

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**Explanatory Memorandum**

The terms and conditions for determination of tariff for the period 1.4.2004 to 31.3.2009 have been notified in terms of the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2004 (hereinafter referred to as 'the 2004 regulations').

2. Sub-clause (i) of Clause (3) of Regulation 5 of the 2004 regulations enables the generating company and the transmission licensees to make application for approval of provisional tariff as per Appendix I to these regulations. It has been represented by Central Power Sector Utilities that submission of Forms 5B and 5C of Appendix I causes delay in making application for approval of provisional tariff. They have, therefore, been representing that the requirement for filing Forms 5B and 5C should be dispensed with at the stage of making application for approval of provisional tariff. The matter has been considered. It is being provided that Forms 5B and 5C need not be filed while making application for approval of provisional tariff. Accordingly, a proviso to sub-clause (i) of Clause (3) of Regulation 5 of the 2004 regulations is proposed to be provided as under:

“Provided that while making the application for determination of provisional tariff, it shall not be necessary to file the details as specified under Forms 5B and 5C of the tariff filing forms, as applicable.”

3. Clause (xv) of Regulation 14 and clause (xv) of Regulation 31 of the 2004 regulations define 'Infirm power' as the electricity generated prior to commercial operation of a generating unit, for thermal and hydro power generating stations respectively. It, therefore, includes energy supplied to the grid by a generating unit during its trial operation period between first synchronization and declaration of commercial operation.

4. Regulation 19 (applicable to thermal generating stations) and Regulation 35 (applicable to hydro generating stations) of the 2004 regulations are reproduced below:-

“19. Sale of Infirm Power: Any revenue (other than the recovery of fuel cost) earned by the generating company from sale of infirm power, shall be taken as reduction in capital cost and shall not be treated as revenue.”

“35. Sale of Infirm Power: Any revenue earned by the generating company from sale of infirm power, shall be taken as reduction in capital cost and shall not be treated as revenue. The rate for infirm power shall be same as the primary energy rate of the generating station.”

5. It would be seen from the above that no criteria has been specified for the rate at which infirm power has to be sold in case of thermal stations, whereas in case of hydro stations it is specified that the rate for infirm power shall be same as the primary energy rate of the generating station. In both cases, the revenue earned by the generating company from sale of infirm power has to be considered for reduction in capital cost.

6. The infirm power (as its name itself signifies) is generated according to the requirements of trial operation of a generating unit, and its generation cannot be predicted on any firm basis. It is implied that the generation of infirm power cannot be scheduled in advance. As of now, the actual infirm power injection is included in the

schedule of a generating station *post facto*, which leads to *post facto* changes in the schedules of the beneficiaries as well. Such *post facto* changes dilute the sanctity of the scheduling process and, therefore, should be avoided.

7. The present practice also is to specify a constant rate for infirm power from thermal generating stations according to their fuel cost per kWh based on normative operational parameters. In this scenario, the generating company has no inducement to programme its testing activities in a manner that the infirm power is injected into the grid during peak load hours and not during off-peak hours. As a consequence, the beneficiaries get extra power at a comparatively low rate, but not necessarily when they require it.

8. It is proposed that Regulations 19 and 35 quoted above be revised to stipulate that the rate of infirm power shall be same as the prevailing rate of Unscheduled Interchange (UI). This would be in line with the concept of Unscheduled Interchange, since any power which cannot be scheduled in advance is in fact Unscheduled Interchange. Once this is stipulated, it would not be necessary to carry out any *post facto* changes in the schedules either for the generating station or for the beneficiaries in respect of infirm power. The mechanism would also induce the generating companies to maximize injection of infirm power during peak load hours and minimize it during off-peak hours.

9. It is expected that the generating companies will get, in comparison to the present situation, higher revenue from sale of infirm power when its rate is equal to the UI rate.

The increased revenue shall be accounted for reduction in capital cost as already stipulated. This would be beneficial for both the generating company (as it would recover some of its investment upfront) and for the beneficiaries (as the capacity charge for the generating station would get reduced on account of reduction in capital cost).

10. Regulations 19 and 35 are proposed to be amended as follows:-

“Infirm power shall be accounted as Unscheduled Interchange (UI) and paid for from the regional / State UI pool account at the applicable frequency-linked UI rate. Any revenue earned by the generating company from sale of infirm power shall be applied for reduction in capital cost and shall not be treated as revenue”.

### **Scheduling of Hydro Electric Generating Stations**

11. It has lately been observed that the hydro generating stations covered by ABT are mostly operating all the time very close to their respective schedules, whereas they should be responding to changes in the grid's load-generation balance. This could be due to (i) the generating company's operational philosophy / policy, (ii) lack of initiative, (iii) absence of a commercial signal, and (iv) certain provisions in the Commission's regulations to check gaming. The Commission now proposes to address this issue.

12. One of the major benefits of hydro generating stations, compared to the other types of generating stations, is their operational flexibility, i.e. the ability to vary the generation with minimal technical problems and little efficiency loss. Therefore, for optimal power system operation, generation at the hydro generating stations should be varied, to the extent technically feasible, to match the system load variation. In a multi-utility system such as in India, and in the scheme of decentralized dispatch adopted, it is

necessary to induce the generating stations to do this through appropriate commercial signals. The requisite signals are already available through the proven scheme of Unscheduled Interchange (UI). However, the generators are presently not acting on these signals, perhaps to avoid being blamed of gaming.

13. The following provision has presently been made in clause (2) of Regulation 42 of the 2004 regulations, namely:-

“(i) Any generation up to 105% of declared capacity in any time block of 15 minutes and averaging up to 101% of the average declared capacity over a day shall not be construed as gaming, and generator shall be entitled to UI charges for such excess generation above the scheduled generation (SG).

(ii) For any generation beyond the prescribed limits, the Regional Load Despatch Centre shall investigate so as to ensure that there is no gaming, and if gaming is found by the Regional Load Despatch Centre, the corresponding UI charges due to the generating station on account of such extra generation shall be reduced to zero and the amount shall be adjusted in UI account of beneficiaries, in the ratio of their capacity share in the generating station.”

14. The prescribed limits could be easily breached if a hydro generating station responds to changes in load-generation balance in the grid (which reflect in changes in frequency, the locally available parameter, to which the stations should respond). As a consequence, a generating station wanting to avoid attraction of gaming allegation would refrain from providing the required frequency response. It is thus obvious that the above quoted regulation is proving to be counter-productive. It is, therefore, proposed that clause (2) of Regulation 42 of the 2004 Regulations be amended as follows, namely :-

“(i) The hydro-electric stations are expected to respond to grid frequency changes and inflow fluctuations. They would, therefore, be free to deviate from the given schedule, as long as they do not indulge in gaming, and do not cause a grid constraint. As a result, the actual net energy supplied by a hydro-electric generating station over a day may differ from the Scheduled Energy (ex-bus) for that day. A compensation shall then be made by the concerned Load Despatch Centre in the schedule for the (Day + 3), as described in clause (xix) of Regulation 45.

(ii) The concerned Load Despatch Centre shall periodically check that the generator is declaring the capacity and energy sincerely, and is not manipulating the declaration with the intent of making undue money through UI.”

15. The hydro generating stations shall henceforth be free to vary/flex their generation, and all deviations from schedule shall be accounted as UI without any limit or restriction. However, the total energy sent out over a day (0000 hours to 2400 hours) shall be duly monitored. If the actual energy sent out on Day 1 exceeds the declared (forecasted) energy for the day by  $x$  MWh, the scheduled energy for Day 4 shall be jacked up by  $x$  MWh above the declared (forecasted) energy for Day 4. In this manner, any net over-generation / under-generation (for a day as a whole) shall be rotationally compensated in kind, and there shall be no net UI energy for hydro generating stations in the end. There would, however, be UI on 15-minute basis, which may provide extra income for the generating company depending on the extent and how it flexes its generation. Clause (xix) to Regulation 45 is proposed to be added for giving effect to the above scheme.

16. There is one more aspect of the above provision. A hydro generating station has to project and declare (forecast) its next day's energy availability to the RLDC for scheduling. This depends on the forecast of inflows for the next day, which would always have an element of uncertainty. The actual inflows could vary, in which case the

generating station may have to deviate from the day-ahead schedule, or revise its declared capacity / energy availability during the day of operation. Once the proposed method of schedule adjustment is in place, it would not be necessary for the generating company to bother about revisions on the day of operation. It could operate its plant in the optimal manner, with the assurance that any resulting deviation from the day's energy declaration shall get adjusted on day 4, without any body complaining. In view of this, sub clause (xii) of Regulation 45 is proposed to be amended to the effect that a declaration amendment would be permissible only in case of a contingency.

17. For operationalising the above proposal, it would be necessary to compute the net energy sent out by a hydro generating station for each day, on a day-by-day basis. Since the present regional energy accounting has a weekly cycle, an additional exercise would now be required to be carried out daily. This should be decentralized, and carried out at the station-level. The concerned RLDCs may develop the necessary software, have it installed at all hydro generating stations under ABT, and impart necessary training to the station personnel. To allow sufficient time for all this, this scheme is proposed to be introduced from 3.12.2007.

18. It is, therefore, proposed that a new clause (xix) be added in Regulation 45 of the 2004 regulations as follows, namely:-

“The schedule finalized by the concerned Load Despatch Centre for a hydro station shall normally be such that the scheduled energy for a day equals the total energy (ex-bus) expected to be available on that day, as declared by the generator, based on foreseen / planned water availability / release. It is also

expected that the total net energy actually supplied by the station on that day would equal the declared total energy, in order that the water release requirement is met. While the 15-minute wise deviations from schedule would be accounted as Unscheduled Interchange (UI), the net energy deviation for the whole day, if any, shall be additionally accounted for as shown in the illustration.

### **Illustration**

Suppose the foreseen/expected total energy (ex-bus) for Day 1 is E1, the scheduled energy is S1, and actual net energy (metered) is A1, all in ex-bus MWh. Suppose the expected energy availability for Day 4, as declared by the generator, is E4. Then, the schedule for Day 4 shall be drawn up such that the scheduled energy for Day 4, shall be

$$S4 = E4 + (A1 - E1).$$

$$\text{Similarly, } S5 = E5 + (A2 - E2),$$

$$S6 = E6 + (A3 - E3),$$

$$S7 = E7 + (A4 - E4), \text{ and so on.}''$$

19. Clause (xii) of Regulation 45 of the 2004 regulations is proposed to be amended as follows, namely:-

“(xii) Revision of declared capability and energy by the generator(s) and requisition by beneficiary (ies) for the remaining part of day shall be permitted, but only in case of a contingency. Revised schedules/declared capability in such cases shall become effective from the 6<sup>th</sup> time block, counting the time block in which the request for revision has been received in the Load Despatch Centre to be the first one.”