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**Implementation of Reactive Energy Accounting Framework for  
Intra-State Hydro Electric Generating Stations in terms of the applicable provisions of the  
MERC (State Grid Code) Regulations, 2020**

**NOTIFICATION**

**Date: 9 March 2022**

1. As per Regulation 70.1 of the MERC (Multi Year Tariff) Regulations, 2019 (**MYT Regulations**), a Generating Station is required to inject/absorb the reactive energy into the grid on the basis of machine capability as per the directions of Maharashtra State Load Dispatch Centre (**MSLDC**).
2. Also, the Regulation 70.2 of these Regulations provides that the reactive energy exchange, only if made as per the directions of MSLDC for the applicable duration (injection or absorption) shall be compensated/levied by the/ to the Generating Station, as specified in the applicable State Grid Code Regulations.
3. Further, in accordance with Regulations 70.3 of the MYT Regulations, the Transmission System Users (**TSUs**) are subjected to Incentive/Disincentive to be compensated/levied by the MSLDC for maintaining the reactive energy balance in the transmission system, as specified in the applicable State Grid Code Regulations.
4. Thus, the MYT Regulations refer to the provisions of the MERC (State Grid Code) Regulations, 2020 (**State Grid Code Regulations**) for recovery/payment of reactive power in the event of instructions issued by the MSLDC for injection/absorption of reactive energy and also for payment of incentive/levy of penalties upon TSUs in order to ensure reactive energy balance in the Intra-State Transmission System.
5. In accordance with the Regulation 37.16 of Grid Code Regulations, notified in the Official Gazette on 2 September, 2020, the Commission is required to notify the date separately for the applicability of the procedure for accounting and settlement of reactive energy charges for Intra-State entities.
6. In this context, MSLDC, which is the implementing agency of the Operation Code of the Grid Code Regulations, vide its letter dated 23 December 2021 has submitted its preparedness for partial implementation of Reactive Energy Accounting Mechanism. MSLDC, in its letter, has stated as below:

- Reactive energy accounting module is ready and tested for accounting and settling the reactive power injected/absorbed by hydro generators during condenser mode operation.
  - Maharashtra State Power Generation Co. Ltd. (**MSPGCL**) has been requesting payments against condenser mode operations of Koyna Generating Units.
  - With the development of reactive energy accounting module, above payment can be made from the Deviation Settlement Mechanism (**DSM**) Pool from the date to be notified by the Commission.
7. Subsequently, on 27 January 2022, MSLDC also submitted a draft Procedure for “Implementation of Reactive Energy Framework and payment of Reactive Energy Charges” covering scope, implementation aspects, payment and settling principles and other details of reactive energy accounting framework. This procedure was deliberated with key stakeholders on 31 January 2022 by DSM Working Group.
  8. The Commission notes that Deviation Settlement Mechanism (**DSM**) has been introduced in the State vide MERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2019, (**DSM Regulations**) dated 1 March, 2019 and the commercial implementation of these Regulations under stabilization period has commenced from 11 October 2021. Also, in order to facilitate and guide implementation, address difficulties, if any, in the implementation of the DSM Regulations, the Commission has constituted the DSM Working Group on 7 January 2019. The Working Group has been interacting with MSLDC and other stakeholders for understanding their difficulties or concerns related to implementation of the DSM Regulations.
  9. Since Reactive Energy Accounting Module is a part of DSM software deployed by MSLDC for implementation of the DSM Regulations, DSM Working Group was asked to provide its input regarding commencement of the Reactive Energy Accounting mechanism in State. Accordingly, the DSM Working Group submitted its report on “*Implementation of Reactive Power Framework in the State of Maharashtra*” on 22 February 2022 providing its views on the commencement of Reactive Energy Accounting framework as suggested by MSLDC and also its views on the comments of the stakeholders on the draft procedure prepared by MSLDC.
  10. The key points of the Report submitted by the DSM Working Group are as under:
    - i. The DSM Working Group has interacted with the stakeholders for commencement of the reactive energy accounting mechanism in State in a phased manner.
    - ii. The DSM Software includes 10 modules, one of which is Reactive Energy Accounting. The Commission, vide its Suo-motu Order dated 6 May 2021 for “*Removal of Difficulty in the process of implementation of MERC DSM Regulations, 2019*”, had directed MSLDC to ensure the deployment of pending DSM software modules such as Reactive Energy Accounting, MIS and Big Data Analysis by the IT implementation partner.

- iii. The Reactive Energy Accounting framework is applicable to all Transmission system Users (**TSUs**), however, MSLDC vide its letter dated 23 December 2021 has submitted its preparedness for partial implementation of Reactive Energy Accounting mechanism, i.e. for Hydro Generators under condenser mode operations in the event of MSLDC's instructions.
- iv. As per the provisions of the Planning Code of the Grid Code Regulations, State Transmission Utility (**STU**) is expected to carry out the planning studies for Reactive Power compensation of InSTS. STU has undertaken the reactive power planning study as a part of action point identified by the High Level Committee (**HLC**) constituted by the Commission for enquiry of the Partial Grid Disturbance occurred on 12 October 2020.
- v. However, present shortfall of reactive power compensation necessitates that, MSLDC harnesses this reactive power requirement from hydro generating resources through condenser mode operation wherever feasible for secure and reliable grid operations. Operation of Hydro Generators connected in InSTS under condenser mode operation (reactive power injection or absorption) is a specific requirement depending on system conditions of voltages. Mainly, Koyna Hydro Electric Generating Units of MSPGCL (4 x 250MW –Stage 4 with 168 MVA reactive power capacity- totaling 672 MVA) are occasionally being operated under condenser mode as per the system conditions.
- vi. As per the recommendations of the High Level Committee HLC set up by the Commission for investigating large scale grid disturbance in Mumbai region in October 2020, STU has identified the reactors /capacitors to be placed at various EHV substations. Accordingly, the procurement and installation of such reactive power compensation devices upon due regulatory process is currently underway. Such installations are expected to improve the overall voltage profile of InSTS network. Till such time, implementation of incentives/disincentives mechanism under reactive power pricing framework for other TSUs except hydro generators will not be proper/appropriate.
- vii. Further, at present, MSLDC is not receiving 100%-meter data through Automatic Meter Reading (**AMR**). Also, in case of few interface locations (about 170 SEMs), still remain outside the scope of AMR project; the meter data for those locations is made available through Meter Reading Instrument (**MRI**). It is observed that, RKVAH component is not available for these locations in MRI data which is necessary for RKVAH billing i.e., reactive power billing.
- viii. Accordingly, the DSM Working Group has suggested that:
  - a. Though the proposed reactive power mechanism is applicable to all TSUs, at present, MSLDC has been issuing instructions to Hydro Generators only, to operate in condenser mode for reactive power compensation. Accordingly, it is recommended that the Commission may commence the Reactive Energy Account mechanism in phases.

- b. In the first phase, the Commission may cover only Hydro Generators under the framework and allow the MSLDC to compensate the Hydro Generators operating in condenser mode as per the instructions of the MSLDC.
- c. In this phase, there will not be any TSU or generator paying in the Reactive Energy pool and there would only be claims to be serviced for reactive power support to be provided by Hydro Generators as per the instructions of MSLDC. Hence, MSLDC may be allowed to pay the Hydro Generators from the State DSM Pool Account which is envisaged for active energy.
- d. The Commission may consider extending the applicability of Reactive Energy Accounting mechanism to other TSUs, upon annual review of current mechanism by MSLDC or as and when MSLDC informs about its preparedness for such extension to other TSUs.

### **Commission's Analysis and Ruling:**

11. Regulation 37.8 of the State Grid Code Regulations provides that MSLDC shall take appropriate measures to control InSTS voltages, which may, inter alia, include operation of Hydro Generating Units under synchronous condenser mode.
12. The State Grid Code Regulations also provide that Reactive energy exchange, only if made as per the directions of MSLDC, for the applicable duration (injection or absorption) shall be compensated/levied as per the detailed procedure for accounting and settlement of intra-state reactive energy charges specified as Annexure-7 of these Regulations. Clause 2.1 of the detailed procedure provides that this Mechanism shall be applicable to all the TSUs' and all generator(s) (including wind and solar generating stations) connected to intra state transmission system, InSTS directly or through common pooling substation in the State.
13. Further, Clause 4.1 of the detailed procedure provides the following methodology for accounting and settlement of reactive energy:

#### *“ 4. Methodology for Accounting and Settlement*

##### *4.1. To discourage VAr draw/injection by the TSUs and Generating Unit, VAr exchanges with InSTS shall be priced as follows:*

- *The TSUs and Generating Unit shall pay into the Pool for any VAr drawl when the voltage at interface metering point is below 97% of the bus voltage at which the TSU and Generating Unit is connected.*
- *The TSUs and Generating Unit shall get paid from the Pool for any VAr injection when the voltage at metering point is below 97% of the bus voltage at which the TSU and Generating Unit is connected.*
- *The TSUs and Generating Unit shall get paid from the Pool for any VAr drawal when the voltage at metering point is above 103% of the bus voltage at which the TSU and Generating Unit is connected.*
- *The TSUs' and Generating Unit shall pay into the Pool for any VAr injection*

*when the voltage at metering point is above 103% of the bus voltage at which the TSU and Generating Unit is connected.*

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*4.2. The charge for kVARh (injection / drawal) to be levied shall be 13.00 paise/kVARh or such other rate as may be stipulated by Commission from the date of applicability of implementation of reactive power compensation mechanism in the state and the same shall be escalated by 0.50 paise/kVARh annually in subsequent years unless otherwise revised by the Commission.*

14. Thus, while reactive energy exchange, only if made as per the directions of MSLDC, needs to be compensated/levied by MSLDC to the generating station, it is also envisaged that there would be a mechanism for incentives/disincentive for all the TSUs in order to have discipline in their respective drawal/injection of reactive energy into grid. Thus, ideally, all TSUs (i.e. all Intra-State Generating Stations including Captive Power Plants, Renewable Energy Generators, Distribution Licensee and Consumers connected to the InSTS) are to be covered under the Reactive Energy Accounting framework, however, it would not be appropriate to penalize these TSUs if there is inadequacy of reactive power compensation or voltage related (over-voltages or under-voltages) issues at the grid level itself in absence of deployment of adequate reactors for reactive compensation at grid level.
15. The Commission therefore accepts MSLDC's suggestions and recommendations of the DSM Working Group and in exercise of powers conferred under Regulation 101 of the State Grid Code Regulations relating to Removal of Difficulty, the Commission directs MSLDC to operationalize the Reactive Energy Accounting framework in phased manner with Hydro Generators to be covered under the framework to begin with, for their condenser mode operations under MSLDC's instructions. The other TSUs would be covered under the framework in subsequent phase/s based on input from MSLDC upon annual review of current mechanism by MSLDC or as and when MSLDC informs about its preparedness for such extension to other TSUs.
16. The detailed procedure for accounting and settlement of intra-state reactive energy charges specified as Annexure-7 of the State Grid Code Regulations contemplates applicability of the mechanism to all the TSUs' and all generator(s) (including wind and solar generating stations) connected to InSTS directly or through common pooling substation in the State. However, since the Reactive Energy Accounting framework is being directed to be implemented in a phased manner, the Commission deems it appropriate to direct that the framework would be implemented as per the modality stipulated in the separate detailed procedure formulated by MSLDC which has been finalized after consultation with key stakeholders by the DSM Working Group.
17. The Commission notes that the MERC (State Grid Code) Regulations, 2020 have specified the rate of Reactive Energy Charges (injection/drawal) as 13 paise/kVARh with escalation by 0.50 paise/kVARh annually. In line with this provision, MSLDC has suggested that the Hydro Generating Stations may be compensated with the same rate during condenser mode operation of these Stations under MSLDC's instructions. The Commission further notes that for specifying the rate for Reactive Energy Charges in the

MERC (State Grid Code) Regulations, 2020, reference is taken of the CERC (Indian Electricity Grid Code) Regulations, 2010 which provides that the charge for VARh shall be at the rate of 10 paise/kVARh w.e.f. 3 May 2010, and this rate shall be escalated at 0.5 paise/kVARh per year thereafter. This rate has been determined by CERC based on its internal study on comparative cost benefit analysis of investment in capacitor installation and reactive power drawl based on the then prevailing purchase orders for capacitor installation by the STUs. Since the rate proposed by MSLDC is the same as that specified in the MERC (State Grid Code) Regulations, 2020 and also in consonance with rate specified by CERC, the Commission accepts the proposed rate of 13 paise/kVARh with escalation by 0.50 paise/kVARh annually as compensation to the Hydro Generating Stations under condenser mode operations under MSLDC's instructions.

18. **Accordingly, the Commissions accepts the recommendations of DSM Working Group and directs that:**
- i. **Mechanism for Accounting and Settlement of Reactive Energy Charges shall be introduced in phased manner.**
  - ii. **In the first phase of this mechanism, Hydro Generators would be covered when operated under condenser mode operation under instructions from MSLDC.**
  - iii. **This first phase shall be implemented by MSLDC from 00.00 Hrs. of Monday, 14 March 2022.**
  - iv. **In the absence of reactive power pool at this stage where there would not be receipt of recoveries from the TSUs, MSLDC is allowed to compensate the Hydro Generators @13.00 paise/kVARh from State DSM Pool account and this rate shall be escalated by 0.50 paise/kVARh annually in subsequent years unless otherwise revised by the Commission through separate Order.**
  - v. **MSLDC shall maintain the weekly account for reactive energy payment made to Hydro Generators.**
  - vi. **The modality for implementation of first phase shall be in accordance with the separate detailed procedure formulated by MSLDC which has been enclosed with this Notification as an Annexure.**
  - vii. **STU shall expedite its study for reactive power compensation and ensure installation of the necessary reactive power compensation facilities at required locations to enable operationalization of Reactive Energy Accounting framework in subsequent phase/s for bringing all TSUs under the framework.**
  - viii. **Notwithstanding anything above, all generating stations connected to InSTS shall follow Regulation 37 of Grid Code Regulations for Voltage Control and Reactive Power Management.**
19. **MSLDC, after taking review after a period not exceeding one year, shall inform the Commission about its preparedness for operationalize the subsequent phase of**


**Reactive Energy Accounting framework.**

20. **Any issue arising during implementation of this framework may be taken up in the Grid Co-ordination Committee formed under the State Grid Code Regulations for assessing and recommending appropriate remedial measures.**

**Sd/-  
(Mukesh Khullar)  
Member**

**Sd/-  
(I. M. Bohari)  
Member**

**Sd/-  
(Sanjay Kumar)  
Chairperson**

  
**(Abhijit Deshpande)  
Secretary**





**MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO.LTD.**  
CIN NO. U40109MH2005SGC153646

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**Procedure for implementation of Reactive Energy Framework and payment of Reactive Energy Charges for Hydro Generating Stations (absorption/injection) under MSLDC's instructions as per Notification dated 9 March 2022 issued by the Commission for "Implementation of Reactive Energy Accounting Framework for Intra-State Hydro Electric Generating Stations in terms of the applicable provisions of the MERC (State Grid Code) Regulations, 2020"**

**1.0 Preamble**

This procedure is prepared in partial compliance with Regulation 37 of MERC (State Grid Code) Regulations, 2020 and hereinafter called the procedure for Accounting and Settlement of Reactive Energy Charges for Intra State Entities.

**2.0 Scope and Applicability of the Mechanism**

- 2.1 In this draft procedure, Hydro Generating stations above 25MW capacity connected to InSTS are covered when operated under condenser mode operation under instructions from MSLDC.
- 2.2 The Hydro Generators covered under this procedure shall respond to the specific instructions (Absorption/Injection of Reactive Power) from MSLDC.

**3.0 Implementation Aspects**

- 3.1 Based on the InSTS Voltage Profile, MSLDC shall instruct for Reactive Power injection/absorption to the Hydro Generators by operating it in condenser mode of operation.
- 3.2 The Start Time Block and End Time Block shall be informed by MSLDC for a particular day in real time to Hydro Generators through Phone/email or any other way of communication.
- 3.3 For the purpose of Reactive Energy Accounting, MSLDC instructions viz., Category (absorption/Injection); Generating Unit; Start Date and Time Block; End Date and Time Block; local Bus Voltages before instructions and after instructions, Remarks, etc. shall be entered in the DSM -Reactive Energy Accounting Module by MSLDC Shift In-charge.

**4.0 Reactive Energy Accounting**



- 4.1 STU shall ensure availability of 15-min. time block wise RkVAH ABT meter data on weekly basis for all the Hydro Generating Stations covered under this Procedure as per the timelines stipulated in the DSM Regulations and Procedure thereon.
- 4.2 Time Block wise accounting of Reactive Energy Injection/Absorption as per the instructions of MSLDC to the Hydro Generators shall be done to compute the payments.
- 4.3 MSLDC shall compute and issue weekly Reactive Energy Account bill along with regular DSM weekly bills.
- 4.4 The Reactive Energy Charges notified as per MERC (State Grid Code) Regulations, 2020 are 13.00 Paisa/kVAh and the same shall be applicable from the date of implementation and shall be escalated by 0.50 Paisa/kVAh annually in the subsequent years unless otherwise revised by the Commission.

#### **5.0 Payments and Settlement principles**

- 5.1 In the absence of reactive power pool at this stage where there would not be receipt of recoveries from the TSUs therefore MSLDC shall compensate the Hydro Generators from DSM Pool Account for Condenser mode operation.
- 5.2 Priority of payments from DSM Pool Account shall be as follows in the descending order-
  - (1) WRPC DSM Charges payments
  - (2) VSE payments
  - (3) Reactive Energy Charges to Hydro Generators
  - (4) State DSM Charges payments
- 5.3 In case of shortfall in DSM Pool, the Reactive Energy Charges payments to the Hydro Generators shall be done on pro-rata basis of their receivables and the balance, if any, shall be made in subsequent weeks from the balance available after WRPC and VSE payments.
- 5.4 No interest shall be applicable in case of delay in payments to the Hydro Generators from MSLDC.
- 5.5 The weekly Reactive Energy Account shall be made available on the DSM portal.
- 6.0 Notwithstanding anything above, all generating stations connected to InSTS shall follow Regulation 37 of MERC (State Grid Code) Regulations, 2020 for Voltage Control and Reactive Power Management.
- 7.0 MSLDC after taking review within a period of one year shall inform the Commission about its preparedness for operationalizing total Reactive Pool Account as specified under Annexure - 7 of MERC (State Grid Code) Regulations, 2020 by incorporating all TSUs connected to InSTS.
- 8.0 Orders/ Directives of MERC, MERC (State Grid Code) Regulations, 2020 shall supersede anything written under this procedure. The procedure shall be amended accordingly as per the directives of MERC from time to time.

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