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**DISCUSSION PAPER**

**ON**

**INTRODUCTION OF AVAILABILITY BASED TARIFF (INTRA-  
STATE ABT) REGIME AT STATE LEVE WITHIN  
MAHARASHTRA**

**AND**

**RELATED ISSUES**

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## **1 PURPOSE AND SCOPE OF DISCUSSION PAPER**

### **1.1 BACKGROUND**

Availability Based Tariff (ABT) is concerned with the tariff structure for bulk power and is aimed at bringing about more responsibility and accountability in power generation and consumption through a scheme of incentives and disincentives. ABT tries to improve the quality of power and curtail the following disruptive trends:

- (a) Unacceptable rapid and high frequency deviations causing damage and disruptions.
- (b) Frequent grid disturbances resulting in generators tripping, power outages and grid instability.

ABT has been implemented in the Western Region since June 1<sup>st</sup> 2002. One of the main reasons for implementing these tariffs was 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 main objectives of introduction of ABT mechanism at regional level have been:

- (a) Encourage grid discipline
- (b) Promote trade in energy and capacity
- (c) Economic load despatch
- (d) Encourage higher generation availability

The ABT mechanism has laid out on financial principles, wherein all generators and beneficiaries must declare a schedule for generation and drawl every 15 minutes one day in advance. Any deviation from the schedule is charged at rates, which are dependent on frequency at that point in time. Currently the ABT is applicable between Central Generating Stations (CGS) and the state beneficiaries.

Although the new frequency based tariff has brought lot of grid discipline, still the inter-State ABT is a partial solution of the problem because currently there is a huge amount of peak power shortage experienced by majority of the State utilities. In addition to this, the transmission corridors are getting congested while bringing the excess amount of power from the remote location to the load centres. A viable alternative in such case is



generation, which can be located directly near the load centres. These could be captive power plants of various industrial units which would pump power into the grid at high peak demands. This will defer transmission and distribution (T&D) expansion, improve the voltage profile of the system and reduce line losses.

## **1.2 CONTEXT SETTING**

With the success of ABT implementation at Regional level and for CGS Power Stations in terms of improved grid frequency, reduced frequency variations and reduction of number of interruptions/grid failures, it is felt that such scheme may further help the Power System, if implemented at State level also. As per clause 5.7.1(b) of National Electricity Policy (NEP) notified by Central Government, Appropriate Commissions are required to introduce ABT regime at State level. The relevant extract of NEP is as under:

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

Thus, it is clear that introduction of ABT mechanism at State level – its scope, pricing methodology, exclusions of some state participants etc. are left at the discretion of respective SERCs. However, the Availability Based Tariff (ABT) mechanism at State level need not necessarily mean UI mechanism as applicable at regional level. In this context, we note that National Task Force in its recommendations have recognized the need for evaluation and addressing of State specific issues. The relevant extract of National Task Force’s recommendations is as under:

*“The Task Force is aware of the possibility that the principles adopted for inter-State flows may not be readily replicable for the State networks due to peculiarities and complications involved.”*

Hence, it is necessary to identify these peculiarities and complications within the power sector at State level before finalizing appropriate design for implementation of ABT at State level.



Before exploring the need at the state-level, we need to understand the reasons why inter-state ABT has seen success. The demonstrated improvement in Grid frequency (and reduced frequency variations) due to ABT has come on account of following factors:

1. Improved scheduling by all the participants-Generators and Beneficiaries.
2. Adherence to the schedules due to incentives/disincentives
3. High quality metering and on line connectivity enabling the System operator to know the actual flows and taking appropriate action
4. Transparency and sharing of the information to all participants-improved trust (even though gaming is suspected within certain bands/limits)
5. Faster settlement process.

It is important to note that primary objective for introduction of frequency linked UI price based ABT regime at regional level has been to encourage grid discipline amongst pool participants at regional level. Further, ABT mechanism with frequency linked UI pricing was introduced at the time when most of the State participants were structured as integrated/bundled entities. Thus, response of State participants at regional level has been a reflection of their system operations by managing their load as well as the generating stations at their disposal. It is important to understand change in role envisaged for various participants including SLDC upon un-bundling/restructuring of State Utilities, as mandated under Electricity Act 2003.

Thus, the objective for introduction of ABT at State level needs to be ascertained in view of changing electricity industry structure. Further, selection of appropriate mechanism for introduction of ABT at State level should have minimal impact on sector entities and retail consumers while meeting the objectives of implementation of ABT at State level. In this context, an analysis of various issues and key concerns in extending intra-state ABT to various participants in the state system is presented under this 'Discussion Paper'.

### ***1.3 OUTLINE OF DISCUSSION PAPER***

This Discussion Paper has been divided over following Chapters



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## **Chapter-2: Regulatory Framework for Market Development and Grid Operations**

This Chapter outlines the relevant provisions of Electricity Act 2003 (EA 2003) pertaining to 'Market Development' and the mandate for the Commission thereof. Further, it elaborates on the National Electricity Policy and National Tariff policy framework outlining the broad policy framework for dealing with the issues of market development and Grid Operations at the State level. In addition, Indian Electricity Grid Code 2006 and State Grid Code Regulations formulated by CERC and MERC respectively, forms an integral part of governing regulations and the selection of the appropriate 'market design framework' will have to be guided by the conditions contained in the said regulations. In summary, this chapter highlights the key issues to be taken into consideration under evolving regulatory policies while determining the appropriate 'Availability Based Tariff' mechanism at the State level.

## **Chapter-3: Key Considerations for design of ABT at State level**

This Chapter discusses various objectives and key considerations for development of Availability Based Tariff (ABT) regime at State level. The development of appropriate mechanism for introduction of ABT regime at State level, need to be viewed in the context of objectives laid out hereunder such as improvement of grid frequency, instilling forecasting and load management discipline amongst distribution licensees, instilling despatch discipline amongst generators, encouraging more participation in state level balancing mechanism. Further, ABT mechanism will have to be devised taking into consideration several criteria such as cost of power for Maharashtra power system should not increase, fair and equitable allocation of risks amongst participants, constraints of system operation and stability, availability of metering and communication infrastructure, promoting long term development of market etc.

## **Chapter-4: Characteristic features of Maharashtra Power System**

In view of the regulatory and policy framework outlined under Chapter 2 and the key considerations for development of ABT regime at State level, as outlined under Chapter 3, it would be important to address some key issues specifically relevant in the context of Maharashtra, such as 'industry restructuring', multiple licensee operations, existing scheduling and despatch process, standby arrangement and islanding operations for Mumbai licensees, etc.



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### **Chapter-5: Applicability of ABT to State Participants and Likely Mechanism**

The most important design parameters in the intra-state ABT mechanism are the participants or the market players to whom the intra-state ABT will be extended and the mechanism for determination of rate for settlement of energy transactions amongst various state participants. Under this chapter, we would discuss in detail the likely reasons for which intra-state ABT might be extended to any participant and the risks and issues associated with extending the intra-state ABT system to that particular participant.

### **Chapter-6: Market structure for introduction of ABT Mechanism at State level within Maharashtra**

This Chapter contains detailed elaborations of emerging market structure, various entities, their roles and responsibility, rules for their operation, and contractual framework for the market operation under proposed Balancing and Settlement mechanism for Maharashtra.

### **Chapter-7: Salient Features proposed ABT Mechanism at State level**

This Chapter deals with the various design parameters used to establish the framework for the ABT mechanism as well as the framework for the reconciliation and settlement mechanism. The various design parameters that have been considered for the development of the State level ABT Mechanism framework are: (a) Scheduling period (for load forecast of State Pool Participants and despatch of generating stations) (b) Trading period (c) Settlement period (d) Measurement unit for State Imbalance pool (e) Treatment of reactive energy drawl and injection (f) Premises for ex-ante and ex-post pool prices (g) Premise for least cost despatch (h) Premise for allocation of losses (i) Premise for allocation of Regional UI charges among State Pool Participants

### **Chapter-8: Implementation Challenges**

This Chapter deals with various implementation challenges that will have to be dealt with appropriately for implementation of ABT mechanism at State level. This Chapter elaborates on specific requirements arising out of proposed ABT mechanism to be adopted at State level in terms of energy metering, energy accounting, information requirement for market operation, obligation of parties to furnish requisite information.



Specific implementation challenge areas covered under this Chapter are (a) Energy Accounting (b) Accounting of energy during emergency conditions (Market Suspension) (c) Metering Requirements (d) Information Requirements (e) Obligations to provide information

### **Chapter-9: Settlement Process and Rules**

This Chapter deals with premise and rule for settlement of energy exchange amongst State Pool Participants in the context of the market operations under ABT mechanism. The principles outlined under this Chapter specifically strives to address rules pertaining to settlement of imbalance energy exchange amongst State Pool participants, rule for settlement of regional UI pool account, rule for settlement of inter-state trade of energy pool account and rule for settlement of fixed cost reconciliation pool amongst State Pool Participants. This Chapter also elaborates on specific requirements for *fail-safe* market operations such as payment guarantees, events of defaults by State Pool Participants, Market Operations (MSPC) and Market Service providers (MSLDC, MSETCL etc.) and remedies thereof. Specific areas covered under this Chapter are (a) Billing and Payment (b) Settlement of Regional UI Pool account (c) Settlement of FCR Pool account (d) Settlement of inter-State trade Pool account (D-trade) (e) Payment Guarantees (f) Payment Default and Remedies

### **Chapter-10: Governance Structure**

This Chapter deals with most critical aspect of 'Governance' in the context of the market operations under State level ABT mechanism. Specific areas covered under this Chapter are (a) Objective of Governance under state level ABT mechanism (b) Constitution of Maharashtra State Power Committee (c) Functions of Maharashtra State Power Committee (d) Powers of Maharashtra State Power Committee



## **2 REGULATORY FRAMEWORK FOR MARKET DEVELOPMENT AND GRID OPERATIONS**

This Chapter outlines the relevant provisions of Electricity Act 2003 (EA 2003) pertaining to ABT mechanism and market development and the mandate for the Commission thereof. Further, it elaborates on the National Electricity Policy and National Tariff policy framework outlining the broad policy framework for dealing with the issues of market development and Grid Operations at the State level. In addition, Indian Electricity Grid Code 2006 and State Grid Code Regulations formulated by CERC and MERC respectively, forms an integral part of governing regulations and the selection of the appropriate 'market design framework' will have to be guided by the conditions contained in the said regulations. In summary, this chapter highlights the key issues to be taken into consideration under evolving regulatory policies while determining the appropriate 'Availability Based Tariff' mechanism at the State level.

### **2.1 ELECTRICITY ACT 2003 AND MANDATE FOR THE COMMISSION:**

The Section 66 of Electricity Act, 2003 regarding Market Development states that,

*“The Appropriate Commission shall endeavor to promote the development of market (including trading) in power in such manner as may be specified and shall be guided by the National Electricity Policy referred to in Section 3 in this regard”*

The National Task Force in its recommendations has advocated the concept of 'common power market design (CMD)' to be adopted across the country in order to usher in harmonious operation of power markets. The Task Force has recommended following definition for CMD:

*“A common power market design comprises a core and common set of philosophies translated to standard rules, procedures and products designed to create a seamless transmission system across multiple wholesale and retail markets and different regulatory jurisdictions across the States. This design must facilitate implementation and must promote reliability, enhance efficiency and offer non-discriminatory access, whilst making access more transparent by offering common standards and validation.”*



The Task Force has recommended that GOI, in consultation with CERC/SERC, the Authority and States, should conceive the overall power market design within one year. While devising the market design, the Task Force has outlined the guiding principles and constraining factors for the same as follows:

- From the perspective of evolving power markets that have adequate depth in terms of sufficiency of market participants, it would be appropriate for the present to adopt 'Region' as a Market.
- Regulatory review and action on market concentration and dominance should consider regional market as unit of evaluation for the present.
- It needs to be noted that frequency integration of the whole country is still some years away.
- The National Load Despatch Centre (NLDC) envisaged in Section 26 of Electricity Act, 2003 is yet to be set up.
- The ABT framework has been implemented at the regional level and this represents the imbalance settlement arrangements that necessarily need to be a feature of the power trading markets.

In view of above, selection of initial design of 'trading separation' would have great influence on whether in the long run truly competitive markets for electricity could be developed in India and the initial market design framework should facilitate creation of competitive market in the long run.

Given the fact that the price discovery is the single most important function of any market, the Commission should consider a framework which has ability to evolve in to a mechanism for true price discovery. This would mean framework has to provide for multiple buyers and sellers and give them ability to provide their price preferences.

Further, while developing such framework, one must take note of the fact that the Act has opted for Open Access as an instrument for transactions in the competitive environment. Whether one uses "Open Access" or any other instrument for competitive transactions, the nature of electricity is bound to create some imbalances vis a vis their contracts. It is essential that we develop suitable mechanism for valuing these imbalances and imposing the costs of imbalance on the parties causing such imbalances.



It is essential that this mechanism is compatible with the long term market design. It is also essential that any mechanism developed is compatible with the inter-state availability based tariff mechanism.

It is being suggested that Availability Based Tariff Mechanism which has worked well at the regional level should be adopted at intra-state level. However, we need to check the suitability of using this at the state level given the fact that the requirements at the state level are totally different than that at regional level. The ABT and UI mechanism was developed essentially as a regulatory mechanism to bring about grid discipline. We need to ensure that this mechanism is suitable as a market mechanism and would be able to provide efficient pricing signals for long term investment in the sector.

## **2.2 NATIONAL ELECTRICITY POLICY: SALIENT FEATURES**

The National Electricity Policy notified on 12<sup>th</sup> February 2005 states as under:

*“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.” (Ref. Clause 5.7.1 (b) of NEP)*

## **2.3 ‘NATIONAL TARIFF POLICY’: SALIENT FEATURES**

The National Tariff Policy notified as on 6<sup>th</sup> January 2006 stipulates that:

*“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. : (Ref. Clause 6.2 (1) of NTP)*

*“Alternatively, a frequency based real time mechanism can be used and the captive generators can be allowed to inject into the grid under the ABT mechanism.” (Ref Cl. 6.3 of NTP)*

Further, as per Section 32 of EA 2003, State Load Despatch Centre shall be an apex body to ensure integrated operations of the power systems in the State. Further, SLDC is responsible for optimal scheduling and despatch of electricity within State in accordance



with the contracts entered into between licensees and generating companies within State. Further, Section 33 of EA 2003 states that -

*“(1) The State Load Despatch Centre in a State may give such directions and exercise such supervision and control as may be required for ensuring the integrated grid operations and for achieving the maximum economy and efficiency in the operation of power system in that State.*

*(2) Every licensee, generating company, generating station, substation and any other person connected with the operation of the power system shall comply with the direction issued by the State Load Despatch Centre under subsection (1).” (Section 33 of EA 2003)*

#### **2.4 FOIR RECOMMENDATIONS**

The Forum of Indian Regulators (FOIR) had formulated Sub-Committees during March 2005 to get into the details of introduction of ABT mechanism at State level. The two specific tasks assigned to the Sub-Committee were (i) to make recommendations to FOIR on implementation of ABT in intra-State systems and (ii) to co-ordinate with CEA on Metering Regulations. Upon several rounds of deliberations, the Sub-Committee finalized its recommendations during November 2005 on implementation of ABT mechanism at the State level.

The Sub-Committee acknowledged that its recommendations are not mandatory and the SERCs are fully competent to decide on the subject matter within their respective State jurisdiction. However, it suggested that while introducing ABT mechanism at State level it needs to be ensured that intra-State ABT mechanism is not incompatible with the inter-State ABT system. Above recommendations were adopted by the FOIR during its 7<sup>th</sup> annual general meeting held on June 15, 2006.

#### **2.5 INDIAN ELECTRICITY GRID CODE 2005**

While formulating the rules for development of ABT mechanism at State level, following key aspects of the power system operations as stipulated under Indian Electricity Grid Code 2005 (IEGC 2005) needs to be taken into considerations such as – (a) Free Governor Mode Operations (FGMO) (b) Connection conditions for Generating Units (c) and power system security aspects. The relevant extract of the clause 1.6 of IEGC 2005 is as under:

*“(i) All thermal and hydro (except those with zero pondage) generating units: with effect from the date to be separately notified by the Commission.*



ii) Any exemption from the above may be granted only by CERC for which the concerned constituent/ agency shall file a petition in advance.

iii) The Gas turbine/Combined Cycle Power Plants and Nuclear Power Stations shall be exempted from Sections 4.8 (c), 4.8 (d), 5.2 (e), 5.2 (f), 5.2 (g) and 5.2 (h) till the Commission reviews the situation.” (Ref. Clause 1.6 of IEGC 2005)

The Clause 4.8 of IEGC 2005 stipulates the **Connection Conditions for Generating Units** as under:

“c) Each Generating Unit shall be fitted with a turbine speed governor having an overall droop characteristic within the range of 3% to 6% which shall always be in service.

d) Each Generating Unit shall be capable of instantaneously increasing output by 5% when the frequency falls limited to 105% MCR. Ramping back to the previous MW level (in case the increased output level can not be sustained) shall not be faster than 1% per minute.” (Ref. Cl. 4.8 of IEGC 2005)

Further, from **system security perspective** Clause 5.2 of IEGC 2005 stipulates as under

(e) All generating units, which are synchronized with the grid, irrespective of their ownership, type and size, shall have their governors in normal operation at all times . If any generating unit of over fifty (50) MW size (10 MW for North-Eastern Region) is required to be operated without its governor in normal operation, the RLDC shall be immediately advised about the reason and duration of such operation. All governors shall have a droop of between 3% and 6%. (Ref Clause 4.8 of IEGC 2005)

(f) Facilities available with/in load limiters, Automatic Turbine Run-up System (ATRS), Turbine supervisory control, and coordinated control system, etc., shall not be used to suppress the normal governor action in any manner. No dead bands and/or time delays shall be deliberately introduced.

(g) All Generating Units, operating at or up to 100% of their Maximum Continuous Rating (MCR) shall normally be capable of (and shall not in any way be prevented from) instantaneously picking up five per cent (5%) extra load when frequency falls due to a system contingency. The generating units operating at above 100% of their MCR shall be capable of (and shall not be prevented from) going at least up to 105% of their MCR when frequency falls suddenly. After an increase in generation as above, a generating unit may ramp back to the original level at a rate of about one percent (1%) per minute, in case



*continued operation at the increased level is not sustainable. Any generating unit of over fifty (50) MW size (10 MW for NER) not complying with the above requirements, shall be kept in operation (synchronized with the Regional grid) only after obtaining the permission of RLDC. However, a constituent can make up the corresponding short fall in spinning reserve by maintaining an extra spinning reserve on the other generating units of the constituent.*

*(h) The recommended rate for changing the governor setting, i.e. supplementary control for increasing or decreasing the output (generation level) for all generating units, irrespective of their type and size, would be one (1.0) per cent per minute or as per manufacturer's limits. However, if frequency falls below 49.5 Hz, all partly loaded generating units shall pick up additional load at a faster rate, according to their capability. (Ref Clause 5.2 of IEGC 2005)*

## **2.6 STATE GRID CODE 2006**

The Clause 32 of MERC (State Grid Code) Regulations, 2006, states that the Commission shall specify 'Scheduling and Despatch Code' separately upon consulting State Load Despatch Centre within six months from notification of the State Grid Code Regulations. The Scheduling and Despatch Code shall contain following:

*“(v) procedures of issuing real time despatch/drawal instructions and rescheduling, if required, to the Users and compliance with the same;*

*(vi) appropriate arrangements for settlement of deviations of actual generation or actual drawal from schedules and mechanism for reactive power pricing:*

*Provided that such settlement shall be carried out in a transparent manner and shall include adequate mechanisms for data verification.*

*(vii) responsibilities of State Load Despatch Centre and Users in voltage and frequency management; “(Ref. Clause 33 of State Grid Code Regulations 2006)*

## **2.7 TRANSMISSION PRICING FRAMEWORK AND INTRA-STATE TRANSMISSION SYSTEM**

The Commission had passed an Order on 27<sup>th</sup> June 2006 (Case 58 of 2005) in the matter of transmission pricing framework within Maharashtra, wherein the 'intra-State Transmission System (InSTS)', principles for pooling of transmission costs of various transmission licensees and recovery mechanism through composite transmission charge, interface points amongst licensees, principles for energy accounting and treatment of losses etc. have been outlined in detail. The above framework for intra-State



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Transmission system will have to be taken into consideration while devising Intra-State ABT mechanism. The monitoring 'schedules' and accounting of the 'deviations' thereof under Intra-State ABT mechanisms will have to be undertaken at the 'interface points' identified amongst the licensees as per above arrangement.



### **3 KEY CONSIDERATIONS FOR DESIGN OF ABT AT STATE LEVEL**

This Chapter discusses various objectives and key considerations for development of Availability Based Tariff (ABT) regime at State level. The development of appropriate mechanism for introduction of ABT regime at State level, need to be viewed in the context of objectives laid out hereunder such as improvement of grid frequency, instilling forecasting and load management discipline amongst distribution licensees, instilling despatch discipline amongst generators, encouraging more participation in state level balancing mechanism. Further, ABT mechanism will have to be devised taking into consideration several criteria such as cost of power for Maharashtra power system should not increase, fair and equitable allocation of risks amongst participants, constraints of system operation and stability, availability of metering and communication infrastructure, promoting long term development of market etc.

#### **3.1 OBJECTIVES FOR INTRODUCTION OF ABT AT STATE LEVEL**

The primary objectives which have to be fulfilled by the new system have to be looked at. The most important objectives are:

##### **3.1.1 To bring in more generation in the system and improve the grid frequency**

Currently, Maharashtra is facing acute power shortage with peak demand growing at a very high rate. During peak summer months, even Mumbai licensee faced acute power shortage necessitating initiation of load regulation measures. While the future position of demand-supply will depend on load growth and capacity additions, tapping of surplus power available today, if any, would assist in improvement of grid frequency and quality of supply.

##### **3.1.2 To instill forecasting and load management discipline in Distribution Licensees**

Prior to introduction of ABT at State level, the Distribution licensees did not face the implications of any inter-state UI earning or payment by the State. Under the integrated power system operations scenario, however, distribution licensees would be required to forecast their requirements accurately. In the market mechanism being developed, it is envisaged that the UI incident on the State will have to be passed on to the distribution licensees through appropriate mechanism, so as to incentivise Distribution licensees to accurately forecast their load requirements and manage the load accordingly.



**3.1.3 To instill despatch discipline in generators**

In the current scenario, some state generators may deviate from their despatch schedules and not face any commercial implications for the same. For example, they may generate beyond their schedule even when the frequency goes beyond 50 Hz. The payment to generators being based on actual generation and not scheduled generation, and the incentives linked to maintaining a high PLF can be the reasons behind these. Therefore, a mechanism might be required to instill despatch discipline among generators.

**3.1.4 To encourage participants within the state in balancing the system**

A balancing mechanism tries to match supply and demand on almost real-time basis. In developed markets, the system operator manages the balancing mechanism through a system of contracts. In India, at the regional level, this is sought to be achieved through ABT where, through a pre-determined price (UI rate), the participants are provided a signal to balance the system. At the state level, the SLDC is expected to play this role. It may do so by using reserves such as hydro capacity or by instructions to the demand side such as load relief measures. We may complement this system by an intra-state ABT mechanism which would encourage the involvement of participants in balancing the system.

**3.2 *KEY CONSIDERATIONS FOR DESIGN OF ABT AT STATE LEVEL***

Before looking into the various aspects of design of a new mechanism to be implemented in the state of Maharashtra, a few important principles have to be kept in mind which could act as the essential criteria for evaluation of any new alternatives. Based on these considerations and the objectives already discussed, we need to devise the system at the state level.

**3.2.1 Cost of power in the Maharashtra system as a whole should not increase**

Any increase in the cost has to be borne by the end consumer and hence, any new mechanism that is implemented should not increase the cost of the system as a whole. Thus, while introducing intra-state ABT with the objective of tapping more generation, we should bear in mind that the extra generation does not come at a very high cost. At the same time, while extending ABT to the state participants, there should not be any significant financial loss to the Distribution Licensees. In the recent past, MSEDCL has incurred significant cost on account of UI. While designing the new system, the intra-



state UI mechanism should be such that the utilities do not incur significant UI costs on account of inter-state UI mechanism.

**3.2.2 Quality of supply and the efficiency of various entities should improve**

One of the most important objectives behind reforms in the electricity sector in the State will have to be improvement in efficiency of the various entities and improvement in the quality of supply. The generating stations should despatched in most efficient manner taking into account economy of operations and merit order despatch principles for the power system as a whole irrespective of the ownership. Any new system should promote/incentivise the improvement in efficiency and quality of supply and exchange of power amongst market participants. Tapping of excess generation will improve the frequency profile of the system and thus will lead to improvement in quality of supply.

**3.2.3 The new system should promote the development of market, i.e., encourage participation by many buyers and sellers.**

Another objective behind the reform process has been the development of a market in the long term. Therefore, any new system should be in line with the overall objective of market development. The new system should offer opportunities to many buyers and sellers to take part in the market and maximise economic gains.

**3.2.4 Fair and equitable sharing of risks amongst various State participants**

The proposed arrangement should not result in in-equitable allocation of risks and costs amongst the State participants. The proposed mechanism should take into consideration existing contractual arrangements and agreed risk sharing arrangements amongst the State participants. The risk and returns should be commensurate with each other.

**3.2.5 System Operations and Stability**

SLDC has the responsibility to maintain system security and stability and for that purpose SLDC can exercise control on the system participants. Before implementing any new mechanism in the State, it is extremely important to examine the impact and implications of the new mechanism on critical system parameters and to ensure that the stability and security of the system is not jeopardised in the new mechanism. The system parameters which are of critical importance are frequency of the grid, line loading, voltage profile, transformer loading etc.



#### **4 CHARACTERISTIC FEATURES OF MAHARASHTRA POWER SYSTEM**

In view of the regulatory and policy framework outlined under Chapter 2 and the key considerations for development of ABT regime at State level, as outlined under Chapter 3, it would be important to address some key issues specifically relevant in the context of Maharashtra, such as 'industry restructuring', multiple licensee operations, existing scheduling and despatch process, standby arrangement and islanding operations for Mumbai licensees, etc.

##### ***4.1 INDUSTRY RESTRUCTURING***

Historically in Maharashtra, the generation, transmission and distribution systems have been developed over the period by different licensees such as MSEB, The Tata Power Company Ltd (TPC), Reliance Energy Ltd (REL – formerly known as BSES Ltd), and Brihanmumbai Electric Supply & Transport Undertaking (BEST) and Mula-Pravara Electric Co-operative Society Ltd (MPECS).

Government of Maharashtra (GoM) vide its GR dated January 24, 2005 has restructured the erstwhile Maharashtra State Electricity Board (MSEB) into four companies, namely, MSEB Holding Co. Ltd, Maharashtra State Power Generation Company Ltd (MSPGCL), Maharashtra State Electricity Transmission Company Ltd (MSETCL), Maharashtra State Electricity Distribution Company Ltd.(MSEDCL), which have commenced their operation with effect from June 6, 2005. Further, GOM has notified MSETCL to act as State Transmission Utility (STU) vide its GR no. Reform 1004/S.No 8885/Energy-5 dated 17<sup>th</sup> February 2005 in accordance with the provisions Section 39 of EA2003. Further, MSETCL as Government Company continues to undertake statewide load despatch related activities.

Pursuant to enactment of EA 2003, while existing deemed licensees continued to undertake various activities such as generation, transmission and distribution, the Commission directed all the licensees to submit their licenses to bring their licensees in line with the requirements under EA2003 and various regulations thereon. In addition, the Commission also directed the licensees to furnish their function-wise segregated annual revenue requirement corresponding to generation, transmission and distribution operations, separately.



Prior to enactment of EA 2003 or even until recently, most of these licensees have had integrated operations and continued to own distribution business and generation assets in addition to the transmission assets as well. However, pursuant to enactment of EA 2003, while generation activity has been de-licensed, the activities pertaining to 'transmission' and 'distribution' have to be viewed as distinct licensed activities to be regulated in accordance with the provisions of the EA 2003.

Accordingly, the Commission had directed all licensees to undertake 'functionwise' segregation of the assets and liabilities and furnish their Petitions for Annual Revenue Requirement for each function separately. Upon detailed regulatory process, the Commission had recently issued Tariff Orders in respect of ARR/Tariff Petitions for FY2006-07 filed by various licensees. Under these Orders, the Commission had extensively dealt with the functionwise segregation of ARR of licensees. Further, the Commission is currently seized with modification to existing licence conditions of these licensees to bring the same in line with provisions outlined under EA 2003 and the Commission's licensing Regulations.

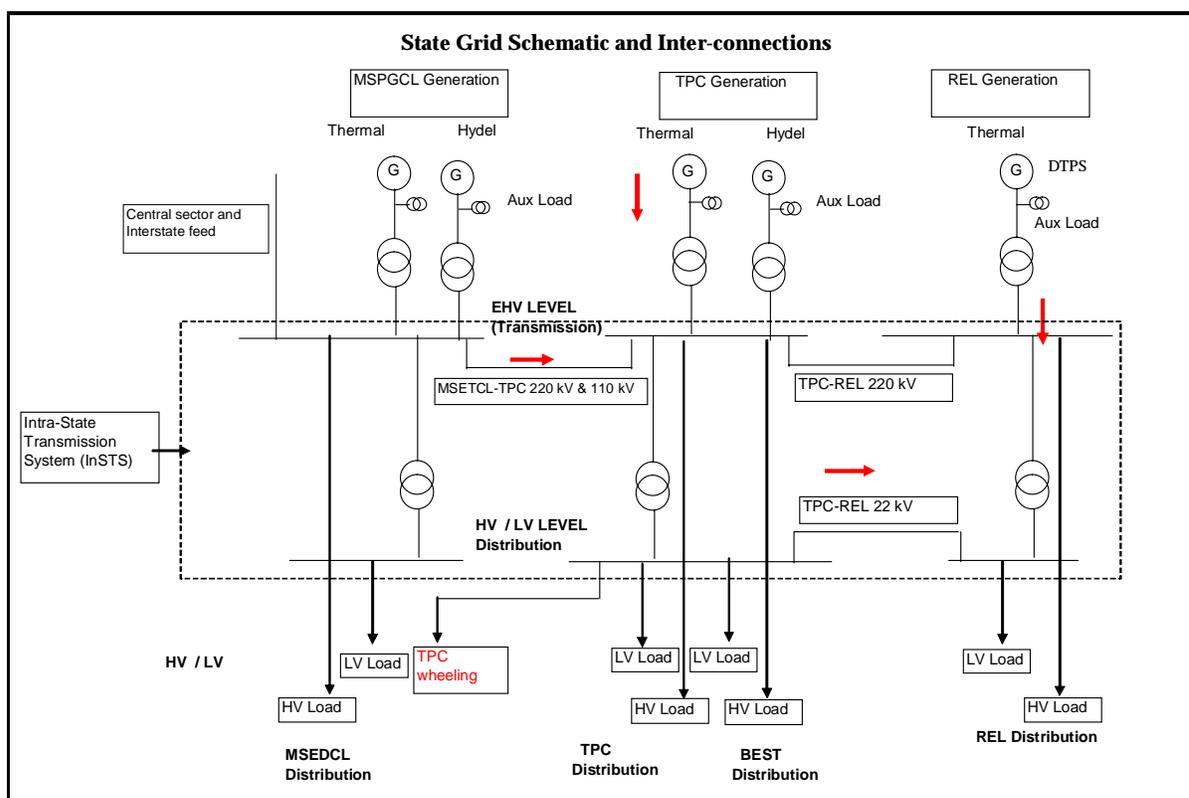
Thus, while licensees could continue to undertake 'generation' and 'distribution' activities simultaneously, their 'deviations' from 'schedule' at generation to transmission (G-T) interface for supply/despatch of generating stations and at transmission to distribution (T-D) interfaces for energy drawal will have to be monitored and accounted separately. Accordingly, development of ABT mechanism at State level will have to specifically take into consideration above aspect so that, responsibility of load-generation balancing amongst various State participants can be addressed appropriately.

#### **4.2 MULTIPLE LICENSEES AND INTERCONNECTIONS**

As outlined earlier, the 'generation' and 'distribution' activities of various participants in the State Grid needs to be accounted separately. For this purpose, the clarity on inter-connections and energy exchange over these exchanges needs to be ascertained. The Commission's transmission pricing framework has clearly defined 'intra-State Transmission system (InSTS) and directed the licensees to enter into Connection Agreements for each interconnection point amongst the licensees.



A Brief Schematic outlining present arrangement of interconnection of ‘generation’ and ‘distribution’ business of various licensees to ‘intra-State transmission system (InSTS) is presented in the diagram below.



Based on information furnished by various licensees, it is evident that there are several interface points (as depicted in table below) that need to be covered for the purpose of ‘energy accounting’.

<b>T&lt;&gt;D Points</b>	<b>Interface</b>	<b>400/220 kV</b>	<b>132 kV/110 kV</b>	<b>66 kV/33 kV/ 22 kV</b>	<b>SUM</b>
MSETCL-MSEDCL		352	719	126	<b>1197</b>
MSETCL – TPC		2	3	18	<b>23</b>
TPC- REL		2		2 / 6	<b>10</b>
TPC-BEST			2	2 / 2	<b>6</b>
<b>TOTAL</b>		<b>356</b>	<b>724</b>	<b>156</b>	<b>1236</b>



The current status of metering at these interface points and the metering plan will have to be taken into account while devising appropriate 'ABT mechanism at State level'. In fact, as metering plan evolves and as sophisticated systems for energy accounting and settlement are put in place, complex ABT mechanism and structures can be introduced and the same can be extended to more State participants without any implementation hurdle.

#### ***4.3 SCHEDULING AND DESPATCH - EXISTING PROCESS***

At present, State Load Despatch Centre (SLDC) operated by MSETCL (Kalwa and Ambazari) caters to the requirements of system operation pertaining to MSPGL and MSEDCL alone. It co-ordinates with Western Regional Load Despatch Centre for scheduling and despatch of allocated share of Maharashtra from central generating stations on day-ahead basis, as well as co-ordinates during real time operations. However, SLDC does not receive any demand forecast from MSEDCL at this stage and only receives availability forecasts from generating stations of MSPGCL on day ahead basis.

Due to significant demand-supply gap (around 4500 MW) currently prevalent in Maharashtra, SLDC had to resort to planned load shedding across Maharashtra. The Commission had approved principles and protocol for load shedding for MSEDCL from time to time and SLDC is required to devise appropriate scheme for catering to daily demand in a planned way.

The generating stations of TPC are scheduled and despatched by TPC's load despatch centre at Trombay. TPC-LDC co-ordinates with SLDC on daily basis, however, it does not submit any 'generation schedule' to SLDC, instead it only furnishes 'availability' details of its generating stations to SLDC. Besides, other distribution licensees such as REL and BEST do not submit any 'demand forecast' to TPC-LDC or SLDC.

Thus, a significant process change is involved not only in terms of 'demand forecasting' by all distribution licensees on daily basis, but also in terms of furnishing such information to SLDC on daily basis. Significant capacity building initiatives in terms of resources and infrastructure will have to be undertaken at SLDC in order to cater to such huge 'data handling' and process related requirements.



Development of ABT mechanism at State level will have to take into consideration above aspects while introducing any ABT mechanism and the phasewise approach is most suitable for adoption under the circumstances.

#### ***4.4 CENTRALISED OR DECENTRALISED DESPATCH***

As outlined above, currently TPC generating stations are scheduled and despatched by TPC-LDC and DTPS is despatched by REL depending on load requirement of REL's distribution system. However, as per Section 32 of EA2003, the State Load Despatch Centre (SLDC) is responsible for co-ordination of grid operations within State. Further, SLDC has to ensure optimal utilization of resources within State.

In order to ensure merit order despatch of generating stations within State, all generating stations within State should be available at command and control of the SLDC and the information pertaining to their daily availability should be available with SLDC.

The environmental restrictions, constraints on thermal loading of generating stations, limitations of ramp-up and ramp-down rates etc will also have to be taken into account while scheduling and despatch of various thermal generating stations within State. Further, the Commission under its recent Order in case of ARR/Tariff Petition of MSPGCL for FY2006-07 has highlighted need for judicious use of precious hydro resource and devised an innovative 'hydro pricing' scheme linked to system marginal prices for generation during peak hours and off-peak hours.

Thus, centralised merit order despatch can cater to various aspects while striving to optimize overall cost of power system operations within State. ABT mechanism at State level will have to be devised suitably.

#### ***4.5 STANDBY SUPPORT AND ISLANDING OPERATIONS FOR MUMBAI LICENSEES***

Currently, there are two characteristic features Mumbai power system operations are 'standby support' provided by MSEDCL system at significant cost of 'standby charges' and 'islanding operations' in the event of emergency in western regional system or system failure in other parts of MSETCL system. The operations of power system and



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rules for 'balancing' during period of islanded operation will have to be put in place to address these specific requirements.

In this context, it is worthwhile to note that the Commission in its Order dated 9<sup>th</sup> December 2005 in the matter of (Case 3 of 2003) has observed that existing islanding scheme for Mumbai will continue to operate. However, the same may need to be reviewed as we move towards principle of 'free flow of power' over all interconnections over intra-State transmission system. Besides, any modification to 'islanding scheme' will have to be undertaken upon detailed technical study and concurrence of the Regional Power Committee would be essential. The relevant extract of the said Order is as under:

*"The Commission is of the opinion that the existing islanding system in Mumbai has been implemented based on the recommendations of the Committee constituted to review the operation of Mumbai islanding system. The existing islanding scheme, which is also in line with the provisions of the PoA and also addresses requirements of both licensees has been operational and has successfully islanded Mumbai city on several occasions. The Commission notes that existing islanding scheme may not work with the principle of 'free flow of power' over intra-State transmission system as specified in this Order, and therefore, the islanding scheme may have to be modified. Any modification to the islanding scheme would require detailed technical study for its formulation and concurrence of Regional Electricity Board/Regional Power Committee for its implementation. Till such time new islanding procedures are developed and implemented, the existing islanding mechanism should be continued." (Clause 84 of Order for Case 3 of 2003)*



## **5 APPLICABILITY OF ABT TO STATE PARTICIPANTS AND LIKELY MECHANISM**

The most important design parameters in the intra-state ABT mechanism are the participants or the market players to whom the intra-state ABT will be extended and the mechanism for determination of rate for settlement of energy transactions amongst various state participants. Under this chapter, we would discuss in detail the likely reasons for which intra-state ABT might be extended to any participant and the risks and issues associated with extending the intra-state ABT system to that particular participant. We shall discuss key considerations for applicability of intra-State ABT mechanism in case of following state level participants:

1. State Generating Stations
2. Renewable energy generators
3. Captive Power Plants
4. Open Access Users
5. Distribution Licensees

### **5.1 STATE GENERATING STATIONS**

As regards State generating stations, whether owned by public or private companies, there are two critical aspects of Availability based Tariff (ABT) that need to be addressed. I.e. (a) linking recovery of fixed costs or capacity charges to the availability of generating station (b) applying 'Un-scheduled interchanges' regime to such generating stations.

Pursuant to un-bundling of MSEB, MSPGCL for the first time have furnished stationwise fixed cost details as a part of their ARR/Tariff submission for FY2006-07. Further, the Commission as per its Order for MSPGCL (Case 48 of 2005) issued during Sep 2006 has already approved station wise fixed costs for various generating stations and approved recovery mechanism linked to normative availability of 80% in accordance with the Tariff Regulations notified by the Commission. Under the said Order, the Commission has also approved the incentive mechanism and recovery thereof corresponding to approved target availability for each generating station.

Further, in case of Hydro Generating Stations, the Commission has introduced 'innovative Hydro Pricing' scheme linked to system marginal cost based on generation



during 'peak hours' and 'off-peak' hours in order to provide appropriate economical signal for judicious utilization of scarce hydro resource.

In addition, the Commission had also approved ARR and determined tariff for FY2006-07 in case of generating stations of private generating companies such as TPC and REL vide its Order dated October 3, 2006 (Case 12 and 56 of 2005) in case of TPC and Order dated October 3, 2006 (Case 25 and 53 of 2005). The fixed cost recovery of said generating stations has been linked to the 'availability' of the respective generating stations in accordance with the Tariff Regulations. Thus, first part of the ABT Mechanism at State level has been suitably extended in case of State Generating Stations.

However, as far as extending second part of ABT mechanism i.e. applicability of UI mechanism to State Generating stations is concerned; there are several critical aspects that need to be taken into consideration as outlined below.

#### 5.1.1 The Objectives Likely to be achieved

The primary objectives to be achieved by introduction of frequency linked UI mechanism to the state generating stations are:

1. To bring in more generation and improve the grid frequency
2. To instill despatch discipline amongst the generators

Under the frequency linked UI regime, charges will be paid to or levied on the generator for any deviations from schedules. These could be favourable if the generator is under-generating at high frequency or over generating at low frequency and unfavourable if the generator is over-generating at high frequency or under generating at low frequency conditions.

In a deficit scenario, where all the generators would have been fully despatched up to their declaration, the generators would utilise the design margins of the machine to achieve generation higher than their installed capacity (when the full capacity has been declared in the first instance) and thus would be able to inject more than their installed capacity into the system at time of low frequency conditions. This mechanism would provide for the right price signals to the generators to generate more when the frequency is low and vice versa and will also pre-empt the possibility of unwanted



generation at higher frequency because the variable cost payment would now be linked to scheduled generation and not actual generation.

While the introduction of frequency linked UI mechanism for state generating stations seems to be a theoretically good option in order to achieve the objectives as listed above, we must analyse any implications of such a step as far as the key considerations as discussed under Chapter 3 earlier are concerned. In the next sub-section we shall look at the risks and issues associated with introduction of frequency linked UI mechanism to the state generating stations.

#### 5.1.2 Key Considerations in Implementing frequency linked UI mechanism for State Generating Stations (SGS)

- Electrical load by its very nature is variable and currently SLDC attempts to meet this load using fixed CGS generation and variable SGS generation. Implementation of UI at State level would take away this flexibility from SLDC as SGS schedules will also have to be fixed and SGS will be allowed to vary their injection if economics works in their favor which is likely to result in increase in cost.
- The SLDC is entrusted with the responsibility of economical despatch of generators. SLDC uses flexibility available in scheduling SGS to minimize UI cost or maximize the UI benefit. This benefit is passed on to the consumers by way of reduction in ARR. If this benefit is passed on to generators (through intra-state ABT mechanism), it would not be available to DISCOMs and thereby to consumers. During past six month period from April 2006 to September 2006, in western region alone central generators earned UI of more than **Rs. 53.96 Crore. Given the financial health of the distribution sector as well as cost recovery from consumers, it is necessary that this benefit is made available to the consumers.**
- It is feared that UI mechanism would lead to increase in costs to the sector as significant gaming opportunities are available to the generators. The frequency linked UI charges similar to the mechanism at the inter-state level would motivate generators to indulge in gaming, i.e., under-declare their availability and then over generate to earn the UI charges. Even at the central level, it has been noticed that some of the central generating stations are consistently under-declaring their



capacity and thereby earning UI. Further, CERC has allowed over-generation (1% in a day) by CGS over the declared capacity to earn UI though various beneficiary states have argued that the excess generation should not call for payment of UI charges and this excess generation should be compensated for by payment of variable cost only.

- The excess generation that is expected to come into the system would be possible if the generators utilise the design margins of the machines under periods of low frequency. According to the grid code, these design margins should only be utilised when the system is under a critical condition. The grid code specifies critical condition as the period when frequency is below 49.5 Hz. Hence, from a system security and stability perspective it might not be desirable on the part of generators to play with the design margins as long as the frequency is above 49.5 Hz. But, introduction of intra-state ABT with frequency linked UI rates might give them an economically attractive rate for higher generation even at frequencies of 49.7 or 49.8 Hz. Under such a scenario, a generator will generate more than its installed capacity to the extent of exhausting the design margin and if due to some reason the grid frequency then falls below 49.5 Hz, there will be no reserve margin in the system left as all the generators would have already exhausted their design margins. This issue is very important from the system security standpoint. Also, from a purely technical perspective on the life of machines, continuous utilisation of the design margins would lead to greater wear and tear of the machines and would be disadvantageous in the long run.
- The load generation balancing act will virtually be taken over by the generators and SLDC will practically become a non-player in discharge of its basic duty of load-generation balance. The role of SLDC as a command and control mechanism is essential to maintain grid security. This issue should be considered under the fundamental principle of ensuring system security and stability.
- As per the terms of the commercial arrangement, all the generators (whether owned by public or private entities) are required to recover their full costs linked to 'availability' based on declared capacity as well as they can earn incentives for their generation beyond normative availability. Any risk of unscheduled outage is also



borne by the DISCOMs. Under the situation, the generators should be made to abide by instructions of the SLDC and the requirements of the distribution licensees alone. There appears to be no necessity to extend any additional incentives to such generators to require them to assist in balancing the system.

- Besides, it may be argued that the system of ABT (with frequency linked UI mechanism) as it exists today is advantageous to the generators and disadvantageous to the beneficiaries. This is because generators have greater control on their output than the DISCOMs have on their load (which can vary due to various factors). Besides, the DISCOMs do not have the infrastructure such as real time communication systems etc. to get real time information about their loads. On the other hand, the generators have full visibility of their own generation. Extending intra-state ABT to generators would then violate the principle of equitable sharing of risks and returns among the participants.
- Extending intra-state ABT will make generators concentrate on generating more active power reducing the reactive power capability of their machines. This would make the voltage management even more difficult which is a very important system parameter as far as system stability is concerned.
- Existing commercial arrangements amongst generators and distribution licensees do not permit levy of the frequency linked charges on the generators. Modification to said commercial arrangements (PPAs) would be required if such pricing is to be implemented. Otherwise, such PPAs will have to be excluded from intra-state mechanism.
- Under the intra-state ABT regime, where the generators will self-despatch as per their economics, it will be much more difficult to maintain system parameters like frequency, voltage, line loadings etc. as the generators will enter and exit with their additional generation at their own discretion.

All the above issues should be looked at in the light of the key considerations as discussed under Section 3. Any system which increases the cost of power in the system



or poses risks to the stable operation of the grid should be carefully examined before being implemented.

### 5.1.3 Conclusion for State Generating Stations (SGS)

Based on above analysis, it is summarized that the costs (due to gaming possibilities) and issues related to system operations such as maintaining adequate reserve margins, maintaining grid parameters etc., related to introducing UI mechanism for state generators would exceed the benefits that would arise due to any excess generation. **Hence, it is preferred that UI mechanism should not be introduced for State Generators at this stage. However, ABT mechanism at State level involving fixed cost recovery linked to ‘availability’ should be extended to State Generating Stations with immediate effect.**

## 5.2 **RENEWABLE ENERGY GENERATORS**

MERC State Grid Code Regulations 2006 as well as Indian Electricity Grid Code (IEGC 2005) has stipulated that all generating units with Capacity of 50 MW and above shall be subjected to scheduling and despatch regime as stipulated under the Grid Codes and shall be subjected to the despatch instructions issued by RLDC/SLDC, as the case may be, from the point of view of system security.

In case of renewable energy generators, unit size of each RE generator ranges from 350 kW (in case of wind) to 6-8 MW (in case of biomass power projects). Further, Renewable energy based generation because of its very nature, is infirm generation and it may not be amenable to scheduling on ‘timeblock to timeblock’ on day ahead basis. In fact, it needs to be despatched at all times as and when available in order to maximize generation and optimal utilization of renewable energy generation assets.

Some renewable energy generation such as biomass based power plants can be subjected to scheduling and despatch regime, however, availability of necessary communication and metering infrastructure is essential for such implementation. Further, benefit of extending ‘scheduling and despatch’ regime to such small capacity (< 10 MW) generating station need to be first ascertained, as most of these projects present a dispersed generation connected at distribution level (33 kV or below) thereby limiting their visibility at SLDC for meaningful command and control operations.



It is with this background, the Commission had determined 'single part' tariff in case of renewable energy based generation in Maharashtra such as wind energy projects, non-fossil fuel based co-generation projects, small hydel power projects and biomass based power projects and have clarified that generation from such RE projects shall not be subjected to merit order despatch.

Further, it is only natural that penalties are commensurate with rewards. The State Generating Stations have capability to change generation using frequency signals (and in turn UI rate) to earn UI benefit. It would be appropriate to apply UI rate for excess generation to such generating plant. Given that renewable energy generation is not able to make use of frequency signals, it would not be appropriate to apply UI rate for any excess injection either for sale to distribution companies or for captive/ OA consumers. Accordingly, extending UI mechanism to RE generators is not desirable.

#### 5.2.1 Conclusion for Renewable Energy Generators (REG)

Based on above analysis, it is summarized that the renewable energy generation cannot be scheduled on 'timeblock' basis and needs to be despatched at all times as and when available in order to maximize generation from available renewable energy resource and optimal utilization of RE generation asset. **Hence, it is preferred that UI mechanism should not be extended for Renewable Energy Generators at this stage.**

### **5.3 CAPTIVE POWER PLANTS**

The Clause 6.3 of the National Tariff Policy stipulates that *“Appropriate Commission should create an enabling environment that encourages captive power plants to be connected to the grid. Such captive plants could inject surplus power into the grid subject to the same regulation as applicable to generating companies. Firm supplies may be bought from captive plants by distribution licensees using the guidelines issued by the Central Government under section 63 of the Act. The prices should be differentiated for peak and off-peak supply and the tariff should include variable cost of generation at actual levels and reasonable compensation for capacity charges. Alternatively, a frequency based real time mechanism can be used and the captive generators can be allowed to inject into the grid under the ABT mechanism.”*



In fact, the Commission earlier had issued an Order around two years ago on September 8, 2004 (Case 55 & 56 of 2003) in the matter of power purchase and other dispensation in respect of fossil fuel based captive power plants. Under the said Order, the Commission had ruled a tariff rate linked to frequency linked UI rate for procurement on firm and non-firm basis with floor rate (1/3<sup>rd</sup> of UI rate at 49 Hz) and ceiling rate (2/3<sup>rd</sup> of UI rate at 49 Hz). Subsequently, the Commission through its Order dated August 11, 2006 (Case 47 of 2005) revised the ceiling rate for purchase of power from fossil fuel based CPPs to be equivalent to UI charge at 49 Hz. Further, it needs to be noted that the payment for such procurement was linked to 'actual energy' injected by CPP and not 'scheduled energy', and the entire procurement was treated as Un-scheduled Interchange to be procured at stipulated rates. However, it is understood that no commercial transaction has taken place based on above arrangement till date. This may be on account of uncertainty surrounding the UI rate or lack of interest of CPP generators to above frequency linked UI arrangement.

In this context, it is noted that the captive power plants are set up primarily to meet load requirement and to ensure reliability of supply to host industry. Sale of surplus power available to the grid is incidental to the overall operations of the CPP and host industry. This is particularly true in case of continuous process industry with CPP, whose first preference would always be to meet load requirement of host industry. For the purpose of planning and co-coordinating power supply from such CPPs, they could be subjected to providing 'schedules' to SLDC for monitoring purposes (subject to visibility at SLDC). However, such CPPs may not be amenable for 'scheduled energy' based compensation structure on 15-minute or 30-minute time block basis.

Subsequently, the Commission instituted a mechanism in the city of Pune; to tap about 90 MW of liquid fuel based captive capacity. Under this scheme, during peak hours, consumers with captive generation plant were to run their CPPs, thereby reducing drawal from the grid. This would release grid energy, which is then supplied to other consumers, thereby eliminating load shedding in the city of Pune. The captive generating plant is being compensated for additional generation cost which is being collected from the consumers in Pune city in the form of 'Reliability Surcharge'. The Commission has developed this scheme through transparent regulatory process and



issued Order dated May 16, 2006 (Case 1 of 2006), which has facilitated bringing surplus Captive Power capacity into grid.

Thus, it is noted that CPP industry would respond to innovative mechanisms provided clarity on commercial settlement mechanisms and regulatory certainty is rendered to such schemes. **Hence, it is suggested that ABT regime including UI mechanism should not be extended to Captive Power Plants at this stage.**

#### **5.4 OPEN ACCESS USERS (TRANSMISSION AND DISTRIBUTION)**

Having discussed the exclusion of captive power plants in the intra-state ABT system, the treatment of Open Access users should be looked at. Open Access (OA) users and captive plants complement each other in the sense that while a captive can inject excess power in the grid, an OA consumer can overdraw from the grid. We have discussed about the treatment of captive power plants and now the settlement of overdrawl by OA consumer needs to be discussed taking into account following key aspects.

It is important to understand and address the complexities of Open Access transactions before applying ABT mechanism to OA Users. It would be worthwhile to understand the distinctive requirement of Open Access Users and their classifications mainly from the perspective of technical feasibility and constraints in subjecting the OA Users to scheduling and despatching regime as per ABT requirements, similar to any other Distribution licensee. The Commission has already classified Open Access Users such as Transmission Open Access Users (TOAU) and Distribution Open Access Users (DOAU) under two separate Regulations, namely, MERC (Transmission Open Access) Regulations 2005 and MERC (Distribution Open Access) Regulations 2005. It is worthwhile to clearly define various classifications of OA users for the purposes of ABT regime as under:

**Transmission Open Access User (TOAU):** means a person who has been allotted transmission capacity rights to access an intra-state transmission system pursuant to a Bulk Power Transmission Agreement. Further, the term '**Direct Consumer**' shall mean Transmission Open Access User, who is also a consumer of a 'Distribution Licensee'.

**Distribution Open Access User (DOAU):** This shall refer to open access user connected to distribution network of distribution licensee (typically at 33 kV or below). The term



**'Embedded Consumer'** shall mean Distribution Open Access User, who is also a consumer of a 'Distribution Licensee'.

It is learned that currently within Maharashtra, all TOAU are consumers of a Distribution Licensee and have supply contract with concerned distribution licensee wherein its drawal point is situated and hence are '**Direct Consumers**'. However, in future it is envisaged that a TOAU may not be a 'Direct Consumer of Distribution Licensee' and shall source its entire power requirement from other sources such as Captive generation, trading licensee or other distribution licensee.

Similarly, it is learned that currently within Maharashtra, all DOAU are consumers of a Distribution Licensee and have supply contract with concerned distribution licensee wherein its drawal point is situated and hence are '**Embedded Consumers**'. However, in future it is envisaged that a DOAU may not be an 'Embedded Consumer of Distribution Licensee' and shall source its entire power requirement from other sources such as Captive generation, trading licensee or other distribution licensee.

For the purpose of operation of 'Balancing & Settlement' mechanism under ABT regime, this distinctive requirement of OA Users poses specific challenge in terms of tracking of imbalances vis-à-vis multiple contracting arrangements. Most importantly, technical feasibility of scheduling, despatching, monitoring of such transactions of Direct and Embedded Consumers (its inclusion or exclusion from Distribution licensees schedules and drawal etc.) needs to be explored before subjecting the concerned TOAU/DOAU to scheduling and dispatch regime as envisaged under ABT regime.

Presently, as per IEGC 2005 and State Grid Code Regulations, all generators above 50 MW need to be monitored and despatched by SLDC and subjected to despatch instructions issued by SLDC. Further, SLDC is required to monitor the drawal at 440/220/132 kV strategic substations and as per clause 4.8.4 (d), SLDC is required to monitor operations of all elements at 132 kV and above.

Thus, at present it is not possible for SLDC to monitor, schedule, and/or despatch any OA transaction involving OA generation below 50 MW and any load connected below 132 kV. Even in case of OA users connected at 132 kV, necessary communication, metering and monitoring facilities need to be installed to offer visibility at SLDC to enable them 'monitor, schedule, verify and effect appropriate adjustments to the wheeling schedules'.



Further, in order to bring OA transactions under ABT regime, some of the key aspects that need to be considered are:

- Provisioning of default service to open access consumers
- Visibility and control of open access load/consumer at SLDC level
- Prioritisation sequence in case of curtailment
- Requirement of energy banking facility for open access transactions

Accordingly, open access transactions can be classified in terms of 'full open access transactions' and 'partial open access transactions'. The 'full open access transaction' are those where in the open access user (generator/consumer) have contracted for its requirement in entirety and is not dependent on distribution licensee to provide any additional support/service (by way of default service or have any contract demand – CMD with a DISCOM) Such Open Access User is nothing but TOAU or DOAU as the case may be depending on voltage level at which drawal/injection point is connected. Thus, 'full open access User' can be treated *on par* with DISCOM for the purpose of 'State imbalance pool' and subjected to similar set of Balancing and Settlement Code.

Further, from system operational point of view in terms of visibility and control at SLDC (providing schedules and receiving dispatch/curtailment instructions in case of emergency) requirements of 'full open access User' connected at Transmission network (i.e. TOAU) are best handled within system rather than for 'full open access User' connected at Distribution network level (i.e. DOAU). Further, Distribution licensee would have already assumed risks and cost associated with all DOAU within its licensed area.

It is worthwhile to mention here that the physical aspects of scheduling, dispatch, monitoring and control do not vary with mechanism that one chooses for settlement of transactions which is in the nature of financial settlement. Thus, on real time basis the generators would inject energy and consumers including distribution licensees and open access users would draw energy. The imbalances arising on account of variation in physical flows as compared to contractual position of the parties would need to be settled by way of 'balancing pool' mechanism. Integration of open access transactions in



the 'imbalance pool' needs to be viewed in light of technical and financial requirements and limitations of operations of the pool.

One of the options is to allow membership of the 'Imbalance pool' to *full* TOAU to begin with and settlement of their transactions shall be made in accordance with the 'Balancing and Settlement Code'. Thus, during the initial phases of ABT regime, the *full* TOAUs will only be considered to be eligible for membership of the Imbalance Pool. However, such membership will be subject to the acceptance of the following conditions by the TOAUs:

- (i) The TOAUs shall share the imbalance costs and the UI costs.
- (ii) The TOAUs availing supply from captive sources have to demonstrate that they have contracted for the necessary capacity (MW) and energy with the generators.
- (iii) The TOAUs shall inform the MSLDC regarding their contracts so as to enable the MSLDC draw the appropriate despatch schedule.

#### 5.4.1 Conclusion for Open Access Consumers

During initial phase of ABT regime, only *full* TOAUs may be treated on par with distribution licensees and subjected to Balancing and Settlement Code for settlement of their overdrawal and underdrawal. The overdrawal by partial TOAU and distribution open access users may be settled at retail tariff rate of the DISCOMs. For this purpose, settlements on a half-hour basis will have to be looked into. Besides providing adequate compensation, this will keep the system simple and be equitable with other consumers of the discom.

### 5.5 **DISTRIBUTION LICENSEES**

#### 5.5.1 Objectives Likely to be achieved

The implementation of an intra-state ABT can serve the purpose of improving the performance of DISCOMs as far as load management is concerned which is one of the objectives mentioned in Section 2 earlier. It is assumed that the implementation of intra-state ABT will provide incentive for better load management discipline among DISCOMs. The downside of such an implementation has to be looked at which is the disproportionate ability of DISCOMs to respond to variability in load as compared to generators.



### 5.5.2 Key Considerations in Implementing Intra-state ABT for DISCOMs

The main issues which need to be considered are:

- **Monitoring capability** - Infrastructure required to monitor real time drawl vis-à-vis their schedule is not available to DISCOMs. At the same time, this infrastructure is available to generators. This entails inherent advantage to the generators over distribution licensees in managing their actual performance on real time basis. Implementation of intra-state ABT in this scenario will then lead to inequitable sharing of risks and returns between these groups of participants.
- **Response capability** – Even if the DISCOMs were able to monitor their load, there is a basic issue of controllability. The demand varies according to various factors such as weather, consumer patterns etc. These are not exactly predictable. If the demand is in excess of schedule and such excess is within acceptable limits, it would be imprudent to levy a heavy penalty on the DISCOMs. If this were done, the generators would gain at the expense of the DISCOMs. This is inequitable from a risk-return perspective. Of course, one might argue that the DISCOMs may resort to load relief measures. However, when the frequency is within acceptable limits, this is not desirable from a reliability of supply perspective.

### 5.5.3 Options for introducing ABT mechanism to DISCOMs:

#### 5.5.3.1 Option-1: Flow through of UI Mechanism as an Option

A feasible option would be to go by the UI pass-through mechanism. As per this mechanism, the UI incident on the state will be shared by the DISCOMs which are causing it on a pro-rata basis. Hence, for example, if the state has a net positive UI earning in a time block, then the DISCOMs which are underdrawing in that particular time-block would share the gains from inter-state UI earnings in proportion of their under-drawl. The same would also be true for overdrawl conditions. This mechanism would serve as an incentive to DISCOMs to better manage their load and would also avoid the situation of one Discom earning UI at the cost of others.

#### 5.5.3.2 Option-2: Deviations priced at System Marginal Price

Another option would be to monitor the deviations of DISCOMs from their scheduled energy and price such deviations (overdrawal/underdrawal) at system marginal price. The overdrawing DISCOM shall pay/contribute to State UI pool to the extent of their



overdrawal at the System Marginal Price prevalent for that time-block whereas the under-drawing DISCOM shall receive from State UI Pool a sum equivalent to their underdrawal at the System Marginal Price prevalent for that time-block. Such pricing shall ensure cost-based recovery of the over-drawal/underdrawal rather than frequency linked pre-determined pricing. For the purpose of System Marginal Price, SLDC shall adopt the State-wide Merit Order despatch principles and the variable cost of the generating stations as approved by the Commission shall form the basis for determination of system marginal price.

#### 5.5.3.3 Option-3: Combination of above two mechanisms

A hybrid option can be devised based on combination of above two mechanisms. I.e. State level UI Pool will comprise Discom deviations from the Schedule as well as the integration of the State's component of the regional UI Pool into the State UI Pool. The Discom deviations from the schedule would be settled at system marginal price. In addition, the State's share of regional UI component shall be 'pass through' to the DISCOMs in proportion to their deviations from the schedule. However, reconciliation of the energy accounts and reconciliation of each Pool participant's deviations from the schedule for each time block would be a challenge. An elaborate energy accounting and reconciliation system will have to be developed to be able to handle the settlement mechanism based on this hybrid mechanism.

#### 5.5.4 Conclusion for Distribution Licensees

Having a full fledged ABT with a frequency linked price for DISCOMs would be inequitable from a risk and return perspective. There are basic issues regarding monitoring and controllability of discom load vis-a-vis generator injections. It is therefore suggested that as far as DISCOMs are concerned a 'hybrid mechanism' based on 'system marginal price and flow through of UI' can be adopted. In this mechanism, over-drawal/under-drawal of the DISCOMs is settled at system marginal price and in addition, the UI gains or losses incident on the State are shared by the DISCOMs on a pro-rata basis. If there is no UI incident on the State, there is no UI implication for any discom even if one discom is overdrawing and another is underdrawing.



## **6 MARKET STRUCTURE FOR INTRODUCTION OF 'ABT MECHANISM' AT STATE LEVEL WITHIN MAHARASHTRA**

This Chapter contains detailed elaborations of emerging market structure, various entities, their roles and responsibility, rules for their operation, and contractual framework for the market operation under proposed Balancing and Settlement mechanism for Maharashtra.

### **6.1 MAHARASHTRA STATE POWER POOL PARTICIPANTS**

The Maharashtra State Power Pool shall comprise tiered structure for market operations comprising various entities such as Market Participants, State Pool Participants, Market Service Providers and Market Watchdog as elaborated in the following paragraphs.

- **Market Participants** – The Market Participant shall mean the generating companies, power trading companies, DISCOMs and the open access users and consumers operating within electricity market within Maharashtra. (i.e. Generators, DISCOMs, traders, OA Users)
- **State Pool Participants** - This shall refer to the Market Participants of Maharashtra Electricity Market who meet the conditions for membership of Pool, subject to fulfillment of qualification criteria or covenants for Pool participation as set out under the Balancing and Settlement Code. Currently, it is envisaged that the DISCOMs and the Transmission open access users (subject to fulfillment of certain qualification criteria or covenants for Pool participation) and operating within electricity market of Maharashtra in accordance with the terms and conditions outlined under the 'Balancing Settlement Rules' shall be the State Pool Participants.
- **Market Service Providers** – Transmission Licensees such as MSETCL, TPC-T and REL-T in their role as intra-State transmission system service providers, MSLDC-OD (Operations Division of Maharashtra State Load Despatch Centre) in its role as State Load Despatch Centre responsible for scheduling and despatch across State, MSLDC-CD (Commercial Division of Maharashtra State Load Despatch Centre) to undertake state-wide energy accounting of energy flows and reconciliation of various energy transactions amongst various State Pool Participants.



- **Market Watchdog** – MSPC (Maharashtra State Power Committee as Market Operator) and MERC (Regulator)

During the initial phases of market operation, the Transmission Open Access Users (TOAUs) will only be considered to be eligible for membership of the State Pool subject to the acceptance of the following conditions by the TOAUs:

- (iv) The TOAUs shall share the imbalance costs and the UI costs.
- (v) The TOAUs availing supply from captive sources have to demonstrate that they have contracted for the necessary capacity (MW) and energy with the generators.
- (vi) The TOAUs shall inform the MSLDC-OD regarding their contracts so as to enable the MSLDC-OD draw the appropriate despatch schedule.

## **6.2 COVENANTS FOR STATE POOL PARTICIPATION**

The primary objective of the Maharashtra Balancing and Settlement Code is to govern the functioning of the various State Pool Participants in a way that discipline is maintained with regard to the supply and drawl of energy by the State Pool Participants and the reliability and integrity of power system is maintained.

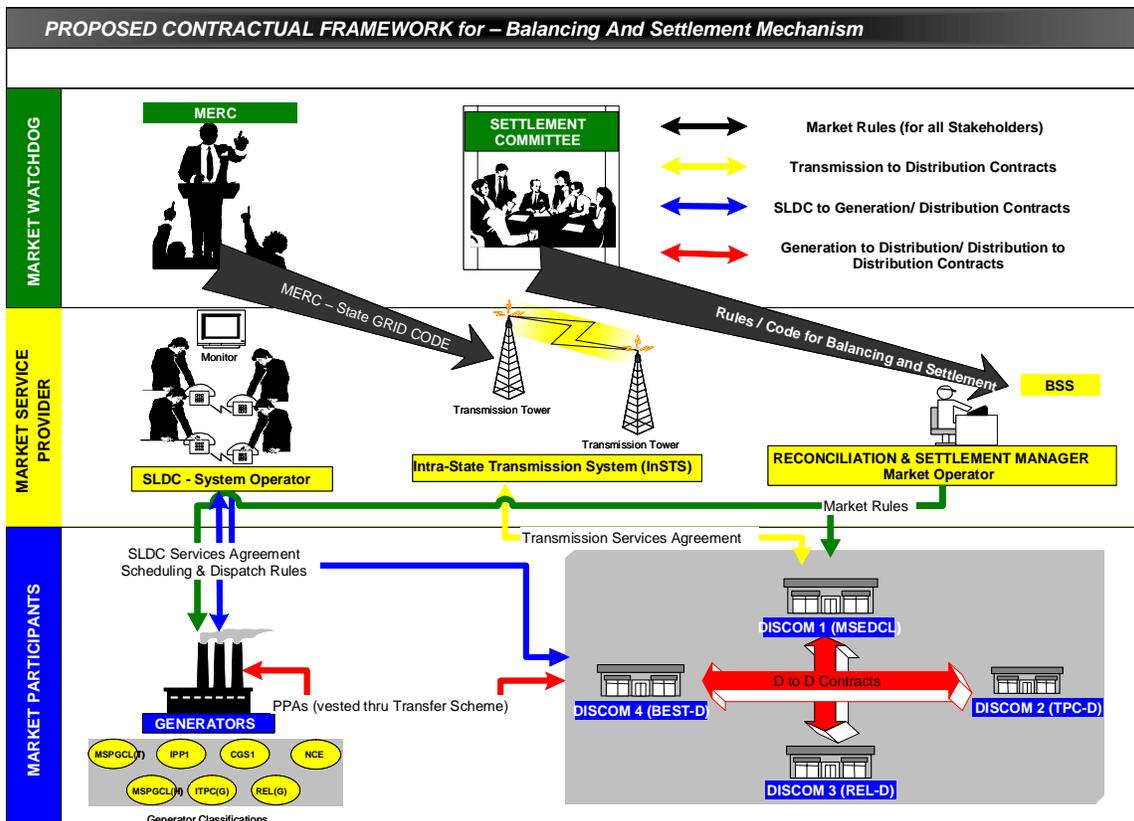
However, in order to fulfill such an objective, necessary preconditions need to be specified and agreed to by the State Pool Participants for an effective operationalisation of the market. The following is a list of such covenants:

- (a) All State Pool Participants have equal and non-discriminatory access to the proposed 'Balancing and Settlement' mechanism.
- (b) The State Pool Participants will have to inform the MSPC of all contracts they have entered / will enter into for exchange of energy.
- (c) The MSLDC-OD will have to take all decisions with regard to the despatching of stations after evaluating all possible network parameters / constraints / congestions in the transmission network and in the eventuality of any such network aberration, the instructions by the MSLDC-OD with regard to despatch and drawl shall be binding on all State Pool Participants.
- (d) The State Pool Participants shall operate their equipments / loads in a manner that is consistent with the provisions of the Indian Electricity Grid Code and the State Grid Code.

- (e) The State Pool Participants shall enter into BPTA (Bulk Power transmission agreement) and Connection Agreement with the concerned transmission licensee (MSETCL or TPC-T or REL-T, as case may be), which shall specify the physical and operational requirements for a reliable operation and gain physical access and connection to the intra-State transmission system (InSTS).
- (f) The MSLDC-OD shall publish all such information as required for all other State Pool participants to be aware of the energy exchanges taking place within the pool as well as exigency conditions, if any.
- (g) All State Pool Participants will have to make necessary arrangements for putting up suitable meters, capable of recording energy flows at half-hour intervals, at the points of injection / drawl.

**6.3 CONTRACTUAL FRAMEWORK FOR PROPOSED MARKET OPERATION**

Figure below illustrates the schematic of the contractual framework among the various constituents of the proposed Balancing and Settlement Mechanism amongst Maharashtra State Pool Participants.





The various regulatory and contractual agreements that would govern the operations of the Maharashtra Electricity Market are:

1. *Maharashtra Balancing and Settlement Code (Market Rules)*: This will govern the operations and behaviour of the Market Participants and State Pool Participants. The rules, after due approval by the Commission, shall be implemented, administered and enforced by the Maharashtra State Power Committee (MSPC).
2. *Power Purchase Agreements*: Following the un-bundling of MSEB and in the proposed industry structuring, the contractual arrangement through PPAs will have to be put in place amongst generating companies and distribution licensees. The commercial arrangement amongst the DISCOMs and Generators shall be settled bilaterally as per the PPA terms.
3. *Bulk Power Transmission Agreement*: The Transmission Licensees comprising MSETCL, TPC-T and REL-T are required to provide transmission service to various transmission system users (TSUs) for use of intra-State Transmission system in accordance with provisions of MERC (Transmission Open Access) Regulations 2005 and Commission's Order dated 27<sup>th</sup> June 2006 (Case 58 of 2005) in the matter of development of transmission pricing framework for the transmission system within Maharashtra. In this regard, the State Pool Participants will have to necessarily enter into a Bulk Power Transmission Agreement (BPTA) and Connection Agreement (CA) with the concerned transmission licensee. The BPTA and CA will describe the terms and conditions to be made binding upon the TSUs of the intra-State transmission system.
4. *SLDC Services Agreement*: As per the provisions under EA 2003, the MSETCL, being a Government Company continues to operate State Load Despatch Centre (MSLDC), till further notification by the GoM. Since the MSLDC will be providing scheduling and despatch services to the Market Participants in accordance with the provisions under State Grid Code. However, in future, as and when SLDC is notified to be operated by separate entity and/or MERC notifies separate scheduling and system operation charges (SLDC charges) to be recovered by SLDC from Market Participants, a separate SLDC Services Agreement may be necessary to be executed amongst MSLDC and State Pool Participants.



5. *State Grid Code:* The Code of Technical Interface or the State Grid Code shall be binding upon all constituents of the Maharashtra Electricity Market – the Market Participants and the Market Service Providers. The operationalisation of the State Power Pool will require certain modifications in the operations/existing practices followed by Market Participants and the Market Service Providers, as stipulated under the State Grid Code, to be in line with requirements of proposed market framework. To this effect, Grid Co-ordination Committee (GCC) shall recommend certain modifications to the State Grid Code for due approval by the MERC.
6. *Commission's Tariff Order:* The Market Participants and the State pool participants shall be responsible for payment of transmission charges and losses in accordance with the Transmission Pricing Framework Order (Case 58 of 2005) and Transmission Tariff Order for FY2006-07 (Case 31 of 2006) as directed by Commission. However, for the purpose of 'energy balance' under proposed market operations and determination of 'imbalance pool computations' thereof, the energy losses shall be determined on the trading period to trading period basis based on actual injections into system and actual drawal from the system corresponding to each trading period, as elaborated under the Transmission Tariff Order (Case 31 of 2006).

#### **6.4 ROLES AND RESPONSIBILITIES OF VARIOUS ENTITIES**

##### **6.4.1 Role of Generating Companies**

Under the proposed industry structure, it is envisaged that the generating companies shall enter into long term contractual arrangement (PPAs) with the distribution companies. Further, it is envisaged that the generators may prefer to enter into bilateral agreements with the DISCOMs and/or OA customers, if any, to sell their generation as also, licensees may wish to procure their entire energy requirement by way of 'bilateral contractual arrangements', until Balancing and Settlement mechanism evolves and parties gain experience of operating in a availability based tariff environment.

Accordingly, generators have not been considered to be members of the State imbalance pool. However, it is clarified that proposed market structure for introduction of ABT regime *per se* does not prohibit any Generator from becoming member of 'State Imbalance Pool' arrangement, if it wishes to sell its entire generation as 'Merchant



Generator', provided it meets the qualification criteria and the membership conditions/norms to be laid down by MSPC in line with Balancing and Settlement Code to be approved by MERC. Further, as the energy input to the imbalance pool from all the generators is the primary input to the imbalance pool accounting, their role in the effective operation of the market, and therefore, implementation of the Balancing and Settlement Code, cannot be ignored /overlooked.

As a seller to the DISCOMs and/or OA Users, a generator is supposed to undertake the following activities:

- (a) Provide capacity offers (availability) on day-ahead basis for each half-hour trading periods on the following day
- (b) Receive an “unconstrained despatch schedule” from MSLDC-OD, detailing how much a generator will produce and when (based on the State-wide Merit Order drawn upon by the MSLDC-OD)
- (c) Provide revised availability, if any, based on the actual generation available, before the finalization of the despatch schedule.
- (d) Despatch generation as per the “constrained schedule”, received from the SLDC; the constrained schedule will be on real-time basis and will be prepared after considering transmission constraints, revised availabilities of generators and revised demands by DISCOMs / other distribution licensees / OA customers, if any.
- (e) Back-down or ramp-up the generation, within the available capacity, as per the despatch instruction from the MSLDC-OD.
- (f) Abide by terms and conditions outlined under State Grid Code and conform to the instructions issued by MSLDC-OD from time to time.

#### 6.4.2 Role of Distribution Licensees

In the State Power pool, the DISCOMs play the role of either 'supplier' or 'buyer' depending on the load-generation balance based on the forecast of load and generation already given by the DISCOMs and the generators respectively, to the MSLDC-OD.

The State Pool Participants whose loss adjusted target drawl schedule is lower than aggregate of allocated generating capacity available to that State Pool Participant in



accordance with the 'target despatch schedule' shall be construed to be contributing (incrementing) into the Imbalance Pool to the extent of the forecasted under-drawl, whereas the State Pool Participants whose loss adjusted target drawl schedule is higher than aggregate of allocated generating capacity available to that State Pool Participant in accordance with the 'target despatch schedule' shall be construed to be drawing (decrementing) from the Imbalance Pool to the extent of the forecasted over-drawl for that trading period.

As a participant of the Imbalance Pool, the State Pool Participants are supposed to undertake the following activities:

- (a) Provide load requirements on day-ahead basis for each half-hour trading period on the following day.
- (b) Receive an 'unconstrained drawal schedule' from MSLDC-OD, detailing the quantum of drawls, along with a list of drawl points.
- (c) Receive the information on 'system marginal price' (ex-ante imbalance pool price) for each timeblock on day-ahead basis, as generated by the MSLDC-CD.
- (d) Provide revised load forecast, if any.
- (e) Maintain load as per the 'constrained schedule', received from the MSLDC-OD; the constrained schedule will be on real-time basis and will be prepared after considering transmission constraints, revised availabilities of generators and revised demands by DISCOMs.
- (f) Arrange for load relief / curtailment, as per the instruction from the MSLDC-OD.
- (g) Abide by terms and conditions outlined under State Grid Code and conform to the instructions issued by MSLDC-OD from time to time.

#### 6.4.3 Role of State Transmission Utility / Transmission Licensees

Pursuant to Section 39(1) of the EA, 2003, the GoM by a notification dated February 17, 2005 has notified the MSETCL as the State Transmission Utility (STU). The Section 39(2) of the EA, 2003, specifies the functions of the STU as follows:

- (a) Undertaking transmission of electricity through intra-State transmission system
- (b) Discharging all functions of planning and co-ordination relating to intra-State transmission system with the Central Transmission Utility (CTU), State



Governments, Generating companies, Regional Power Committees, Licensees, and, any other person notified by the State Government in this behalf

- (c) Ensuring development of an efficient, coordinated and economical system of intra-State transmission lines for smooth flow of electricity from a generating station to the load centers
- (d) Providing non-discriminatory open access to its transmission system for use by (a) any licensee or generating company on payment of the transmission charge, or (b) any consumer as and when such open access is provided by the State Commission under sub-section (2) of Section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission.

To summarize, the MSETCL, as an STU and the Transmission Service Provider, will be responsible for:

- (a) Ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity;
- (b) Contributing to security of supply through adequate transmission capacity and system reliability;
- (c) Facilitating the MSLDC-OD in managing energy flows on the system, taking into account exchanges with other interconnected systems. To that end, the MSETCL shall be responsible for ensuring a secure, reliable and efficient electricity system and, in that context, for ensuring the availability of all necessary services insofar as this availability is independent from any other transmission system with which its system is interconnected.

#### *6.4.3.1 Transmission Tariff for Use of Transmission System*

MSETCL and transmission licensees shall be entitled to levy and collect Transmission Tariff and other charges from the Transmission System Users (State Pool Participants) in accordance with the Transmission Pricing Framework (Case 58 of 2005) and Transmission Tariff Order for FY2006-07 (Case 31 of 2006) as directed by MERC from time to time. MSETCL and other transmission licensees shall maintain details of its entire cost related information pertaining to transmission services provided by it to the State Pool Participants in the form and manner and as per accounting codes as approved by Commission.



#### 6.4.4 Role of MSLDC

Pursuant to Section 31(2) of the EA, 2003, MSETCL being Government Company continues to operate the State Load Despatch Centre (MSLDC). Various functions to be undertaken by the SLDC have been specified under Section 31(2) of the EA, 2003, as follows:

- (a) Being responsible for optimum scheduling and despatch of electricity within a State, in accordance with the contract entered into with the licensees or generating companies operating in that State;
- (b) Monitoring of grid operations in line with guidelines issued by WRLDC from time to time and abiding by instructions which inter-alia, includes security of the grid.
- (c) Keeping accounts of the quantity of electricity transmitted through the State Grid;
- (d) Exercising supervision and control over the intra-State transmission system, and,
- (e) Be responsible for carrying out real time operations for grid control and despatch of electricity within the State though secure and economic operation of the State grid in accordance with the Grid Standards and the State Grid Code.

In essence, the MSLDC will be responsible for:

- (a) Managing energy flows on the system, taking into account exchanges with other interconnected systems;
- (b) Providing to the all market constituents as well as non-market constituents, with whom its system is interconnected sufficient information to ensure the secure and efficient access, operation, coordinated development and interoperability of the interconnected system;
- (c) Ensuring non-discrimination between system users or classes of system users, in the context of the OA Regulations specified by MERC.

##### 6.4.4.1 SLDC Fees and Charges

MSLDC shall be entitled to levy and collect scheduling and system operation charges (SLDC Annual Fees and SLDC Operating charges), fees and other charges from the Market Participants in accordance with the Tariff Order (Case 30 of 2005) directed by



MERC from time to time. In this context, it is noted that for FY2006-07, the Commission had approved the proposed mechanism for recovery of SLDC Fees and charges from MSEDCL alone for FY2006-07 vide its Order dated 29th June 2006 (Case 49 of 2005).

Further, the Commission has directed MSETCL to submit SLDC Budget for FY2007-08 by 30th November 2006 in line with Regulation 18.1 of MERC (Transmission Open Access) Regulations, 2005. In addition, the Commission has also directed MSETCL to submit proposal for 'Levy of SLDC Fees and Charges' for FY 2007-08 in line with principles for levy of 'SLDC Fees and Charges' outlined under Clause 50 of Commission's Order dated 16th May 2006 (Case 30 of 2005). Accordingly, MSETCL will have to maintain details of its all cost related information pertaining to system operations function and services provided by it to the Market Participants in the form and manner and as per accounting codes as approved by the Commission.

#### 6.4.5 Role of Market Operator (Maharashtra State Power Committee)

As a part of emerging industry structure, an institutional mechanism needs to be created to address commercial issues, which would arise among the State Participants. A Maharashtra State Power Committee (MSPC) is recommended for this purpose.

The main objectives of this arrangement are:

- (a) Develop and provide a platform for a market oriented trading mechanism
- (b) Provide a framework for efficient reconciliation and settlement of operational and accounting disputes between the DISCOMs
- (c) Recording of commercial arrangement and accounting of energy exchange amongst parties
- (d) Ensuring the integrity of prices produced in the imbalance pool mechanism
- (e) Bring transparency in operation, improve upon the market system and procedures

##### 6.4.5.1 Core functions of MSPC

- (a) The main functions of MSPC shall, inter alia, include the following:
  - (i) The MSPC shall co-ordinate and shall facilitate the intra-state and inter-state



trading activities by optimal utilisation of resources.

- (ii) The MSPC shall review energy accounting and billing for inter-utility trading of power and ensure settlement of imbalances amongst State Pool Participants in accordance with the Balancing and Settlement Code.
- (iii) The MSPC shall represent the common interest of the State Pool Participants in the matters related to power purchase from CGS and pertaining to issues related to WRLDC at the regional level.
- (iv) The MSPC shall monitor compliance of State Balancing and Settlement Code by the State Pool Participants and resolve complaints/disputes amongst the State Pool Participants.

#### **6.4.5.2 Key Activities**

(b) Thus, the key activities that MSPC shall undertake in order to discharge its functions shall include following:

- (i) Facilitate settlement of imbalance pool transactions on monthly and annual basis. Ensure implementation and operation of Balancing and Settlement Code as approved by MERC. Monitor compliance of State Balancing and Settlement Code by the State Pool Participants. Review the 'State Balancing and Settlement Code' from time to time from operationalisation perspective and propose amendments/modifications/alterations/deletions, for approval of MERC, as may be necessary for effective and efficient market operations.
- (ii) Establish appointment of 'Reconciliation and Settlement Manager' for purposes of operationalisation of energy accounts and reconciliation. Issue necessary directions to RSM.
- (iii) Review and take on record the energy accounting data and inter-utility billing related information in pursuance to State Balancing and Settlement Code on monthly basis.
- (iv) Monitor conduct of State Pool Participants and hearing of complaints of the State Pool Participants.
- (v) Suggest modification, alteration, deletion, and/or replacement the conduct of business rules of the MSPC as may be deemed fit from time to time.



- (vi) Reconcile differences between the State Pool Participants.
- (vii) Provide platform to identify and resolve market participants concerns and to represent common interest of Distribution Licensees at regional level. Keep track of the commercial arrangements between the State Pool Participants.
- (ix) Approve applicants for admission to membership of imbalance pool in accordance with State Balancing and Settlement Code.
- (x) Receive notification of rule breaches from Reconciliation and Settlement Manager (RSM) and take disciplinary actions for any breach of rules.
- (xi) Act as an agency for interaction with MSLDC, WRLDC, WRPC and CGS for all matter related to power purchase by the Distribution Licensees and Open Access consumers. Provide information to the State Pool Participants on the operation of market, including information on quantum of energy exchange, energy accounting etc. and any other information required to be conveyed to the State Pool Participants for effective and efficient market operation.

#### 6.4.6 Role of Reconciliation and Settlement Manager (RSM)

Though the RSM does not figure as a separate entity in the proposed Maharashtra Electricity Market, yet its role in the operation of the Electricity Market cannot be underestimated since the RSM will play an important role in facilitating the settlement of the energy imbalances among the DISCOMs. During the initial phase of ABT regime, it is envisaged that the role of the RSM shall be undertaken by the Commercial Division of Maharashtra State Load Despatch Centre (MSLDC-CD).

The RSM shall provide a service to all stakeholders and shall be guided by requirements and instructions as received from MSPC. Though, currently MSLDC-CD activities are envisaged to be owned by MSETCL, it is envisaged that since MSETCL shall no longer be involved in trading, it is expected that it shall render the requisite services to all stakeholders in an impartial and un-biased manner. The role of the RSM shall continue in its present form of the MSLDC-CD, for the following activities.

- (a) Collecting metering data from all Transmission to Distribution interface points.
- (b) Verifying the collected data
- (c) Processing the collected data



- (d) Storing the collected data

In addition the RSM shall:

- (a) Collect metering data from all Generation to Transmission interface points.
- (b) Verify process and store the G – T data.
- (c) Ensure that any data that is not collected by MRI download is substituted by profiled actual data using the interface point manual reading as a base.
- (d) Obtain the required data from other sources that is required to run the BSS, these include:
  - (i) REA data for weekly UI charges and CGS scheduled generation
  - (ii) Data recorded by MSLDC-OD relating to DISCOM day ahead load forecasts, inter-state sales and the daily least cost despatch schedule
  - (iii) Invoice data from Generators supplying details of fixed and variable costs of generation.
  - (iv) Data relating to approved PPA allocations and MERC approved Transmission Tariffs.
- (e) Ensure the accuracy and completeness of the data before the BSS is run.
- (f) Running of the BSS on a monthly retrospective basis once all data has been collected and verified.
- (g) Issue statements to each DISCOMs / TOAUs which clearly and accurately shows the overall balances attributable to each entity for the month.
- (h) Publish the ex-ante day ahead indicative pool price (system marginal price) by the stipulated time on each day and make available this information to the State Pool Participants.

All information produced by the RSM will be confidential to the State Pool Participants. It is the role of the RSM to ensure that imbalance prices and volumes are accurately recorded and allocated on the predetermined basis to the DISCOM to which they are applicable.

- (a) All source data used in constructing the final statement of balances will be made available to Stakeholders.



- (b) The issued statements shall have supporting documentation that allows the stakeholders to analyse their balances on a trading period basis.

The responsibility and performance obligation of the RSM in its capacity as 'Reconciliation and Settlement Manager' shall cover following key areas:

1. **Metering Systems:** All metering systems at the G-T and T-D interface points will be read using MRIs in addition all metering points will have manual start finish readings collected as check data on a monthly retrospective basis. The procedures for maintenance, replacement and accuracy calibration are detailed in the State Grid Code, which will continue to be the point of reference for all matter relating to metering systems.
2. **Data Collection:** Data collection will, as stated above be by way of MRI backed up be manual start finish readings. The data shall be collected at the end of each calendar month and is time stamped to ensure accuracy. All collected data shall be received by the RSM within 3 days of the end of the calendar month to which it relates.
3. **Data Storage:** The collected data shall be securely stored within the RSM at the MSETCL and back ups taken which are to be held of site as a contingency against data catastrophe. The system holding the data shall have appropriate anti virus and firewalls to ensure that the data cannot be accessed by unauthorised persons.
4. **Data Substitution:** Where any case of totally or partially missing data is found the affected interface point shall have its entire months data substituted using the Profiled Data Substitution Module.
5. **Data Processing:** The collected data once verified as accurate and complete shall form the inputs into the Balancing and Settlements System.
6. **Information Outputs:** Although the BSS will provide the outputs that are required to ascertain the accuracy and financial effect of the monthly accumulated imbalances. It is expected that the majority of outputs will over time be user defined. As Stakeholders gain a better understanding of the implications of their operational actions, their requirements for information will become more refined. The BSS and the MSLDC-CD need to be equipped to meet these information requirements as and when they arise.



7. **Information Sharing:** All data collected from interface points shall be shared upon demand with the stakeholders to whom it relates. The MSLDC-CD need to develop capability to store a repository of data for 18 months of G-T data and T – D data, and the same need to be made available should Stakeholders wish to see historic profiles. The data need to be available for each month once the final balancing and settlement statement has been prepared.

*6.4.6.1 Fees, charges and compensation to RSM*

RSM shall be entitled to levy and collect fees and other charges from the Market Participants in accordance with the 'Balancing and Settlement Code' as may be directed by MERC from time to time. At present, it is envisaged that role of RSM shall be undertaken by MSLDC-CD of MSETCL and it is noted that the costs pertaining to statewide energy accounting and billing related activities forms part of revenue requirement of MSETCL. However, going forward, MSETCL will have to maintain details of its all cost related information pertaining to energy accounting and billing function and services provided by it in its role as RSM to the Market Participants, in the form and manner and as per accounting codes as approved by MERC.



## **7 SALIENT FEATURES OF PROPOSED ABT MECHANISM AT STATE LEVEL**

This Chapter deals with the various design parameters used to establish the framework for the ABT mechanism as well as the framework for the reconciliation and settlement mechanism. The various design parameters that have been considered for the development of the State level ABT Mechanism framework are: (a) Scheduling period (for load forecast of State Pool Participants and despatch of generating stations) (b) Trading period (c) Settlement period (d) Measurement unit for State Imbalance pool (e) Treatment of reactive energy drawl and injection (f) Premises for ex-ante and ex-post pool prices (g) Premise for least cost despatch (h) Premise for allocation of losses (i) Premise for allocation of Regional UI charges among State Pool Participants

### **7.1 SCHEDULING PERIOD**

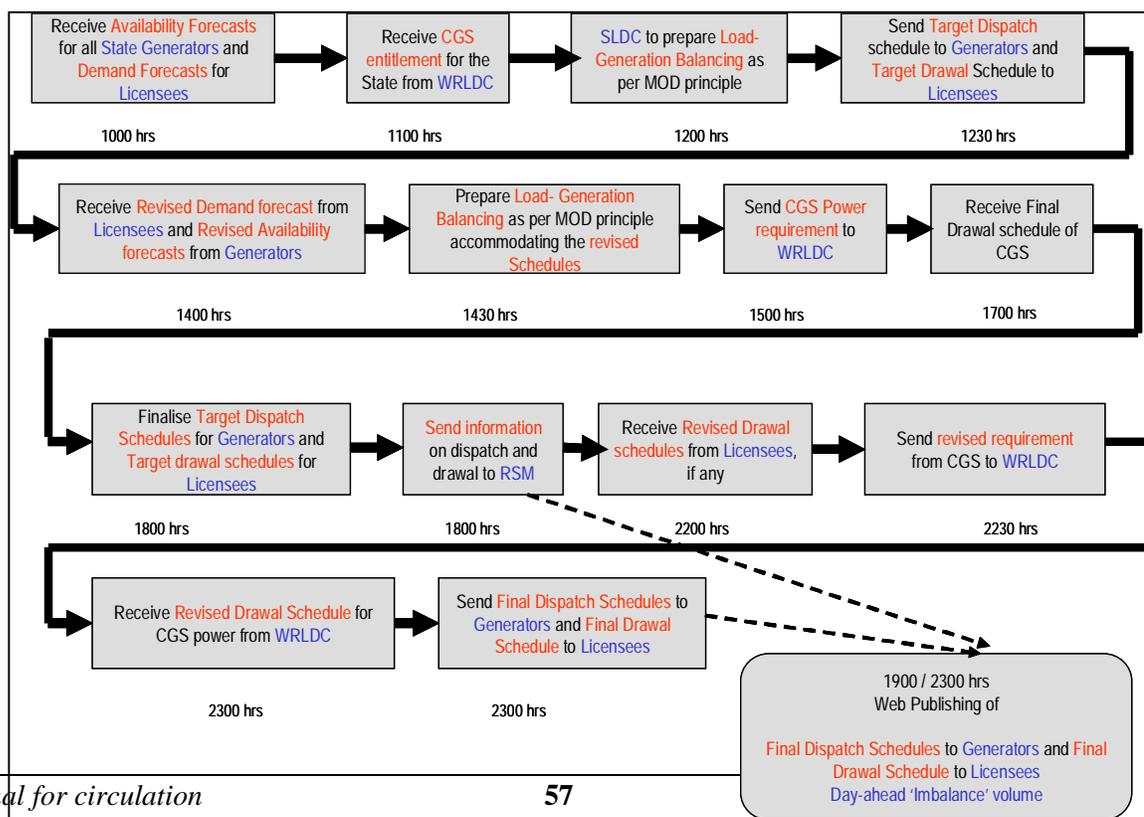
#### **7.1.1 General**

- (a) The scheduling period shall comprise of 48 time blocks, each of 30-minute duration starting from 00:00 hours (IST) ending with 24:00 hours (IST). Thus, first time block of scheduling period shall commence from 00:00 hours (IST) to 00:30 hours (IST), second time block of scheduling period shall commence from 00:30 hours (IST) to 01:00 hours (IST) and so on.
- (b) Based on the availability schedule forecasted by generating stations and load requirement forecasted by State Pool Participants, the MSLDC-OD shall draw up the least cost despatch schedule for the State as a whole in accordance with the merit order principles approved by MERC from time to time.
- (c) Before finalizing the least cost despatch schedule for the State as a whole, the MSLDC-OD shall inform the State Pool Participants about availability of surplus power, if any, so as to enable them to decide to undertake any inter-state trade transactions.
- (d) The MSLDC-OD shall co-ordinate with WRLDC and furnish overall drawl schedule for the State as a whole in respect of each ISGS in accordance with the Scheduling and Despatch Code outlined under IEGC 2005.
- (e) Based on least cost despatch schedule, the MSLDC-OD shall notify the Target Despatch Schedule to generating stations and Target Drawl Schedule to the State



Pool Participants. The target despatch schedules and target drawal schedules shall be determined by undertaking load-generation balancing and adopting MOD principles at reference frequency of 50 Hz.

- (f) The Target Despatch Schedule and the Target Drawal Schedules shall be finalised by the MSLDC-OD by 23:00 hrs on a day-ahead basis. MSLDC-OD shall appropriately co-ordinate with WRLDC before finalization of the schedules.
- (g) In case of shortfall in 'declared availability', SLDC shall take into account the available contracted capacity to each Distribution Licensee (or State Pool Participant) before finalising Target Drawal Schedule' for respective Distribution licensee. The load curtailment as may be necessary, shall be applicable on all distribution licensees uniformly in proportion to their 'contracted capacity' and shall be applicable for shortfall beyond their contracted capacity.
- (h) Schedules once finalised by SLDC shall not be modified during the course of operation in a day except under exceptional circumstances (*to be defined as force majeure / system emergency conditions*) and shall be binding on the State Pool Participants and the generating companies. A brief outline of proposed timeframe for 'day-ahead scheduling processes is depicted below.





**7.1.2 Load Forecast Schedules from State Pool Participants**

- (a) The State Pool Participants (DISCOMs and TOAU, for the time being, as the case may be) shall furnish their forecasted load requirement to MSLDC-OD on day-ahead basis for scheduling period of 30-minute duration i.e. the load forecast schedule for each DISCOM shall include the load forecast schedule for 48 time blocks each of 30-minute duration for following day.
- (b) Each DISCOM shall furnish its schedule to MSLDC-OD by 10:00 hours of each day corresponding to their forecasted load requirement for 00:00 hrs to 24:00 hours of the following day.
- (c) The schedule shall be furnished in accordance with the format devised for the purposes.
- (d) While furnishing the load forecast schedule, the DISCOMs shall take into consideration the load requirements of the 'open access consumers' (DOAU and partial TOAU) located within their area of DISCOMs as well. The DISCOMs, while furnishing its overall load forecast schedule to the MSLDC-OD shall include forecasted load requirement of only those 'open access consumers' (DOAU and partial TOAU) which are not State Pool Participants.
- (e) However, in case 'Open Access Users' (Full TOAU) that fulfill the qualification criteria to be 'State Pool Participant', such OA consumers shall also have to furnish the schedules corresponding to their forecasted load requirement to the MSLDC-OD on day-ahead basis in accordance with the format devised for the purposes.
- (f) In case DISCOM fails to furnish schedule by 10:00 hours, the MSLDC-OD shall treat actual off-take by the DISCOM for the previous day (d-1) as the schedule for the following day (d+1). Such schedule as considered by the MSLDC-OD in the event of non-availability of schedule from the DISCOM shall be construed as the schedule of the distribution licensee and the concerned distribution licensee shall be responsible for such schedule.

**7.1.3 Availability of Schedules from Generating Stations**

- (a) All Generating Stations (with unit size > 50 MW) excluding RE generating stations shall furnish their forecasted unit-wise availability schedule in respect of generating stations to MSLDC-OD on day-ahead basis for scheduling period of 30-minute



duration i.e. the availability schedule for each generating station shall cover unit-wise availability forecast schedule for 48 time blocks each of 30-minute duration for following day. As regards renewable energy generators, MSLDC shall co-ordinate with such RE generators for possibility of ascertaining their day-ahead generation. In the absence of any available information, actual generation by RE generators on the previous day shall be taken into consideration for load-generation balancing purposes. MSLDC will have to address requirement of communication with such RE generators.

- (b) Each generating station shall furnish its availability schedule to the MSLDC-OD by 10:00 hours of each day corresponding to their unit-wise availability forecasts for 00:00 hrs to 24:00 hours of the following day.
- (c) The schedule shall be furnished in accordance with the format devised for the purposes.
- (d) While furnishing the availability forecasts, the generating companies shall take into consideration the load requirement of their 'captive consumers and open access consumers' and present these requirements separately so as to be despatched fully up to the contracted OA load i.e., the OA generators shall not be subjected to backing down instructions (subject to system emergency and transmission constraint) up to the requirement of their OA transactions. However, generation beyond the load requirement of OA transactions shall be subjected to centralized MOD principles.
- (e) In case generating company fails to furnish schedule by 10:00 hours, the MSLDC-OD shall treat the actual generation by the generating company for the previous day (d-1) as the schedule for the following day (d+1). Such schedule as considered by the MSLDC-OD in the event of non-availability of schedule from the generating company shall be construed as the schedule of the generating company and the concerned generating company shall be liable for such schedule.

## **7.2 TRADING PERIOD**

- (a) The trading period denotes the period for accounting of energy exchange amongst the State Pool Participants for the purpose of commercial settlement.
- (b) In view of existing metering infrastructure and capability to measure energy exchange at T<>D interface points, the trading period for the purpose of market operation shall be of 30 minute duration.



- (c) The trading period for the market operations shall be of 30-minute duration starting from 00:00 hours (IST) for a particular day ending with 24:00 hours (IST) on that day. Thus, the first time block of trading period shall commence from 00:00 hours (IST) to 00:30 hours (IST), second time block of trading period shall commence from 00:30 hours (IST) to 01:00 hours (IST) and so on. Thus, in effect, there shall be 48 trading periods in a particular day.
- (d) The price for settlement of energy exchange amongst the State Pool Participants shall be determined separately for each trading period based on weighted average 'System Marginal Price' prevalent for that time block. These prices for settlement shall be determined with the help of a 'Balancing and Settlement System' (BSS) software, to be run by the RSM.

### **7.3 SETTLEMENT PERIOD**

The commercial settlement for the imbalances amongst the State Pool Participants will be of two tiers as follows.

#### **7.3.1 Monthly Settlement**

- (a) For the purposes of settlement of energy exchanges amongst State Pool Participants, the RSM shall work out the 'Imbalance Pool Increments' and 'Imbalance Pool Decrements' by each State Pool Participant corresponding to each trading period in accordance with the rules outlined under reconciliation and settlement. The concept of 'imbalance pool increments / decrements' have been outlined under subsequent paragraphs.
- (b) Based on 'Imbalance Pool Increments' and 'Imbalance Pool Decrements' and the 'Ex-Post Imbalance Pool Price', the 'Imbalance Pool Amount Payable' and 'Imbalance Pool Amount Receivable' in respect of each State Pool Participant corresponding to each trading period shall be determined.
- (c) The aggregate of 'Imbalance Pool Amount Payable' and 'Imbalance Pool Amount Receivable' corresponding to each trading period over the period of one month in respect of each State Pool Participant shall form the basis for 'Net Imbalance Pool Amount Payable' or 'Net Imbalance Pool Amount Receivable' by the respective State Pool Participant for that month.



- (d) For the purposes of the monthly settlement, the 'Month' shall be referred to as calendar month.

### 7.3.2 Annual Fixed Cost Settlement

- (a) For the purposes of settlement of capacity exchanges amongst State Pool Participants, the RSM shall work out the 'FCR Pool Increments' and 'FCR Pool Decrements' by each State Pool Participant corresponding to each trading period in accordance with the rules outlined under reconciliation and settlement.
- (b) The computation of 'FCR Pool Increments' and 'FCR Pool Decrements' shall be based on Available Capacity declarations as provided by the Generating Stations. The Generating Stations shall abide by backing down instructions issued by MSLDC on account of system constraints, grid security aspects, etc. For the purpose of Fixed Cost Reconciliation, the generating stations shall be deemed to be available upto its declared capacity, even though it may be backed down for the reasons not attributable to such generating station. Further, it is clarified that during real-time operations if required, SLDC may seek to verify available capacity of the generating station upto 'declared capacity' and issue despatch instructions accordingly.
- (c) Based on 'FCR Pool Increments' and 'FCR Pool Decrements' and the 'FCR Pool Price' (to be determined in accordance with the rules outlined hereunder), the 'FCR Pool Amount Payable' and 'FCR Pool Amount Receivable' in respect of each State Pool Participant corresponding to each trading period shall be determined.
- (d) The aggregate of 'FCR Pool Amount Payable' and 'FCR Pool Amount Receivable' corresponding to each trading period over the period of one fiscal year in respect of each State Pool Participant shall form the basis for 'Net FCR Pool Amount Payable' or 'Net FCR Pool Amount Receivable' by the respective State Pool Participant for that fiscal year.
- (e) For the purposes of the annual fixed cost settlement amongst the State Pool Participants, the 'annual period' shall be referred to as the 'fiscal year'.

### **7.4 MEASUREMENT UNITS FOR IMBALANCE POOL**

- (a) The 'Imbalance Pool Increments', the 'Imbalance Pool Decrements', and the 'FCR Pool Increments' and the 'FCR Pool Decrements' shall be accounted in terms of



electrical energy units. The measurement unit for the 'Imbalance Pool' and the 'FCR Pool' shall be kilowatt hours (kWh).

- (b) The decimal component of the energy unit shall be rounded off to nearest integer value.
- (c) The 'Imbalance Pool Amount Payable', the 'Imbalance Pool Amount Receivable', and, 'FCR Pool Amount Payable' and the 'FCR Pool Amount Receivable' shall be accounted in terms of Indian Rupees (INR). The measurement unit for the 'Imbalance Pool Amount' and the 'FCR Pool Amount' shall be Indian Rupees (INR).
- (d) The decimal component of the Amount shall be rounded off to nearest integer value in Rupee terms.

#### **7.5 TREATMENT OF REACTIVE ENERGY DRAWL AND INJECTIONS**

- (a) The generating companies and the State Pool Participants shall be responsible for injection of reactive energy and drawl of reactive energy in accordance with the State Grid Code for the safe, reliable and steady operations of the grid.
- (b) The energy exchange amongst the State Pool Participants shall be settled commercially only in terms of the active energy component. Further, reactive energy drawl (kVAR) by the State Pool Participants shall be accounted and monitored. The same shall be dealt with in accordance with the mechanism outlined under the Commission's Order for Transmission Pricing Framework (Case 58 of 2005).

#### **7.6 BASIS FOR COMPUTATION OF EX-ANTE IMBALANCE POOL PRICE**

- (a) The Ex-Ante Imbalance Pool price shall be derived for each trading period separately. The Ex-Ante Imbalance Pool price shall be based on overall pool volume and pool value to be determined based on the 'target despatch schedule' for the generators and 'target drawl schedule' for the State Pool Participants to be finalised by MSLDC-OD on day-ahead basis.
- (b) The State Pool Participants whose loss adjusted target drawl schedule is lower than aggregate of allocated generating capacity available to that State Pool Participant in accordance with the 'target despatch schedule' shall be construed to be contributing (incrementing) into the Imbalance Pool to the extent of the forecasted under-drawl, whereas the State Pool Participants whose loss adjusted target drawl schedule is higher than aggregate of allocated generating capacity available to that State Pool



Participant in accordance with the 'target despatch schedule' shall be construed to be drawing (decrementing) from the Imbalance Pool to the extent of the forecasted over-drawl for that trading period. The losses for the purpose of 'loss adjustment' shall be based on average intra-State transmission system losses for previous 52 week period.

- (c) The 'Ex-Ante Imbalance Pool Volume' is summation of all 'imbalance pool increments' corresponding to particular trading period which would be equal to the summation of all 'imbalance pool decrements' so that any trading period the 'imbalance pool volume' shall always be balanced in energy terms.
- (d) The 'Ex-Ante Imbalance Pool Value' is aggregate of product of weighted average variable cost of the marginal stations of the contributing State Pool Participant and the 'imbalance pool increments' by the contributing State Pool Participant into the imbalance pool. For the purpose of determining the marginal station for a particular State Pool Participant, the 'Merit Order Stack' for that State Pool Participant comprising the generating stations to the extent of generation capacities contracted by that State Pool Participant based on their variable cost shall be drawn and the same shall form the basis for determining marginal station in respect of that State Pool Participant.
- (e) The variable cost of each generating station for the purpose of Merit Order Despatch stack and for computation of 'Ex-Ante Imbalance Pool Price' shall be the per unit energy charge outlined in the energy bill for the previous month in respect of each generating station or the latest information available in respect of such generating station, as the case may be.
- (f) The per unit energy charge in the energy bill shall be in accordance with the heat rate, auxiliary consumption factor, the formula for energy charge as approved by the Commission and the delivered cost of fuel for that month in respect of each generating station.
- (g) The Ex-Ante Imbalance Pool price shall only provide a signal at which imbalance pool settlement amongst the 'State Pool Participants' shall take place if on ex-post basis, the actual energy injection and energy drawl by various market constituents take place exactly in accordance with the forecasted schedule on ex-ante basis. The ex-ante price is intended to provide economic signal, however, it is noted that the



same is dependent on several factors not limited to accuracy of load forecasts provided by market participants, availability forecast of generation stations, availability of latest variable cost information pertaining to generating stations etc.

- (h) As outlined earlier, the overall imbalance pool volume for each trading period comprises summation of 'imbalance pool decrements'. The imbalance pool decrements include decrements on account of inter-State trade of energy and decrements on account of energy exchange amongst Pool Participants.
- (i) The Ex-Ante Imbalance Pool Prices shall be denominated in Rs per kWh with fractional numbers specified up to two decimal places. The fractional points from third decimal point would be rounded off to nearest integer for second decimal point.

**7.7 BASIS FOR COMPUTATION OF EX-POST IMBALANCE POOL PRICE (SETTLEMENT PRICE)**

- (a) The Ex-Post Imbalance Pool Price shall be derived for each trading period separately. The Ex-Post Imbalance Pool Price shall be based on overall pool volume and pool value to be determined based on the 'actual injection' by the generators and 'actual drawl' by the State Pool Participants.
- (b) State Pool Participants whose actual loss adjusted drawl during a trading period is lower than aggregate of actual injection of the generating stations contracted by the State Pool Participant in accordance with their contracted capacity shall be construed to be contributing (incrementing) into the Imbalance Pool to the extent of their under-drawl, whereas the State Pool Participants whose actual loss adjusted drawl during the trading period is higher than aggregate of actual injection of the generating stations contracted by the State Pool Participant in accordance with their contracted capacity shall be construed to be drawing (decrementing) from the Imbalance Pool to the extent of their over-drawl. The losses for the purpose of 'loss adjustment' shall be based on actual losses for the trading period computed as difference between actual injections by generating stations and actual drawl by State Pool participants.
- (c) The 'Ex-Post Imbalance Pool Volume' is summation of all 'imbalance pool increments' corresponding to particular trading period which would be equal to the summation of all 'imbalance pool decrements' so that for any trading period the 'imbalance pool volume' shall always be balanced in energy terms.



- (d) The 'Ex-Post Imbalance Pool Value' is the aggregate of product of weighted average variable cost of the marginal stations of the contributing State Pool Participant and the 'imbalance pool increments' by the contributing State Pool Participant into the imbalance pool for a particular trading period. For the purpose of determining the marginal station for a particular State Pool Participant, the 'Merit Order Stack' for that State Pool Participant comprising the generating stations to the extent of generation capacities contracted by that State Pool Participant based on their variable cost shall be drawn and the same shall form the basis for determining marginal station in respect of that State Pool Participant.
- (e) The variable cost of each generating station for the purpose of Merit Order Stack and for computation of 'Ex-Post Imbalance Pool Price' shall be the per unit energy charge outlined in the energy bill for the instant calendar month corresponding to the settlement period in respect of each generating station. In case of generating stations having billing cycle spread over two calendar months, the latest information as available pertaining to previous billing cycle shall be considered for the purposes.
- (f) The per unit energy charge in the energy bill shall be in accordance with the heat rate, auxiliary consumption factor, the formula for energy charge as approved by the Appropriate Commission and the delivered cost of fuel for that month in respect of each generating station.
- (g) The Ex-Post Imbalance Pool price shall represent the price for settlement of energy exchange amongst the 'Pool Participants' in accordance with the 'Imbalance pool Volume' determined for a particular trading period within a particular 'Settlement Period'.
- (h) The 'Ex-Post Imbalance Pool Price' computation shall entail two separate price computations viz. (a) Ex-Post Imbalance Pool Price for settlement of inter-State trade of energy (D-trade) and (b) Ex-Post Imbalance Pool Price for settlement of energy exchange amongst Pool Participants (D<>D).
- (i) As outlined earlier, the overall imbalance pool volume for each trading period comprises summation of 'imbalance pool decrements'. The imbalance pool decrements include decrements on account of inter-State trade of energy and decrements on account of energy exchange amongst State Pool Participants and un-scheduled interchange (UI) energy, if negative.



- (j) Ex-Post Imbalance Pool Price for inter-State trade of energy including UI energy, if negative shall be derived based on highest marginal cost of the generating station of the contributing State Pool Participants.
- (k) Ex-Post Imbalance Pool Price for energy exchange amongst State Pool Participants (D<>D) shall be derived based on remainder of imbalance pool value after adjusting for value corresponding to valuation of inter-State trade transactions including UI energy, if negative in the Imbalance Pool.
- (l) The Ex-post Imbalance Pool prices shall be denominated in Rs per kWh with fractional numbers specified up to two decimal places. The fractional points from third decimal point would be rounded off to nearest integer for second decimal point.

#### **7.8 PREMISES FOR LEAST COST DESPATCH**

- (a) The MSLDC-OD shall be responsible to prepare Least Cost Despatch Schedule after taking into account the requirement of the State as a whole. The process of scheduling and despatch and role/responsibility of the MSLDC-OD shall be in accordance with the procedure outlined under 'Scheduling and Despatch Code' of the State Grid Code, modifications / amendments thereto and any such Order issued by the MERC from time to time. Further, MSLDC-OD shall determine the target despatch schedules and target drawal schedules by undertaking load-generation balancing and adopting MOD principles at reference frequency of 50 Hz.
- (b) The least cost despatch planning shall be based on the 'Merit Order Stack' to be adopted by the MSLDC-OD on day-ahead basis based on the available capacity declaration furnished by the generating stations on a day-ahead basis corresponding to each trading period. During real-time operations, SLDC may seek to verify available capacity upto 'declared capacity' and issue despatch instructions accordingly.
- (c) During real-time operations, in case of shortfall in 'availability', SLDC shall take into account the available contracted capacity to each Distribution Licensee (or State Pool Participant) before issuing drawal/curtailment instructions for respective Distribution licensee. The load curtailment as may be necessary, shall be applicable on all distribution licensees uniformly in proportion to their 'available contracted



capacity' and shall be applicable for shortfall beyond their available contracted capacity.

- (d) The 'Merit Order Stack' shall be based on the energy charge inclusive of fuel cost adjustment charge, if any, of various generating stations. The energy charge of the generating stations shall be based on the heat rate, auxiliary consumption factor, the formula for determination of energy charge as approved by appropriate Commission and the delivered cost of fuel at respective generating stations.
- (e) The generating stations shall furnish the details of the prevalent fuel charge including, details of the delivered cost of fuel during the month to the MSLDC-OD from time to time at least once during the month and not later than fifth day of the month to enable the MSLDC-OD develop centralized 'Merit Order stack' for the State as a whole.
- (f) For the purpose of Merit Order Stack, the Must run generating stations, constrained generating stations such as hydro stations linked to irrigation shall be ranked earliest in the Merit Order Stack.
- (g) All generating stations and State Pool Participants (including distribution licensees and TOAUs) would strictly comply with provisions of MERC(State Grid Code) Regulations 2006 including amendments thereof, and shall abide by Scheduling and Despatch instructions issued by SLDC from time to time.

#### **7.9 BASIS FOR ALLOCATION OF LOSSES**

- (a) For the purpose of determination of imbalance pool increments/decrements, the actual drawl by State Pool Participants need to be corrected to derive 'loss adjusted drawl' by each State Pool Participant to a common reference point (ex-bus) for comparison.
- (b) The intra-State transmission system losses for the purposes of imbalance computations shall be based on difference of actual injections by generating stations including UI energy (if positive) and actual drawl by State Pool Participants including drawl for inter-state trading (d-trade) purposes and UI energy (if negative).



- (c) The intra-State transmission system losses shall be allocated amongst the State Pool Participants at actual (ex-post) in proportion to the actual drawl by each State Pool Participant.
- (d) The mechanism for energy accounting and treatment of intra-State transmission system losses have already been elaborated under Commission's Transmission Tariff Order for FY2006-07 (Case 31 of 2006).

***7.10 BASIS FOR ALLOCATION OF REGIONAL UI CHARGES AMONGST STATE POOL PARTICIPANTS***

- (a) Settlement of regional UI charges shall be on **weekly** basis in accordance with Regional Energy Accounts finalised by WRLDC and the claim raised by WRLDC/WRPC for the State shall be settled by MSPC on behalf of State Pool Participants corresponding to deviations for each 30 minute duration.
- (b) However, allocation of UI charges amongst the State Pool Participants shall be in accordance with parameters and principles outlined herein below and shall be undertaken on **monthly** basis corresponding to deviations of State Pool Participants from their schedule for each 'trading period' of 30-minute duration. For the purpose of determination of 'absolute deviations', deviations of State Pool Participants including in-state generators from their schedule shall be determined on 30-minute basis and the same shall be compared against the summation of UI energy of two consecutive 15-minute block duration.
- (c) The RSM (whose role will be undertaken by the Commercial Division of MSLDC) shall develop statement of reconciliation corresponding to each trading period for weekly regional UI charges against the monthly allocation of net UI charges and monthly weighted average scheduled energy charges covered as a part of 'imbalance pool settlement'.
- (d) The un-scheduled interchange (UI) charges at the regional level corresponding to Maharashtra State shall be shared/allocated amongst all the State Pool Participants on the following basis.



- (i) The weekly statement of regional UI charges as prepared by WRLDC/WRPC shall form basis for sharing of UI charges (cost or incentive) amongst the State Pool Participants.
- (ii) The Gross UI charges (aggregate of two 15-minute time blocks) corresponding to UI energy for each 'trading period' shall be divided into two components viz. a) Cost corresponding to UI energy (if positive) at weighted average scheduled energy rate of the contributing State Pool Participants based on the CGS stations or cost corresponding to UI energy (if negative) at D-trade price and b) net UI charges is the difference of gross UI charge and cost associated with UI energy as considered in the 'imbalance pool' workings.
- (iii) The net UI charges shall be allocated to the State Pool Participants in proportion to their deviation from the 'target drawl schedule' or 'target despatch schedule', as the case may be, corresponding to each trading period. For this purpose, of allocation of net UI cost/incentive, the basis for deriving proportionate share shall be 'aggregate deviation' of each State Pool Participant from its 'target schedule'.
- (iv) Further, 'aggregate deviation' of the in-state generators shall also be captured apart from 'aggregate deviation' of State Pool Participants.
- (v) Net UI charges shall be divided into two parts (i) Net UI charges-1: corresponding to 'aggregate deviation' of State Pool Participants, and (ii) Net UI charges-2: corresponding to 'aggregate deviations' of in-state generators.
- (vi) Net UI charges-1 shall be allocated amongst the State Pool Participants which have been responsible for the deviations depending on the incidence of the UI cost/incentive i.e. in case, for a particular trading period, if there exists an incidence of UI cost, the same would be allocated amongst the State Pool Participants who have overdrawn compared to their drawl schedule for that trading period. Alternately, for a trading period, if there exists an incidence of UI incentive, the same would be allocated amongst the State Pool Participants who have under-drawn compared to their original drawl schedule for that trading period.



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Maharashtra and related issues***



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- (vii) Net UI charges-2 shall be allocated amongst all State Pool Participants in proportion to actual drawl during that trading period.
  - (viii) Net UI charges-2 corresponding to in-State generator deviations shall be captured only when in-State generator deviations are in tandem (of same sign) with overall UI implications for the State. (I.e. when (i) State earns UI incentive and in-State generators deviations has facilitated earning of UI incentive AND (ii) State incurs UI cost and if in-State generators has caused UI cost). Under other scenarios, the in-state generator deviations should be netted off against the overall State deviations before allocating the UI cost/incentive amongst the State Pool Participants.



## **8 IMPLEMENTATION CHALLENGES**

This Chapter deals with various implementation challenges that will have to be dealt with appropriately for implementation of ABT mechanism at State level. This Chapter elaborates on specific requirements arising out of proposed ABT mechanism to be adopted at State level in terms of energy metering, energy accounting, information requirement for market operation, obligation of parties to furnish requisite information. Specific implementation challenge areas covered under this Chapter are (a) Energy Accounting (b) Accounting of energy during emergency conditions (Market Suspension) (c) Metering Requirements (d) Information Requirements (e) Obligations to provide information

### **8.1 ENERGY ACCOUNTING**

- (a) For the purpose of electricity market operations under ABT mechanism, maintenance of information pertaining to 'energy accounts' shall be the responsibility of the Commercial Division of MSLDC (MSLDC-CD), in its capacity as 'Reconciliation and Settlement Manager'(RSM).
- (b) The 'Energy Accounting Information' shall include metered data covering all interface points between generating station to transmission network of intra-State transmission system (G<>T interface points) and metered data covering all interface points between transmission network of intra-State transmission system (InSTS) to distribution licensee (T<>D interface points). The 'Energy Accounting information' shall also include energy accounting data covering all interface points between transmission network of CTU and STU (PGCIL<>MSETCL interface points), as recorded by Western Regional Energy Account prepared by WRLDC/WRPC.
- (c) The 'Energy Accounting Information' shall also include metered energy data and scheduled energy data pertaining to inter-State generating stations contracted by State Pool Participants, un-scheduled interchange energy data pertaining to Maharashtra State (for direct and embedded customers covering State Pool Participants) as per Western Regional Energy Account maintained by WRLDC/WRPC.
- (d) In order to enable RSM perform the task of accounting of energy, all Market Participants shall provide requisite information and access to metered data within their control.



- (e) All 'Energy Account' related information shall be maintained by the RSM for each 'trading period' for all the Market Participants.
- (f) 'Monthly Energy Account' information as maintained by RSM for each calendar month shall form basis for reconciliation of energy exchanges and settlement of imbalances amongst the State Pool Participants for the corresponding calendar month.
- (g) 'Monthly Energy Account' information as maintained by RSM for each calendar month of a fiscal year shall form the basis for reconciliation of energy exchanges and settlement of 'Annual Fixed Cost Reconciliation' amongst the State Pool Participants.
- (h) The Commission under its Order (Clause 3.8.2 – Case 58 of 2005) directed MSETCL as Government Company undertaking SLDC operations to submit its Status Report and Action Plan for establishment of 'Energy Accounting Centre' within one month from date of issue of that Order.
- (i) SLDC has established Energy Accounting Cell headed by SE alongwith deployment of requisite supporting staff as on August 2006. Until December 2006, it plans to undertake and complete various activities related to energy accounting such as defining processes, procedures for data gathering and energy accounting, manpower training etc.
- (j) In this context, the Commission, under its Order dated 27<sup>th</sup> September 2006 (Case 31 of 2006) had directed SLDC to expedite establishment of Energy Accounting Centre and co-ordinate with all transmission licensees and distribution licensees to establish procedures for information sharing, flow of data, including demand forecast and records energy flow at various interface points as outlined under paragraph 28. The Energy Accounting Centre should be operational not later than December 31, 2006.

**8.2 ACCOUNTING OF ENERGY DURING EMERGENCY CONDITIONS (MARKET SUSPENSION)**

- (a) In case due to emergency condition or any other reasons including force majeure such as islanded mode of operation, if the Market Operator (MSPC) has notified the operations of markets to be suspended for a specific duration during a particular calendar month (period of reconciliation) then, 'accounting of energy' corresponding to such specified period shall be considered only for the purpose of assessment of transmission losses and 'energy accounts' shall be maintained accordingly.



- (b) However, for the purpose of ‘imbalance pool computation’, the ‘monthly energy account’ shall exclude the specified periods of market suspension and the reconciliation of energy exchange and settlement of imbalance pool workings shall be determined excluding the energy exchange, if any, during period of Market suspension.
- (c) For the purpose of transmission loss determination, the ‘energy accounts’ for the ‘specified period of market suspension’ shall consider the ‘profiled data substitution’ methodology, in case requisite information pertaining to metered data is not available for some interface points.
- (d) Further, it is clarified that during such period of ‘market suspension’ the energy exchange amongst State participants (say, within island formed) will have to be settled by mutual agreement or at system marginal price for the islanded system prevalent at that point in time.

### **8.3 METERING REQUIREMENTS**

- (a) All metering systems at the G-T and T-D interface points will be read using MRIs. In addition, all metering points will have manual start finish readings collected as check data on a monthly retrospective basis. Further, all readings should be taken for full calendar month and should be received by the RSM within three days from the end of the month.
- (b) The procedures for installation, operation, maintenance, replacement and accuracy calibration of meters at various interface points shall be in accordance with various applicable provisions under IEGC 2005, MERC (State Grid Code) Regulations, 2006 and CEA (installation and Operation of Meters) Regulations 2006.
- (c) MSETCL, vide its letters dated July 26, 2006 and August 11, 2006 has furnished its phasewise plan for installation of meters at interface points and establishment of Energy Accounting Cell to undertake State-wide energy accounting. During Phase-I of the proposed plan, MSETCL intends to cover inter-State and inter-Utility lines within State in following manner:
- Providing 224 nos of ABT compliant meters at interface points
  - Hardware and software required at sub-station level for Automatic Meter Reading of ABT compliant meters
  - Time synchronisation of equipment at each sub-station



- Hardware and software required for data processing at central location i.e. SLDC-Kalwa
  - Communication system through V-SAT link between various sub-stations and SLDC for on-line data transfers.
  - Software and hardware for monitoring at five transmission zones.
- (d) The STU, transmission licensees, distribution licensees and generating companies will have to adhere to the metering plan as approved by the Commission from time to time.

#### **8.4 INFORMATION REQUIREMENT**

- (a) For reliable and accurate market operations, it is important that all requisite information necessary for development of 'energy account reconciliation statement' and 'financial settlement of imbalances' on monthly basis amongst the Pool Participants is available to the RSM on timely basis.
- (b) All State Pool Participants shall be responsible for timely furnishing of the requisite information, documents, contractual information, copies of the energy bills, and access to the metered energy data available in their respective control to the RSM from time to time within stipulated time frame. The contractual information required to be furnished by State Pool Participants shall include -
- (i) Power Purchase Agreements amongst Licensees (State Pool Participants) and Generators/Traders (Market Participants).
  - (ii) Bilateral Agreements amongst licensees, if any.
  - (iii) Bilateral/Purchase Agreements amongst TOAU (OA Generators and OA Users).
  - (iv) Wheeling Agreement amongst TOAU (OA generators and OA Users) and Transmission licensee.

##### **8.4.1 PPA and commercial information**

- (a) All Pool Participants shall furnish details of capacity/energy contracted by them under power purchase agreements executed by them with generators/traders to the RSM to enable it allocate metered injections from generators to State Pool Participants and determine the energy exchange and volume of imbalance amongst the State Pool Participants.



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- (b) All State Pool Participants shall also notify to RSM from time to time any modification in the existing capacities or any additional capacities contracted by them.
- (c) For the purpose of market operations, the contracted capacity shall be considered only after its entry into commercial operation and if despatched by the MSLDC-OD in the normal course of operations in accordance with the Merit Order Despatch principles.
- (d) The in-firm generation by the generating station prior to commercial operation shall not be considered for the purpose of determination of 'imbalance' volume.
- (e) All generators shall furnish details of their per unit variable cost of generation to the MSLDC-OD to enable it propose a Merit Order Stack of generating stations, to MSPC (Market Operator) for its approval, after taking into account MUST run and constrained generating stations.
- (f) The details for determining 'per unit variable charge' for the purposes of the Merit Order Stack' shall include computation of energy charge inclusive of fuel cost adjustment charge, if any, of various generating stations as applicable for extant month. The computation of energy charge shall be based on the heat rate, auxiliary consumption factor, the formula for determination of energy charge as approved by Appropriate Commission and the delivered cost of fuel at respective generating stations.
- (g) The generating stations shall furnish the details of the prevalent fuel charge including, details of the delivered cost of fuel during the month to the MSLDC-OD from time to time at least once during the month and not later than fifth day of the month to enable the MSLDC-OD develop centralized Merit Order Stack' for the State as a whole.
- (h) To enable the RSM to determine the weighted average system marginal cost (WASMC) of contributing State Pool Participants, all State Pool Participants shall furnish details of the per unit variable cost of generation stations contracted by them as per monthly energy bills received by them from the generating companies/traders. This information shall be furnished to the RSM within seven days from expiry of calendar month for the month for which the information relates.



#### **8.4.2 Bilateral Agreements of licensees**

- (a) All licensees shall furnish details of capacity/energy contracted by them under power purchase agreements executed by them with inter-State traders to the RSM to enable it allocate metered injections corresponding to purchase/supply by inter-State trader to State Pool Participants and to determine the energy exchange and volume of imbalance amongst the State Pool Participants.
- (b) All State Pool Participants shall also notify to RSM from time to time any modification in the existing capacities contracted by them or any additional capacity contracted by them with inter-State trader. The State Pool Participants shall furnish the copy of their power purchase agreement to RSM within seven days from date of execution of such agreement and shall notify commencement of power procurement under such agreement.
- (c) All licensees (or as applicable) shall furnish details of capacity/energy contracted by them for purpose of inter-State sale with inter-State traders to the RSM to enable it allocate metered injections corresponding to purchase/supply by inter-State trader to State Pool Participants and determine the energy exchange and volume of imbalance amongst the State Pool Participants.
- (d) All State Pool Participants shall also notify to RSM from time to time any modification in the existing capacities contracted by them or any additional capacity contracted by them with inter-State trader.

#### **8.4.3 Bilateral Agreements of OA Users**

- (a) All OA users (which are State Pool Participants, i.e. TOAU) shall furnish details of capacity/energy contracted by them under bilateral power purchase agreements executed by them with generators/traders/other licensees to RSM to enable it allocate metered injections from generators/traders/licensees to OA Users (which are State Pool Participants, i.e. TOAU) and determine the energy exchange and volume of imbalance amongst the State Pool Participants.
- (b) All OA users (which are State Pool Participants, i.e. TOAU) shall also notify to RSM from time to time any modification in the existing capacities contracted by them or any additional capacity contracted by them. All OA users (which are State Pool Participants, i.e. TOAU) shall furnish the copy of their power purchase agreement to



RSM within seven days from date of execution of such agreement and shall notify commencement of power procurement under such agreement.

- (c) For the purpose of market operations, the contracted capacity shall be considered only after its entry into commercial operation and if despatched by the MSLDC-OD in the normal course of operations in accordance with Merit Order Despatch principles.
- (d) The in-firm generation by the generating station prior to commercial operation shall not be considered for the purpose of determination of 'imbalance' volume.

#### **8.4.4 Metered injections and metered off-take**

- (a) The collection of the metered data shall be by way of MRI backed up manual start-finish readings. The data shall be collected at the end of each calendar month and shall be time stamped to ensure accuracy. All collected data shall be received by the RSM within 3 days of the end of the calendar month to which it relates.
- (b) The collected data shall be securely stored within the RSM and the back ups taken which are to be held off-site as a contingency against data catastrophe. The system holding the data shall have appropriate anti-virus and firewalls to ensure that the data cannot be accessed by un-authorized persons.
- (c) In case of totally or partially missing data is found, the affected interface point shall have its entire months data substituted using the Profiled Data Substitution Methodology (PDSM) as outlined in following paragraph.
- (d) The collected data once verified as accurate and complete shall form the inputs into the Balancing and Settlements System (BSS), which shall form basis for computation of 'imbalance pool' workings, reconciliation of energy exchange and settlement of 'imbalances' amongst the 'State Pool Participants'.

##### **8.4.4.1 Data substitution methodology**

- (a) The data substitution shall be required corresponding to some interface points in case MRI data for the trading periods is not available. The energy from the start – finish readings shall be allocated throughout the 30 minute trading periods in the month using 'Profile Method' in a manner that reflects the profile of the majority data that has been collected by MRI.



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- (b) The 'Profile Method' for data substitution will result in the demand profile after inclusion of the Substitute Data to more closely reflect the actual profile and shall further minimise the imbalances caused by including the Substitute Data.
  - (c) In case 95% of the available data is successfully collected by MRI, the resultant percentage of data attributable to each of the trading periods should be a close reflection of the profile that would have applied to the substitute data had it been collected via MRI.

**8.5 OBLIGATIONS TO PROVIDE INFORMATION**

- (a) The MSLDC-CD shall publish all such information as required for all other State Pool participants to be aware of the energy exchanges taking place within the pool as well as exigency conditions, if any.
- (b) All data collected from interface points shall be shared with the stakeholders to whom it relates. The RSM will hold a repository of historical data (18 months T - D data), and will make the same available, should Stakeholders wish to see historic profiles. The data shall be available for each month.
- (c) Although, the BSS will provide the outputs that are required to ascertain the accuracy and financial implications of the monthly imbalances, it is expected that the majority of outputs will over time be user defined. As stakeholders gain a better understanding of the implications of their operational actions, their requirements for information will become more refined. The BSS and the RSM need to be equipped to meet these information requirements as and when they arise.



## **9 SETTLEMENT PROCESS AND RULES**

This Chapter deals with premise and rule for settlement of energy exchange amongst State Pool Participants in the context of the market operations under ABT mechanism. The principles outlined under this Chapter specifically strives to address rules pertaining to settlement of imbalance energy exchange amongst State Pool participants, rule for settlement regional UI pool account, rule for settlement of inter-state trade of energy pool account and rule for settlement of fixed cost reconciliation pool amongst State Pool Participants. This Chapter also elaborates on specific requirements for *fail-safe* market operations such as payment guarantees, events of defaults by State Pool Participants, Market Operations (MSPC) and Market Service providers (MSLDC-CD, MSLDC-OD, MSETCL etc.) and remedies thereof. Specific areas covered under this Chapter are (a) Billing and Payment (b) Settlement of Regional UI Pool account (c) Settlement of FCR Pool account (d) Settlement of inter-State trade Pool account (D-trade) (e) Payment Guarantees (f) Payment Default and Remedies

### **9.1 BILLING AND PAYMENT**

- (a) The RSM shall prepare monthly 'Statement of Imbalance Pool Settlement' corresponding to energy exchange amongst the State Pool Participants for each trading period over the monthly period of each fiscal year under consideration commencing from April in accordance with the energy account reconciliation rules.
- (b) The RSM shall present such monthly 'Statement of Imbalance Pool Settlement' to MSPC for its approval within fifteen calendar days from the end of the month corresponding to the preceding month.
- (c) The 'Statement of Imbalance Pool Settlement' shall clearly provide for following distinct statements of settlement:
  - (i) Settlement of Imbalances (energy exchange) amongst State Pool Participants.
  - (ii) Settlement of Net UI charges amongst the State Pool Participants.
  - (iii) Settlement of inter-State sale of energy and sharing of profit/loss for inter-State sale transactions.
  - (iv) Aggregate net position of settlement amongst the State Pool Participants.



- (d) MSPC shall within seven calendar days from submission of such monthly 'Statement of Imbalance Pool Settlement' to it by the RSM, accord its approval to enable RSM to raise bill on behalf of MSPC (Market Operator) on State Pool Participants for them to effect payment/receive payment, as the case may be.
- (e) In case, MSPC does not approve monthly 'Statement of Imbalance Pool Settlement' within seven calendar days, it shall record reasons in writing for such non-approval and seek clarification from the RSM / State Pool Participants / Market Participants, as may be required.
- (f) However, pending approval of monthly 'Statement of Imbalance Pool Settlement' by MSPC, the RSM shall raise Bills on the State Pool Participants upon expiry of seven days of its submission to MSPC for its approval and the such Statement shall be due for payment and shall be binding on all State Pool Participants to settle the payment on interim basis similar to 'MSPC approved monthly Statement for settlement'.
- (g) Upon seeking necessary clarification or resolving issues for pending approval, MSPC shall approve the monthly 'Statement for Imbalance Pool Settlement' and notify of its approval to the RSM with necessary corrections/modifications. The RSM in turn, shall issue 'Supplementary Bill' to State Pool Participants within seven calendar days from receipt of notification/approval from MSPC with due modifications/adjustments (credit note/debit note) as may be necessary.
- (h) All bills, (whether Interim, Final or supplementary) issued by the RSM to State Pool Participants shall be due for payment within seven calendar days from its submission to the State Pool Participants.
- (i) MSPC shall open and maintain a bank account to receive/release payments in respect of settlement amongst State Pool Participants.
- (j) The State Pool Participants shall make all payments in favor of MSPC on or before due date and MSPC shall in turn release payments to State Pool Participants within three calendar days from receipt of payment from decrementing State Pool Participants. In case, all payment due from decrementing State Pool Participants is not available on due date of payment, MSPC shall release payment (to the extent collected against concerned monthly settlement due and as available on due date) to contributing State Pool Participants in proportion to their entitlement as per Monthly 'Statement of Imbalance Pool Settlement'.



## **9.2 SETTLEMENT OF REGIONAL UI POOL ACCOUNT**

- (a) The RSM shall prepare Monthly 'Statement of Net UI Charge Settlement' corresponding to allocation of Net UI Charges amongst the State Pool Participants for each trading period over the monthly period of each fiscal year under consideration commencing from April in accordance with the regional UI energy account reconciliation rules.
- (b) The RSM shall present such Monthly 'Statement of Net UI charge Settlement' to MSPC for its approval within fifteen calendar days from the end of the month corresponding to the preceding month.
- (c) The MSLDC-CD shall provide to MSPC/RSM the weekly Statement of regional UI charges (cost or incentive) payable or receivable, as the case may be, based on the 'Regional Energy Account' statements furnished by WRLDC/WRPC.
- (d) MSPC shall maintain records of weekly/monthly regional UI energy and regional UI charge corresponding to each trading period. MSLDC-CD on behalf of MSPC shall maintain records of weekly/monthly allocation of UI energy and allocation of regional UI charges (Gross and Net UI charge) amongst State Pool Participants corresponding to each trading period of the calendar month.
- (e) The regional UI charges comprises charges corresponding to active UI energy and reactive charges, however, for the purpose of this regional UI settlement, MSPC shall consider only active UI charges since under proposed ABT Mechanism allocation of Net UI charges amongst State Pool Participants are based on active UI energy. At present, regional reactive UI charges are to be borne by MSETCL and forms part of its Annual Revenue Requirement and recovered through transmission tariff. Hence, the MSETCL shall make payment to MSPC corresponding to regional reactive UI charges on weekly basis to enable MSPC settle the regional UI bill on weekly basis.
- (f) MSPC on behalf of State Pool Participants shall collect on monthly basis and make payment towards settlement of the regional UI charges to WRLDC/WRPC on weekly basis.
- (g) State Pool Participants shall make payment to MSPC on monthly basis in accordance with the rules outlined hereinabove.



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- (h) Since settlement of regional UI charges are to be made on weekly basis and settlement of imbalances and allocation of net UI charges amongst State Pool Participants are made on monthly basis, there shall be requirement for the MSPC of funds towards working capital.
  - (i) State Pool Participants shall agree to provide fixed sum equivalent to one month (four week regional UI charges) towards funding working capital requirement of MSPC, in advance, based on past three monthly average UI charges for the State. The requirement of working capital of MSPC for this purpose shall be reviewed every quarter of the fiscal year and the MSPC shall direct State Pool Participants to provide fixed sum towards working capital.
  - (j) The sharing of funds for working capital amongst the State Pool Participants shall be based on share in allocation of UI charges amongst the State Pool Participants in the previous quarter. The decision of MSPC in this regards shall be final and binding on all State Pool Participants.

### **9.3 SETTLEMENT OF FCR POOL**

- (a) The RSM shall prepare Annual 'Statement of FCR Pool Settlement' corresponding to capacity exchange amongst the FCR Pool Participants for each trading period over the monthly period of each fiscal year under consideration commencing from April in accordance with the 'FCR energy account' reconciliation rules.
- (b) The RSM shall present such Annual 'Statement of Imbalance Pool Settlement' to MSPC for its approval within fifteen calendar days from the end of the fiscal year corresponding to the preceding fiscal year.
- (c) The 'Statement of FCR Pool Settlement' shall clearly provide for following distinct statements of settlement:
  - (i) Settlement of Imbalances (capacity exchange) amongst FCR Pool Participants in accordance with 'FCR Pool Volume', separately for each month of the Fiscal year.
  - (ii) Aggregate net position of settlement amongst the FCR Pool Participants.
- (d) MSPC shall within seven calendar days from submission of such Annual 'Statement of FCR Pool Settlement' to it by the RSM accord its approval to enable the RSM to



raise bill on behalf of MSPC (Market Operator) on FCR Pool Participants for them to effect payment/receive payment, as the case may be.

- (e) In case, MSPC does not approve Annual 'Statement of FCR Pool Settlement' within seven calendar days, it shall record reasons in writing for such non-approval and seek clarification from the RSM / FCR Pool Participants / other Market Participants, as may be required.
- (f) However, pending approval of Annual 'Statement of FCR Pool Settlement' by the MSPC, the RSM shall raise Bills on the FCR Pool Participants upon expiry of seven days of its submission to MSPC for its approval and the such Statement shall be due for payment and shall be binding on all FCR Pool Participants to settle the payment on interim basis similar to 'MSPC approved Annual Statement for settlement'.
- (g) Upon seeking necessary clarification or resolving issues for pending approval, MSPC shall approve the Annual 'Statement for FCR Pool Settlement' and notify of its approval to the RSM with necessary corrections/modifications. RSM in turn, shall issue 'Supplementary Bill' to FCR Pool Participants immediately upon receipt of notification/approval from MSPC with due modifications/adjustments (credit note/debit note) as may be necessary.

#### **9.4 SETTLEMENT OF INTER-STATE TRADE POOL ACCOUNT (D-TRADE)**

- (a) The MSLDC-CD shall provide to the RSM the recorded details of inter-State energy sales as per Regional Energy Accounts pertaining to inter-State trade transactions contracted by the State Pool Participants.
- (b) State Pool Participant(s) who have availed the inter-State trading license shall provide to the RSM the details of the contracts entered into by them with Traders for inter-State sale purposes. The details shall cover the period of commencement of contract, capacity contracted, sale price as per agreement, tenure of contract, delivery point and any other details as may be required by the RSM and approved by MSPC from time to time for the purpose of energy accounting/reconciliation purposes.
- (c) The RSM shall prepare Monthly 'Statement of Inter-State sale Account (D-trader) Settlement' corresponding to allocation of revenue/profits amongst the State Pool Participants for each trading period over the monthly period of each fiscal year under consideration commencing from April in accordance with the 'inter-state sale (D-trader) reconciliation' rules.



- (d) The RSM shall present such Monthly 'Statement of Inter-State sale Account (D-trader) Settlement' to MSPC for its approval within fifteen calendar days from the end of the month corresponding to the preceding month, along with other Monthly Statements furnished for approval of Settlement.

**9.5 PAYMENT GUARANTEES**

- (a) State Pool Participants shall make payments on or before due date by way of cheque/demand draft to be drawn in favor of MSPC.
- (b) Any delay in payment shall attract penal interest charge at the rate of short term SBI PLR+4% per annum or part thereof. In no case, delayed payment by Pool Participants shall be permitted beyond the period of three months from the due date of payment, despite any dispute as regards settlement computation. The MSPC shall have right to initiate necessary disciplinary actions against defaulting parties in case of delay beyond period of three months from due date.
- (c) Before commencement of Market operations and not later than two months from constitution of MSPC, all State Pool Participants shall open, at their own cost, an irrevocable letter of credit (L/C) of nationalized bank in favor of MSPC. The L/C shall cover an amount not exceeding one month energy and transmission charges based on average of previous twelve monthly energy bills incl. transmission/wheeling charges of that State Pool Participant.
- (d) The LC shall provide un-conditional right of encashment to MSPC in case of non-payment, part-payment or delay in payment beyond the due date of payment by the State Pool Participant. The Pool Participant shall immediately reinstate the L/C for an amount to the extent that it is encashed.
- (e) Before commencement of Market operations and not later than two months from constitution of MSPC, all Pool Participants shall submit, at their own cost, a 'Bank Guarantee' (BG) of nationalized bank in favor of MSPC. The BG shall cover an amount not exceeding three month energy and transmission charges based on average of previous twelve monthly energy bills incl. transmission/wheeling charges of that State Pool Participant.
- (f) The BG shall provide un-conditional right to MSPC to invoke, in case of non-payment, part-payment or delay in payment beyond the due date of payment by the



State Pool Participant. State Pool Participant shall immediately revise and reinstate the BG to an extent it is invoked.

- (g) Notwithstanding provisioning of payment guarantees as outlined above, the MSPC shall have right to modify/alter any terms and requirement of 'payment guarantee' in parts or full and/or relax such conditions upon recording reasons in writing, for modification/relaxation of such terms/conditions. However, such right to alter/modify can only be exercised upon experience of market operation for one full year and not earlier.

#### **9.6 PAYMENT DEFAULT AND REMEDIES**

(a) Following events shall constitute events of default by State Pool Participant:

- (i) Delay in payment (part or full) by any State Pool Participant beyond period of three months from due date of payment as per Monthly 'Statement of settlement' shall constitute an event of default by that State Pool Participant.
- (ii) Delay in opening/reinstating the L/C by any State Pool Participant beyond the stipulated period shall constitute an event of default by that State Pool Participant.
- (iii) Delay in opening/reinstating the BG by any State Pool Participant beyond stipulated period shall constitute an event of default by that State Pool Participant.
- (iv) Non-compliance of any of the terms/conditions/rules outlined under this 'Balancing and Settlement Code' by any of the State Pool Participant shall constitute an event of default by that State Pool Participant.
- (v) Non-compliance of any of the directives issued by MSPC to any of the State Pool Participant, so long as such directives are not inconsistent with any of the provisions of these Balancing and Settlement Code and in accordance with the Functions and within the Powers outlined for MSPC, shall constitute an event of default by that State Pool Participant.

(b) Remedies for Events of default by State Pool Participant:

- (i) MSPC shall have right to discontinue membership of State Pool Participant to MSPC and forfeit its BG, L/C, membership fees, security deposit, if any.



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- (ii) MSPC shall have right to levy penalty on State Pool Participant, in accordance with its conduct of business.
- (iii) MSPC shall have right to direct the MSLDC to regulate power supply, issue despatch instructions to defaulting State Pool Participant.
- (iv) Defaulting State Pool Participant shall be liable for penal/disciplinary action to be initiated by the Commission in accordance with extant Rules, Regulations, Grid Codes and relevant Act provisions, as may be applicable.
- (c) Following events shall constitute events of default by MSPC:
- (i) Non-compliance of any of the terms/conditions/rules outlined under this 'Balancing and Settlement Code' by MSPC shall constitute an event of default by MSPC.
- (ii) Non-compliance of any of the directives issued by the Commission to MSPC shall constitute an event of default by MSPC.
- (iii) If in the opinion of the Commission, there are sufficient reasons/developments to ascertain that in the course of its market operations, MSPC has exceeded any its powers/functions outlined under these 'Balancing and Settlement Code' then that shall be construed as event of default by MSPC.
- (d) Remedies for Events of default by MSPC:
- (i) The Commission shall revoke the powers/rights granted to MSPC under these Balancing and Settlement Code.
- (ii) MSPC shall be liable for penal/disciplinary action to be initiated by the Commission in accordance with extant Rules, Regulations, Grid Codes and relevant Act provisions, as may be applicable.
- (e) Following events shall constitute events of default by RSM:
- (i) Non-compliance of any of the terms/conditions/rules outlined under this 'Balancing and Settlement Code' by RSM, except due to force majeure events and for reasons solely attributable to RSM, shall constitute an event of default by RSM.



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- (ii) Non-compliance of any of the directives issued by MSPC to RSM, so long as such directives are not inconsistent with any of the provisions of these Balancing and Settlement Code and in accordance with the Functions and within the Powers outlined for MSPC, shall constitute an event of default by RSM.
- (iii) In-ordinate delay (i.e. beyond period of two months from due dates) in furnishing 'Monthly Statements for Imbalance Pool settlement' and 'Annual Statement for FCR Pool settlement' to MSPC or any State Pool Participant, so long as delay is not on account of reasons beyond the reasonable control of RSM, shall constitute an event of default by RSM.
- (f) Remedies for Events of default by RSM:
- (i) MSPC shall have right to levy penalty on the RSM, in accordance with its conduct of business.
- (ii) The Commission shall revoke the powers/rights granted to RSM under these Balancing and Settlement Code.
- (iii) The RSM shall be liable for penal/disciplinary action to be initiated by the Commission in accordance with extant Rules, Regulations, Grid Codes and relevant Act provisions, as may be applicable.



## **10 GOVERNANCE STRUCTURE**

This Chapter deals with most critical aspect of 'Governance' in the context of the market operations under State level ABT mechanism. Specific areas covered under this Chapter are (a) Objective of Governance under state level ABT mechanism (b) Constitution of Maharashtra State Power Committee (c) Functions of Maharashtra State Power Committee (d) Powers of Maharashtra State Power Committee

### **10.1 OBJECTIVE OF GOVERNANCE UNDER STATE LEVEL ABT FRAMEWORK**

As a part of the proposed ABT mechanism at State level, an institutional mechanism needs to be created to address commercial issues, which may arise between the trading partners. A Maharashtra State Power Committee (MSPC) is recommended for this purpose.

The main objectives of this institutional arrangement shall be to:-

- (a) Develop and provide a platform for better governance of a market oriented trading mechanism
- (b) Provide a framework for efficient reconciliation and settlement of differences between the trading partners
- (c) Recording of commercial arrangement and accounting of energy exchange amongst parties
- (d) Bring transparency in operation and improve upon the system and procedures of market operation

### **10.2 CONSTITUTION OF MAHARASHTRA STATE POWER COMMITTEE**

- (a) The Maharashtra State Power Committee shall consist of following members
  - (i) Chief Executive of MSEDCL
  - (ii) Chief Executive of TPC-D
  - (iii) Chief Executive of REL-D
  - (iv) Chief Executive of BEST-D
  - (v) Head Executive of MSLDC



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- (b) The Chairman of the Maharashtra State Power Committee can be appointed from amongst the Chief Executives of the Distribution Licensees on a rotational basis with the MD of MSEDCL may be appointed as first Chairman of MSPC.
- (c) The tenure of the Chairman shall not exceed a period of one year and the appointment shall be ex-officio.
- (d) Head Executive of MSLDC shall be ex-officio Member – Secretary of the MSPC and the Administrative Division of MSLDC shall provide secretarial and administrative assistance to MSPC to undertake its various activities. MSPC shall further address institutional requirements of this arrangement suitably, as may be necessary.
- (e) The MSPC may at its discretion, constitute such functional committees or sub committees consisting of such members of the MSPC as the MSPC may deem appropriate. The MSPC may invite/appoint any other person, expert or agency to help and guide such functional committees or sub-committees. The period for such functional committee or sub-committee including its terms of reference or scope of work shall be fixed by the MSPC.
- (f) Subject to the terms of reference or scope of work determined by the MSPC, such functional committee or sub committee shall examine various technical and commercial issues and make recommendations to the MSPC for its consideration and final decision. The functional committees or sub committees in discharge of its function shall abide by any specific direction or guideline issued by the MSPC in relation to the terms of reference or scope of work of such functional or sub committee.
- (g) The MSPC shall have the power to expand and to reduce the membership of the MSPC subject to fulfillment of conditions to be developed by MSPC.
- (h) The MSPC shall, on such terms and conditions as maybe mutually agreed, utilise services of the RSM (to be carried out by the MSLDC-CD, to begin with) for energy accounting, reconciliation and settlement.
- (i) All the decisions of MSPC have to be based on consensus with at least 3/4<sup>th</sup> of its members supporting it fully.



### **10.3 FUNCTIONS OF MAHARASHTRA STATE POWER COMMITTEE**

#### **10.3.1 Core Functions**

The main functions of MSPC shall, inter alia, include the following:

- (i) The MSPC shall co-ordinate and shall facilitate the intra-state and inter-state trading activities by optimal utilisation of resources.
- (ii) The MSPC shall review energy accounting and billing for inter-utility trading of power and ensure settlement of imbalances amongst State Pool Participants in accordance with the Balancing and Settlement Code.
- (iii) The MSPC shall represent the common interest of the State Pool Participants in the matters related to power purchase from CGS, inter-State/inter-regional resources and pertaining to issues related to WRLDC at the regional level.
- (iv) The MSPC shall monitor compliance of Balancing and Settlement Code by the State Pool Participants and resolve complaints/disputes amongst the State Pool Participants.

#### **10.3.2 Key Activities**

Thus, the key activities that MSPC shall undertake in order to discharge its functions shall include following:

- (i) Facilitate settlement of imbalance pool transactions on monthly and annual basis. Ensure implementation and operation of Balancing and Settlement Code as approved by MERC. Monitor compliance of Balancing and Settlement Code by the State Pool Participants. Review the 'Balancing and Settlement Code' from time to time from operationalisation perspective and propose amendments / modifications /alterations /deletions, for approval of MERC, as may be necessary for effective and efficient market operations.
- (ii) Review and take on record the energy accounting data and inter-utility billing related information in pursuance to Balancing and Settlement Code on monthly basis.
- (iii) Monitor conduct of State Pool Participants and hearing of complaints of the State Pool Participants.
- (iv) Suggest modification, alteration, deletion, and/or replacement the conduct of



- business rules of the MSPC as may be deemed fit from time to time.
- (v) Reconcile differences between the State Pool Participants.
  - (vi) Provide platform to identify and resolve market participants concerns and to represent common interest of Distribution Licensees at regional level. Keep track of the commercial arrangements between the State Pool Participants.
  - (viii) Approve applicants for admission to membership of imbalance pool in accordance with Balancing and Settlement Code.
  - (ix) Receive notification of rule breaches from Reconciliation and Settlement Manager (RSM) and take disciplinary actions for any breach of rules.
  - (x) Act as an agency for interaction with MSLDC, WRLDC/WRPC and CGS for all matter related to power purchase by the Distribution Licensees and Open Access consumers. Provide information to the State Pool Participants on the operation of market, including information on quantum of energy exchange, energy accounting etc. and any other information required to be conveyed to the State Pool Participants for effective and efficient operation of the market.

#### **10.4 POWERS OF MAHARASHTRA STATE POWER COMMITTEE**

Following powers and the decisions of the MSPC shall be binding on the State Pool Participants. The powers of MSPC shall be to:

- (a) Constitute and designate an independent agency to attend to all aspects of payment and receipt for UI and other payments/charges. Pending such appointment, MSLDC shall undertake this task.
- (b) Accept/approve new membership in the MSPC.
- (c) Propose modifications in Balancing and Settlement Code, if necessary, subject to and the approval of the State Pool Participants.
- (d) Formulate and modify byelaws for regulation of the business of the MSPC from time to time.
- (e) Fix (monthly/annual) contribution and/or charge fees from the constituent members to meet administrative expenses.
- (f) Appoint sub-committees for detailed scrutiny, verification, analysis and reporting the matter to MSPC for its decision or ruling.



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- (g) Appoint expert agency or any other consultant to assist Functional Committee or Sub-committee of MSPC.
  - (h) Hire any personnel and appoint as staff member of MSPC.
  - (i) Engage services of the RSM, consultant or expert agencies.
  - (j) Call upon reports, information and records from the RSM for verification
  - (k) Reconcile and settle differences amongst State Pool Participants and refer matter to experts to address concerns of Pool Participants, and,
  - (l) Call upon State Pool Participants to furnish various information including copies of agreements, as may be necessary for proper functioning of the market.

***10.5 REVIEW MECHANISM FOR BALANCING AND SETTLEMENT CODE***

The Balancing and Settlement Code once approved by the Commission shall be applicable and binding on all State Pool Participants, Market Participants and Market Service Providers.

It shall continue to be in force until reviewed and revised by the Commission upon undertaking due regulatory process. The Commission may initiate the regulatory process for modification to Balancing and Settlement Code on suo-moto basis or based on recommendations of MSPC.