

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Coram:

- 1. Shri Bhanu Bhushan, Member**
- 2. Shri R. Krishnamoorthy, Member**

Petition No. 58 /2008 (suo motu)

In the matter of

Clarity regarding control areas and demarcation of scheduling responsibility between RLDCs and SLDCs

ORDER

Through his communication dated 8.4.2008, which is annexed to this order as Annexure, ED (SO & NRLDC), PGCIL has sought directions of the Commission for a clarity regarding control areas and demarcation of scheduling responsibilities between RLDCs and SLDCs. The complexity of the subject can be gauged from a perusal of the above communication, which has been taken on record as a *suo motu* petition. In response to the above, we are covering in this order the subject of demarcation of scheduling responsibility, which appears to require urgent attention.

2. India has a federal structure of governance, and the same is also reflected in the Electricity Act 2003, the subject of "power" being on the concurrent list. The Act provides a broad demarcation of respective jurisdictions of the State organizations (the State Governments, the State Electricity Regulatory Commissions, the State Transmission Utilities and the State Load Despatch Centres) vis-à-vis the Central organizations (the Central Government, the Central

Electricity Regulatory Commission, the Central Transmission Utility, the National and Regional Load Despatch Centres).

3. Since the power systems of all States are now fully integrated with the regional power systems, and operate electrically in a seamless manner, it is necessary to clearly demarcate the roles and responsibilities between the State and Central organizations, in order to minimize the overlaps and gaps which could otherwise arise. For example, all States have clear geographical boundaries between them, but there are no geographic boundaries between the Union of India and the States since the former encompasses all States. However, there are notional electrical boundaries between the State and Central organizations, which could shift in one direction or the other depending on the criteria applied, and the purpose for which a demarcation is sought.

4. To illustrate the above, let us take the case of a typical 400/220 kV substation of POWERGRID (the CTU). As per the philosophy / approach accepted and applied so far, the 400/220 kV ICTs and two (2) 220 kV outgoing feeder bays per ICT are installed and owned by POWERGRID. Although the substation is located within the geographical boundary of a State, by virtue of its ownership by the CTU, it comes within the jurisdiction of the Central Commission regarding determination of transmission charges, etc.

5. Further, the metering boundary may differ from the geographic as well as the ownership boundaries, as is the case in the above example. The accepted metering boundary is on 400 kV side of the ICTs, which means that while the ICTs belong to POWERGRID (and their transmission charges are shared by all

States of the region), their electrical losses are to the account of the local State only.

6. There are also assets constructed on deposit work basis in which case ownership and maintenance boundaries become different. So, while electrons flow across the whole system in a seamless manner, there are different boundaries between Central and State organizations depending on criteria applied.

7. Coming to the matter of scheduling and despatch, the approach followed in India since introduction of Availability Tariff (ABT) in 2002-2003 can be summarized as follows :

- (i) Each State power system has been treated as a notional control area;
- (ii) To define precisely, a State power system is the system bounded or enclosed by the metering interfaces between the STU and CTU/ISGS/other STUs;
- (iii) The SLDCs monitor, supervise and control the State power system, and are totally responsible for scheduling and dispatch of all intra-State generation, as also the load management within their State;
- (iv) The SLDCs also decide and/or coordinate the schedule for drawal of States' entitlements in Central generating stations, i.e. the generating stations belonging to Central Government owned or controlled corporation (NTPC, NHPC, etc.). The RLDCs basically coordinate the scheduling of Central generating stations which are

contracted to supply power to more than one State, commonly referred to as ISGS (Inter-State generating stations);

- (v) The ISGS are allowed to self-despatch, i.e. deviate from the given schedule, at their discretion under the UI mechanism and subject to certain provisions in the Indian Electricity Grid Code (IEGC);
- (vi) Certain generating stations owned by Central Government corporation are dedicated to one State only. They are scheduled by the concerned SLDC only, even though their tariff is determined by the CERC (as specified in the Act); and
- (vii) CERC has further specified in IEGC that in case the State in which an ISGS is located has a predominant share in that ISGS, the concerned parties may mutually agree (for operational convenience) to assign the responsibility for scheduling of the ISGS to the State's LDC.

8. The underlying theme in the above approach is decentralization of responsibilities to the extent possible. This has many advantages. On one hand, it imparts autonomy to the States and reduces the scope for heart-burning and disputes. On the other hand, it allows the RLDCs to concentrate on grid security aspects. In recent years, the RLDCs' workload has increased considerably on account of scheduling and accounting of inter-State open access transactions. The latter have to be handled very meticulously, so as not to have disputes later on.

9. In section 32(2) of the Electricity Act 2003, it is clearly provided that
"That State Load Despatch Centre shall –

(a) be responsible for optimum scheduling and dispatch of electricity within a State, in accordance with the contracts entered into with the licensees or the generating companies operating in that State;.....”

10. The responsibility demarcation described in para 7 and 8 is in consonance with the quoted Act provision, with an agreed rider that ISGS are considered as lying outside the States’ power systems. There are also some exceptions to the general rules, reflecting flexibility in the matter.

(i) While most Central generating stations are directly connected to the CTU’s transmission system and can be taken to be a part of the regional power system, some (like most nuclear stations) connect only into the local State systems. However, since many States have shares in these, it is operationally expedient to have their scheduling coordinated by the RLDCs.

(ii) Central generating stations like Kayamkulam and Faridabad CCPPs are connected to the grid through lines belonging to CTU. However, since they are dedicated fully to the local State, it is operationally expedient to have them scheduled directly by the concerned SLDC.

11. As for the approach to be adopted in future, it would be logical and in line with the foregoing for RLDCs to coordinate the scheduling of Ultra-Mega power projects, and of other large privately-owned power plants (of 1000 MW or larger size) in which States other than the host State have substantial permanent

shares (50% or more). We need to emphasise on plant size (1000 MW and above) and share of other States (50% or more), to retain the philosophy of decentralization as also for operational expediency. Such plants may already be planned to be connected directly into the CTU network, and metering of the plants' injection may have already been contemplated by the CTU. This would be another reason for RLDC to be coordinating their scheduling. Power plants not meeting the above criteria regarding plant size and share of other States should be scheduled by the SLDC of the State in which they are located.

12. The above is being specified as a general guideline. There could be exceptions, for reasons of operational expediency, by a mutual agreement between the concerned RLDC and SLDC.

13. The State load despatch centre which is responsible for coordinating the scheduling of a generating station shall also be responsible for (i) real-time monitoring of the station's operation, (ii) checking that there is no gaming in its availability declaration, (iii) revision of availability declaration and injection schedule, (iv) switching instructions, (v) metering and energy accounting, (vi) issuance of UI accounts, (vii) collections/disbursement of UI payments, (viii) outage planning, etc. It is necessary that the concerned SLDCs are immediately geared up for undertaking the above tasks, rather than their lack of readiness being made out as a reason for thrusting the scheduling responsibility on RLDCs. SLDCs have been termed as "apex body to ensure integrated operation of the power system in a State," and their statutory position

must be respected by all concerned. They should be empowered to play their role, and must not be bypassed or undermined.

14. In the above context, we would like to quote the following from a document titled "Control Area Concepts and Obligations" issued by the North American Electricity Reliability Council (NERC) in July 1992.

"A control area is obligated to:

- (a) carefully select and train its system operating personnel. The operation of increasingly sophisticated control centers, which is supported by control equipment, instrumentation, and data presentation systems, and the closer integration of power systems through stronger interconnections, require highly-skilled and extensively-trained personnel. Proper action during a system emergency as well as minute-to-minute operation depends upon prompt, correct human performance.
- (b) empower system operators with sufficient authority to take any action necessary to assure that the system or control area for which the operator is responsible is operated in a stable, accurate, and reliable manner. Each control area shall provide its operators with a clear definition of their responsibilities and authority. Each control area shall make other system personnel aware of the authority of the system operators.
- (c) select system operators with skills that include directing other personnel and contributing to a positive working environment. Ability to perform under pressure in high-stress situations is of utmost importance. In addition, system operators should possess aptitude for logical problem solving, strong reasoning, and mechanical, electrical, mathematical analysis, communication, supervisory, and decision-making skills. Successful performance in lower-level positions is desirable.
- (d) provide each system operator with guidelines for solving problems that can be caused by realistic contingencies and known facility limitations. They shall be thoroughly indoctrinated in the basic principles and procedures of interconnected systems operation.
- (e) implement a training program for its operating personnel. This should include both classroom and on-the-job training. Emergencies should periodically be simulated using a simulation training program when possible."

15. Whatever has been said therein is most apt for being implemented in toto in our RLDCs and SLDCs as well, and all concerned must initiate the necessary action at the earliest. This is a prerequisite for secure operation of our power system in the scenario of continuous load growth, system expansion and multiplying number of organizations whose operation will have to be coordinated by the RLDCs and SLDCs in the coming years.

16. The owners of many new generating stations are trying to get their stations categorized as ISGS so as to bypass the State organizations. We would not like to encourage this trend. The other aspects on which Commission's directions have been sought would be dealt with in due course. Meanwhile, the Commission would welcome any comments or suggestions in these and related matters.

17. This order may be treated as an elaboration of clause 5.1 (e) and section 6.4 of the Indian Electricity Grid Code (IEGC).

Sd/-
(R.KRISHNAMOORTHY)
MEMBER
New Delhi dated the 7th May 2008

Sd/-
(BHANU BHUSHAN)
MEMBER

To,
 The Secretary,
 Central Electricity Regulatory Commission,
 Core-3, 6th Floor, SCOPE Complex,
 Lodi Road, New Delhi-110 003

Sub: Control Areas—clear demarcation of jurisdiction---clarification regarding

Sir,

The Indian electricity grid is expanding rapidly. Central generating Stations having more than one state as customers have been commissioned at a rapid pace. The Indian Electricity Grid Code (IEGC) and the Availability Based Tariff (ABT) have provided a certain direction on the issues of scheduling, metering, accounting and Pool settlement. RLDCs have been discharging this responsibility in line with the directions issued by the Honourable CERC from time to time. Hitherto, the state boundaries and the Inter State Generating Stations (ISGS) belonging to the Central sector were the notional control areas. The model is close to the generically known Coordinated Multilateral Trading Model.¹

Electricity Act 2003 has resulted in further radical changes with open access to the transmission system. At the inter state level; this has been implemented by RLDCs since May 2004 as per the directions of the Honourable Commission. Thus, a vibrant electricity market has developed in the country, which would further grow with the advent of Power Exchanges (PX). Some states have implemented intra state ABT while in many others; the SLDCs are scheduling contracts and accounting for imbalances.

We are currently at a juncture where a variety of generating plants and customers are expected such as (this is not an exhaustive list).

- Ultra Mega Power Projects (UMPPs) serving more than one states with its Associated Transmission System (ATS) connected to the existing Inter State Transmission System (ISTS) on a pan India basis and crossing regional boundaries.
- Two or more states jointly locating a plant in a third state having the fuel resources.
- Power plants either wholly or partly merchant injecting into either the state grid or ISTS and having customers changing on day-to-day basis.
- A state utility buying the entire output of an IPP's plant located in a different state (barring free power as royalty to the home state)
- Two Special Economic Zones (SEZ) located in different states connected to the state grid or ISTS and buying power from more than one plant located outside the state

The above variety would obfuscate the concept of 'control areas' commonly understood so far. Railways, NLC Mines etc. have been exceptions to the commonly defined control areas. However, the above variety of plants and customers would cause a sudden proliferation of control areas. This might be at the cost of dilution of the original concept of control areas.² Recent petitions by some stakeholders for treating the entire output by their power plants as Unscheduled Interchange (UI) and accommodating the same in the Regional Pool Accounts is one example of such dilution. Such requests have to recognize the limited depth that a RLDC's footprint can have and that it might be easier and more effective for that entity to be monitored at the level of SLDCs/DISCOM.

¹ Felix F. Wu and Pravin Varaiya, 'Coordinated Multilateral Trades for Electric Power Networks: Theory and Implementation', June 1995, Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA94720-1770

² NERC, 'Control Area Concepts and Obligations', July 1992.

Larry R. Day, 'Control Area Trends: Principles and Responses', IEEE Computer Applications in Power April 1995, pp34-39

There are various issues like payment security mechanism, limit to the UI volumes by any entity, location bias, tightening of frequency band, factoring transmission losses which are yet to be resolved. A meaningful definition of control areas is therefore relevant in this context.

The legal provisions so far to handle the above situations is placed at Annex-I. A matrix has also been drawn up of the current power station entities being scheduled in each region and the same is placed at Annex-II. Examination of Annex-II would reveal the following ten (10) attributes at a minimum that need to be defined for a power station before placing it under the jurisdiction of NLDC/RLDCs/SLDCs/DISCOMs for the purpose of a control area:-

- i. Voltage level of connection.
- ii. Real time monitoring and control
- iii. Shared by multiple states
- iv. MW capacity
- v. Switching instruction authority
- vi. Ownership of plant
- vii. Connection with ISTS, intra state or DISCOM
- viii. Tariff type---two part or single part
- ix. Regulation by CERC/SERC/Gol
- x. UI Pool Member at which level

Prima facie it appears that RLDCs might need to handle only the following entities as control area:

- Only multi-state shared projects above a certain MW capacity. (free power on account of royalty not to be treated as share) **and**
- Connectivity to the ISTS at, say 220 kV and above **and**
- Central Generating Companies, MPPs, UMPPs but not State GENCOs **and**
- CERC's jurisdiction

We seek the Honourable Commission's directions on this important issue so that all stakeholders are clear on the jurisdiction issues and the market matures accordingly. These directions need to cover the entire spectrum ranging from Long Term Open Access (LTOA), Short Term Open Access, Power Exchange (PX) and Unscheduled Interchange (UI). These directions need to encompass the entire range of activities from open access approvals to scheduling, monitoring and control in real time, metering, accounting and pool settlement. The matter assumes urgency considering many cases likely to come up, particularly in Western Region. Clarity on these issues would pave the way for sustained smooth power system operation as well as electricity market operations.

Thanking you,

Yours faithfully,

(S. K. Soonee)
Executive Director (SO & NRLDC)

Encl:

- i) Extracts from EA 2003, IEGC on jurisdiction
- ii) Matrix of attributes for different generating stations
- iii) Abstract of 'Co-ordinated Multilateral Trades for Electric Power Networks: Theory and Implementation' Felix F. Wu and Pravin Varaiya
- iv) NERC, 'Control Area Concepts and Obligations', July 1992.
- v) Larry R. Day, 'Control Area Trends: Principles and Responses', IEEE Computer Applications in Power, April 1995, pp34-39