ABSTRACT

Various demand and supply estimates for energy are available. They differ in magnitude but confirm the same trend and pattern. In the developing countries, not only will the energy consumption increase substantially in the next decades, it will also tend to outpace the supply at a faster rate. The Indian energy scenario presents the same features, as both the energy-intensity of economic activities and the standard of living in this country are relatively low.

The relative endowment of fossil fuels in India is more critically favourable to coal as compared to oil. In terms of technological advances in respect of nuclear and non-conventional resources of energy India's prospect are not as bright as in advanced countries. All this means that we have to be more dependent on coal for supply of energy. The extent to which coal will be able to play this critical role in India's economic development will depend as much on the expansion of coal production as on adequate arrangements for transportation, distribution and processing of coal.

In this thesis an attempt has been made to build an overall framework, under which the planning for Coal Sector can be carried out.

To begin with, the overall demand assessment of the consuming sectors for the inter-industry uses and the final consumption demand, considering alternative growth scenarios in the economy, have been looked into.

The supply of coal in future will materialise mainly from the new exploitation of potential reserve blocks in the coalfields where capacity additions will be possible; and from the declining share of the existing mines over the planning horizon. The cost of new capacity creation will depend on the specific geo-mining conditions of a reserve block and the use of feasible technological options. In the second step, therefore, this study estimates the availability of coal from the existing sources over the planning horizons and from the identified potential reserve blocks that can be exploited with present level of technological competence.

The long-run cost of production for future mines, will depend primarily on the geo-mining characteristics of the reserve blocks. These variables, in turn will determine the feasible technological options, quantum of investment requirement, capacity limit, recovery factor and gestation lag. Therefore, long-term economic cost of production has been arrived at, after considering the above influencing factors in the third step.

A comprehensive data base is mandatory for carrying out such analysis. Therefore, from primary and secondary sources, relevant data structures have been compiled. These structure are consistent with Indian coal sector with respect to geo-mining characteristics of the reserve blocks and existing technological options.

In order to optimise the investment/output mix, the critical long-run economic cost components involving production, beneficiation and transportation of coal to the consuming sectors are considered in the next step to find an optimal linkage with coalfields to the consumers. Linear programming models have been designed and solved for Power and Steel sectors with the objective of minimising the overall long-run delivered cost of coal in the economy by satisfying quantitative demand of these sectors. The models also take care of the qualitative dimensions of demand, which is not being fulfilled to the satisfaction of the consuming sectors at present.

From the solutions, an optimal selection of new capacities in the coalfields with appropriate technological option, timing and quantum of investment requirement, productivity and return on investment can be estimated.

As an indicative study, the linkage results of above analyses have been subjected to a hierarchical programming model assigning different priorities which may be present in an economic planning. The results of this model may be helpful in decision making when conflicting goals of planning are confronted.

The planning model attempted here is inter-temporal in nature and the same procedures can be extended to next plan period with relevant data structure. This study can be supplemented with a study on exploration strategy for coal resources. The scope of the dissertation can be extended by considering inter-fuel substitution possibilities among the consuming sectors.