

Staff Consultative Paper on Implementation of Intra-State ABT
in Tamil Nadu

(Comments/suggestions are invited on or before 17-08-2012)

1.0 Background

1.1 Introduction

1.1.1 In nineties, due to lack of proper balancing of generation and demand for power in the grid on real time basis, there were frequent blackouts and islanding in different parts of the country. As a solution to this problem the ABT (Availability Based Tariff) was introduced to maintain the grid discipline and to attain economical use of system resources.

1.1.2. In 1999, the CERC issued necessary orders for implementation of Inter state ABT in India and ABT has been implemented region by region during 2002 and 2003. The implementation of inter-state ABT has brought about substantial improvement in the grid operation resulting in grid discipline and optimal utilization of the generation capacities. The average grid frequency was marginally increased and it was hovering around the standard frequency of 50 Hz.

1.1.3. Considering the benefits derived from ABT, the National Electricity Policy issued under the provisions of the Electricity Act, 2003, envisages introduction of Intra-State ABT vide Section 5.7.1, which reads as follows:

“The ABT regime introduced by CERC at the national level has had a positive impact. It has also enabled a credible settlement mechanism for intra-day power transfers from licenses with surpluses to licenses experiencing deficits. SERCs are advised to introduce the ABT regime at the State level within one year”.

1.1.4. The related provisions of Tariff Policy issued by the Government of India are reproduced below:

Section: 6.2(1): *“A two-part tariff structure should be adopted for all long term contracts to facilitate Merit Order despatch. According to National Electricity Policy, the Availability Based Tariff (ABT) is to be introduced at State level by April 2006. This framework would be extended to generating stations (including grid connected captive plants of capacities as determined by the SERC). The Appropriate Commission may also introduce differential rates of fixed charges for peak and off peak hours for better management of load”*

Section: 7.1 (8): *“Metering compatible with the requirements of the proposed transmission tariff framework should be established on priority basis. The metering should be compatible with ABT requirements, which would also facilitate implementation of Time of Day (ToD) tariffs”.*

1.1.5. In line with the above policy, the Commission published a draft consultative paper on introduction of Intra-State ABT in Tamil Nadu during December, 2006 and invited comments from various stake holders. In response to the above, only few stake holders have given feed back / suggestions. The matter was discussed in the State Advisory Committee (SAC) and the SAC considered that the Intra-State ABT could be better implemented in this State after unbundling of TNEB. Now that the Tamil Nadu Electricity Board has been reorganised with effect from 01-11-2010, the Commission has proposed to implement Intra-State ABT in this State. Therefore, the Commission has decided to issue a fresh consultative paper and seek fresh views from various stakeholders in the unbundled scenario before issuing regulation on Intra-State ABT. This consultative paper is an exercise towards this end. The Commission has attempted to provide the conceptual issues involved in ABT, the benefits as seen from the experiences of other utilities and regional grid etc., the applicability of this mechanism in the existing set up in the State and how to make a start.

1.2. Importance of Intra-State ABT

1.2.1. One of the main reasons for implementing ABT is to encourage grid discipline by making the pricing of power, frequency dependent, thereby forcing state participants to improve procedures for forecasting, scheduling and load despatch. The objectives of the introduction of ABT are as under:

- (a) Encouragement of grid discipline
- (b) Promotion of trade in energy and capacity
- (c) Economic load despatch
- (d) Encouragement of higher availability

1.2.2. The generating capacity connected to Tamil Nadu grid including the allocation from Central Generating Station is 10237 MW as on 31.03.2012 comprising 2970 MW from TANGEDCO's four thermal stations, 516 MW from four gas turbine stations, 2191 MW from hydro stations, 17.55 MW from TNEB's wind farm, 1180 MW from private sector power projects, 215 MW as contribution to Tamil Nadu grid by sale of electricity from captive generating plants, 2861 MW as Tamil Nadu's share from central generating stations 305 MW from external assistance and all other medium term/short term Power Purchase Agreements, Open Access Customers. Generating capacity from privately owned wind farms is 6954 MW. The installed capacity of cogeneration in sugar mills, biomass and solar is 638 MW, 169 MW and 7 MW respectively.

1.2.3. The relaxation of load limit to open access eligibility by the Commission in the Intra-State Open Access Regulations, 2005, introduction of Restriction and control measures due to power shortage in the State and the various tariff orders issued by the Commission are also expected to increase the number of players using the State Grid. To meet the increasing energy demand in the coming years, it is reported that TANGEDCO has proposed new generation projects to the tune of 7000 MW in the next 5 years. There is a reported addition of around 2000 MW by the Merchant Power Plants and around 2000 MW by the Captive Power Plant promoters in the next few years. With many active players in the State, there is a need to develop a balancing mechanism at State level in line with the balancing mechanism at the regional level.

1.2.4. In the existing Regional ABT, though various entities are connected to the Tamil Nadu grid, the State as a single unit is considered to be connected to the southern grid and is liable to receive or pay UI charges in case of deviations from schedule. The increase in users of the State transmission network necessitates efficient energy accounting and balancing mechanisms. Hence, interstate ABT principles have to be replicated at the intrastate level.

2.0 Entities involved in Intra-State ABT

2.1 Intra-state ABT shall be applicable on suppliers and drawers, who are required to give daily schedules to SLDC, unless excluded from the applicability of ABT under the Commission's proposed Intra-State ABT Regulations / orders. Provided that the applicability of the ABT shall remain suspended during the period of grid disturbance, islanded mode of grid operation as intimated by SLDC as per provisions of the Tamil Nadu Electricity Grid Code.

2.1.1. Generating Stations:

All generating stations except the following shall be covered by intra-state ABT, if:-

- (i) Generating Stations covered by inter-state ABT,
- (ii) Nuclear Power Stations,
- (iii) Hydro Stations of less than 25 MW,
- (iv) Power Plants of capacity below 10 MW

Wind and Solar power stations are dealt with separately in this concept paper.

2.1.2. Licensees:

All Distribution/trading licensees in the State.

2.1.3. Open Access Customers:

2.1.3.1 An open access customer, within the State, shall be governed by intra-state ABT only in respect of electricity supplied to him by the generating station / licensee governed by inter-state/ intra-state ABT. Intra state ABT shall be applicable to the extent of such supply only.

Provided that drawal schedule of open access customer for a working day shall be the normal drawal schedule of the working day and that of a holiday shall be the normal drawal schedule of a holiday. Any significant deviation shall be treated as gaming and may be disallowed by SLDC.

2.1.3.2 The open access customers could be directly connected to either the Central Transmission Utility system or the State Transmission Utility system or

the DISCOM. In case they are connected to the CTU system, the Regional Load Despatch Centre (RLDC) would be responsible for scheduling and accounting and in other cases, either the SLDC or the Distribution Control Centre (DCC) would be responsible. The following table summarizes the above:

Table 1. Responsibility of scheduling and accounting

OA Customers and entities	Responsibility of Scheduling and Accounting
Connected at CTU System	RLDC
Connected at STU System	SLDC
Connected at DISCOM System	SLDC/DCC
Embedded Generators in DISCOMs	SLDC/DCC

2.1.4. Implementation of ABT:

Intra-state ABT shall be implemented to all HT & EHT OA customers in this State irrespective of the sanctioned demand from the date of issue of Intra state ABT order.

3.0 Components of ABT

3.1 Capacity Charge:

This is payable by the beneficiaries based on the capacity allocated to them, and is irrespective of the amount of power they draw or schedule to draw. The Capacity Charges can be computed and recovered as per the Commission's Regulations / Orders in force.

3.2 Energy Charge:

All the scheduled energy that is drawn is charged as per the variable energy charge of the station from which power is being drawn. The energy cost comprises of the fuel cost and it is to be charged as per the Commission's Regulations / Orders in force.

3.3 UI Charge:

3.3.1. The UI (Unscheduled Interchange) charge is levied on those units of energy that are a deviation from the schedule. This UI charge is frequency dependent and shall be based on average frequency of the time block. The UI rates and threshold frequencies as determined from time to time by CERC shall apply to the users of the intra-state grid for each 15 minute block linked to frequency.

3.3.2. As per the CERC (Unscheduled Interchange charges and related matters) Regulations, 2009, the charges for Unscheduled Interchange for all the time-blocks shall be payable for over-drawal by the buyer or the beneficiary and under-injection by the generating station or the seller and receivable for under-drawal by the buyer or the beneficiary and over-injection by the generating station or the seller and shall be worked out on the average frequency of the time-block at the rates given hereunder:-

Average frequency of time block (Hz)		UI Rate (Paise per kWh)
Below	Not below	
	50.20	0.00
50.20	50.18	16.50
50.18	50.16	33.00
50.16	50.14	49.50
50.14	50.12	66.00
50.12	50.10	82.50
50.10	50.08	99.00
50.08	50.06	115.50
50.06	50.04	132.00
50.04	50.02	148.50
50.02	50.00	165.00
50.00	49.98	193.50
49.98	49.96	222.00
49.96	49.94	250.50
49.94	49.92	279.00
49.92	49.90	307.50

49.90	49.88	336.00
49.88	49.86	364.50
49.86	49.84	393.00
49.84	49.82	421.50
49.82	49.80	450.00
49.80	49.78	478.13
49.78	49.76	506.25
49.76	49.74	534.38
49.74	49.72	562.50
49.72	49.70	590.63
49.70	49.68	618.75
49.68	49.66	646.88
49.66	49.64	675.00
49.64	49.62	703.13
49.62	49.60	731.25
49.60	49.58	759.38
49.58	49.56	787.50
49.56	49.54	815.63
49.54	49.52	843.75
49.52	49.50	871.88
49.50		900.00

(Each 0.02 Hz step is equivalent to 16.50 paise/kWh in the 50.20-50.00 Hz frequency range, 28.50 paise/kWh in 50 Hz to 49.8 Hz and 28.12 paise/kWh in frequency in the below 49.8 Hz to 49.5 Hz range.). These rates are the applicable rates as notified by CERC. As and when CERC Change these rates, the revised rates would automatically apply for this order as well.

3.3.3. Unscheduled Interchange Cap Rates

- (a) The UI Cap Rate shall be 421.50 Paise/kWh for all generating stations using coal or lignite or gas supplied under Administered Price Mechanism (APM) as the fuel, in case when actual generation is higher or lower than the scheduled generation.

- (b) The UI Cap Rate shall be 450.00 Paise/kWh for the under draws by the buyer or the beneficiaries in excess of 10% of the schedule or 250 MW whichever is less.
- (c) The UI Cap Rate shall be 450.00 Paise/kWh for the injection by the seller in excess of 120% of the schedule subject to a limit of ex-bus generation corresponding to 105% of the Installed Capacity of the station in a time block and 101% of the Installed Capacity over a day.
- (d) The UI Cap Rate shall be 165.00 Paise/kWh for the injection by a generating station other than the hydro generating station in excess of 105% of the Declared Capacity of the station in a time block or in excess of 101% of the average Declared Capacity over a day.
- (e) The UI Cap Rate shall be 165.00 Paise/kWh for the injection by the seller in excess of ex-bus generation corresponding to 105% of the Installed Capacity of the station in a time block or 101% of the Installed Capacity over a day.
- (f) The cap rates for the infirm power injected into the grid by a unit of a generating station during the testing/commissioning prior to COD of unit shall be as follows corresponding to the fuel used for the generation:

Domestic coal/ Lignite/Hydro	
(Rs./ kWh sent out) :	1.65
APM gas as fuel	
(Rs./ kWh sent out) :	2.60
Imported Coal/RLNG	
(Rs./ kWh sent out) :	3.30
Liquid Fuel	
(Rs./ kWh sent out) :	9.00

3.3.4. Additional Unscheduled Interchange Charges

- (a) The Additional Unscheduled Interchange Charge for over-drawal of electricity for each time-block when grid frequency is "below 49.7 Hz" and up to "Not below 49.5 Hz" shall be equivalent to 20% of the Unscheduled Interchange Charge corresponding to grid frequency of

"below 49.5 Hz". The Additional Unscheduled Interchange Charge for under-injection of electricity for each time-block when grid frequency is "below 49.7 Hz" and up to "Not below 49.5 Hz" shall be equivalent to 20% of the Unscheduled Interchange Charge of the corresponding grid frequency of "below 49.5 Hz":

Provided that the Additional Unscheduled Interchange Charge for over-drawal of electricity for each time-block when grid frequency is below 49.5 Hz and up to 49.2 Hz shall be equivalent to 40% of the Unscheduled Interchange Charge 900.0 Paise/kWh corresponding to the grid frequency of below 49.5 Hz. The Additional Unscheduled Interchange Charge for under-injection of electricity for each time-block when grid frequency is below 49.5 Hz and up to 49.2 Hz shall be equivalent to 40% of the Unscheduled Interchange Charge of 900.0 Paise/kWh corresponding to the grid frequency of below 49.5 Hz:

Provided that the Additional Unscheduled Interchange Charge for over-drawal of electricity for each time-block when grid frequency is below 49.2 Hz shall be equivalent to 100% of the Unscheduled Interchange Charge 900.0 Paise/kWh corresponding to the grid frequency of below 49.5 Hz. The Additional Unscheduled Interchange Charge for under-injection of electricity for each time-block when grid frequency is below 49.2 Hz shall be equivalent to 100% of the Unscheduled Interchange Charge of 900.0 Paise/kWh corresponding to the grid frequency of below 49.5 Hz.

- (b) The Additional Unscheduled Interchange Charge for under-injection of electricity during the time-block when grid frequency is below 49.7 Hz and up to 49.5 Hz for the generating stations using coal or lignite or gas supplied under Administered Price Mechanism (APM) as the fuel shall be equivalent to 20% of the UI Cap Rate of 421.50 Paise/kWh:

Provided that the Additional Unscheduled Interchange Charge for under-injection of electricity during the time-block when grid frequency is

below 49.5 Hz for the generating stations using coal or lignite or gas supplied under Administered Price Mechanism (APM) as the fuel shall be equivalent to 40% of the UI Cap Rate of 421.50 Paise/kWh.

Explanation: The UI rates, UI cap rate and additional UI charges for intrastate entities in Tamil Nadu from the date of operationalisation of implementation of intrastate ABT shall be in line with the Central Electricity Regulatory Commission (Unscheduled Interchange charges and related matters) Regulations and amendments issued from time to time.

3.4 Reactive Power Compensation

3.4.1. This shall be charged as per the provision in the Indian Electricity Grid Code / Tamil Nadu Electricity Grid Code as amended from time to time. The reactive power compensation should ideally be provided locally, by generating reactive power as close to the reactive power consumption as possible. The beneficiaries are therefore to provide local VAr compensation / generation such that they do not draw VARs from the EHV grid, particularly under low voltage condition.

3.4.2. The VAr exchanges by any beneficiary with State Transmission System shall be priced as follows:

- i The beneficiary pays for VAr drawal when voltage at the metering point is below 97%
- ii The beneficiary gets paid for VAr return when voltage is below 97%
- iii The beneficiary gets paid for VAr drawal when voltage is above 103%
- iv The beneficiary pays for VAr return when voltage is above 103%

4.0 Pre-requisites for intra-state ABT implementation

4.1 Technical Requirements

4.1.1. All interface points should be identified and ABT compliant meters should be provided.

4.1.2. Appropriate data communication system between meters and Distribution Control Centre (DCC)/SLDC must be provided.

4.1.3. Information Technology (IT) system must be provided in the SLDC to monitor generation and drawal positions and energy accounting.

4.2 Commercial Requirements

The tariff system should be in two parts. i.e. Fixed and variable costs computed for each stage of each generating station.

5.0 Scheduling

All entities involved in Intra-State ABT shall schedule and dispatch according to instructions given by SLDC. The methodology of scheduling shall be according to the provisions made in the Tamil Nadu Electricity Grid Code.

6.0 Gaming

6.1. Generating Stations under ABT generating up to 105% of the 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 the generator shall be entitled to UI charges for such excess generation above the scheduled generation (SG).

6.2. However, for any generation beyond the prescribed limits as cited above, the State Load Despatch Centre shall investigate so as to ensure that there is no gaming, and if gaming is found by the State 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.

7.0 Demonstration of declared capability

7.1. Any generating station under ABT may be required to demonstrate its declared capability as and when asked by the SLDC. In the event of the generating company failing to demonstrate the declared capability, the capacity charges due to the generator shall be reduced as a measure of penalty.

7.2. The quantum of penalty for the first mis-declaration for any duration/block in a day shall be the charges corresponding to two days fixed charges. For the second mis-declaration, the penalty shall be equivalent to fixed charges for four days and for subsequent mis-declarations, the penalty shall be multiplied in the geometrical progression.

7.3. The operating log books of the generating station shall be available for review by the SLDC. These books shall keep record of machine operation and maintenance.

8.0 Metering and Meter Reading

8.1. ABT compatible interface meters as specified by Central Electricity Authority (Installation and Operation of Meters) Regulation, 2006 shall be provided by STU at the periphery/terminals of all intra-State entities, all open access users connected to the transmission network, and other entities proposed to be covered by UI mechanism. ABT meters shall be provided by the distribution licensee for all the open access consumers / entities connected to the distribution network. All expenses including installation charges and all other charges incurred for providing ABT compatible meters shall be reimbursed to the STU and distribution Licensee as the case may be by the entity/consumer concerned.

8.2. Where, the entry point and exit point is connected to the network of Transmission system, it shall be the responsibility of the State Transmission Utility to take down the meter reading and record the metered data, maintain database of all the information associated with the interface meters and verify the correctness of metered data and furnish the same to various agencies.

8.3. Where, however, the entry point and exit point is connected to the network of Distribution Licensee's system, it shall be the responsibility of the Distribution Licensee to take down the meter reading and record the metered data, maintain database of all the information associated with the interface meters and verify the correctness of metered data and furnish the same to various agencies.

8.4. All concerned entities (in whose premises the special energy meters are installed), shall fully cooperate with the State Transmission Utility/State Load Dispatch Centre and extend the necessary assistance to transmit the meter data to the State Load Dispatch Centre.

8.5. STU / SLDC shall formulate a procedure covering summation, collection and processing of tariff meter readings at various metering points. The Distribution Licensees shall formulate procedure for metering locations for Open Access Customers within their areas.

9.0 Energy Accounting

9.1. A State Energy Account, for the billing and settlement of 'Capacity Charge', 'Energy Charge', 'UI Charge' and 'Reactive Charge' shall be prepared by the SLDC.

9.2. The energy accounting related to availability for capacity charges and schedules for energy charges shall be done by SLDC and bill shall be raised and settled mutually by generating company/supplier and the beneficiary according to the PPA between the two. Billing and settlement of 'UI Charge' and 'Reactive Charge' shall be carried out by SLDC.

9.3. The SLDC shall be responsible for computation of actual net MWh injection of each generating station and actual net drawal of each beneficiary (Distribution Licensee /Open Access customer), 15 minute-wise, based on the above mentioned meter readings and for preparation of the State Energy Accounts.

9.4. All computations carried out by SLDC shall be open to all constituents for checking/verifications for a period of 15 days. If any mistake/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.

9.5. Such Account shall be examined and verified by the State Power Committee (SPC) comprising of SLDC, STU, Distribution Licensee and Generators as constituents. A proposal to establish the SPC may be sent by the STU for the approval of the Commission.

9.6. Provided that in the case of Generators, only one representative from each class of Generators mentioned below shall be represented on the Committee:

- i. TANGEDCO,
- ii. Independent Power Producers (IPPs) in private sector,
- iii. Generating Companies under joint venture,
- iv. Non-conventional Energy (NCE) Developers (Biomass, Small hydro, Wind, etc.)
- v. Captive Generating Plants

9.7. SLDC shall periodically review the actual deviation from the dispatch and net drawal schedules being issued, to check whether any of the constituents are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the Member-Secretary of the Committee for further investigation/action.

9.8. SLDC will forward the necessary data / schedules to regional level in line with Regulations formulated by Central Electricity Regulatory Commission.

10.0 Commercial settlement

10.1. The beneficiaries shall pay to the respective generating company Capacity charges corresponding to plant availability and Energy charges for the scheduled dispatch. However, calculation of capacity charges and energy charges may be made according to their bilateral contract. (i.e. PPA) The bills for these charges shall be issued by the respective generating companies to each beneficiary on monthly basis.

10.2. The sum of the above two charges from all beneficiaries shall be fully reimbursed to the Generating Stations according to the given dispatch schedule. In case of a deviation from the dispatch schedule, the concerned Generating Station shall be additionally paid for excess generation through the UI mechanism approved by CERC. In case of actual generation being below the given dispatch schedule, the concerned Generating Station shall pay back through the UI mechanism for the shortfall in generation.

10.3. The summation of station-wise ex-power plant dispatch schedules from each Generating Station and any bilaterally agreed interchanges of each beneficiary shall be adjusted for transmission losses, and the net drawal schedule so calculated shall be compared with the actual net drawal of the beneficiary. In case of excess drawal, the beneficiary shall be required to pay through the UI mechanism for the excess energy. In case of under-drawal, the beneficiary shall be paid back through the UI mechanism, for the energy not drawn.

10.4. Initially, the open access users shall bear average energy losses in the transmission system as notified by the Commission. After one quarter of the year, the open access users shall bear average energy losses in the transmission system as estimated by SLDC subject to a maximum of the values as notified by the Commission. The information regarding average energy losses for the previous 52 weeks shall be posted on the website of the SLDC.

10.5. Monthly Energy Accounts and weekly statement of UI charges shall be prepared by the SLDC. The weekly statement of UI charges shall be issued to all constituents by Thursday for the seven-day period ending on the penultimate Sunday mid-night. Payment of UI charges shall have a high priority and the concerned constituents shall pay the indicated amounts within 10 (ten) days from issue of statement into a state UI pool account operated by the SLDC. The agencies who have to receive the money on account of UI charges would then be paid out from the state UI pool account, within three (3) working days.

10.6. The SLDC shall also issue the weekly statement for VAr charges, to all constituents who have a net drawal / injection of reactive energy under low/high voltage conditions. These payment shall also have a high priority and the concerned constituents shall pay the indicated amounts into the state reactive account operated by the SLDC within 10 (ten) days of statement issue. The constituents who have to receive the money on account of VAr charges would then be paid out from the -state reactive account, within three (3) working days.

10.7. The SLDC/STU may insist on appropriate payment security mechanism by way of Bank Guarantee or Bank Draft equal to 10% of the scheduled energy either receivable or payable.

10.8. If payments against the above UI and VAr charges are delayed by more than two days, i.e., beyond twelve (12) days from statement issue, the defaulting constituent shall have to pay simple interest @ 0.04% for each day of delay. The interest so collected shall be paid to the constituents who had to receive the amount, payment of which got delayed. Persistent payment defaults, if any, shall be reported by the SLDC to the Commission, for initiating remedial action.

10.9. If total payment receivable in the State UI pool account, after accounting for the receivables from/payables to the Regional UI pool account, is more or less than the UI payable, UI payable/receivable for the intra-State entities will be proportionately adjusted to make the payable and receivable amounts equal

10.10. The money remaining in the state reactive account after pay-out of all VAr charges up to 31st March of every year shall be utilized for training the SLDC operators, and other similar purposes which would help in improving/streamlining the operation of the respective regional grids, as decided by the SPC from time to time.

10.11. In case the voltage profile of the grid improves to an extent that the total payout from the VAr charges account for a week exceeds the total amount being paid-in for that week, and if the reactive account has no balance to meet

the deficit, the pay-outs shall be proportionately reduced according to the total money available in the above account.

10.12. The SLDC shall prepare the complete statement of the state UI account and the state Reactive Energy Account, on a quarterly basis and circulate the same to all the pool members for verification.

10.13. All 15-minute energy figures (net scheduled, actually metered and UI) shall be rounded off to the nearest 0.01 MWh.

11.0 Special Requirements for Solar/ wind generators

11.1. The SLDC shall make all efforts to evacuate the available solar and wind power and **treat them as a must run station**. However, System operator may instruct the solar /wind generator to back down generation if grid security or safety of any equipment or personnel is endangered and Solar/ wind generator shall comply with the same.

12.0 Energy accounting and commercial settlement for the Wind / Solar Energy Generators

12.1. For the purpose of physical measurement of energy, all the Wind Energy Generators (WEGs) and all the Solar Energy Generators (SEGs) will have to provide ABT compliant meters.

12.2. The meters shall be provided by the STU at the cost of Generator / Developer if the power is injected into the transmission system. The meters should be provided by the Distribution Licensee at the cost of Generator / Developer if the power is injected into the Distribution System.

12.3. All the ABT compliant meters shall be as per Central Electricity Authority (Installation and Operation of meters) Regulations, 2006 with the facilities to communicate real time data to the nearest substation of the Distribution Licensee or STU as the case may be. The Distribution Licensee / STU shall make necessary arrangements for transmitting such real time data to the

SLDC. **The meters shall be installed latest by 31-08-2012.** The new WEGs /SEGs shall be commissioned only after installing ABT meters.

12.4. The commercial settlements of the WEGs/SEGs opting for sale to distribution licensee or for captive use or for third party sale or sale under Renewable Energy Certificate mechanism shall be as per the methodology / procedure prescribed by the Commission in its regulations/orders issued from time to time.

12.5 Wind/Solar energy being of variable nature, needs to be predicted with reasonable accuracy for proper scheduling and dispatching of power from these sources in the interconnected system. Hence wind/solar generation forecasting is necessary for increased penetration.

12.6. The wind/solar energy forecasting system shall forecast power at the following time intervals:

- i) Day ahead forecast: Power forecast with an interval of 15 minutes for the next 24 hours.
- ii) The schedule by such power generating stations supplying intra state power under long-term access and medium-term and short-term open access may be revised by giving advance notice to SLDC. Such revisions by wind/solar power generating stations shall be effective from 6th time-block, the first being the time – block in which notice was given. There may be maximum of 8 revisions for each 3 hour time slot starting from 00:00 hours during the day.

12.7. The wind/solar generators shall be responsible for forecasting their generation upto an accuracy of 70%. Therefore, if the actual generation is beyond +/- 30% of the schedule, generator would have to bear the UI charges. For actual generation within +/- 30% of the schedule, no UI would be payable/receivable by Generator, The SLDC shall bear the UI charges for this variation, i.e within +/- 30%. However, the UI charges borne by the SLDC due to the wind generation, shall be paid by the purchaser/captive user in the form of a regulatory charge known as the Renewable Regulatory

Charge operated through the Renewable Regulatory Fund (RRF) by the SLDC. This provision shall be applicable to all WEGs/SEGs with effect from the date of issue of Intra state ABT order. Illustrative calculations in respect of above mechanism are given in Appendix.

12.8. A maximum generation of 150% of the schedule only, would be allowed in a time block, for injection by WEGs/SEGs from the grid security point of view. For any generation above 150% of schedule, if grid security is not affected by the generation above 150%, the only charge payable to the generators would be the UI charge applicable corresponding to 50-50.02 HZ

12.9. Appendix : Illustrative examples for commercial settlement for Wind/Solar Generation

Case 1: Actual as per generation schedule

Schedule (MW)	Actual Generation (MW)	Implication On Purchaser/Captive user	Unscheduled Interchange (UI)	
			Implication on State	Implication on generator
10	10	Purchaser to pay Wind Generator for 10 MW at contracted rate.	No implication.	No implication on generator.

Case 2: Under Injection by the Generator within 30% variation

Schedule Unit (MW)	Actual Generation Unit (MW)	Implication On Purchaser/Captive user	Unscheduled Interchange (UI)	
			Implication on State	Implication on generator
10	7	Payment to be made by purchaser for 7 MW (as per actual) at contracted rate and for 3 MW to Renewable Regulatory Fund (RRF) at UI rate.	For 3 MW UI liability on the state, as a result of under generation by the Wind Generator embedded in the State system, the same shall be received from RRF.	No implication on wind generator

Case 3: Under Injection by the Generators beyond 30 % variation

Schedule (MW)	Actual generation (MW)	Implication on Purchaser/Captive user	Unscheduled Interchange (UI)	
			Implication on state	Implication on wind generator
10	6	To pay for 7 MW to generator (since, in this range, the wind generator comes under UI mechanism) at contracted rate. 3 MW by purchaser at UI rate to RRF.	Out of 4 MW liability of UI on state on account of generation by generator, UI for 3 MW shall be received by the state from RRF and UI of 1 MW would be received from the UI pool.	UI rate for 1 MW payable by Generator to UI Pool.

Case 4: Over Injection by the generators within 30% variation

Schedule (MW)	Actual generation (MW)	Implication on Purchaser/captive user	Unscheduled Interchange (UI)	
			Implication on state	Implication on generator
10	13	To pay for 13 MW to generator at Contracted rate. Purchaser shall receive Payment for 3 MW from RRF at UI rate.	For 3 MW, UI benefit for the State on account of over-generation by generator to be passed on to the RRF.	No implication on generator.

Case 5: Over Injection by the wind generator from 130% to 150% generation

(as compared to schedule)

Schedule (MW)	Actual generation (MW)	Implication on Purchaser/captive user	Unscheduled Interchange (UI)	
			Implication on state	Implication on generator
10	14	To pay for 13 MW at Contracted rate. Purchaser Shall receive	For 4 MW UI benefit for the State on account of over generation	UI for 1 MW to be received from UI

		payment for 3 MW from RRF at UI rate.	by generator, UI for 3 MW to be passed on to the RRF and UI for 1 MW to be passed to UI pool.	pool.
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Case 6: Over Injection by the wind generator from 130% to 150% generation (as compared to schedule)

Schedule (MW)	Actual generation (MW)	Implication on Purchaser/captive user	Unscheduled Interchange (UI)	
			Implication on state	Implication on generator
10	16	To pay for 13 MW at Contracted rate. Purchaser Shall receive payment for 3 MW from RRF at UI rate.	For 6 MW benefit for the State from UI Pool on account of higher generation by the generator, UI for 3 MW to be passed on to RRF and UI for 3 MW to be passed on to UI pool.	UI for 2 MW to be received by Generator from UI Pool at the UI rate applicable at that particular time and for 1 MW UI to be received by Generator from UI Pool at the UI rate applicable for frequency interval below 50.02 and not below 50.00 Hz.

Explanation:

- (1) For all of the above scenarios, the UI rate shall be the normal UI rate applicable at that particular time block except in case 6 i.e. for over injection beyond 50 %. In this case the wind generator shall get UI for injection beyond 50% of the schedule at the UI rate applicable for frequency interval below 50.02 and not below 50.00 Hz, in accordance

with the CERC (Unscheduled Interchange Charges and related matters Regulations,2009, as amended from time to time.

- (2) The RRF shall be created and operated by the SLDC on a state basis. For all cases above it is assumed that Purchaser's drawal is as per schedule.

13.0 Two-part tariff

Implementation of intra-state ABT requires that all the generating stations and Distribution Licensee within the State should adopt a two-part tariff within the frame work of the existing PPAs. Appropriate action should be taken by all concerned to convert the existing single part tariff if any to two-part tariff in respect of all the generating stations and distribution Licensee. For the time being wind, solar and hydro stations are exempted from converting to two-part tariff. Operation of hydro stations shall be strictly done by the SLDC and operated economically.

14.0 Scheduling and Dispatch Code

14.1. Demarcation of responsibilities

14.1.1. The SLDC shall coordinate the scheduling of all such generating stations located within the State, which are not scheduled by the RLDC in terms of CERC regulations as notified from time to time. The SLDC shall also be responsible for such generating stations 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/Reactive energy accounts,
- (vii) Collections/disbursement of UI payments,
- (viii) Outage planning, etc. besides the stipulations in the IEGC and State Grid Code

14.1.2. The State grid shall be operated as loose power pool (with decentralized scheduling and dispatch), in which the Distribution Licensee shall have full operational autonomy, and the Area Load Dispatch Centres (ALDCs) shall have the total responsibility for (i) regulating the demand of their customers, (ii) scheduling their drawal from the Generating Stations and Inter-State Generating Station (ISGS) (within their share in the respective plant's expected capability), (iii) arranging any bilateral interchanges, and (iv) regulating their net drawal from the State grid as per following guidelines.

14.1.3. The algebraic summation of scheduled drawal from State Generating stations and ISGS and any bilateral inter-change shall provide the drawal schedule of the Distribution Licensee, and this shall be determined in advance on daily basis. While the Distribution Licensee would generally be expected to regulate their consumers' load so as to maintain their actual drawal from the State grid close to the above schedules, a tight control is not mandated. The Distribution Licensee may, at their discretion, deviate from the drawal schedule, as long as such deviations do not cause system parameters to deteriorate beyond permissible limits and/or do not lead to unacceptable line loading. Deviations from net drawal schedule are, however, to be appropriately priced through the Unscheduled Interchange (UI) mechanism.

14.1.4. Provided that the Distribution Licensee, through their Distribution Control Centres, shall always endeavour to restrict their net drawal from the grid to within their respective drawal schedules, whenever the system frequency is below 49.8 Hz. When the frequency falls below 49.7 Hz, requisite load shedding shall be carried out by the Distribution Licensee to curtail the over-drawal.

14.1.5. The Distribution Licensee shall regularly carry out the necessary exercises regarding short-term and long-term demand estimation for their area, to enable them to plan in advance as to how they would meet their consumers' load without overdrawing from the grid.

14.1.6. The State Generating Stations (SGS/ IPP/ CGP if scheduled) shall be responsible for power generation according to the daily schedules advised to

them by the SLDC on the basis of the requisitions received from the Distribution Licensee, and for proper operation and maintenance of their Generating Station, such that these stations achieve the best possible long-term availability and economy.

14.1.7. While the Generating stations would normally be expected to generate power according to the daily schedules advised to them, it would not be mandatory to follow the schedules tightly. In line with the flexibility allowed to the Distribution Licensee, the Generating Stations may also deviate from the given schedules depending on the plant and system conditions. In particular, they would be allowed / encouraged to generate above the given schedule under deficit conditions. Deviations from the ex-power plant generation schedules shall, however, be appropriately priced through the UI mechanism.

14.1.8. Provided that when the frequency is higher than 50.2 Hz, the actual net injection shall not exceed the scheduled dispatch for that time. Also, while the frequency is above 50.2 Hz, the Generating Stations may (at their discretion) back down without waiting for an advice from SLDC in order to restrict the frequency rise. When the frequency falls below 49.8 Hz, the generation at all Generating Stations shall be maximized, at least up to the level which can be sustained, without waiting for an advice from SLDC.

14.1.9. However, notwithstanding the above, the SLDC may direct the Distribution Control Centres / Generating Stations to increase/decrease their drawals/generation in case of contingencies e.g. overloading of lines/transformers, abnormal voltages, threat to system security. Such directions shall be immediately acted upon. In case the situation does not call for very urgent action, and SLDC has some time for analysis, it shall be checked whether the situation has arisen due to deviations from schedules, or due to any power flows pursuant to short-term open access. These shall be terminated first, in the above sequence, before an action which would affect the scheduled supplies from Generating Stations to the long term customers is initiated.

14.1.10. For all outages of generation and transmission system, which may have an effect on the State grid, all constituents shall cooperate with each other and coordinate their actions through State Coordination Committee (SCC) for outages foreseen sufficiently in advance and through SLDC (in all other cases), as per procedures finalized separately by SCC. In particular, outages requiring restriction on Generating Stations' generation and/or restriction of Generating Stations' share which a beneficiary can receive (and which may have a commercial implication) shall be planned carefully to achieve the best optimization.

14.1.11. The constituents shall enter into separate joint/bilateral agreement(s) to identify the scheduled drawal pattern, tariffs, payment terms etc. All such agreements shall be filed with the SLDC for being considered in scheduling and State energy accounting. Any bilateral agreements between constituents for scheduled interchanges on long-term/short-term basis shall also specify the interchange schedule, which shall be duly filed in advance with the SLDC.

14.1.12. All constituents shall abide by the concept of frequency-linked load dispatches and pricing of deviations from schedule, i.e., unscheduled interchanges. All generating units of the constituents, licensees and generating companies should normally be operated according to the standing frequency-linked load dispatch guidelines issued by the SLDC, to the extent possible, unless otherwise advised by the SLDC.

14.1.13. It shall be incumbent upon the Generating Stations to declare the plant capabilities faithfully, i.e., according to their best assessment. In case, it is suspected that they have deliberately over/under declared the plant capability contemplating to deviate from the schedules given on the basis of their capability declarations (and thus make money either as undue capacity charge or as the charge for deviations from schedule), the SLDC may ask the Generating Station to explain the situation with necessary backup data.

14.1.14. The STU shall install special energy meters on all inter connections between the State constituents and at other identified points for recording actual net MWh interchanges and MVarh drawals. All concerned entities (in

whose premises the special energy meters are installed) shall fully cooperate with the STU/SLDC and extend the necessary assistance by taking weekly meter readings and transmitting them to the SLDC.

14.1.15. The SLDC shall be responsible for computation of actual net MWh injection/drawal of concerned intra-state entity, 15 minute-wise, based on the above meter readings and for preparation of the State Energy Accounts. All computations carried out by SLDC shall be open to all constituents for checking/verifications for a period of 15 days. In case any mistake/omission is detected, the SLDC shall forthwith make a complete check and rectify the same.

14.1.16. The Distribution Licensee shall have Distribution Control Centres to capture and monitor the online data supplied by the ABT meters and control the drawal / injection of power as per the schedule. Similarly, the SLDC may have their Sub Load Despatch Centres to capture and monitor the online data supplied by the ABT meters and control the drawal / injection of power as per the schedule.

14.1.17. In order to handle the increased volume of data under Intra-state ABT and also to perform the functions of monitoring and energy accounting, the state load despatch centre needs to be up-graded suitably by providing necessary software, hardware, human resources and other infrastructure.

14.1.18. SLDC shall periodically review the actual deviation from the dispatch and net drawal schedules being issued, to check whether any of the constituents are indulging in unfair gaming or collusion. In case any such practice is detected, the matter shall be reported to the Commission for further investigation/action.

14.2. Scheduling and Dispatch procedures

All Intra-State Generating Stations shall be duly listed. The station capacities and allocated/contracted shares of different beneficiaries shall also be listed

out. All the entities of the Intra-State ABT shall follow the procedure laid in the Commission's Grid Code.

15.0 Redressal Mechanism

All complaints regarding unfair practices, delays, discrimination, lack of information, supply of wrong information or any other matter related to intrastate ABT shall be directed to the competent authority in SLDC. The concerned authority shall investigate and endeavour to resolve the grievance. If the authority is unable to resolve, the matter shall be reported to Commission for a decision.

16.0 Conclusion

16.1. Since the Intra State ABT is being introduced in the State, the Commission would like to operate it as trial run (as a mock ABT exercise) for a period of three **months from the date of issue of the order**. During this period all the Commercial settlement will be based on the existing arrangement.

16.2. The actual working of Intra State ABT mechanism may necessitate adjustments. The TANTRANSCO will be responsible for the implementation of Intra State ABT. The TANTRANSCO should study and document the working of Intra-State ABT for a period of 6 to 9 months and submit a detailed report to the Commission. The Commission based on the practical experience so documented, if considered necessary, will review the provisions of Intra State ABT Order.

(By order of the Tamil Nadu Electricity Regulatory Commission)

(S.GUNASEKARAN)
Secretary