced by more than a percentage of minimum load power flow

We heard –

- Desirable to have indication on map
- Desirable to remove threshold results from future tabular report to avoid confusion

We will investigate what it takes to indicate where Voltage Supervisory Reclosing (VSR) is already installed causing the unintentional islanding threshold to not be of concern

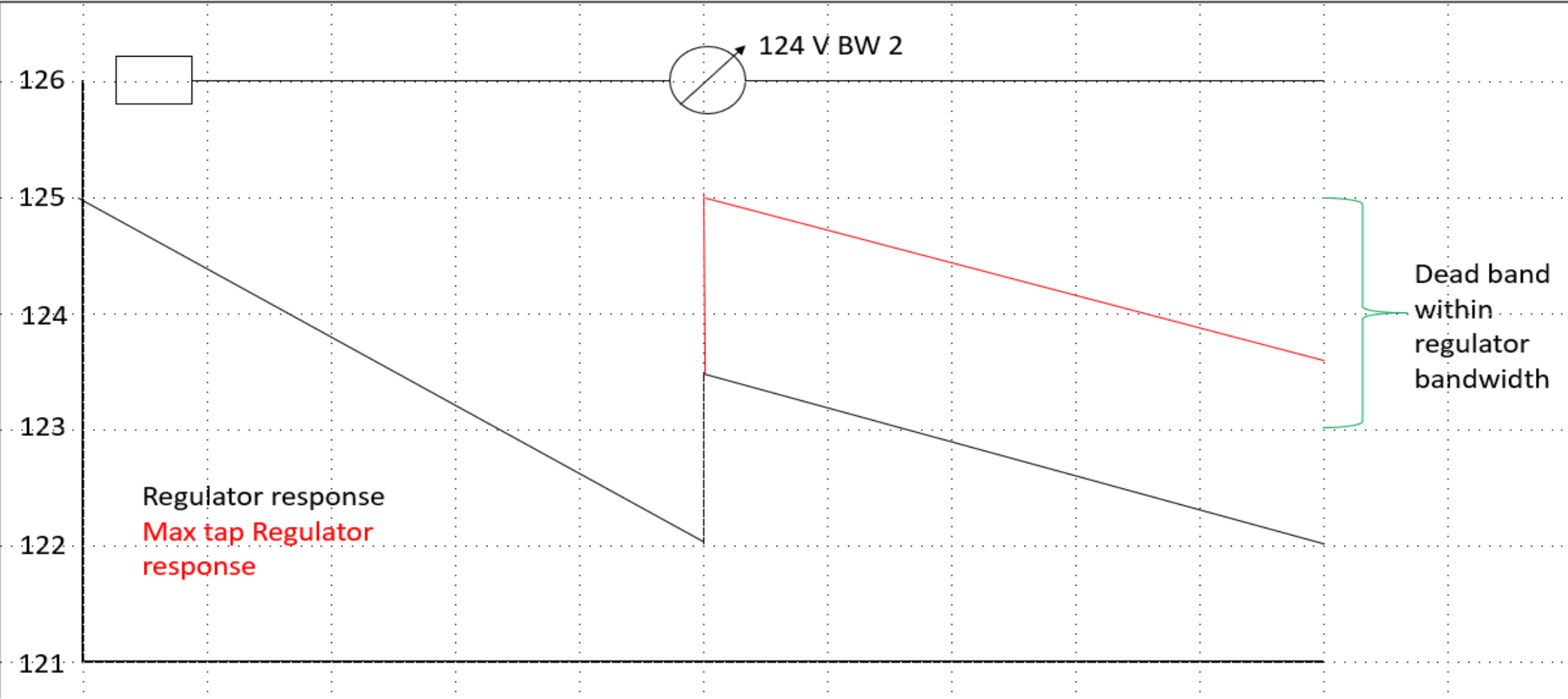
MAX TAP REGULATOR SETTING

Advanced Setting in DRIVE

Setting: Enabled

This setting takes into account variations in load, regulator response, and the resulting voltage changes within the regulator dead band that will and do occur on the system

MAX TAP REGULATOR SETTING – Explained





IREC FEEDBACK/QUESTIONS ON MAX TAP REGULATOR

MAX TAP REGULATOR SETTING

Question – Does this setting increase voltage profile in worst case by 1.5%, from baseline power flow (reducing voltage headroom by 1.2%)?

Answer – The change in voltage is tied to the bandwidth of the regulator and where the voltage settles within the specified bandwidth.

Example: For a 2 volt bandwidth, if the voltage settles at the bottom of the bandwidth, then the increase could be the entire bandwidth. If it settles at the top of the bandwidth, there could be no increase to the voltage.

LINE DROP COMPENSATION

Question – Is line drop compensation used and accounted for in the HCA?

Answer – We make assumptions based on the most common setting philosophy of maintaining a specified voltage.

- Would be a manual process to gather actual regulator settings currently.
- Actual settings would refine results, but current approach is reasonable.
- We expect our Advanced Grid Intelligence and Security (AGIS) and Advanced Distribution Management System (ADMS) initiatives that are underway to help in the future.



2019 HEAT MAP UPDATE

Two HCA tools on website – Tabular Report and Heat Map

Discovered error in Heat Map pop-up

- Units labeled as “kW” and should have been “MW”
- Is now corrected to reflect proper MW label

Popup	
SUBSTATION NAME	GLEASON LAKE
FEEDER NAME	GSL079
NOMINAL VOLTAGE (kV)	7970 Volts,13800 Volts
PHASE	1 Phase,3 Phase
TYPE (OH/UG)	OH, UG
SUBSTATION DML (kVA)	5743
FEEDER DML (kVA)	1334
EXISTING DG ON SUB (kVA)	95
EXISTING DG ON FEEDER (kVA)	18
QUEUED DG ON SUB (kVA)	91
QUEUED DG ON FEEDER (kVA)	17
DATE DG STATUS UPDATED	10/30/2019
HOSTING CAPACITY (MW)	0.36,1.07,1
LIMITING VIOLATION	ReversePowerFlow,ThermalDischarging
DATE HOSTING CAPACITY UPDATED	10/30/2019



EXPLAINED – HEAT MAP SEGMENT AGGREGATION

- **Hosting capacity analysis conducted at “node” level**
 - Thousands of nodes per feeder
- **Heat map aggregates the *presentation* of nodes by geographic proximity into “sub-feeder segments”**
 - ~500 ft x 500 ft square area
- **Pop-up presents **actual** nodal information (*i.e., not averaged or aggregated*)**

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WHAT IS NEXT – 2020 Analysis and Outcomes from 2019 Proceeding

2020 Hosting Capacity Analysis

Potentially Include	Include	Other Analysis	Further Engage Stakeholders
<ul style="list-style-type: none">• Tfx Name• Tfx Absolute Min• LTC or Regulator• Feeder Absolute Min• Network/Radial• Unique name/# for each line segment• Show actual system lines• Stakeholder feedback from Workshops	<ul style="list-style-type: none">• Sub-Feeder results on tabular report• Indicator of actual/estimated DML use• Publish criteria violation and HCA value for each model run and location (<i>with appropriate caveats</i>)• Summary of stakeholder feedback received & applied/not applied	<ul style="list-style-type: none">• Options for monthly, quarterly, and semi-annual HCA updates (including cost estimates)	<ul style="list-style-type: none">• Refine the HCA to align with long-term goal• Costs & benefits of replacing or augmenting portions of interconnection process• Data validation plan that aligns with a future Commission-determined HCA Use Case

Long-Term Goal: Use the hosting capacity analysis in the interconnection process's fast track screens



WRAP-UP DISCUSSION

Michelle Rosier, Minnesota Public Utilities Commission Staff

