

SMUD's Experience with Interconnection of PV

David Brown P.E.
May 8th 2019

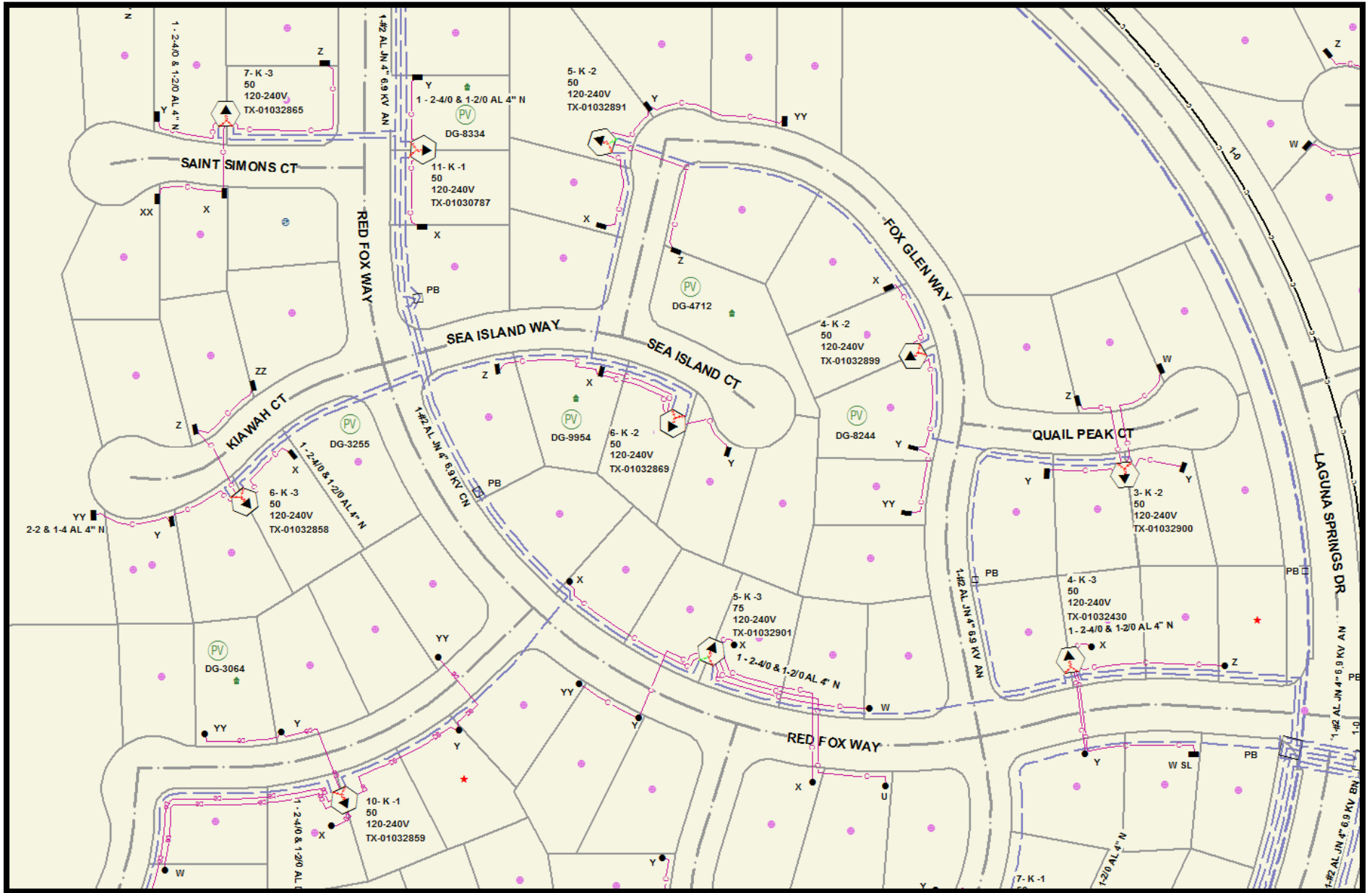
Powering forward. Together.



About Sacramento Municipal Utility District (SMUD)



- 626,000 meters
- 1.5 million population
- \$1.5 billion in revenues
- 900 mi², 2304 km² service territory
- 7 member, elected Board of Directors
- Not-for-Profit Utility
- 2nd largest muni in California, 6th largest in the US
- 2219 employees
- 3299 MW peak load (2006)
- 460 MW of PV under contract



Process Improvement

Old Process - Highlights

- Paper Applications
- Solar Specialist reviewed application and did data entry
- Distribution System Planner did each single-line review
- Solar Specialist inspects installation, and coordinates with City Building Inspector
- Paper notification sent to update Billing

New Process - Highlights

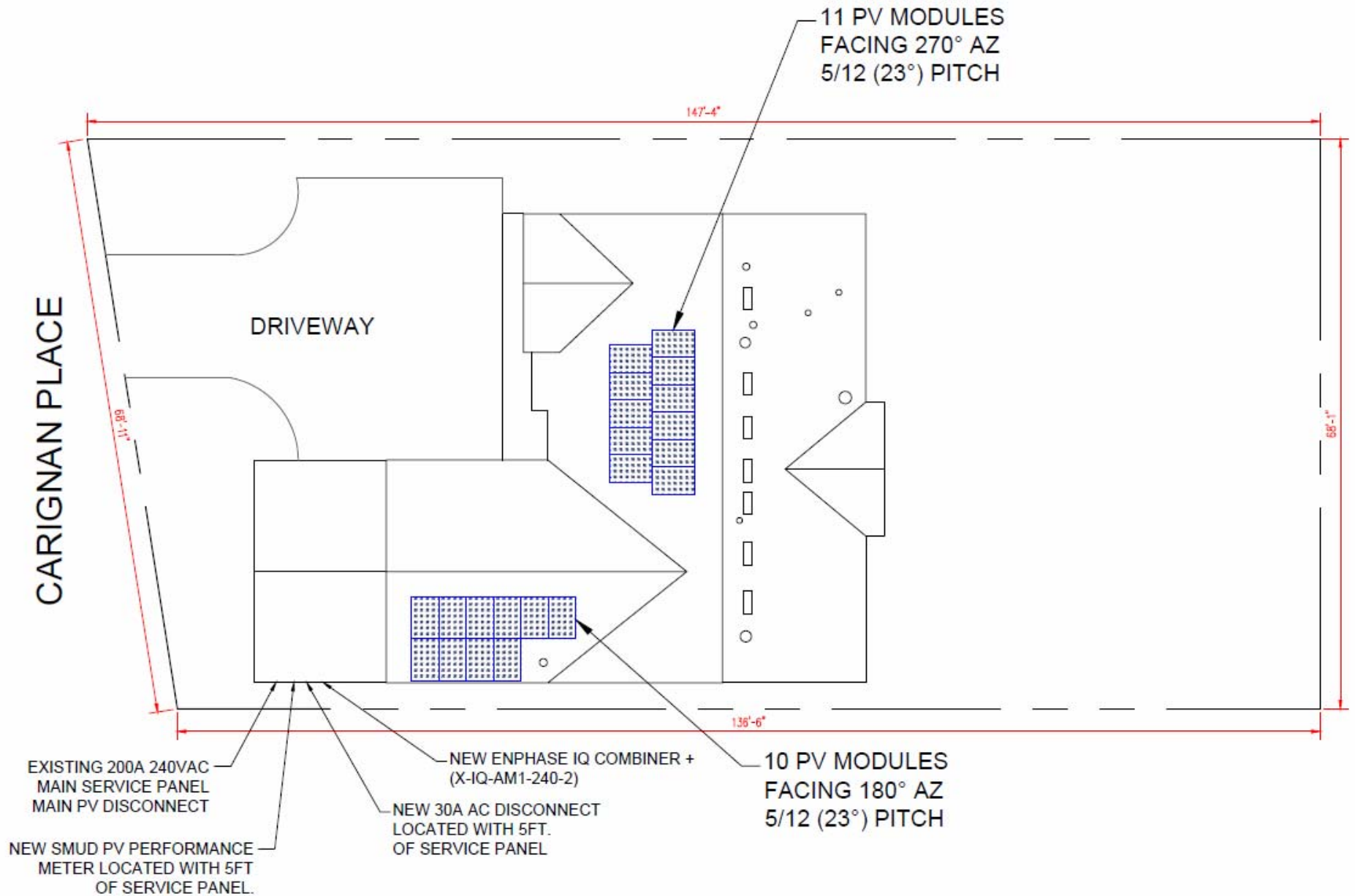
- On-line Applications
- New Business Designer reviewed
- Distribution System Planners review only complex designs
- Meter Tech inspects
- E-mail to City inspector to release
- Billing updated directly

PowerClerk 2 – Application Tool

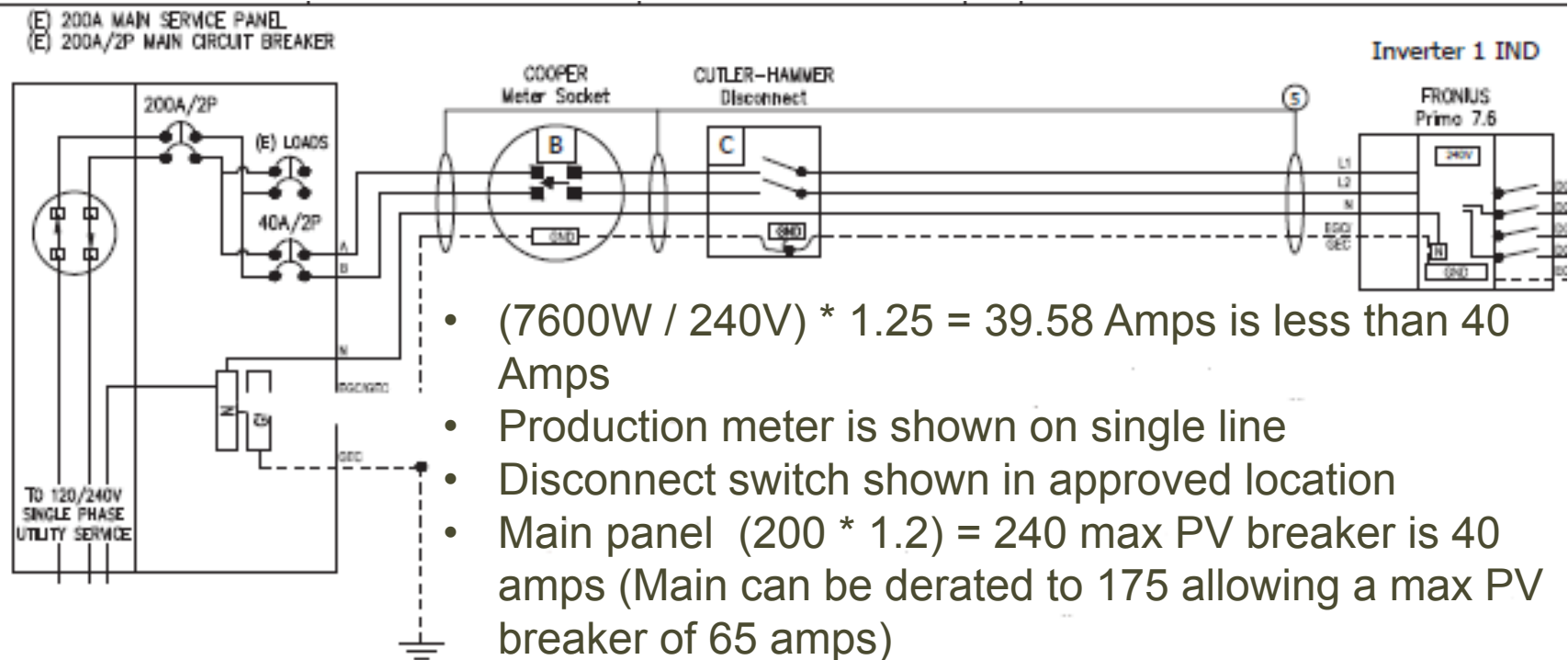
from Clean Power Research

- On-line Interconnection Application
 - Customer and Site information
 - Input proposed system information – Smart Inverters
- Calculates
 - Estimates system annual output for Net-Energy Metering (NEM) program compliance
- Scan in documents
 - Recent billing
 - Layout Drawing
 - Electrical Single-line drawing
- Communicates
 - Auto generates status e-mails to applicant and their contractor

CARIGNAN PLACE



2016 CEC705.12D(2)(3)b Connection





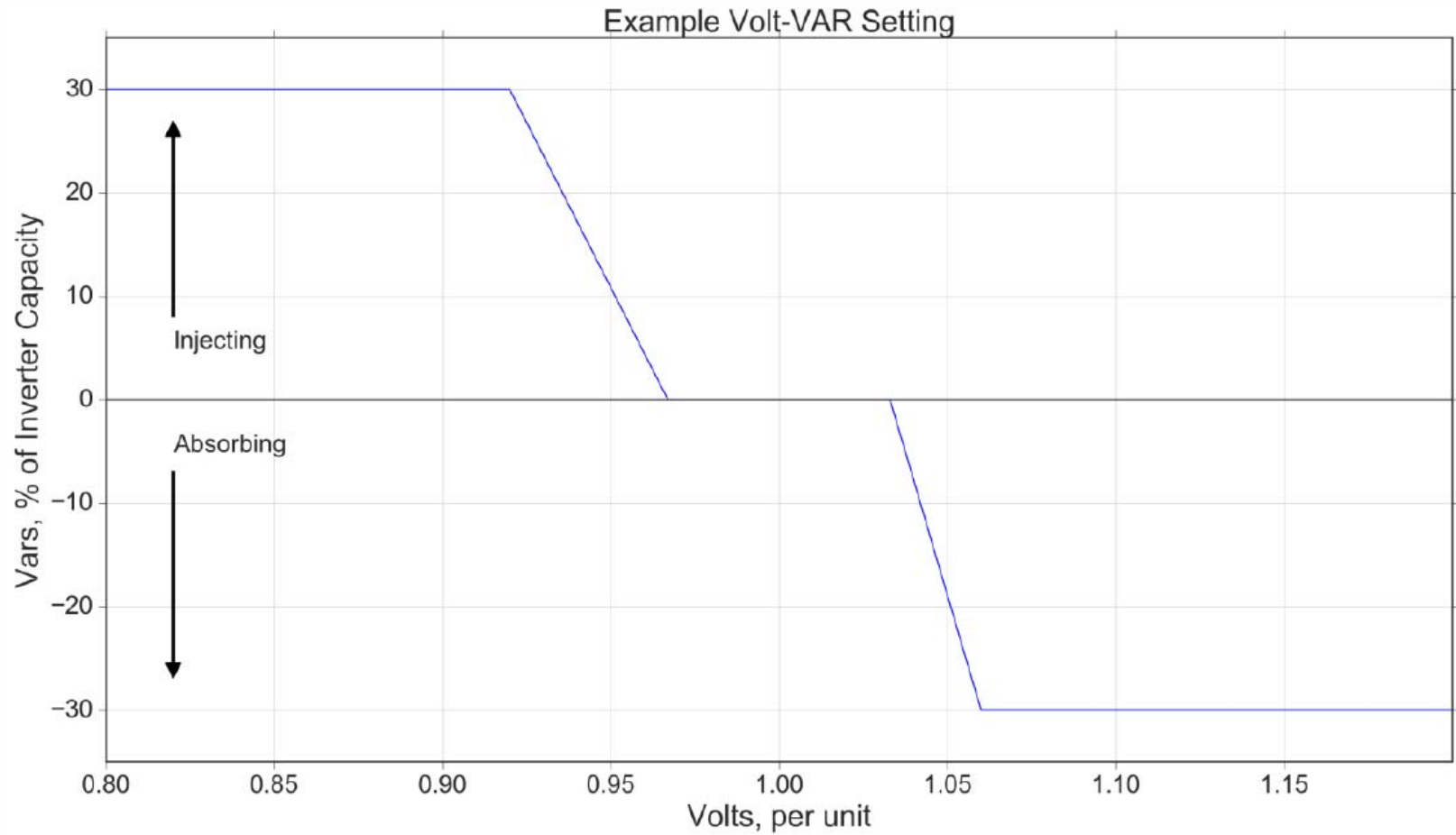
Voltage Rise

Situation

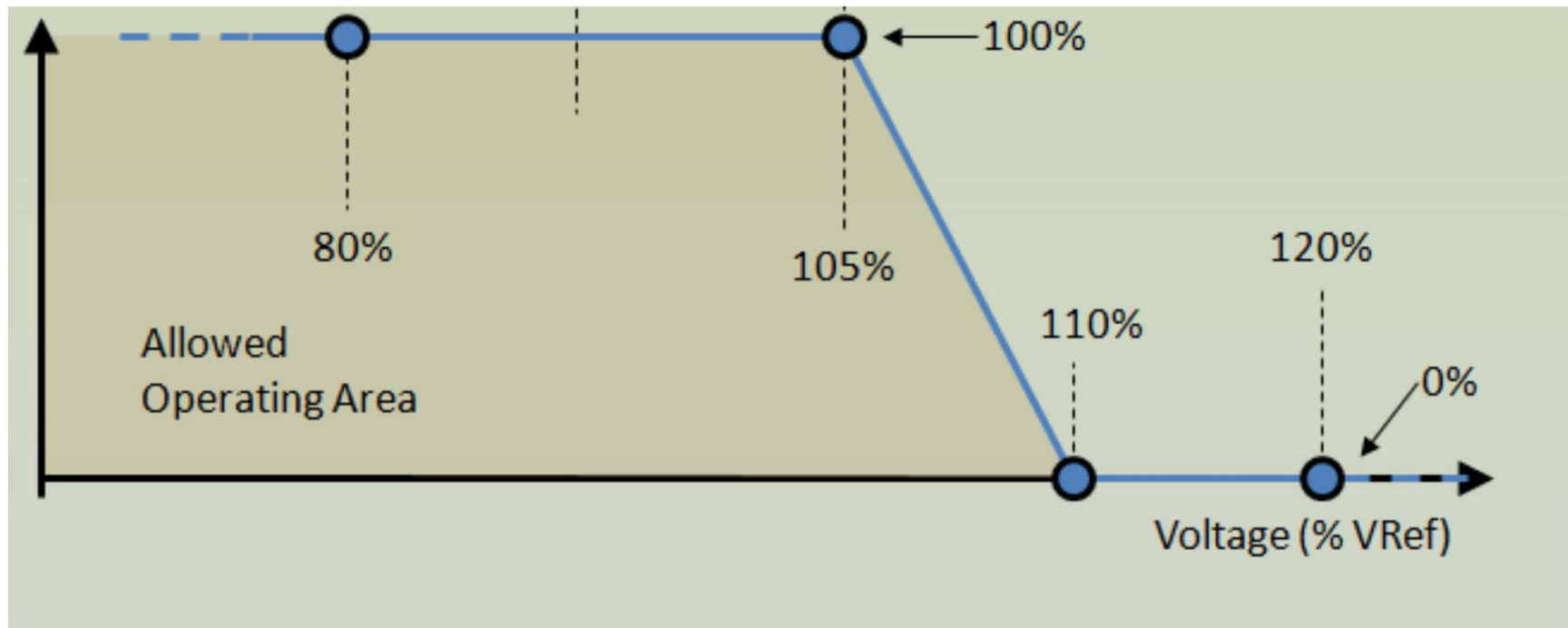
Additional residential solar installations can result in a local high voltage on the shared secondaries and services. Solutions:

1. Install a dedicated transformer(s)
2. Increase the size of the secondary conductors
3. Install a voltage regulating transformer(s)
4. Enable Smart Inverter Features (Volt/VAr, Volt/Watt)
5. Employ battery storage during minimum load

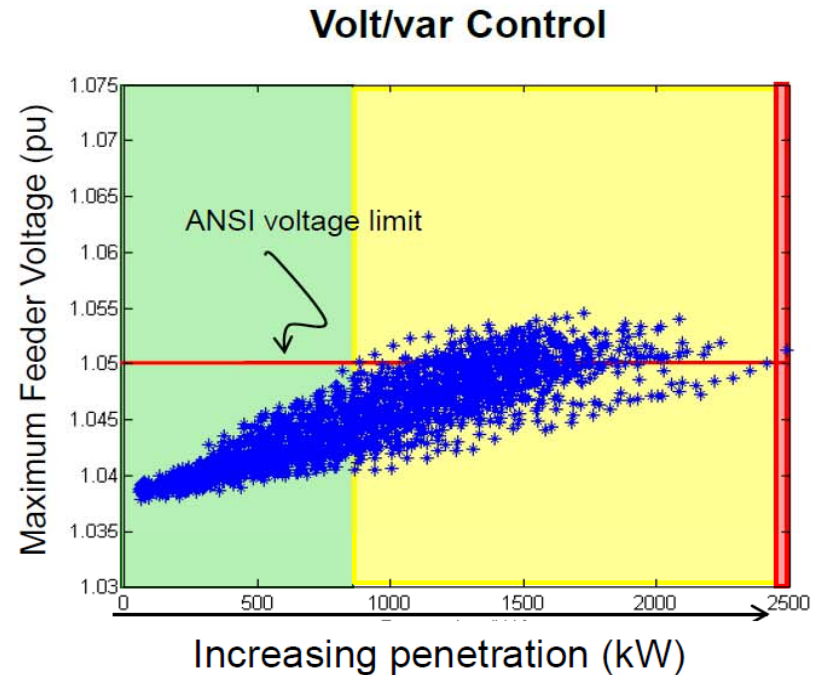
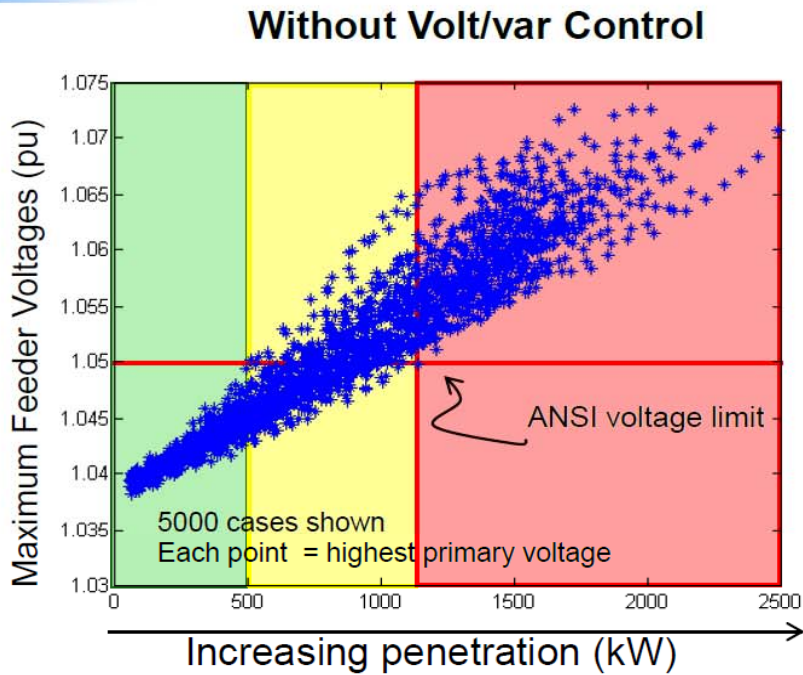
Smart Inverter Volt-VAR



Smart Inverter Volt-Watt



Increasing Hosting Capacity with Smart Inverters



		PV Hosting Capacity (kW)		
		Without Volt/var	With Volt/var	
Primary Voltage Deviation	1st violation	938	>2500	← 160% increase in hosting capacity
	50% scenarios with violation	1323	>2500	
	All scenarios with violation	1673	>2500	
Primary Over Voltage	1st violation	540	880	← 60% increase in hosting capacity
	50% scenarios with violation	871	1464	
	All scenarios with violation	1173	2418	

Thank You

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