Study of demand and supply in the selected states in northern region

[Sponsor: Jaiprakash Hydro-Power Limited and ICICI]

Executive summary

Objective

The objective of the study was to arrive at a detailed and realistic assessment of demand and supply scenario in Delhi, Haryana, Punjab, Rajasthan, and Uttar Pradesh, which buy surplus power from the HPSEB (Himachal Pradesh State Electricity Board). This would help Jaiprakash Industries Ltd, developer of the 300 MW (megawatt) Baspa Stage-II hydro power station in Himachal Pradesh, in assessing the potential and scope for selling power by HPSEB in the future. The study also attempted to assess the price competitiveness of Baspa power with other possible options of power purchase available with the selected states.

Demand forecasting

All the energy requirement projections obtained from the EPS (Electric Power Survey) were adjusted with respect to the projections made by the latest available survey, that is, the 16th EPS. This correction ratio was calculated for all the years for which there was an overlap of projections between the 15th and 16th EPS; the average correction ratio (K1) thus obtained was used to correct the projections of the 15th EPS. The projections of the 14th EPS were corrected in two steps. In the first step, the 14th EPS was corrected with respect to 15th EPS in the same manner as described above to obtain the average correction ratio (K2) and in the second step, these were further adjusted with respect to the 16th EPS by multiplying them by K1. A similar exercise was carried out for the 13th EPS projections. The next step was to estimate the correction factors. These were estimated by taking the ratio of the actual energy requirement to the adjusted projections. This was done for all the years from 1991/92 to 2002/03. A time series of correction factors was obtained, which was forecasted using the ARIMA (autoregressive integrated moving average) method popularly known as the Box-Jenkins approach to economic modelling and forecasting. The energy requirement projections of the 16th EPS were thus corrected using the forecasted correction factors obtained using ARMA methodology. In order to capture the effect of reforms on the energy requirement in different states, reforms were treated as a qualitative variable and a dummy variable was used to quantify the effect of reforms on the energy requirement. The dummy test was performed for each state for the year when the State Electricity Regulatory Commission was set up in the

state. Seasonal variations in the energy requirement were also forecasted for each state using the monthly data for past years.

Supply forecasting

The installed capacity was estimated by considering the existing projects and projects likely to be commissioned during the study period, that is, up to 2007/08. Discussions were held with concerned authorities in the respective state and the CEA (Central Electricity Authority) to determine the possibility of commissioning of the new plants as per schedule, taking into account the latest physical progress of the projects under execution. As the second step, the PLF (plant load factor) of thermal plants was estimated. For the existing thermal plants, energy availability was worked out based on the analysis of the past PLF trend (plant-wise). For new plants and plants under construction, norms specified by the CEA were considered to estimate the available energy, taking into account the stabilization period. In order to arrive at the energy availability from existing thermal plants, the plant-wise PLF was taken on judgmental basis based on the past trends of PLF of each individual plant.

The availability from existing plants as well as from the future plants, taking into account the share of the respective states from the central sector stations and unallocated share, was also considered along with the trading arrangements with other states. For the hydro plants, available energy was arrived at by taking into account the design energy of the project for a 90% dependable year. The net energy available was computed after considering the auxiliary consumption as per the CEA norms. The peak demand availability was computed considering the relationship between energy availability and peak demand availability for the state.

The state-wise, year-wise energy and peak surplus/deficit and aggregate figures for the study period were estimated. The adequacy of the inter-state transmission system in view of expected power flows in future was also studied. The price competitiveness of Baspa power vis-à-vis other available options with the selected states was also studied. This was based primarily on data on power purchase costs obtained from the tariff orders issued by the respective regulatory commissions.