Chapter 6 *Plug and Play: Hosting Capacity Analysis* 

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#### Hosting Capacity Analysis Requirements & Staged Evolution

- Update PGE's Netmetering Map with PSPS
- Options Analysis needed to inform Grid Needs Identification
  - Option 1 Annual and at circuit
  - Option 2 Monthly and at feeder
  - Option 3 Iterative modeling, hourly and at line segment

	Comprehensive hosting capacity considering both	
	distribution and transmission. Increased level of detail regarding distribution constraints, asset performance, and DER performance metrics. Address emerging technology development.	
Stage 3	Maps indicate node/section-level hosting capacity.	
	datasets sufficiently accurate and frequent to streamline interconnection.	
	Conduct system-wide hosting capacity evaluations to inform Grid Needs Identification.	
Stage 2	capacity analysis inform stakeholders of potential interconnection challenges, or replace portions of interconnection studies; publish hosting capacity maps with greater detail over time. Update areas with greater/faster DER adoption more frequently.	
	Include distribution-level impacts to the substation and transmission system.	
	Conduct hosting capacity evaluations to inform Grid Needs Identification.	
	Conduct a system evaluation to identify areas of limited DER growth.	
Stage 1	vide a plan to conduct hosting capacity evaluations in the near-term which v inform Grid Needs Identification, inform stakeholders of potential rconnection challenges, or replace portions of interconnection studies. In may address options that may provide more approachable and instructive a for communities.	
	data for communities.	

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A mature hosting capacity analysis is essential to PGE's vision of a plug and play DER future. The ability to seamlessly interconnect a modernized grid with a multi-directional flow is a key enabler to improved access to DERs. HCA provides the necessary visibility into system conditions to support seamless, on-demand integration of DERs.

# Plug and Play Overview

PGE's long-term plan for HCA includes establishing criteria aimed at targeting feeders in need of updated HCA and ensuring that analysis takes place on a regular basis, with the results uploaded to a publicly accessible location directly following the updated analysis.

The objectives of HCA are to provide increased transparency as to where each utility has hosting capacity, provide developers/customers visibility into better or worse locations for DERs and to understand where and how DERs impact the entire distribution system. Over time, combining this analysis with existing DER penetration and long-term DER forecasts can help inform where infrastructure upgrades may be considered.

PGE anticipates that, as HCA matures and more datasets become available (such as energy burden), combining these data will enable PGE and customers to identify and unlock the value of DERs. As PGE moves toward a 21st century community-centered distribution system, the ability to seamlessly interconnect with a modernized grid is a key enabler to improved access to DERs, achieving a plug and play future.



Hosting Capacity Analysis (HCA)	<ul> <li>Publish info about equipment, performance and queue to inform siting, reduce failed applications</li> <li>Expand data displayed on Net Metering map</li> <li>Identify how ADMS can support HCA</li> <li>Use ADMS to support powerflow modeling and Use HCA in distribution studies and investment planning, e.g., add capacity for DER penetration with load</li> <li>Increase granularity, data sharing, frequency</li> <li>Leverage ADMS/DERMS to match DERs with load</li> </ul>
Interconnection	<ul> <li>HCA as screening tool for developers/customers</li> <li>Technical outreach &amp; education regarding data</li> <li>More granular visualization of hosting capacity in GIS</li> <li>Recruit DERs to meet grid needs</li> <li>Evolve distribution market functions</li> </ul>
Target Use	Identify favorable DER locations Communicate DER Readiness Support investment decision- Grid Needs, facilitate distribution

Accelerate screening process

Cases

making to increase DER Readiness

Grid Needs, facilitate distribution market operations

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# **Distributed Generation Evaluation Map**

Distributed Generation Evaluation Map



### HCA Options Analysis UM2005 Requirements

HCA Characteristic	Option 1	Option 2	Option 3
Methodology	Stochastic modeling/ EPRI DRIVE modeling	Same as option 1	Iterative modeling
Geographic granularity	Circuit	Feeder	Line segment
Temporal granularity	Annual minimum daily Ioad	Monthly minimum daily load	Hourly assessment
Data presentation	Web-based map for the public and available tabular	Same as option 1	Same as option 1
Data update frequency	Annual refresh	Monthly refresh	Monthly refresh
Other info	Queued generation	Same as option 1	Same as option 1

### **PGE's HCA Options Analysis Evaluation**

Evaluation parameter	Option 1	Option 2	Option 3
Timeline	12 months	24 months	24-36 months
Cost	\$141k	\$2.61M	\$58.38M
Data security risk	Low	Low	Medium
Result validation	Low	High	High
Implementation concerns	Low	Medium	High
Interconnection use case implications	Medium	High	High
Planning use case implications	Low	Medium	Medium
Locational value and benefits	Medium	Medium-high	Medium-high
Interaction with grid needs identification	Medium	Medium-high	Medium-high

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# PGE's HCA Execution Plan

#### Current Practice vs Proposed Approach



Current practice (twice annually)		DRIVE model incorporation (twice annually)			
Activity	Hours	Cost	Activity	Hours	Cost
Setup	1120	\$ 67,200	Setup	2,240	\$ 134,400
GIS	80	\$ 4,800	GIS	240	\$ 14,400
Reporting	120	\$ 7,200	Reporting	240	\$ 14,400
			Modeling	1400	\$ 84,000
			Analysis	325	\$ 19,500
			DRIVE license renewals		\$ 7,200
Total	1,320	\$ 79,200	Total	4,445	\$ 273,900

In order to transition from publishing DML twice annually to producing an HCA twice annually, we will need to invest an additional \$195K.

# PGE's HCA Execution Plan

## HCA Tasks, Resources and Effort



HCA activity	Resources	Level of effort (hours)	Notes
Create base case models, Distribution (CYME) Model Validation; Functionality Testing	Planning engineers CYME software	1,400	Approximately 1 hour per feeder
Calculate peak and DML	Planning engineers SCADA data	2,240	Includes peak winter, peak summer, minimum and daytime minimum load
Load data into DRIVE and execute HCA	Scripts EPRI DRIVE	325	Approximately 15 minutes per feeder
Result validation		40	Estimated effort to identify, analyze and correct issues for 653 feeders
Reporting	Planning engineers Interconnections team Excel	200	Includes publishing system data content that resides in OASIS
Result publication	EPRI DRIVE ARC GIS	240	Transfer of data from DRIVE to ARC GIS and Excel; visualization and testing of data

# PGE's HCA Execution Plan

## A sample screen shot of hosting capacity heat map





Base case models will be created through CYME, then data will be input to DRIVE. Hosting capacity analysis is performed in DRIVE, one feeder at a time, the output will be in the form of heat maps (example left) and excel files, which will be transitioned to a publicfacing GIS platform.

## Chapter Take-Aways

Review the Distributed Generation Evaluation map and provide feedback

PGE currently is required to update its DML analysis and limited generation feeder list twice annually. DML is the primary input into conducting HCA and represents a significant amount of the time and effort required to perform HCA

Beginning in late 2022, we plan to begin performing HCA twice annually

PGE's recommendation for the long-term evolution of HCA is that updates should be performed at the line segment level on an as-needed basis

### **Questions?**

Please email us at dsp@pgn.com

