

# AVAILABILITY BASED TARIFF

**KALKI**

Communication Technologies Pvt Ltd

# ABT Overview

- ▶ It is a performance-based tariff for the supply of electricity by generators owned and controlled by the central government
- ▶ It is also a new system of scheduling and despatch, which requires both generators and beneficiaries to commit to day-ahead schedules.
- ▶ It is a system of rewards and penalties seeking to enforce day ahead pre-committed schedules, though variations are permitted if notified One and one half hours in advance.
- ▶ The order emphasises prompt payment of dues. Non-payment of prescribed charges will be liable for appropriate action under sections 44 and 45 of the ERC Act.



# CERC

- ▶ The Central Electricity Regulatory Commission (CERC) established under the Electricity Regulatory Commissions Act, 1998
- ▶ Vested with the jurisdiction inter-alia, to regulate the tariff of generating companies owned or controlled by the Central Government
- ▶ Jurisdiction with regard to tariff with effect from 15th May, 1999
- ▶ Prior to this date, the tariff jurisdiction was exercised by the Central Government by virtue of Section 43A(2) of the Electricity Supply Act, 1948
- ▶ Mandated to regulate only bulk electric power tariffs viz., the tariff of generation and transmission, and the inter state transmission of power
- ▶ Promoting competition, efficiency and economy, encouraging investment in the industry and safeguarding the consumer interest
- ▶ Simulate some of the possible effects of a market



# Problems in Grid Operation

- ▶ Low frequency during peak load hours, with frequency going down to 48.0-48.5 Hz for many hours every day.
- ▶ High frequency during off peak hours, with frequency going up to 50.5 to 51Hz for many hours every day.
- ▶ Rapid and wide changes in frequency – 1 Hz change in 5 to 10 minutes, for many hours every day.
- ▶ Very frequent grid disturbances, causing tripping of generating stations, interruption of supply to large blocks of consumers, and disintegration of the regional grids.
- ▶ Integrated grid operations require the normalisation of frequency across all five Regions requiring proactive load management by beneficiaries and despatch discipline by generators.
- ▶ Least cost power not despatched in preference of more costly power



# Resolution

- ▶ Maximisation of generation during peak load hours and load curtailment equal to the deficit in generation
- ▶ Backing down of generation to match the system load reduction during off peak hours, keeping the merit order of generation in view



# ABT

- ▶ ABT order dated January 4, 2000 of CERC
- ▶ Generators and beneficiaries must declare day- ahead availability and demand based on 15-minute time blocks
- ▶ Energy charges are proposed to be charged only to the extent of the scheduled drawal by the beneficiary
- ▶ Unscheduled interchange of power (UI charges) are payable/receivable depending upon who has deviated from the schedule and also subject to the grid conditions at that point of time
- ▶ ABT system will entitle the generating station to reimbursement of fixed cost based on the availability or declared capacity of the generating station
- ▶ ABT introduces system of incentives and disincentives based on actual performance



# Applicability

- ▶ Confined to sale of electricity by generating companies (meaning central generating companies) to electricity boards and other persons, by generating stations having more than one SEB/State/UT as beneficiary
- ▶ Does not extend to sale of electricity by any central generating company which exclusively supplies to one SEB/State/UT; nor does it apply to other generating companies.



# Availability

▶ What exactly is availability?

‘Availability’, for the purpose of this order, means the readiness of the generating station to deliver ex-bus output expressed as a percentage of its related ex-bus output capability as per rated capacity.

▶ How is availability calculated?

Availability of thermal generating station for any period shall be the percentage ratio of average SOC for all the time blocks during that period and rated Sent Out Capability of the generating station as per the following formula:

$$\text{Availability} = \left\{ \frac{\sum_{i=1}^n \text{SOC}_i}{(1-\text{AUX}/100)} + \text{CL} \right\} \times \frac{100}{h \times \text{I.C.}}$$

where,

*I.C.* = Installed Capacity of the station in MW

*SOC<sub>i</sub>* = SOC of the *i*th time block of the period

*n* = Number of time blocks during the period

*AUX* = Normative Auxiliary Consumption as a percentage of gross generation.

*h* = Number of hours during the period = *n*/4

*CL* = Gross MWH of capacity of unit(s) kept closed on account of Generation scheduling order.



# Scheduling

To match the supply and demand on a daily basis at least one day in advance.

- i) Each day of 24 hours starting from 00.00 hours be divided into 96 time blocks of 15 minutes each.
- ii) Each generating station is to make advance declaration of its capacity for generation in terms of MWh delivery ex-bus for each time block of the next day. In addition, the total ex-bus MWh which can actually be delivered during the day will also be declared in case of hydro stations. These shall constitute the basis of generation scheduling.
- iii) While declaring the capability, the generator should ensure that the capability during peak hours is not less than that during other hours.
- iv) The Scheduling as referred to above should be in accordance with the operating procedures in force.
- v) Based on the above declaration, the regional load despatch centre shall communicate to the various beneficiaries their respective shares of the available capability.



# Scheduling (cont.)

vi) After the beneficiaries give their requisition for power based on the generation schedules, the RLDC shall prepare the generation schedules and drawal schedules for each time block after taking into account technical limitations and transmission constraints.

vii) The schedule of actual generation shall be quantified on ex-bus basis, whereas for beneficiaries, scheduled drawals shall be quantified at their respective receiving points.

viii) For calculating the drawal schedule for beneficiaries, the transmission losses shall be apportioned in proportion to their drawals.

ix) In case of any forced outage of a unit, or in case of any transmission bottleneck, RLDC will revise the schedules. The revised schedules will become effective from the 4th time block, counting the time block in which the revision is advised by the generator, to be the 1st one.

x) It is also permissible for the generators and the beneficiaries to revise their schedules during a day, but any such revisions shall be effective only from the 6th time block reckoned in the manner as already stated.



# Scheduling (cont.)

xi) RLDC is also entitled to revise (if need be), the schedules during the day in the interest of better system operation. These revised schedules shall become effective from the 4th time block counting the time of issue of revised schedule as the 1st time block.

xii) In the event of any grid disturbance, the schedules of both generation and drawal shall be deemed to have been revised to be equal to their actual generation/drawal. The grid disturbance and its duration shall be certified by RLDC.

xiii) The schedules issued/revised by RLDC shall be effective from designated time block, irrespective of communication success or failure.



# Unscheduled Interchange

- i) a generator generates more than the schedule, thereby increasing the frequency;
  - ii) a generator generates less than the schedule, thereby decreasing the frequency.
  - iii) a beneficiary overdraws power, thereby decreasing the frequency;
  - iv) a beneficiary underdraws power, thereby increasing the frequency.
- ▶ UI to be worked out for each 15 minutes time block. The charges shall be based on the average frequency of the relevant time block.

<u>Average Frequency of time block</u>	<u>UI Rate (Paise/ KWh)</u>
50.5 Hz and above	0.0
Below 50.5 Hz and up to 50.48 Hz	4.8
Below 49.4 Hz and 49.02 Hz	355.2
Below 49.02 Hz	360.0
Between 50.5 Hz and 49.02 Hz	linear in 0.02 Hz step

*(Rates subject to change through a separate notification from time to time)*



# Comparison

Sl. No.	Description of Item	Existing System	Draft ABT Proposal	ABT Order
1.	Capacity / Fixed Charge	Annual Fixed Charge (AFC) include : a). Interest on loan b). Depreciation c). O&M d). Return on Equity e). Income-Tax f). Interest on Working Capital	Fixed charges excluding ROE i.e. all other five items of the existing system. ROE treated separately	Capacity charge as per existing system
2.	Basis of recovery	Recovered at 62.79% deemed PLF. 50% AFC at 0% PLF and full recovery at 68.49% deemed PLF.	FC excluding ROE recovered at 30% availability on pro-rata basis between 0% and 30% availability. ROE recovered on pro-rata availability between 30% and 70%	Pro-rata recovery of capacity charge for : i) <b>NTPC stations:</b> Between 0 to 80% availability in the first year and 0 to 85% availability in the second year ii) <b>NLC Stations</b> Between 0 to 77% availability in the first year and 0 to 82% availability in the second year iii) <b>NHPC Stations</b> Between 0 to 85% availability in the first year and availability in the second year to be announced by the commission separately.



# Comparison (Cont.)

3.	Incentives	Above 68.49% deemed PLF, incentives at 1 paise/KWh for each 1% increase in PLF.	Incentive beyond target availability of 70% is as follows: 70% to 85% - 0.4% of equity for each 1% increase in availability beyond 85%.	1 paise/KWh/each percentage increase in PLF of 80%/ 85% in the first/ second year for NLC and 85% in the first year for NHPC..
4.	Sharing of fixed cost	Based on actual energy drawals	Based on allocated capacity	Based on allocated capacity
5.	Recovery of variable cost	Based on actual energy drawals	Based on Scheduled Energy	Based on Scheduled Energy
6.	Deviations from schedule – UI charges	No penalties for such deviation	Varying between 0 to 360 paise/kwh for the frequency range of 50.5 Hz to 49 Hz	Varying between 0 to 420 paise/kwh for the frequency range of 50.5 Hz to 49 Hz
7.	Norms for tariff determination	GOI Tariff notification	GOI Tariff notification	GOI Tariff notification till such time Commission finalises its views
8.	Procedure for payment of capacity charge if ABT is introduced in the middle of a financial year	Not applicable	Not specified	Specified
9.	Prolonged Outages	Included in item (2) above	Provided for payment of adjusted capacity charges	Does not provide for payment of capacity charges
10.	Marketing of surplus energy	Not applicable	Not specified	Encouraged and will not require commission's approval



# Comparison (Cont.)

11.	Splitting up of capacity and energy charge for hydro stations.	Capacity charge covered depreciation and interest on loan. Energy covered ROE, income tax, O&M and interest on working capital.	Capacity charge covered depreciation and interest on loan. Energy covered ROE, income tax, O&M and interest on working capital.	Till such commission notifies peak and off-peak energy rates for hydro-stations, primary energy charge would be taken as 90% of the lowest variable charge of the thermal power station in the concerned region. The balance of total charges would be recovered as capacity charges.
12.	Payment of dues to generators	As per agreements	As per agreements	As per orders of the commission



# Comparison (Cont.)

13.	Applicability	All central generating stations	All central generating stations staggered regionwise	<p>i). ABT implementation is staggered regionwise</p> <p>ii) Fixed charge recovery and basis for incentive payments revised from 1<sup>st</sup> April, 2000.</p> <p>iii) GOI to decide about ABT for automatic power stations.</p>
14.	PLF for incentives during interim period	Not applicable	Not specified	<p>Till the introduction of ABT in other regions and after 1.4.2000, the actual PLF for incentive purposes for NTPC shall be 80% instead of deemed PLF of 68.49%. The PLF in the first year for incentive purposes for NHPC shall be 85%.</p>



# Advantages

- ▶ By bifurcating the method of charging Capacity Charges (fixed) and Energy Charges(variable), the incentive for trading in power is enhanced
- ▶ The beneficiaries have a claim on the capacity, which they can trade either within or outside the region
- ▶ By isolating the variable charge, a beneficiary can again trade such power depending upon its needs, market demand and the economics of power in the home state
- ▶ Facilitates Merit Order Dispatch
- ▶ Helps enforce grid discipline and control frequency excursions
- ▶ More relevant incentives and disincentives encourage better performance



# Pending Issues

- ▶ The following are untouched until studies are completed:
  - i) Financial structure
  - ii) Return on Equity and Income Tax Liability
  - iv) Depreciation
  - iii) Method of Reckoning Incentives
  - v) Operation & Maintenance expenditures
  - vi) Station heat rate
  - vii) Auxiliary power consumption
  - viii) Specific fuel oil consumption
  - ix) Admissibility of start up charges for thermal plants.



# Gaming

- ▶ Over declaration to increase fixed charges and rate of return
- ▶ Under declaration to increase unscheduled interchange charges

## Mechanisms to prevent gaming

- ▶ Monitoring and enforcement of generation availability may be accomplished through auditing plant records and conducting unannounced tests
- ▶ If a unit fails to reach the level of availability which was declared by the plant operator, the capacity charges should be reduced to cover the actual availability for that day
- ▶ The capacity charges should then stay reduced until a higher availability can be demonstrated
- ▶ If a unit fails in an availability test, severe penalty should be imposed, possibly retro-active for some period.



# NTPC plants

NTPC plants where ABT is to be implemented:

## Northern Region

1. NCTPP Dadri (4 X 210 MW)
2. Feroz Gandhi Unchahar TPS (2 X 210 MW)
3. Dadri Gas Power Station (829.78 MW)
4. Anta Gas Power Station (419.33 MW)
5. Auraiya Gas Power Station (663.36 MW)
6. Singrauli STPS (2000 MW)
7. Rihand STPS (1000 MW)

## Western Region

8. Korba STPS (2100 MW)
9. Vindhyachal STPS (1260 MW)
10. Kawas Gas Power Station (656.2 MW)
11. Jhanor Gandhar Gas Power Station (657.39 MW).

## Southern Region

12. Ramagundam STPS (2100 MW).

## Eastern Region

13. Farakka STPS (1600 MW)
14. Kahalgaon STPS (840 MW)
15. Talchar STPS (1000 MW).



# Future

- ▶ As the transmission capacity improves, and there is an improvement in generated power, opportunities for trading will increase
- ▶ At that time, the Commission may decide to move away from the regulatory burden of determining tariffs in such detail, and go for market determination
- ▶ Preconditions for this to happen include the elimination of allocations of power between CGS and customers, and suitable changes in legislation which permit easy trading without the need for permissions from state governments
- ▶ It requires that SEBs operate under commercial discipline and that they will buy or back down their generation or shed load, depending on the tariff



# Thank You

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