

## AURORA<sup>®</sup>xmp<sup>®</sup> ELECTRIC MARKET MODEL

This section describes the AURORA<sup>®</sup>xmp<sup>®</sup> (AURORA<sup>®</sup>) software that City Light used to analyze the candidate resource portfolios. AURORA<sup>®</sup>, offered by EPIS,LLC, was initially released in 1997. It continues to be used by many utilities, resource planners, and regulatory agencies for long-term planning.

The AURORA<sup>®</sup> model contains a database that includes the characteristics of load centers, generating resources and transmission networks throughout the West. The model simulates the operation of the market for electric power on the western grid. It provides aggregated data for the load centers (referred to as zones) in the system. The zones City Light used to model the system are shown in Figure 1.

The model forecasts electricity prices for each zone within the Western Electricity Coordinating Council (WECC) region, taking into account transmission costs and constraints that are a source of differences in wholesale electricity prices from one part of the region to another.

AURORA<sup>®</sup>'s extensive database of the North American power market is updated regularly by the developer. The type of information in the database includes generating resources with their retirement dates and constraints on generation capability, transmission capacities, pollutant emission rates, and reserve requirements. The database also contains forecasts of certain parameters, such as natural gas prices and other fuel types.

In addition to these data provided by EPIS, City Light reviews and enhances the database based off of additional data sources and internal analysis.

AURORA<sup>®</sup> forecasts new generating capacity additions using a proprietary optimization algorithm that identifies when and where capacity is needed. It then selects new resources based on which resource is the lowest cost. This cost includes environmental costs.

The model draws on its database to simulate the electric power market using economic dispatch logic. The model stipulates that the resources with the lowest marginal cost will be dispatched first. AURORA<sup>®</sup> forecasts future hourly demand at each load center, then applies its algorithms in order to economically dispatch resources to meet demand in every hour at every load center, subject to transmission availability. The result is an hourly local market clearing price equal to the marginal cost of the last resource dispatched.

Figure 1: AURORA® Model System Diagram

