MAHARASHTRA ELECTRICITY REGULATORY COMMISSION

EXPLANTORY MEMORANDUM (EM)

ON

DRAFT MAHARASHTRA ELECTRICITY REGULATORY COMMISSION (FORECASTING, SCHEDULING AND DEVIATION SETTLEMENT FOR SOLAR AND WIND GENERATION) (FIRST AMENDMENT) REGULATIONS, 2023

DECEMBER 2023

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ABT	Availability Based Tariff
ACP	Area Clearing Price
AEML	Adani Electricity Mumbai Limited
AMR	Automatic Meter Reading
AvC	Available Capacity
BEST	Brihan-Mumbai Electric Supply & Transport Undertaking
CERC	Central Electricity Regulatory Commission
COD	Date of Commercial Operation
CSS	Cross Subsidy Surcharge
CTU	Central Transmission Utility
CUF	Capacity Utilization Factor
CY	Calendar Year
DAM	Day Ahead Market
DSM	Deviation Settlement Mechanism
FY	Financial Year
F&S	Forecasting and Scheduling
GCN	Generation Credit Note
GoI	Government of India
GoM	Government of Maharashtra
GW	Gigawatt
IEGC	Indian Electricity Grid Code
InSTS	Intra-State Transmission System
ISTS	Inter-State Transmission System
JMR	Joint Meter Reading
LGBR	Load Generation Balance Report
MERC	Maharashtra Electricity Regulatory Commission
MoP	Ministry of Power
MSEDCL	Maharashtra State Electricity Distribution Company Ltd.
MSETCL	Maharashtra State Electricity Transmission Company Ltd.
MSKVY	Mukhyamantri Saur Krushi Vahini Yojana
MSLDC	Maharashtra State Load Despatch Centre
MSPC	Maharashtra State Power Committee
MW	Megawatt
NLDC	National Load Despatch Centre
NRLDC	Northern Regional Load Despatch Center
OA	Open Access
PPA	Power Purchase Agreement

PSS	Pooling Sub-Station
QCA	Qualified Co-ordinating Agency
RE	Renewable Energy
REA	Regional Energy Account
REGS	Renewable Energy Generating Station
REMC	Renewable Energy Management Centre
RLDC	Regional Load Despatch Centre
RPC	Regional Power Committee
RPO	Renewable Purchase Obligation
RTM	Real Time Market
SEM	Special Energy Meter
SERC	State Electricity Regulatory Commission
SLDC	State Load Despatch Centre
STU	State Transmission Utility
TPC	The Tata Power Company Ltd
WRLDC	Western Regional Load Despatch Center
WTG	Wind Turbine Generator

1 Introduction

1.1 Background & Regulatory Framework

1.1.1 Context

The installed Renewable Energy (RE) sources capacity of Maharashtra as on July 2018 was exceeding 8 GW which included variable RE generation of Wind Energy (4.7 GW) and Solar (0.8 GW). With large scale integration of renewable energy based generating stations particularly wind and solar generating stations with the state grid in the earlier years (before 2018) and likely to add in the near future (subsequent to 2018), it was felt that managing the state grid would be a daunting task for the State Load Despatch Centre (SLDC). Forecasting and scheduling of these generators was critical to anticipate balancing requirements and procure requisite reserves to maintain load-generation balance and grid reliability. In order to mitigate the problems that may be affecting various stakeholders including consumers, it was felt necessary to frame regulations on forecasting, scheduling, deviation settlement and related matters of solar and wind generation sources that are connected and are likely to connect to the state grid.

Accordingly, the Maharashtra Electricity Regulatory Commission (**"MERC"** or **"Commission"**) notified the Maharashtra Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2018 (**"MERC F&S Regulations"** or **"the Principal Regulations"**) on 20 July 2018. With the completion of mock trial, other preparatory activities such as metering arrangements, QCA registration and software deployment and understanding implementation challenges, the Commercial implementation of MERC F&S Regulations commenced from 6 January 2020.

1.2 Relevant Developments

The Commission has come across a number of developments at Central/State level in last 3-4 years and the sector has become dynamic due to which amendment to the MERC F&S Regulations has become necessary. The nature and background of these developments/issues are discussed below:

1.2.1 Regulation 4.2 of the MERC F&S Regulations

The Regulation 4.2 of the MERC F&S Regulations mandates the Commission to review the Principal Regulations including formulation of Absolute Error, Accuracy Band and Deviation

Charge thereof as stipulated under Regulation 7.2 and Annexure; after two years, or earlier if it considers necessary.

1.2.2 MERC (Deviation Settlement Mechanism and related matters) Regulations, 2019

1) The Commission notified the Maharashtra Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2019 (**"MERC DSM Regulations"**) on 1 March 2019. The objective of the MERC DSM Regulations is to maintain the grid discipline and grid security as envisaged under the MERC (State Grid Code) Regulations, 2020 (**"State Grid Code"**) through commercial mechanism for Deviation Settlement through drawal and injection of electricity by the users of the grid.
2) At the time of notification of the MERC DSM Regulations, the Commission had clarified that commercial operationalisation of the MERC F&S Regulations is expected to commence well ahead of commercial operationalisation of the MERC DSM Regulations for conventional generators/Sellers and distribution licenses/Buyers. Hence, upon gaining experience of operationalising the forecasting and scheduling regime for variable RE, suitable amendments to the forecasting and scheduling framework can be explored.
3) **DSM Working Group**: In order to facilitate and guide for timely implementation, address difficulties, if any, and to monitor progress of several implementation steps related to the MERC DSM Regulations, the Commission constituted a working group ("**DSM Working Group**") on 7 January 2019.
    a. The DSM Working Group, from time to time, had provided its input and recommendations to the Commission based on feedback received from the stakeholders and based on the analysis of Deviation Settlement Mechanism (DSM) bills and regional bills.
    b. The DSM Working Group submitted its report on 23 March 2022 to the Commission on *"Analysis of DSM Operations during Stabilization Period"* ("**Report**") covering analysis of DSM bills for four months i.e., the period of 11 October 2021 to 31 January 2022, key issues raised by stakeholders and Maharashtra State Load Despatch Centre (MSLDC) and its recommendations on each of the issues and also on the implementation of the MERC DSM Regulations post completion of the stabilization period.
    c. The DSM Working Group Report also included RE Integrated Analysis and the issue of DSM Pool deficit and its resolution.

1.2.3 Relevant Orders issued by the Commission

1) **MERC Suo-motu Order dated 1 April 2022 (on Extension of stabilisation period for Commercial Implementation under the MERC DSM Regulations):**
   a) The Commission opined that suggestions/recommendations of the DSM Working Group (submitted through the Report mentioned in Para above) should undergo the stakeholder's consultation before an Order is passed by the Commission. Further, as the Maharashtra State Power Committee (MSPC) has wider representation of stakeholders responsible for DSM implementation, the Commission directed the MSPC to submit comments on the DSM Working Group Report.
2) **MERC Suo-motu Order dated 2 August 2022 (on Commercial Implementation of the MERC DSM Regulations, post expiry of stabilisation period and related issues):**
   a) The MSPC, on 5 May 2022, provided its comments on the DSM Working Group Report and accordingly, the Commission in its Order dealt with various issues/genuine concerns raised by stakeholders for further implementation of the MERC DSM Regulations.
   b) Relevant issues raised in the MERC Order:
      i. **RE Integrated Analysis:** The Integrated DSM analysis considering RE schedule and RE actual generation indicates that RE under-injection has significant implications on deviation management at State periphery level.
      ii. Pool deficit issue and its resolution during stabilisation period:
         - Post commencement of the stabilization period, from DSM bills (for the first 8 weeks' period), it was observed that DSM Pool Account was in deficit. Majority of the Buyers and Sellers were receivables from the Pool but there was no sufficient fund in the DSM Pool Account to pay to the Buyers and Sellers.
         - Deviations of RE Generators (Wind and Solar) and, deviations of Co-generation plants were found to be the key potential causes for the DSM Pool Account deficit.
         - **MSLDC action:** Therefore, MSLDC, while preparing the DSM bills, replaced the RE schedule in buyers' drawal schedule by RE actual generation. MSLDC also replaced the Hydro generators' schedule and co-generation plants' schedule with actual generation in the buyers' drawl schedule. This resulted in the DSM Pool becoming surplus from its earlier deficit Pool position.

- MSLDC action invited objections from the buyers (Distribution Licensee) due to impact on them on account of RE deviations. Buyers submitted that RE generation should be credited and settled as per the schedule only as the same mechanism is successfully working at regional level.

DSM Working Group's (relevant) recommendations:

- Such replacement of schedule with actual for adjustment of beneficiary schedules on post-facto basis, is not preferred as it amounts to errors of forecasting/scheduling and risk of deviation management for these RE resources getting passed on to beneficiaries/buyers on post-facto basis.
- Continued operation of the DSM Pool Account under deficit conditions cannot be sustained.
- Interim treatment of replacement of beneficiary schedule with actual maybe continued to manage deficit in the DSM Pool Account until the payments of RE is shifted to scheduled based payment and scheduling/deviation management of such resources is improved through amendment of regulatory framework.
- **The Commission may initiate separate study for amendment of relevant provisions of the MERC F&S Regulations to link payment of RE generation (wind and solar) to schedule based regime and further improvement/tightening of error band. The action of bringing RE generators under schedule based payment regime would be consistent with framework adopted by the Central Electricity Regulatory Commission (CERC)**.

MSPC's (relevant) comments:

- The practice of replacing RE schedule by actual generation while computing DSM bill may be continued as a temporary measure. **Meanwhile, the necessary regulatory process may be initiated for adopting the CERC mechanism in this regard.**

Commission's (relevant) ruling:

- Amongst various issues, the Commission consented to the above referred recommendations of the DSM Working Group.
- To compensate deficit in the DSM Pool, the Commission directed that the amount accumulated under the REDSM Pool shall be utilized for meeting the shortfall in the DSM Pool on account of payments to be made to the receivable entities. This would be in addition to the utilization of the REDSM Pool for the payment of DSM charges for the State as a whole.

This will ensure functioning of both DSM and REDSM pools without any difficulty and is therefore in the interest of all stakeholders.

- The Commission directed the MSLDC to continuously monitor the DSM and REDSM Pool position (surplus/deficit position) and apprise the MSPC from time to time for taking suitable corrective action, if needed.
- **The Commission noted that a feasibility study may be carried out before initiating amendments in the relevant provisions of the MERC F&S Regulations which will ensure its implementation smoothly. The Commission stated that it will pass directions separately in this matter.**

3) **MERC Suo-motu Order dated 29 May 2023 (on Removal of Difficulty in applicability of State Periphery Charges under the MERC F&S Regulations):**
   a) **State Periphery Charges:**
      i. Although, the Commission prima-facie accepted the input given by the DSM Working Group regarding deferment of State Periphery Charges, it directed MSLDC, which is implementing agency of the F&S Regulations, to carry out various analysis for longer period to provide its input when the MERC F&S Regulations are taken up for amendment in future.
      ii. The Commission continued with its earlier directive of deferment of levy of impact of State Periphery Charges till further directions of the Commission in the matter/ till the amendment / review of the MERC F&S Regulations.
   b) **Initiation of Study: The Commission informed that it has already initiated the process for review of the MERC F&S Regulations and the MERC (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2018 in line with the recommendations of the DSM Working Group and the DSM Regulations of the CERC, wherein the inputs from all stakeholders shall be taken into consideration.** (The Commission initiated this process by starting a separate Study through its consultants, M/s. Mercados Energy Markets India Pvt. Ltd.)

1.2.4 CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022

1) CERC notified the CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 ("**CERC DSM Regulations**") dated 14 March 2022 *vide* which it narrowed the error band for the grid connected regional entities and other entities engaged in inter-State purchase and sale of electricity. For wind-solar generator, the

range of deviation from the schedule by way of over-injection and under-injection, has been revised to 5% and 10% respectively.

2) Subsequently, the CERC *vide* its Suo-Motu Order dated 6 February 2023, revised error bands for Solar and Winds to 10% and 15% respectively, until further Orders in the matter.

1.2.5 Target of 500 GW generation capacity from non-fossil fuel resources by 2030:

1) The Government of India (GoI) has set an ambitious target of becoming a carbon neutral nation by the year 2070, and for which, the GoI has set a target to install RE capacity of 500 GW by the year 2030.
2) Simultaneously, in order to promote and facilitate installation of RE, the Ministry of Power (MoP), GoI, had recently issued few Rules and Orders, to act as a catalyst in achieving the envisaged target. The MoP had notified the "Renewable Purchase Obligation (RPO) and Energy Storage Obligation Trajectory till 2029-30" Order on 22 July 2022 and its Corrigendum on 19 September 2022. The MoP has further sent a letter dated 13 September 2022 to all State Electricity Regulatory Commissions (SERCs), advising the SERCs to make their regulations consistent and in alignment with the above-said Rules and Orders. Accordingly, the Commission had issued the draft MERC (Renewable Purchase Obligation, its Compliance and Implementation of Renewable Energy Certificate Framework) (First Amendment) Regulations, 2023 and received stakeholder comments.

1.2.6 Mukhyamantri Saur Krushi Vahini Yojana (MSKVY)

The Government of Maharashtra (GoM) seeks to ensure stable daytime electricity to agriculture consumers through decentralised solar power projects. To achieve this, the Industries, Energy and Labour Department, GoM has notified MSKVY 2.0, under which at least 30% (thirty percent) of agricultural feeders are proposed to be solarised by 2025 and faster capacity addition will be facilitated in the "Distributed RE Mode". The GoM intends to develop decentralized solar projects with a cumulative capacity of 7000 MW in the State of Maharashtra.

In view of the above referred issues and developments, and based on the experience gained since notification and commercial operations of the MERC F&S Regulations, the Commission has undertaken the study and reviewed the MERC F&S Regulations.

Accordingly, the Commission now proposes relevant amendments at appropriate places in the MERC F&S Regulations.

1.3 Structure of Explanatory Memorandum

The rationale for the changes proposed in the MERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2018 have been elaborated in this Explanatory Memorandum. In cases where no change is proposed, the same has not been explicitly mentioned. Generally, only the clauses where any addition/modification is proposed in the MERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) (First Amendment) Regulations, 2023 have been discussed in this Explanatory Memorandum.

The Commission while formulating the MERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) (First Amendment) Regulations, 2023 has endeavoured to balance the interest of consumers, Qualified Co-ordinating Agencies (QCAs), RE generators, Distribution Licensees, MSLDC and other stakeholders.

The draft MERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) (First Amendment) Regulations, 2023 should be read along with the present Explanatory Memorandum (EM) as the Commission, after duly considering the comments/suggestions received from stakeholders, may consider to incorporate various requirements laid down under the present Explanatory Memorandum, while finalizing the amendment Regulations and/or these requirements may become guiding principles for the procedures to be prepared by MSLDC under these Regulations.
The Explanatory Memorandum is organised in the following Chapters:

Chapter 1: Introduction

Chapter 2: Review of provisions of the MERC F&S Regulations related to Formulation of Absolute Error, Error Band and REDSM/Deviation Charges for Wind and Solar generators and other related issues

a) For Sale or self-consumption of power within Maharashtra
b) For Wind and Solar Generators connected to the Intra-State Transmission network and selling or consuming power outside Maharashtra

Chapter 3: Shifting of RE generators (Wind and Solar) to Scheduled generation based payment regime

Chapter 4: Other Issues

2 Review of provisions of the MERC F&S Regulations related to Formulation of Absolute Error, Error Band and REDSM/Deviation Charges for Wind and Solar generators and other related issues

This Chapter of the Explanatory Memorandum elaborates the reasoning and justification for incorporating amendments on account of revision in Error Bands and REDSM/Deviation Charges.

2.1 Review of Formula for Calculating Absolute Error

2.1.1 Existing Approach

The deviation accounting and deviation settlement for RE sources (i.e., Wind and Solar generators connected to a particular Pooling Sub-Station (PSS), with combined installed capacity of equal to or more than 5 MW or an individual Generator connected to some other Sub-Station with installed capacity of equal to or more than 5 MW) is governed by the MERC F&S Regulations. As per these Regulations, the Absolute Error is computed as the difference between the Scheduled Generation and the Actual Generation injected by Solar or Wind Generators expressed as a percentage of their Available Capacity (AvC) in each time block. i.e. Actual Generation – Scheduled Generation/Available Capacity.

2.1.2 Inputs received from Distribution Licensee

The Commission vide email dated 4 May 2023 circulated questionnaire to Distribution Licensee and MSLDC and had sought replies/input/comments on the said questionnaire. Based on the direction of the Commission, concerned stakeholders, in addition to reply to specific questions raised in the questionnaire have also provided inputs/comments on the issue of formula for calculating Absolute Error. The same have been summarized as below:

Table 1: Comments of Distribution Licensees on Absolute Error Formula

Particulars	Comments
MSEDCL	a) The formula for "Absolute Error" shall be corrected as below: Absolute Error (%) = 100 x [Actual Generation – Scheduled Generation] / Scheduled Generation instead of existing formula. b) The error band is to be revised to 10% and 7% for Wind and Solar generators respectively as per proposed formula.

Particulars	Comments
	c) If the formula for "Absolute Error" is retained as per the existing formula, then the error band needs to be tightened to 5% and 3% for Wind and Solar generators respectively.
AEML	a) Wind generation varies largely from season to season / months, therefore having same error band across the year may not prompt QCA/Generators to ensure higher accuracy across all the seasons. Therefore, it appears that there is need to consider the seasonality as one of the factor to decide the error bands. Further, different bands across all the seasons need to be considered so that in absolute terms the deviation allowed in MW will be commensurate to the actual MW generated in such season b) AEML proposed to have % Error allowable based on CUF of generation, i.e., highest error band during higher CUF i.e., during monsoon.

2.1.3 Proposal

In this context, the Commission at the time of adopting the present error formula based on AvC had deliberated on this issue in detail. The relevant extract of the Statement of Reasons of the MERC F&S Regulations issued by the Commission on 20 July 2018 is reproduced below:

"4.3 Analysis and Commission's Decision

The Commission notes that, all RE generators have proposed to adopt the Error formula under Option 1 which is based on AvC at denominator. SLDC and State Distribution Licensee have recommended the Option 2 considering possibility of mis-declaration of AvC by RE generators. ***The Commission also notes that, Model F&S Regulations of FOR, DSM Regulations of Central Commission and other SERCs and have also considered the error formula based on AvC at denominator.***

The Commission is of the view that, the provisions of Regulation 5.23 of Draft Regulations related to Gaming are adequate to avoid the possibility of mis-declaration of AvC by RE generators.

Considering the ease of implementation at the initial stage of F&S Regulations and to ensure uniformity at regional level the Commission finds it appropriate to adopt the Error formula under Option 1 which is based on AvC at denominator to begin with this stage of introduction of F&S framework at the State level. ***This will also reduce the commercial impact on RE generators and would encourage quick adoption of forecasting and scheduling mechanism at state level.*** *However, upon gaining*

experience of operationalisation over the period, the Commission may consider, Suo-motu or upon application filed by any stakeholder may revisit and initiate process of revision of Error formulation, Error range and applicable Deviation Charges thereof, as deemed necessary.

…

27.2 Analysis and Commission's Decision

…

Further, as per detailed analysis covered under Discussion Paper, ***the Commission is of the view that while the Error formula based on scheduled generation may be conceptually logical, it does not cover significant data-points within a reasonable Accuracy Band level.***

Moreover, during non-peak seasons, the degree of error in absolute terms would be insignificant but the percentage error value would be significantly higher since forecasts and schedules are much lower. On the other hand, the Error formula based on Available Capacity is not saddled with such large differences and a smaller range of accuracy bands can be followed uniformly despite seasonal variations. *" (emphasis added)*

Further, the CERC in its CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022 has continued with the Error formula based on AvC at denominator in case of Wind and Solar generators. Further, all other SERC's of RE rich state have adopted the error formula based on the AvC at denominator.

Table 2: Absolute Error Formula notified by SERC's

State	Absolute Error
Rajasthan	(Actual Generation – Scheduled Generation)/AvC
Gujarat	(Actual Generation – Scheduled Generation)/AvC
Tamil Nadu	(Actual Generation – Scheduled Generation)/AvC
Karnataka	(Actual Generation – Scheduled Generation)/AvC
Andhra Pradesh	(Actual Generation – Scheduled Generation)/AvC
Maharashtra	(Actual Generation – Scheduled Generation)/AvC
Madhya Pradesh	(Actual Generation – Scheduled Generation)/AvC
Uttar Pradesh	(Actual Generation – Scheduled Generation)/AvC

As regards the percentage error formula based on CUF of generation as proposed by AEML, the same cannot be made applicable as different plants would have different CUFs, and, common error band for all RE generators based on CUF would be ambiguous and complex to

implement. Moreover, the Commission has also introduced additional regulations which strengthen the existing provisions related to gaming. Accordingly, no change has been introduced in the Absolute Error formula in the proposed amendments.

2.2 Revision in Error Bands and Deviation Charges

2.2.1 Data Considered for Analysis

As on August 2023, around 8,142 MW of RE capacity (Solar/Wind/Hybrid) is under the framework of the MERC F&S Regulations. However, for the purpose of study the data as on 31 August 2022 has been considered due to initiation of analysis activity after Suo-motu Order dated 2 August 2022.

a) The following table shows the overall RE installed capacity covered under the MERC F&S Regulations as on 31 August 2022 and considered for the purpose of analysis.

Table 3: Data considered for Analysis (as on 31.08.2022)

Description	Wind	Solar	Hybrid	Total
RE Installed Capacity (MW) of State as on 31 August 2022	4,304	2,262	903	7,487
Total PSS covered under F&S framework (No.)	74	47	6	127
Largest QCA -Manikaran Capacity (MW)	2,577	761	805	4,143
Total PSS (No.)– Manikaran	38	14	5	57
2nd Largest QCA -REConnect Capacity (MW)	598	487	97	1,182
Total PSS (No.) - REConnect	23	19	1	43
Total QCAs operating in State	16 No. (Manikaran, REConnect, Statkraft, Kreate, TPREL, MSEDCL, Shradha, Vedanjay, Clean, Walwhan, Sharda, Ratnagiri Wind Power, Fermi Solarfarms, Unilink Engineering, Avaada Energy, Avaada Mhbuldhana)			

Source: MSLDC website

For the purpose of analysis, total 97 no. of PSS out of 127 no. of PSS have been considered.

b) Selection of PSS and QCA:

i) The overall analysis of RE sources (Wind/Solar/Hybrid) in the State has been done based on technology (wind, solar and hybrid), seasonal (monsoon, non-monsoon, windy and non-windy) and capacity connected to PSS.

ii) Similarly, the QCA-wise analysis has been done based on the same approach/parameters as adopted for Overall RE analysis.

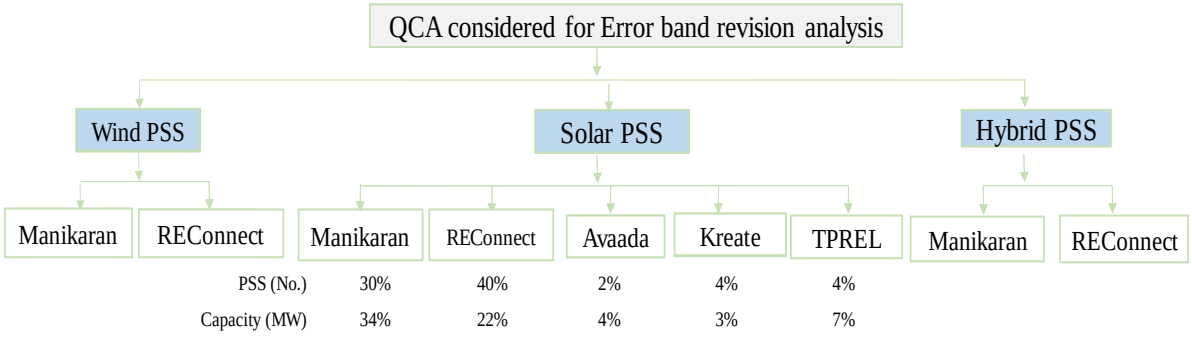
   a. The % share of Manikaran in above considered total installed capacity is ~55% and for REConnect the share is ~15.78% (Cumulative share capacity = ~70%)

   b. Total No. of PSS covered by both = ~80%

iii) For the purpose of analysis RE DSM bills/statements for the period FY 2020-21, FY 2021-22 and FY 2022-23 (April to September) have been considered.

iv) The following figure depicts the overall QCAs considered for Error Band revision analysis.

Figure 1: QCAs considered for Error Band revision analysis



v) For the QCA wise analysis, data of Manikaran and REConnect have been considered for wind technology, however, for solar technology apart from Manikaran and REConnect, data of Avaada, Kreate and TPREL have also been considered.

2.2.2 Stakeholders perspective on revision in Error bands and Deviation Charges

a) DSM Working Group

The DSM Working Group recommended to consider revision in Absolute Error Band and linkages to the Power Purchase Agreement (PPA) rate. The relevant extract of the Commission Order dated 2 August, 2022 is reproduced below:

"11. The key points of the Report submitted by the DSM Working Group are as under:

11.4 Pool deficit issue and its resolution during stabilization period:

i. Post commencement of the stabilization period, MSLDC prepared DSM Bills (for the first 8 weeks' period i.e. from 11 October 2021 to 5 December 2021) as per the provisions of the DSM Regulations. However, it was observed that DSM Pool Account was in deficit and majority of the Buyers and Sellers were receivables from the Pool but there was no sufficient fund in the pool account to pay to the Buyers and Sellers. Deviations of RE Generators (Wind and Solar), deviations of Co-generation plants was found to be the key potential causes for DSM Pool account deficit and hence MSLDC, while preparing the DSM bills, replaced the RE schedule in buyers' drawal schedule by RE actual generation. MSLDC also replaced the Hydro generators' schedule and co-generation plants' schedule with actual generation in the buyers'

ii. ***Hence, there is need for ensuring improvement in forecasting/scheduling accuracy of RE resources, guiding such resources towards scheduled based payment regime and tightening of the error bands in stages as significant experience is gained over operational period since commercial implementation of the MERC (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2018 (F&S Regulations) since 6 January 2020.***

iii. At the same time, continued operations of DSM pool account under deficit conditions cannot be sustained. Hence, a pragmatic solution needs to be explored as suggested by MSLDC for replacement of beneficiary schedule with actual (only for Pooling Substation (PSS) wise RE Generators (wind and solar) connected at InSTS, on post-facto basis) ***until the payments of RE is shifted to schedule based payment and scheduling/deviation management of such resources is improved through amendment of Regulatory framework…***

…

11.8 Key Recommendations of the Working Group:

…

iv. Considering the impact of RE deviations and Co-Generators' deviations on DSM Pool account, the amendment of the F&S Regulations and the MERC (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2019 (RE Tariff Regulations) may be considered to change RE payment from actual

generation to schedule based generation, along with revision in Absolute Error band and linkages to PPA rate.

b) Inputs sought from Licensee and MSLDC

Simultaneously, the Commission vide email dated 4 May 2023 circulated questionnaire to major Distribution Licensees and MSLDC and had sought replies/inputs/comments on the said questionnaire. Based on the direction of the Commission, Distribution Licensees and MSLDC, has provided inputs/comments on the issue of revision of Error Bands and Deviation Charge. The same have been summarized below:

Table 4: Replies/Inputs/Comments on Revision in Error Bands and Deviation Charge

Particulars	Replies / Inputs / Comments
MSLDC	a) Commercial implementation of the Regulations has completed three years. Thus, QCAs have got substantial time for training & fine tuning their forecasting models. b) MSLDC has carried out Scheduling Accuracy Evaluation Analysis for the period Jan- Dec' 2022. This covered all seasonal variations such as Summer (Solar Peak), Monsoon (Wind Peak). c) It is observed that the % Error for combined RE (Wind + Solar) is within ± 10% for 97% of time blocks in the CY: 2022. The % error of Wind & Solar is within ± 10 % band for 90 % & 94 % of time blocks respectively. d) % Error may be revised further so that QCAs can move towards better accuracy. e) Also, separate band may be considered for Wind & Solar generation, as Solar generation is more firm compared to Wind Generation f) Result of analysis of deviations in terms of MW - Even though the % Error is within ± 15 % band, the deviations in terms of MW are high, - Also, for 79% of the time blocks, RE was Under-injecting (Over-scheduled). Also, for 52% of time blocks, the error in terms of MW is within ± 200 MW g) Analysis on Comparison of State Periphery Deviations & RE Deviations: - the maximum State Over-drawl was 1492 MW & corresponding RE deviation (Under-injection) was 231 MW. Similarly, Maximum RE Under-injection was 1114 MW & corresponding State deviation was

Particulars	Replies / Inputs / Comments
	478 MW (Over-drawing). Hence, for deviations at State Periphery, the same needs to be analysed with deviations of RE along with deviations by Discoms & Conventional Generators h) Considering forecasting accuracy & nature of generation, separate bands for Wind & Solar generation can be created, however, to avoid complicated deviation accounting, season-wise error bands may not be created i) Separate error band may be created for hybrid PSS (Wind + Solar) as no. of such PSS are likely to be increased in future
MSEDCL	a) Discom has to be bear the DSM penalty caused due to the deviation by RE generators and at the same time it has to pay the RE generators at PPA tariff on actual injection and further utilize excess of precious hydro resources. b) The formula for "Absolute Error" shall be corrected as below: Absolute Error (%) = 100 x [Actual Generation – Scheduled Generation] / Scheduled Generation instead of existing formula. c) The error band is to be revised to 10% and 7% for Wind and Solar generators respectively as per proposed formula. This is necessary to control RE generators from over forecasting. d) If the formula for "Absolute Error" is retained as per the existing formula, then the error band needs to be revised to 5% and 3% for Wind and Solar generators respectively. e) The bands should not be considered on windy/non-windy and monsoon/non-monsoon season as it will increase complexity. The method should be kept as simple as possible for ease of working. f) It is repeatedly noticed that RE generators over forecasts generation and that badly troubles in maintaining in daily LGBR. SLDC has instructed RE generators to provide accurate daily schedules. No improvement is seen from the generators side. MSEDCL is trying to manage the under-injection caused by over-forecasting of RE generators by using its hydro resources to avoid the deviation penalty at state level.
AEML	a) There are huge financial implications on Discoms on account of RE deviation and the current treatment given under existing regulatory framework. The deviation band, methodology for credit etc. need to be

Particulars	Replies / Inputs / Comments
	aligned so that risk rewards are distributed amongst the stakeholders appropriately. b) Post operationalization of MERC F&S regulation since Jan-20, Generators/QCAs have substantially gained experience in terms of RE F&S. c) CERC has revised band to 10% from earlier 15% for solar. There is need to revise the error band in line with the trajectory followed by CERC at the Regional level. d) To have consistency in approach, CERC like mechanism for ease of scheduling & settlement may be adopted. e) There is need to consider the seasonality as one of the factor to decide the error bands, different error bands across all the seasons need to be considered so that in absolute terms the deviation allowed in MW will be commensurate to the actual MW generated in such season.
TPC-D	a) RE deviations causes financial implications for Discoms in the form of DSM charges which increases the total power purchase cost & power planning cannot be done at optimum level b) Gradual revision of bands over the period of time is suggested. c) As regards seasonality, gradual revision of bands has been suggested and shall be on an overall basis for RE generators. The revision of bands will reduce the window for deviation and improve the RE generation forecasting
BEST	a) There are financial implications on the discom on account of RE deviation. b) RE bands should be revised (to ensure accurate forecasting by the generator) in steps to achieve the practical level of accuracy which is possible. c) RE bands can be customized on the basis of type of generation (As the predictability is different) d) As regards seasonality, setting the limits uniformly will simplify the procedure to great extent. However, consideration of seasonality will facilitate QCA to cover uncertainties in forecasting. The seasons need to be precisely defined in advance. In case of weather turning out different that defined scenario, it may result into disputes

2.2.3 Experience at Central level and in Other States

a) CERC in its DSM Regulations, 2022 narrowed the error band for the grid connected regional entities and other entities engaged in inter-State purchase and sale of electricity. For wind-solar generator, the range of deviation from the schedule by way of over-injection and under-injection, was revised to 5% and 10% respectively.

b) Subsequently, CERC *vide* its Suo-Motu Order dated 6 February 2023, revised error bands for Solar and Wind generators to 10% and 15% respectively, until further Orders in the matter.

c) Further, the relevant regulations of RE rich states have also been examined. A comparison of the relevant regulations is shown in the following table:

Table 5: Error Bands and Deviation Charges in key states

State	**Applicability**	**Absolute Error in % terms in 15-minute time block (selling power within the State)**	**Deviation Charges in case of under- or over-injection of power (selling power within the State)**
Maharashtra (July 2018)	All Wind & Solar generators connected to InSTS, using power for self-consumption or sale within and outside the State and having individual or combined capacity of >= 5MW	• <=15%: • >15% but <= 25%: • >25% but <=35%: • >35%:	None Rs.0.50 per unit Rs.1 per unit Rs.1.50 per unit
Gujarat (August 2019)	All Wind and Solar generators connected to the State grid/substation, using power for self-consumption or sale within and outside the State and having combined installed capacity of above 1 MW	**Wind** • <=12%: • >12% but <= 20%: • >20% but <=28%: • >28%: **Solar** • <=7%: • >7% but <= 15%: • >15% but <=23%: • >23%:	**Wind** None Rs.0.25 per unit Rs.0.50 per unit Rs.0.75 per unit **Solar** None Rs.0.25 per unit Rs.0.50 per unit Rs.0.75 per unit
Tamil Nadu (March 2019)	All Wind and Solar generators (excluding Solar Rooftop) connected to InSTS or distribution system and using power for self-consumption or sale within and outside the State	• <=10%: • >10% but <= 20%: • >20% but <=30%: • >30%:	None Rs.0.25 per unit Rs.0.50 per unit Rs.1 per unit
Madhya Pradesh	Selling power within State:	**Old generators** (i.e. commissioned before	**Old generators:** Same as Maharashtra

State	Applicability	Absolute Error in % terms in 15-minute time block (selling power within the State)	Deviation Charges in case of under- or over-injection of power (selling power within the State)
(Principal-April 2018) (Amendment – October 2019)	Combined installed capacity of Wind generators >=10 MW & Solar generators >= 5MW Selling power outside State: All Wind & Solar generators having combined installed capacity of >=1MW	notification of Regulations)**:** Same as Maharashtra **New generators** (i.e., commissioned after notification of Regulations): • <=10%: • >10% but <= 20%: • >20% but <=30%: • >30%:	 **New generators:** None Rs.0.50 per unit Rs.1 per unit Rs.1.50 per unit
Rajasthan (September 2017)	All Wind & Solar generators connected to State grid, using power for self-consumption or sale within and outside the State and having individual or combined capacity of >= 5MW	Same as Maharashtra	Same as Maharashtra
Karnataka (May 2016) (Amendment 2022)	All Wind generators using power generated for captive consumption or sale within the State having combined installed capacity of >= 10 MW at PSS Solar >=5 MW	• <=10%: • >10% but <= 20%: • >20% but <=30%: • >30%:	None Rs.0.25 per unit Rs.0.50 per unit Rs.0.75 per unit
Andhra Pradesh (August 2017) (Amendment - 2021)	All Wind and Solar generators connected to the State grid and using power for captive consumption or sale within or outside the State	• <=10%: • >10% but <= 20%: • >20% but <=30%: • >30%:	None Rs.0.50 per unit Rs.1 per unit Rs1.50 per unit
Uttar Pradesh (2018)	All Wind & Solar (excl. Solar Roof Top) generators connected to InSTS, and using power for self-consumption or sale within the State and having capacity of >=5 MW	• <=15%: • >15% but <= 25%: • >25% but <=35%: • >35%:	None 10% of PPA rate 20% of PPA rate 30% of PPA rate

Source: SERC's websites

d) From the above, it can be observed that the narrowed Error Bands were already notified by the respective SERCs in the States of Gujarat, Tamil Nadu and Madhya Pradesh in

the year 2019 itself. Further, the SERCs of Andhra Pradesh and Karnataka have also revised their Error Bands to improve forecasting and scheduling.

2.2.4 Scheduling Accuracy Evaluation Analysis

The overall analysis for the purpose of revision in Error Bands has been based on technology (wind, solar and hybrid), seasonal (monsoon, non-monsoon, wind and non-windy) and RE capacity connected to PSS. Similar analysis has been done for data of two numbers of QCAs selected for the purpose of analysis.

1) **Analysis carried out:**

The analysis of data mentioned under para 2.2.1 (RE DSM bills/statements for the period FY 2020-21, FY 2021-22 and FY 2022-23 (April to September)) were carried out. The Overall analysis of RE sources (Wind/Solar/Hybrid) in the State has been done based on technology (wind, solar and hybrid), seasonal (monsoon, non-monsoon, windy and non-windy), QCA wise (Overall, Wind, Solar, Hybrid and seasonal).

- Overall analysis of RE sources – Overall, Solar, Wind & Hybrid
- Overall analysis of RE sources –Season wise analysis – Monsoon & Non Monsoon Season (33 PSS) – Solar
- Overall analysis of RE sources –Season wise analysis – Windy & Non Windy Season (59 PSS) - Wind
- QCA wise analysis - Manikaran
    a) Overall analysis (Solar (13) + Wind (39) + Hybrid (4) PSS)
    b) Solar
    c) Wind
    d) Hybrid
- QCA wise analysis - REConnect
    a) Overall analysis (Solar (17) + Wind (20) + Hybrid (1) PSS)
    b) Solar
    c) Wind
    d) Hybrid
- Overall Comparative Seasonal Performance for Wind - (REConnnect & Manikaran)
- Overall Comparative Seasonal Performance for Solar - (REConnnect & Manikaran)

The various abovementioned analysis carried out is provided in brief in **Annexure** of this Explanatory Memorandum.

A summary of "the Overall analysis RE sources" is provided below for ready reference:

Table 6: Summary of Overall analysis of RE sources

Particulars	Inference (Please refer Annexure)
Overall analysis of RE sources – Overall	▪ RE deviations continue to remain at peripheral limits of +/- 15% (97 PSS). ▪ There is no improvement in sub ±15% Error Bands. ▪ There is abnormal concentration of entries in -12% to -15% range which has seen an increase of 9.51% in FY 21-22 from FY 20-21.
Overall analysis of RE sources – Solar	▪ RE deviations in Solar have reduced with more concentration in upto +/- 12% (33 PSS). ▪ In Solar, time blocks are mostly concentrated in band between 0 to ±10%. ▪ Variations fairly spread across all bands against overall RE (wherein -12% to -15% band showcased large concentration). ▪ This shows possibility of revision of band from (0 to ±15%) to (0 to ±10% or 12%) which shall prompt further improvement in forecasting efficiency.
Overall analysis of RE sources – Wind	▪ Forecasting error in wind projects continue to remain at marginal limit of +/-15% (59 PSS). ▪ Quantum of time blocks in 0 to ±15% has remained almost constant. ▪ There is reduction in blocks in 0 to +10% error bracket and significant increase is seen in -12% to –15%.
Overall analysis of RE sources – Hybrid	▪ Significant increase in errors in various blocks in case of Hybrid (5 PSS) ▪ The forecasting error is shifting to over forecasting with increasing concentrations in -12% to -15% range. 7% increase is observed in this bracket

2) **Analysis submitted by MSLDC in its Reply**: MSLDC in its analysis for period Jan 2022 to Dec. 2022, has submitted that

a) The % Error for combined RE (Wind + Solar) is within ± 10% for 97% of time blocks in the CY: 2022. The % error of Wind & Solar is within ± 10 % band for 90 % & 94 % of time blocks respectively.
b) The % Error may be revised so that QCAs can move towards better accuracy.

3) Experience in Other States:

a) From the Table 5 above, it can be observed that the narrowed Error Bands were already notified by the respective SERCs in the State of Gujarat, Tamil Nadu and Madhya Pradesh in the year 2019 itself. Further, the SERCs of Andhra Pradesh and Karnataka also revised their Error Bands in 2021 and 2022 respectively.
b) More importantly, **the FOR observed in the year 2015 itself, while framing the Model Regulation, that 10% accuracy (defined with respect to available capacity) is quite achievable with the framework of QCA at Pooling Station**.
c) The Commission at that point of time had taken liberal view and adopted +/- 15% permissible Error band.

4) Other factors:

a) The existing permissible Error Band of 15% were based on suggestions made by several objectors to specify the Absolute Error with denominator as Available Capacity instead of Schedule Capacity in view of initial stage of introduction of forecasting and scheduling regime. Further, the Commission at that time had taken note of the stipulations covered under the Model F&S Regulations and provisions of the F&S Regulations of other States.
b) The Commission is of the view that regulations should not be promoting over-forecasting behavior, and such over-forecasting behavior needs to be restrained so that grid security and stability is maintained.
c) Post notification of the MERC F&S Regulations, QCAs have been established and a proper forecasting system has come in to existence. This apart, the Wind and Solar generators have got well acquainted with the weather conditions in the State and gained rich experience in forecasting in the State. Thus, the conditions as they stood when the MERC F&S Regulations were notified in the year 2018, have undergone a qualitative change on the aspect of gaining forecasting and scheduling operational experience including the revisions in scheduling.
d) Going forward, forecasting/scheduling techniques can further be improved/developed through various IT technologies.

e) It may be noted that as on 30 September 2023, the aggregate RE installed capacity in Maharashtra is 13,159 MW which is approximately ~28% of the total installed capacity in the State. It may be noted that as on 30 September 2023, the Wind and Solar (excluding Rooftop and off-grid) capacity in Maharashtra is 8,156 MW.

f) As mentioned earlier, the Industries, Energy and Labour Department, GoM has notified MSKVY 2.0, under which at least 30% (thirty percent) of agricultural feeders are proposed to be solarised by 2025 and faster capacity addition will be facilitated in the "Distributed RE Mode". GoM intends to develop decentralized solar projects with a cumulative capacity of 7,000 MW in the State of Maharashtra.

g) As mentioned earlier, the GoI has also set an ambitious target of becoming a carbon neutral nation by the year 2070.

h) Hence, keeping in view the target to achieve 500 GW renewable energy installed capacity by 2030, the Commission for the sake of grid security and in order to integrate maximum quantity of RE generation, opines that there is need for making revision in error band from the present level to a reasonable extent.

5) Impact of Deviations in terms of MW:

a) As per analysis submitted by MSLDC for period Jan. 2022 to Dec. 2022 in its reply, even though the % Error is within ±15% band, the deviations in terms of MW are high. For 79% of time blocks, RE was Under-injecting (Over-Scheduled). Also, for 52% of time blocks, the error in terms of MW is within ±200 MW.

b) Further, as quoted above, all of the major Distribution Licensees in the State have submitted that RE deviations causes financial implications for Discoms in the form of DSM charges which increases the total power purchase cost & thereby impairing their ability to undertake power planning in efficient manner.

c) One of the determinants to control deviation is formulation of suitable Error Bands.

6) State Periphery Charges:

a) As per the existing Regulation 12 of the MERC F&S Regulations, if there is any shortfall in the aggregate amount of RE Deviation Charge payable by Solar and Wind Generators at the State periphery and the amount receivable from them by the Pool Account shall be paid by the respective QCAs in proportion to their deviation reflected at State periphery. This provision was introduced with the intent of zero-sum operation of the DSM Pool at State level. However, the Commission, *vide* its Order dated 29 May 2023, has continued with its earlier directive of deferment of levy of impact of State Periphery Charges.

b) Further, the Commission in the said Order also directed MSLDC, which is implementing agency of the MERC F&S Regulations to carry out various analysis for longer period. MSLDC in its reply during the course of study has submitted that for deviations at State Periphery, needs to be analyzed with deviations of RE along with deviation by Discoms & Conventional Generators. It is suggested that MSLDC carries out complete analysis. Further, with the implementation of proposed amendments, it expected that new data would be available for more realistic analysis and complete picture can be made available for the Commission to decide.

7) Proposed revision in Error bands:

In view of above, there is need for making revision in error band from the present level to a reasonable extent. This will not only achieve grid discipline but also enable MSLDC, Distribution Licensees and QCAs to plan their power procurement activities in a more efficient and economical manner.

a. The Error Bands for Solar or Wind or Hybrid (Wind + Solar) are proposed to be at same level.

b. Further, the CERC DSM Regulations has defined the 'WS seller' as a seller based on wind or solar or hybrid of wind-solar resources. In line with the CERC approach, it is proposed to have the Error Bands applicable for Solar Generators to that of Wind-Solar Hybrid projects.

c. Although, significant operational experience has been gained in forecasting and scheduling, the Commission feels that this is not the right time to introduce season-wise error bands. In order to avoid complicated deviation accounting, season-wise error bands are not proposed. However, considering the seasonal variations, **the Error Band has been proposed to be reduced to 0 to ±10% for Solar as well as Wind,** which is reasonable, keeping in view the improvement in the forecasting techniques, suggestions from Discoms and regulatory framework/ suggestions of central level authorities etc.

d. Further, **Absolute Error to be specified as ±10%, 12%, 15%, 25%, >25%.**

e. Although, the State Periphery Charges have been deferred by the Commission, from the holistic perspective existing provisions regarding State Periphery charges have been retained. **As such, the deferment of the State Periphery Charges shall be continued till further directions of the Commission in the matter.**

8) Future revisions in Error Bands:

The purpose of the Deviation Settlement Mechanism is to discourage all the participating entities from deviating from their schedules. Hence, as the Solar and Wind Generators will get more and more operational experience and with the combination of advanced technology and availability of past data, the window of deviation should reduce over a period of time. **The Commission expects that, going forward, over the next five-year period tolerance limit/Error Band require to be improved in a graded manner and hence it will be set at a level of 5-7%, with a reduction of say 1% every alternate year. The MERC F&S Regulations already has a provision for review after two years. Therefore, given the constantly evolving sector, upcoming capacity addition and policy level changes, suitable amendments in the regulations have been proposed so that even an annual review of Error Bands may be carried out, if found necessary**.

2.2.5 Deviation Charges

1) As per analysis, it is observed that number of time blocks falling in the Error Bands between -12% to -15% is significantly higher. As already stated earlier, the Commission is of the view that regulations should not be promoting over-forecasting behavior, and such over-forecasting behavior needs to be restrained so that grid security and stability is maintained. Apart from setting suitable tolerance band/Error Bands, one of the determinants to control deviation is penalty i.e., Deviation Charges associated with Error Bands.
2) As already stated earlier, the window of deviation should reduce and DSM rates should gradually increase.
3) Linking RE-DSM/Deviation Charges with the PPA rates
    a. As discussed in next Chapter (Table 15), in all RE rich states, RE generators are paid on the basis of actual generation. Further, applicable rate for settlement for deviation in all key States is fixed rate specified by the respective SERC of the State.
    b. Further, suitability of implementation of linking RE-DSM/Deviation Charges with PPA rates in case shifting to scheduled generation based payment is discussed in next Chapter.
4) Accordingly, under this amendment, **it is proposed to continue within the same limits of RE Deviation Charges in case of under- or over-injection of power i.e. Nil to Rs. 1.5 per unit.** Further, **for Absolute Error to be specified as +/-10%, 12%, 15%, 25%, >25%, Deviation Charges are proposed as Nil, Rs.0.5/unit, Rs. 0.75/unit, Rs. 1/unit and Rs. 1.5/unit respectively.**

5) Further, as stated above, going forward, forecasting/scheduling techniques can further be improved/developed. Any avenues for utilizing the amount accumulated under "Pool Account" for such aforementioned purpose can also be explored.
6) The MERC F&S Regulations already has a provision for review after two years. Therefore, given the constantly evolving sector, upcoming capacity addition and policy level changes, suitable amendments in the regulations have been proposed so that even annual review of Error Bands and associated Deviation Charges may be carried out, if found necessary.

2.2.6 Draft Amendments Introduced

Accordingly, based on the above discussion, the following amendments have been introduced:

a) The Regulation 7.2 of the Principal Regulation shall be substituted by 7.2A and 7.2B
b) Based on discussion covered in this Chapter, the proposed Regulation 7.2A shall specify Error Bands and Deviation Charges when sale of power is settled on the basis of Actual Generation.
c) Based on the discussion covered in the next Chapter, the proposed Regulation 7.2B shall specify Error Bands and Deviation Charges when sale of power is settled on the basis of Scheduled Generation.
d) The Regulation 4.2 of the Principal Regulations shall be substituted, whereby the Commission may even undertake annual review of the formulation of Absolute Error, Accuracy Bands and Deviation Charges thereof, if it considers necessary.

2.3 Treatment for Intra-State and Inter-State transactions

2.3.1 Existing Approach

The MERC F&S Regulations also specifies the framework for Deviation Charges for under-injection/over-injection by Solar and Wind Generators connected to the Intra-State Transmission network and selling or consuming power outside Maharashtra. i.e. provides the accuracy band as well as the corresponding Deviation Charges. Further, such Deviation Charges (as specified in the existing MERC F&S Regulations) are similar to the charges specified by the CERC in the CERC (Deviation Settlement Mechanism and related matters) (Second Amendment) Regulations, 2015. The Commission at that time had clarified that the Generators which are connected to Intra State Transmission System and selling or consuming power outside the State, shall be governed by the provisions of the CERC DSM Regulations. However, the payment of RE Generators undertaking Inter-State transactions are on the Scheduled Generation basis, whereas payments for RE Generators undertaking for Intra-State

transactions are on Actual Generation basis. Therefore, different treatment for deviation accounting is necessary as specified in the Annexure to the MERC F&S Regulations.

The relevant extract of the MERC F&S Regulations is reproduced as below:

"7 ***Deviation Settlement for Intra-State Transactions***

....

7.6. ***The Deviation Charges for under or over-injection by Generators connected to the Intra State Transmission Network and selling or consuming power outside Maharashtra shall be governed by the Regulations of the Central Electricity Regulatory Commission (CERC) governing the Inter-State Deviation Settlement Mechanism and related matters; and the accounting for this purpose shall be done by the SLDC limited to the deviations in the Intra State Transmission Network resulting from such under- or over-injection.***

8 ***Deviation Settlement for Inter-State Transactions***

8.1 *The sale or self-consumption of power outside Maharashtra by Solar and Wind Energy Generators connected to the Intra-State Transmission Network shall be settled by the Procurers on the basis of their scheduled generation.*

8.2 *Inter-State transactions at a Pooling Sub-Station shall be permitted only if the concerned Generator is connected through a separate feeder.*

...

8.4 *The SLDC shall prepare the deviation settlement account for such Generator on the basis of measurement of the deviation in the energy injected and its impact at the State periphery.*

8.5 *The Generator shall pay the Deviation Charges applicable within Maharashtra in case of deviations in the State DSM Pool Account, the consequences of such deviation at the Inter-State level being governed by the CERC Regulations governing the Deviation Settlement Mechanism and related matters.*

8.6 ***The Deviation Charges for under- or over-injection by Generators connected to the Intra-State Transmission Network and selling or consuming power outside Maharashtra shall be as specified in the Annexure to these Regulations, the accounting for which shall be done by the SLDC.****" (emphasis added)*

In this context, it is also pertinent to mention that the CERC had clarified in its Statement of Reasons issued for Framework on Forecasting, Scheduling and Imbalance Handling for Variable Renewable Energy Sources (Wind and Solar) as under:

> *"2.3.3* ***As regards the RE projects connected only with the state transmission network but supplying power outside the states, it is clarified that such projects are presently treated as entities under SLDC control area and their scheduling is handled by SLDC****. The intent of the current regulatory process is not to disturb the existing arrangement for such projects.* ***In other words, such projects (connected only with the state transmission network but supplying power outside the state) shall, unless decided otherwise through separate regulatory dispensation, continue to operate within the control area of SLDC and their deviation settlement shall also continue to be governed by the State level deviation settlement mechanism****." (emphasis added)*

2.3.2 Regulatory Developments

Subsequently, the CERC has issued the CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022. As regards the intra-State entities i.e., entities connected only with the intra-State transmission network but supplying power outside the State, following related provisions are observed in the CERC DSM Regulations:

> *"4. Scope*
>
> *These regulations shall be applicable to all grid connected regional entities and* ***other entities engaged in inter-State purchase and sale of electricity****.*
>
> *…*
>
> *9. Accounting of Charges for Deviation and Ancillary Service Pool Account*
>
> *(1) By every Thursday, the Regional Load Despatch Centres shall provide the data for deviation calculated as per Regulation 6 of these regulations, for the previous week ending on Sunday mid-night to the Secretariat of the respective Regional Power Committees.*
>
> *(2) After receiving the data for deviation from the Regional Load Despatch Centre, the Secretariat of the Regional Power Committee shall prepare and issue the statement of charges for deviation prepared for the previous week, to all regional entities by ensuing Tuesday:*
>
> ***Provided that transaction-wise DSM accounting for intra-State entities shall not be carried out at the regional level." (emphasis added)***

From the above, it is clear that transaction-wise DSM accounting for intra-State entities shall not be carried out at the regional level.

2.3.3 Draft Amendments Introduced

Accordingly, following amendments have been introduced:

a) The Regulation 7.6 of the Principal Regulations shall be deleted.

b) In continuation to the present approach, the Commission shall provide the Error Bands and Deviation Charges for Solar and Wind Generators connected to the Intra-State Transmission network and selling or consuming power outside Maharashtra.

c) As the regulations envisage transition from actual generation based settlement to scheduled generation based settlement, Error Bands and Deviation Charges for aforementioned inter-State projects have been aligned with the Error Bands and Deviation Charges for intra-State projects when sale of power is settled on the basis of scheduled generation.

   Accordingly, Clause 1(a), (b) and (c) of the Annexure of the Principal Regulations shall be substituted.

d) Suitable amendments to the Regulation 8.6 proposed.

3 Shifting of RE generators (Wind and Solar) to Scheduled generation based payment regime

This Chapter of the Explanatory Memorandum elaborates the reasoning and justification for proposing amendments on account of shifting of the RE generators (Wind and Solar) from Actual generation based payment regime to Scheduled generation based payment regime.

3.1 Regulatory Framework at Central level

3.1.1 Context

As per the framework adopted by the CERC, the payment to RE generators is on "scheduled" generation basis. It is important to understand such framework at Central level and how this differs from the one adopted at the State level.

3.1.2 Scheduled generation based payment mechanism for Solar and Wind at Central level

1) CERC (Deviation Settlement Mechanism and related matters) Regulations, 2014:

a) The CERC specified its F&S Framework for Solar and Wind energy generators at the national level through the CERC (Indian Electricity Grid Code) (Third Amendment) Regulations, 2015 and the CERC (Deviation Settlement Mechanism and related matters) (Second Amendment) Regulations, 2015. Table below summarises the salient features of F&S framework of the CERC.

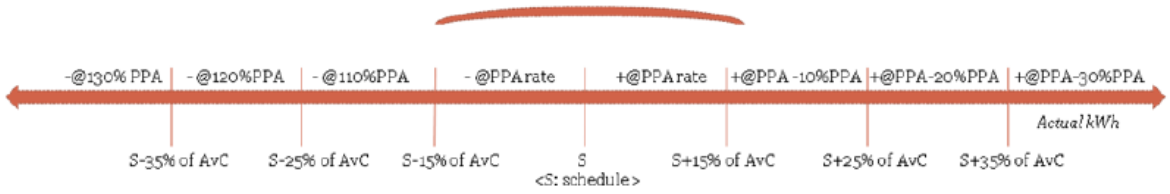
Table 7: CERC F&S Framework for Solar and Wind Energy (2015)

Parameter	Description
Objective	To maintain grid discipline and grid security as envisaged under the Grid Code through commercial mechanism for deviation settlement through drawal and injection of electricity by users of the grid
Applicability	Applicable to Solar and Wind Generators which are Regional entities, whether supplying power to the distribution licensees under PPAs, or through open-access to third party consumers or for captive consumption.
Forecasting	Multiple forecasting by both the RLDC/REMC and Solar and Wind Generators for better confidence level/ lower forecast Errors. RE Generators will have an option to choose between

Parameter	Description
	its own forecast or site level forecasting done by the RLDC to provide its schedule. However, commercial impact of deviation from forecast would be borne by the RE Generator.
Frequency of revision of schedule per day	One revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to a maximum of 16 revisions during the day.
Definition of Forecasting Error	Error (%) = (Actual Generation – Scheduled Generation) / (Available Capacity) x 100 Where Available Capacity is the cumulative capacity raring of Wind turbines/Solar inverters that are capable of generating power in a given time block.
Tolerance limits	Within +/- 15% band
Data telemetry	Required at the Wind turbine/Solar inverter level. Parameters such as turbine availability, power output and real-time weather measurements (Wind speed, temperature, pressure etc.) must be provided by the Generator

b) The pricing vector for deviation settlement for Solar and Wind Generators which are Regional entities is represented in Figure below:

Figure 2: Price vector for Deviation Settlement (CERC Regulations, 2015)



i) Absolute Error = 100 X [(Actual generation –Scheduled generation)/ Available Capacity]

ii) Payment as per schedule at the Power Purchase Agreement (PPA) rate

iii) Deviation Settlement within tolerance band (+/-15%):

- Receipt from/payment to the Pool at the PPA rate (i.e., in effect, payment as per actuals)
- Beyond 15%, 3 Bands for Deviation Charges are specified as below:

Absolute Error (% of AvC)	Deviation Charge related to PPA
15%-25%	110% (for under-injection) or 90% (for over-injection) of PPA rate

Absolute Error (% of AvC)	Deviation Charge related to PPA
25%-35%	120% or 80% of PPA rate
>35%	130% or 70% of PPA rate

c) For Regional Entities, the CERC had specified that a QCA would act on behalf of Solar and Wind Generators connected to a PSS, and that the 'lead' Generator may be the QCA. The QCA would be responsible for operational and commercial activities such as providing data on day-ahead schedules, Available Capacity (AvC), forecasting and actual generation to the Regional Load Despatch Centre (RLDC), allocation of the Deviation Charges among the Generators connected to a PSS, technical coordination with these Generators, etc., on behalf to the Generators connected to each PSS.

d) The CERC had amended its IEGC and DSM Regulations to incorporate the above F&S Framework. The National Load Despatch Centre (NLDC) had formulated a detailed F&S procedure defining the roles and responsibilities of the entities involved and the procedures to be followed by them in pursuance to the CERC framework.

2) CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022:

a) The CERC notified its revised F&S Framework for Solar and Wind energy generators at the national level through the CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2022. Further, the CERC through the CERC (Indian Electricity Grid Code) Regulations, 2023 also specified the procedure specifying data, F&S for RE generating stations at inter-State level. Table below summarises the salient features of F&S framework of the CERC.

Table 8: CERC F&S Framework for Solar and Wind Energy (2022)

Parameter	Description
Objective	To ensure, through a commercial mechanism that users of the grid do not deviate from and adhere to their schedule of drawal and injection of electricity in the interest of security and stability of the grid.
Applicability	Applicable to Solar and Wind Generators which are Regional entities and other entities engaged in inter-State purchase and sale of electricity. Transaction-wise DSM accounting for intra-State entities shall not be carried out at the regional level.

Parameter	Description
Forecasting	QCA or generating station or Lead Generator shall provide the forecast to the concerned RLDC. QCA or generating station or Lead Generator will have an option to choose between its own forecast or forecasting done by the RLDC. Any commercial impact on account of deviation from schedule based on the forecast chosen by QCA shall be borne by the respective QCA.
Definition of Forecasting Error	Error (%) = (Actual Injection – Scheduled Generation) / (Available Capacity) x 100 Where Available Capacity is the cumulative capacity raring of Wind turbines/Solar inverters that are capable of generating power in a given time block.
Tolerance limits	Provided in Table 9 below.
Data telemetry	QCA (for the REGS it is representing) or REGS (who are not represented through QCA) or Lead Generator shall - Provide real time data at turbine/inverter level and generation data at Pooling station level - Be responsible for metering and data collection, transmission and co-ordination with RLDC/SLDC/RPC/CTS and other agencies - Undertake commercial settlement for deviation as per Regulations - Establish protocol for communication with individual generators to implement the RLDC instructions - Shall maintain records and accounts of the time-block wise Schedules, the Actual generation injected and the deviation, for the pooling station and individual generator(s) separately. - Ensure availability of data telemetry at the turbine/inverter level to the concerned RLDC and shall ensure that the correctness of the real time-data and undertake corrective actions, if required

b) The Charges for deviation in a time block by a Wind or Solar or hybrid of Wind-Solar generator seller shall be payable by such seller as under:

Table 9: Deviation Charges for WS Seller (Wind or Solar or hybrid of Wind-Solar generator) - 2022

Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Deviation by way of over injection	**Deviation by way of under injection**
Zero: Provided that such seller shall be paid back for over injection as under: (i) @ contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, up to [*5% Deviation -WS seller (in %)*]; and (ii) @ 90% of the contract rate, or in the absence of a contract rate, @ 90% of the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [*5% Deviation-WS seller (in %)*] and up to [*10% Deviation-WS seller (in %)*].	(i) Zero up to [10% Deviation-WS seller (in %)]; and (ii) @ 10% of the normal rate of charges for deviation beyond [10% Deviation-WS seller (in %)]: Provided that such seller shall pay back for the total shortfall in energy against its schedule in any time block due to under injection, @ the contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges, for the respective time block.

i) Absolute Error = 100 X [(Actual generation –Scheduled generation)/ Available Capacity]
ii) The CERC continued with special dispensation provided to the WS sellers in the formula for computation of deviation as this method of deviation calculation gives a lot of relief to the WS sellers. (It is to be noted that in case of buyers, deviation is calculated with scheduled generation in the denominator)
iii) Payment as per schedule at the PPA rate.
iv) The CERC continued with another comfort extended to the WS sellers on the provision for payment to such sellers in the event of over-injection.

c) For Regional entities, the CERC has specified that a QCA would act on behalf of Solar and Wind Generators connected to a PSS it is representing. The CERC also specified that individual RE generation station (who is not represented through QCA) or Lead Generator can also undertake various activities. The QCA would be responsible for operational and commercial activities such as providing data on day-ahead schedules, Available Capacity (AvC), forecasting and actual generation to the RLDC, allocation of the Deviation Charges among the Generators connected to a PSS, technical coordination with these Generators, etc., on behalf of the Generators connected to each PSS. QCA to de-pool DSM charges as per the mutual agreement between generators and QCA.

d) The CERC in the interest of grid security and based on the feedback of the stakeholders during consultations, *vide* its Order dated 6 February 2023 issued practice directions. The CERC relaxed Regulation 7 (Normal Rate of Charges for Deviations) and Regulation 8 (Charges for Deviation) of the CERC DSM Regulations, 2022 until further orders. The revised Charges for deviation in a time block by a Wind or Solar or hybrid of Wind-Solar generator seller shall be payable by such seller as under:

Table 10: Deviation Charges for WS Seller being a generating station based <u>on solar or hybrid of wind-solar resources</u> -– Order dated 6 February 2023

Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Deviation by way of over injection	**Deviation by way of under injection**
Zero: Provided that such seller shall be paid back for over injection as under: (i) @ contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, up to [*10% D_{WS}*]; and (ii) @ 90% of the contract rate, or in the absence of a contract rate, @ 90% of the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for	i) Zero up to [*10% D_{WS}*] and (ii) @ 10% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [*10% D_{WS}*] and up to [*15% D_{WS}*] and (iii) @ 50% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the

Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Deviation by way of over injection	**Deviation by way of under injection**
the respective time block for deviation beyond [*10% D_{WS}*] and up to [*15% D_{WS}*]	respective time block for deviation beyond [*15% D_{WS}*]: Provided that such seller shall pay back for the total shortfall in energy against its schedule in any time block due to under injection, @ the contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges, for the respective time block.

Note: D_{WS} means Deviation-WS seller (in %)

Table 11: Deviation Charges for WS Seller being a generating station based <u>on wind resources</u> –– Order dated 6 February 2023

Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Deviation by way of over injection	**Deviation by way of under injection**
Zero: Provided that such seller shall be paid back for over injection as under: (i) @ contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block, up to [*15% D_{WS}*]; and (ii) @ 90% of the contract rate, or in the absence of a contract rate, @ 90% of the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [*15% D_{WS}*] and up to [*20% D_{WS}*].	(i) Zero up to [*15% D_{WS}*] and (ii) @ 10% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [*15% D_{WS}*] and up to [*20% D_{WS}*] and (iii) @ 50% of contract rate or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block for deviation beyond [*20% D_{WS}*]:

Charges for deviation payable to Deviation and Ancillary Service Pool Account	
Deviation by way of over injection	**Deviation by way of under injection**
	Provided that such seller shall pay back for the total shortfall in energy against its schedule in any time block due to under injection, @ the contract rate, or in the absence of a contract rate, @ the weighted average ACP of the Day Ahead Market segments of all Power Exchanges, for the respective time block.

Note: D_{WS} means Deviation-WS seller (in %)

3.1.3 Main difference between MERC vs. CERC framework

1) The CERC DSM Regulations, 2022 provides for the payment to RE generators on "scheduled" generation basis, whereas, at the State level, RE generators are paid on "actual" generation basis.
2) Accordingly, the treatment of deviation (or Absolute Error) under the CERC and the MERC F&S regulations differs. In case of RE generator connected at regional/ISTS level (i.e. RE Regional Entity) the (deviation or absolute error) represents over-injection (+ve) that is receivable from Regional DSM pool whereas under-injection (-ve) represents payable into Regional DSM Pool.
3) On the other hand, in case of treatment of deviation (or Absolute Error) of RE Generators connected to intra-State transmission system (i.e. RE State Entity), the RE Generator is required to pay into State DSM Pool for both (+ve & -ve) deviations (or Absolute Errors) whether over-injection or under-injection vis-à-vis schedule. Further, the net impact of RE deviation at the State Periphery of all the RE generators connected to InSTS may be either +ve or –ve which depends upon whether the State is over-drawing or under-drawing for that particular time block. Accordingly, the RE generator may be net payable into the State DSM Pool or net receivable from the State DSM Pool, as specified by the Commission under Regulation 8 and 12.1(d) of the MERC F&S Regulations.
4) The applicable rate for settlement of deviations (or Absolute Errors) is linked to the PPA rate in case of RE Regional Entities at the regional level; whereas, the applicable rate for settlement of deviations (or Absolute Errors) in case of RE State Entities is de-

linked from the PPA rate, and instead is linked to the absolute rates such as Rs. 0.50 pu, Rs. 1.0 pu and Rs. 1.50 pu.

5) Thus, there are fundamental differences in terms of energy accounting, deviation accounting, treatment of deviation (or Absolute Error) within the DSM Pool, applicable rates for deviation settlement etc. for between the RE intra-State Entities as against RE regional entities. The main difference between the MERC F&S Regulations and the CERC DSM Regulations are summarised in the table below:

Table 12: Comparison of important parameters of MERC & CERC framework

Parameters	**MERC F&S Regulations, 2018**	**CERC DSM Regulations, 2022**
Payment in RE Generators	Actual generation basis	Scheduled generation basis
Error bands	Same bands for Wind & Solar	Separate bands for Wind & Solar
Charges for Deviation Settlement	Fixed rate in Bands (i.e., Rs/unit of 0.50, 1.00 & 1.50)	Linked to the % of PPA rate in Bands
Rates for Deviation Settlement	Same rates for Over & under-injection	Separate rates for Over & under-injection
Deviation Charges Settlement with the State Pool	▪ For over-injection: Pay into DSM Pool ▪ For under-injection: Pay into DSM Pool	▪ For over-injection: Receive from DSM Pool ▪ For under-injection: Pay into DSM Pool

3.2 Information / Data for Analysis

3.2.1 Availability of generator-wise scheduled generation data

1) The Regulations 7.3 of the MERC F&S Regulations provides that SLDC and the QCA shall maintain records and accounts of the time block-wise Schedules, the actual generation injected and the deviations, for the Pooling Sub-Station and the individual Generators separately."

2) During interaction with QCAs, it was observed that since the energy accounting, deviation accounting and settlement is being undertaken at PSS level, no record of individual generator-wise scheduled generation is available.

3.3 Stakeholders' perspective on Shifting of RE generators to Scheduled generation

based payment regime

This section discusses, DSM Working Group, MSPC's and major Distribution licensee's views/perspective on shifting of RE generators to scheduled generation based payment regime.

3.3.1 DSM Working Group and MSPC

a) Both the DSM Working Group as well as the MSPC recommended to consider changing RE payment from actual generation to schedule generation. Such recommendation of the DSM Working Group has already been captured in para 2.2.2 above. Further, the relevant extract of the Commission's Order dated 2 August 2022 is reproduced below:

*"**16. Issue No. 1: Replacement of actual generation of RE generators in schedule of corresponding buyers***

…

Working Group's recommendations

16.8 Such replacement of schedule with actual for adjustment of beneficiary schedules on post-facto basis, is not preferred as it amounts to errors of forecasting/scheduling and risk of deviation management for these RE resources getting passed on to beneficiaries/buyers on post-facto basis. Further, there is an urgent need to initiate the separate study for improvement in forecasting/scheduling accuracy of RE resources (Wind and Solar), guiding such resources towards schedule based payment regime and tightening of the error bands in stages as significant experience is gained over operational period under F&S regime since January 2020.

….

16.10 ***The Commission may initiate separate study for amendment to the relevant provisions of RE Tariff Regulations to change the payment to RE (Wind and Solar) Generators and also the Cogeneration projects (for the same reasons as that of RE generators) on scheduled generation payment basis instead of actual generation basis. Further, the Commission may initiate separate study for amendment of relevant provisions of F&S Regulations to link payment of RE generation (wind and solar) to schedule based regime and further tightening of error band. The action of bringing RE generators under schedule based payment regime would be consistent with framework adopted by Central Electricity Regulatory Commission (CERC).***

16.11 In the interim, the current treatment suggested by MSLDC to replace the Co-gen and RE (Wind and Solar) schedule with actual in the buyers' drawal schedule to manage the deficit in the DSM Pool account may be continued.

…

MSPC's comments

16.13 The practice of replacing RE schedule by actual generation while computing DSM bill may be continued as a temporary measure. ***Meanwhile, the necessary regulatory process may be initiated for adopting the CERC mechanism in this regard.***

16.14 MSPC also agrees with the view of the Working Group that if in case, any buyer is required to pay incremental ADSM charges on account of such treatment, such incremental ADSM charges may be allowed to pass through to the Tariff during true up or FAC process.

…

Commission's Analysis and Rulings

….

16.20 Further, if the buyers are given credit for scheduled energy of RE for DSM computation and they are allowed to pay the RE generators on actual basis, it would mean that the buyers are getting credit for a higher generation while paying for a lower generation. In case of thermal generators, these generators are being paid on schedule energy basis, the buyers are getting the credit for same quantum of energy which they are paying to their contracted generators i.e. scheduled generation. ***Ideally, the energy considered for accounting/billing and the energy considered for deviation accounting should be the same.*** *However, due to regulatory mechanism of actual generation based payment to RE generators, the buyers are getting benefits in DSM computation either in terms of being receivable or in terms of lower DSM charges payable. Hence,* ***MSLDC's action of replacement of RE schedule in buyers' drawal schedule by RE actual generation is justified till the RE generators are brought under schedule based payment regime through appropriate Regulations***.

16.21 … Accordingly, in exercise of the power under Removal of Difficulty, it is directed that MSLDC is allowed to replace the RE schedule in buyers' drawal schedule by RE actual generation ***till the RE generators are brought under schedule based payment regime through a separate regulatory process***. *Further, such post facto replacement should be based on metered energy for*

PSS wise RE Generators (wind and solar) connected at InSTS and not on an approximate basis. Same treatment should be given to the Bagasse based Cogeneration plants.

....

16.28 Under such circumstances, ***the Commission is of the view that till the time wind and solar generators are brought under schedule based payment regime along with other aspects of improving their forecasting and scheduling accuracies and deviation management of these generators, there is need to take appropriate action to deal with the impact of RE deviations on the DSM pool sustainability and accordingly, to compensate deficit in DSM pool.*** *Hence, it is directed that the amount accumulated under the REDSM pool shall be utilized for meeting the shortfall in DSM pool on account of payments to be made to the receivable entities. This would be in addition to the utilization of REDSM pool for the payment of DSM charges for the State as a whole. This will ensure functioning of both these deviation pool without any difficulty and is therefore in the interest of all stakeholders.*

....

16.34 ***Apart from recommendation regarding schedule based payment for RE generators (Wind, Solar and Bagase based co-generation plant connected to InSTS with installed capacity of 25 MW), the Working Group has also recommended that existing error band for RE generators may be reviewed and the deviations charges may also be linked to their respective PPA rate.*** *In this context, the Commission notes that vide its Order dated 19 April 2021, the Commission has already directed the Working Group to provide its recommendations on the State Periphery Charges leviable on the RE generators. The relevant extract of the Order reads as follows:*

"16. The DSM Working is directed to continue to monitor implementation of the F&S Regulations. Once the commercial implementation of the MERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2019 commences, the data regarding deviation of conventional generators and the Distribution Licensees would be available. DSM bills for the six months' period after commercial implementation of the DSM Regulations shall be analyzed by the DSM Working Group for providing its suggestions on the modality of the determination of State Periphery Charges for RE Generators which

would be considered by the Commission at the time of review of the F&S Regulations for duly making any needed changes."

…

16.36 ***The Commission notes that the Working Group has recommended that the Commission may initiate separate study for amendment to the relevant provisions of RE Tariff Regulations to change the payment to RE Generators (Wind, Solar and Bagasse based cogeneration plants) on schedule based generation payment and for linking REDSM payments/receipts of RE generation (wind and solar) to schedule based regime and further tightening of error band. In view of this, it would be appropriate that the feasibility study may be carried out before initiating such amendment which will ensure its implementation smoothly.*** *Hence, the Commission will pass directions separately to cover the above aspect. The Commission shall decide on the agency (through the working group or through any other person/agency/expert) to carry out this study. The said study will incorporate its recommendations/suggestions regarding revision of error band, recommendations regarding linking the deviation charges with PPA rates and pro and cons of bringing the RE generators under schedule based payment regime. The agency may discuss/consult the aspect with QCAs, RE generators, Distribution Licensees and MEDA. Such report shall be submitted by the agency within four months of this Order which shall be considered by the Commission for amending the RE Tariff Regulations and the F&S Regulations by following the due process envisaged under the Act.****" (emphasis added)***

b) Based on recommendations from key stakeholders i.e. the DSM Working Group and MSPC, as referred above, the Commission after deliberation felt appropriate to take next steps in the process of shifting to scheduled based payment regime.

3.3.2 Inputs received from Distribution Licensee and MSLDC

The Commission vide email dated 4 May 2023 circulated questionnaire to major Distribution Licensees and MSLDC and had sought replies/inputs/comments on the said questionnaire. Based on the direction of the Commission, Distribution Licenses and MSLDC, has provided inputs/comments on shifting to scheduled based payment regime along with probable suggestions. The same have been summarized broadly in three parts, as below:

- Overall perspective towards shifting to scheduled generation based payment regime.

- Various issues on implementation difficulties/challenges in shifting to scheduled generation based payment regime.
- Inputs received on linking deviation charges with PPA rates.

1) Inputs received on shifting to scheduled generation based payment regime – overall perspective

Table 13: Replies/Inputs/Comments on shifting to scheduled generation based payment regime

Particulars	Replies / Inputs / Comments
MSLDC	a) Prior to arriving at any decision, inter-connection and commercial arrangements of RE plants at State level need to be considered. b) It explained various implementation difficulties/challenges in shifting to scheduled based payment regime. c) In case of CTU connected PSS, the number of generators & contracts are limited. Hence, it is possible for separate schedules & calculate charges based on Contract Rate at Central level. d) Prior to moving to towards schedule-based payment, information sharing process needs to be streamlined by the Discoms.
MSEDCL	a) The payment to the generator should be on schedule basis. b) Shifting to scheduled based payments for RE instead of actual generation will align the MERC regulations with the CERC regulations. c) However, if the payment of RE generators are shifted to scheduled generation, then it is most likely that Discoms resources will be picked up to control the overdrawl of the State through VSE mechanism as RE generators may not generate as per their schedule. Thus, Discoms contracted precious resources will be used to control State load generation balance. Discom need to be compensated at the rate of Discoms marginal station on the bar during that time block. d) Since, the share of RE power in energy basket will be increasing multi-fold compared to present share, the schedule based billing is necessary from future grid safety perspective as well. e) The system as adopted by Central DSM may be studied and adopted in the State for effecting schedule based payment to RE generators.
AEML	a) There are huge financial implications on account of RE deviation on Discoms and the current treatment given under the existing Regulatory Framework. Therefore, the deviation band, methodology for credit etc.

Particulars	Replies / Inputs / Comments
	need to be aligned so that risk rewards are distributed amongst the stakeholders appropriately. b) To have consistency in approach CERC like mechanism for ease of scheduling & settlement may be adopted.
Tata Power-D	a) Discom requires schedule-based payment to RE generators and no post facto replacement of schedule by actual. b) We do not foresee any difficulties/challenges in shifting to scheduled based payment as against actual generation based payment.
BEST	a) The payment to the RE generators should be on schedule basis. It will avoid post facto changes in Discoms schedule. However, in such case the RE deviation band need to be tightened. b) RE generator will tend to give over schedule to the extent of allowable limit. c) Ideal solution is the RE generator should pay to the REMC, i.e., RE deviation settlement mechanism at PPA rate. It will be no loss no profit scenario for the RE generator. Any extra money collected from discom through schedules more than actual injection will have to be transferred to RE DSM Pool; vice versa, for over injection, RE generator will expect payment from DSM pool.

2) Implementation difficulties/challenges in shifting to scheduled based payment regime have been summarized issue-wise. Inputs on such issues along with stakeholder's probable suggestions have been summarized and captured while dealing the respective issue.

3) Inputs received on linking deviation charges with the PPA rates

Table 14: Replies/Inputs/Comments on Linking deviation charges with PPA rates

Particulars	Replies / Inputs / Comments
MSLDC	a) As contracts are changing dynamically (mostly on monthly basis) the contract rates will also change frequently and it will be difficult for MSLDC to maintain updated records of such large number of individual contracts/ generators & changes. b) MSLDC submitted that for third-party transactions, contract rates may vary depending up on mutual agreement between consumer and

Particulars	Replies / Inputs / Comments
	generator. For captive transactions, contract is not available. Therefore, some rate needs to be defined for consideration of Contract rate
MSEDCL	a) It is suggested that the normal rate of deviation is to be aligned with PPA rates in line with CERC DSM Regulations
AEML	a) In case of schedule based payment, generators will be paid as per schedule, also generator need to settle its deviation with RE DSM operated by SLDC. b) As the payments are linked to the schedule the deviation charges also need to be linked to PPA rate otherwise this may create arbitrage to generators & may lead to gaming. As there is not arbitrage for higher or lower schedule the generators/QCA will try to forecast as accurate as possible. c) AEML submitted that under schedule based regime the Open Access consumers especially Captive etc., may schedule higher as the avoidance of Utility tariff/ CSS benefits will be far higher than the Deviation charge payable in the RE DSM pool. Therefore, necessary checks & balances also need to be introduced for OA transactions. Hence, deviation charges to be linked to some benchmark rates say Avg. DAM for Captive generators so as to ensure neutrality.
Tata Power-D	a) As the RE generators get more experience and with the combination of advanced technology and past data available, the window of deviation should reduce and DSM rates should gradually increase. b) It may be taken into consideration that whatever rate will be finalized, it does not create a deficit in the pool account.
BEST	a) If RE generator is made to pay to RE DSM pool at PPA rate, there will not be any financial impact on the generator. However, PPA rates differ with the date of COD. E.g., BEST contracted rate Rs. 8.56/unit. Then in case of over injection, whether MSLDC will be able to pay to the generator at this rate? b) This arrangement being between generator and RE DSM pool, the PPA provisions would not matter.

So, from this section, it can be seen that the DSM working group and MSPC (which has wider representation of stakeholders responsible for DSM implementation) has already recommended for adopting the CERC like mechanism. Further, the Distribution Licensee also

consented for shifting towards scheduled generation based payment regime with certain issues in implementation. The MSLDC, which is implementing agency of the existing MERC F&S Regulations, has shared number of implementation challenges.

3.4 Practice followed in other States

a) As regards the basis of payment to RE generators, the relevant regulations of RE rich states have been examined. A comparison of the relevant regulations is shown in the following table.

Table 15: Basis of Payment to RE generator & applicable rate for settlement of Deviations in key States

State	Payment to RE Generators – On the basis of	Applicable rate for settlement of Deviation
Rajasthan	Actual generation	Fixed rate of Rs./unit
Gujarat	Actual generation	Fixed rate of Rs./unit
Tamil Nadu	Actual generation	Fixed rate of Rs./unit
Karnataka	Actual generation	Fixed rate of Rs./unit
Maharashtra	Actual generation	Fixed rate of Rs./unit
Madhya Pradesh	Actual generation	Fixed rate of Rs./unit
Uttar Pradesh	Actual generation	% of PPA

b) In all RE rich States, RE generators are paid on the basis of actual generation. Further, the applicable rate of settlement for deviation (or Absolute Errors) in all key states is linked to Fixed rate, as specified by the respective SERC.

c) As regards the applicable rate for settlement of deviation in case of payment to RE generators on the basis of actual generation, the same has been already discussed in the Chapter 2 of this Explanatory Memorandum.

3.5 Sample analysis

3.5.1 Sample analysis

1) In the absence of data of schedule and actual generation of individual wind and solar generator having PPA with Discom for the period from 1 April 2021 to 31 March 2022, sample/illustrative analysis has been carried out.
2) Under sample/illustrative analysis,

a. Net transaction cost as per the existing MERC F&S Regulations and CERC DSM Regulation, 2023 has been carried out.
b. Net transaction cost means (payment to the generator by the procurer + RE DSM Charges)
    i. Payment to the generator by the procurer @ actual generation, as per the existing MERC F&S Regulations.
    ii. Payment to generator by procurer @ schedule generation, as per CERC DSM Regulations.
    iii. RE DSM charges considered as per respective MERC and CERC regulations.
c. Analysis has been carried out for over-injection and under-injection separately.

3) For the purpose of carrying out sample/illustrative analysis following assumptions are made:

Available Capacity (Units)	150 (For all cases)					
Schedule generation (Units)	100 (For all cases)					
Actual generation (Units)	105	110	120	125	140	155
% Deviation= (Actual – Sch.)/AvC	3.33	6.67	13.33	16.67	26.67	36.67

Analysis has been carried out for Block /PPA rate of Rs. 3/unit and Rs. 5/unit

4) The abovementioned sample/illustrative analysis carried out is provided in brief at **Annexure** of this Explanatory Memorandum.
5) The inferences from sample analysis in case of "Over-injection" and "Under-injection" is provided below for ready reference:

Over-injection	As per sample analysis • The MERC F&S Regulations are favorable to the RE generators when Error band is > 15%, particularly solar. • The CERC DSM Regulations reduces the rate of over-injection, which means generators have less incentive to over-inject as compared to the MERC F&S Regulations. • Higher the PPA rate, higher the benefits to generators
Under-injection	As per sample analysis, the MERC F&S Regulations are favorable to the RE generators when Error band is <-15%.

3.5.2 Financial analysis for FY 21-22

The net transaction cost as per the existing MERC F&S Regulations and the CERC DSM Regulation were calculated for total 22 number of PSS (10 number of Wind PSS and 12 number of Solar PSS) based data available for the FY 2021-22.

For the purpose of this exercise,

1. Only those PSS were selected where total number of generators connected are limited to 3 number.
2. In case of more than one generator, weighted average PPA was derived and the same was applied.
3. PPA rates were applied.
4. Net transaction costs were carried out for over-injection as well as under-injection.

From the financial analysis, it is observed that the inferences derived from sample analysis that 'MERC existing regulations are favorable to RE generators' is validated.

3.6 Benefits and Constraints in bringing RE generators under schedule generation based payment regime

3.6.1 Benefits

1) Adoption of scheduled based payment regime shall
    a. Improve forecasting and scheduling accuracy,
    b. Instil dispatch discipline in RE generators, and
    c. Improve grid security
2) Scheduled generation based payment regime shall facilitate fair and equitable sharing of risks amongst various State Pool participants. This shall help to reduce the passing on of error of forecasting on ordinary consumers
3) Scheduled generation based payment regime shall encourage participants within the state in balancing the system.
4) Scheduled generation based payment regime shall remove the distinction between Intra-State and Inter-State

3.6.2 Constraints to be addressed

1) Implementation of scheduled generation based payment regime would be complex after introduction of open access for the capacity above 100kW.
2) Going forward introduction of MSKVY and similar scenarios involving small and distributed generation would increase complexity in implementation of scheduled generation based payment regime.
3) In absence of proper framework, treatment of RPO compliance/accounting is a challenge.

4) In the absence of real time data of generators may end up causing higher error at PSS level.

3.7 Linking Deviation Charges with PPA rates

3.7.1 Inputs received from MSLDC & Distribution Licensees

Please refer Table 14 above.

3.7.2 Observations

1) In view of concerns raised around fixed reference rates, and with a view to ensure fair play in forecasting and scheduling, the CERC indexed deviation rate to contract (PPA) rate so that the deviations are settled at the contract rate and payment is done in effect at actuals,
2) Further, in the absence of the contract rate, the CERC mechanism uses Area Clearing Price (ACP) of the Day Ahead Markets segments of all Power Exchanges.

3.8 Proposal

3.8.1 Rationale

1) There is a need for intra-State RE generators to align with the existing energy accounting practice at the regional level (generator payments are linked with scheduled energy at the regional level).
2) There is a need for intra-State RE generators to align with the existing energy accounting practice at the State level for Conventional generators (Payments to Conventional generator are linked with scheduled energy at the State level).
3) DSM Working Group, MSPC and major Distribution Licensee also recommended to shift payments to RE generators on the basis of scheduled generation.
    a. Under the MERC (F&S) Regulations, the Commission has adopted the mechanism where energy credit to Wind and Solar generators is based on actual. This is in contrast to the CERC, where the Buyer / Discom receives power as scheduled by the Seller. Effectively, therefore, the variation in the Solar and Wind generation contracted by the Discom has to be absorbed by the Discom. Because, while settling, the SLDC shall consider the actual generation from Solar and Wind generators contracted to the Discom and accordingly change the Scheduled Drawl of the Discom. Therefore, in case of under-injection by these generators, considering there is no demand variation at Discom end, the Discom will appear to be over-drawing, whereas, in reality, it is not the fault of

the Discom, but it simply happened due to under-injection from its Wind and Solar sources.

b. As RE generation has 'Must Run' status, schedules submitted by the QCA for such RE generation is considered as final. The other generation is scheduled after considering the available schedules of the RE generation for respective time block. However, errors due to over-scheduling in real time are managed using flexible generation viz. Hydro.

4) Sample analysis reveals that the existing MERC F&S Regulations are favorable to RE generators.
5) Apart from revision in error bands and determining suitable deviation charges, one of the determinants to maintain grid discipline and grid security is to shift to scheduled based payment regime. Shifting to scheduled based payment regime and linking deviation charges with PPA rates would send right signal to participants.
6) Certain capacity in the State of Maharashtra is already undertaking scheduled generation based payment.

3.8.2 Proposed RE DSM for scheduled based payment

RE Deviation Settlement Mechanism has been proposed in line with the CERC approach for Over-injection as well as Under-injection with certain modifications

Energy accounting: Energy accounting will be at scheduled generation based payment instead of actual generation.

Deviation Charges:

- As the proposed Regulations envisage transition from Actual generation based settlement to Scheduled generation based settlement,
    - Tolerance Bands & Error Bands or Accuracy Bands have been set based on the analysis carried out in earlier Chapter. Absolute Error to be specified as $\pm$10%, $\pm$12%, $\pm$15%, $\pm$>15%.
    - DSM Charges are linked to PPA
- In case of scheduled generation based payment mechanism deviation charges would be linked to Contract/PPA Rate or, in absence of such Contract/PPA Rate, at the weighted average ACP of the Day Ahead Market segments of all Power Exchanges for the respective time block.
- Additionally, in case of over-injection, considering impact on the DSM Pool Account, it is proposed to put a ceiling rate of Rs. 2.50/unit. This is in view of the recently discovered solar tariff ranging from Rs. 2.55/unit to Rs.3.92/unit.

3.9 Implementation issues/Design considerations

As discussed earlier, implementation difficulties/challenges in shifting to scheduled based payment regime have been summarized issue-wise. Inputs on such issues along with stakeholder's probable suggestions have been summarized and captured below while dealing the respective issue.

3.9.1 Metering related Considerations

1) Inputs received

a) MSLDC submitted that, as Contract rates are changing Wind Turbine Generator (WTG)-wise, ABT meters will have to be installed for each WTG so as to compute deviations for individual WTG for correct deviation accounting.

b) Timely meter data pertaining to 34 nos. of PSS connected in MSEDCL network: MSLDC submitted that for 34 nos. of 33 kV PSS which are owned by MSEDCL, ABT meters having AMR facility are not installed. The Commission in its Order dated 30 September 2019 had directed MSEDCL to install ABT meters with AMR facility. Also, in the 2nd MSPC meeting held on 4 April 2022, MSPC had directed MSEDCL to install ABT meters with AMR facility. MSLDC has taken up the issue of meter installation with MSEDCL at number of times, however, such meters are yet to be installed. Also, the meter data for these PSS is not received from MSEDCL in time. A time lag of around 5-6 months has been observed in receipt of meter data.

c) As regards the delay in current RE DSM billing, AEML submitted that the same may be due to data acquisition related issues of RE Generators and further QCA billing to RE generators. Robust metering & data acquisition system needs to be built, which will be the backbone for all the DSM & accounting related mechanisms. All the PSS need to be connected with the FO connectivity whereas generator level may also connect with FO/ wireless connectivity as feasible.

d) MSLDC submitted that on the issue of trend of over-scheduling, QCAs have informed that the issue is mainly due to poor visibility of RE generation. In the absence of complete visibility, they are more relying on the weather data & historical data. As erroneous feedback for the forecasting model is received, there are chances of erroneous schedules resulting in to over-scheduling. MSLDC submitted that it is issuing Synchronization Permission to new commissioned RE projects only if real time visibility is available.

2) F&S is necessary to facilitate the integration of higher share of RE in the grid to assist the intra-State and inter-State wheeling of RE power and to ensure scheduling and energy accounting for such transaction. Solar and Wind energy are the main variable

RE energy generation sources in the State. The fact that most such Generators are connected the State network calls for a holistic mechanism for F&S and stability of the grid. A robust F&S mechanism at the State level has to be coupled with 100% metering (with Special Energy Meters) and setting up of an efficient and scalable telemetry system. This is required to enhance the visibility of the RE Generators at the MSLDC, enable a commercial settlement mechanism based on the actual/schedule generation, and establish an institutional framework to facilitate this process.

3) On this backdrop, the existing F&S Regulations envisaged the PSS as the basic unit for the forecasting, scheduling and DSM mechanism. It was required that all the relevant parameters, namely, Scheduled Generation, Actual Injection, Deviations (Absolute Error) and Deviation Charges, would be monitored and accounted for within the State Imbalance Pool with reference to the PSS. Hence, metering arrangements, communication infrastructure and protocol at each PSS are critical. As specified in the MERC F&S Regulations, the appointment of QCA at all the PSS, adequate provision of SEM metering arrangement at all the PSS, and availability of meter data of all the PSSs at MSLDC are pre-requisites for computation of Deviation Charges.

4) Existing Status and Relevant Orders on Metering

a) Apart from provisions in the MERC F&S Regulations, the Commission through its various Orders from time to time have directed stakeholders to undertake metering in time bound manner. The relevant extract of the Order dated 30 September 2019 in the Cases of 43 RE Generators is reproduced below:

"3. State Transmission Utility (STU) / Maharashtra State Electricity Transmission Co. Ltd. / Distribution Licensees are directed to undertake all the activities related to metering arrangement for all RE Pooling Sub-Stations (PSS) with immediate effect to ensure that, before finalization of amendment to the RE F&S Procedure, Qualified Co-ordinating Agency (QCA), STU and Distribution Licensees jointly shall be able to collect the meter data of all PSS and make available to MSLDC during extended trial period allowed by the Commission in this Order."

b) The Commission noted in its Order dated 12 August 2020 on the issue of activities related to metering to all RE PSS that ABT meters at all PSS were already in place.

c) As regards the issue of timely meter data pertaining to 34 nos. of PSS connected in MSEDCL network, the Commission vide its Suo-motu Order dated 29 May 2023 had specifically directed as under:

"55. …Thus, while MSEDCL has been suggesting to bring as many as RE Generators possible under the REDSM framework, MSEDCL's own action is

not in accordance with its suggestion since inspite of suggestions from the DSM Working Group, MSEDCL has not taken action in making AMR / regular weekly basis meter data available at its RE generators connected MSEDCL's PSS for computation of REDSM by MSLDC as per F&S Regulations. Under such circumstances, ***the Commission directs MSEDCL to complete AMR of these PSSs within 6 months and make the data available to MSLDC for DSM computation on weekly basis." (emphasis added)***

d) Further, the Commission in its Order dated 11 January, 2022 in Case No. 66 of 2021 also issued following directions to the STU:

"7. State Transmission Utility is directed to ensure metering at correct locations in line with the requirements specified in the Metering Code and the amended F&S procedure."

5) Further, MSLDC submitted that it is issuing Synchronization Permission to new commissioned RE projects only if real time visibility is available.
6) Under the proposed Regulations, the Commission thinks it fit to continue with the existing arrangement of PSS as building block as part of the MERC F&S Regulation for the purpose of forecasting, scheduling, co-ordination/communication of the schedules/data/information exchange with the MSLDC, metering, energy accounting and de-pooling of applicable deviation charges at PSS.
7) In addition to this, under the proposed Regulations, it is envisaged that there would be individual generators wise forecasting, scheduling, co-ordination/communication of the schedules/data/information exchange with QCA, metering, energy accounting and de-pooling of applicable deviation charges at PSS level. This information exchange is envisaged through web based QCA portal. The same has been discussed subsequently in detail in this Chapter. In order to have such greater and granular level of information schedules/data/information exchange with QCA, the metering arrangements, communication infrastructure and protocol at PSS is required. In general, it is expected that the following has already been ensured-
    i) SEM for every generator (connected to PSS)
    ii) AMR facility and real time visibility of each generator at **respective PSS/QCA level**
8) For transitioning to scheduled generation based payment regime at PSS/QCA level, aforementioned provisions of the metering arrangements, communication infrastructure and protocol at QCA level are pre-requisites.

9) The Commission would like to emphasize that, irrespective of the proposed regulations, RE Generators and QCA are already mandated to undertake metering arrangements, communication infrastructure and protocol under various existing regulations, metering codes and procedure and Orders. However, the Commission would like to grant additional time, as mentioned in the table given below, to complete such necessary arrangement or infrastructure.

Table 16: Metering & Communication related activities

Sr. No.	Particulars	Responsibility	Timeline
a.	SEM @ Discom connected PSS including AMR facility	MSEDCL	3 months
b.	Ensuring SEM for every generator for PSS (Selected)	RE Generator	3 months
c.	Ensuring AMR facility and real time visibility of each generator At respective PSS	RE Generator in Coordination with QCA	2-3 months

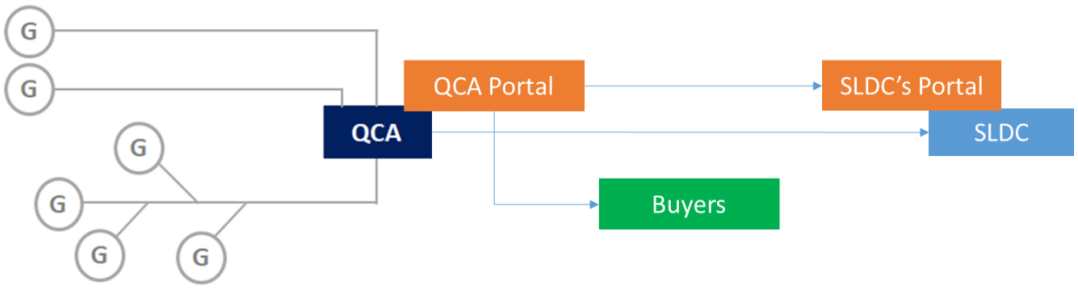
RE Generator in coordination with QCA are directed to undertake all the activities related to metering arrangement with immediate effect to ensure that, before finalization of amendment to the RE F&S Procedure, all the metering and communication protocol are already in place.

10) In case of non-compliance of this directive, the Commission shall undertake appropriate actions under the relevant regulations. Further, during ongoing non-windy season, necessary shutdown can be undertaken without much financial hardship.

3.9.2 Development of Web based QCA Portal

1) In order to smoothen the transition from actual generation based payment regime to scheduled generation based payment mechanism, the proposed regulations envisage the development of QCA portal by MSLDC. Such QCA portal will be addition to the SLDC portal currently in place. The following figure depicts the QCA portal in existing framework.

Figure 3: QCA Portal



G: Solar and Wind Generator; QCA: Qualified Coordinating Agency

2) MSLDC is the implementing agency of the MERC F&S Regulations and it has got enough operational experience in the earlier portal development. Further, for RE DSM related transaction, data is being managed by MSLDC. Therefore, the Commission feels that it is necessary that the responsibility of development of QCA portal is undertaken by the MSLDC. The MSPC shall guide the MSLDC in various activities associated with such development of the QCA portal.
3) It is envisaged that there would be individual generator-wise forecasting, scheduling, co-ordination/communication of the schedules/data/information exchange with QCA, metering, energy accounting and de-pooling of applicable deviation charges at PSS level. For effective implementation of the scheduled generation based regime, it is important that this information exchanges should be carried out in a transparent manner on the QCA portal. Therefore, the QCA portal access shall be provided to QCA, SLDC, Sellers and Procurers.
4) Further, it is presumed that all generators will authorize the QCA to modify their schedules and to submit onwards to the MSLDC. The same is expected to be governed by the commercial agreement between the QCA and generators.
5) It is envisaged that the QCA shall operate a dynamic web-based application and provide its log-in access to the SLDC, Sellers and Procurers for undertaking the following:
   i) To enable the SLDC to access live data of all Schedules and Deviations and facilitate the timely billing and payment of Deviation Charges;
   ii) To facilitate Sellers to upload their Generator-wise schedules, revision of schedules, Generator outages and their reasons;
   iii) Upload site characteristics and details of the Wind Turbines, Solar Inverters, etc.;
   iv) Certification of final implemented schedules of individual Generators by the QCA;
   v) Communication between the QCA and the Sellers to access live data of all Schedules and Deviations and facilitate the timely billing and payment of Deviation Charges.

The detailed modalities of the web-based application operated by the SLDC and the QCA shall be provided in the updated Detailed Procedure to be stipulated by the SLDC in accordance with the proposed proviso to Regulation 5.20.

6) Once the QCA portal is developed by MSLDC, there would be seamless integration of data with web-portal of MSLDC. It is expected that this portal would be developed and operationalised by MSLDC within 90 days after date of notification of the amendment regulations. Further, it is expected that MSLDC shall also extend the coverage of its dynamic web portal to absorb individual generator-wise schedules/information, beside the current practice of PSS level details.
7) Accordingly, Regulation 11.3 & 11.4 of the existing MERC F&S is proposed to be substituted.

3.9.3 PPA rates

1) Inputs received

a) AEML submitted that after shifting to schedule based payment regime and if Deviation Charge is linked to the PPA rate as done by the CERC, the SLDC will have to get PPA rate for all contracts. Getting the PPA rate for transactions undertaken by Discom will not be concern, whereas for Open Access (OA) consumers it would be difficult, given that the present rates defined by generator contracted with OA consumer are not at common periphery or interface, e.g., rate declared at Ex-bus, InSTS at consumer periphery etc. Even if we assume all the generators need to declare PPA rate InSTS periphery, the generator deviation need to be evaluated InSTS after accounting for Distribution losses as most of the generators are connected to MSEDCL network (22 kV/ 33kV).

b) MSEDCL submitted that there are hundreds of RE generators having PPA with MSEDCL and they are having different PPA rates.

c) MSLDC submitted implementation difficulty citing 220 kV Jamde substation, being one of the largest PSS having 328 MW Wind and 70 MW Solar capacities. 328 MW capacity is having total 271 no. of WTG's owned by 118 no. of individual generators. Out of 328 MW capacity, 76.8 MW (63 no. of WTG) capacity is contracted under long-term whereas 54.95 MW is under Medium-term. If grouping of long-term contracted capacity based on same contract period is done, then there are 9 such for which PPA rate might be same. Further, same generator may have different PPAs with MSEDCL which may different PPA rates.

- Hence, in this case of contract by MSEDCL, MSEDCL would require separate schedules for 63 no. of WTGs and
- For calculation of deviation accounting, PPA rate of each WTGs (271 no.) will be required.
- This scenario is applicable for medium term and short-term contract of MSEDCL and contracts of different Discoms viz. TPC, AEML, etc.

2) The Commission agrees with the suggestion that some rate needs to be defined for consideration of contract rate. There can be two options:

Option 1: Initially, all generators need to declare the PPA rate at InSTS periphery

Option 2: Billing rate approved/adopted by the Commission.

Captive transaction: The settlement can be at weighted average ACP of Day Ahead Market to ensure neutrality.

Open Access/Third Party OA: The settlement at weighted average ACP of Day Ahead Market.

3.9.4 Contract mapping and information sharing process:

1) Inputs received

a) MSLDC submitted that it is mandated to maintain a Common Registry having technical and commercial information of each generator. The technical information is updated from Generators through the QCA, whereas, the commercial information having contract period is updated as provided by Discoms. It is observed that the information provided by Discoms (especially by MSEDCL) is delayed. Also, complete updated information is not provided in the month when contract has been signed or Open Access has been issued. Due to lack of updated information, MSLDC may not map some capacity for which schedules will not be available and generator may claim for energy charges which cannot be settled due to non-availability of schedules. Such conditions may result in legal and commercial implications. Hence, prior to moving towards scheduled generation based payment, information sharing process needs to be streamlined by the Discoms.

b) As, Contracts are changing dynamically (mostly on monthly basis) the contract rates will also change dynamically and it will be difficult for MSLDC to maintain updated records of such large number of individual contracts/generators & changes.

2) It is observed that these difficulties are in the nature of operational difficulties, most of which should get streamlined once the QCA portal is put in place and the same is

integrated with the dynamic web portal of MSLDC. Further, the Commission feels that other difficulties can be ironed out during the Trial Mode implementation which is being discussed as part of proposal.

3) As regards submission of Contract rates, the suitable amendments in the regulations have been proposed mandating the Solar and Wind energy generators to furnish the Contract rates on duly notarized affidavit to the QCA, with its copy to the MSLDC, for the purpose of preparation of the Deviation Charge account, along with copies of power purchase/ sale agreements.

3.9.5 Schedule Certification:

1) Inputs received

a) MSLDC submitted that, as Discoms will have to pay generators based on schedules, Discoms may seek certification of MSLDC for schedules of each generator. As per existing regulations, scheduling is to be carried out for whole PSS and it is the responsibility of the QCA to arrive at the aggregated schedule at PSS. Hence, it will not be possible for MSLDC to certify generator-wise schedules.

b) MSEDCL submitted that it is already receiving around 2000MW RE power from interstate generators for which payment is being effected on schedule as certified by REA/ on the basis of schedule data shared by WRLDC/NRLDC.

c) AEML submitted that as per existing provision, QCA's forecast and schedules renewable energy at PSS level. The schedule that is received by Discom is at total level or broadly at QCA level based on the capacity contracted by Discom at QCA level. Therefore, Contract-wise and generator-wise schedule in proportion to capacity on PSS need to be published by the SLDC for payment or invoice issuing by Generators, to avoid issues of proration, etc.

2) As already stated above, it is presumed that all generators will authorize QCA to modify its schedule and to submit onwards to MSLDC. The same is expected to be governed by the commercial agreement between QCA and generators.

3) In case of interstate generators for which payment is being effected on schedule, as certified by REA or on the basis of schedule data shared by WRLDC/NRLDC. Along the same lines, the Commission feels that ideally schedule certification under the proposed schedule based payment regime should have been done by MSLDC. However, QCAs are also registered entities under the MERC F&S Regulations and the scheduled generation based payment regime is envisaged at PSS level. Therefore, final Certification of final implemented schedules of individual Generators shall be done by

the QCA. After integration of the QCA portal with the MSLDC portal, the MSLDC can 'publish' such 'QCA certified schedule'. Further, procurers will also be provided with access of the QCA portal.

3.9.6 Future Complexities in scheduling:

1) Inputs received

a) AEML submitted that with implementation of Green OA, wherein eligibility of OA customers will get reduced to 100 kW (from present 1000 kW), number of contracts per generator with different Discom will increase. Hence, Contract-wise scheduling will get more complicated and SLDC has to be consider all these practical aspects in the beginning.

b) MSLDC also submitted that once OA for the capacity above 100 kW is permitted this will aggravate the conditions.

2) Scheduled generation based payment mechanism would necessitate the MSLDC, to update its own platform, in addition to the development of the QCA portal. It is a matter of fact that as power sector will evolve, scheduling will become more complex, but good software design /IT infrastructure can help manage such situation. It is expected that this complexity will be better managed with development and operationalization of the QCA portal. Further, the Trial Mode implementation is expected to provide various inputs on such issues to be resolved subsequently.

3.9.7 Amendment in existing PPA:

1) Inputs received

a) BEST has submitted that, for shifting scheduled generation based payment regime necessary amendments are required to be done with the existing PPA. The PPA need to be approved from the concern authorities.

b) AEML submitted that as per existing PPA, payment to the RE generators is linked to actual generation based on GCN/JMR issued by MSEDCL/MSETCL. While migrating to schedule generation based regime, necessary provisions/mandate need to be incorporated in the regulations.

c) MSEDCL submitted that PPAs has the general provision that, the rules/regulations as amended by the Commission from time to time shall be applicable.

2) The Commission opines that as PPAs have general provision that the Rules and Regulations as amended by the MERC from time to time shall be applicable, no

amendments in PPAs are required. However, if there is any specific instance, the stakeholders are invited to comment on the same.

3.9.8 Treatment of RPO:

1) Inputs received:

a) AEML submitted that treatment of RPO compliance/ accounting under scheduled generation based regime needs to be clearly defined through regulations.

2) The Commission has not felt it necessary or appropriate at this juncture to introduce related mechanism in the proposed regulations. The Commission is of the view that the development of RPO framework need to be appropriately adopted when the Trial Mode (explained in the para below) implementation ends.

3.9.9 Trial Mode implementation

1) Need for Trial Mode Operation:

Though, the stakeholders have gained enough experience on implementation of the MERC F&S Regulations and the MERC DSM Regulations, the lessons and learnings from implementation of such regulations have underscored the need for Trial Mode operations for developing/upgrading the software and mechanism, validating trial run results and taking corrective action arising therefrom, and implementing transition from actual generation based payment regime to scheduled generation based payment regime., etc. It is envisaged that, upon notification of the proposed amendment regulations through regulatory process, the proposed amendments pertaining to the scheduled generation based payment shall be implemented in Trial Mode and after resolution of issues that would arise during such Trial Mode, scheduled generation based payment regime could be rolled out for actual commercial implementation at a later date. The Trial Mode implementation period of at least twelve months would be necessary. Further, it is clarified that implementation of Trial Mode should not be held up due to unpreparedness of a single PSS (hardware/metering). Accordingly, suitable provision has been introduced in the proposed regulations such that PSS-wise integration can be done under Trial Mode operation. Therefore, the Commission has suitably introduced enabling provision in the proposed regulations.

It is envisaged that Trial Mode implementation shall start within three months from the date of notification of the proposed amendment regulations.

2) Modalities of Trial Mode:

During Trial Mode, following activities have been envisaged.

Table 17: Modalities for Trial Mode implementation

Sr. No.	Particulars
A.	**The existing billing and settlement arrangement specified under the MERC F&S Regulations shall be continued. i.e., actual generation based payment regime.** • PSS/QCA shall continue submission of Schedule to the MSLDC and collection of meter data as per existing practices. • During this period, the MSLDC shall continue with implementation of all the activities such as scheduling of RE generation, computation of Absolute Error, RE Deviation and RE Deviation Charges, preparation of RE DSM Bills. • Post notification of amendment, o Revised Error Bands and Deviation Charges (Reg. 7A) and other related provisions for actual generation based payment mechanism, after notification, shall be made applicable. o The Error Bands and Deviation Charges for Solar and Wind Generators connected to the Intra-State Transmission network and selling or consuming power outside Maharashtra shall be as per the Annexure of the MERC F&S Regulations. • All regular activities currently undertaken shall be continued.
B.	**In parallel to the existing actual generation based payment regime, the Trial Mode will be implemented for scheduled generation based payment regime for a minimum period of twelve months.** During this period, • Revised Error bands & Deviation Charges (Reg. 7B) and other related provisions, after notification, shall also be referred. • Energy bills will be generated as per scheduled generation based payment regime. • DSM charges will be as per proposed charges (Reg. 7B) • QCA shall continue submission of Schedule to the MSLDC as per proposed mechanism
C.	• MSLDC should publish the RE Schedule, Energy Accounting Statement and RE DSM Statement (including mock DSM bills) on its website for each QCA and every PSS, separately. • These bills shall be issued to QCAs, however, QCAs shall not be required to pay the DSM charges against these DSM Bills during trial period of twelve months.

Sr. No.	Particulars
	• Further, QCAs shall also undertake de-pooling of the RE DSM charges amongst RE Generators for their respective PSS, but no commercial transaction shall be done. • QCAs shall provide information of scheduled based settlement with the individual generators during the Trial Mode to MSLDC. During Trial mode period, • Discom would continue payment to RE generator based on actual generation • SLDC will prepare Pool Account as well as State DSM Pool Account as per both regimes • Gain experience on operating scheduled generation based payment regime on Deviation Pool accounts and impact on QCA (aggregation at QCA and de-pooling at individual generators may not be a zero-sum game)
D.	• QCA and MSLDC to submit Trial Mode implementation result to the MSPC on periodic basis, preferably quarterly. • MSLDC to submit the Integrate analysis and RE analysis especially pertaining to State Periphery Charges (as directed in Order dated 29 May 2023)
E.	• The MSPC is directed to monitor the Trial Mode operations closely to evaluate its results and to address any difficulties faced by the stakeholders, including the MSLDC. • Undertake analysis of mock trial run bills and based on interaction with stakeholders, the MSPC shall provide its recommendation on various issues. The MSPC is expected to have necessary deliberation or further review/monitoring to address with the constituents from time to time.

3.9.10 Roles and Responsibilities:

Based on the discussion above, the roles and responsibilities for implementation of scheduled based payment regime are summarised in Table below:

Table 18: Roles and Responsibilities for implementing scheduled based payment regime

Sr. No.	Particulars	Responsibility
a.	Schedule submission responsibility	QCA (implementation at PSS level)

Sr. No.	Particulars	Responsibility
b.	Generator PPA rate submission	Individual generator to provide QCA with copy to SLDC
c.	Schedule Certification and Publication on website	QCA portal (with access to SLDC, Sellers & Procures). SLDC to Publish on its portal also.
d.	Settlement of sale of energy to Discom	• At scheduled generation basis (certified by QCA & published on QCA Portal &/or SLDC portal) • As per Contract rate
e.	Deviation Accounting i. At State Periphery ii. At PSS level	MSLDC
f.	De-pooling	QCA
g.	De-pooling basis	• Against each generator as per scheduled generation and as per Deviation Charges as specified
h.	Energy accounting related to Deviation	• QCA to prepare on weekly basis based on inputs from MSLDC • To be made available to MSLDC (preferably through IT enabled system & software)
i.	Trial Run implementation	As stipulated
j.	Necessary Amendment in Procedure	To be carried out by MSLDC

3.9.11 Dispute Resolution:

1) As per the MERC DSM Regulations, the role of MSPC in DSM activities is to monitor compliance of the MERC DSM Regulations by the State Entities as well as guide, support and advice MSLDC for modification of procedures, if any, & to address the implementation difficulties. Further, MSPC can provide necessary support and advice to the Commission for amendment to the provisions of Regulations as may be necessary.

2) It is proposed that the existing MSPC structure under the MERC DSM Regulations shall be brought under the MERC F&S Regulations, mainly for the dispute resolution. Such structure, if required, shall be modified to allow wider participation/ representation of diverse stakeholder groups related to the MERC F&S Regulations.
3) It is envisaged that MSPC shall take following key activities:
   a) Provide platform to identify stakeholders concerns under the MERC F&S Regulations.
   b) Reconcile and/or resolve concerns/differences between the stakeholders under the MERC F&S Regulations.
   c) Guide the MSLDC for modification of procedure(s) to address the implementation difficulties, if any.
   d) Provide necessary support and advice to the Commission for suitable modifications/issuance of operating procedures, practice directions, and amendment to the provisions of this Regulations, as may be necessary.
4) In case any issue is not fully covered in the Commission's Regulations or Orders, the issue shall necessarily be referred to the MSPC for its guidance.
   Provided that the stakeholders may also refer such an issue to the Commission subject to jurisdiction of the Commission under the EA.
5) Pending the decision of the Commission, the directions of MSPC shall be complied by the stakeholders.
6) It is clarified that MSPC activities mentioned above are envisaged for both actual generation as well as scheduled generation based payment regime.
7) Accordingly, new Regulation 16A is proposed in the Principal Regulations.

3.10 Preparation for Transition from Actual to Scheduled generation based payment regime

3.10.1 Implementation of Scheduled generation based payment regime in Phases

The Commission has taken note of recommendation of the DSM Working Group and MSPC and submissions made by MSLDC and major Distribution Licensee regarding their perspective for shifting to scheduled generation based payment regime, undertaken comprehensive review of the existing MERC F&S Regulations and studied the mechanism at Central level, and considered the developments in the sector and various issues before it. Accordingly, the Commission proposes to implement the scheduled generation based payment framework in phased manner to allow adequate time for preparedness by all key stakeholders, including the MSLDC, to provide sufficient time to set up necessary hardware/software, and to undertake pilot test runs.

Various stages involved from issuance of these draft regulations to its commercial implementation/roll out have been elaborated in the following paragraphs.

Stage-I – Formulation/Amendment of Detailed Procedure

It is proposed that the MSLDC will amend its detailed procedure considering the revised/new provisions outlined under the MERC F&S Amendment Regulations. The MSLDC shall finalise the same upon detailed stakeholder consultation process. Upon addressing comments/suggestion received through stakeholder consultation process, the MSLDC shall submit the modified detailed procedure to the Commission for its approval.

1) The Commission feels that for amending the detailed procedure for revision in error bands and deviation charges (under actual generation based payment regime) much less time than proposed two months of time period allocated for revision would be sufficient. The MSLDC to undertake this revision immediately and start implementing it as soon as modification in software are undertaken, given that the revision in error band has already undergone necessary stakeholder consultation.
2) As regards the amending of the detailed procedure (for scheduled generation based payment regime), it is proposed that the MSLDC will prepare/update detailed procedures covering information/data requirement, as necessary. It is expected that the MSLDC should start preparation immediately so that it will adhere to the timelines specified in the proposed regulations.
3) It is proposed that, during and after the end of the Trial Mode implementation, if any further changes, modifications or revisions are required in the Detailed Procedure, the same should be referred to the MSPC and need not undergo the detailed stakeholder consultation process again.

Stage-II – Establishment of Hardware (Metering and Communication) Component

It is envisaged that upon notification of Amendment Regulations through regulatory process, three months' period has been envisaged for various stakeholders to set up necessary components such as metering, communication, etc. Ideally, stakeholders should not wait for the final notification of the Amendment Regulations, and start preparations before such final notification, given that the requisite infrastructure has already been mandated under various existing regulations and codes issued by the Commission.

The MSPC shall ensure implementation of metering and establishment of AMR and communication infra as proposed in the Regulations.

Stage-III – Establishment/Upgradation of Software Component

8) The State is already implementing the RE DSM mechanism, as specified by the Commission (under actual generation based payment regime -for intra-State and inter-State projects). However, this software need to be modified for revised Error bands and RE DSM charges, after notification of the Amendment Regulations. The Commission is of the opinion that this change would be less time consuming.

9) Formulation of new web based QCA portal:

Scheduled generation based payment mechanism would necessitate MSLDC to undertake development and deployment of QCA portal/software using suitable platform though engagement of suitable IT solution/service provider

Necessary documentation of Functional Requirement Specification/ Software Requirement Specifications in line with the approved principles / conditions outlined under Scheduled generation based payment mechanism shall be developed before engaging IT solution/ service provider.

10) Integration of QCA portal with MSLDC portal:

Once the QCA portal is developed, there would be seamless integration of data with web-portal of the MSLDC. The MSLDC shall be responsible for monitoring, guiding, enabling and supervising the Portal integration with MSLDC web portal and other modules. Further, regulatory and user requirements consists of the need for regular updates/changes to the software to adopt to the changes. It is expected that the QCA portal would be developed and operationalise within 90 days from the date of notification of the Amendment Regulations. Further, the MSLDC shall also extend the coverage of its dynamic web portal to absorb individual generator-wise schedules/information, beside the current practice of PSS level details.

Stage-IV – Undertaking Trial Mode operation of Scheduled generation based payment mechanism

Upon establishment of the necessary hardware and software for implementation of Scheduled generation based payment mechanism, the Trial Mode or test run of the same shall be commenced by MSLDC under intimation to the Commission before its commercial roll out.

It is expected that all PSSs connected at transmission level will be geared with the necessary hardware and software for transitioning to Scheduled generation based

payment mechanism. Further, it is clarified that transition through Trial Mode implementation should not be held up even for unpreparedness of a single PSS (hardware/metering). Accordingly, suitable provisions have been proposed in the Amendment Regulations such that PSS-wise integration can be done under Trial Mode operation.

The Trial Mode shall be implemented for at least twelve months under the proposed regulations. The stakeholders shall conduct the test runs for the entire cycle of day ahead & week ahead forecasting and scheduling process, real-time load-generation balancing, revision in schedule, metering, energy accounting and settlement of energy /deviation accounts for multiple settlement periods on trial run basis. The limitation of process and error/bugs (if any) noticed through various stages shall be addressed carefully to avoid implementation difficulties and chances of litigation in future.

It is proposed that, during and after the end of the Trial Mode implementation, if any further changes, modifications or revisions are required in the relevant provisions of regulations pertaining to the scheduled generation based payment, and if the same are brought before the Commission by the concerned stakeholders i.e. MSLDC or MSPC, the Commission shall use its inherent power to incorporate appropriate such changes in the regulations and it is proposed that such changes in regulations brought before the Commission need not undergo the "detailed" stakeholder consultation process again, as required under previous publication procedure.

Stage-V – Modification to MSPC (for dispute resolution)

The existing MSPC structure under the MERC DSM Regulations shall be brought under the MERC F&S Regulations. Such structure, if required, shall be modified to allow wider participation/ representation of diverse stakeholder groups related to the MERC F&S Regulations. MSPC activities are envisaged for both actual generation as well as scheduled generation based payment regime.

3.10.2 Compliance with the timelines

In order to have smooth transition from the prevailing actual generation based payment regime to the proposed scheduled generation based payment regime, stakeholders need to ensure that the timelines specified in the Amendment Regulations and in the Explanatory Memorandum should be adhered to. In case of non-compliance of this directive, the Commission shall undertake appropriate actions under the relevant regulations against the necessary party(ies).

3.11 Draft Amendments Introduced

Accordingly, following amendments have been introduced:

a) A proviso is introduced after Regulation 7.1 of the Principal Regulations enabling settlement of sale of power by the Procurers on the basis Scheduled Generation.
b) The Regulation 7.2 of the Principal Regulation shall be substituted by 7.2A and 7.2B
c) Based on discussion covered in the previous Chapter, the draft Regulation 7.2A shall specify Error Bands and Deviation Charges when sale of power is settled on the basis of Actual Generation.
d) Based on the discussion covered in this Chapter, the draft Regulation 7.2B shall specify Error Bands and Deviation Charges when sale of power is settled on the basis of Scheduled Generation.
e) Based on discussion in the earlier Chapter, the Regulation 4.2 of the Principal Regulations shall be substituted, whereby the Commission may even undertake annual review of formulation of Absolute Error, Accuracy Bands and Deviation Charge thereof, if it considers necessary.
f) Second and Third proviso are introduced after the First proviso to Regulation 1.2 of the Principal Regulations enabling phase-wise transition to scheduled generation based regime in the manner described in paragraphs above
g) New definitions, Regulation 2.1(d)(a) (Area Clearing Price), Regulation 2.1(f)(a) (Contract Rate) and Regulation 2.1(x)(a) (Trial Mode) are introduced to the Regulation 2 of the Principal Regulations. Regulation 2.1(d)(a) is in line with the MERC DSM Regulations.
h) Various suitable provisions related to scheduled based payment regime such as metering, schedule submission, QCA portal, de-pooling related, etc. have been introduced.
i) Based on the discussion covered in this Chapter, the Regulation 16A for bringing existing MSPC structure under the ambit of the MERC F&S Regulations is proposed.

4 Other issues

This Chapter of the Explanatory Memorandum elaborates the reasoning and justification for incorporating Amendments on account of other related issues.

4.1 Amendment to Regulation 5 of the Principal Regulations

4.1.1 Substitution of provisos to Regulation 5.19 of the Principal Regulations

The provisos to Regulation 5.19 of the existing MERC F&S Regulations, 2018 specifies as under:

"5.19 The QCA may revise the Schedule of Generators connected to the Intra-State Transmission Network (excluding collective transactions) by giving advance notice to the SLDC;

Provided that, ***such revisions shall be effective from the 4th time block following the time block in which notice was given****;*

Provided further that, there may be one revision for each time slot of one and half hours starting from 00.00 hours of a particular day, subject to a maximum of 16 revisions during the day." ***(emphasis added)***

a) As per the existing MERC F&S Regulations, revision in schedule of generator shall be effective from the 4th time block "following" the time block in which the notice was given. During discussion with the MSLDC, it was observed that this provision implied that revision shall be effective in the 5th block, which is not in line with the practice currently followed/implemented by the MSLDC as per the State Grid Code. The relevant extract of the State Grid Code is reproduced below:

"53.2 Revision of Schedule as per WRLDC Instructions

53.2.1. In case of forced outage of a unit of ISGS for those stations who have a two part tariff based on capacity charge and energy charge for long term and medium term contracts, WRLDC shall revise the schedules on the basis of revised declared capability by ISGS. The revised declared capability and ***the revised schedules shall become effective from the fourth time block, counting the time block in which the revision is advised by the ISGS to be the first one.***

53.2.2. In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the transmission system, associated switchyard and substations owned by the Central Transmission Utility or any other transmission licensee involved in inter-state transmission (as

certified by WRLDC) necessitating reduction in generation, ***the WRLDC shall revise the schedules which shall become effective from the 4th time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one…..***

53.2.3. WRLDC shall permit the revision of declared capability by ISGS and drawal schedule of the State for the remaining period of the day/block with advance notice of four-time blocks. ***Revised schedules/declared capability in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received by WRLDC to be the first one.***

…

53.3 Revision of Schedule by SLDC

53.3.5. Accordingly, SLDC shall issue necessary despatch or curtailment instructions in accordance with Centralised MoD principles for the state as whole, considering the technical constraints such as Ramp rate of generators so as to maintain the Load-Generation balance and comply with conditions stipulated under these Regulations and IEGC. ***In such cases, the revised schedules shall become effective from the 4th time block, counting the time block in which the revised schedule is issued by the SLDC to be the first one.*** *Also, during the first, second- and third-time blocks of such an event, the schedules shall be deemed to have been revised to be equal to actual generation or actual drawal as the case may be.*

….

53.3.9. In the event of bottleneck in evacuation of power due to any constraint, outage, failure or limitation in the transmission system, associated switchyard and substations owned by the State Transmission Utility or any other transmission Licensee involved in Intra-State transmission (as certified by SLDC) necessitating reduction in generation, ***the SLDC shall revise the schedules which shall become effective from the 4th time block, counting the time block in which the bottleneck in evacuation of power has taken place to be the first one.*** *Also, during the first, second and third time blocks of such an event, the scheduled generation of the Intra-State Generator shall be deemed to have been revised to be equal to actual generation, and the scheduled drawal of the beneficiaries shall be deemed to have been revised accordingly.*

53.4 Revision of Schedule by Sellers

…

53.4.2. In case of forced outage of an Unit of Intra-State Generator for those stations who have two part tariff based on Capacity Charge and Energy Charge for long term and medium term contracts, SLDC shall revise the schedules on the basis of revised declared capability of Intra-State Generators. The revised declared capability and ***the revised schedules shall become effective from the fourth time block, counting the time block in which the revision is advised by the Intra-State Generator to be the first one.***

…

53.4.6. SLDC shall permit the revision of generation schedule by Sellers for the remaining period of the day/block with advance notice of 4-time blocks. ***Revised generation schedules in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received by SLDC to be the first one****.*

…

53.5 Revision of Schedules by Buyers

53.5.1. SLDC shall permit the revision of drawal schedule of the Buyers for the remaining period of the day/block with advance notice of 4-time blocks. ***Revised drawal schedule in such cases shall become effective from the 4th time block, counting the time block in which the request for revision has been received by SLDC to be the first one.****" (emphasis added)***

The Scheduling process (including revisions) for RE will have to be aligned with the overall scheduling and despatch procedure of SLDC to facilitate grid operations. Accordingly, Amendment is proposed in Regulation 5.19 of the existing MERC F&S Regulations. Further, the same Regulation is a part of the existing MERC (State Grid Code) Regulations, 2020 and necessary change in MERC (State Grid Code) Regulations, 2020 shall be undertaken as and when said Regulations are taken up for amendment.

b) Limiting frequent minor revisions (under actual generation based payment mechanism):

The revisions of RE schedule are being allowed at the interval of six time blocks i.e. one and half hours. Procurers/Discoms have informed that even with the existing 16 number of revisions allowed, the power procurement planning exercise becoming difficult for Procures, as they have to keep bidding the power under RTM for almost every bidding block to maintain Load Generation Balance. Further, the

Commission in exercise of the power under the Removal of Difficulty, allowed to replace the RE schedule in buyers drawal schedule by RE actual generation till the RE generators are brought under the schedule based payment regime. Therefore, in order to enable the Discoms to manage the RE revisions effectively, and in the manner not detrimental to their interest, it is imperative that at least frequent minor revisions should be disallowed.

Therefore, in the interest of stakeholders and in order to avail such opportunities of schedule revisions, it is proposed that till such time sale of power within Maharashtra by Solar and Wind Energy Generators connected to Intra-State Transmission network is settled on the basis of actual generation, revision in Schedule of such Generators shall not be allowed if the revision is less than two (2) percent of previous Schedule. Accordingly, Amendment is proposed in Regulation 5.19 of the existing MERC F&S Regulations.

4.2 Amendment to Regulation 5.20 of the Principal Regulations

4.2.1 Regarding applicability of the MERC F&S Regulations to projects under MSKVY:

The deviation accounting and deviation settlement for RE sources (i.e., Wind and Solar generators connected to a particular PSS, with combined installed capacity of equal to or more than 5 MW or an individual Generator connected to some other Sub-Station with installed capacity of equal to or more than 5 MW) is governed by the MERC F&S Regulations. In accordance with Regulation 5.20 of the MERC F&S Regulations, the MSLDC had submitted the Amended Detailed Procedure to the Commission which was duly approved on 19 December 2019. As per the applicability of the Procedure, relaxation for projects developed under the 'Mukhyamantri Sour Krishivahini Yojana' was granted. The relevant extract of the Procedure is reproduced below:

"1.2. APPLICABILITY OF THE PROCEDURE:

1.2.1. All Wind and Solar Energy Generators in Maharashtra connected to the Intra-State Transmission System, on or after the date notified by the Commission of coming into force of the Regulations, including those connected through Pooling Sub-Stations and using the power generated for self-consumption or sale within or outside the State.

Provided that the combined installed capacity of the Solar or Wind Generators connected to a particular Pooling Sub-Station, or that of an

individual Generator connected to some other Sub-Station, shall not be less than 5 MW.

Provided further that ***till further direction in this matter this Procedure shall not be applicable for Solar power generation projects developed under 'Mukhyamantri Sour Krishivahini Yojana' as these projects are load serving embedded generation connected to distribution network of distribution licensee.*** *" (emphasis added)*

In this context, as already mentioned earlier, the GoM seeks to ensure stable daytime electricity to agriculture consumers through decentralised solar power projects. To achieve this, the Industries, Energy and Labour Department, GoM has notified MSKVY 2.0, under which at least 30% (thirty percent) of agricultural feeders are proposed to be solarised by 2025 and faster capacity addition will be facilitated in the "Distributed RE Mode". The GoM intends to develop decentralized solar projects with a cumulative capacity of 7000 MW in the State of Maharashtra. It may be noted that as on 30.09.2023, the Wind and Solar (excl. Rooftop and off-grid) capacity in Maharashtra is 8,156 MW. With the proposed addition of 7,000 MW under MSKVY, the installed capacity in the State is set to double. With increasing penetration of variable RE Generating sources such as Wind and Solar, issues of grid management, managing load generation balance, grid security and stability problems in the near future would become more complex; unless several steps for managing such variable RE integration into grid are initiated. Therefore, the Commission is of the opinion that the projects set up under the MSKVY should also be brought under the ambit of the MERC F&S Regulations. Accordingly, the MSLDC to undertake implementation of this revision (removal of relaxation) immediately and start implementing it as soon as amendment regulations are notified and given that this proposed change would have undergone necessary stakeholder consultation process, the same should not be brought up again at the time of stakeholder consultation process required to carried out for amending the Detailed Procedure.

4.3 Amendment to Regulation 5.23 of the Principal Regulations

4.3.1 Substitution of Regulation 5.23 of the Principal Regulations

The Commission at the time of notification of the MERC F&S Regulations, had made the existing Regulations 5.23 related to Gaming to avoid any possibility of mis-declaration of capacity by RE generators. It is proposed to further strengthen this

provision of Regulations by requiring the MSLDC to continuously monitoring AvC declared by the QCAs. Accordingly, suitable changes have been introduced by substitution.

4.3.2 Introduction of Regulation 5.23A after Regulation 5.23 of the Principal Regulations

As per the MERC DSM Regulations, 2022, in case of Gaming, the Commission, either suo-motu or on a petition filed by any affected party, may order an investigation. Accordingly, suitable provisions have been introduced.

4.3.3 Introduction of Regulation 2.1(i)(a) after Regulation 2.1(i) of the Principal Regulations

Suitable definition of 'Gaming' have been introduced.

4.4 Substitution of Regulation 2.1(u) of the Principal Regulations

Suitable amendments to align the definition of "State DSM Pool Account" under the MERC F&S Regulations with the MERC DSM Regulations have been introduced.

4.5 Introduction of a proviso to Regulation 8.2 of the Principal Regulations

As per the existing MERC F&S Regulations, distinct methodologies have been adopted for Inter-State and Intra-State transactions in terms of different payment mechanisms, different deviation rates and different deviation charge settlement are undertaken. These distinct methodologies require separate accounting for energy/deviation for Inter-State and Intra-State transactions. Provision of separate feeder for Inter-State transactions in the existing MERC F&S Regulations is aimed at establishing separate accounting for the two types of transactions. As under the proposed amendment transition to scheduled generation based payment regime is envisaged accordingly, an enabling provision relaxing the condition of separate feeder is introduced.

Annexure

A. The analysis of data mentioned under Para 2.2.1 (RE DSM bills/statements for the period FY 2020-21, FY 2021-22 and FY 2022-23 (April to September)) were carried out. The Overall analysis of RE sources (Wind/Solar/Hybrid) in the State has been done based on technology (wind, solar and hybrid), seasonal (monsoon, non-monsoon, windy and non-windy), QCA wise (Overall, Wind, Solar, Hybrid and seasonal).

1. Overall analysis of RE sources – Overall, Solar, Wind & Hybrid (97 PSS)

a) Overall RE

RE Deviations continue to remain at peripheral limits of +/- 15% (97 PSS)

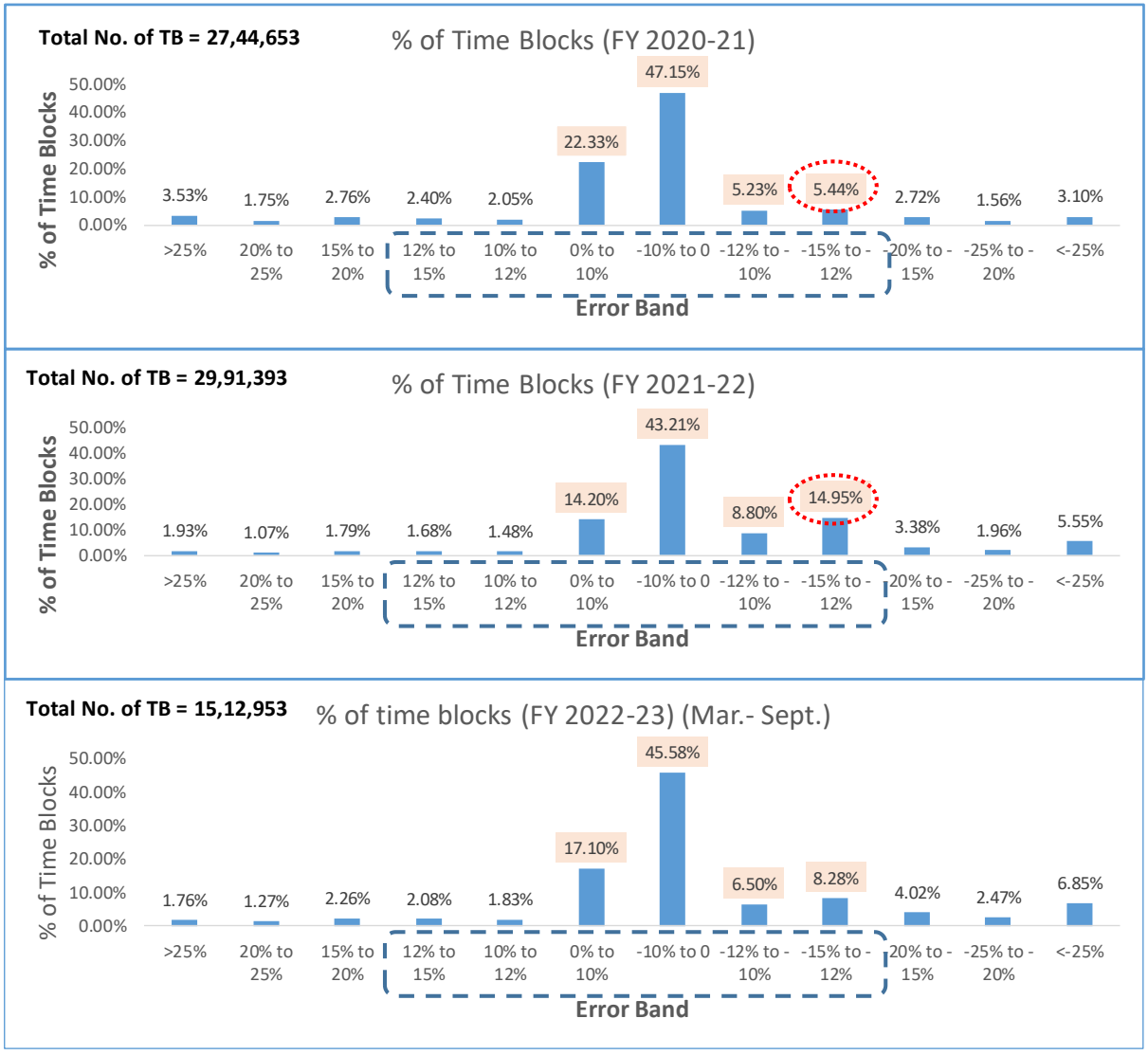


Table 19: Distribution of blocks in bands – Overall RE

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	6.63%	7.48%	8.61%
0 - ±25%	93.37%	92.52%	91.39%
0 - ±20%	90.06%	89.49%	87.66%
0 - ±15%	**84.59%**	**84.32%**	**81.38%**
0 - ±12%	76.75%	**67.68%**	71.01%
0 - ±10%	69.47%	**57.40%**	62.68%

- There is no improvement in sub +15% bands
- There is abnormal concentration of entries in -12% to -15% range which has seen an increase of around 9.51% (Refer Chart) in FY 21-22 from FY 20-21

b) Overall RE- Solar

RE Deviations in Solar have reduced with more concentration in upto +/- 12% bands (33 PSS)

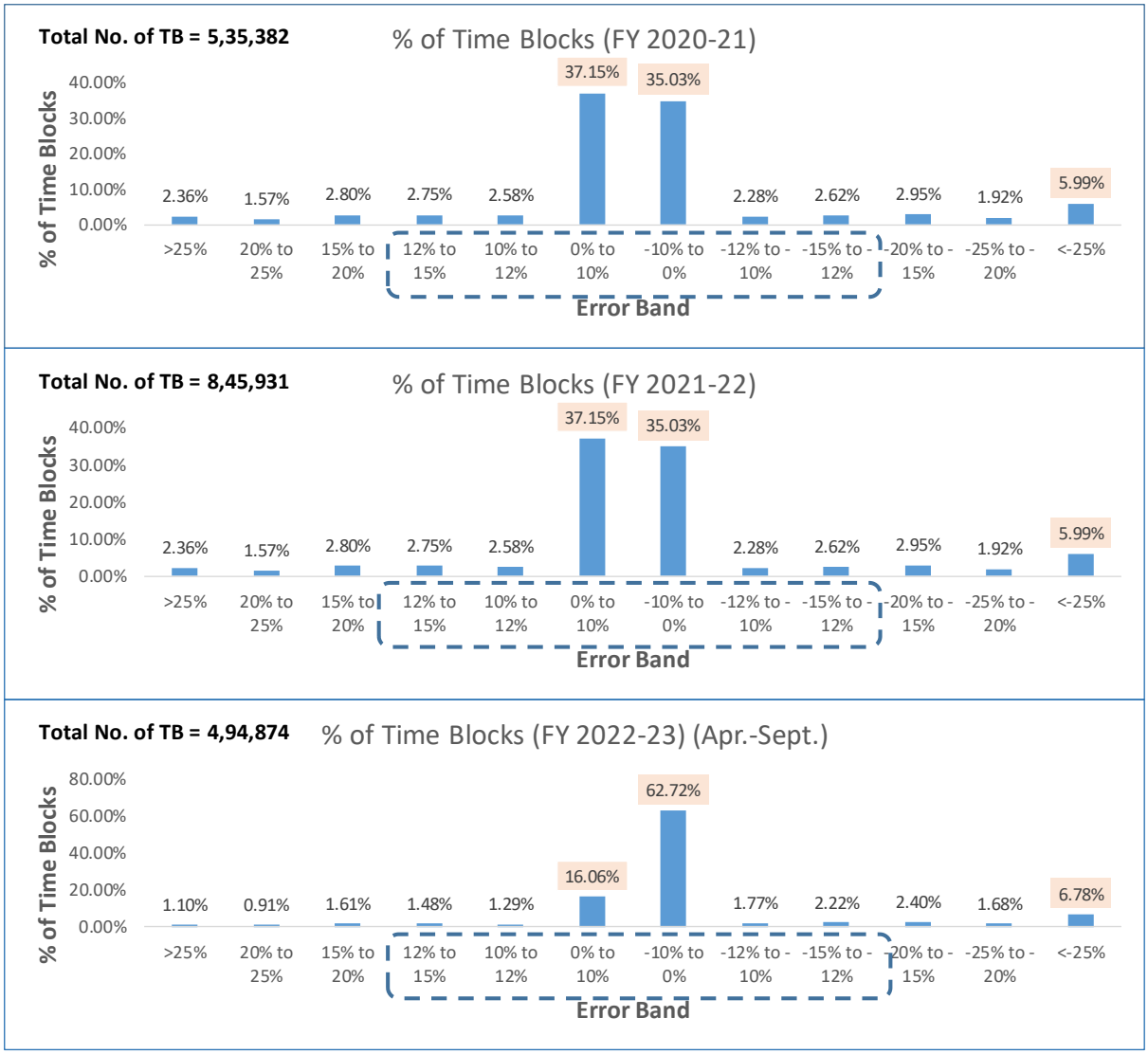


Table 20: Distribution of blocks in bands – Overall RE- Solar

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	8.35%	10.40%	7.87%
0 - ±25%	91.65%	89.60%	92.13%
0 - ±20%	88.15%	87.04%	89.55%
0 - ±15%	82.41%	**83.07%**	85.53%
0 - ±12%	77.04%	**79.43%**	81.83%
0 - ±10%	72.18%	**76.37%**	78.78%

- In Solar, Time Blocks are mostly concentrated in band between **0 to ± 10%.**
- Variations fairly spread across all bands against overall RE (wherein -12 to -15% band showcased large concentration).

- **There is an overall possibility for tightening the band from (0 to ± 15%) to (0 to ± 10% or 12%) which shall prompt further improvement in forecasting efficiency.**

c) Overall RE -Wind

Forecasting Error in Wind Projects continue to remain at marginal limit of +/- 15% (59 PSS)

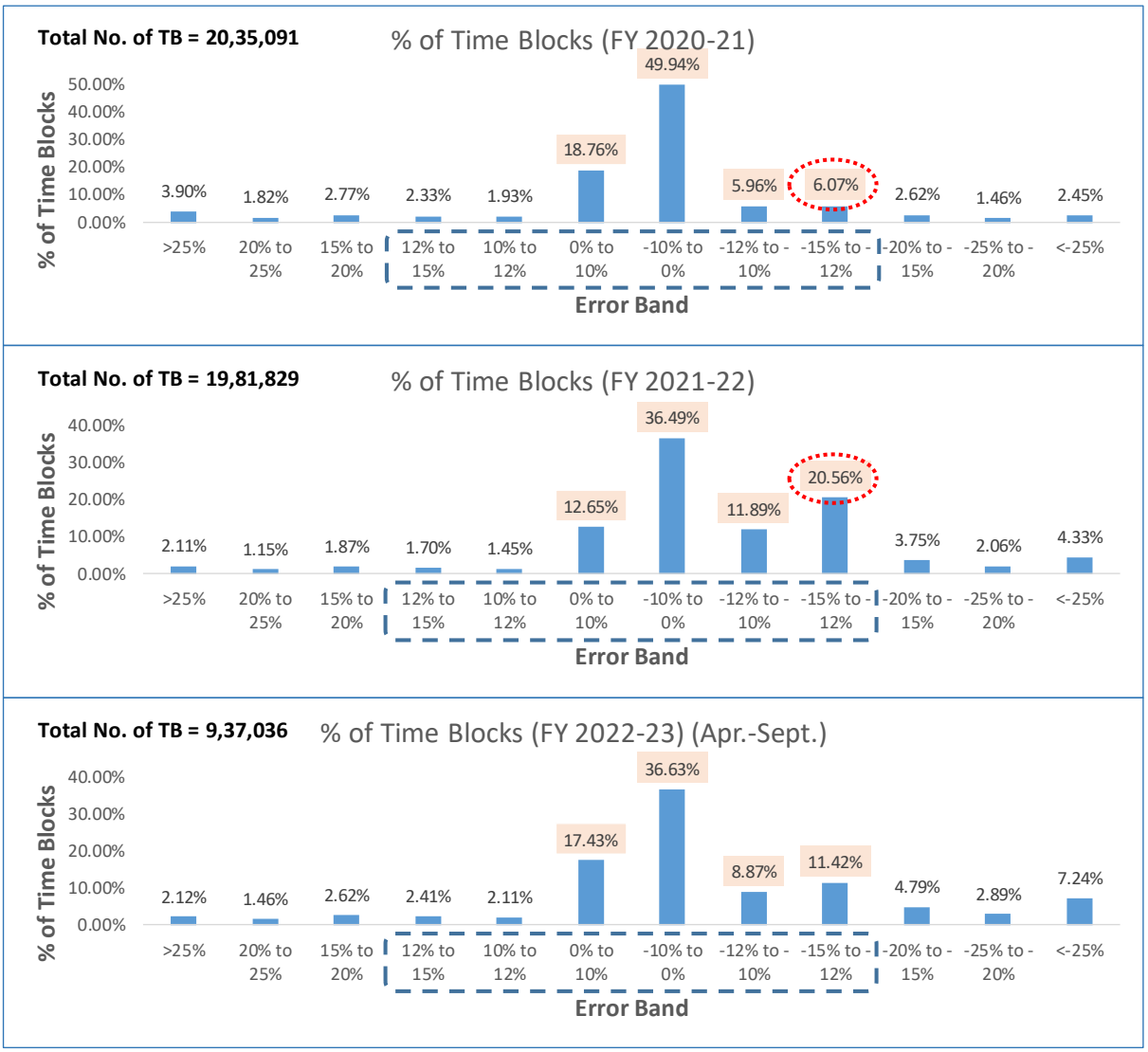


Table 21: Distribution of blocks in bands – Overall RE- Wind

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	6.34%	6.45%	9.36%
0 - ±25%	93.66%	93.55%	90.64%
0 - ±20%	90.37%	90.35%	86.28%

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
0 - ±15%	**84.99%**	**84.74%**	78.87%
0 - ±12%	76.58%	**62.47%**	65.04%
0 - ±10%	68.69%	**49.14%**	54.06%

- Quantum of blocks in 0 to ± 15% has remained almost constant.
- There is reduction in blocks in 0 to ± 10% bracket and **significant increase is seen in -12 to -15%.**

d) Overall RE -Hybrid

Significant increase in Errors in various blocks in case of Hybrid (5 PSS)

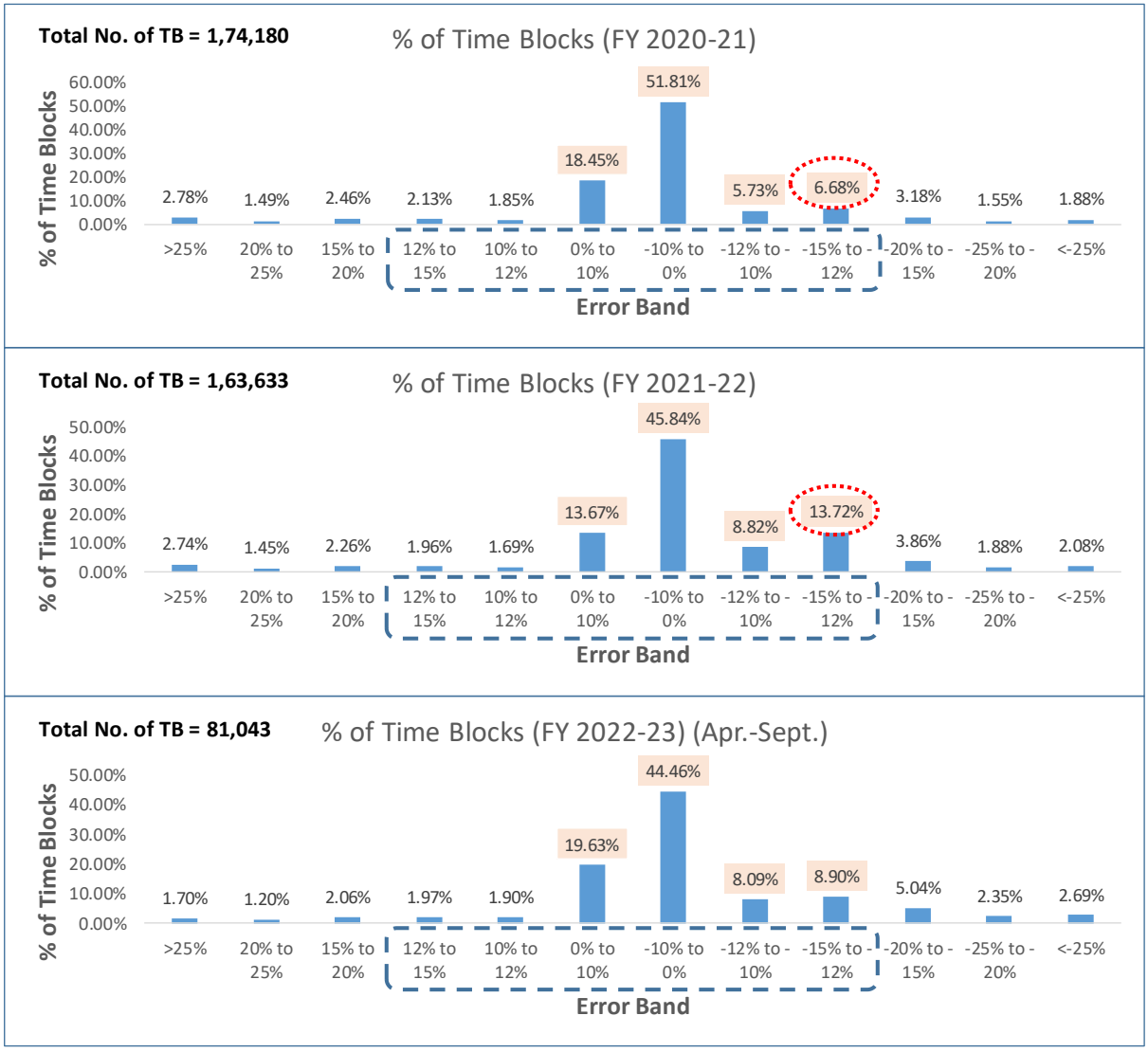


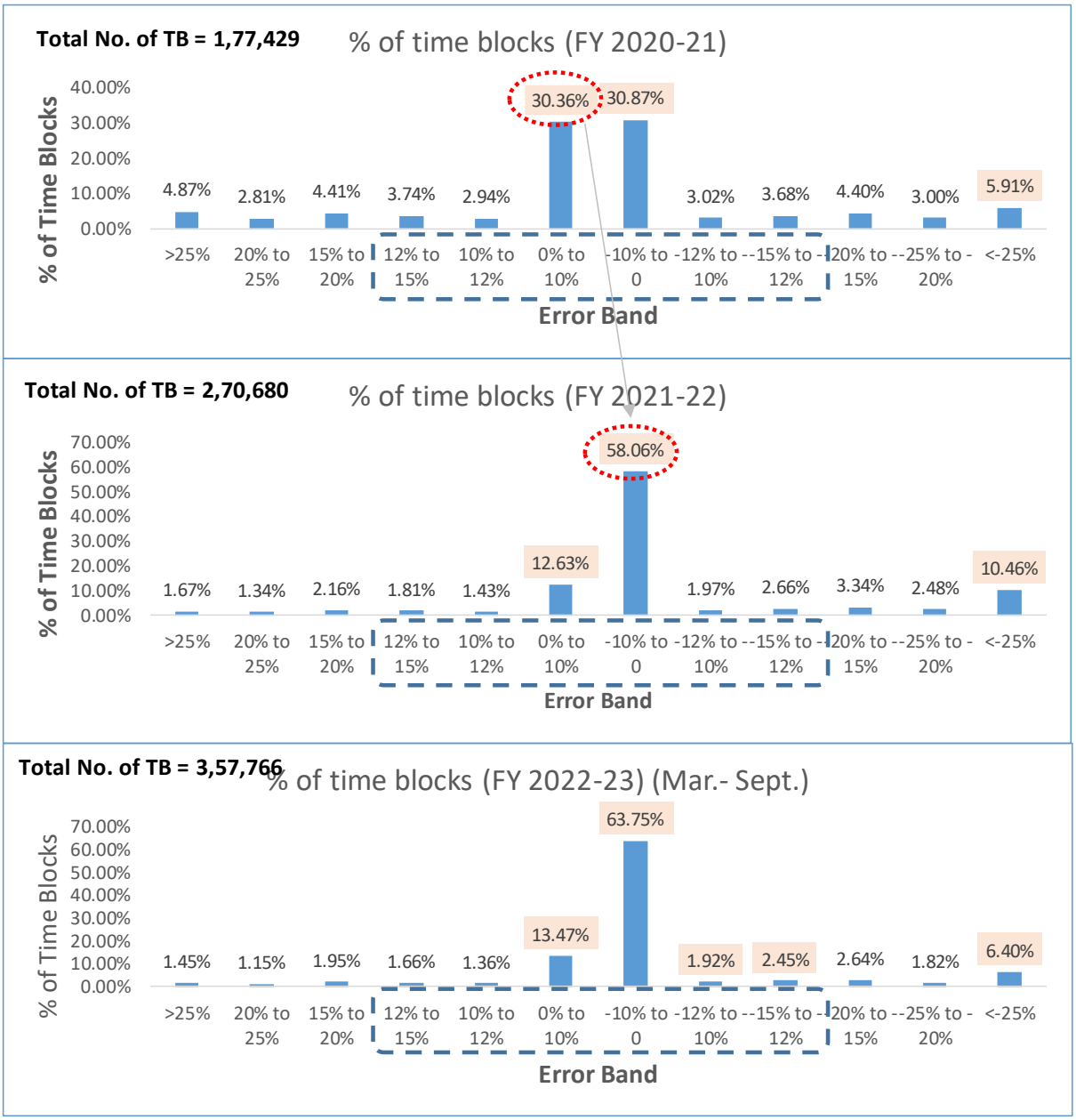
Table 22: Distribution of blocks in bands – Overall RE- Hybrid

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	4.66%	4.83%	4.39%
0 - ±25%	95.34%	95.17%	95.61%
0 - ±20%	92.30%	91.84%	92.06%
0 - ±15%	86.65%	**85.71%**	84.96%
0 - ±12%	77.84%	**70.03%**	74.08%
0 - ±10%	70.26%	**59.51%**	64.09%

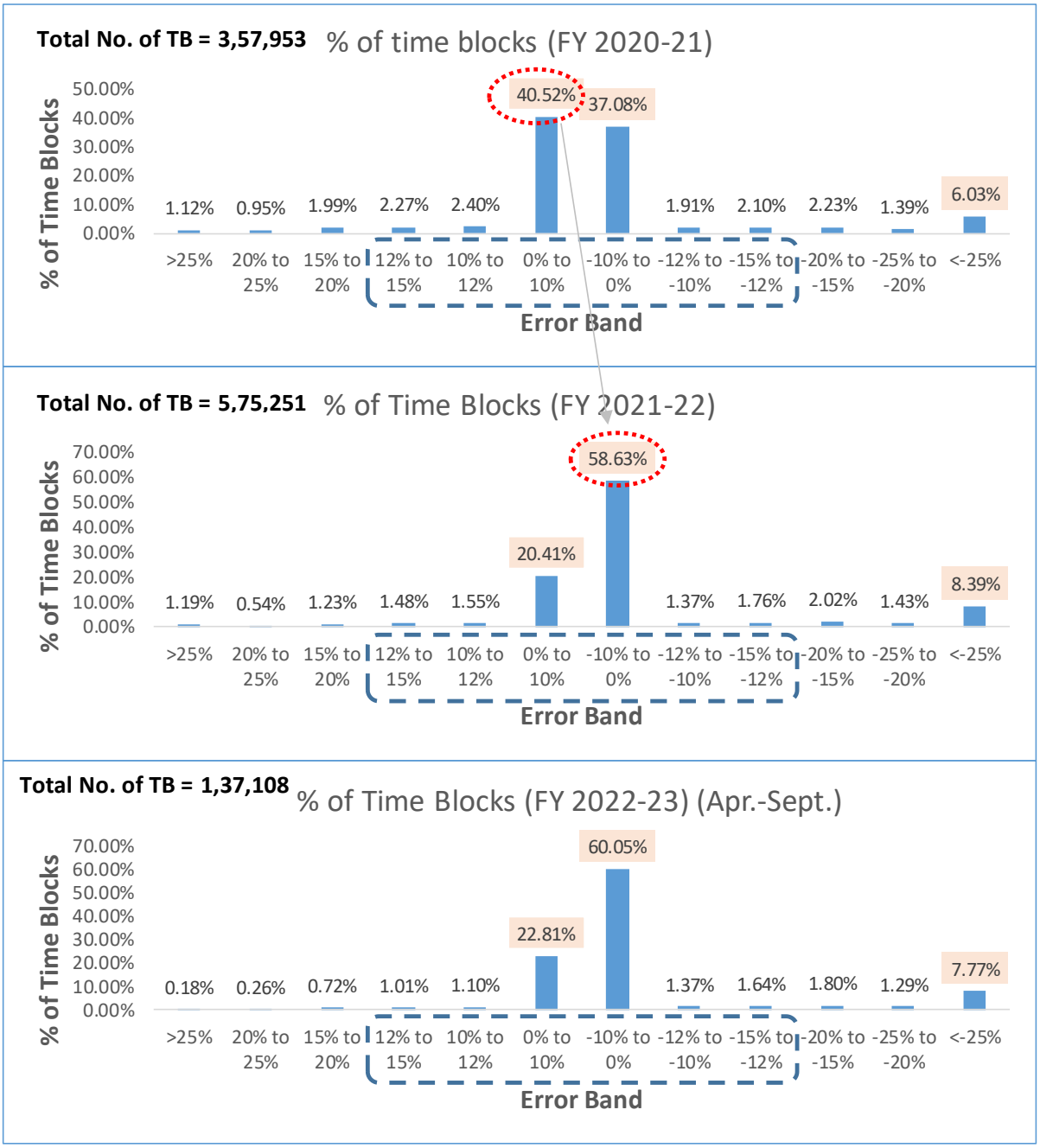
- The forecasting error is shifting to over forecasting with increasing concentrations in -12% to -15% range. 7% increase is observed in this bracket.

2. Overall analysis of RE sources –Season wise analysis – Monsoon & Non Monsoon Season (33 PSS) – Solar

Monsoon (June – Sept)



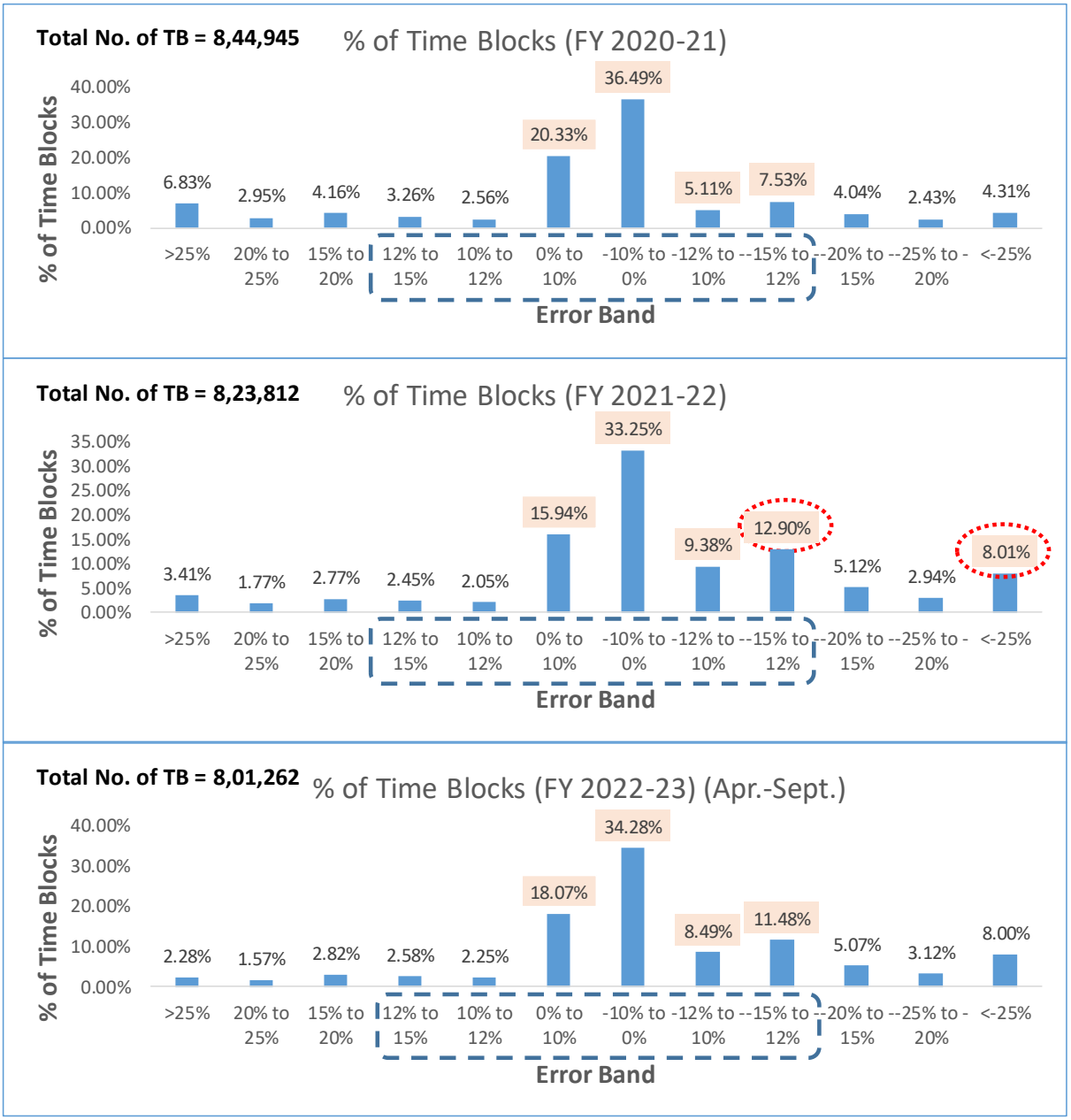
Non-Monsoon (Remaining Months)



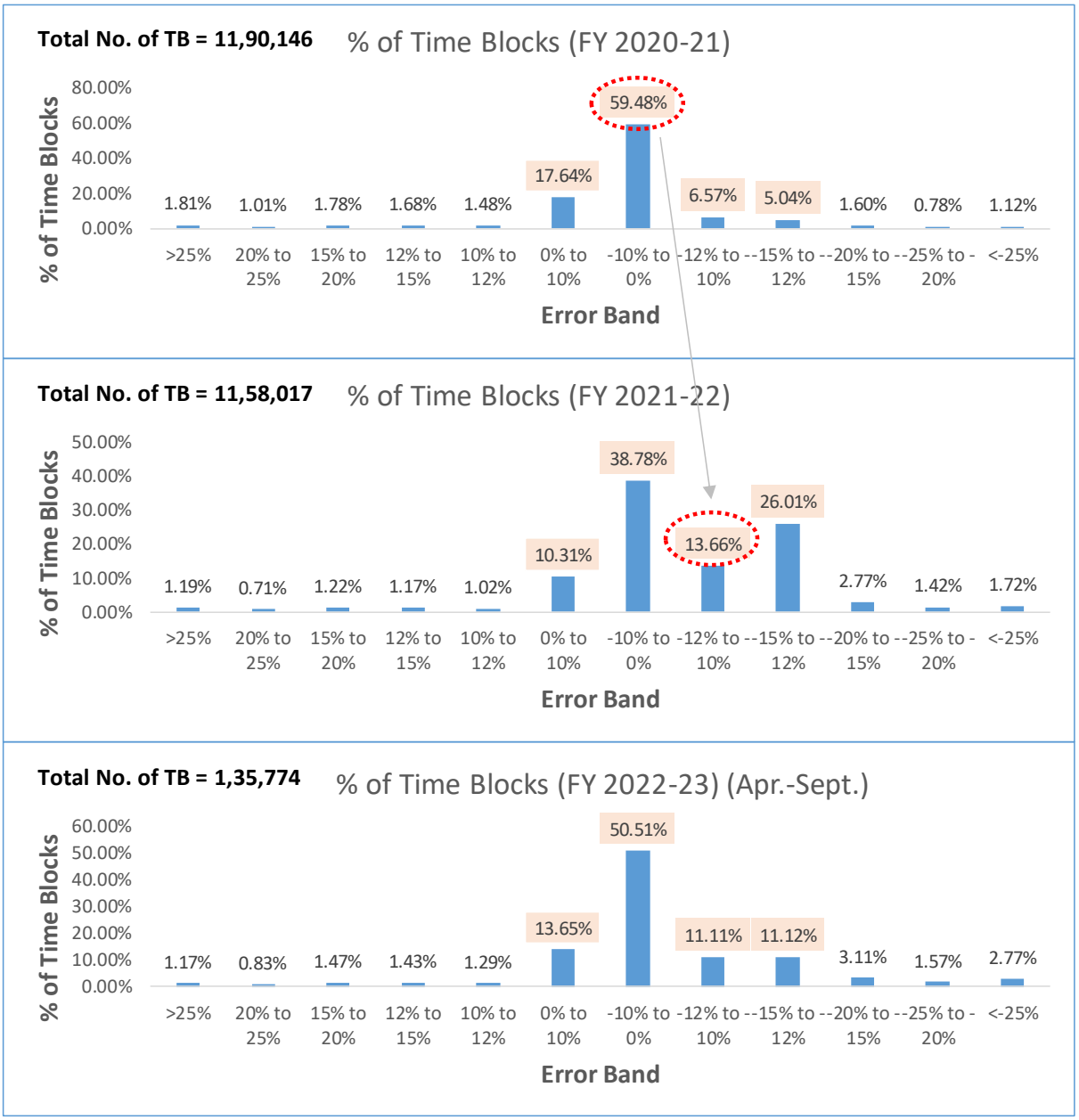
- Overall Solar forecasting has improved in both monsoon and non-monsoon periods even in 0 to + 10% bands.
- The concentration of blocks in the band between 0 to -10% has increased by 21.63% in FY 21-22 in non-monsoon season which is basically a shift from 0 to +10%.

3. Overall analysis of RE sources –Season wise analysis – Windy & Non Windy Season (59 PSS) – Wind

Windy (May – Sept)



Non-windy (Remaining Months)



- There is consistently increasing trend of over forecasting in both windy and non-windy seasons in the bands between -12% to -15%
- Absence of penalty in 0 to ± 15% leads to concentration in these limits

4. QCA wise analysis - Manikaran

a) Overall analysis (Solar (13) + Wind (39) + Hybrid (4) PSS)

The overall error for Manikaran [Solar (13 PSS) + Wind (39 PSS) + Hybrid (4)] has increased

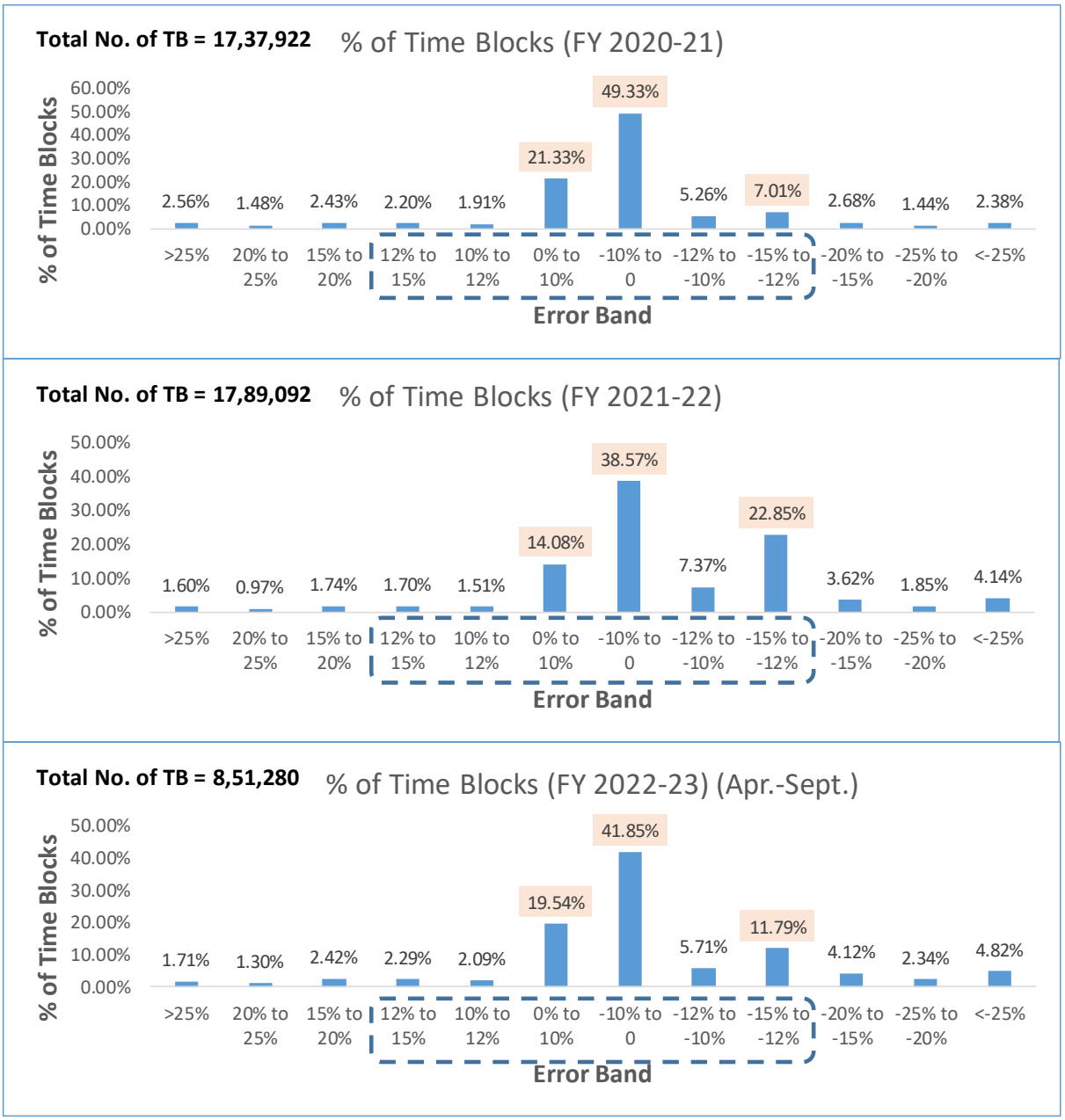


Table 23: Distribution of blocks in bands – Overall RE - Manikaran

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	4.94%	5.75%	6.53%
0 - ±25%	95.06%	94.25%	93.47%
0 - ±20%	92.15%	91.44%	89.83%
0 - ±15%	87.04%	86.07%	83.29%
0 - ±12%	77.83%	**61.53%**	69.21%
0 - ±10%	70.66%	**52.65%**	61.40%

- There is no improvement in sub 15% categories as the number of blocks in 0 - ±10% and 0 - ±12% have shown a decline.
- There is an abnormal concentration of entries in -12% to -15% band.

b) QCA wise analysis – Manikaran - Solar

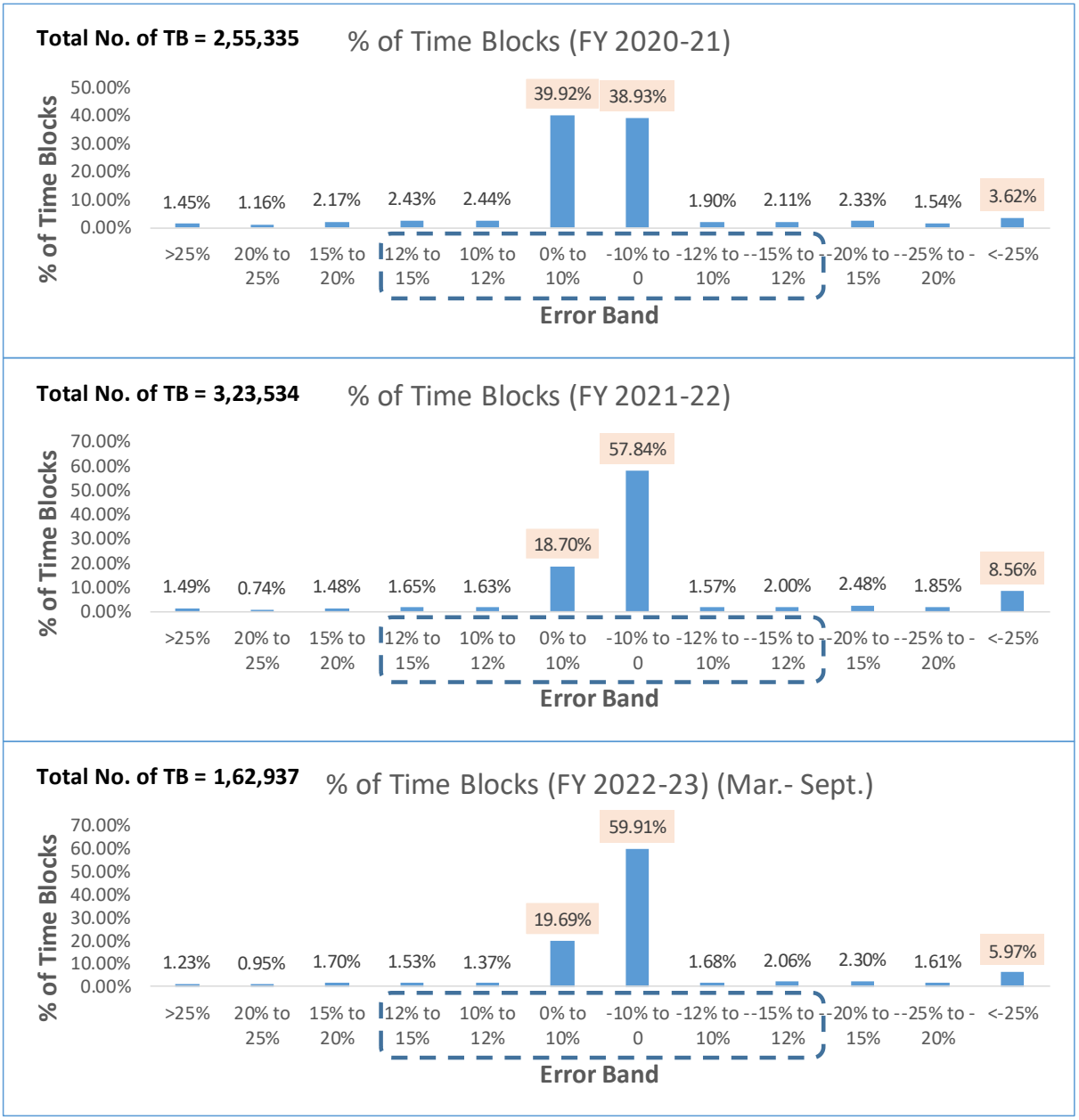


Table 24: Distribution of blocks in bands – Manikaran - Solar

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	5.08%	10.05%	7.20%
0 - ±25%	94.92%	89.95%	92.80%
0 - ±20%	92.23%	87.36%	90.24%
0 - ±15%	87.73%	83.40%	86.24%
0 - ±12%	83.20%	**79.75%**	82.66%
0 - ±10%	78.85%	**76.55%**	79.60%

- There is a shift in forecasting error in 0 to +10% of around 20% which has moved to 0 to -10% band signifying an over-forecasting trend.
- Unlike overall Solar, there is no improvement in 0 to ± 12% band in FY 21-22

c) QCA wise analysis – Manikaran Wind

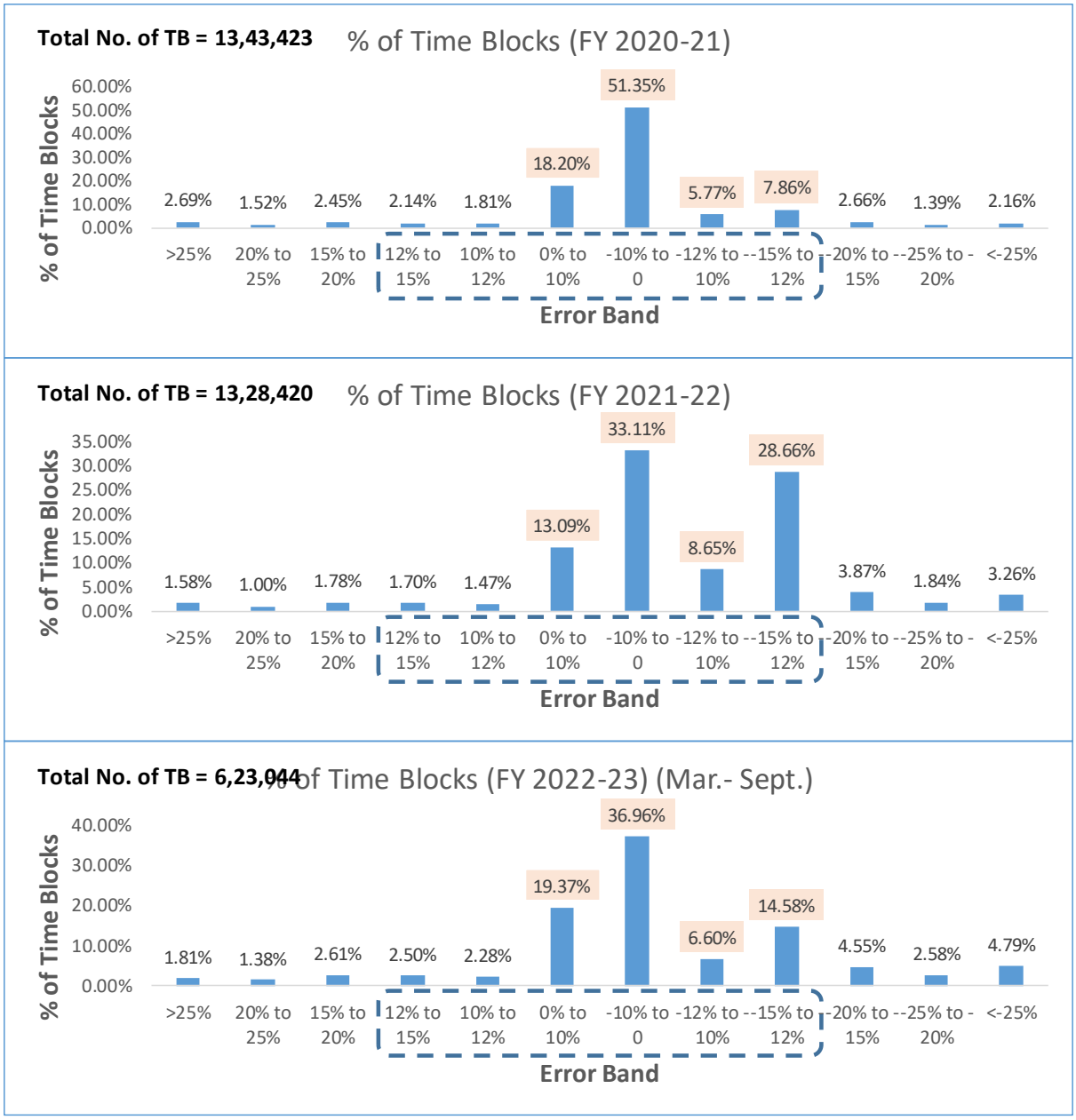


Table 25: Distribution of blocks in bands – Manikaran - Wind

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	4.85%	4.84%	6.60%
0 - ±25%	95.15%	95.16%	93.40%
0 - ±20%	92.24%	92.31%	89.44%
0 - ±15%	87.13%	86.67%	82.28%
0 - ±12%	77.13%	**56.32%**	65.20%
0 - ±10%	69.55%	**46.20%**	56.32%

- There is a massive reduction in blocks in bands 0 to ± 10% and an equivalent rise in blocks falling in the -12% to -15% band.
- The forecasting accuracy can be seen drastically reduced in the bands between 0 to ± 12% in FY 21-22
- Revising the bands will help bring in the required discipline in forecasting

d) QCA wise analysis – Manikaran - Hybrid

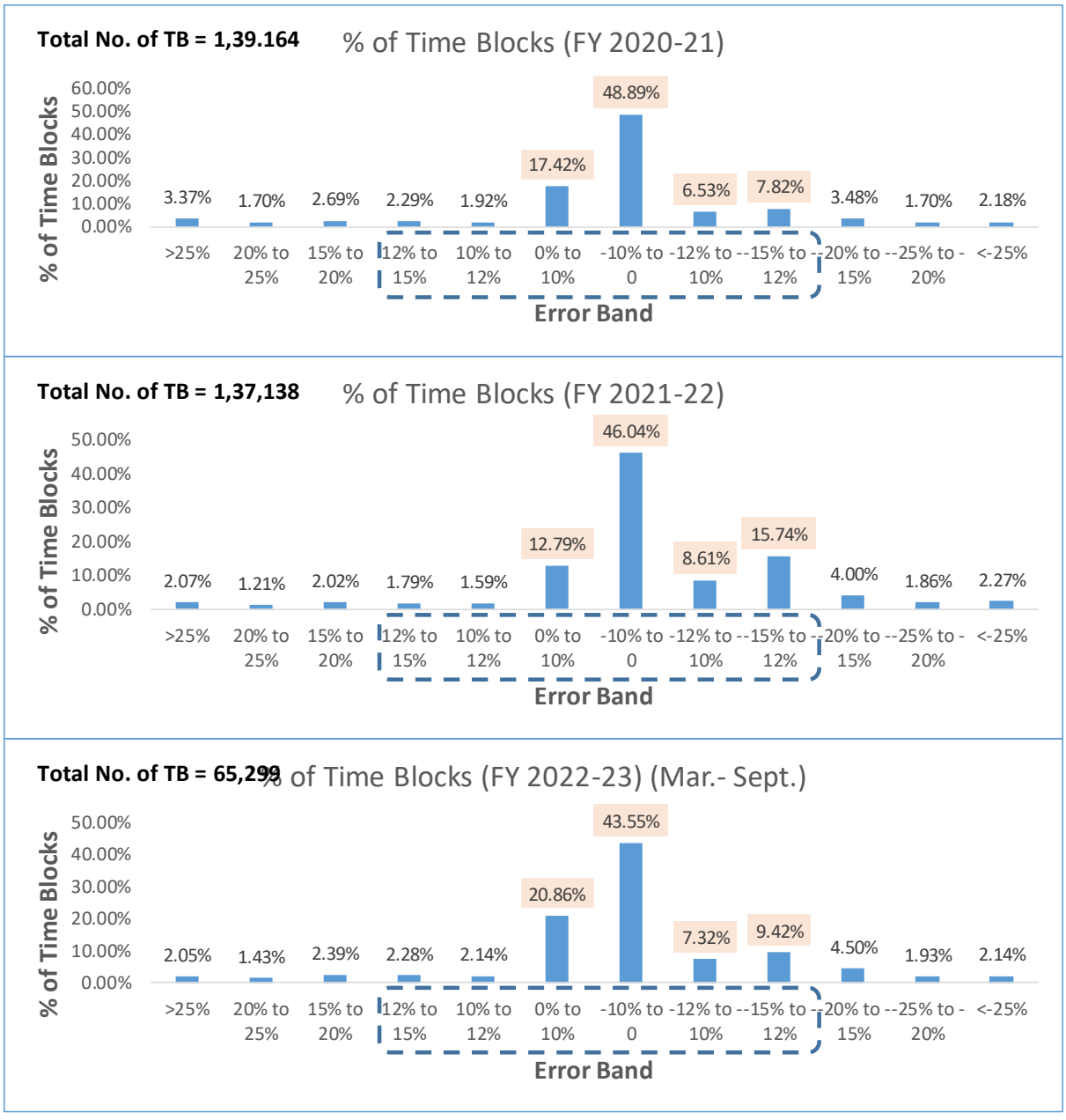


Table 26: Distribution of blocks in bands – Manikaran - Hybrid

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	5.55%	4.33%	4.19%
0 - ±25%	94.45%	95.67%	95.81%
0 - ±20%	91.04%	92.59%	92.45%
0 - ±15%	84.87%	86.57%	85.56%
0 - ±12%	74.77%	**69.03%**	73.87%
0 - ±10%	66.31%	**58.84%**	64.41%

- The forecasting error is shifting to over forecasting with increasing concentration in -12% to -15% range accounting for ~8% increase in FY 21-22

5. QCA wise analysis - REConnect

e) Overall analysis (Solar (17) + Wind (20) + Hybrid (1) PSS)

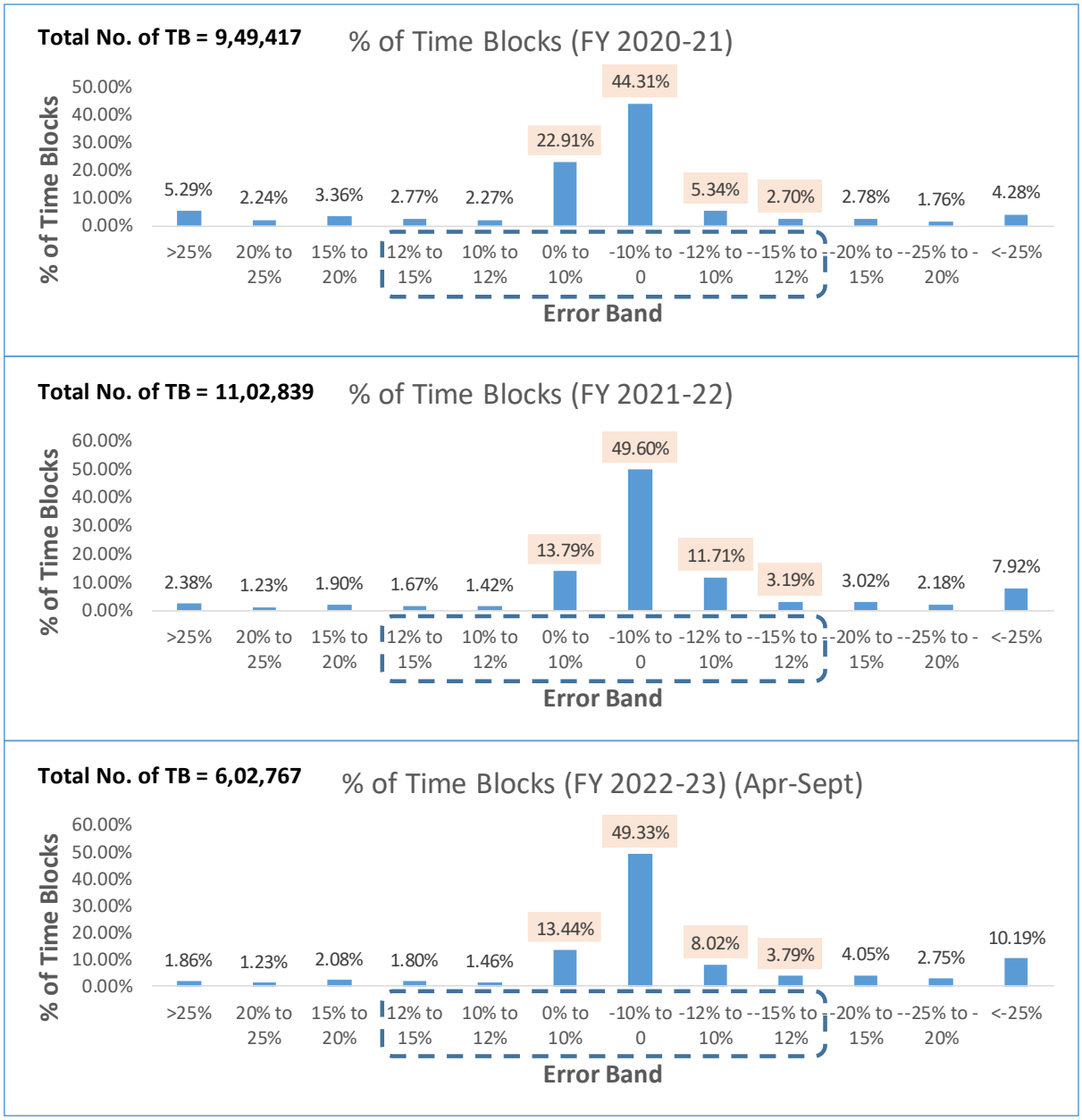


Table 27: Distribution of blocks in bands – Overall RE – REConnect

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	9.57%	10.30%	12.04%
0 - ±25%	90.43%	89.70%	87.96%
0 - ±20%	86.44%	86.30%	83.97%
0 - ±15%	80.30%	81.37%	77.84%
0 - ±12%	74.83%	76.52%	72.25%
0 - ±10%	67.22%	63.39%	62.77%

- The number of time blocks falling in 0 to ±15% have marginally improved from FY 20-21 to FY 21-22
- There is reversal in trend from under forecasting to over forecasting between FY 20-21 and FY 21-22 for deviation higher than 25%.

f) QCA wise analysis – REConnect – Solar

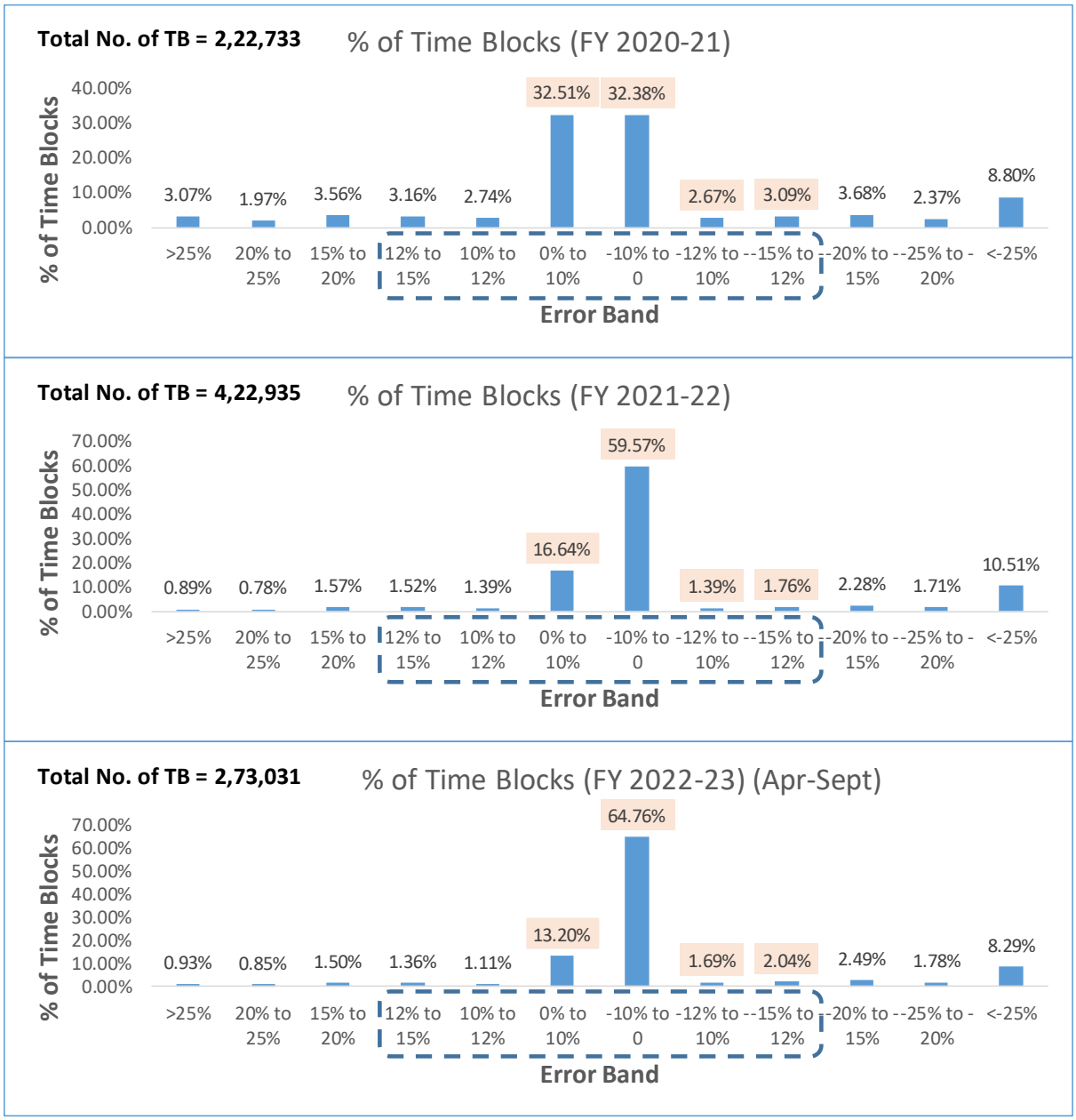


Table 28: Distribution of blocks in bands – REConnect - Solar

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	11.87%	11.40%	9.22%

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
0 - ±25%	88.13%	88.60%	90.78%
0 - ±20%	83.79%	86.12%	88.15%
0 - ±15%	76.55%	82.26%	84.16%
0 - ±12%	70.30%	78.98%	80.76%
0 - ±10%	64.89%	76.20%	77.96%

- There is significant increase in distribution of time block sin FY 21-22 for the band 0 to ± 12% and 0 to ± 15%
- There is an overall possibility for revising this band from (0 to ±15%) to (0 to ±10% / ±12%)

g) QCA wise analysis – REConnect - Wind

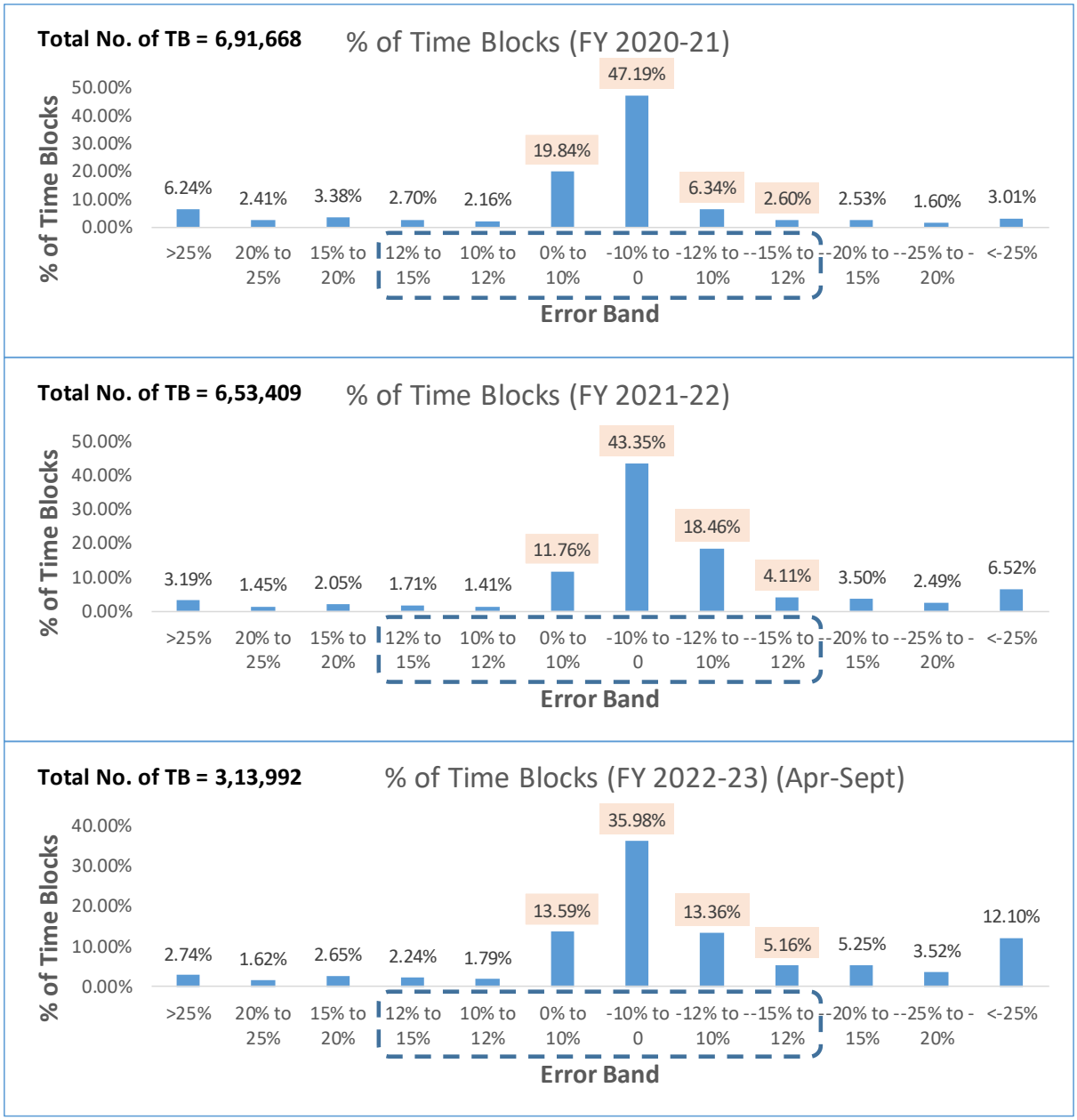


Table 29: Distribution of blocks in bands – REConnect - Wind

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	9.25%	9.71%	14.84%
0 - ±25%	90.75%	90.29%	85.16%
0 - ±20%	86.74%	86.35%	80.02%
0 - ±15%	80.83%	80.80%	72.12%
0 - ±12%	75.52%	74.98%	64.71%
0 - ±10%	67.03%	55.12%	49.56%

- The performance of QCA in 0 to ± 10% and 0 to ± 12% is better than overall average for entire Wind PSS in the State

h) QCA wise analysis – REConnect - Hybrid

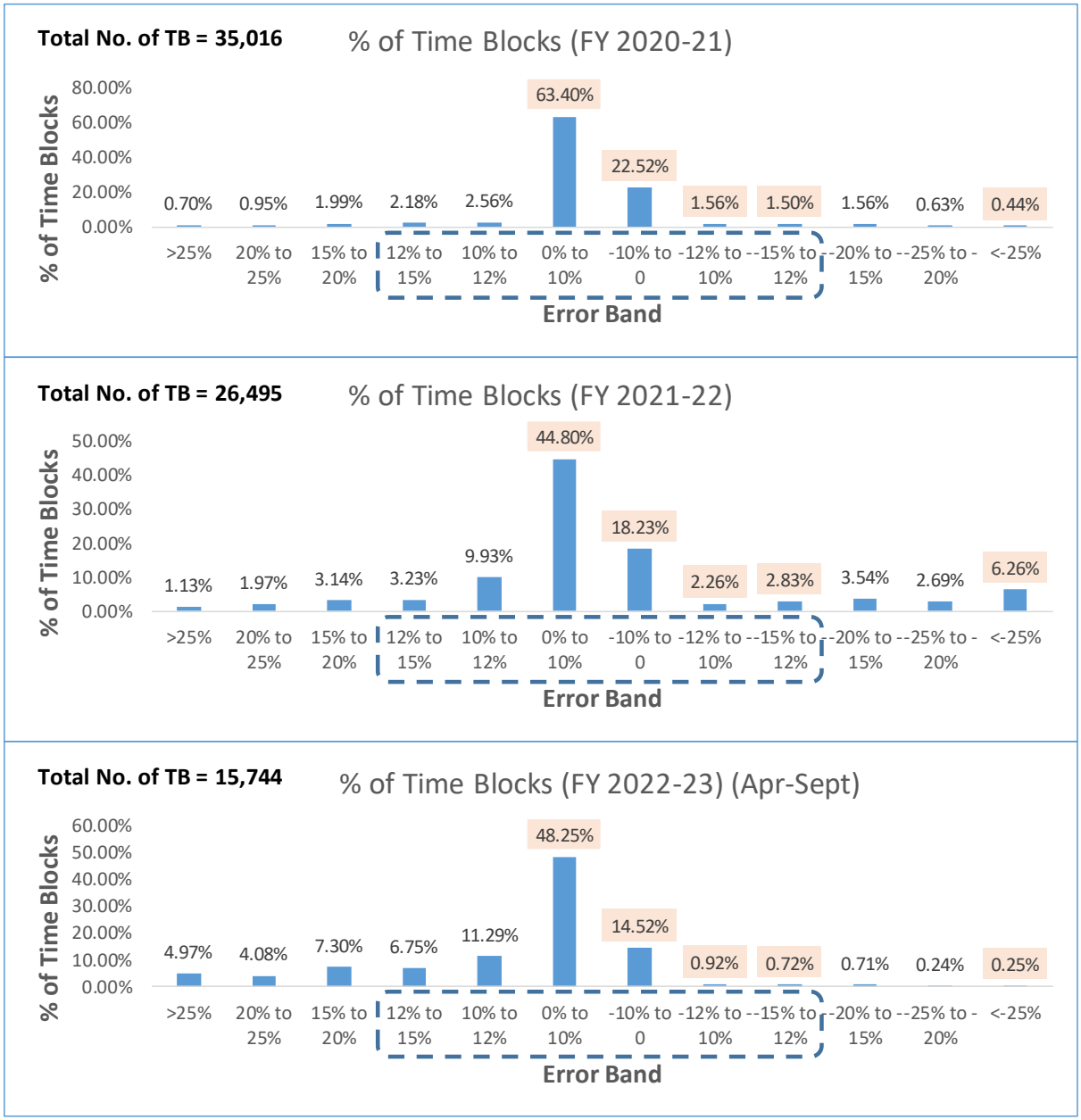


Table 30: Distribution of blocks in bands – REConnect - Hybrid

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
> ±25%	**1.14%**	**7.39%**	**5.22%**
0 - ±25%	98.86%	92.61%	94.78%

Bands	FY 20-21	FY 21-22	FY 22-23 (April- Sept)
0 - ±20%	97.28%	87.96%	90.46%
0 - ±15%	**93.73%**	**81.28%**	**82.45%**
0 - ±12%	90.04%	75.21%	74.98%
0 - ±10%	85.92%	63.03%	62.77%

- The forecasting error is shifting to over forecasting with increasing concentration in < - 25% range accounting for ~6% increase in FY 21-22
- The performance is lower than the overall RE Hybrid PSS in the State. However, the efficiency in forecasting is better than Manikaran for 0 to ±12% bands

e) Overall Comparative Seasonal Performance for Wind - (REConnnect & Manikaran)

Windy (REconnect)			
Bands	**FY 20-21**	**FY 21-22**	**FY 22-23**
> ±25%	15.46%	17.53%	16.61%
0 - ±25%	84.54%	82.47%	83.39%
0 - ±20%	78.35%	77.33%	77.73%
0 - ±15%	69.83%	70.19%	69.20%
0 - ±12%	63.12%	64.10%	61.41%
0 - ±10%	57.09%	47.91%	47.01%

Non-Windy (REconnect)			
Bands	**FY 20-21**	**FY 21-22**	**FY 22-23**
> ±25%	4.82%	4.13%	4.53%
0 - ±25%	95.18%	95.87%	95.47%
0 - ±20%	92.74%	92.78%	93.32%
0 - ±15%	88.69%	88.36%	89.10%
0 - ±12%	84.39%	82.73%	83.96%
0 - ±10%	74.13%	60.25%	64.45%

Windy (Manikaran)			
Bands	**FY 20-21**	**FY 21-22**	**FY 22-23**
> ±25%	8.91%	8.41%	7.10%
0 - ±25%	91.09%	91.59%	92.90%
0 - ±20%	86.13%	87.08%	88.70%
0 - ±15%	78.09%	78.83%	81.13%
0 - ±12%	65.19%	**58.92%**	63.93%
0 - ±10%	56.68%	**49.82%**	55.03%

Non-Windy (Manikaran)			
Bands	**FY 20-21**	**FY 21-22**	**FY 22-23**
> ±25%	1.97%	2.31%	3.62%
0 - ±25%	98.03%	97.69%	96.38%
0 - ±20%	96.57%	96.03%	93.85%
0 - ±15%	93.53%	92.25%	89.08%
0 - ±12%	85.57%	**54.47%**	72.74%
0 - ±10%	78.66%	**43.62%**	64.00%

- The overall performance of REConnect in 0 to ± 12% band is better than Manikaran

f) Overall Comparative Seasonal Performance for Solar - (REConnnect & Manikaran)

Monsoon (REconnect)			
Bands	FY 20-21	FY 21-22	FY 22-23
> ±25%	12.50%	13.89%	9.43%
0 - ±25%	87.50%	86.11%	90.57%
0 - ±20%	81.31%	82.47%	87.59%
0 - ±15%	72.14%	77.17%	83.13%
0 - ±12%	64.68%	73.08%	79.46%
0 - ±10%	58.62%	69.93%	76.47%

Non-Monsoon (REconnect)			
Bands	FY 20-21	FY 21-22	FY 22-23
> ±25%	11.54%	10.29%	8.69%
0 - ±25%	88.46%	89.71%	91.31%
0 - ±20%	85.10%	87.74%	89.62%
0 - ±15%	78.89%	84.53%	86.85%
0 - ±12%	73.28%	81.60%	84.18%
0 - ±10%	68.21%	78.99%	81.86%

Monsoon (Manikaran)			
Bands	FY 20-21	FY 21-22	FY 22-23
> ±25%	7.88%	10.83%	6.39%
0 - ±25%	92.12%	89.17%	93.61%
0 - ±20%	86.87%	85.25%	90.69%
0 - ±15%	78.48%	79.71%	86.04%
0 - ±12%	71.27%	**75.27%**	81.99%
0 - ±10%	65.41%	**71.92%**	78.66%

Non-Monsoon (Manikaran)			
Bands	FY 20-21	FY 21-22	FY 22-23
> ±25%	3.76%	9.63%	9.38%
0 - ±25%	96.24%	90.37%	90.62%
0 - ±20%	94.73%	88.50%	89.05%
0 - ±15%	92.05%	85.41%	86.78%
0 - ±12%	88.77%	82.18%	84.45%
0 - ±10%	85.13%	79.06%	82.14%

- There is consistent improvement in forecasting for both QCAs, except in case of Manikaran which shows declining results in FY 22 for non-monsoon period
- The overall industry performance in both seasons in Manikaran were significantly higher (in FY 21) than the currently improved performance by REConnect
- Hence, narrowing the band to 0 to ±10%/ ±12% can be considered from the data analysis of both Manikaran as well as REConnect

Further, PSS capacity-wise analysis has also been carried out.

B. Sample Analysis

1) In the absence of data of schedule and actual generation of individual wind and solar generator having PPA with Discom for the period from 1 April 2021 to 31 March 2022, sample/illustrative analysis has been carried out.
2) Under sample/illustrative analysis,

a. Net transaction cost as per the existing MERC F&S Regulations and CERC DSM Regulation, 2023 has been carried out.

b. Net transaction cost means (payment to the generator by the procurer + RE DSM Charges)

i. Payment to the generator by the procurer @ actual generation, as per the existing MERC F&S Regulations.

ii. Payment to generator by procurer @ schedule generation, as per CERC DSM Regulations.

iii. RE DSM charges considered as per respective MERC and CERC regulations.

c. Analysis has been carried out for over-injection and under-injection separately.

3) For the purpose of carrying out sample/illustrative analysis following assumptions are made:

Available Capacity (Units)	150 (For all cases)					
Schedule generation (Units)	100 (For all cases)					
Actual generation (Units)	105	110	120	125	140	155
% Deviation= (Actual – Sch.)/AvC	3.33	6.67	13.33	16.67	26.67	36.67

Analysis has been carried out for Block /PPA rate of Rs. 3/unit and Rs. 5/unit

Over Injection:

Block/ PPA Rate @ Rs.3/unit

MERC Regulations				
% Deviation	Error Bands	@Actual Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -15%	315	0	315
6.67		330	0	330
13.33		360	0	360
16.67	15% - 25%	375	1	374
26.67	25% - 35%	420	10	410
36.67	> 35%	465	26	439

CERC 2023 Reg. - Solar				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -10%	300	15	315
6.67		300	30	330
13.33	10% - 15%	300	59	359
16.67	> 15%	300	65	365
26.67		300	65	365
36.67		300	65	365

CERC 2023 Reg. - Wind				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -15%	300	15	315
6.67		300	30	330
13.33		300	60	360
16.67	15% - 20%	300	74	374
26.67	> 20%	300	88	388
36.67		300	88	388

Block/ PPA Rate @ Rs.5/unit

MERC Regulations				
% Deviation	Error Bands	@Actual Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -15%	525	0	525
6.67		550	0	550
13.33		600	0	600
16.67	15% - 25%	625	1	624
26.67	25% - 35%	700	10	690
36.67	> 35%	775	26	749

CERC 2023 Reg. - Solar				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -10%	500	25	525
6.67		500	50	550
13.33	10% - 15%	500	98	598
16.67	> 15%	500	109	609
26.67		500	109	609
36.67		500	109	609

CERC 2023 Reg. - Wind				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
3.33	0% -15%	500	25	525
6.67		500	50	550
13.33		500	100	600
16.67	15% - 20%	500	124	624
26.67	> 20%	500	146	646
36.67		500	146	646

Over-injection	As per sample analysis • The MERC F&S Regulations are favorable to the RE generators when Error band is > 15%, particularly solar. • The CERC DSM Regulations reduces the rate of over-injection which means generators have less incentive to over-inject as compared to the MERC F&S Regulations

	• Higher the PPA rate, higher the benefits to generators

Under Injection:

Block/ PPA Rate @ Rs.3/unit

MERC Regulations				
% Deviation	Error Bands	@Actual Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -15%	285	0	285
-6.67		270	0	270
-13.33		240	0	240
-20.00	-15% to -25%	210	4	206
-26.67	-25% to - 35%	180	10	170
-36.67	< -35%	135	26	109

CERC 2023 Reg. - Solar				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -10%	300	15	285
-6.67		300	30	270
-13.33	-10% to - 15%	300	62	239
-20.00	< -15%	300	104	197
-26.67		300	149	152
-36.67		300	216	84

CERC 2023 Reg. - Wind				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -15%	300	15	285
-6.67		300	30	270
-13.33		300	60	240
-20.00	-15% to -20%	300	92	208
-26.67	< -20%	300	137	163
-36.67		300	205	95

Block/ PPA Rate @ Rs.5/unit

MERC Regulations				
% Deviation	Error Bands	@Actual Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -15%	475	0	475
-6.67		450	0	450
-13.33		400	0	400
-20.00	-15% to -25%	350	4	346
-26.67	-25% to - 35%	300	10	290
-36.67	< -35%	225	26	199

CERC 2023 Reg. - Solar				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -10%	500	25	475
-6.67		500	50	450
-13.33	-10% to - 15%	500	103	398
-20.00	< -15%	500	173	328
-26.67		500	248	253
-36.67		500	360	140

CERC 2023 Reg. - Wind				
% Deviation	Error Bands	@ Sch. Gen.(Rs)	DSM (Rs.)	(Rs.) Net transaction
-3.33	0% to -15%	500	25	475
-6.67		500	50	450
-13.33		500	100	400
-20.00	-15% to -20%	500	154	346
-26.67	< -20%	500	229	271
-36.67		500	341	159

Under-injection	As per sample analysis, the MERC F&S Regulations are favorable to the RE generators when Error band is <-15%.