2007 Demand & Energy Requirements Methodology

The demand and energy requirements forecast is an input into the analysis and creation of forecasts for losses, operating reserves, generator outputs, and exports / imports. The AESO regularly reviews its assumptions, data sources, and methodology to improve its forecast quality while ensuring its approaches are consistent with industry practices.

In the electric industry, there are several available methodologies to estimate future demand and energy requirements. The more common approaches include econometric top-down modeling, system-wide customer segment projections, and bottom-up 'regional' approaches.

In the fall of 2003, the AESO reviewed its demand and energy requirements forecast needs and identified a critical need for much greater detailed forecast. Specifically, the AESO's planners require detailed forecasts at the Metering Point Identifier ("MP_ID") load level. To meet these needs, the AESO introduced a new MP_ID forecasting methodology to replace its previous allocation approach. Figure 1 provides a high level overview of the AESO approach to create a future demand and energy requirements outlook. The following describes the process.

Process Description:

1. The forecast process begins with analysis of historical load and customer consumption characteristics to identify drivers the AESO can use to estimate future electrical needs. For each customer segment, the future needs forecast is a function of variables related to electrical consumption in that sector (economic or demographic variables). This analysis identifies relationships between customer segment electrical consumption and demographic or economic variables. For example, residential consumption is a function of the number of households (population and average persons per household) and average use per household dwelling.

2. As previously outlined, the AESO develops an economic outlook including forecasts for economic and demographic variables that materially impact electrical consumption in Alberta. The estimate of future energy requirements by customer segment is a product of the economic outlook and the customer segment models.

3. The AESO uses the customer segment growth rates to develop 'geographical area' forecasts. The methodology uses the segment growth rates and customer characteristics in each geographical area to create a forecast for each Metering Point Identifier ("MP_ID") load in Alberta. This results in a twenty-year energy requirements outlook for almost 500 MP_ID load points. The forecast includes any new, incremental industrial loads identified in a particular area (based on available information regarding size and timing).

4. The AESO derives a unique 'typical' load shape for each MP_ID load in Alberta. This involves detailed analysis of the historical hourly load profiles for each point and results in an 8760 hour 'typical' load shape for each MP_ID.

5. The AESO applies the specific future MP_ID energy requirements estimate by year to the 'typical' load shape. The result is an 8760 hourly load profile for each year and each MP_ID until 2024. These shapes are critical elements to support technical planning and analysis. Since the AESO uses actual hourly data to create the typical load shapes, they represent more 'realistic' demand profiles with the inherent high load and low load days - not flat average values or a typical weekday and weekend approach.

6. The summation of the MP_ID forecasts plus loss estimates (provided by the AESO's planning area) yields the aggregate Alberta Interconnected Electric System (AIES) forecast. This forecast represents the net load on the Alberta grid system. As a 'reasonableness' check, there is a comparison of the aggregated MP_ID plus losses forecast to a system level 'test' forecast.

7. To forecast Alberta Internal Load (AIL), the AESO estimates 'behind the fence' load using typical operating characteristics of each self-served generation (and related load) based on actual historical data. The total Alberta demand outlook is the sum of the future Alberta Interconnected Electiric System outlook and the future 'behind the fence' outlook. This represents the total demand in the Province without regard for how the load is served.

8. Weather is an important function in electrical consumption. The outlook contains an explicit relationship between load and weather conditions. The accuracy of weather forecasts is good in the short-term (i.e. up to five days), but no accurate long-term weather forecast is available. The AESO assumes weather conditions around the peak hours are similar to those present during previous 'peak conditions'. For example, the forecast assumes colder than average weather during winter peak periods and warmer than average conditions during summer peak periods. This is accomplished through the creation of 'typical' load shapes which better represent actual consumption patterns than would an average shape.

Figure 1: Methodology Flow Diagram