MINUTES OF FIFTH MEETING OF "STANDING TECHNICAL COMMITTEE FOR IMPLEMENTATION OF FRAMEOWORK ON RENEWABLE AT STATE LEVEL-GROUP-I & II
(Through Video Conference)

Day and Date: Friday, 16th April 2021

List of Participants: Annexure-1(Enclosed)

The Fifth meeting of the FOR Standing Technical Committee was held on 16th April 2021 under the Chairmanship of Shri I. S. Jha, Member CERC. At the outset, the Chairperson welcomed all the participants and special invitees including the new members of the group. He gave a brief update on the terms of reference of the Group-I and Group-II of the Committee and brief background of the Agenda items to be deliberated in the meeting. Thereafter agenda items were taken up for consideration.

Agenda Item No.1: Status of implementation of Regulations on Forecasting, Scheduling and Deviation Settlement

2. Chief (RA), CERC briefly explained the background of the Forecasting, Scheduling (F &S) and Deviation Settlement Mechanism (DSM) for Solar and Wind generators at the interstate level and the model Regulations for state level. He also informed that FOR entrusted Technical Committee to review and take regular update on implementation of the model F&S and DSM framework at State level.

3. Representative of the consultant to the Standing Technical Committee presented status update of implementation, Forecasting & Scheduling and DSM Regulations for various States (**Annexure-II**).

4. The representative apprised the Committee that 20 states have notified Regulations for Forecasting and Scheduling and 15 States are in the process of preparing the Regulations for their respective States. It was also informed that 13 States have notified DSM Regulations

and Telangana, West Bengal and Odisha have published draft DSM Regulations, while remaining 20 states are yet to initiate or in drafting stage.

5. Chairperson, HPERC informed the Committee that they will soon initiate the regulatory process to introduce Forecasting & Scheduling and DSM Regulations applicable in the state of Himachal Pradesh. Chairperson, KSERC informed the Committee that the draft Forecasting, Scheduling and DSM Regulations are in the final stages and shall be notified shortly.

6. Chairperson, UPERC apprised the Committee that the Forecasting, Scheduling Regulations have already been notified for the state of Uttar Pradesh and the same has the provision for deviation settlement mechanism for wind and solar generators. Chairperson, WBERC updated the Committee that the draft DSM Regulations have been finalized and shall be notified soon.

Action Point(s)/ Decision(s):

The committee noted the status on implementation of Regulations on Forecasting, Scheduling and Deviation Settlement Mechanism. The Consultant was advised to update the status of F & S and DSM Regulations as deliberated in the meeting.

Agenda Item No. 2: Status of implementation of SAMAST:

7. Representative of the consultant to the Standing Technical Committee briefly explained the background of Scheduling, Metering, Accounting and Settlement of Transactions (SAMAST) and presented the status update on SAMAST implementation across different States. (**Annexure-II**).

8. The Committee was also apprised on State-wise developments of implementation of SAMAST. It was informed that DPRs for 18 States for SAMAST have been approved and DPRs for 5 States are under scrutiny. The DPRs for 13 States are under progress.

9. Chairperson, KSERC and Member, BERC raised concerns over the delay in the remittance of SAMAST funds. Member, BERC emphasized that the DPR proposal was

given before the tendering process and the DPR amount was approved after the tender was awarded.

10. CMD, POSOCO updated the status of approval of SAMAST proposals under PSDF funding (**Annexure-III**). He informed that Gujarat and Uttarakhand have already executed the projects under their own funds and grants have been sanctioned under PSDF for 18 proposals received from the States. He also informed that the sanction of PSDF Grant was revoked for the state of Rajasthan and Bihar as they have awarded the contracts before approval of project through PSDF Scheme.

11. Shri A.S. Bakshi, special invitee emphasized that there is a need to review the terms of PSDF grants and necessary assistance may be given to the remaining States and UTs in preparation of their SAMAST DPR.

Action Point (s) / Decision(s):

The Committee noted the status of implementation of SAMAST and decided that the PSDF Committee be requested to expedite disbursement of fund for SAMAST implementation. It was also decided to get an update on SAMAST implementation from the States which are not part of the Standing Technical Committee.

Agenda Item No.3: Update on SANTULAN Report and RPO Web-tool

Update on SANTULAN Report

12. Sr. General Manager, POSOCO presented an update on the Intrastate Reserves and Ancillary Services for Balancing (SANTULAN). He apprised the Committee that for implementation of Reserves there is a need of regulatory intervention and guidance from Regulatory Commissions for notification of norms, settlement systems for Reserves, procedure for declaration of capacity, computation of area control error, dispatch of reserves and incentives mechanism. He highlighted the key recommendations of the sub-group read as under:

i. Active balancing along with passive balancing.
ii. Generation margin as Reserves to be recognised
iii. Distributed primary reserves and dimensioning of secondary and tertiary reserves to be done.
iv. Computation monitoring of Area Control Error.
v. Information on scheduling limits
vi. Unit commitment to ensure reserves
vii. Reserve computation and monitoring of reserves in real time.
viii. Reserve dispatch and Gate closure for reserve dispatch.
ix. Honour transmission constraints along with transmission charges and losses administration.
x. Regulation on reserves and ancillary services.

13. Chief (RA), CERC highlighted that there is a need of maintaining reserves at State level to manage the frequency fluctuation, load variations and forecast errors. He highlighted the methods suggested by the sub-group for estimation of reserves requirement and its benefit to the States. He remarked that reserves at State level are also required to manage area control error. For this purpose, there is a need to provide regulatory framework for Ancillary Service at State level as recommended in the SANTULAN report.

The Committee noted the suggestions.

Update on RPO Web Tool

14. Representative of the Consultant to the Standing Technical Committee appraised the Committee on the status update on RPO web tool. It was informed that for monitoring compliance of Renewable Purchase Obligation (RPO) by the states, MNRE in association with TERI has developed a web-tool which provides a centralized platform for update on the RPO compliance. The Committee was updated that the tool is currently available and operational but some of the details which were proposed as the part of the tool especially the compliance part are not currently functional.

15. Shri A.S. Bakshi, informed the Committee that RPO Web-Tool was envisaged for State Nodal Agencies to monitor the compliance of RPO targets by obligated entities. He

further informed that there were multiple such tools being developed by States to monitor their RPO compliance and emphasized the need for common tool at Central level to compile RPO Compliance related data on real time basis.

16. The Committee discussed the RPO compliance. It was opined by some Members that SERCs have entrusted RPO compliance to the State Nodal Agency and updates on RPO compliance are also provided in the Tariff Order separately. Any central agency compiling the RPO compliance data may get updates from the respective State Nodal Agency and tariff orders.

Action Point(s) / Decision(s):

The technical committee appreciated the presentation on Reserves and Ancillary Services at State level and noted status update on RPO Web Tool.

17. The remaining agenda item couldn't be taken due to lack of time and the Committee decided to take up the same in the next meeting.

18. The meeting ended with a vote of thanks to the Chair.

*****

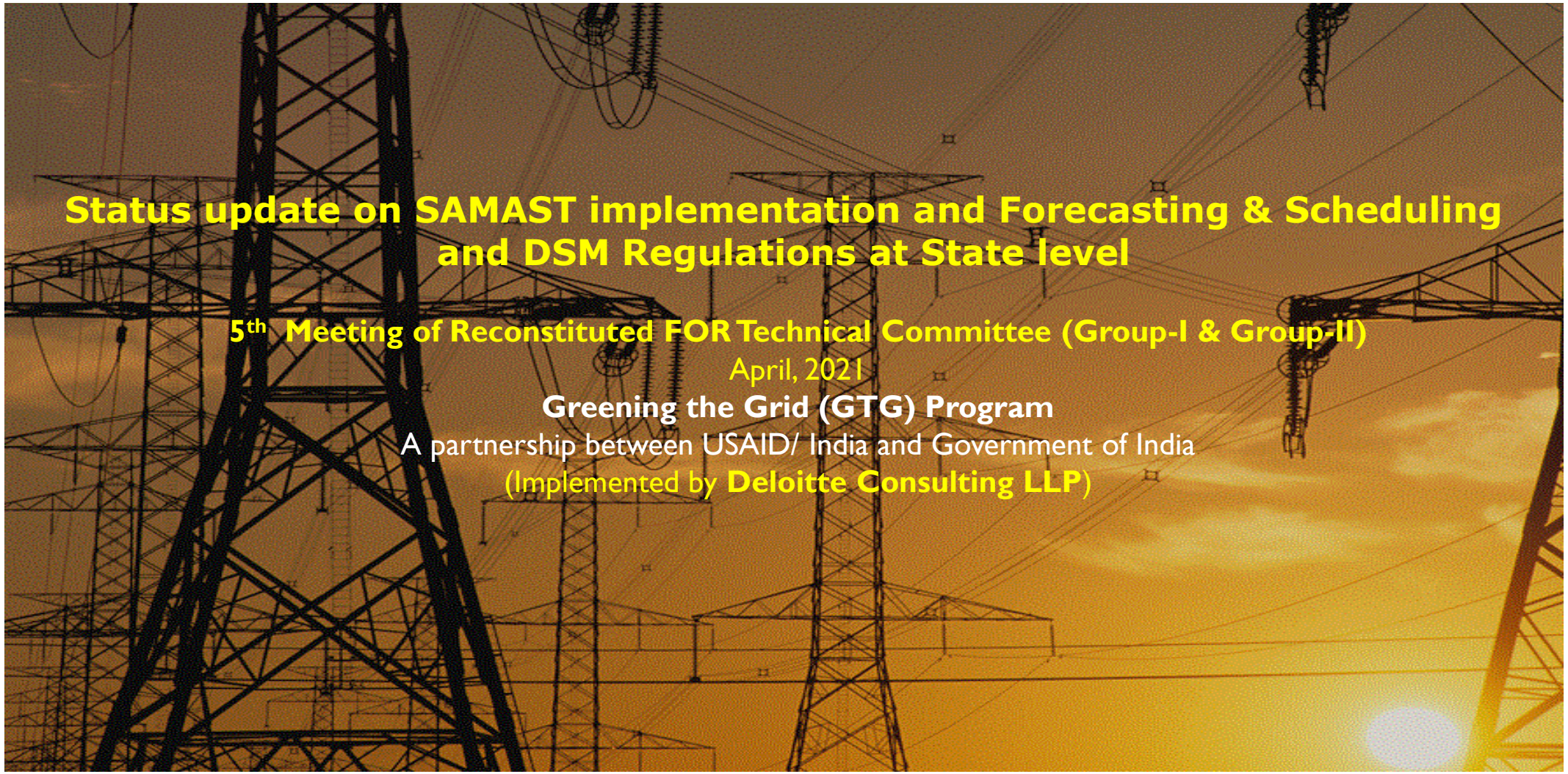
ANNEXURE – I

LIST OF PARTICIPANTS ATTENDED THE FIFTH MEETING OF RECONSTITUTED TECHNICAL COMMITTEE (COMBIINED GROUP- I & II) HELD ON 16.04.2021.

S. NO.	NAME & DESIGNATON	ORGANIZATION
01.	Shri I.S. Jha, Member	CERC
02.	Shri Preman Dinaraj, Chairperson	KSERC
03.	Shri Raj Pratap Singh, Chairperson	UPERC
04.	Shri M. Chandrasekar, Chairperson	TNERC
05.	Shri D.K. Sharma, Chairperson	HPERC
06.	Shri A.S. Bakshi, Former Member	CERC
07.	Shri R.K. Choudhary, Member	BERC
08.	Ms. Anjuli Chandra, Member	PSERC
09.	Shri Durgadas Goswami, Member	WBERC
10.	Shri H.M. Manjunatha, Member	KERC
11.	Shri S.N.Kalita, Member	AERC
12.	Shri Thakur Rama Singh, Member	APERC
13.	Shri KVS Baba, Chairman	POSOCO
14.	Dr. S.K. Chatterjee, Chief (RA)	CERC
15.	Shri Vijay Menghani, Chief (Engg.)	CERC
16.	Shri Sameer Saxena, Chief General Manager	POSOCO
17.	Ms. Rashmi Nair, Dy. Chief (RA)	CERC
18.	Shri Ravindra Kadam, Advisor (RE)	CERC
19	Shri Siddhant Raj Singh, RA	CERC

20	Shri Anish Mandal	Deloitte/GTG-RISE
21	Ms Rashmi Gupta	Deloitte
22	Shri Nirmal Shaju	Deloitte
23	Shri Kirtan Patel	Deloitte

Annexure- II



Status update on SAMAST implementation and Forecasting & Scheduling and DSM Regulations at State level

5th Meeting of Reconstituted FOR Technical Committee (Group-I & Group-II)

April, 2021

Greening the Grid (GTG) Program

A partnership between USAID/ India and Government of India

(Implemented by **Deloitte Consulting LLP**)

Context (1/2)

Re-constitution of Standing Technical Committee of Forum of Regulators

- A Technical Committee was constituted under the chairmanship of Member, CERC on 18.11.2015 for implementation of Framework on Renewables at State level.
- During 66th meeting of the FOR it was decided that "the standing nature of the Technical Committee would imply that the Committee always be headed by the Technical Member of CERC. But, the members of the Committee would change as per the subject(s) under consideration, so as to ensure representation of all States by rotation.
- In pursuance of the above decision, the Competent Authority in FOR has reconstituted the Standing Technical Committee of the Forum of Regulators (FOR) as under:-

Group - I: Renewable Energy (RE) integration and related matters.
The composition of the Group is as under:-

Shri I. S. Jha, Member, CERC	Chairman
Chairperson/ Member of GERC (Gujarat)	Member
Chairperson / Member of MERC (Maharashtra)	Member
Chairperson / Member of TNERC (Tamil Nadu)	Member
Chairperson / Member of KERC (Karnataka)	Member
Chairperson / Member of RERC (Rajasthan)	Member
Chairperson / Member of APERC(Andhra Pradesh)	Member
Chairperson / Member of HPERC(Himachal Pradesh)	Member
Chairman & Managing Director, POSOCO	Member
Head of Regulatory Affairs Division, CERC	Member Secretary

Special Invitee: Head of Engineering Division, CERC
The committee may co-opt any other member/expert as deemed fit.

Terms of Reference for Group -I

i. Deployment and implementation of framework on Forecasting, Scheduling and Deviation settlement of Wind and solar generating stations at the State Level.
ii. Evolve a framework for Ancillary Services and Reserves at the State Level.
iii. Implementation of Automatic Generation Control (AGC) and Primary Control within the States.

Context (2/2)

Group - II: Implementation of ABT Framework at State Level
The composition of the Group is as under:-

Shri I. S. Jha, Member, CERC	Chairman
Chairperson/ Member of PSERC (Punjab)	Member
Chairperson / Member of UPERC (Uttar Pradesh)	Member
Chairperson / Member of BERC (Bihar)	Member
Chairperson / Member of WBERC (West Bengal)	Member
Chairperson / Member of KSERC (Kerala)	Member
Chairperson / Member of AERC(Assam)	Member
Chairman & Managing Director, POSOCO	Member
Head of Regulatory Affairs Division, CERC	Member
	Secretary

Special Invitee: Head of Engineering Division, CERC
The committee may co-opt any other member/expert as deemed fit.

Terms of Reference for Group -II

i. Introduction/Implementation of the Availability Based Tariff (ABT) Framework at the State Level as mandated in the National Electricity Policy and Tariff Policy.

- The Standing Technical Committee shall provide periodic report to the FOR and may co-opt any other member, as deemed fit.
- 1st meeting of both the Groups of Re-constituted FOR Technical Committee was scheduled on 1st July, 2019.
- 2nd meeting of Group-I of Re-constituted FOR Technical Committee was scheduled on 23rd August, 2019.
- 3rd meeting of both the Groups of Re-constituted FOR Technical Committee was scheduled on 3rd January, 2020
- 4th meeting of both the Groups of Re-constituted FOR Technical Committee was scheduled on 3rd March, 2020

Contents

Model Regulations of Forum of Regulators (FOR) for States

- Forum of Regulators (FOR), published the **Model Regulations for Forecasting, Scheduling and Deviation Settlement** for Wind and Solar Generators for States in 2015.
- FOR entrusted the Responsibility on the **FOR Technical Committee to guide** the States for preparing their Regulations for Forecasting, Scheduling and DSM framework in line with Model Regulations of FOR.
- **United States Agency for International Development (USAID)** along with its contractor Deloitte is providing technical assistance to the Technical Committee of FOR through **its Greening the Grid (GtG) Program under Renewable Integration and Sustainable Energy (RISE)** initiative for assisting the States in preparation of said Regulations for their States.
- Subsequently, FOR also published **Model Regulations for introducing Deviation Settlement Mechanism for States** for Buyers and Sellers.

Implementation of F&S at State level of Group-I states (as on 7th April 2021)

Sr.	State	Notification of F&S Regulations	Formulation & approval of F&S Procedure	QCA registration process	IT software & Trial operation	Commercial Implementation / DSM Bills issue
1	Andhra Pradesh	Notified (Aug 2017)	Y (approved)	Y	Y	Y
2	Gujarat	Notified (Jan 2019)	Y (approved)	Y	Y	Y
3	Maharashtra	Notified (July 2018)	Y (approved)	Y	Y	Y
4	Karnataka	Notified (May 2016)	Y (approved)	Y	Y	Y
5	Rajasthan	Notified (Sep 2017)	Y (approved)	Y	Y	Y
6	Tamil Nadu	Notified (Mar 2019)	Y (approved)	Y	In Progress	NA
7	Himachal Pradesh	No solar/wind potential	NA	NA	NA	NA

Status of F&S and DSM Regulations of Group-I States (1/2) (as on 7th April 2021)

States	F&S Regulations and Implementation	DSM Regulations and implementation
Gujarat	• Notified (19th Jan, 2019). • All QCA have been registered • Commercial Implementation has initiated since August 2019	• DSM mechanism **implemented** in line with CERC DSM Regulations (17 Feb 2014)
Maharashtra	• Notified on 20th July, 2018. • The Procedure for implementation of Regulation is approved by the Commission on 7 December, 2018 and **an amendment was issued on 19th December 2019** • The Commercial implementation of the Regulation has commenced from **6th January, 2020**.	• The State is presently implementing Final Balancing and Settlement Mechanism (FBSM) since 2011. • State has **Notified** DSM Regulations on 1st March, 2019 in line with CERC DSM Framework. • The DSM software development is in process • Due to COVID-19 outbreak, the Commercial implementation date is **postponed** by the commission. Till then, the FBSM framework 2011 will be followed
Tamil Nadu	• Notified (1st March, 2019) • **First amendment** to the regulation was notified on 8th July 2020 (implementation delayed) • Procedures for implementation of F&S have been approved by TNERC on 14th October, 2020 • Trial of software for F&S is underway from Mid-March 2021 for 6 months. First trial report will be generated after 2 months of trial • Implementation to be notified after trial completion	• **Notified** DSM Regulations in line with CERC DSM Regulations (1st March, 2019) • DSM Software Development is in progress • **First amendment** to the regulation was notified on 8th July 2020 (implementation delayed) • DSM Software trial has started from February 2021
Karnataka	• Notified (31 May, 2016) • Implementation from 1st June 2017.	• Intra-state ABT mechanism in place from 20 June 2006 **for Open Access**

Status of F&S and DSM Regulations of Group-I States (2/2) (as on 7th April 2021)

States	F&S Regulations and Implementation	DSM Regulations and implementation
Rajasthan	• Regulations **Notified** (14th Sept 2017) in line with Model F&S Regulations. • Regulations are in Implementation • **First amendment** to the regulation was notified on 28th January 2020	• **Notified** (8th Nov, 2017 in line with CERC DSM Framework • First **Amendment Notified** (5th March 2019) • DSM Framework is in implementation.
Andhra Pradesh	• Regulations **Notified** (21 Aug 2017) in line with Model F&S Regulations. • Implementation initiated	• DSM regulations not notified • **Balancing and Settlement Code** in place from 11 Aug 2006 (as amended in 2013, 2014, 2016 & 2019) **for intra-state OA**.
Himachal Pradesh	• No major Wind and Solar Resources in the state • Majority of RE potential is Hydro power which covers under DSM Framework notified by the State	• **Notified** (16th Oct, 2018) in line with FOR Model and CERC DSM Regulations. • **First Amendment (29 June 2019)** issued in line CERC 4th and 5th Amendment to DSM Regulations

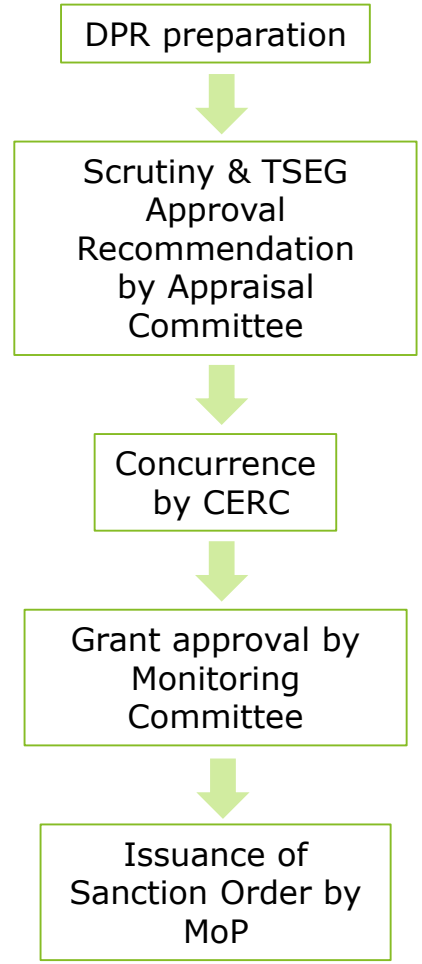
Status Update of F&S and DSM Regulations (as on 7th April 2021)

States	F&S Regulations			DSM Regulations		
Region	*Notified*	*Draft Published*	*WIP or Yet to initiate*	*Notified*	*Draft Published*	*WIP or Yet to initiate*
North	**4** RJ, UP, HR, PB		**3** DL, UK, HP (only Hydro potential)	**6** HP, DL, RJ, UK,HR, PB, UP		
West	**4** CG, MP, MH, GJ		**1** Goa (no major Wind/Solar Potential)	**3** GJ, CG, MH		**2** Goa, MP (B&S for OA)
South	**4** AP, KR, TS, TN		**1** KL	**1** TN	**1** TS	**3** AP, KR, KL (AP and KR ABT for OA)
East	**3** JH, SK, BR	**1** OR*	**1** WB	**1** BR	**2** WB, OR*	**2** SK, JH (B&S for OA)
North-East	**5** AS, MN, ML, MZ,TR		**2** AR,NL	**2** ML, AS		**5** AR, MN, MZ,NL, TR
UT			**7** CH, PY, DD, DNH, LD, AN, J&K			**7** CH, PY, DD, DNH, LD, AN, J&K
TOTAL	**20**	**1**	**15**	**13**	**3**	**20**

* Draft regulations were notified by OERC in 2015. However, a new set of regulations are presently under preparation

Status Update of SAMAST DPR & Implementation (as on 8th April 2021)

States	SAMAST DPR		
Region	*Proposal approved*	*Under examination*	*WIP or Yet to Prepare*
North	**4** HP, HR, PB, RJ[2]	**1** UP	**2** UK[1], DL
West	**1** MP[5]	**1** CG	**3** Goa, GJ[1], MH[3]
South	**4** KR[4], AP, TN, KL	**1** TS	
East	**2** BR[2], WB	**2** JH, OR	**1** SK
North-East	**7** AS, ML, NL, TR, AR, MN, MZ		
UT			**7** CH, PY, DD, DNH, LD, AN, J&K
TOTAL	**18**	**5**	**13**



[1] Gujarat and Uttarakhand have executed the project with their own funds and the projects are completed

[2] Grant for Rajasthan and Bihar was revoked by PSDF

[3] Maharashtra is already executing the implementation of SAMAST

[4] Karnataka is procuring meters from their own resources

[5] MP has requested for an additional grant for meter cost which is pending approval

Status of SAMAST implementation in (Group I) States (1/2) (as on 8th April 2021)

States	Category as per SAMAST	Remarks
Gujarat	Group-A	• The State has already implementing Intra-State ABT Mechanism since 2009 in line with CERC DSM Framework • Adequate interface meters at pooling stations & other relevant regulations in line with the SAMAST recommended activities. • Project is being implemented using own funds • Fresh proposal for New Energy Accounting & Scheduling Software submitted on 19th January 2021
Maharashtra	Group-A	• Intra-State ABT/FBSM framework at state level under operation since 2011. • MERC has notified the DSM Regulations on 1st March, 2019. The Commercial implementation of DSM Regulations is delayed due to COVID 19 pandemic
Rajasthan	Group-B	• State Transmission Operation Management System (STOMS) project implemented by RVPN, akin to SAMAST, in the State having additional features as compared to SAMAST. • Estimated cost of Rs 13.18 Cr and 90% (Rs 11.86 Cr) sanctioned from PSDF • Approval revoked as contracts were awarded before PSDF grant approval
Tamil Nadu	Group-C	• Estimated cost of Rs 13.31 Cr and 90% (Rs 11.98 Cr) sanctioned from PSDF • TNERC has notified DSM Regulations on 20th March, 2019 • Software for scheduling, energy accounting has been procured. • Pilot run for state owned generators and IPPs are under progress

Status of SAMAST implementation in (Group I) States (2/2) (as on 8th April 2021)

States	Category as per SAMAST	Remarks
Karnataka	Group-B	• Proposal recommended by the Appraisal Committee on 26th July 2019, and project cost accepted to Rs. 10.00 Cr, PSFD grant is sanctioned for Rs. 9 Cr • Proposal approved by the Monitoring Committee on 31st January 2020 and sanction order was issued by MoP on 20th March 2020. • Agreement has been signed and executed on 22nd June 2020 • The state is currently under tendering stage for award of contracts and is procuring meters from its own resources
Andhra Pradesh	Group-B	• Estimated cost of Rs 21.48 Cr and 90% (Rs 19.33 Cr) sanctioned from PSDF • Letter of approval issued by MoP on 27th July, 2018 and agreement signed on 28th Nov 2018 • The state is currently in tendering stage for award of contracts
Himachal Pradesh	Group-D	• Proposal recommended by the Appraisal Committee on 26th July 2019 (project cost accepted to Rs. 8.11 Cr.). Proposal approved by the Monitoring Committee on 31st January and sanction order was issued by MoP on 20th March 2020. • Agreement has been signed and executed on 22nd June 2020 • Work contracts are partly awarded and under execution

Summary status of SAMAST, F&S and DSM Regulations

States	SAMAST DPR			F&S Regulations			DSM Regulations		
Region	*Proposal approved*	*Under examination*	*WIP or Yet to Prepare*	*Notified*	*Draft Published*	*WIP or Yet to initiate*	*Notified*	*Draft Published*	*WIP or Yet to initiate*
North	**4** HP, HR, PB, RJ	**1** UP	**2** UK, DL	**4** RJ, UP, HR, PB		**3** DL, UK, HP (only Hydro potential)	**6** HP, DL, RJ, UK,HR, PB,UP		
West	**1** MP	**1** CG	**3** Goa, GJ, MH	**4** CG, MP, MH, GJ		**1** Goa (no major Wind/Solar Potential)	**3** GJ, CG, MH		**2** Goa, MP (B&S for OA)
South	**4** KR, AP, TN, KL	**1** TS		**4** AP, KR, TS, TN		**1** KL	**1** TN	**1** TS	**3** AP, KR, KL (AP and KR ABT for OA)
East	**2** BR, WB	**2** JH, OR	**1** SK	**3** JH, SK, BR	**1** OR*	**1** WB	**1** BR	**2** WB, OR*	**2** SK, JH (B&S for OA)
North-East	**7** AS, ML, NL, TR, AR, MN, MZ			**5** AS, MN, ML, MZ,TR		**2** AR,NL	**2** ML, AS		**5** AR, MN, MZ,NL, TR
UT			**7** CH, PY, DD, DNH, LD, AN, J&K			**7** CH, PY, DD, DNH, LD, AN, J&K			**7** CH, PY, DD, DNH, LD, AN, J&K
TOTAL	**18**	**5**	**13**	**20**	**1**	**15**	**13**	**3**	**20**

* Draft regulations were notified by OERC in 2015. However, a new set of regulations are presently under preparation

- **RISE Contracting Officer Representative: Monali Zeya Hazra**, USAID India, mhazra@usaid.gov
- **Chief of Party: Tushar Sud**, RISE, tsud@deloitte.com

Annexure-III

PSDF
Update on SAMAST Proposals
As on 08.04.2021

1. In accordance with the recommendations of Forum of Regulators (FOR), the proposals for implementation of SAMAST are being considered for PSDF funding. Subsequently, as per the communication by CERC, the interface meters are also included for funding from PSDF scheme for SAMAST proposals.

2. The status of approval of SAMAST proposals is given hereunder:

Sr. No	Details	(Nos)	Remarks/States
1	Projects Executed from own funds	2	Gujarat and Uttarakhand. Projects already completed.
2	Projects approved for sanction of grant from PSDF Scheme	18	Approval for Rajasthan and Bihar revoked subsequently. Refer Table-A for details.
3	Projects Under examination for sanction of Grant from PSDF.	5	Odisha, Telangana, U.P, Chhattisgarh, Jharkhand. Refer Table-B
4	States/UTs who have not submitted the Proposal till now.	6	Maharashtra, Goa, Delhi, Sikkim, Puducherry, Jammu & Kashmir

3. For the projects under examination, the quantity of the interface meters needs to be justified by the entities. In this regard, the Techno Economic Subgroup (TESG) of PSDF has sought the details of interface points and depiction of the same on the grid network map for Odisha, Telangana, U.P, Chhattisgarh, Jharkhand. Also, while finalising the requirements; the CEA Metering Standards are to be followed by the Entities.

4. There being a wide variation in the cost estimates for meters, the Appraisal Committee has approved a benchmark cost for the meters @ ₹ 36000/- per meter in its 20th meeting held on 25.06.2018. The Benchmark cost was revised by the Appraisal Committee in its 23rd Meeting held on 11th January, 2021. The Revised Benchmark cost for Interface meter is as per below

Cost of Interface meter (5min)	**NER states & hilly states/UTs viz. J&K, Ladakh, Sikkim, Himachal Pradesh and Uttarakhand.**	**Other States/UTs**
Supply cost of meter (Excluding GST)	₹ 37750	₹ 37750
Installation cost (Excluding GST)	₹ 15000	₹ 9000
Total cost (Excluding GST)	₹ 52750	₹ 46750
Total cost (Including GST@18%)	**₹ 62245**	**₹ 55165**

The Benchmark cost shall be reviewed after 1 Year.

5. The Appraisal Committee, in its 21st meeting held on 15.11.2018, has also approved the Benchmark cost for HW, SW and other components at ₹ 10 crore. The benchmark cost is based on the cost estimates of HW, SW, & associated field equipment under the Proposals of MP, Rajasthan, AP and TN which have already been approved for PSDF funding.

Summary of SAMAST proposals

1. Approved proposals **Table-A**

(Amount in Rupees crore)

Sr. No	Entity	No of Meters	Approved Cost estimate	Sanctioned Grant	Date of sanction	Grant disbursed/ utilized	Present Status of implementation
1	Madhya Pradesh $		4.00	3.60	17.03.2016	2.44	Works of S/W & H/W portion completed. Proposal for interface meters under approval
2	Tamil Nadu	0	13.31	11.98	02.01.2017	6.28	Under execution
3	Rajasthan *	0	13.18	11.86	19.05.2017	1.186	Approval Revoked as Contracts Awarded before PSDF grant approval. 10% grant refunded
4	Andhra Pradesh	2444	21.48	19.33	27.07.2018	1.933	Tendering stage
5	BSPTCL, Bihar *	Not requested	7.61	6.85	20.03.2020		Approval Revoked as Contracts Awarded before PSDF grant approval. Works already completed
6	HPLDA, Himachal Pradesh	223	8.11	8.11	20.03.2020	1.17	Part contracts Awarded / Works under execution
7	KPTCL, Karnataka #		10.00	9.00	20.03.2020	0.90	Tendering stage

8	WBSETCL, West Bengal	1035	11.20	10.08	20.03.2020	1.008	Tendering stage
9	PSTCL, Punjab	1228	13.58	12.22	20.03.2020	1.222	Tendering stage
10	AEGCL, Assam	560	10.25	10.25	20.03.2020	1.025	Contracts Awarded / under execution
11	MePTCL, Meghalaya	225	8.48	8.48	20.03.2020	0.848	Contracts Awarded / under execution
12	HVPNL, Haryana	2255	17.91	16.12	20.03.2020		Tendering Stage
13	Nagaland	128	10.80	10.80	31.03.2021		Agreement execution stage. Approved Recently (31.03.2021)
14	Tripura	261	11.62	11.62	31.03.2021		
15	Arunachal Pradesh	55	10.34	10.34	31.03.2021		
16	Mizoram	223	11.39	11.39	31.03.2021		
17	Manipur	475	12.96	12.96	31.03.2021		
18	KSEB Kerala	1326	17.03	15.33			Sanction order kept on hold. Shall be issued after submission of Grid Map showing meter locations.
	Total		**213.25**	**200.32**		**18.012**	

$ The Proposal for HW & SW for SAMAST was approved for MPPTCL in the year 2016, and the project has already been completed on 07.03.2019. Subsequently MPPTCL requested for sanction of Meter cost through PSDF grant. The proposal was approved in March, 2020 subject to the submission of Board approval by MPPTCL. The issue of sanction order for the proposal is kept on hold as MPPTCL has not submitted the Board approval.

***** The sanction of PSDF Grant was revoked for Rajasthan and Bihar as they have awarded the Contracts before approval of Project through PSDF Scheme.

KPTCL, Karnataka is procuring meters from their own resources

2. Proposals Under examination by TESG. **Table-B**

(Cost in Rupees lakhs)

Sr. No	Entity	HW cost	SW cost	Communication cost	No of Meters	Cost of Meters	Cost per Meter	Total
1	Telangana #	329.07	577.02	539.31	1770	3964.16	2.24	5409.56
2	Jharkhand				1970			21589
3	Chhattisgarh							1800.00
4	Uttar Pradesh				17			12764.00
5	Odisha				1683			3000.00
	Total							44562.56

-Telangana proposal: -TESG observed that TSTRANSCO, Telangana is not following the CEA Metering Regulations. TSTRANSCO informed that for compliance of the CEA Metering Regulations, the entity shall have to incur extra expenditure for installation of CTs & PTs.

Report of the FOR Sub-Group

Intrastate Reserves and Ancillary Services for Balancing (SANTULAN)

Meeting of FOR Standing Technical Committee

16th April 2021

Sub Group Composition – FOR Comm. dated 22nd Feb 2019

- Chairman - Shri S.K Soonee, Advisor POSOCO
- Convenor Member – CERC/FOR representative
- 4 SERC representatives- MP, MH, GJ, TL
- 4 SLDC representatives- MP, MH, GJ, TL
- 1 NLDC representatives
- 2 RLDC representatives- WRLDC, SRLDC
- Chief (RA), CERC
- Academia representative – IIT Delhi

- Terms of Reference -

Disseminate learning from experience at interstate level

Recommend to harness flexibility; Implementation Roadmap

Recommend Model Regulation

Deliberations and activities

- 7 meetings
- Multiple interactions for Capacity Building
- Multi-disciplinary working group in SLDCs
- Capacity building on Optimisation Techniques
- 3 pilot exercises – SLDC MP/MH/GJ
- SLDC survey (35 questions, 22 responses received)
- Literature survey

Key Aspects Deliberated

Need for intra-state reserves	Prevailing Practice on Imbalance Handling	Reserve Assessment & Monitoring	Despatch of Reserves
Replenishment of reserves	Learning from RRAS, FRAS	Essential Reliability Services	Intra-state vs Inter-state reserves
Defining Generator thresholds	Unit Commitment	Cost Recovery	Settlement systems

Evolution of framework at ISTS level

1. Policy for 5% spinning reserve at national level
2. CERC - Road map to operationalise Reserves
3. Defining Generation Thresholds - Tech Min, Pmax, Ramp Rate
4. Ancillary Services – RRAS, FRAS
5. Automatic Generation Control pilot
6. Security Constrained Economic Despatch pilot

On-line Survey of States – 22 responses

- ✓ Grid Code in all states
- ✓ 7 states have ABT
- ✓ 1 State having URS mechanism (Delhi)
- ✓ 13 states-Multiple discoms , 5 -single discom
- ✓ Scheduling as per MOD
- ✓ 4 SLDCs despatch govt. owned discoms only (AP, GJ, HY, DVC)
- ✓ 4 Zero-sum DSM Pools: GJ/MP/MH/RJ
- ✓ 3 Non-zero DSM Pools: CG, WB, Delhi
- ✓ 1 state -Technical Min – 55% (MP),
- ✓ DC & Ramp info. Availability – Most SLDCs
- ✓ 4 states with FSPs for RE (GJ,MP,MH,RJ)
- ✓ Most SLDCs appreciated the need for Optimized dispatch

Capacity building program (19-21 Sep)

'Implementation of Optimization Techniques for Indian Power System Operation'

Tailor made by IIT-Delhi & NLDC Team

- **Basics of Optimization:**
- **Excel Solver for Optimization (Hands on)**
- **Economic Load Despatch (ELD)**
- **Unit Commitment (UC)**
- **General Algebraic Modelling System (GAMS)**
- **Hands on Session on GAMS**
- **Illustration - SCED Module being operated at NLDC**

Key take-aways:

- Problem Formulation
- Tools – Solver/GAMS
- Co-optimization
- IT Infra specification
- Interfacing
- Visualization

Solver Module for Economic Despatch Incorporating Reserves

	A	B	C	D	E	F	G	H	I
1	Reserves / Ancillary Services		Despatch Model :	Madhya Pradesh		Total Schdl	Total Cost (Rs.Lac per hour)	Average Rate (Rs./unit)	Net UP Reserve Avail
2			Forecast Demand	4363			83	1.77	1313
3			Reserve	330			Total Cost (Rs./hour)	SMP	Net Down Reserve Avail
4	17.06.19	50 block	Total Demand	4693		4693	8283965	3.33	1238
5			Tech. Min (%)	0.70					
6	Column Name -->		A	B	C	D	E=C*D	F	G=D-F
7	Column Totals -->		7964	3004		4693		4758	-65
8	S No	Station Name	P Max	Pmin	Variable Charge	Schedule for Block 'T'	Production Cost	Schedule for Block 'T-1'	Difference in Schedule of Blocks T & T-1
9	1	JP Nigrie	417.28	277.20	64	417.28	267075	417.28	0
10	2	Rihand III (NR)	2.36	0.00	132	2.36	3113	2.36	0
11	3	SIPAT I	105.48	0.00	133	105.48	140149	105.48	0
12	4	Rihand II (NR)	1.08	0.00	134	1.08	1451	1.08	0
13	5	Rihand I (NR)	1.94	0.00	134	1.94	2600	1.94	0
14	6	SIPAT II	158.02	0.00	137	158.02	216346	158.02	0
15	7	KSTPS-III	71.51	0.00	139	71.51	99751	71.51	0
16	8	KSTPS	405.31	0.00	142	405.31	573850	405.31	0
17	9	Sasan	1366.88	956.81	145	1366.88	1986890	1366.88	0
18	10	Singrauli (NR)	3.59	0.00	150	3.59	5371	3.59	0
19	11	ATPS (210MW) Chachai	193.00	135.00	160	193.00	308800	193.00	0
20	12	VSTPS-IV	266.21	0.00	175	56.21	98095	126.21	-70
21	13	VSTPS-V	131.37	0.00	176	0.00	0	0.00	0
22	14	VSTPS-III	211.93	0.00	177	0.00	0	0.00	0
23	15	VSTPS-II	138.99	0.00	179	0.00	0	0.00	0
24	16	VSTPS-I	355.45	0.00	184	0.00	0	0.00	0
25	17	SGTPS -1x500	470.00	350.00	197	350.00	689850	350.00	0
26	18	SGTPS -4x210	445.00	405.00	216	405.00	875610	405.00	0

Instructions | State_Details | +

Madhya Pradesh Optimization Exercise July 2019

(Each case refers to a time block)

Cases	Production cost before Optimization (Rs Lakhs)	Production cost After Optimization (Rs Lakhs)	Total Saving (Rs Lakhs)	Average Cost before Optimization (Rs/Unit)	Average Cost After Optimization (Rs/Unit)	SMP rate (Rs/Unit)
Case 1: Maximum Demand (Morning)	159.2	157.9	1.3	2.12	2.10	3.93
Case 2: Minimum Demand (Morning)	104.8	102.6	2.2	1.78	1.74	2.57
Case 3: Maximum Demand (Evening)	152	152	0	2.04	2.04	5.92
Case 4: Minimum Demand (Evening)	103.5	100	3.5	1.78	1.72	2.57
Case 5: Maximum Surrender day	82.8	80.6	2.2	1.77	1.72	1.76
Case 6: Minimum Surrender day	146.9	146.9	0	1.98	1.98	5.92
Case-7: Max RE Gen.	86	84	2	1.76	1.72	1.77

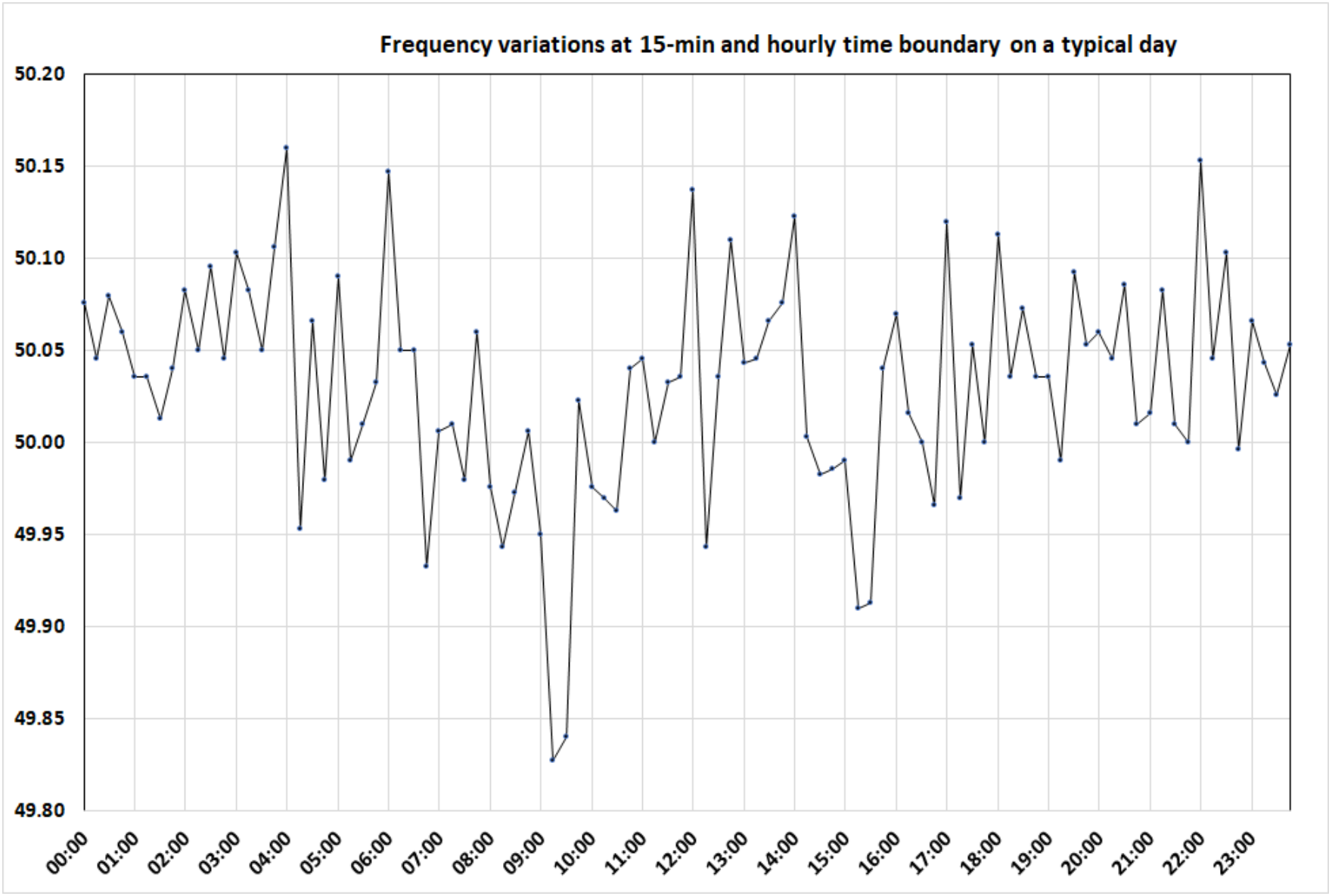
Maharashtra Optimization Exercise Aug 2019

(Each case refers to a time block)

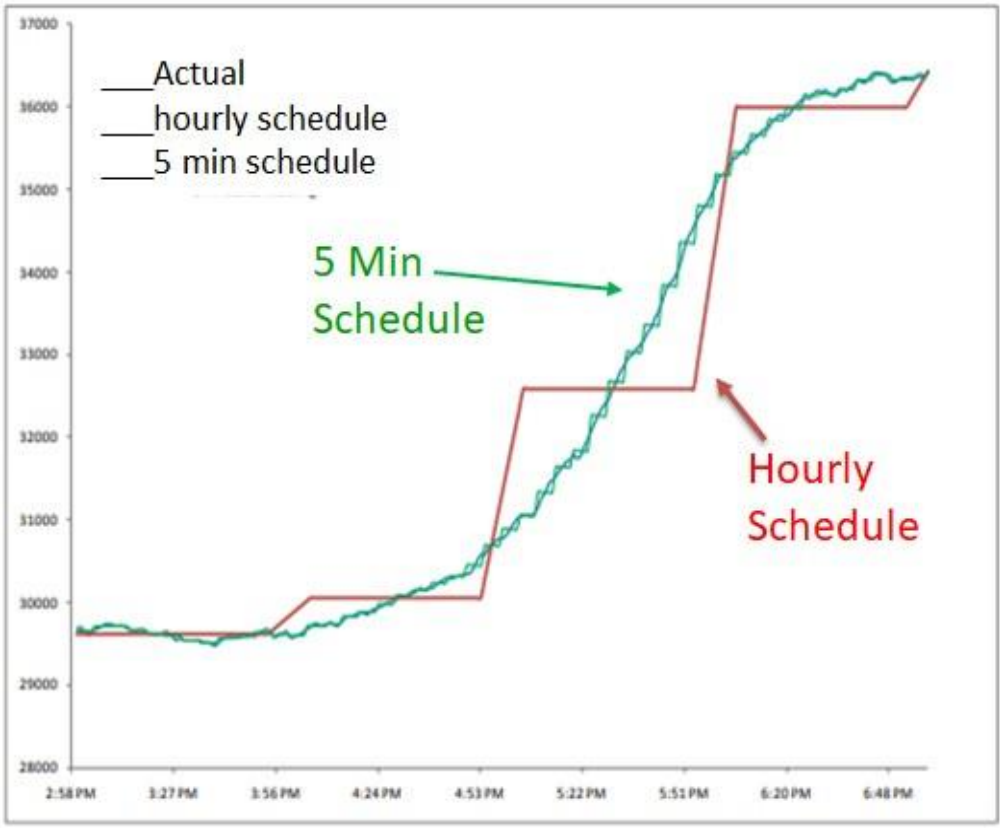
Cases	Production cost before Optimization (Rs Lakhs)	Production cost After Optimization (Rs Lakhs)	Total Saving (Rs Lakhs)	Average Cost before Optimization (Rs/Unit)	Average Cost After Optimization (Rs/Unit)	SMP rate (Rs/Unit)
Case 1: Maximum Demand	515	484	31	2.54	2.49	3.29
Case 2: Minimum Demand	366	320	46	2.45	2.27	2.81
Case 3: Maximum Wind	375	350	25	2.47	2.31	2.96
Case 4: Minimum Wind	361	349	12	2.3	2.26	3.69
Case 5: Maximum Surrender	284	276	8	2.54	2.51	2.52
Case 6: Minimum Surrender	507	483	24	2.59	2.41	2.82

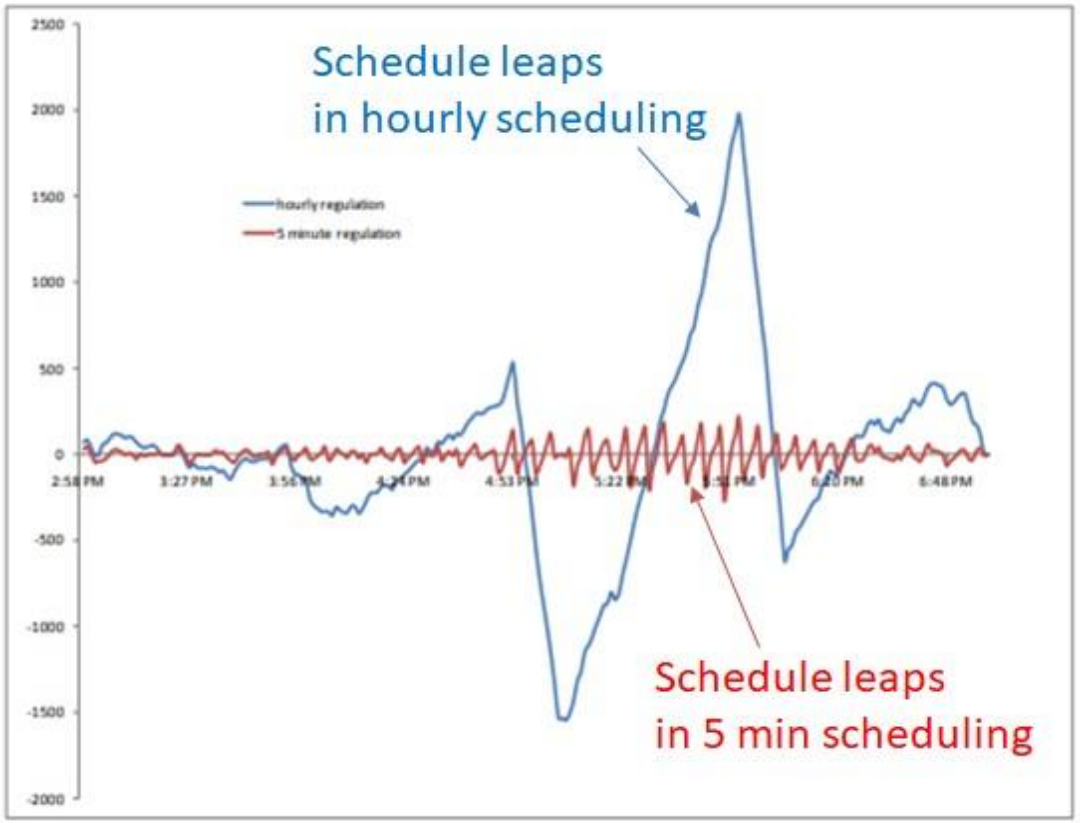
Gujarat Optimization Exercise July 2019

Scenarios used for optimization (each case ref to a time block)		Total production cost in Rs lakh		Average Production cost (Rs/Unit)		System Marginal Price (Rs/Unit)
Day	Block	Pre	Post	Pre	Post	
20-Jun-19	89	347	340	2.97	2.94	1.99
21-Jul-19	61	400	392	3.16	3.11	3.67
21-Jul-19	80	321	318	2.94	2.94	3.67
22-Jul-19	21	411	387	3.17	3.11	3.33
22-Jul-19	61	386	386	3.15	3.13	3.84


Frequency variations at 15-min and hourly time boundary on a typical day
50.20
50.15
50.10
50.05
50.00
49.95
49.90
49.85
49.80
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

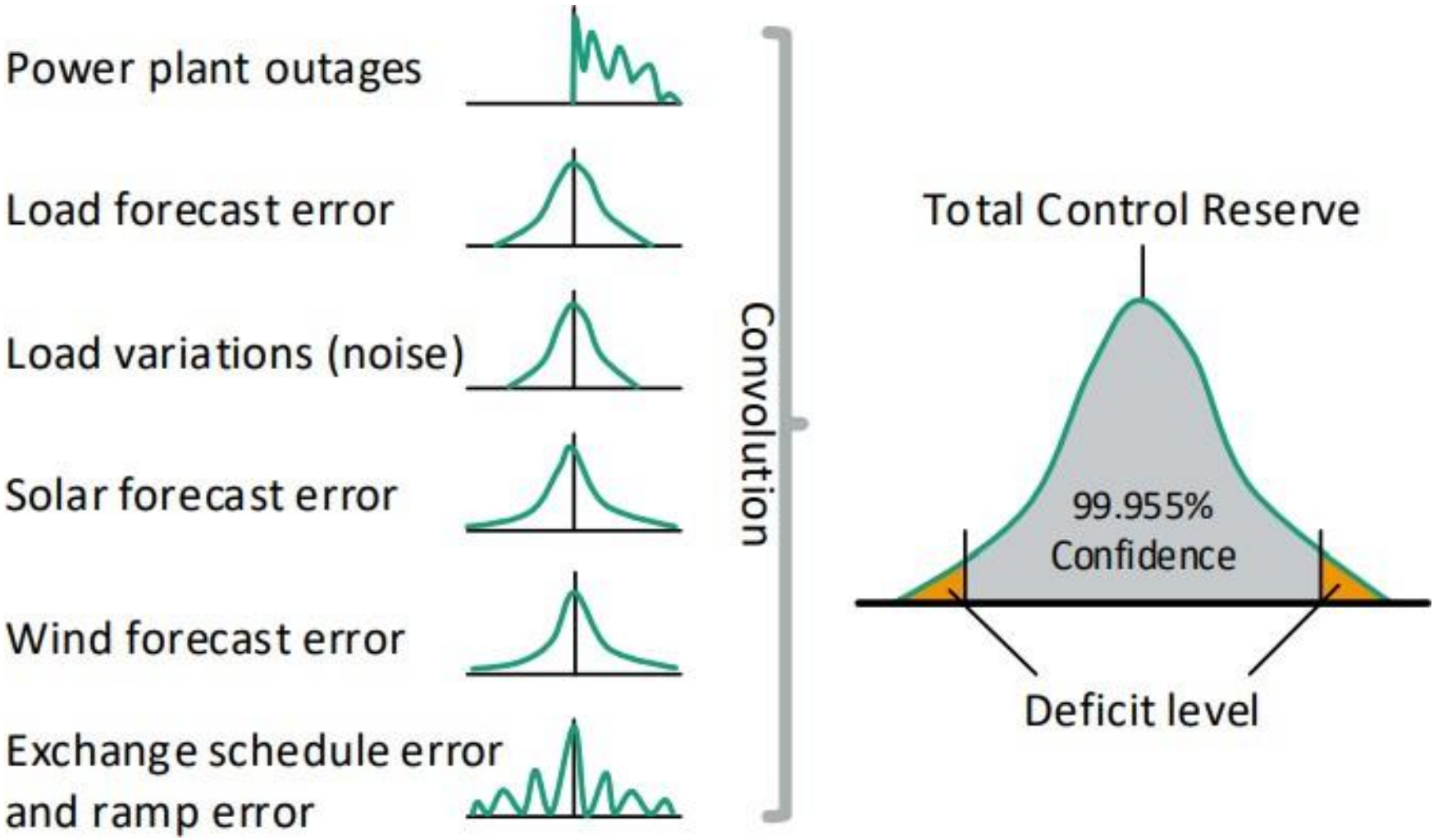
Schedule leaps at time block boundary

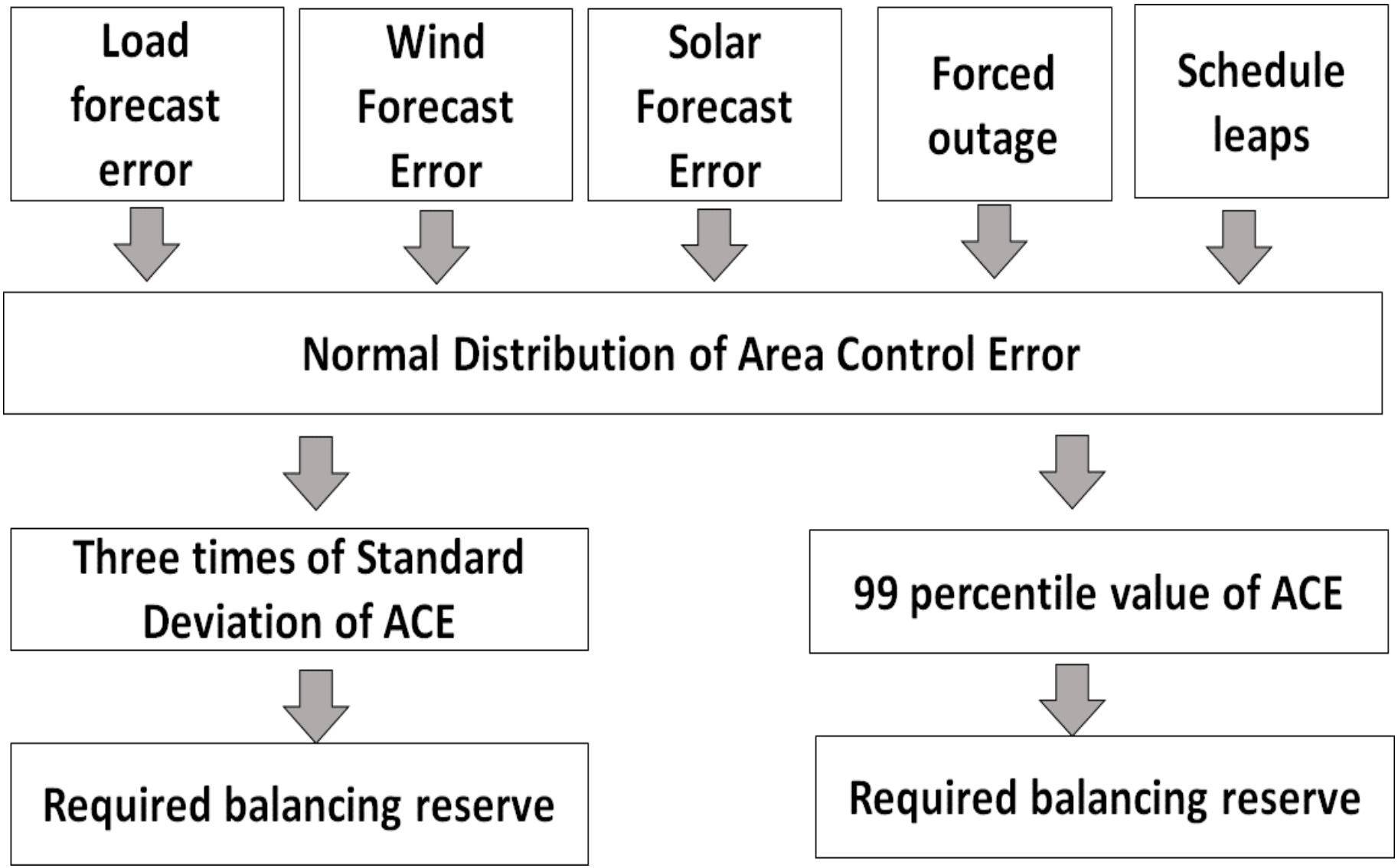




Regulation required for handling deviation
in 60-min scheduling is much higher than 5-min scheduling

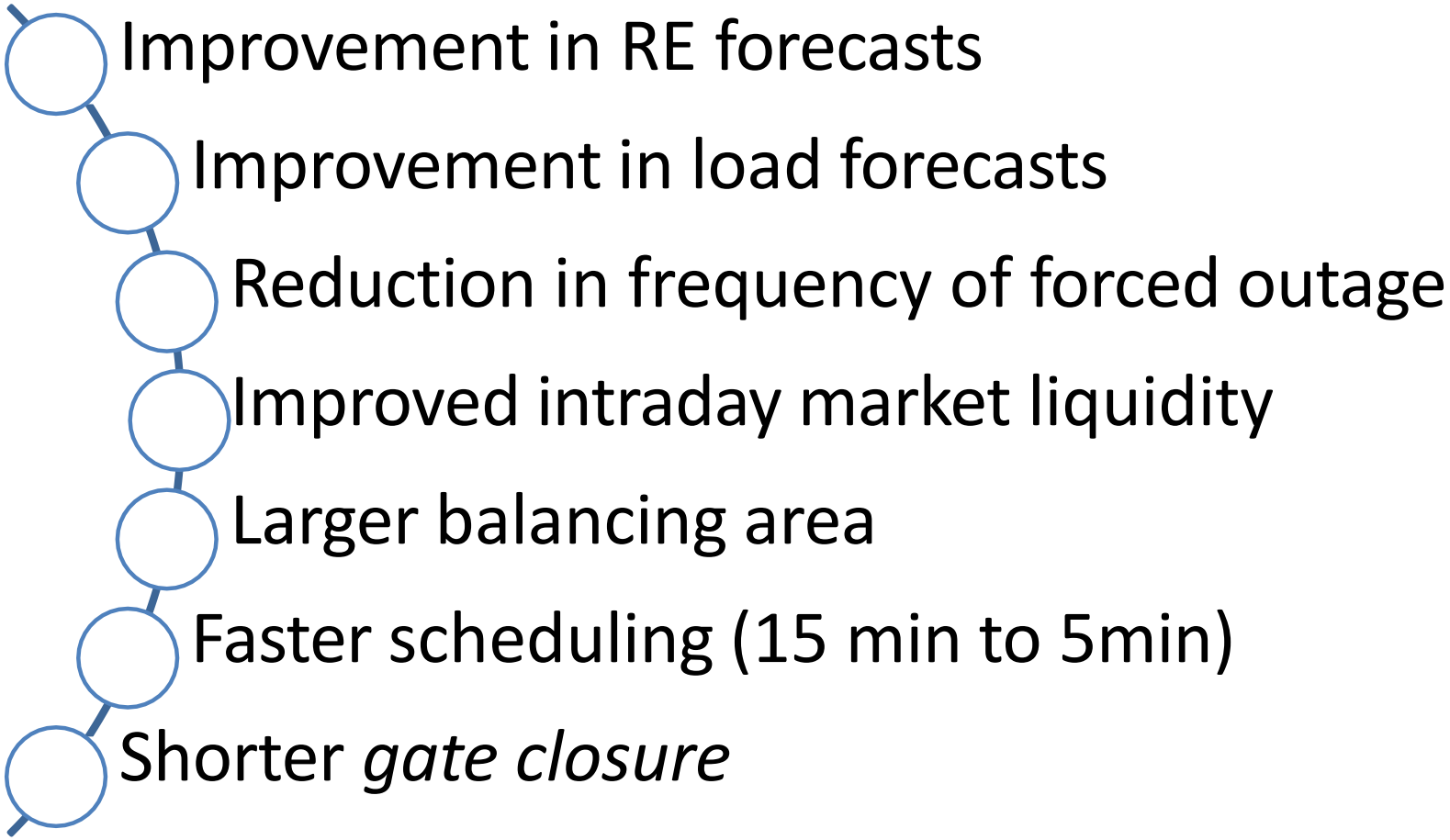
Dimensioning of Reserve- Probabilistic approach




Load forecast error
Wind Forecast Error
Solar Forecast Error
Forced outage
Schedule leaps
Normal Distribution of Area Control Error
Three times of Standard Deviation of ACE
Required balancing reserve
99 percentile value of ACE
Required balancing reserve

State	99 percentile	99 percentile
	Positive ACE (MW)	Negative ACE (MW)
Maharashtra	640	538
Gujarat	576	625
Madhya Pradesh	636	582
Andhra Pradesh	672	560
Telangana	620	595
Karnataka	638	768
Tamil Nadu	720	630
Rajasthan	718	788

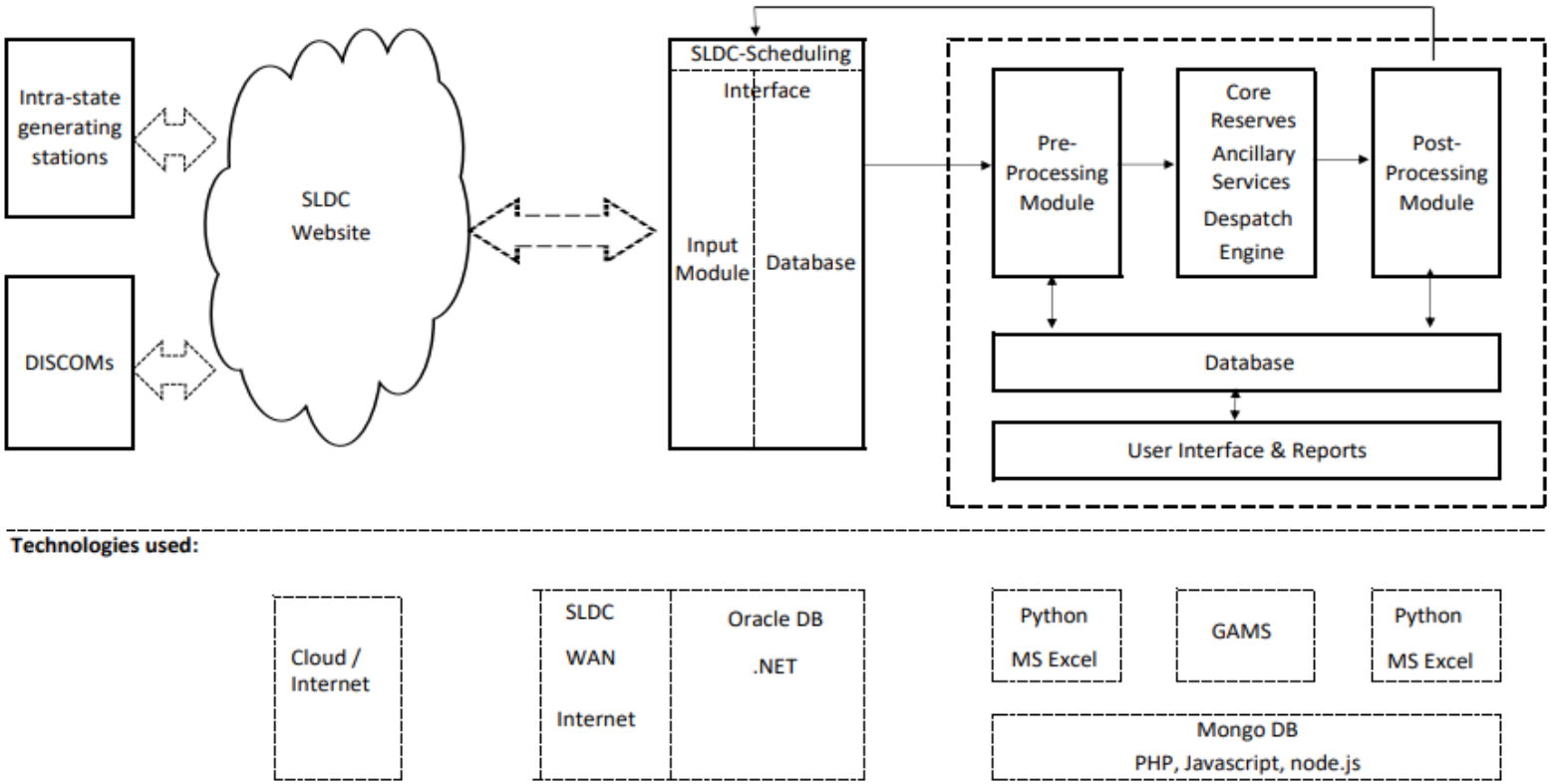
Reserve requirement would decrease with



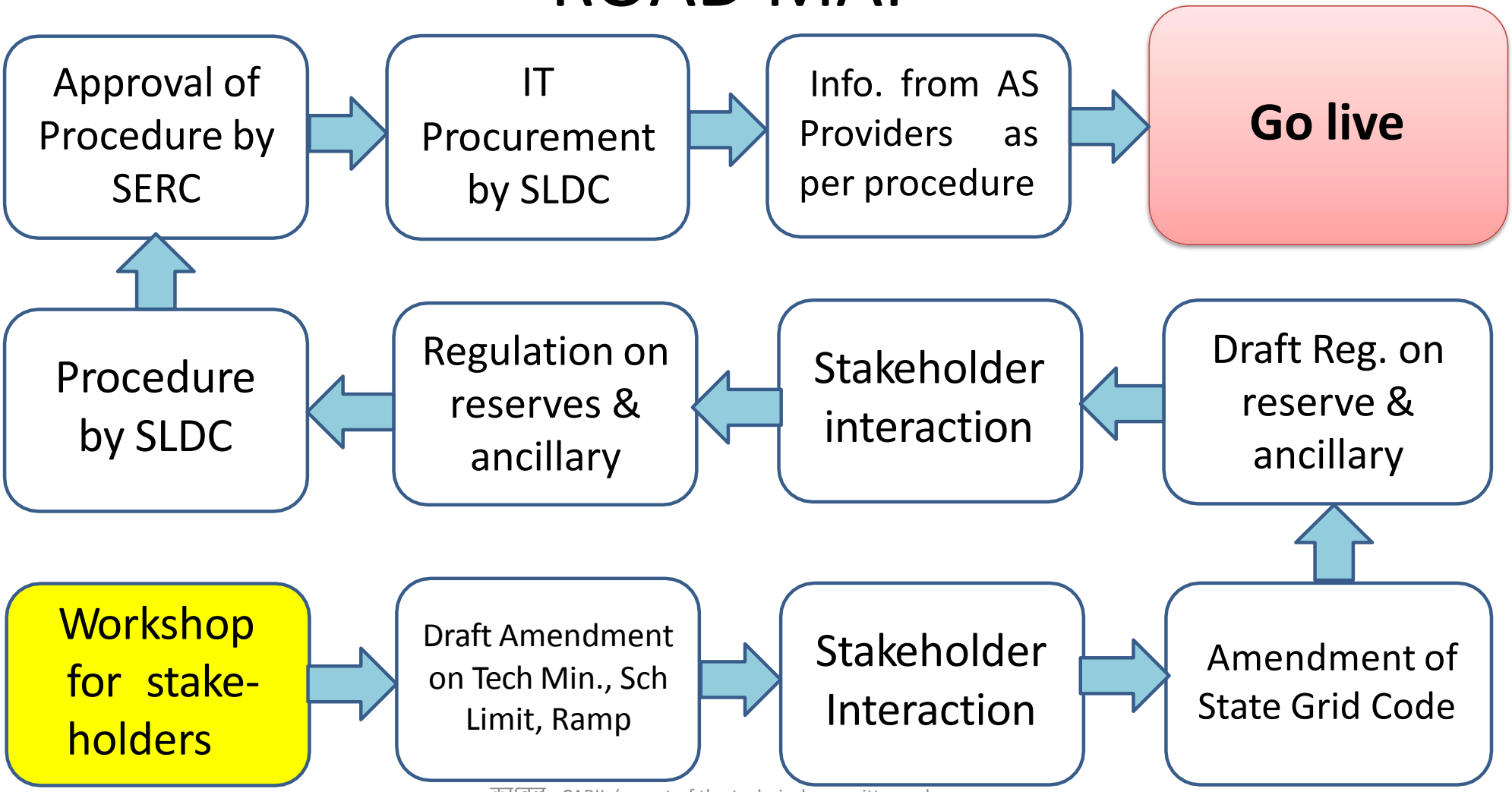
Regulatory Intervention for Implementation

- Notification of norms
  - Minimum turn down level, Upper scheduling limit, Ramp rate
- Non-zero regulatory pool account
- Procedure for assessment of reserves
- Mandate computation and monitoring of Area Control Error (ACE)
- Procedure for declaration by intrastate generators
  - DC, Variable charges, Tech Min., Ramp, cold/warm start up time
- Criteria and algorithmic approach for despatch of reserve
- Incentives, Settlement Mechanism

Typical Schematic for IT Infrastructure



- ROAD MAP -


Approval of Procedure by SERC
IT Procurement by SLDC
Info. from AS Providers as per procedure
Go live
Procedure by SLDC
Regulation on reserves & ancillary
Stakeholder interaction
Draft Reg. on reserve & ancillary
Workshop for stake-holders
Draft Amendment on Tech Min., Sch Limit, Ramp
Stakeholder Interaction
Amendment of State Grid Code

- Recommendations -

Active balancing along with passive	Gen. Margin as Reserve	Distributed primary reserve	Dimensioning of secondary and tertiary reserves	Computation and monitoring of area control error
Secondary Control	Pre-requisites for intra-state ERS	Information on scheduling limits	Sanctity of VC, DC and schedule	Unit commitment to ensure reserves
Reserve Computation in real time	Monitoring of reserves in real-time	Gate closure for reserve despatch	Information and communication	Reserve Dispatch
Honour transmission constraints	VAE creation	Settlement	Transmission charge and loss administration	Regulation on reserves & ancillary services

THANK YOU!