

PacifiCorp's Underlying Load Forecast Assumptions for ATC Calculations

The load forecast was developed by forecasting the annual sales by customer class for each jurisdiction. The residential and commercial sales forecasts by jurisdiction are developed by end-use forecasting techniques using the Electric Power Research Institute's (EPRI) models the Residential End-use Energy Programming System (REEPS) model and the Commercial End-Use (COMMEND) model, respectively. The industrial sales forecast is developed for each jurisdiction using an econometric model. The sales forecast was increased by losses implementing a different loss factor for each state to arrive at an annual load or energy forecast for each state. An hourly load forecast for each jurisdiction is derived from the annual load forecast based on an hourly load regression model. The monthly forecasts are derived from this hourly forecast.

The REEPS model develops forecasts for the following customer end-uses: heating, cooling, water heating, ventilation, lighting, cooking, clothes washing, dish washing, drying, television, microwaves, refrigeration and miscellaneous in the residential customer class. Each of these end-uses is projected for three housing types: single family, multi-family, and mobile homes. The summation of projected annual sales for these end-uses across a single housing type produces the annual sales forecast for that housing type. The sum of the forecasts across the three housing types produces the total residential sales forecast. The drivers for these end-use sales are the saturation rates of these end-uses, annual energy usage for these end-uses, and the number of residential customers in the jurisdiction. To project the saturation rates and annual energy usage for each end use the primary drivers are real personal income for the region and the real prices of electricity. The source of the historical saturation rates is from PacifiCorp's Energy Decision's Residential Survey which is conducted every other year. The source of the annual usage by end-use is based on conditional demand analysis based on information from these surveys and the respondent's monthly electricity usage. The annual energy estimates from this analysis were compared to values from ITRON and the Energy Information Administration (EIA) for the Mountain and Pacific Census Regions for validity. The forecast of personal income and electricity prices is from Global Insights, Inc. The residential customer forecast is based on the Global Insights, Inc. forecast for the number of households within the relevant region in the PacifiCorp service territory.

The COMMEND model develops forecasts for the following customer end-uses: heating, cooling, ventilation, lighting, cooking, water heating, refrigeration, office equipment, and miscellaneous equipment in the commercial customer class. Each of these end-uses is projected for several building types: offices, restaurants, food stores, other retail stores, etc. The summation of projected annual sales for these end-uses across a single building type produces the annual sales forecast for that building

type. The sum of the forecasts across the building types produces the total commercial sales forecast. The drivers for these end-use sales are the saturation rates of these end-uses on a square foot basis, annual energy usage for these end-uses, and the square feet of the building type in the jurisdiction. To project the saturation rates and annual energy usage for each end use the primary drivers are employment by building type. The source of the historical saturation rates is from PacifiCorp's Energy Decision's Commercial Survey which is conducted every other year. The source of the annual usage by end-use is based on conditional demand analysis based on information from these surveys and the respondent's monthly electricity usage. The annual energy estimates from this analysis were compared to values from ITRON and the Energy Information Administration (EIA) for the Mountain and Pacific Census Regions for validity. The forecast of employment by building type is from Global Insights, Inc.

The industrial econometric model estimation technique is ordinary least squares by major Standard Industrial Classification (SIC) code within the jurisdiction. The drivers of these forecasts are the state's industrial production index or the region's employment by SIC codes, the industrial price of electricity, and the industrial price of natural gas provided these variables are statistically significant. The forecasts of the production index, employment, and prices are from Global Insights, Inc.

The estimation techniques for the hourly load model by jurisdiction are non-linear least squares, stepwise ordinary least squares, and ordinary least squares. The purpose of the model is to produce hourly load shapes by jurisdiction. To produce these shapes the estimation has three steps corresponding to the three estimation procedures. The first step is to employ a technique known as multivariate adaptive regression splines using the statistical software package B34S. This technique identifies temperature "break-points" in the relationship between load and temperature. These "break-points" identify the temperature values where the temperature slope changes in the load equation. These "break-point" values produce the base temperature for heating and cooling degree day variables. After these different heating and cooling degree day variables are determined, a stepwise ordinary least squares estimation is performed for each jurisdiction. This stepwise estimation includes these heating and cooling degree day variables, humidity, day of the week variables, month of the year variables, hour of the day variables, week of the year variables, holiday variables, and seasonal variables. Some of these variables are considered as interaction variables, e.g., hour of the day multiplied by day of the week, as well as individual variables. The stepwise technique will choose the statistically significant variables to be included in the model. The final estimation will be ordinary least squares of the statistically significant variables provided they have the appropriate sign. The stepwise technique and the ordinary least squares estimation are produced using the statistical software package SAS. To produce the projected load shape, the 30-year normal heating and cooling degree-days are used in the equation. Each hourly demand value is a direct result of this hourly load shaping model.

