

## **4. Demand Forecast Methods and Models**

### **Demand Forecast Methodology**

For most years, the City of Anaheim, Public Utilities Department (City of Anaheim), uses linear regression modeling to forecast peak load, total system energy consumption, and total energy consumption by customer class. Using monthly observation, four econometric models are developed to create a 20-year monthly forecast for peak load, total system energy, commercial consumption, and residential consumption. For FY 2011/2012, all retail class forecasts, total demand forecast and peak forecasts were created using actual data. Given the current economic conditions, the econometric forecast were failing and not accurately portraying recessions. As actual data poured and poorly compared to the previous econometric forecasts, Anaheim decided to use actual data to forecast for FY 2011.

### **Demand Forecast Methodology- Energy Efficiency and Demand-Side Measures**

At this time, the City of Anaheim does not have a separate forecast for energy efficiency (EE) and other demand-side measures; rather, they are embedded in the data used to determine the base load energy forecast. EE and other demand-side measures are absorbed in the actual numbers we use as constants for our forecast of Peak demand, total system energy, and customer class consumption. For example, total savings for fiscal year ending June 2007 realized a total of 3.153 MW peak demand reduction as a result of energy efficiency and demand response programs. A total energy savings of 8,241 MWh (or 8.2 GWh) were realized as a result of energy efficiency and demand-side measures. Our peak for this period was 593 MW in July 2006. Our total energy as measured at Lewis substation was 2,687 GWh. If these programs were not in place, the resulting load for fiscal year 2007 would have been 2,695.2 with a peak load of 596 MW. In using the actual numbers as the constant, Anaheim creates the forecast using other variables (economic performance, population, seasonal variation) that impact the constants (which are the monthly actual data for consumption).

The nominal amount of EE and other demand-side measures (which is currently below 1% of total energy consumption) is hard to forecast separately, as significant reductions have only occurred in the past few years. As the City of Anaheim moves forward with its energy efficiency and demand-side measures, a better method of calculating future improvements will have to be created. At this time, more data is needed to forecast the reduction in consumption caused by EE and demand-side measures.

Anaheim uses historic energy usage by customer class in its forecast for future energy consumption. The historic energy usage reflects all energy efficiency programs that were

implemented over the course of the last 10 years (with the most significant reductions occurring in the past few years). The historic usage data includes the cumulative impacts of all Anaheim's conservation programs, energy efficiency products (LED lights, CFL light bulb installation), and energy efficiency programs. Anaheim's energy load growth is thereby impacted by the EE and demand-side programs the City provides, specifically conservation and energy efficiency programs. The past actual energy demand mega-watt hours are mitigated by a negative energy demand as a result of these programs.

## **I. System Forecast**

Monthly peak demand is estimated using 10 years of actual data, adjusted for weather temperatures and recent actual demand. Econometric forecasting was not accurate in capturing current economic conditions and the City decided to move from econometric forecasting, until the economy approves.

Monthly total system energy consumption is estimated using an average of the last two years of actual data for all months, beside July, August and September. These months are derived from using the average from the last three years of actual data. All of this data is adjusted to accommodate load additions and subtractions, as well as losses.

## **II. Customer Class Forecast**

### **a. Industrial Consumption**

Due to poor past performance with the Eviews forecast and anticipated demand reductions, Anaheim used an average of the last two years of actual consumption for FY 2011 (adjusted for planned peak additions and reductions) for the long term forecasts. The statistical results from Eviews and the past poor results were significantly off from actual consumption, resulting in the new forecast outside of Eviews. The data for Industrial Class has been adjusted accounting for a redistribution of rate classes, which caused 400 Industrial Customers to be moved to Commercial. The movement began in October 2009.

### **b. Disney Consumption (formerly "resort" consumption)**

Due to poor past performance and long term results that indicate unreasonable growth rates, Disney energy consumption is estimated using an average of the last three years of actual data (adjusted for planned peak additions and reductions)

### **c. Commercial Consumption**

Due to poor past performance with the Eviews forecast and anticipated demand reductions, Anaheim used an average of the last two years of actual consumption for FY 2011 (adjusted for planned peak additions and reductions) for the long term forecasts. The statistical results from Eviews and the past poor results were significantly off from

actual consumption, resulting in the new forecast outside of Eviews. The data for the Commercial Class has been adjusted accounting for a redistribution of rate classes, which caused 400 Industrial Customer to be moved to Commercial. The movement began in October 2009.

#### **d. Residential Consumption**

Due to poor past performance with the Eviews forecast and anticipated demand reductions, Anaheim used an average of the last six years of actual consumption, adjusted for growth rate. The forecast for FY 2011 was adjusted for planned peak additions and reductions. The statistical results from Eviews and the past poor results were significantly off from actual consumption, resulting in the new forecast outside of Eviews.

#### **e. Other Consumption**

Due to poor past performance and the insignificant results produced by our preferred econometric equation, other consumption is estimated using the average monthly results for the previous two years, adjusted for planned peak additions and reductions. This method is appropriate for this class as no other growth is anticipated at this time. Rate schedules included in this customer class are Lighting Street and Highway-1, Lighting Street and Highway-2, Lighting Street and Highway-3, Lighting Outdoor Area, and Power - Agricultural. This class includes street and highway lighting service installed during underground conversion of electric facilities where the customer is responsible for maintaining the street lighting equipment. This class includes street and highway lighting where a customer owns and maintains street lighting equipment. Also included, are outdoor area lighting service, other than street and highway lighting service, supplied from overhead lines where the Utility owns and maintains the area lighting equipment. And finally, power service for general agricultural purposes, or for general water or sewerage pumping, are also included.