

CHAPTER - 9

Conclusion and Recommendations

9.1 Conclusion

One of the major objectives of formation of PGCIL was to bring about integrated operation of the regional transmission systems by undertaking construction of inter-regional links. This was to facilitate the growth of economic exchange of power (replacing costly energy transactions within a region with cheaper ones from another region to reduce the cost of power) which would ultimately lead to formation of a 'National grid' and ensure better utilisation of available generation resources. The process of integration of regional grids was progressively taken up from 1990s and with the synchronisation of Southern Grid with the rest of the grid on 31 December 2013, the entire Indian power transmission grid is now being operated at the same frequency and load generation balance is achieved at a national level, completing the technical process of formation of 'National Grid'. However, when viewed in terms of congestion scenario and low level of inter-regional power transfer capability, the objective of formation of 'National Grid' remains to be fully achieved.

Power exchange data showed that percentage of time congestion occurred above 75 per cent increased from two months in 2010-11 to all the 12 months in 2012-13. Similarly, volume of electricity that could not be cleared due to congestion (as a percentage of the actually cleared volume), went above 75 per cent for 3 months in 2011-12 and increased to five months in 2012-13. Impact of congestion was visible in large variations in the electricity prices over the regions. Comparison of Market Clearing Prices (price for cleared transactions in the whole country, if there is no congestion at all) with the Area Clearing Prices¹¹¹ in Indian Energy Exchange showed that buyers in S1 and S2 bid areas (States of Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Goa and Union Territory of Pondicherry) paid higher prices during 2011-13 (₹ 5.1 to 7.3 per unit as against Market Clearing Price of ₹3.5 per unit) to procure power. On the other hand, sellers in W3, E1 and E2 bid areas (Chhattisgarh, Orissa, West Bengal, Sikkim, Bihar and Jharkhand) received lower prices (₹ 2.8-2.9 per unit as against Market Clearing Price of ₹ 3.5 per unit) due to transmission constraints. Thus, there remains a need for strengthening WR-SR and ER-SR links (W3, E1, E2 to S1 and S2 *i.e.* generation surplus to power deficient states) to fully achieve the benefits of a 'National grid'.

XI Plan (2007-2012) noted that planning and operation of the transmission system had shifted from the regional level to the national level necessitating the need for a strong all-India grid. Towards this end, XI Plan stipulated target of inter-regional transfer capacity of 17000 MW. Against the XI Plan target of 17000 MW, PGCIL achieved 13900 MW of inter-regional capacity leaving a shortfall of 3100 MW in achievement. While shortfall to the extent of 1000 MW was due to annulment of one of the projects, the remaining shortfall of 2100 MW was

¹¹¹ *In case of congestion across a transmission corridor, the cleared prices in different areas i.e. Area Clearing Prices (ACP) are adjusted so that the flow of power across transmission corridor is same as available transfer capability.*

due to controllable factors like delay in submission of proposal for forest clearance and land acquisition issues. MOU targets for PGCIL for 2007-12 were fixed at 10100 MW which fell short of XI plan target by 6900 MW (17000 MW minus 10100 MW). In two years (2007-08 and 2010-11) MOU targets were fixed at 'Nil'.

Capacity augmentation in inter-regional corridors was assessed by PGCIL based on addition of physical capacity of individual lines connecting two regions without taking into account its total power transfer capability (TTC). Cumulative transmission capacity at the end of XI Plan arrived at by adding physical capacity of all inter-regional lines was 25050 MW against which the cumulative transfer capability was only 11530 MW. In fact, inter-regional TTC showed a decline from 12280 MW in 2010-11 to 11530 MW in 2011-12. TTC of a corridor, *i.e.* the ability of a transmission corridor to move power from one region to another, is often less than the physical transmission capacity due to system limitations. Thus, for better appreciation of ability of transmission network to transfer power across regions it is necessary that TTC is also declared and disclosed alongwith transmission capacity.

Import of power by NR is mainly through WR-NR and WR-ER-NR corridors. Import by NR is dependent on the transfer capability of 'short-tie' of WR-NR rather than that of the 'long tie' of WR-ER-NR. However, bulk of the inter-regional augmentation (63 *per cent* of total inter-regional transmission capacity of 25050 MW (cumulative at the end of XI Plan) was concentrated along the long-tie. Hence, high level of augmentation of the longer tie *i.e.* ER-NR, ER-WR and NR-ER-WR would not yield desired results for transmission of increased power to the NR as the short tie *i.e.* WR-NR is not adequately augmented.

PGCIL has not put in place a mechanism for assessing utilisation of transmission lines with the result that there were pockets of congestion, as well as areas of redundancy. As an illustration, in Odisha region, there was congestion in the transmission network due to interim 'Loop in Loop out' arrangements made for evacuation of power from Independent power producers without ensuring adequacy of the transmission system. On the other hand, out of 22 high voltage 765 kV lines, six lines remained undercharged at 400 kV for more than 5 years out of which two lines remained undercharged for more than 13 years. During 2011-12, average utilisation of 33 out of 40 inter-regional lines ranged between 0 to 30 *per cent* in all inter-regional corridors except WR-SR and ER-SR. In case of intra-regional lines, 478 (68 *per cent*) out of 706 lines in five regions had average utilisation of 0-30 *per cent* only.

The Country faced a severe Grid disturbance (GD) on 30 and 31 July 2012 which resulted in 757 million units of energy not being served (compared to total generation of 2400 million units per day) to users. The proximate cause for the major GD of 30 July 2012 (involving NR) and 31 July 2012 (involving Northern, Eastern and North-Eastern Regions) was ill-timed shut down of the trunk line (400 kV Bina - Gwalior-Agra) between WR and NR for four days (26 to

29 July 2012) in peak season due to construction work. While the shutdown initially planned for four days got extended due to non-completion of work, TTC on WR-NR corridor that was curtailed from 2400 MW to 2000 MW during initially planned shutdown was not restricted to 2000 MW by NLDC in the extended shutdown though the system had faced a near miss situation on 29 July 2012. TTC was not reviewed on WR-NR corridor on 30 July 2012 which led to scheduling of power by RLDCs beyond the capacity of system. Over scheduling coupled with over-drawals by NR SPUs and under-drawals/over-injection by WR SPUs overloaded the system beyond control, which ultimately led to ‘cascade tripping’ of alternate paths. WRLDC did not instruct WR generators to back down power generation and did not convey proper instructions to SPUs to reduce under drawal of power, which was a major cause for GD. SPUs in NR and WR did not comply with RLDCs’ instructions which contributed to over-loading of lines.

Systemic issues such as absence of early warning mechanism by way of declaration of emergency status, fragile interconnection of NR with connecting regions due to skewed *inter-se* distribution of power flow among the links, heavy volume of Unscheduled Interchange (UI) flows due to commercial consideration, demand-supply gap and inter-play between UI and congestion mitigation measures contributed to GD in July 2012.

Works and Procurement Policy of PGCIL limits the exercise of detailed survey of transmission line route only to forest stretches, contrary to advice of Working Group on power for XI Plan constituted by Planning Commission, which suggested that detailed survey should be carried out before start of procurement process. 179 contracts (42 *per cent*) were finalized within the prescribed time frame of 20/28 weeks while 245 contracts (58 *per cent*) were finalized beyond the prescribed time frame. Thus, contracts could not be finalised within the stipulated time frame in majority of the cases. Delay in award was due to delayed funding tie up with World Bank (in case of ERSS-I¹¹², East-West Transmission Corridor and WRSS-II¹¹³ projects), and excessive time taken by PGCIL in contract finalisation.

Out of 20 projects selected for Audit, only one was completed within scheduled time and delay was above 20 months in nine projects. Time taken in acquisition of land, handing over site and providing approved drawings to contractors, release of advance to contractors and forest clearance had contributed to delays which were possible to have been controlled by PGCIL, with more effective planning and monitoring.

PGCIL also lost the opportunity of earning ₹350.28 crore during the project life towards additional return on equity, which could have been earned in terms of CERC Regulations, for commissioning of projects within the prescribed timeline in case of projects approved after 1 April 2009.

¹¹² Eastern Region System Strengthening Scheme-I

¹¹³ Western Region System Strengthening Scheme-II

Monitoring mechanism for implementation of transmission projects, though in place, needed further strengthening as the project review meetings were not held as per the prescribed frequency of once in two months. Against 30 meetings required to be held during 2007-12, meetings ranging between three and twelve were held in various regions. Minutes of the pre award meetings as well as follow up action on the decisions taken in the previous meetings were not recorded.

Between 2004-05 and 2012-13, PGCIL received ₹906.49 crore as part of STOA charges that were required to be used for building new transmission systems as per regulations and orders of CERC. However, PGCIL did not maintain project-wise details of transmission schemes where these STOA charges were utilised with the result that new transmission systems/schemes were deprived of reduction of capital cost.

9.2 Recommendations


Based on the audit findings discussed in the foregoing chapters, the following recommendations are made to facilitate improvement in the planning, implementation of transmission projects and management of Grid:-

- (i) CEA and PGCIL may enhance capacity of interregional corridors appropriately based on analysis of data regarding power transfer requirements between regions to fully achieve the objective of formation of 'National Grid'.
- (ii) PGCIL may disclose and monitor the key parameter of TTC in the long and medium term as per CERC regulations and for better appreciation of the transfer capability of the system.
- (iii) MOP may evolve norms for assessing efficiency of transmission network and loss reduction in accordance with the tariff policy.
- (iv) POSOCO may study the possibility of developing a system for offering un-requisitioned inter-regional transfer capability to needy users and consider making a proposal in this regard before CERC.
- (v) To expedite project execution, PGCIL may initiate advance action to conduct detailed survey of forest stretches and submit forest clearance proposals before investment approval of the project.
- (vi) Since long shut down to carry out construction work was the starting point for two major GDs, POSOCO may stipulate tolerance limits for antecedent line loadings and 'no-go' periods for key corridors for allowing long shut downs to prevent GDs. POSOCO may also consider taking up with CERC an appropriate warning system that specifies responsibility centres that would be tasked with informing constituents about state of emergency of the system.

- (vii) In order to improve diligence in declaring TTC and scheduling power, POSOCO may critically review the existing practices in this regard to ensure secure grid operation.

MOP was generally in agreement with the audit recommendations.

New Delhi
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