

CALIFORNIA ELECTRICITY MARKET LONG-TERM FORECAST

LCG CONSULTING

Renewable portfolios, storage technologies, greenhouse gas emissions, regulations, even the mercurial weather: these are just a few of the complications rewiring the way we produce, trade, and transmit electricity in California's rapidly evolving electricity landscape.

LCG Consulting's latest ten-year forecast of the CAISO electricity market is now available to help tame all these unruly parameters. The forecast's meticulously prepared dataset deftly weaves together LCG's integrated generation and transmission models for predicting electricity prices, congestion, and generator performance with the best available information on existing and planned electricity infrastructure.

Harnessing the power of LCG's UPLAN Network Power Model, our PLATO-CAISO FNM Data Model, and decades of experience modeling the CAISO market, LCG provides a clear picture of the California electricity market for a reference case as well as alternative scenarios.

For example, the reference case available assumes CAISO will meet the state's mandated RPS targets and the expected electricity loads in the future years. However, upon request, LCG can build scenarios that accelerate or delay development. Customized scenarios can add transmission and generation, or mix in developing technologies like battery and compressed air energy storage units.

LCG CAISO Modeling

Long term forecasting through fundamental modeling (10-20 years)

LMPs at trading hubs and DLAPs

Renewable integration - RPS, solar, wind, geothermal and others

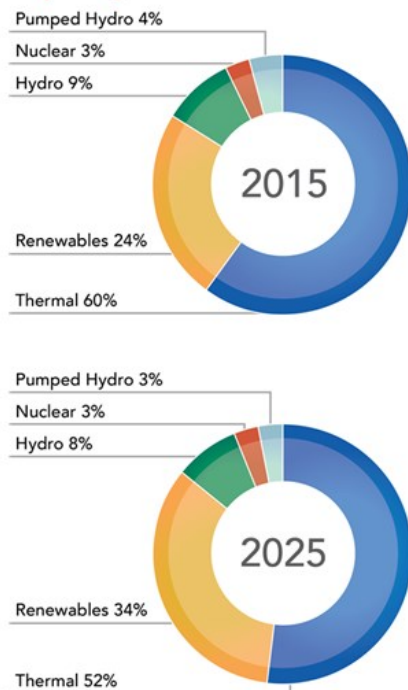
Transmission congestion and Greenhouse gas emission

Generation and Transmission Expansion

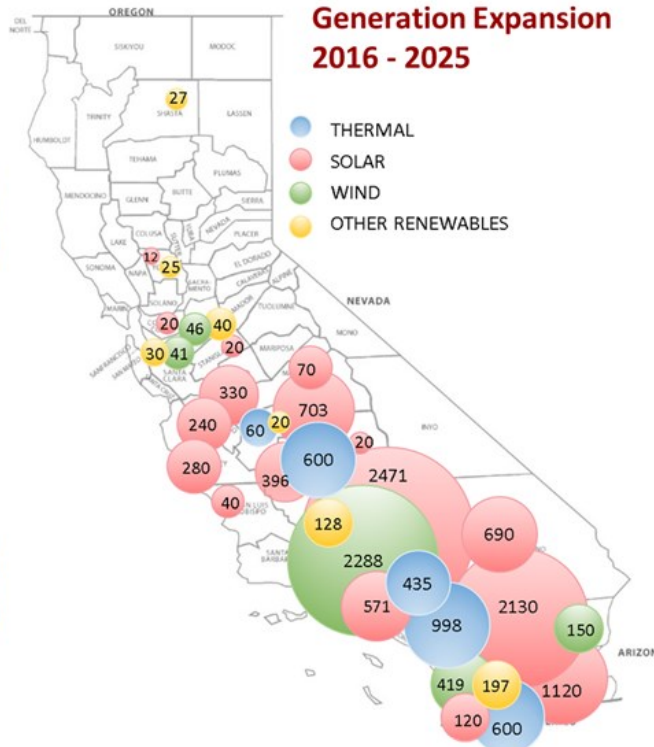
Policy impact studies

Capacity Mix and New Additions in CAISO

Capacity Mix



Generation Expansion 2016 - 2025



* The Renewable percentage includes imports

Increasing Capacity and Generation of Renewables

Over the ten-year time horizon, growing renewables pose the most profound change to California's electricity market. The previous figure shows reference case projected renewable capacity growth. Difficult to model, renewables require knowledge of both day-to-day and seasonal resource patterns. LCG's models include predictions of solar and wind resources for every hour of

the year. LCG's algorithms produce the only long-term forecasts available using both capital and production costs for renewables.

As shown in the next figure, in 2025 renewables generate a higher share in the summer, while imports go up during the winter months from low-cost hydro generation.

Changing Generation: Comparison of Average Hourly Generation and Imports during Summer and Winter



LCG's latest forecast shows the implied heat rates associated with the Locational Marginal Prices (LMPs) at the trading hubs (TH) and Default Load Aggregation Points (DLAP) gradually increasing over the time horizon.

The model tracks how congestion and system conditions impact LMPs. An example of just one day's worth of LMPs is shown below. Day: August 18, 2025.

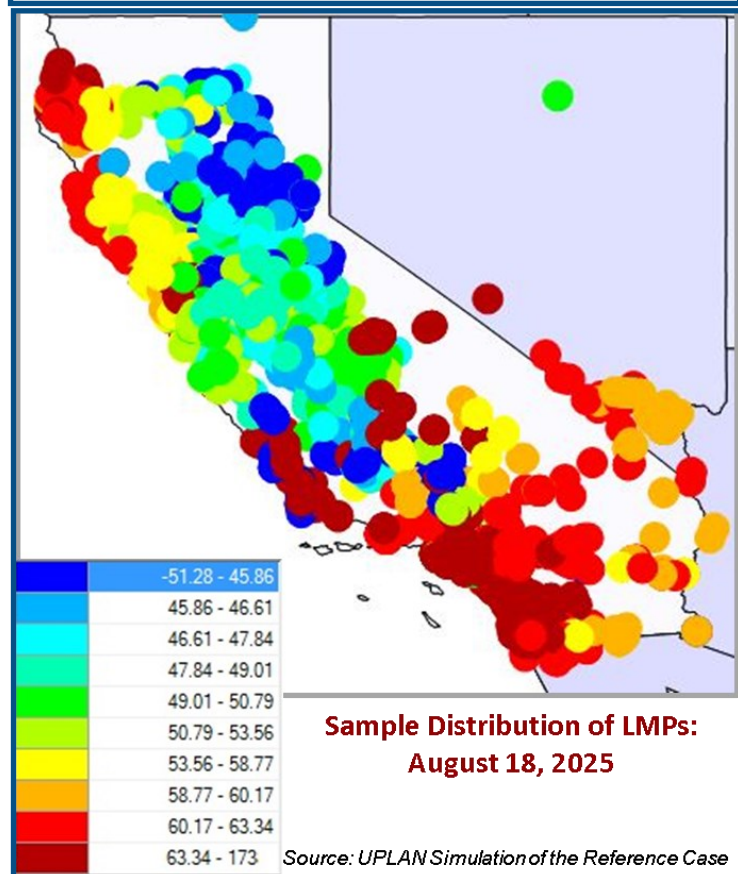
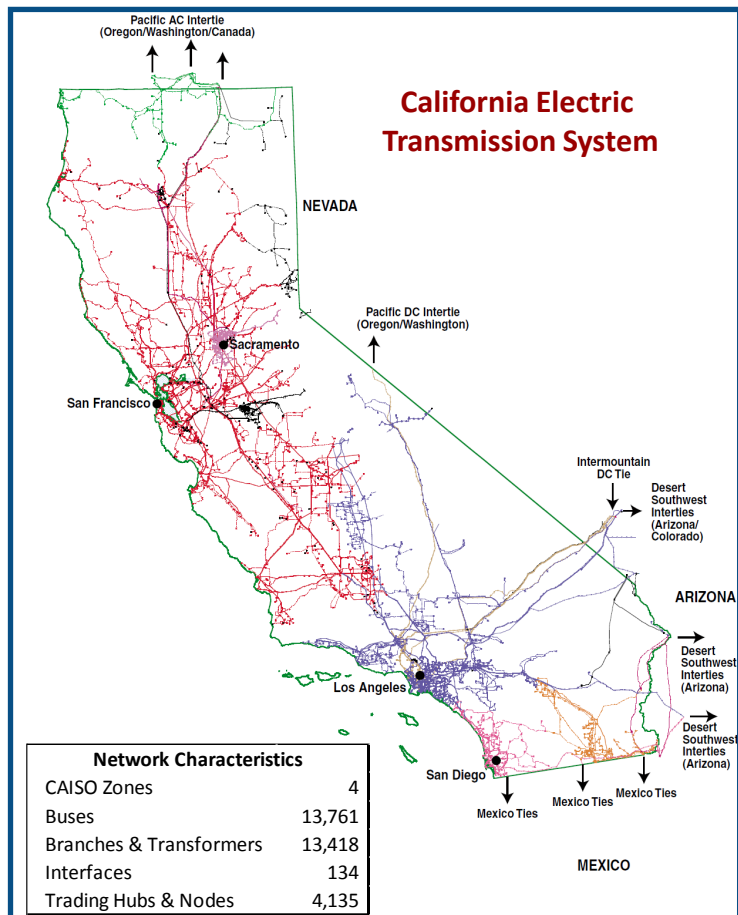
CAISO Network Topology and Price Forecasting

LCG's CAISO Market Outlook

LCG offers a suite of state of the art products including our UPLAN Network Power Model, PLATO-CAISO data model, as well as short- and long-term forecasts of electricity markets nationwide.

Our software and data models have been painstakingly constructed and tested over decades with a large number of clients in a wide variety of scenarios. They have withstood the scrutiny of electricity market participants, regulators and the investment community.

LCG's fully tested UPLAN models and PLATO CAISO Data Model are used to develop the Reference Case and the long-term market outlook. The report provides forecasts of congestion, LMPs, shadow prices and many other operating performance data.



LCG Expertise in the CAISO Electricity Market

CAISO 10-Year Outlook

Ready now, our off-the-shelf 10-year forecast report containing

- Capacity and generation mix for current and future years
- Load forecast
- Fuel price forecast
- Hourly LMPs (Energy, congestion and losses) at THs, DLAPs, and AP nodes of interest
- Transmission congestion and shadow prices
- Performance of selected generators including generation (MWh), curtailment (%) and energy revenues for both traditional and renewable technologies
- Any other mutually agreed simulation output

Custom Studies

We provide fully tailored studies using your own system-level and economic assumptions.

- Cost benefit analysis of generation and transmission assets
- Congestion and curtailment analysis
- Siting analysis and investment risks
- Price and performance forecasts

About LCG Consulting

LCG is a widely recognized leader in electricity industry restructuring and a pioneer in modeling deregulated energy markets. We are one of the first companies to research the implications of competitive pricing and marketing in the United States and abroad, and to develop models to accurately analyze these competitive power markets. Our innovative studies have set the standard for developing models for restructuring analysis throughout the U.S. and abroad.



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