

## SECTION – 9

### CONCLUSIONS AND RECOMMENDATIONS

- 9.1** The data on operation of large number of hydro plants located in India and abroad, some Power Purchase Agreements for the development of hydro power stations in Private Sector in India and other countries, information collected during visit to some plants and the provisions made in the GOI notifications dt 31.3.92 (as ammended upto 6.11.95) have been analysed to (i) establish best industry practice of Operational Cost Norms of hydro power; and (ii) for formulation of Operational Cost Norms which would promote efficiency and economy in the operation of the plants.
- 9.2** The Design Energy is one of the key operational parameters used in determining tariff for sale of hydro power. This is also an important parameter is determining techno-economic viability of a new projects. Due care therefore is taken and all possible checks are made to ensure its correctness. Design Energy is indicated in the Techno-Economic Clearance issued by the Authority. It is considered advisable that the Design may be reviewed by the Authority on completion of the project to consider additional hydrological data which would have become available and latest status of consumptive use of water upstream of the project.
- 9.3** The data on Auxiliary consumption and Transformation losses vary very widely from station to station. The analysis of data on Auxiliary consumption, and computation of excitation requirements and transformation losses leads to the conclusion that for surface stations with rotating exciters mounted on the shaft of generator, the Auxiliary consumption should be considered as 0.2% of energy

generated. For surface stations with static excitation equipment it shall be 0.5% of energy generated. The Auxiliary consumption for underground power stations is higher due to additional Air conditioning/dewatering load and should therefore be considered as 0.4% in stations with rotating exciters and 0.7% for stations with static excitation equipment.

**9.4** The analysis of data on Availability for all the plants in India, indicate that normative Availability of 85% presently notified for payment of fixed charges is in order. The formula for calculating Availability given in the notification need minor modifications. Necessary corrections would need to be introduced in the formula to reflect influence of head for power generation, operation of units under over load etc.

**9.5** The average value of O&M expenditure based on the data of 29 plants works out to 1.36% of the capital cost. The expenditure in insuring the assets against fire, flood and earthquake is likely to be 1.11% of the capital cost. This total O&M expenses thus work out to 1.47% of capital cost which is very near to the value of 1.5% already notified. The provision of annual O&M cost at 1.5% of capital expenditure in the first year of commercial operation should therefore be retained. The O&M expenses for the subsequent years should be calculated using the escalation formula specified. The expenses on security of plants located in sensitive areas will to have to be considered by CERC separately on case to case basis.

**9.6** The existing provisions regarding Deemed Generations are found to be generally in order. Some explanations however need to be added.

**9.7** For incentive purpose, the Availability should be determined on the peaking hours in non-monsoon months and 24 hours basis in monsoon months in case of plants designed for peaking purposes. For run of river type schemes without storage, the basis of determining Availability for incentive purpose should be on 24 hours basis for monsoon months only.

The incentive on Availability should be admissible on attaining Availability more than 85% instead of 90% as notified. To reduce the quantum of incentive, the rate of incentive could be graded.

**9.8** The hydro plants may some times be called upon to provide Reactive power by sacrificing the generation of active power (kWh). CERC could initiate studies to determine appropriate price for Reactive power.

**9.9** The analysis of data available on annual consumption of spares and stores and annual O&M expenses reveals that value of spares and stores to be consumed can be considered about 6% of annual O&M expenditure.

**9.10** The detailed recommendations on each of the Norms are indicated in the respective section. The recommendations are generally applicable for Medium and Large hydro plants.