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Distribution Planning Process

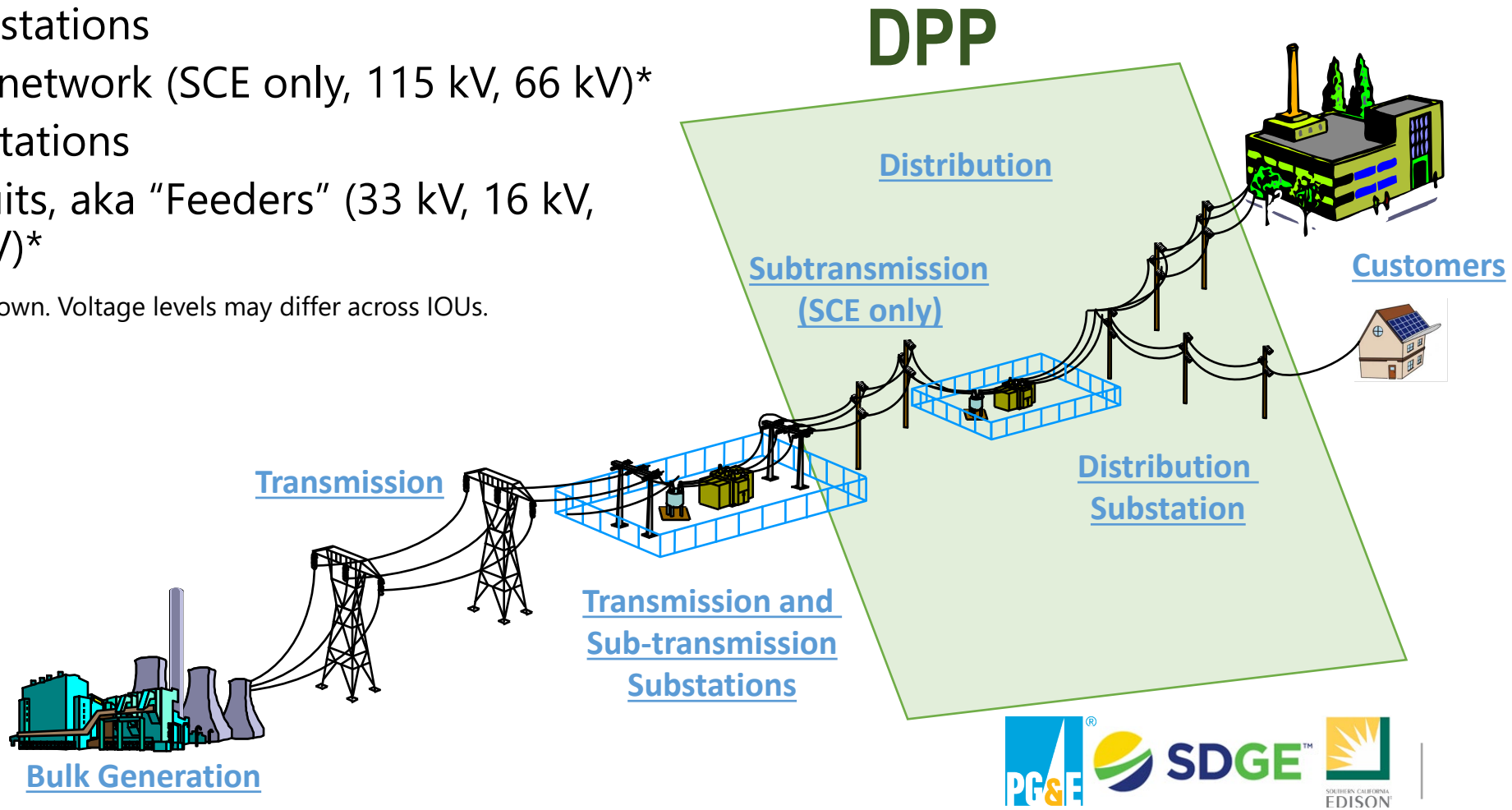
May 9, 2023

Distribution Planning Process (DPP)

Electric Power System Overview

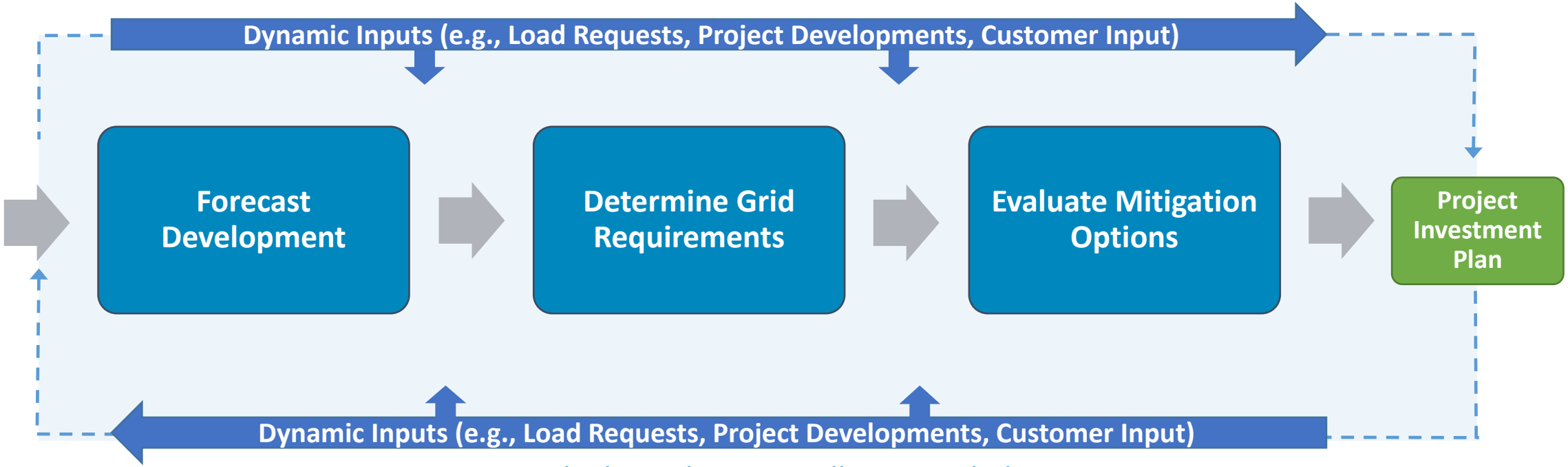
- The electric power system broadly consists of:
  - Central-station bulk generation
  - Transmission network (500 kV, 220 kV)*
  - Transmission Substations
  - Subtransmission network (SCE only, 115 kV, 66 kV)*
  - Distribution Substations
  - Distribution Circuits, aka “Feeders” (33 kV, 16 kV, 12 kV, 4 kV, 2.4 kV)*

*Typical voltages for SCE system are shown. Voltage levels may differ across IOUs.



Distribution Planning Process Overview

The current **Distribution Planning Process** is an **annual**, **dynamic process** that identifies projected **distribution capacity** deficiencies and determines mitigation plans to address those projected deficiencies.



Revisit and adjust plans annually, as needed

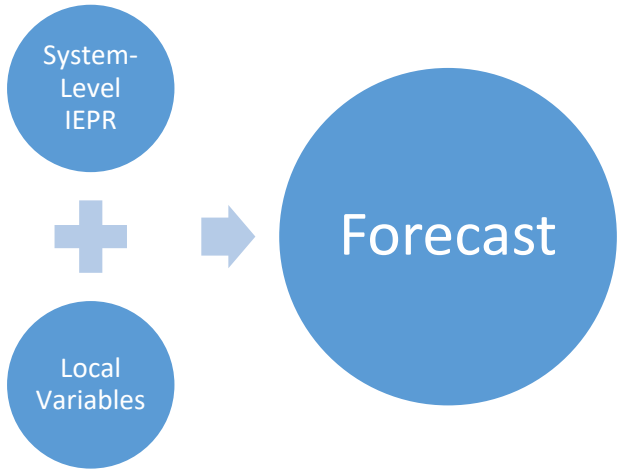
Forecast Development*

Load Forecast

- Utilize CEC's Integrated Energy Policy Report (IEPR) (top down) forecast of system-level electric load growth
- Utilize localized variables (bottom up) such as historical area loading, economic indicators and temperature data
- Develop 1-in-10-year temperature-adjusted load forecast at the substation and circuit levels
- Load Service Applications
  - Account for requests for new load service at specific locations with specific in-service dates
  - Customer engagement on load applications

DER Forecast

- CEC's forecast of system-level DER growth disaggregated to circuit and substation level and added to forecast
  - DER hourly profiles are incorporated into the load forecast
  - DERs can increase load (e.g., EVs) or decrease load (e.g., solar PV)

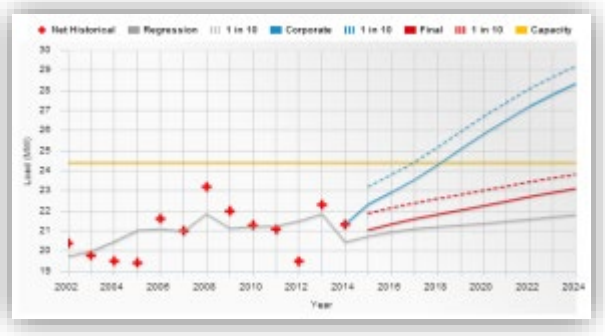


*Detailed process for each IOU to be presented in upcoming Distribution Forecast Working Group (DFWG) Meeting

Determine Grid Requirements

Considerations

- Impact of projected forecasts on existing capacity equipment and configurations
- Maintain safety and reliability for customers
- Effects of planned utility projects and transfers
- Maintain operability to transfer customers under emergency conditions
- Diversity of specific geographic load and customer mix
- Effects on protection schemes
- Incorporation of local knowledge on customer needs and inputs



General Process

- Determine Thermal Capacity Needs
- Evaluate Voltage and Power Quality Needs

Evaluation of Mitigation Options

Transfers/Operational changes

- Utilize existing capacity, where available

Incremental Upgrades

- Identify smaller system upgrades to enable use of existing capacity

New Capacity

- Determine if a capacity increase is needed (e.g., new circuit, substation capacity increase, new substation)

DER Solutions

- e.g., DIDF sourcing, Customer-driven projects

Guiding Principles

- Cost effectiveness for customers
- Ensure all grid requirements are met (e.g., capacity, voltage, reliability)
- Ensure system reliability and power quality
- Consideration of:
  - Customer needs
  - Forecasted loads and dependable information about future growth
  - Impact on grid operations
  - Mitigation options that address multiple grid requirements
  - Ensure equal treatment for all customers

Scope of Distribution Capacity Improvement	Typical Timeline
Small system upgrades – increases to cable/conductor size, modification of underground conduit systems	1-3 years
Medium system upgrades – new distribution feeders, increase in substation capacity	3-5 years
Large system upgrades – large projects which may require licensing (e.g., subtransmission)	4-6 years
Very long system upgrades – large projects requiring licensing (e.g., new substations)	7+ years

Ongoing Improvements to the DPP

- Engaging with Fleets to obtain multi-year load data and profiles
- Leveraging existing outreach efforts with communities and customers to better inform the DPP
- Use of IEPR forecast scenarios that are aligned with state policies (e.g., Local Reliability scenario with high electrification)
- Increasing complexity is driving the need for more advanced distribution planning tools and processes
- Enhancing ICA data (e.g., hosting capacity data) to better inform customers
- Exploring load flexibility/management to further facilitate interconnection and/or provide bridging solutions
- Exploring approaches where utilities can effectively orchestrate flexible loads and resources to manage capacity of the grid

QUESTIONS?