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2025 IEPR
Form 4: Forecast: Method and Assumptions

GENERAL METHOD

The forecast integrates separate energy demand projections from CleanPowerSF's baseline model and an electrification model adapted from Siemen PTI's May 2025 analysis. The baseline forecast is based on current energy demand trends from CleanPowerSF customers and projects future demand without major changes to enrollment or expanded electrification efforts, while the electrification forecast considers new demands from expanded building electrification and EV charging. The baseline model is used for Forms 1.1b and 1.3 while the baseline model and electrification model are used for Form 3, Incremental Demand Modifier Impacts.

BASELINE FORECAST

Forecasters used MetrixND[1] to construct linear regression models for each of ten rate classes at every hour of the day (n = 240). These models quantify the relationship between energy demand per customer and various demand drivers, including date characteristics (month of year, day of week, holidays, daylight savings) and weather (temperature, precipitation). To improve interpretability, all hourly models for a given rate class have the same specification. Most models were trained on the most recent one to three years of actual hourly demand data.

Coefficients representing the average effect that each variable had on energy demand were multiplied by covariates representing the expected condition of those drivers during the forecast window. The sum of these values represents energy demand per customer for any given time period. These totals were scaled up according to the number of enrolled customers and then adjusted based on expected annual growth rates.

[1] Software developed by Itron

GROWTH RATES

Forecasters calibrated the models by forcing per customer energy demand to align with growth rates derived from the California Energy Commission's (CEC's) Integrated Energy Policy Report (IEPR) Demand Forecast.[2] These growth rates represent the expected year-over-year percentage increase in energy demand as a result of "economic, demographic, and price scenarios" (per CEC), but they exclude new demand from other specific load modifiers (these are modeled in other CEC forecasting scenarios), including electrification. Since the electrification model that Siemens prepared includes energy demand from new construction, forecasters adjusted the CEC growth rate (by 50 percent) to avoid double-counting demand from the electrification scenarios.

WEATHER

The baseline model simulates CleanPowerSF demand under elevated weather conditions. Forecasters evaluated historic weather data from the San Francisco Internation Airport station (KSFO) for the most recent 20-year period (April 2005 to March 2025) and calculated the number of *degree days*[3] in each month. They ranked the totals for every calendar month and calculated the likelihood of exceedance by determining how many years had higher degree day totals for a given calendar month. They adopted the actual daily temperature and precipitation data from months with the second highest degree day totals for the analysis period (corresponding with a 10 percent chance of exceedance).

To ensure that the forecast adequately captures peak energy demand, the most extreme weather day in any given month was assigned to the second Wednesday of that month. For months where the second Wednesday is a holiday, the extreme weather day was assigned to a different Wednesday in the month.

ENROLLMENT

Although the integrated forecast includes demand impacts from new construction and uses growth rates adopted from the CEC forecast that could include some changes to CleanPowerSF enrollment, it does not include any specific new enrollment projections and does not model enrollment trends

[2] Available at: https://www.energy.ca.gov/data-reports/california-energy-planning-library/forecasts-and-system-planning/demand-side-2 Refer to Form 1.1c from "CEDU 2024 Baseline Forecast LSE and BAA Tables". Accessed April 22, 2025.

[3] Degree days are a measure of temperature extremeness. They are calculated by finding how many degrees above or below a specific temperature threshold the average temperature was on a given day. Colder months use heating degree days (HDD), which suggest energy is needed to bring the indoor temperatures up to a desired range, while warmer months use cooling degree days (CDD), which suggest energy is needed to lower the indoor temperature to the desired level.

during the forecast window. Of course, small changes in customer counts are likely to occur. As CleanPowerSF staff are made aware of new enrollments in the future, an updated forecast might be required to capture the impact of these changes.

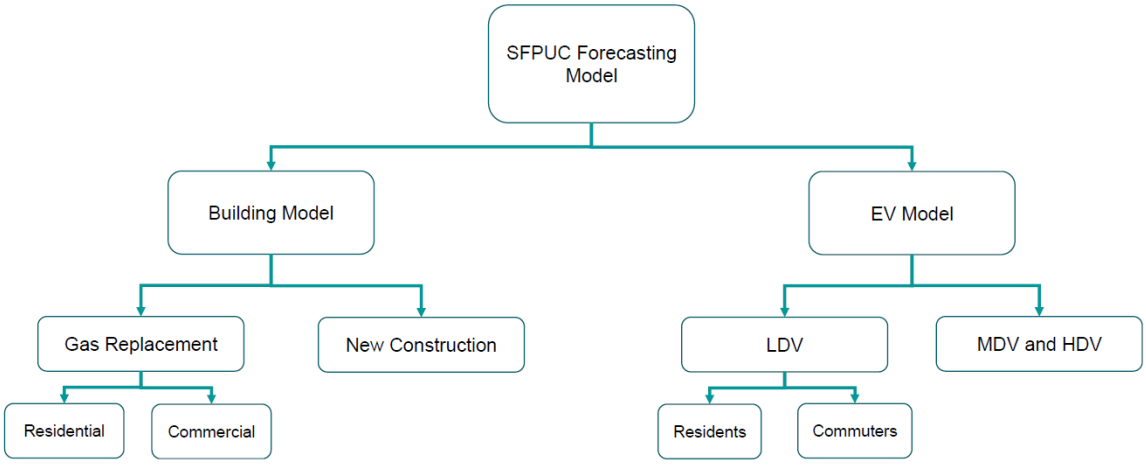
LOSSES

Distribution losses are based on the average hourly difference between demand at CleanPowerSF's default load aggregation point and the customer meter during 2024. The loss fraction for major rate classes ranges from 1.86 percent to 6.43 percent.

ELECTRIFICATION FORECAST

CleanPowerSF staff used a fuel switching model developed by Siemens in May 2025 to forecast new electrification demand from CleanPowerSF customers. The model calculates annual energy demand from building electrification and expanded Electric Vehicle (EV) charging in San Francisco between 2025 and 2050. A schematic of the basic model components was provided by Siemens:

Figure 1: Electrification Model Structure, provided by Siemens in May 2025



BUILDING MODEL

The building model includes two separate components: electric demand from gas replacement at existing buildings in San Francisco and electric demand from new construction. The gas replacement component separately considers residential, small commercial (<50,000 ft^2), and large commercial (>50,000 ft^2) facilities. It identifies the existing gas demand from PG&E's IEPR gas forecast and constructs a replacement timeline where buildings are retrofit with

electrical components. Electric demand is calculated based on a gas-to-electric conversion factor.

The new construction forecast uses the San Francisco Existing Building Energy Performance dataset[4] to identify the stock of existing buildings in San Francisco by building type in recent years. Energy demand from new construction is calculated by multiplying existing building square footage by the average annual growth rate and electricity intensity factors derived from the San Francisco 2016 greenhouse gas Inventory and 2006 California End-Use Study.

EV MODEL

The EV model calculates charging demand from a growing number of electric vehicles. There are separate calculations for light-duty vehicle charging among San Francisco residents, light-duty vehicle charging from commuters traveling to San Francisco, medium-duty vehicles, and heavy-duty vehicles. Energy demand is calculated by forecasting the number of plug-in electric vehicles (PEVs) on the road based on the existing stock of PEVs, the percentage of future car sales that are PEV, and the vehicle survival rates. This stock is multiplied by the average numbers of miles traveled each year and by factors that represent the average electric demand per mile by vehicle type.

INTEGRATION

Several adjustments were necessary to calibrate the electrification model for CleanPowerSF. First, forecasters removed the portion of demand that had occurred prior to 2025 since this was already included in the baseline forecast. Second, they mapped the annual energy demand forecasts from each of the model subcomponents to CleanPowerSF's ten major rate classes and to an hourly load shape. This enabled forecasters to integrate the electrification forecast with the baseline forecast and calculate peak demand impacts from new electrification activity.

Building electrification demand was assumed to follow the existing CleanPowerSF load shape (from the baseline model). Demand from light-duty vehicles was mapped to an hourly profile that represented the average weekly shape for at home charging. Demand from heavy-duty vehicles was adopted from a custom load shape provided by Siemens and ranges from 1.8 percent to 9.1 percent.

Third, forecasters scaled total electrification demand to include only the fraction that is served by CleanPowerSF. Since the model estimates energy

[4] Available at: https://data.sfgov.org/Energy-and-Environment/Existing-Buildings-Benchmark-Reports/4ua7-5sfx/about_data. Accessed June 10, 2025.

demand for the entire County of San Francisco, the portion of demand served by other load serving entities was removed. This adjustment was based on gas demand data from PG&E's 2024 Item 16 Report and San Francisco building benchmark data and was calculated separately for residential and non-residential customers. CleanPowerSF serves about 80 percent of gas demand in San Francisco.