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Making Clean Local Energy Accessible Now

MADRI WORKING GROUP MEETING 38
COMPREHENSIVE DISTRIBUTION SYSTEM PLANNING

California Distribution Resources Plan & 'More Than Smart' Working Group

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Clean Coalition Mission and Advisors

Mission

To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

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Distributed Energy Resources (DER)

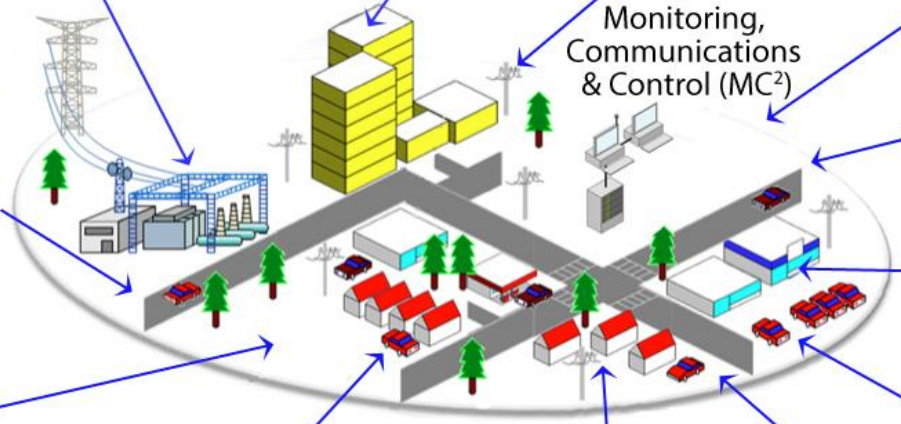
Grid Energy Storage

Distributed Generation

Switches &
Power Electronics

Distributed Generation

Biopower Generation



Monitoring,
Communications
& Control (MC^2)

Energy Storage

Microturbine

Distributed Generation

Electric Vehicles (EV)

Home Energy System

Fuel Cells

Distributed Generation

California Distribution Resources Plan (DRP)

Proceeding overview

Background:

California Distribution Resources Planning (DRP), CPUC Rulemaking 14-08-013

- AB 327 enacted Pub. Util. Code §769, requires IOUs to identify optimal locations for the deployment of distributed resources and potential for net benefits.
- Emphasis is on the how "optimal locations" are defined
  - » Relative to grid benefits and net ratepayer value
  - » Emphasizing aggregate value of a portfolio
  - » Ability to model impacts and value
- Distribution Resource Planning = Giving a location on DER value

Regulatory Activity

- Rulemaking instituted in August 2014
- Final Guidance issued February 2015
- Biennial process
- Parties collaborating in informal 'More Than Smart' Working Group
- IOUs must issue initial Distribution Resources Plans by July 1, 2015,
- Commission anticipated to approve initial plans March 2016
- Implement initial DRP in one Distribution Planning Area per utility in 2016

Distribution Resources Plan (DRP)

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Requirements per CA Public Utilities Code Sec. 769 – from AB 327 (2013)

Identify **optimal locations** for the deployment of Distributed Energy Resources (DERs)

DERs include distributed renewable generation, energy efficiency, energy storage, electric vehicles, and demand response

Evaluate **locational benefits and costs** of DERs based on reductions or increases in local generation capacity needs, avoided or increased investments in distribution infrastructure, safety benefits, reliability benefits, and any other savings DERs provide to the grid or costs to ratepayers

Propose or identify **standard tariffs, contracts, or other mechanisms for deployment** of cost-effective DERs that satisfy distribution planning objectives

Propose cost-effective methods of effectively **coordinating existing commission-approved programs, incentives, and tariffs** to maximize the locational benefits and minimize the incremental costs of DERs

Identify **additional utility spending** necessary to integrate cost-effective DERs into distribution planning

Identify **barriers to the deployment of DERs**, including, but not limited to, safety standards related to technology or operation of the distribution circuit in a manner that ensures reliable service

CA Distribution Resources Plans (AB 327)

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Emphasis is on the how "optimal locations" are defined

Optimal Location Benefit Analysis Requirements:

- Unified IOU Locational Net Benefits methodology
- Utilize E3's Distributed Energy Resources Avoided Cost Model (DERAC)
- But, Current DERAC model has "system level" values that need to be modified/replaced with relevant locational specific values.

#	**Minimum Value Components to include in Locational Net Benefit Methodology**
1	Avoided Sub-Transmission, Substation and Feeder Capital and Operating Expenditures
2	Avoided Distribution Voltage and Power Quality Capital and Operating Expenditures
3	Avoided Distribution Reliability and Resiliency Capital and Operating Expenditures
4	Avoided Transmission Capital and Operating Expenditures
5	Avoided Flexible Resource Adequacy (RA) Procurement
6	Avoided Renewables Integration Costs
7	Any societal avoided costs which can be clearly linked to the deployment of DERs
8	Any avoided public safety costs which can be clearly linked to the deployment of DERs

More Than Smart (MTS) Working Group

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MTS WG Purpose & Objectives

Purpose:

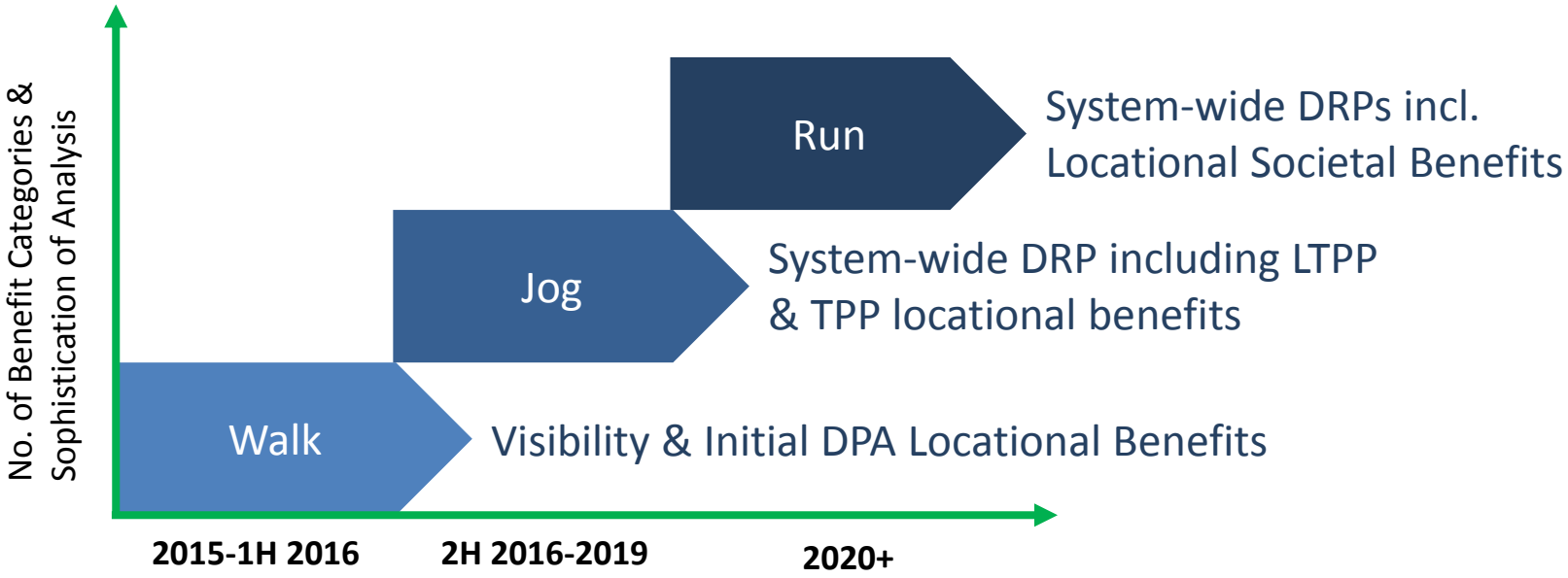
- Provide an open, voluntary stakeholder forum to discuss core issues toward finding common ground regarding the evolution of California's distribution system and the seamless integration of DER to meet customers' needs and public policy. The results of the discussions will be for the benefit of the participants and will be made public without specific participant attribution.

Objectives:

- ✓ Define common parameters for the development of distribution planning scenarios for utilities to properly stress test plans and to achieve a measure of comparability among the different plans.
- ✓ Identify and define the integrated engineering-economic analysis required to conduct distribution planning in the context of AB 327 requirements.
- ✓ Define the potential grid end-states in the context of existing plans/roadmaps and identify the considerations regarding grid evolution to meet customers' needs and California's policy objectives.
- Define the scope and parameters of an operational/DER market information exchange to facilitate an open planning process and enable R&D efforts.
- Define distribution services associated with identified DER values including performance requirements.
- Define new distribution operational functions (DSO) and related integration technologies (vendor neutral) to create "node-friendly" open grid

Evolution of DRP Optimal Location Benefits Analysis

- What are the immediate benefit categories that can reasonably be evaluated within the next 3 months for the first DRP?
- What are the next logical set (incl. data and tools needed) for system-wide DRPs?



Stages of DRP Optimal Location Implementation

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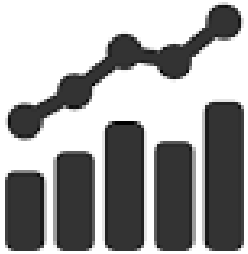
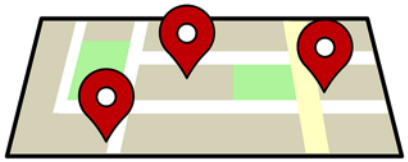


Analysis & Planning

Full cost and value accounting for DER



Grid Modeling & Optimization

Siting analysis; Power-flow modeling; DER optimization

Distribution Resource Plan Design

Design and approval

Distributed Energy Resource Deployment

Implementation; procurement and interconnection programs

DRP Analysis Process

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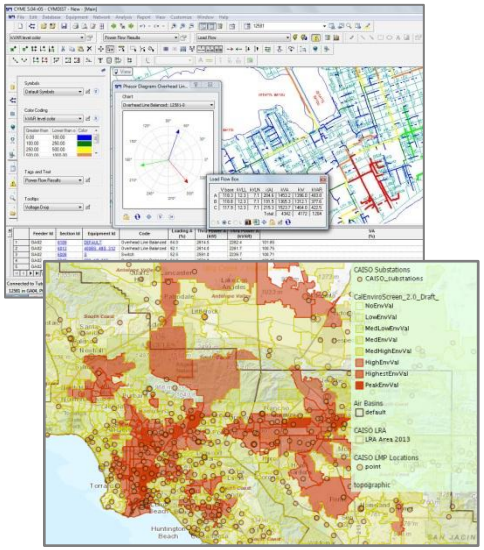
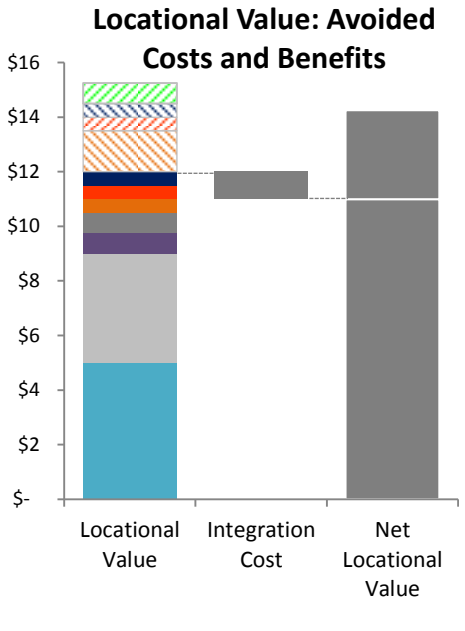
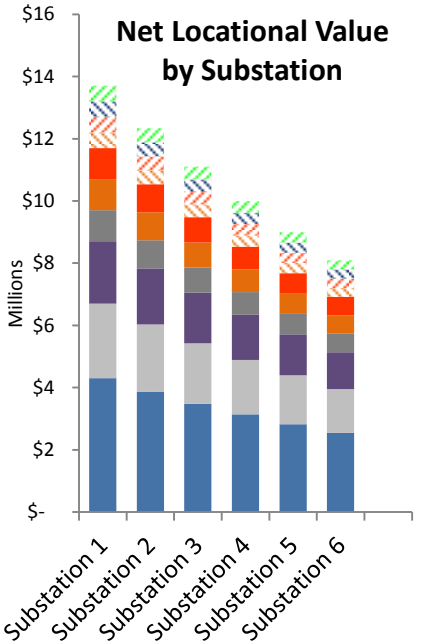
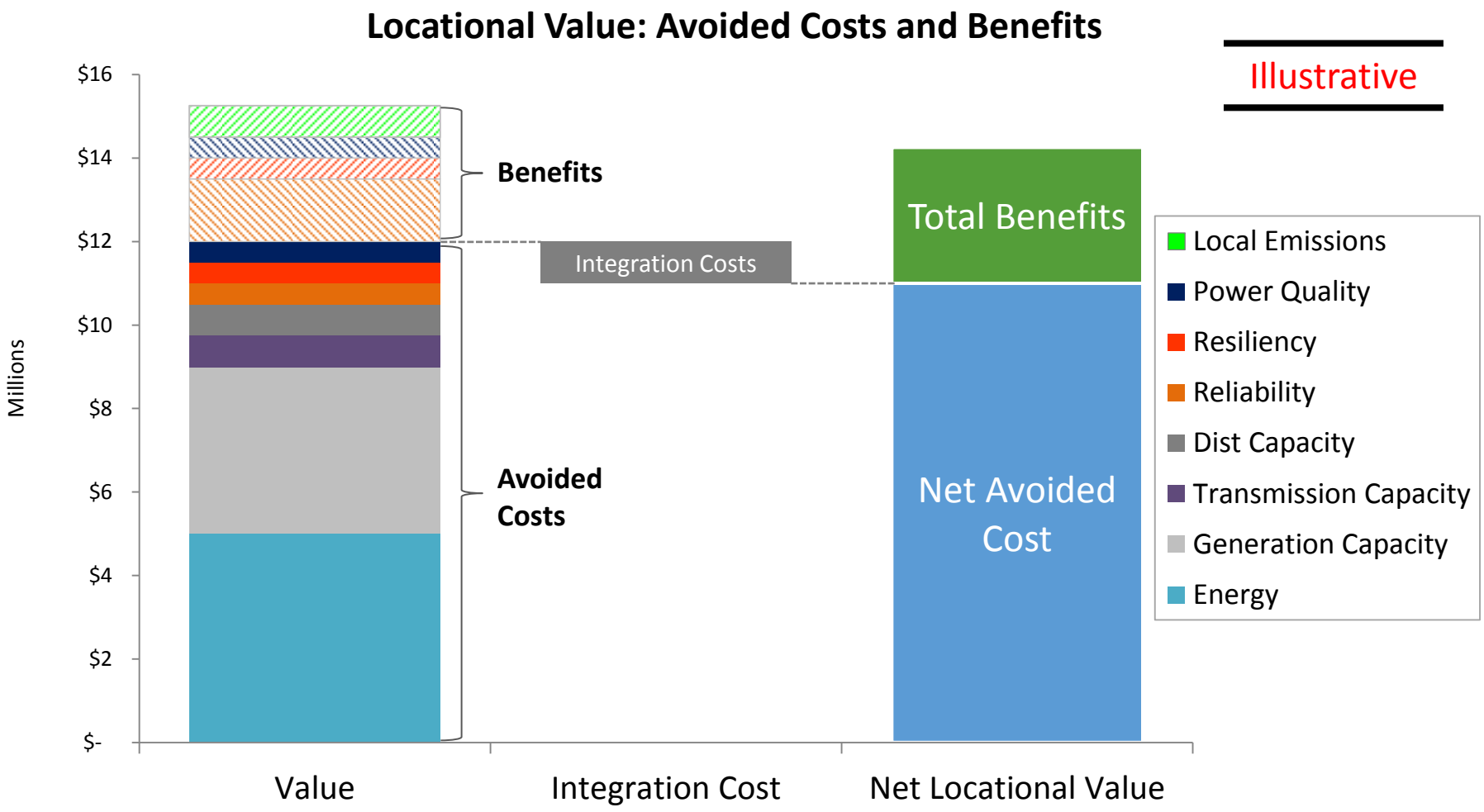
Identify DPA & Substations → **Perform Planning Analyses** → **Calculate Locational Net Value** → **Rank Substations by Locational Net Value**







Value Analysis: Avoided Costs and Benefits



Note: Analysis excludes some avoided costs/benefits that do not have a locational dimension. Therefore, analysis is not intended to estimate full stack of avoided costs and benefits associated with DER

MTS DER Value Components (1 of 2)

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Objective is to define a mutually exclusive and collectively exhaustive (MECE) list irrespective of whether these could be valued or monetized today, or if the value is part of CA utility revenue requirements. Value components reflect NEM 2.0 and MTS discussion on potential DER value for Customers, Society, Bulk Power system & Distribution with a focus on locational value.

	Value Component	Definition
Wholesale	WECC Bulk Power System Benefits	Regional BPS benefits not reflected in System Energy Price or LMP
	CA System Energy Price (NEM 2.0)	Estimate of CA marginal wholesale system-wide value of energy
	Wholesale Energy	Reduced quantity of energy produced based on net load
	Resource Adequacy (NEM 2.0 modified)	Reduction in capacity required to meet Local RA and/or System RA reflecting changes in net load and/or local generation
	Flexible Capacity	Reduced need for resources for system balancing
	Wholesale Ancillary Services (NEM 2.0)	Reduced system operational requirements for electricity grid reliability including all existing and future CAISO ancillary services
	RPS Generation & Interconnection Costs (NEM 2.0)	Reduced RPS energy prices, integration costs, quantities of energy & capacity
	Transmission Capacity	Reduced need for system & local area transmission capacity
	Generation/DER Deliverability	Increased ability for generation and DER to deliver energy and other services into the wholesale market
	Transmission Congestion + Losses (NEM 2.0 modified)	Avoided locational transmission losses and congestion as determined by the difference between system marginal price and LMP nodal prices
	Wholesale Market Charges	LSE specific reduced wholesale market & transmission access charges

MTS DER Value Components (2 of 2)

	Value Component	Definition
Distribution	Subtransmission, Substation & Feeder Capacity (NEM 2.0 modified)	Reduced need for local distribution system upgrades
	Distribution Losses (NEM 2.0)	Value of energy due to losses between wholesale transaction and distribution points of delivery
	Distribution Power Quality	Improved steady-state (generally >60 sec) voltage, voltage limit violation relief, reduced voltage variability, compensating reactive power
	Distribution Reliability + Resiliency+ Security	Reduced frequency and duration of outages & ability to withstand and recover from external natural, physical and cyber threats
	Distribution Safety	Improved public safety and reduced potential for property damage
Customer & Societal	Customer Choice	Customer & societal value from robust market for customer alternatives
	CO2 Emissions (NEM 2.0 modified)	Reductions in federal and/or state carbon dioxide emissions (CO2) based on cap-and-trade allowance revenue or cost savings or compliance costs
	Criteria Pollutants	Reduction in local emissions in specific census tracts utilizing tools like CalEnviroScreen. Reduction in health costs associated with GHG emissions
	Energy Security	Reduced risks derived from greater supply diversity
	Water Use	Synergies between DER and water management (electric-water nexus)
	Land Use	Environmental benefits & avoided property value decreases from DER deployment instead of large generation projects
	Economic Impact	State and/ or local net economic impact (e.g., jobs, investment, GDP, tax income)

NEM 2.0 values drawn from E3 identified avoided cost components in
"Overview of Public Tool to Evaluate Successor Tariff/Contract Options", Dec. 16, 2014

Optimal Locations for DER Value

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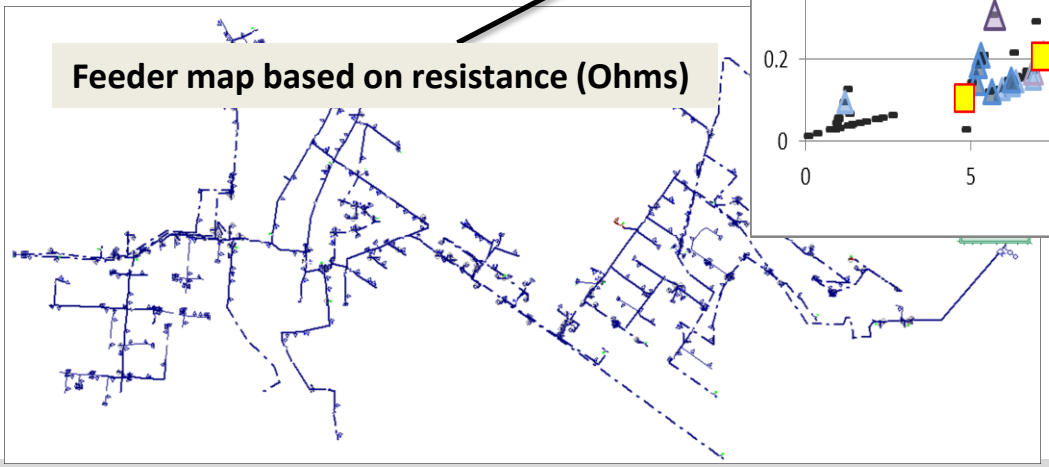
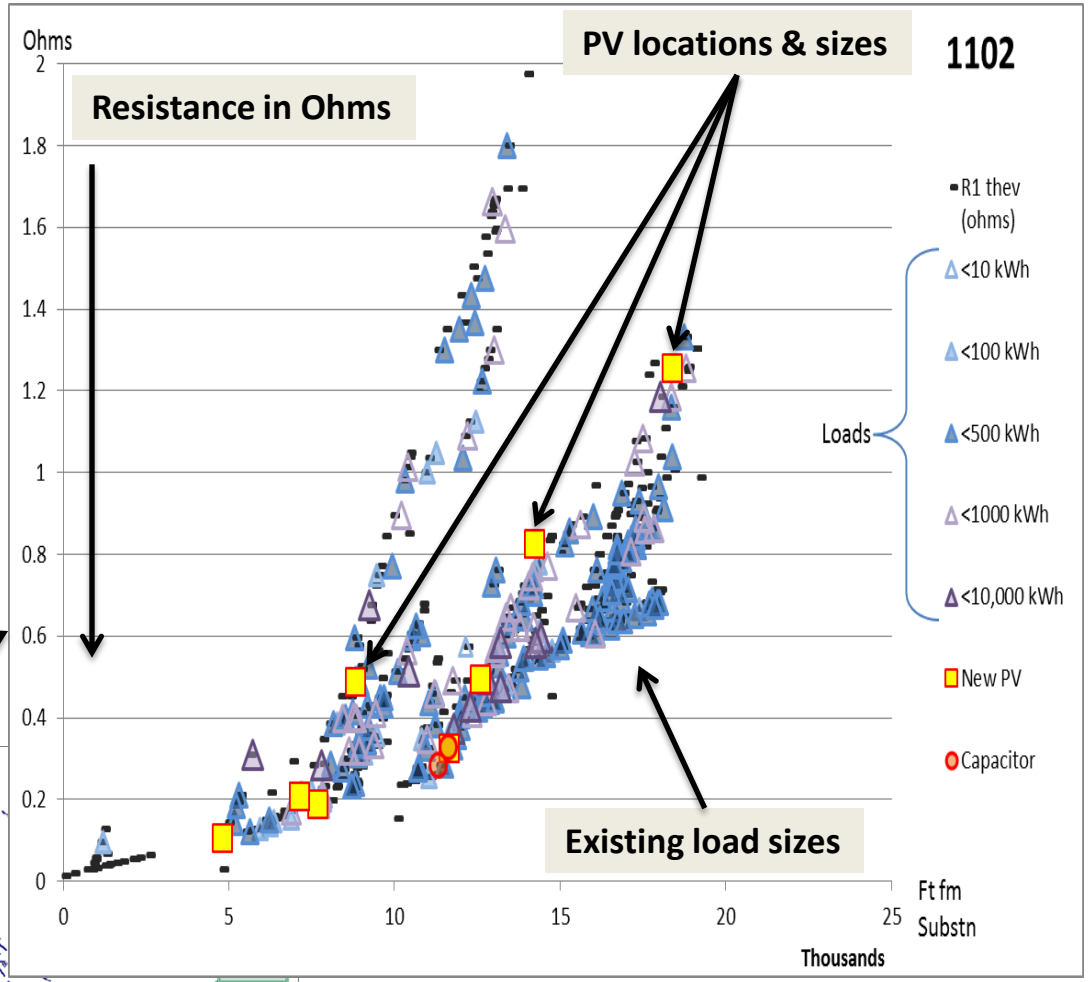
Distribution level: Example, identifying optimal PV capacity locations:

1. Robust feeder locations: less resistance (lower Ohms) means more capacity for local generation
2. Matching load types: e.g. higher loads during daytime means better match for PV
3. Utilizing DER such as storage and auto-demand response across the substation
4. Avoided costs: reconductoring, Conservation Voltage Reduction, ride-through, transformer life, ...





Regulatory Interactions

Distribution Resources Plans require coordination with ISO transmission planning schedules and Energy Commission forecasts.

The DRP also overlap with many other proceedings within the CPUC. A partial list:

- Long Term Procurement Planning(R.13-12-010)
- Resource Adequacy (R.14-10-010)
- Joint Reliability Planning (R.14-02-001)
- Rule 21 Interconnection (R.11-09-011)
- Renewable Portfolio Standard (R.11-05-005)
- Alternative Fueled Vehicles (R.13-11-007)
- Demand Response (R.13-09-011)
- Distributed Generation (R.12-11-005)
- Energy Efficiency (R.13-11-005)
- Energy Storage/Storage Roadmap (R.10-12-007)
- Integrated Demand-Side Management (R.14-10-003)
- Net Energy Metering Successor Tariff (R.14-07-002)
- Smart Grid (R.08-12-009)
- Residential Rate Reform (R.12-06-013)