MINUTES OF SECOND MEETING OF "FOR TECHNICAL COMMITTEE FOR IMPLEMENTATION OF ABT FRAMEWORK AT THE STATE LEVEL-GROUP-II"

Venue : Hotel: Lemon Tree Premier
Near Ram Gulam Chowk
Exhibition Road,
Patna, Bihar
Date : 02-09-2019 (Monday)

List of Participants: At Annexure –I **(Enclosed)**

1. The Second meeting of reconstituted Standing Technical Committee of FOR was held on 2nd September, 2019 under the Chairmanship of Shri Indu Shekhar Jha, Member CERC. At the outset, Chairperson Shri S. K. Negi of Bihar Electricity Regulatory Commission (BERC) welcomed the Chairperson of the Technical Committee Shri I.S. Jha and Shri M. K. Iyer, Member CERC, other Members of the Technical Committee and Special Invitee. He expressed gratitude to the Forum of Regulators (FOR) for giving BERC an opportunity to host this meeting at Patna Bihar. He also mentioned that implementation of SAMAST is indispensable as it solves the puzzle – "Who" pays to "Whom" and for "What".
2. Chairperson of the Technical Committee Shri I. S. Jha thanked the Chairperson BERC for the invitation and for hosting the meeting of the Technical Committee Group- II at Patna, Bihar. He highlighted the agenda of the meeting and emphasised the need of introducing ABT at the State Level in order to have balancing mechanism and to inculcate dispatch discipline. He emphasised on the importance of implementing the SAMAST and ABT framework being need of the hour in view of the development of the Power Sector. He also lauded the effort of the BERC for taking steps in implementing Deviation Settlement Mechanism (DSM) at the State Level.
3. Shri S.K. Chatterjee Chief (Regulatory Affairs), CERC gave brief background of the FOR Technical Committee Group-II and highlighted the agenda items scheduled for the Meeting.
4. Thereafter agenda items were taken up for discussion:

Discussions on the Agenda items

Agenda No.1:Status of implementation of SAMAST and ABT inBihar:

5. The representative of Bihar SLDC made presentation on the stats update of Scheduling, Accounting, Metering and Settlement of Transactions (SAMAST) and ABT in Bihar (**Annexure-II**).
6. He highlighted the importance of SAMAST Implementation at State Level using Information Technology (IT) applications for automating, streamlining and integrating the entire gamut of activities. He informed that Bihar State has already initiated SAMAST implementation in phased manner. Phase I which consists of 4 modules regarding Scheduling, Accounting, open Access, DSM etc. have been successfully implemented in February 2018 at SLDC, Bihar and bills have been issued accordingly including for Railways who applied for 50 MW LTOA in the State of Bihar. The Phase- II which is under implementation constitutes implementation of ABT type energy meter and balance work of SAMAST.
7. The representative of SLDC, Bihar apprised the Committee that Bihar State Power Transmission Company Limited (BSPTCL) has awarded a contract for managing metering & communication part.
8. On the balance work under SAMAST, he informed that Bihar SLDC has awarded the contract on dated 06.06.2019 . He also updated on the work awarded to commence load forecasting by the State Discom and development of software at SLDC for scheduling of all intra-State entities to be operational from September, 2019.
9. He also informed that adequacy of Human Resource (HR) in SLDC has been approved by the State Regulatory Commission which will be helpful in completing the implementation of SAMAST framework at earliest in the State of Bihar.
10. On funding for SAMAST, the representative of SLDC Bihar, informed the long process of approval under PSDF and delay in receiving the PSDF grant for implementation of SAMAST works.
11. The Committee requested the representative from POSOCO to update on the latest Status of PSDF grants approved to the Bihar State. Shri Sameer Saxena, from POSOCO, updated the Committee that out of total DPR estimate of Rs. 11.75 crore submitted by the Bihar State, PSDF Committee approved around Rs. 7.61

crore for the State of Bihar in the last meeting of the PSDF Committee held on 26th July, 2019.

12. Some Committee members pointed out different approaches are taken by PSDF Committee while approving the SAMAST DPRs of the States. It was pointed out that while a few SAMAST DPRs submitted by the Sates have been approved with cost of meters while some are not. Dr S.K. Chatterjee also clarified the Committee that the decision of exclusion of cost of meters from the DPR was also based on the recommendations of the FOR Technical Committee. However, he also suggested POSOCO to look into this matter in more detail and update the Committee if there are some differences in approach by the PSDF Committee while approving grants under SAMAST DPRs.
13. Some members also expressed concerns over delay in getting grants under PSDF funds for SAMAST implementation. It was pointed out that the four stage process followed under PSDF is very cumbersome and sometimes results in delay of awards of schemes due to unavailability of the funds. Hence, in few cases States are forced to go ahead with their internal resources to ensure timely completion of the SAMAST implementation. . The Committee suggested that POSOCO should expedite the process of approving DPRs and release of grants for SAMAST through monitoring Committee of PSDF.

Action points/ Decisions

i. *The Committee appreciated the initiatives taken by Bihar SLDC in implementation of SAMAST and ABT framework at the State*

ii. *The Committee requested POSOCO to expedite and simplify the process of approval of the DPRs submitted for SAMAST framework;*

Agenda Item No. 2: Status of implementation of Regulations on Forecasting, Scheduling & Deviation Settlement

14. The representative of BERC, made a presentation (**Annexure-III**) on the Status of implementation of Regulations on Forecasting, Scheduling and Deviation Settlement in Bihar. He updated the committee that Bihar State relies mostly on the ISGS and ISTS system to meet their day to day power requirement. Most of the ISGS plants are conventional coal based and Hydro Power while there are very limited solar and wind power generation in the State of Bihar.

15. He updated the Committee that BERC has recently issued draft Regulations on Intra State Availability Based Tariff and Deviation Settlement Mechanism seeking comments from the stakeholders. He highlighted that the draft Regulations have been prepared in line with the FOR model DSM Regulations and CERC's DSM Regulations till 4th Amendments. He also informed that concept like Qualified Co-ordinated Agency (QCA) would be included in the Regulations as and when RE generation increases in the State in future.
16. Dr. S.K. Chatterjee appreciated the efforts by the State Regulators to adopt 4th amendment of the CERC's Regulations on the DSM. However he pointed out that the CERC has since notified the 5th Amendment of the DSM Regulations and suggested to adopt the same while finalising Bihar DSM Regulations.
17. It was clarified that State DSM Pool has two separate deviation pools for conventional and RE generators similar to FOR DSM Regulations. Dr. S.K. Chatterjee suggested to perform some simulations to assess the sufficiency of State level DSM pool to pay inter-regional DSM pool.
18. Bihar chairperson requested assistance from the Technical Committee Secretariat to assist BERC in finalisation of the State DSM Regulations.

Action points/ Decisions

1. *The Technical Committee appreciated the initiative taken by Bihar State Electricity Regulatory Commission in framing the ABT framework along with Regulations on Deviation Settlement Mechanism in the State and directed the FOR secretariat to assist the staff of BERC in finalisation of the State DSM Regulations.*

Agenda Item No. 3: Report of the Sub group on issues of Aggregator /QCA

19. The Chairperson KSERC presented the background of the subgroup constituted by the Technical Committee. He updated the Committee about the detailed deliberations of the sub-group on international experience on aggregators and its relevance for India. He also briefed on the detailed discussions in the series of meetings of the sub-group on the QCA experience in the country.
20. Shri Anish Mandal, the Consultant (M/s Deloitte) assisting the subgroup, made a presentation on the recommendations made in the report by the subgroup (**Annexure-IV**). He informed that the subgroup deliberated on the international experience of Aggregators extensively and highlighted that aggregator business

models are mostly market driven and role of regulators is limited. However, to protect consumers and ensure that they are dealing with financially solvent and technically competent aggregator companies, in some countries the Commission have considered establishing a certification process for aggregators. After deliberation, the subgroup recommended that there is a need for separate sets of Regulations governing activities of "Aggregator" in general, as the market evolve.

21. He informed that on the issue of providing legal status and regulatory oversight, the sub group recommended that Appropriate Commission may recognize QCA, as Regional Entity/State Entity, for the purpose of bringing such entities under control of RLDC/SLDC. It was recommended that considering the simplicity for operationalization, the Institutional structure for QCA as an Agent or Representative of Generators may be preferred.
22. Shri Ravindra Kadam, Advisor-RE CERC, informed the decisions taken in the Technical Committee Group-I on the QCA report. He informed that the Group –I of the Technical Committee accepted the recommendation of the subgroup of appointing one QCA per pooling sub-station with majority principle i.e. consent of Generators having more than 50% of the installed capacity at Pooling Sub-Stations for acting on behalf of all RE generators connected to the pooling stations. QCA appointed with the majority principle will be mandatory to all RE generators connected to the pooling stations. All the RE generators shall accept the schedule provided by the QCA with SLDC. However, if any RE generator chooses to not accept the QCA appointed by the majority principle, then such RE generator shall have the responsibility to make its own arrangement separately to provide individual schedule directly to SLDC.
23. It was also informed that the Committee also recommended that in case RE generators connected to a pooling station have not appointed any QCA and/or not providing any schedule to respective SLDC, then in that case the schedule prepared by the SLDC/REMC as the case may be , will be binding on the RE generators of that pooling station. Any deviation from actual generation in that case will be borne by the RE generators.
24. He updated further that the QCA shall be responsible for only deviation settlement and not for energy bill settlement. In the event of RE curtailment due to grid security there would be deemed revision of schedule of QCA RE generators or QCA shall not be charged with deviation charge for any RE

curtailment due to grid security issue. However, QCA shall be responsible for ensuring real time communication with RE generators of such curtailment along with appropriate proof of records. The Committee recommended that equitable curtailment subject to security constraints could be followed while implementing the RE curtailment among QCA and RE generators.

Action points/ Decisions

i. *The Committee (Group –II) endorsed the report prepared by the sub group along with recommendations made by Group –I and Group –II of the Standing Technical Committee and agreed that the modified report be presented before FOR in its next meeting for approval.*
ii. *The Committee also endorsed the recommendation of Group-I to amend the extant model regulations of FOR on RE Forecasting and Scheduling and Deviation Settlement Mechanism based on the deliberations of the Committee to suitably incorporate the QCA related aspects.*
iii. *The Committee also reiterated the decision that the consultant should continue to assist the Technical Committee and present a study report on the operational experience of Forecasting and Scheduling framework in the country and provide status update. It was also decided that based on the findings of the study report, review of the tolerance band of deviation can be undertaken subsequently.*

Agenda Item No. 4: Update on the Subgroup on Reserves and Ancillary Services at the State Level

25. Shri Sameer Saxena, from POSOCO presented an update on the sub group on Reserves and Ancillary Services at State Level. (**Annexure-V**)He briefed on the constitution of the sub group under the chairmanship of Shri S.K. Soonee along with the representatives Gujarat, Maharashtra, Madhya Pradesh and Telangana. He also informed that the committee has co-opted two experts namely Dr. S. K. Chatterjee, CERC and Prof. Abhijit Abhyankar, IIT Delhi. He briefed the Committee on the terms of reference of the sub group to disseminate the learning from the experience of implementing the reserve regulation ancillary services and fast response ancillary services at the interstate level. He informed the Committee that four meetings of the sub group were held and the sub group deliberated on the key design aspects for implementation of reserves/ancillary services like tariff for generating stations, mechanism for declaring technical capabilities of the generators, scheduling and despatch mechanism, computation

of reserves, settlement system etc. He also highlighted the basic data requirement like DC on bar Technical Minimum, Variable Charge etc. required for Reserves computation at State Level.

26. Shri Saxena highlighted that for pilot to run at State level adequate provision for IT, communication infrastructure and HR resources is essential. He also informed the Committee that that Gujarat SLDC, MP SLDC and Maharashtra SLDC would implement the pilot at State level with the help of NLDC. It was further informed that teams comprising members conversant with scheduling, commercial regulatory, IT have been formed in the respective SLDCs to run the optimisation module for the respective state.
27. The Committee noted the update on the subgroup and agreed to include a few more states in the sub group as requested.
28. Shri S.K. Chatterjee briefed the committee about the road map of reserves detailed out by the Hon'ble CERC to maintain primary, secondary and tertiary reserves at National, Regional and State Level. He clarified that while reserves have been maintained at regional level, there is a need to keep some reserves especially tertiary reserves at State Level. He said the roadmap envisage the State should have reserves equivalent to 50% of the largest unit at the State level. It was decided that the sub-group should finalize report and present for discussion in the Technical Committee

Action points/ Decisions

i. *The Committee noted the updates provided on the sub group activities.*
ii. *The Committee accepted the request of the sub group to include a few more States for gaining insight on State level Ancillary Services.*
iii. *The Committee also directed the sub group to submit the report at the earliest.*

Agenda Item No. 5: Proposed Framework on the Real Time Market for Electricity

29. Dr. S.K. Chatterjee, Chief (RA) CERC, made a presentation on the Real Time Market (RTM) framework for electricity proposed by the Hon'ble Central Electricity Regulatory Commission (CERC). **(Annexure-VI).** He informed the committee that the idea of RTM owes its genesis to the recommendation of the Technical Committee. He also appraised the Committee that recommendations of the Technical Committee are reflected in the design of RTM proposed by the

CERC first through discussion paper and subsequently by the draft Regulations. He updated that CERC has issued draft Regulations for the RTM seeking comments from the stakeholders.

30. He underscored that a need for an organised market platform for balancing energy close to real time was necessitated in view of the intermittent renewable energy. In the absence of such a real time market in India, the market players have over the period relied on unscheduled interchange (e.g. drawing power from the grid more than their schedule or injecting into the grid power more than their schedule), which threatens grid security . It is in this context that an organized real time energy market is being introduced He also emphasised that introduction of RTM would bring the required flexibility in the market to provide real time energy balance while ensuring optimal utilization of the available surplus capacity in the system.
31. The RTM design also introduces the concept of Gate Closure which is important to bring firmness in the schedule. He informed that existing practise of right to revision of schedule before four time blocks of the delivery period creates difficulties in managing the grid operation and assess the reserves. 'Gate Closure' implies the point of time after which no trade or revision of schedule is allowed After Gate Closure, the system operator takes over the responsibility for balancing the system. The RTM design proposed envisages half hourly market with double sided closed auction with uniform price mechanism.
32. Some members sought clarification on the monitoring of such market to make sure no market participants game the system. It was also emphasised that effective market monitoring would be in place to deter any manipulation of the market by any players. It was clarified that RTM will provide a national level organised market for the discom to manage its real time energy imbalance with optimum utilisation of the available resources in the system .
33. The committee appreciated the Real Time Market proposed by CERC and agreed to facilitate the proposed RTM framework to state level.

Action points/ Decisions

The Committee noted and appreciated the design proposed by CERC for introducing RTM framework and agreed to facilitate the proposed RTM framework to State Level

34. The meeting ended with a vote of thanks by Shri S.K. Jha Secretary CERC.

Annexure-I

LIST OF PARTICIPANTS AT THE SECOND MEETING OF RECONSTITUTED TECHNICAL COMMITTEE (GROUP-II) FOR IMPLEMENTATION OF ABT FRAMEWORK AT THE STATE LEVEL HELD ON 2nd SEPTEMBER, 2019

1	Sh. I.S. Jha, Member	CERC
2	Dr. M.K. Iyer, Member	CERC
3	Sh. S. K Negi, Chairperson	BERC
4	Sh. Preman Dinraj, Chairperson	KSERC
5	Sh. S.C. Das, Chairperson	AERC
6	Sh. R.P. Singh., Chairperson	UPERC
7	Sh. Rajeev Amit , Member	BERC
8	Sh. R.K. Choudhary	BERC
9	Ms., Anjuli Chandra Member	PSERC
10	Sh. Durgadas Goswami, Member	WBERC
11	Shri S. K. Jha, Secretary	CERC
12	Dr. S.K. Chatterjee, Chief (RA)	CERC
13	Sh. Sameer Saxena, DGM	POSOCO
	Sh. RavindraKadam, Advisor (RE)	CERC
14	Sh Anish Mandal,	Consultant
15		

Status of implementation of SAMAST and ABT in Bihar

SLDC, Bihar

Introduction of SAMAST

- The Forum of Regulators, in its report on “Scheduling, Accounting, Metering and Settlement of Transactions in Electricity”, recommended **Implementation of Information Technology (IT) applications** for automating, streamlining and integrating the entire gamut of activities.

Definition of SAMAST

- SAMAST is introduced in power sector to regulate the invoice for the charges related to capacity, active energy, reactive energy, transmission usage, deviation from schedule, market operation, trading margin and incentives that have to be raised by power sector utilities rely on the energy account statements.
- The integrity , probity and timeliness of the energy accounting and settlement system are indispensable for the viability, financial stability and sustainability of the sector. Thus, it is essential that adequate priority and importance must be given to this critical statutory function in the Indian power sector.

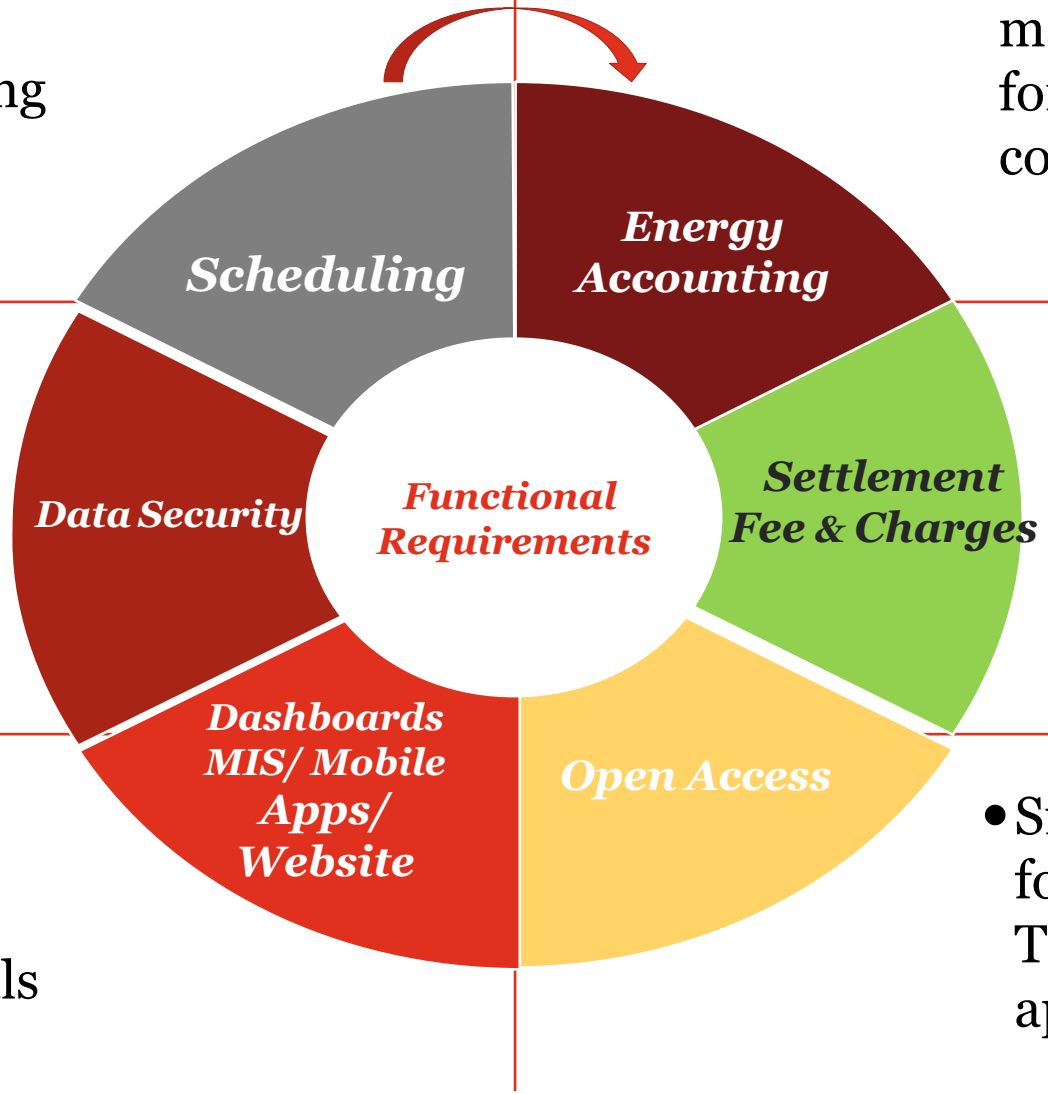
Objective of SAMAST

- Preparation of **"Energy Balance Sheet"** transmitted through grid substation in the state to provide transparency to different generations, transmission licensee, Discoms & Open Access consumer.
- Indicate the schedule and actual interchange of entities with the grid as well as account for the transmission losses incurred in the system.
- SAMAST is indispensable as it solves the puzzle **-"Who" pays to "Whom" and for "What?"**

Key functional requirements

- Capacity to handle both 15 minutes as well as 5 minutes block scheduling as and when required.
- Automated Scheduling

- Both AMR based and manual energy accounting for all entities in Bihar control area



- Cyber Security Implementation
- Security Audit
- Data Archival and Retrieval.

- Provision to manage bills for all generators, OA and Discoms in state as per CERC and BERC guidelines
- Creation of State DSM pool and balance payable and receivable

- Outage reports
- Daily/ weekly/ monthly reports
- Mobile App/ Web portals

- Single integrated platform for processing the Short Term Open Access applications.

Status of implementation of SAMAST

- Bihar, in line with recommendations of SAMAST report, **already initiated implementation** in phased manner:
  - ***Phase-I .....Implemented in February 2018.***
  - ***Phase-II ..... Under progress***

Status of SAMAST Phase-I

- There are 4 modules which has been successfully implemented in February 2018 at SLDC, Bihar.
  - Scheduling
  - Accounting
  - Open Access
  - DSM

- Railway applied to BSPTCL for granting 50 MW LTOA in Bihar. In Order to proper accounting for this they have provided necessary IT infrastructure support to SLDC, Bihar for availing Open Access power from BRBCL to multiple drawal points of Railway (in Bihar).
- DSM bills are being issued to Railway w.e.f. 22.05.2018 with the help of these modules as per CERC DSM (Deviation Settlement Mechanism and related matters) Regl., 2014 & its amendments.

Status of SAMAST : Phase-II

- ***Phase-II ..... Under progress***
- ***Components of Phase-II***
  - (a) Implementation of ABT type energy Meter
  - (b) Balance Work of SAMAST

Status of SAMAST : Phase-II

1. DLMS compliant 0.2s class ABT type energy Meter

- *"Supply, Installation, Testing & Commissioning of DLMS compliant 0.2s class ABT type energy meter with implementation of 100% metering, data acquisition and online ABT monitoring for the transmission & sub-transmission systems upto 33 KV level, monthly energy accounting and service maintenance for a period of 5 years" was* ***awarded on dated 08.05.2018.***
- BSPTCL has awarded a contract for managing metering & communication part that included installation, commissioning of ABT meters and deployment of AMR system in SLDC.

Status of SAMAST Phase-II (ABT type energy Meter)

- ABT type meter is **3-phase 4-wire**, ***Draw out (Rack Mounted)***
- The total cost of project is Rs. 73.06Crore Approx. and Work awarded on 08.05.2018.
- Funding obtained on equity ratio of 80:20 (80% - Bank Loan 20% - Grant by Bihar Govt.)
- 1769 nos. Energy Meter have been installed at various interface point.
  - 220 KV Trans. line & Bus Coupler
  - 132 KV Trans. line & Bus Coupler
  - LV side of 132/33 KV Transformer
- All meters are as per CEA metering standards.
- 1500 nos. Energy Meters are commissioned & 1200 nos. Energy Meters are communicating data with SLDC till date

Commissioning and data communication with SLDC of all meters shall be completed by 15th Sept 2019.

Status of implementation of SAMAST

Phase-II….

2. **Balance Work of SAMAST comprise:-**

- Development, Implementation, Testing and Commissioning of Software at DC, SLDC
- Supply, Installation, Testing and Commissioning of Hardware at DC, SLDC
- Supply, Installation, Testing and Commissioning of Software, Hardware and minor Civil work at DRC, Gaya.
- AMC and Manpower for the work of SAMAST work at DC & DRC centre for Five years

Status of Implementation of Balance Work of SAMAST

- SLDC has awarded a contract for Implementation of Balance Work of SAMAST on dated 06.06.2019.
- Cost of the contract is Rs. 22.38 Crore Approx. (through IRF).
  - Balance work comprises of development of various modules:-
    - Configuration and Implementation of Scheduling, Meter Data Management ,Energy Accounting and Open Access Software along with due to changes in Government CERC & BERC regulations, etc. from time to time
    - Configuration of software for implementation of different Fees and Charges
    - Shutdown and LC/Outage Management Software
    - E-logbook and Control Room Management Software
    - Reporting Solution
    - Management Information System Dashboard and Analytics Portal
    - Mobile App (Android/iOS)
    - SLDC Website with content management System
    - SAMAST Digitalization
    - Data Archival and Retrieval
    - Knowledge management Software

Status of Implementation of Balance Work of SAMAST

S.N	Activity	Status	Remarks
1.	Commencement of Load Forecasting	Done	PMC (Power Management Cell) department of BSPHCL has awarded the work for carrying out daily load forecasting
2.	Commencement of Scheduling by SLDC for all the Intra State Entities	Process initiated	Scheduling software deployed. Master data for all intra-state entities are being collected/ configured in system. To be operational from Sep'19
3.	Formation of a State Power Committee for preparation of Account	Done	
4	Establishment of State Regulatory Pool Account	Done	

Status of Implementation of Balance Work of SAMAST

S.N	Activity	Status	Remarks
5.	Computation of transmission losses for each 15-min by SLDC	In progress	Software is being updated to capture meter data and calculate loss at 15 min interval. AMR integration for fetching T-D meter data is almost done. To be completed Oct '19.
6.	SLDC Website	In progress	Initial design of website is finalised. To go live from Nov'19 onwards
7.	Monthly State Energy Account (SEA)	In progress	SLDC to start preparing Monthly Energy Account of state thermal stations from Oct'19
8.	Adequacy of HR in SLDC as approved by SERC	Done	Partially deployed

Funding for SAMAST

DPR for implementation of SAMAST amounting to Rs. 93.76 Crore (excluding GST) was approved in BoD of BSPHCL on dated 19.02.2018.

Proposal for PSDF grant for implementation of Balance work of "SAMAST" in SLDC amounting Rs.93.76 Cr. was submitted to NLDC- PSDF on dated 26.02.2018.

Clarification sought regarding revision of the estimate by sub-Group TESG of PSDF held on 31.05.2018.

Revised estimate amounting Rs. 81.69 Cr submitted to NLDC-PSDF on 31.07.2018.

Funding for SAMAST (Contd.)

Metering Scheme amounting Rs. 73.06 Cr was awarded on equity ratio of 80:20 (80% - Bank Loan 20% - Grant by Bihar Govt.).

Again sub-Group TESG of PSDF suggested to review estimates and submit the revised proposal as per meeting held on 19.09.2018.

After revisiting proposal, Some items such as AMC including Manpower Cost & Civil Work was excluded as suggested by TESG and Final Revised estimate amounting Rs.11.75 Cr for B/W of SAMAST was submitted for PSDF Grant to NLDC on 26.10.2018.

Funding for SAMAST (Contd.)

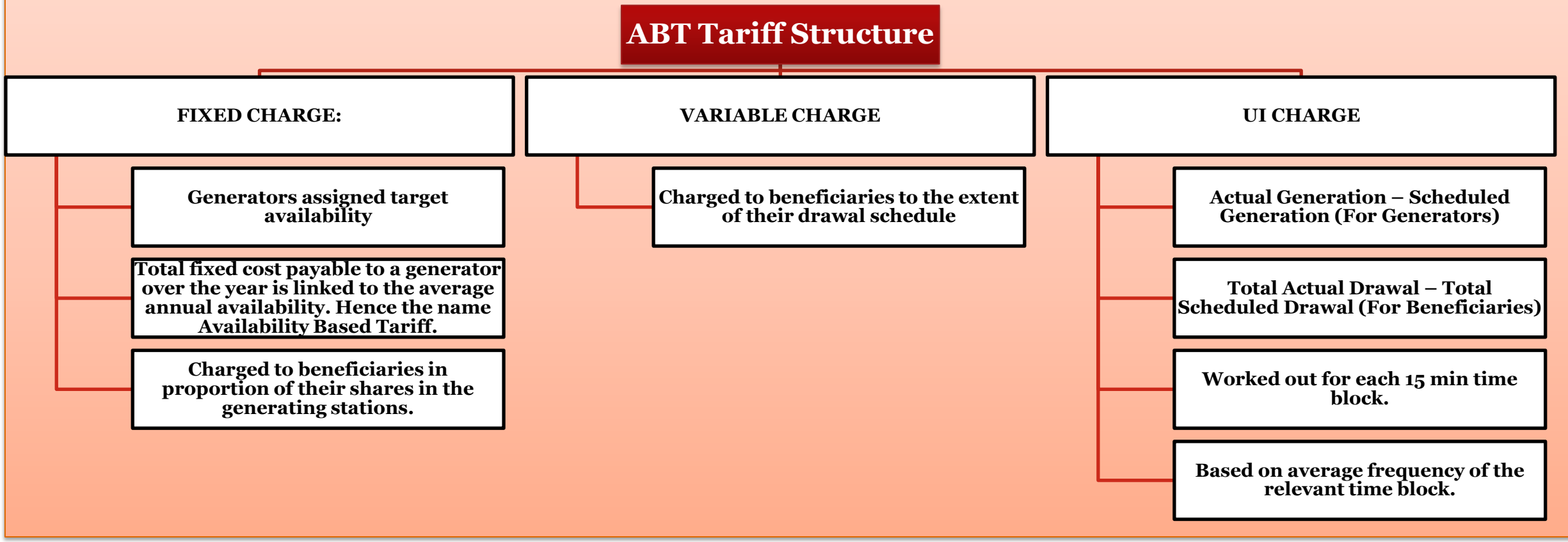
On 25.01.2019, BSPTCL requested to NLDC-PSDF to allow to place work order in anticipation of approval of PSDF grant.

During 49th TESG meeting held on 25.03.2019, NLDC –PSDF mentioned that further 3-4 months will take for fund release.

However, to avoid further delay and to ensure timely completion of SAMAST recommendations, BSPTCL decided to use Internal Resource Fund (IRF) as per direction of Hon'ble BERC for Balance Work of SAMAST (Engagement of Consultant/Solution provider for implementation etc.)

Introduction of ABT

- **Availability Based Tariff** (ABT) is a frequency based pricing mechanism applicable in India for unscheduled electric power transactions.
- CERC issued ABT order dated 04.01.2000 and it is implemented in WR wef 01.07.2002 and then in other regions.



Status of ABT/DSM in Bihar

Load Forecasting is done by PMC, BSPHCL

- **Three Part Tariff structure for all long and medium term contract to facilitate Merit order dispatch.**
- **Facilitate development of power market.**
- **DSM bills for Open Access is being generated from system.**


Thank you!

बिहार विद्युत विनियामक आयोग

Bihar Electricity Regulatory Commission

Status of Implementation of Regulations on Forecasting, Scheduling and Deviation Settlement in Bihar

2nd Sept 2019

Evolution of Forecasting, Scheduling and Deviation Settlement Regulation

After blackout of national grid in 2012, CERC notified (Deviation Settlement Mechanism and Related Matters) Regulations in 2014.

http://www.cercind.gov.in/2016/regulation/14.pdf

Repealed the Central Electricity Regulatory Commission (UI charges and related matters), Regulations, 2009.

http://www.cercind.gov.in/2019/regulation/DSM(5th%20Amendment)149.pdf

5 Amendments done in CERC DSM Regulations so far- latest on 28.05.2019

Amendments to CERC DSM Regulations, 2014 - Highlight

1st Amendment - 8.12.2014

- Upper limit of frequency set at 50.10 Hz
- http://www.cercind.gov.in/2014/regulation/noti_132.pdf

2nd Amendment - 07.08.2015

- Absolute error, Available capacity in context of wind and solar generators introduced.
- Provision of deviation and charges of deviation of wind and solar incorporated different than conventional generators deviation charges.
- Relaxation for deviation of volume for wind and solar generators.
- http://www.cercind.gov.in/2015/regulation/Noti7.pdf

3rd Amendment - 06.05.2016

- Renewable rich State has been incorporated.
- Provision and methodology of Deviation for Renewable rich States included.
- Deviation volume limited to 48 MW for Buyer/Seller for schedule less than or equal to 400 MW.
- No Additional Charges of Deviation for violation of volume limit by Solar and Wind Generators.
- http://www.cercind.gov.in/2016/regulation/Noti123.pdf

Amendments to CERC DSM Regulations, 2014 - Highlight

4th Amendment - 20.11.2014

- DSM charges linked to Area Clearing Price (ACP), Day Ahead Market (DAM).
- Frequency bandwidth squeezed from **49.7- 50.10 Hz** to **49.85- 50.05 Hz**.
- Total Deviation in a Day restricted to **3%** and **1%** for drawee entities and Generators respectively with **20 %** additional Deviation Charges.
- Sign change of deviation after every 6-time blocks with additional charges @ 20% per violation introduced.
- http://www.cercind.gov.in/2018/regulation/dsm_fourth_amendment11-22-2018.pdf

5th Amendment - 28.05.2019

- Daily Base DSM Charge, Time Block DSM Charge included.
- Inter-regional, Cross boarder Charges for Deviation based upon unconstrained market Clearing Price in DAM Market.
- Upper frequency Limit for additional charges of deviation for over- injection/under-drawal has been increased to **50.10** Hz from **50.05** Hz.
- Sign change of deviation again modified from 6-time blocks to **12-time blocks** (Till FY 20) with additional charges per violation.
- Sign change deviation volume relaxed to 20 MW.
- http://www.cercind.gov.in/2019/regulation/DSM(5th%20Amendment)149.pdf

Evolution of Forecasting, Scheduling and Deviation Settlement Regulation

CERC notified **Procedure for Implementation of the Framework on Forecasting, Scheduling and Imbalance handling for Renewable Energy (RE) Generating Stations including Power Parks based on Wind and Solar at Inter-State level** in March 2017.http://www.cercind.gov.in/2017/regulation/pro.pdf

Highlights are:

- Lead Generator
- Principle Generator
- Solar Power Park Developer
- Wind Power Park Developer

Evolution of Forecasting, Scheduling and Deviation Settlement Regulation

Forum of Regulators (FoR) notified **Model Regulations on Forecasting, Scheduling and Deviation Settlement of Wind and Solar Generating Stations at the State level** in 2015.

http://www.forumofregulators.gov.in/Data/study/MR.pdf

Highlights are:

- Pooling Station
- Qualified Coordinating Agency (QCA)
- Deviation Charges of Wind and Solar Generators within the State ***Prior to Notification of Regulation***
- Deviation Charges of Wind and Solar Generators within the State ***Beyond notification of Regulation***
- Deviation Charges of Wind and Solar Generators selling power outside of State

Evolution of Forecasting, Scheduling and Deviation Settlement Regulation

Forum of Regulators Notified Model DSM Regulations at State Level in March 2017.

http://www.forumofregulators.gov.in/Data/Working_Groups/DSMR.pdf

Highlights are

- Qualified Coordinating Agency (QCA)
- Deviation Charges for Solar & Wind as well as conventional Generators
- Additional Charges for deviation in line with CERC

Deviation Settlement in Bihar – State Context

- Bihar has no Regulation to cater deviation at Intra-State level.
- Bihar rely mostly on ISGS and ISTS system to meet their day to day power requirements.
- Most of the ISGS plants are conventional coal based (NTPC) and Hydro power (NHPC).
- No major Solar & Wind Generators in Bihar.
- Number of Solar generator is very less and no wind Generator.

Deviation Settlement in Bihar – Progress Made

Draft BERC (Intra-state Availability Based Tariff and Deviation Settlement Mechanism) Regulations

- Publication in June 2019
- Public hearing on 06.08.2019.
- Next hearing on 03.09.2019

Highlights

- Incorporated basis concept of CERC DSM regulation till 4th amendments .e.g.: frequency band, step size and time block wise rates, Percentage (%) of variation from schedule etc.
- DSM described in context of ABT.
- Covered all generators (Conventional and **RE including Wind & Solar**).
- Applicable for all buyers within the State.
- Includes Scheduling and Dispatch as per Grid Code.
- Includes Energy accounting and settlement
- **Distinguished Features: Volume limit of deviation taken as : 10 MW, (10- 13) MW, (13 – 16) MW & > 16 MW**

When quantum and number of RE Generation (Wind & Solar) in State will increase, QCA shall be incorporated for Wind & Solar Generators.

DSM Regulations by Other States

SERC	Status	Date of Notification	Regulation
AERC	Draft	02-Nov-18	Draft AERC (Deviation Settlement Mechanism and related matters), Regulations, 2018
	Final	06-Nov-18	AERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2018
APERC	Final	21-Aug-17	APERC Forecasting Scheduling and Deviation Settlement of Solar and Wind Generation Regulation 2017 4 of 2017
APERC	Final	11-Aug-06	Interim Balancing and Settlement Code
CSERC	Final	07-Nov-16	CSERC (Intra-state Availability Based Tariff and Deviation Settlement Mechanism) Regulations, 2016
GERC	Final	19-Jan-19	GERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2019
HERC	Final	29-Apr-19	Haryana Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2019.
	Final	29-Apr-19	Haryana Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) Regulations, 2019
JSERC	Final	08-Dec-16	JSERC (Scheduling and forecasting for wind and solar) Regulations 2016

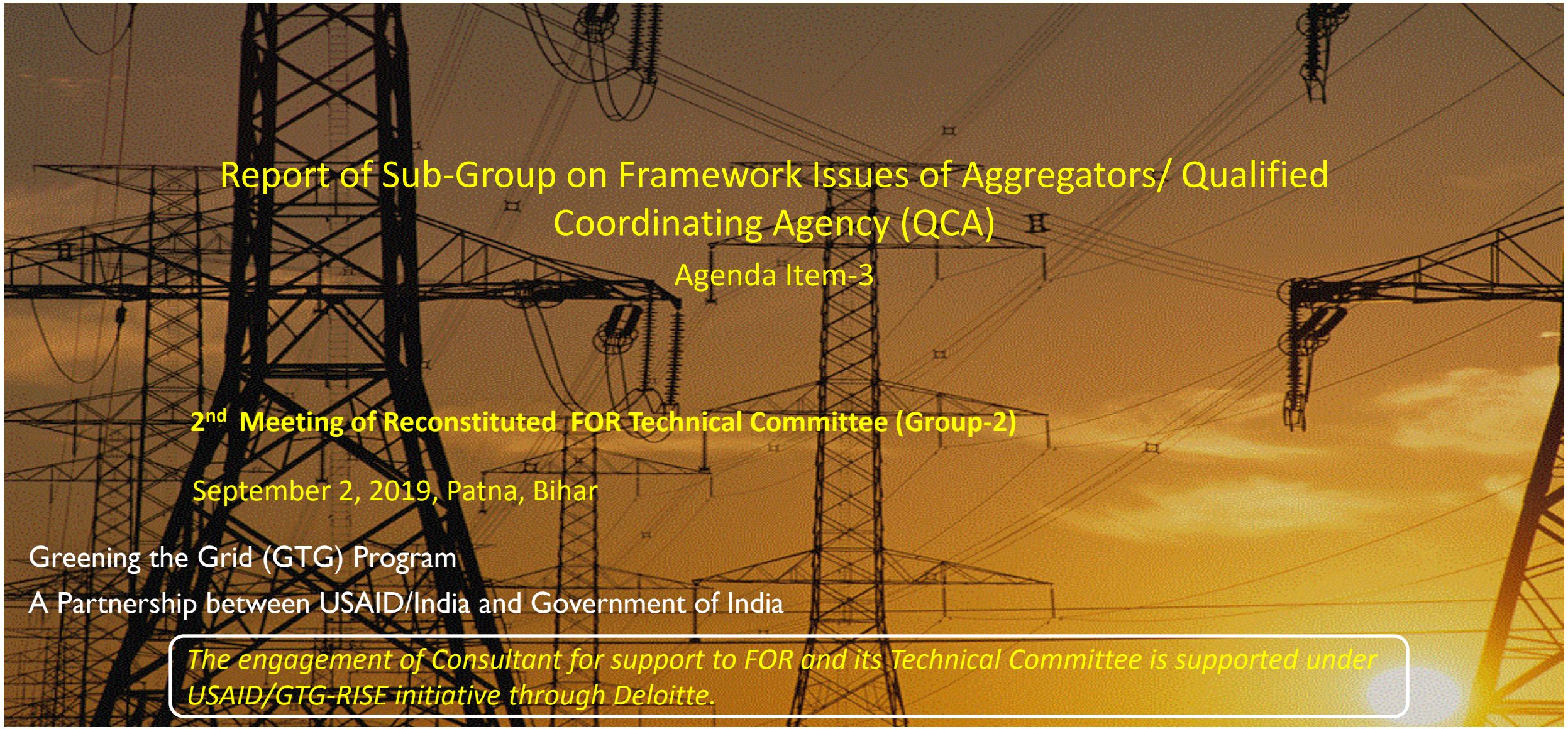
DSM Regulations by Other States

SERC	Status	Date of Notification	Regulation
JERC (Manipur & Mizoram)	Final	09-Aug-16	Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources, Regulations, 2016
KERC	Final	31-May-17	KERC (Forecasting, Scheduling, Deviation settlement and Related Matters for Wind & Solar Generation Sources) Regulations, 2015
MERC	Final	20-Jul-18	Maharashtra Electricity Regulatory Commission (Forecasting, Scheduling and Deviation Settlement for Solar and Wind Generation) Regulations, 2018
	Final	01-Mar-19	Maharashtra Electricity Regulatory Commission (Deviation Settlement Mechanism & related matters) Regulations, 2019
MPERC	Final	20-Apr-18	MPERC (Forecasting, Scheduling, Deviation settlement Mechanism and related matters of wind and Solar generating stations) Regulations, 2018
	Final	30-Oct-09	Madhya Pradesh Electricity Balancing and Settlement Code, 2009
OERC	Draft	23-Sep-15	OERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2015.
	Final	17-Dec-07	Intra-State Availability Based Tariff (ABT) Regulations, 2007
PSERC	Final	07-Jan-19	Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources, Regulations 2019

DSM Regulations by Other States

SERC	Status	Date of Notification	Regulation
RERC	Final	14-Sep-17	RERC (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 2017
	Final	24-Aug-06	Intra State ABT
TERC	Final	18-Nov-16	TERC (Forecasting, Scheduling, Deviation Settlement and Related Matter of Solar and Wind Generation Source), Regulations 2016
TNERC	Final	01-Mar-19	Forecasting, Scheduling and deviation settlement mechanism and related matters for Wind and Solar Generation Regulations
	Final	01-Mar-19	Deviation settlement mechanism and related matters Regulations 2019
TSERC	Final	30-May-18	TSERC (Forecasting, Scheduling, Deviation Settlement and Related Matters for Solar and Wind Generation Sources) Regulations No.3 of 2018.
UERC	Final	06-Feb-17	UERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2017
UPERC	Final	12-Dec-18	ABT (Solar & Wind) Regulation 2018 (Forecasting, Scheduling, Deviation Settlement and Related Matters)
WBERC	Final	25-Mar-08	WBERC (Balancing and Settlement Code) Regulations, 2008
	Draft	23-Feb-17	Draft West Bengal Electricity Regulatory Commission (Balancing and Settlement Code) Regulations,2017

Thank You



Report of Sub-Group on Framework Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Agenda Item-3

2nd Meeting of Reconstituted FOR Technical Committee (Group-2)

September 2, 2019, Patna, Bihar

Greening the Grid (GTG) Program

A Partnership between USAID/India and Government of India

The engagement of Consultant for support to FOR and its Technical Committee is supported under USAID/GTG-RISE initiative through Deloitte.

Context

- Need for addressing issues related to QCA and Model Contract arrangement was deliberated during **16th Meeting of FOR Technical Committee** meeting at **Gujarat**.
- Subsequently, during **20th Meeting of the FOR Technical Committee**, representatives from Andhra Pradesh State Load Dispatch Centre (APSLDC) and few QCAs made presentations sharing their experience of operationalizing Forecasting and Scheduling for Renewable power projects in various states.
- A need for undertaking a detailed study on the QCA's role, responsibility and accountability was discussed. In addition, the possibility of examining the roles and responsibilities of Aggregators was also discussed.

Constitution of the Sub-Group:

- FOR Technical Committee in its 20th Meeting held on **17th July 2018** at CERC, New Delhi, constituted a Sub-group headed by Shri Preman Dinaraj, Chairperson KSERC to examine the issues faced/likely to be faced by Aggregator/ QCA.
- Other Members of the Sub-Group include Shri SK Soonee, Advisor POSOCO, and Members/representatives from POSOCO, KERC, APERC and FOR Secretariat.

Mandate of the Sub-Group:

1. To examine the feasibility of drafting a Model Tripartite Agreement between the QCA, SLDC and Renewable Energy generators
2. To examine the generic concept of Aggregator in the Power Sector.

Meetings of the Sub-Group on Aggregator/QCA

- **7th September, 2018 (CERC, New Delhi) – Presentations and deliberations covered following:**
  - draft contours of model agreement specifying the proposed roles and responsibilities of the parties
  - Wider role of the Aggregators in the ever emerging, electricity market scenario.
  - Need for demarcation of roles and identify potential areas of disputes between the RE generators and QCA

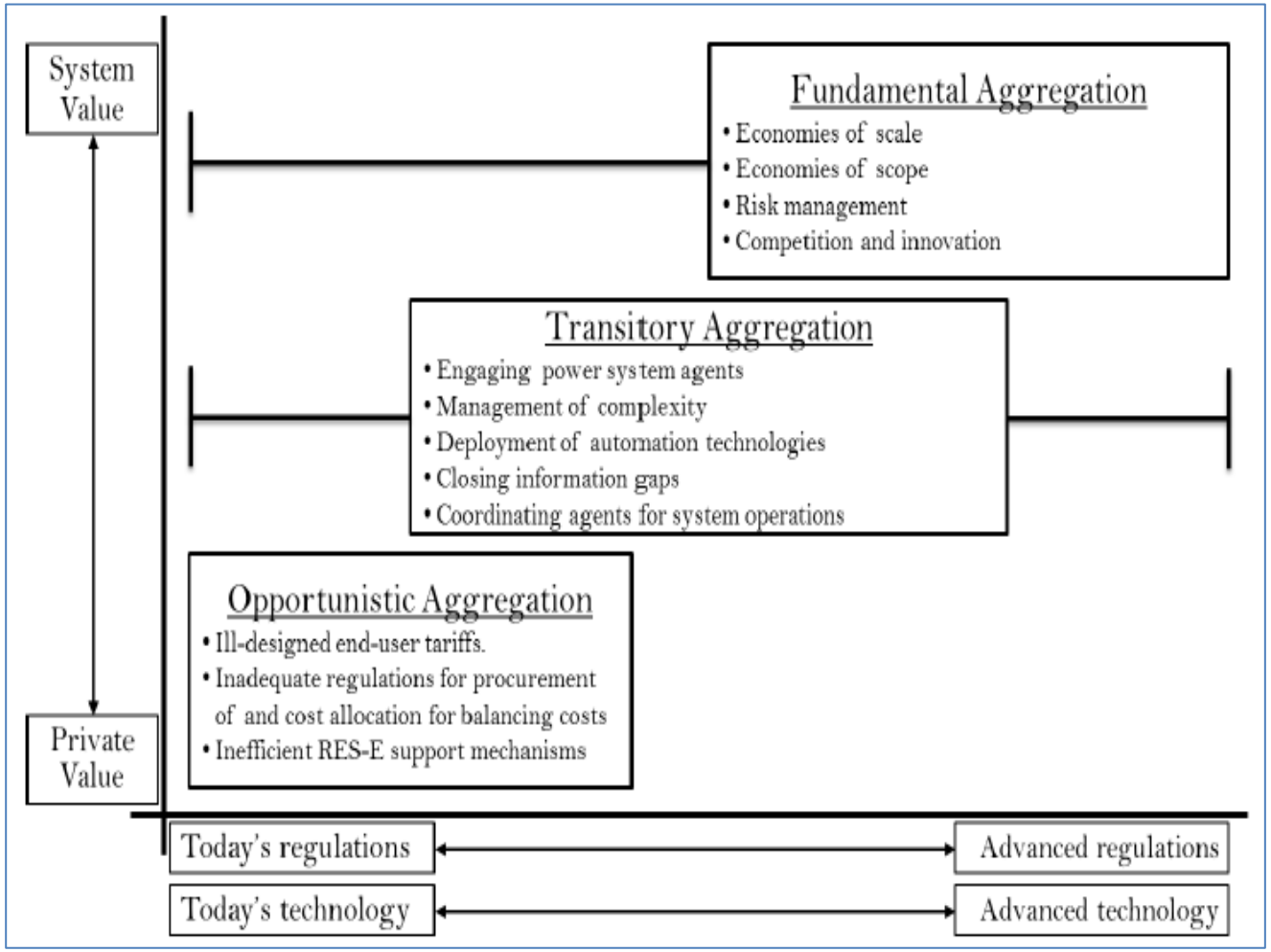
- **21st December, 2018 (CERC, New Delhi) – Presentations by Consultant and deliberations covered following:**
  - International experience of Aggregators highlighting the business models operating in US and EU markets.
  - Experience of QCA in India and the contours of the model agreement.
  - Challenges to be addressed for enabling framework for Aggregators in the Indian context.
  - Regulatory aspects of the twin interactions of QCA-SLDC and QCA-RE Generator.

- **22nd February, 2019 (CERC, New Delhi) - Deliberations on Draft Report**
  - Review of contents/structure of the draft Report.
  - Specific issues on institutional structure, legal status, interactions of QCA-SLDC and QCA-RE Generators, guidelines for model agreement were discussed at length.

- **14 June, 2019 (KSERC, Thiruvananthapuram) – Deliberations and Finalisation of Report**
  - Updation of Draft Report and important aspects of the Aggregator/QCA roles, its regulatory oversight and demarcation of roles.
  - Need for separate sets of Regulations governing activities of "Aggregator", as the market evolve.

- The Draft Report was discussed during the meeting of re-constituted technical committee of Gr-1 on 23rd August, 2019. based on the deliberations during the meeting the draft recommendations of the Sub-Committee are revised for discussions during Gr-2 meeting dated 2 Sept,2019.

Learnings from International Experience and its relevance for India



Source: MIT CEEPR Report on The Value of Aggregators in Electricity Systems

Key learnings from International Experience and relevance for India

- Aggregators operate in Demand Response, Distributed Energy Resources, Imbalance Markets and certain grid services.
- Aggregation business models are mostly market driven and role of regulators is limited;
- To protect consumers and ensure that they are dealing with financially solvent and technically competent aggregator companies, the Commission may consider establishing a certification process.
- Regulators may formulate Model Regulations to cover
  - Minimum standards of service quality
  - Providing Consumers with sufficient information for them to make informed decisions for selection of Aggregator
  - Requirement of transparency in transactions
  - Model contract with standardized clauses on contract term, privacy protection, customer information, technical /process requirements

Role and Responsibilities of QCA

Definition of QCA:

"Qualified Co-ordinating Agency" (or "QCA") means the agency appointed by the Wind or Solar Energy Generators connected to a Pooling Sub-Station, or by an individual Generator connected directly to a Sub-Station, to perform the functions and discharge the obligations specified in the F&S Regulations;

Key Role and Responsibilities of QCA:

- To collect, verify, ascertain and maintain records of generator-wise static project information [turbine/inverter].
- To act as 'single point of contact' between SLDC and RE Generators for implementation of F&S Regulations.
- To coordinate with RE Generator(s) for the forecasts/ schedule(s).
- To communicate aggregate forecast(s)/schedule(s) to SLDC (day ahead) and revision of schedules during intra-day operations in line with the relevant Regulations.
- To receive instructions from SLDC for curtailment, real-time operations and cause to implement such SLDC instructions.
- To facilitate with STU/SLDC for establishment of facilities for communication of meter data/RTU data as required.
- To establish data/information exchange protocol and keep records of data collected for each Generator
- To receive Statements of Energy Account/ Deviation Account [Weekly/Monthly] and Deviation Charge Bill Amount from SLDC.
- To prepare and share Generator-wise 'Statement of De-Pooling Account' as per approved Regulations.
- To receive/make payments from/to RE Generator(s) and to make/receive payments to the State Deviation RE Pool Account,
- To claim and receive payment for interest/delayed payment charges from RE Generators.

Key Framework Issues for Aggregators/QCA

- Sub-group has studied the **F&S Regulations, Operating Procedures and experiences** in states where F&S framework is already operational.
- Sub-Group has **interacted with key stakeholders** SLDCs/QCAs and verified existing practices, modalities of contracting arrangements
- Upon deliberations, Sub-group deliberated and **identified following key issues** to be addressed:
  - **Issue-1** :Legal status of QCA and regulatory oversight
  - **Issue-2** :Institutional structure of QCA
  - **Issue-3** :QCA – SLDC interactions
  - **Issue-4** :QCA – RE Generator interactions
  - **Issue-5** : Guidelines for Model Agreement between QCA and RE Generator(s)
  - **Issue-6** : Regulating QCA and Aggregators

Summary of Recommendations

Issue 1: Legal Status of QCA and Regulatory Oversight

- Concept of QCA is already recognized by Regulators. **QCA will operate under control of SLDC**, subject to conditions.
- Legal Status for QCA shall be established on the lines of **regulatory precedents for aggregators** such as **'Lead Generator', 'Principal Generator', Professional Member'** in Power Markets and Solar Park Developer.
- **Section 66** of Electricity Act, 2003 (EA,2003) for development of Market provides enabling legal status to QCA along with **Section 28, 29, 32, 33** which recognise RLDC's/SLDC's powers and functions to bring it under control of RLDC/SLDC to facilitate secure and reliable grid operations along with necessary regulatory oversight.
- Further, **Appropriate Commission may recognize 'Aggregators' in general and QCA in particular**, as **Regional Entity/State Entity**, for the purpose of bringing such **entities under control of RLDC/SLDC**, as the case may be, to facilitate secure and reliable grid operations along with framing conditions for **necessary regulatory oversight** over their operations.
- The Appropriate Commission may require to amend the provision of the State Grid Code to recognize the QCA as State Entity.

Summary of Recommendations

Issue 2: Institutional structure of QCA

- Considering the simplicity for operationalization, the Institutional structure for **QCA as an Agent or Representative of Generators** may be preferred.
- RE Generators at Pooling Sub-Station can engage **Lead/Principal Generator** or **Third-Party Agency** through **'Agreement'** to perform role of QCA.
- **One QCA** to be appointed per Pooling Sub-station **with majority principle** i.e. consent of Generators having **more than 50% of the installed capacity** at Pooling Sub-Stations for acting on behalf of them subject to condition of **minimum threshold capacity limit** to be specified by Appropriate Commission.
- Above such threshold capacity limit, **RE Generators will have choice** either to schedule directly or schedule through QCA.
- Once the QCA will be appointed by following majority principle, **it will act on behalf of all the generators** within Pooling Sub-Station. However, if RE generators opt for separate QCA in line with minimum threshold capacity limit specified by the Commission, they will provide their schedule separately through their QCA within same Pooling Station.
- In case the RE generators failed to appoint QCA within stipulated time frame SLDC, shall nominate the professional agency from among the list of empaneled list of QCAs which shall be binding on the RE generators at the PSS, until such time the RE generators appoint their own QCA.
- The QCA may **undertake operation of multiple Pooling Sub-Stations**, however deviation accounting and energy accounting of each Pooling Sub-Station **shall be maintained separately**. Aggregation of scheduling and forecasting of multiple Pooling Sub-Stations shall not be allowed.

Summary of Recommendations

Issue 3: QCA-SLDC Interaction

- As QCA is a State Entity, the QCA-SLDC interactions will be regulated.
- Major aspects governing the interaction including eligibility, registration with system operator, commercial and other aspects should be defined as part of regulations.
- The details of terms and conditions of appointment of QCA may form the part of detailed procedure to be prepared by SLDC.
- Every QCA need to register themselves with SLDC as per the Detailed Procedures to be laid down by the SLDC.
- If any RE generators is not opting for QCA and decided to submit its schedule directly to SLDC, all the provisions of the QCA shall be applicable to that generator and it will have to undertake the role of QCA for its own generators.
- Non compliance of provisions of F&S Regulations or procedures, including continued delay/default in payment of applicable charges/fees/levies shall be liable for proceedings under Section,142 of the EA,2003.

Issue 4: QCA-RE Generator Interaction

- The QCA-RE Generator interactions are not under regulatory purview.
- To facilitate the development of QCA and to bring in uniformity, **Guidelines for Model Agreement** between QCA and RE Generators has been covered under this report.
- It is clarified that the guidelines for Model Agreement between QCA and RE Generators provided under this Report are **only indicative and suggestive**.
- The same may be considered only for guidance purpose to **facilitate evolution of standard contract** framework.
- RE Generators would be **free to deviate or formulate their own commercial agreement** based on terms to be mutually decided between parties and this **Sub-Group in no way suggests that the principles and broad contours** covered under this **Model Agreement guidelines are binding on parties**.

Summary of Recommendations

Issue 5: Guidelines for Model Agreement

General

- **Premise**
  - Parties
  - Project Details
  - Premise for appointment
- **Objective / Purpose of Agreement**
- **Important Definitions**
  - Effective Date
  - Absolute Error
  - Pooling Sub-station
  - Interconnection Point
  - Metering Point
  - De-pooling

Powers, Functions & Role of QCA & RE Generators

- **Part-A**
  - Mobilisation
  - Registration
- **Part-B**
  - Forecasting
  - Scheduling/ revisions
  - Real time coordination
- **Part-C**
  - Meter Data collection
  - Real time Coordination
  - Information exchange
  - Data management
- **Part-D**
  - De-pooling & Commercial settlement
  - Payment modalities
  - Treatment for delay or part payment

Data Sharing, Energy Accounting & Payment

- **Information / Data Sharing**
  - Data Requirement
  - Sharing protocol
  - Data management policy
- **Metering, Energy Accounting, Billing**
  - Formats for Meter/Energy Account statement
  - Deviation Account Statement
  - De-pool statement
- **Payment Modalities**
  - Payment terms for De-pooling charges
  - Delayed payment charges/interest
  - Payment security mechanism

Commercial conditions

- **Commercials**
  - QCA fees and charges
  - Recovery of other costs
  - Payment terms
- **Term and Termination**
  - Period
  - Termination conditions & treatment
- **Events of Default and treatment**
  - By QCA
  - By RE Generator(s)
- **Dispute Resolution**
  - Reconciliation & Arbitration
  - Governing jurisdiction
- **Miscellaneous**
  - Representation & Warranty
  - Change of Law / Taxes
  - Force Majeure
  - Confidentiality
  - Limitation of liability

Summary of Recommendations

Issue 6: Regulating QCA and Aggregators

- At present, role of QCA is limited. However, with **evolution of electricity market, emergence of DR and DER**, role of Aggregators would expand.
- There should be regulatory oversight and **separate Model Regulations** be formulated to govern their operations. Thus, the Sub-Group opined that **there is a need for separate sets of Regulations governing activities of "Aggregator", in general, as the market evolve**.
- Areas where Commission may formulate Regulations for governing the operations of Aggregators and cover them through regulatory oversight are:
  - Minimum **standards for service** quality
  - Providing consumers with **sufficient information to make informed decisions** about choosing an aggregator or retail customers
  - **Requirements of transparency** in transactions
  - To **protect consumers** and to ensure that they are dealing with financially solvent and technically competent aggregator companies, the Commission may consider **establishing a certification process**.
  - **Model contracts** suggesting **standardized clauses on contract terms**, privacy protection for customer information, terminal process, etc. in such contracts by Aggregators with customers.

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

FOR Sub-Group on Reserves and Ancillary Services at State Level - Status Update

2nd September 2019

Background

- FOR Standing Technical Committee: 22nd Meeting
  - 01st November 2018, New Delhi

- Need for pilot on Reserves and Ancillary Services at intra-state level

- Constitution of Sub-Group on Reserves and Ancillary Services at intra-state level

Constitution

- *Shri S.K Soonee, Advisor , POSOCO - Chairman*
- Members
  - Representative of GERC (Gujarat)
  - Representative of MERC (Maharashtra)
  - Representative of MPERC (Madhya Pradesh)
  - Representative of TSERC (Telangana)
  - Chief Engineer, SLDC Gujarat
  - Chief Engineer, SLDC Maharashtra
  - Chief Engineer, SLDC Madhya Pradesh
  - Chief Engineer, SLDC Telangana
  - Executive Director, WRLDC, Mumbai
  - Executive Director, SRLDC, Bengaluru
  - Representative of NLDC, New Delhi
- *Representative of CERC/FOR - Convenor*

Meetings Held

- 1st Meeting : 6th May 2019 at NLDC
- 2nd Meeting: 6th June 2019 at SLDC Gujarat, Vadodara
- 3rd Meeting: 26th July 2019 at SLDC MP, Jabalpur
- 4th Meeting: 30th August 2019 at SLDC Maharashtra, Mumbai

Reserves and Ancillary Services
Key Design Aspects

- Tariff of Intra-state Generation Plants (Single-part/Multi-part)
- Mechanism for Declaring Capability, Ramp Rates, Technical Minimum
- Scheduling and Despatch
- Imbalances and Settlement thereof
- Computation of Reserves Quantum
- Compensation Mechanism for Reserve
- Incentive/Mark-up
- Settlement Systems
- Recovery for Sustainable Mechanism

Basic Data & Reserves Computation

- **Basic Data required**
  - Declared Capability (DC) and DC-on-bar
  - Injection Schedule
  - Plant Availability – Pmax
  - Technical Minimum – Pmin
  - Variable Charges (VC)
  - Ramp Up & Ramp Down Rates

- **Computation of Reserves**
  - Cold Reserve = DC – (DC-on-bar)
  - Hot/Spinning Reserve
    - Regulation Up Possible
      = (DC-on-bar) – Schedule
    - Regulation Down Possible
      = Schedule – Technical Minimum
  - Real Reserve : Limited by ramping

Despatch of Ancillary (ERS) - Using Reserves

- Merit Order
- Despatch to the Pool
- Payment to Ancillary Service Provider
- Incorporation in the schedules
- Settlement System
- Incentives
- Fiscal Sustainability and Pool Design

Economic Despatch

- Objective Function
  - Minimize Total Generation Variable Cost

- Constraints
  - Equality
    - Meeting total requisition
  - Inequality
    - Transmission Constraints
    - Technical Minimum
    - Maximum Generation
    - Ramp Up/Down Rates

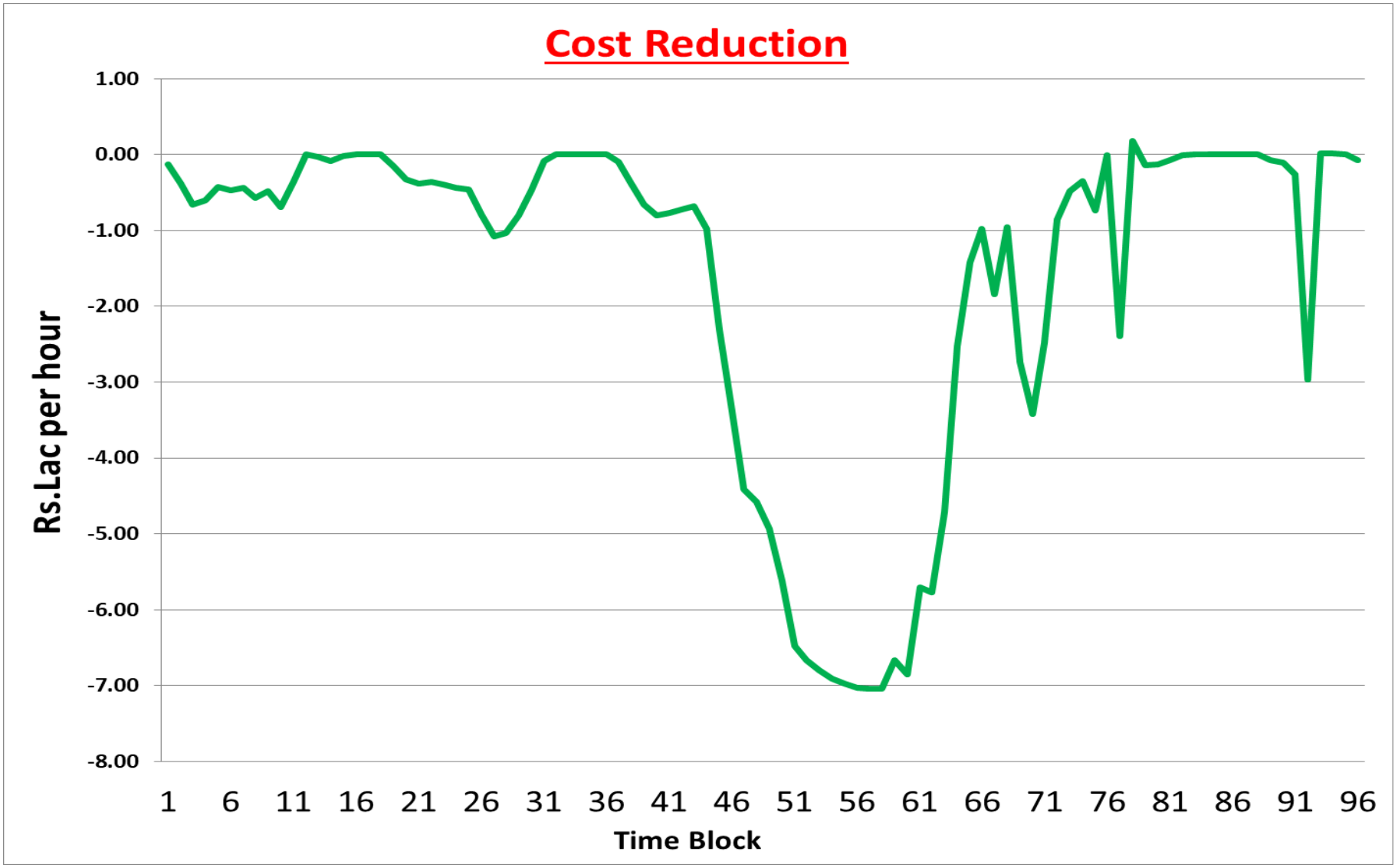
Deliberations

- Sharing of the experience gained at inter-state level regarding implementation of RRAS & FRAS
- Optimization based Model developed in Excel for optimal despatch of thermal generation
  - Developed at NLDC
  - Despatch of reserves under ancillary incorporated in the model
  - Model shared with all Member States
- Model run successfully by SLDC MP, Maharashtra and Gujarat

Case Study : MP (1)

Case	Avg. Cost Pre-Solver (Rs/unit)	Avg. Cost Post-Solver (Rs/unit)	Marginal Station	SMP
Morning Demand Max	2.12	2.10	Gadarwara	3.93
Morning Demand Min	1.78	1.74	Singaji Stg II	2.57
Evening Demand Max	2.04	2.04	Torrent	5.92
Evening Demand Min	1.78	1.72	Singaji Stg II	2.57
Max Surrender in a day	1.77	1.72	VSTPS-V	1.76
Mininmum Surrender in a day	1.98	1.98	Torrent	5.92
Maximum RE generation	1.76	1.72	VSTPS-III	1.77

Case Study : MP (2)



Cases Summary : Maharashtra

Cases	Production cost before Optimization (Lakhs)	Production cost After Optimization (Lakhs)	Total Saving (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	12

(NOTE- It shows that after optimization System is having maximum benefits in terms of Average Cost)

Case Study : Gujarat

case	Block	date	avg cost Rs/MW/hour	opt. cost Rs/MW/hour	shadow price Rs/MW	Allowable Increase MW	Allowable Decrease MW
1	89	20-06-2019	347.63	340.56	1990	66	216
2	61	21-07-2019	400.51	392.69	3670	11.16	227.84
3	80	21-07-2019	320.82	318.38	3670	14.27	111.73
4	21	22-07-2019	410.75	387.29	3330	54.83	145.17
5	61	22-07-2019	386.42	386.04	3840	44.19	125.81

Further Actions of Sub-Group

- Online Survey for all states

  https://docs.google.com/forms/d/e/1FAIpQLSfSUgcGh6e76USjtqWD2BePWqjUxX_ys3gh7WqoQR0r3ZHZ5Q/viewform

  - Total 41 Questions
  - Responses received so far: From 3 States (SLDC Maharashtra, Odisha, West Bengal). Others being pursued
- Special Training Program (Tutorial form) being organised for the members of the Sub-Group
  - Young enthusiasts from SLDCs to participate
- Deliberation regarding inclusion of states from NR (UP), ER (WB) and NER (Assam)
  - ABT/SAMAST implementation a pre-requisite
  - Advise of Technical Committee sought in this regard
- Expected outcome
  - Readiness to implement a pilot in these states as per the orders/directive by respective SERC
  - Draft Model Regulations for State Level Ancillary

Thank You !

The Real Time Market – RTM

2nd Meeting of Standing Technical Committee – Group –II

Dr. S.K. Chatterjee
Chief (RA Wing), CERC

02.09.19

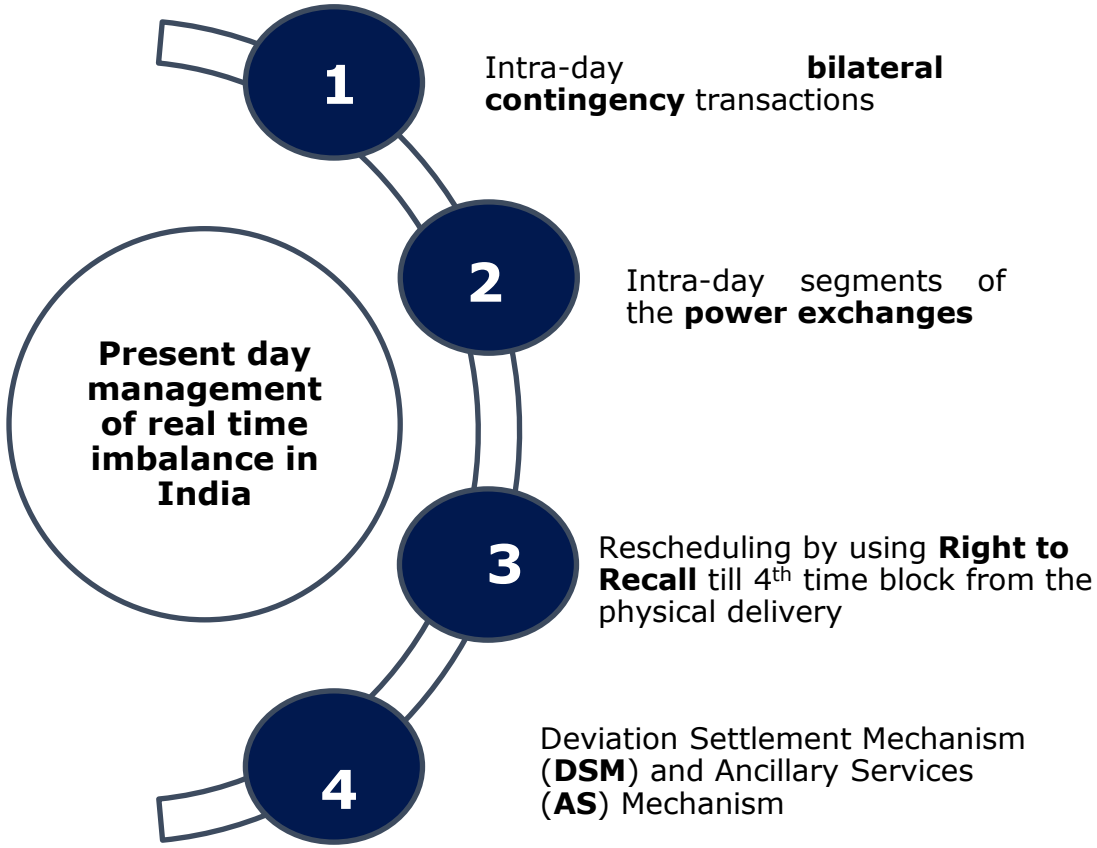
Contents

- Real Time Market - Rationale & Benefits
- Real Time Market Design – as suggested in Discussion Paper
- Comments on Discussion paper
- Proposed Real Time Market Design

Real Time Market- Rationale and Benefits

Energy Imbalance Management at Real Time

Existing Mechanism and their Issues



1. Intra-day **bilateral contingency** transactions
2. Intra-day segments of the **power exchanges**
3. Rescheduling by using **Right to Recall** till 4th time block from the physical delivery
4. Deviation Settlement Mechanism (**DSM**) and Ancillary Services (**AS**) Mechanism

Treatment of DSM

DSM is meant for last mile imbalance management and frequency control.

DSM used as an avenue for real time energy procurement and sale;

Ancillary services have been used for a longer period

Liquidity in Power Exchanges

Volume traded under intra-day market approx. 0.1 % of total generation

Price discovery methodology of "Pay as you bid" instead of "Uniform Clearing price"

Absence of Gate Closure

- **Right to Recall**: Non participation of URS in intra day market due to right to recall prior to 4 time blocks .
- **Absence of gate closure** prevents firmness of schedule .

There is a need for real time market with Gate Closure

Rationale for RTM….1/2

Market Operation – Framework			
Categories of Market	**Day Ahead Market (DAM)**	**Real Time Market (RTM)**	**System Imbalance/Ancillary Services Market**
Purpose	Energy Trade	Energy Trade	Inadvertent deviation management
Market Operation – India			
Current	DA (self-scheduling + Power Exchange (PX))	Deviation settlement Mechanism (DSM) + Ancillary Services (AS) + Intra-Day (PX) + Re-Scheduling (4 time blocks prior to dispatch)+ Intra-day contingency	
Desirable	DA (self-scheduling + PX)	Real Time Market (Hourly), with gate closure	DSM + AS

Rationale for RTM….2/2

Larger Pool	• Organised platform with access to a larger pool for buyers and sellers
RE Integration	• Market mechanism closer to real time to handle RE variability
Avenue for Merchant plants	• Avenue for merchant / un-tied capacities to sell power
Managing demand in real time	• Option for managing real time load variation
Organized market vis-à-vis DSM	• RTM to induce generators / discoms to organized energy market and reduced dependence on DSM
Collective vs. Continuous bids	• Collective transaction expected to bring in confidence of stakeholders in RTM
Introduction of gate closure	• Provision of right to recall 4 time blocks before delivery affects firmness of schedules and in turn liquidity in the market. Hence the need for Gate closure.

Future power markets would be characterized by huge demand-supply variability leading to grid reliability issues

There is a need for designing of organized real time market in the country

Benefits of Real time markets

SNo	Benefits	Entity concerned
1	Discoms would **procure power** for real time imbalances **from organized markets** instead of leaning onto DSM	Discom
2	Discoms will have **access to a larger pool of generation** for the procurement of the power	Discom
3	**Prices discovered** under Market environment are **likely to be more efficient / transparent**	Social welfare
4	Gains realized by sale of URS power would be shared in the ratio of 50:50 with contracted beneficiary	Generator / Discom
5	Alternatively, **DISCOM can directly participate in the market** and sell surplus power and retain 100% gains.	Discom
6	RTM **incentivizes cheaper generators** by increasing their visibility at a national level	Generator
7	RTM provides default payment security	-

There are benefits to all stakeholders with the introduction of real time markets

Introduction of Gate Closure

Integrated Market mechanism

- **Mostly followed in US markets**.
- System Operator centrally optimizes the scheduling and dispatch of resources
- The Unit Commitment along with Economic Dispatch is carried out by the SO

Exchange Based Market mechanism

- Mostly, **European and Australian markets follow Exchange based markets**
- Trading of energy in exchanges throughout the day and clearing of market is based on trade prices.
- Bidding process is carried at a market operator level, hence the MO is largely dependent upon the bidders for sanctity of bids.

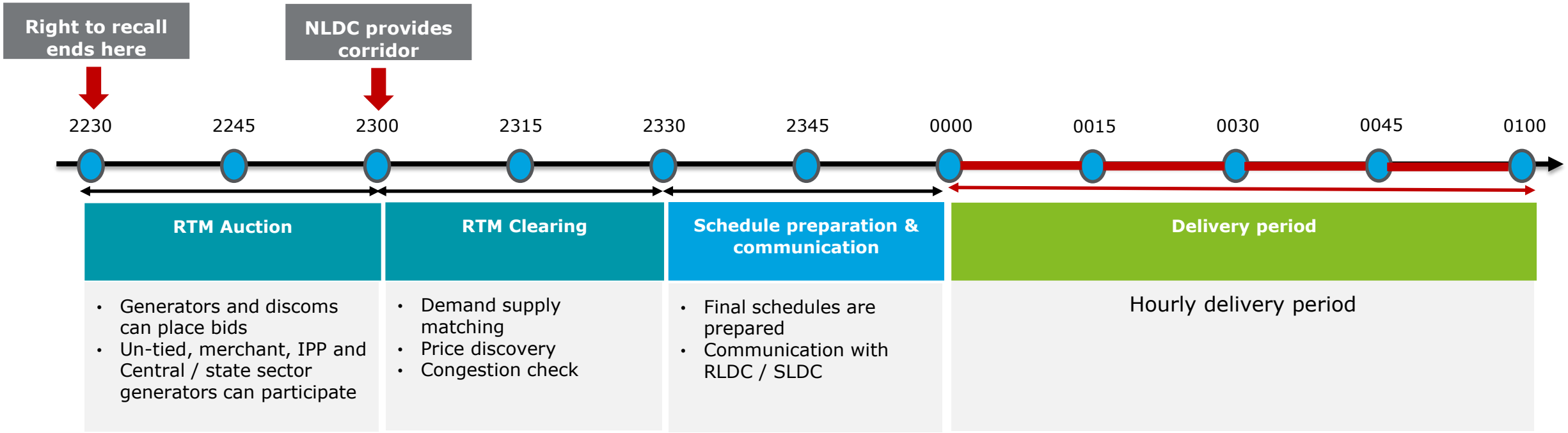
Concept of Gate Closure

In both types of Markets, at some point before physical delivery, schedules are frozen/finalized. This ensures clear knowledge of system imbalance to S/O.

System Operator then uses this information for maintaining reliability of the grid.

- Real Time Market Design – as suggested in Discussion Paper

Hourly Real time market as suggested in Discussion Paper



RTM auction start time	RTM auction end time	RTM clearing interval	Schedule prep and Communication	Delivery period (MCP and MCV will be discovered for each 15 minute block)
22:30 Hrs (of the previous day)	23:00 Hrs (of the previous day)	23:00-23:30 Hrs (of the previous day)	23:30-24:00 Hrs	00:00-01:00
23:30 Hrs (of the previous day)	00:00 Hrs (of the delivery day)	00:00-00:30 Hrs	00:30-01:00 Hrs	01:00-02:00
…				
21:30 Hrs	22:00 Hrs	22:00-22:30 Hrs	22:30-23:00 Hrs	23:00-00:00

Go to half hourly RTM

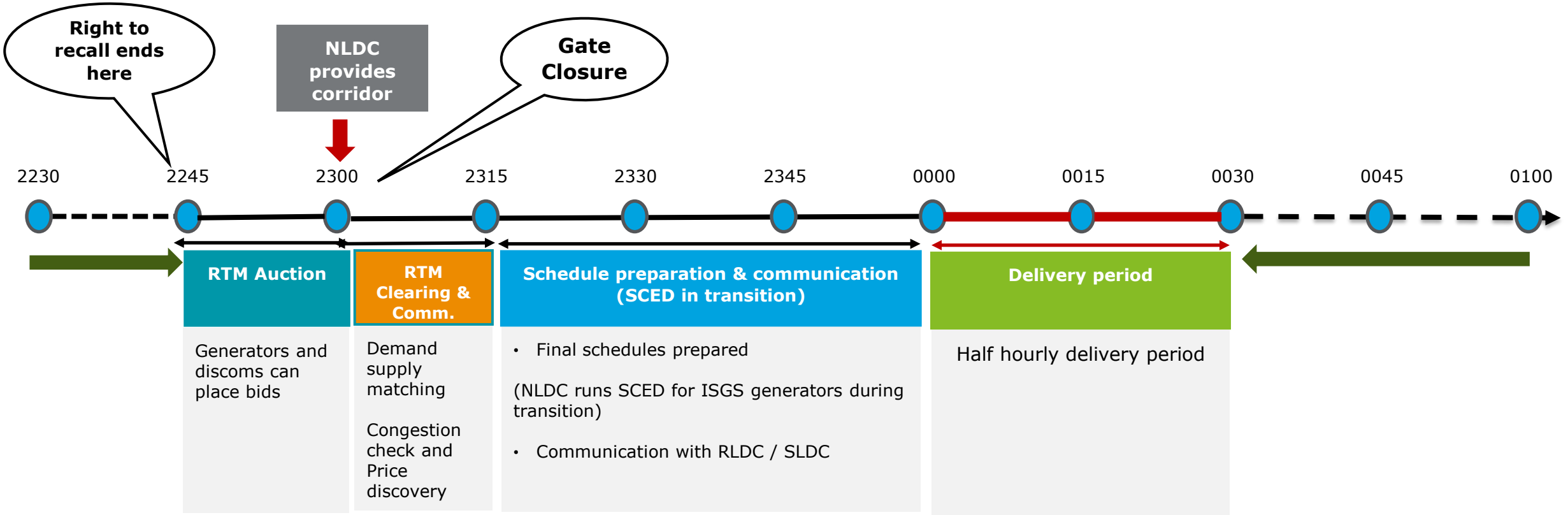
Comments Received by Stakeholders

Overview of key comments received by stakeholders

Issue	Overview of key comments		
	Generators	**Discoms**	**System operator**
Gate closure	NTPC and NLCIL also suggested to **reduce the gate closure time to one hour**	Gujarat / Maharashtra suggested to **exclude tied up generators** from RTM Suggested that **power procurement should be left to control of discoms**	POSOCO suggested a gate closure at **2 hours** before physical delivery considering operational complexities SLDC Gujarat suggested to exclude ISGS from concept of gate closure
Timelines, Operational procedure	**Bidding in Market should be open for all time blocks** at all times, however concerned bids may be considered for dispatch	MSEDCL suggested to **monitor the sanctity of bids** (Ramp check), Economic Dispatch of URS prior to RTM.	**Movement of Market towards 5-mins** from 15-mins, **allowance of one product** at a time, Proper Banking agreements as it's a 24*7 market mechanism, Formulation of Market rules to be left with exchanges
Transmission Corridor allocation and Congestion Management	**Transmission margins on key corridors** should be made available on RLDC website and may be updated on continuous basis, clarification for transmission charges and allotment priority for different products.	MSEDCL requested that the Transmission Corridor margin available for real time transaction should be declared by POSOCO accurately for optimum benefit of RTM. It also proposed that no additional transmission charges shall be levied to utility for transactions of power for PPAs having LTA/MTOA by utilities	POSOCO suggested that **declaring transmission corridor margin in advance of trading session would have impact on behavior of market participants and price discover in RTM.**
Other issues	• **Switching to 5-minute systems** in the future may also be kept in view. • **Clearing and settlement mechanism** to be worked out • Hourly market requires **substantial automation** • **Liquidity in the RTM** will be critical considering possible small volume of transactions in RTM. • **Pilot tests** could be conducted for gaining some experience before implementation • At least 5% of **quantum of demand from DISCOMs** should be made mandatory for procurement through RTM • SRPC argued hat URS left may be viewed as a need required for system operation by S/O		

Proposed Real Time Market Design

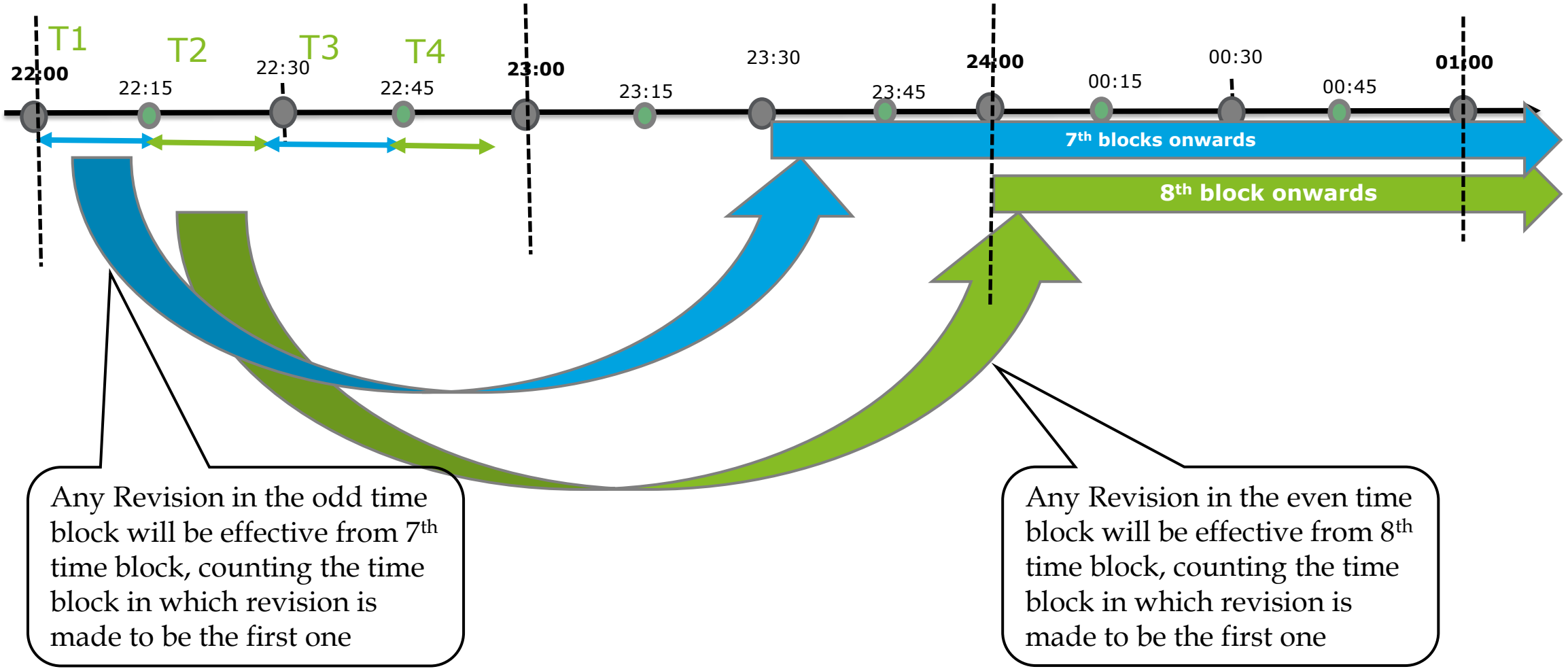
Half hourly Real Time Market



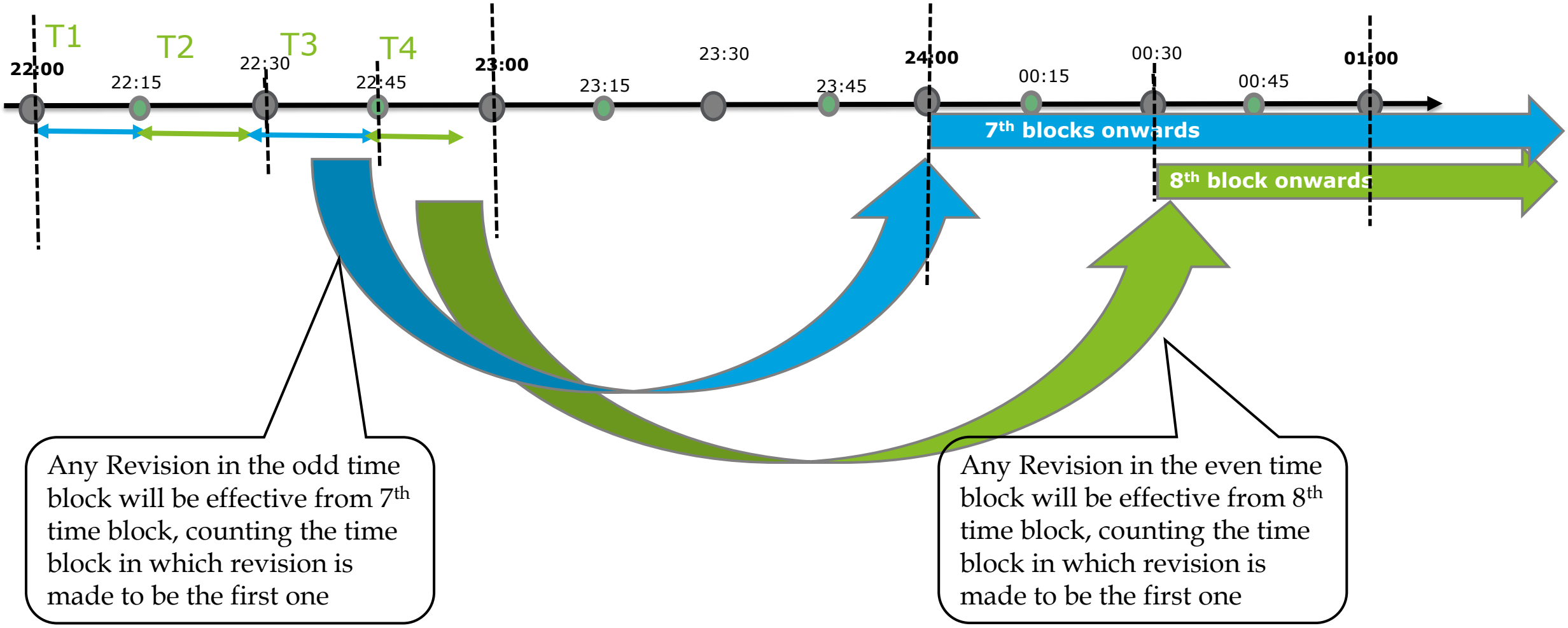
RTM auction start time	RTM auction end time	RTM clearing interval	Schedule prep and Communication	Delivery period (MCP and MCV will be discovered for each 15 minute block)
22:45 Hrs (of the previous day)	23:00 Hrs (of the previous day)	23:00-23:15 Hrs (of the previous day)	23:15-24:00 Hrs	00:00-00:30
23:15 Hrs (of the previous day)	23:30 Hrs (of the previous day)	23:30-23:45 Hrs	23:45-00:30 Hrs	00:30-01:00
…				
22:15 Hrs	22:30 Hrs	22:30-22:45 Hrs	22:45-23:30 Hrs	23:30-00:00

Go to Hourly RTM
Go to SCED Timeline

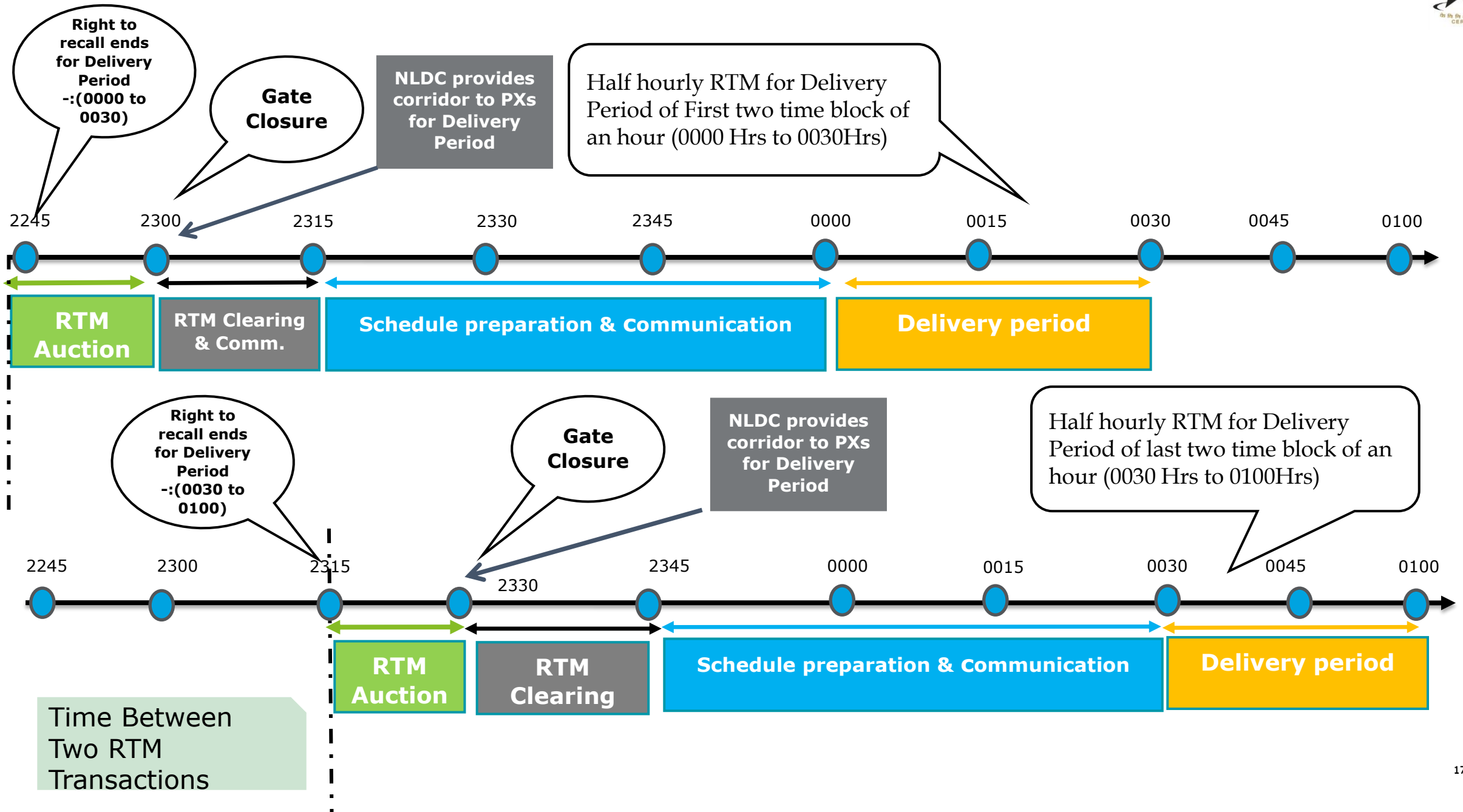
Timeline for Right to revise the schedule



Timeline for Right to revise the schedule



Timeline for Two Half hourly RTM



Required Regulatory Amendment

Regulations	Provisions
Indian Electricity Grid Code Regulations, 2010	• Provision for Right to recall • Scheduling for RTM Transactions • Settlement under RTM
Power Market Regulations, 2010	• Definition of Gate Closure, Real-time contracts etc. • Price Discovery Mechanism
Open Access Regulations, 2010	• Definition of Real time transaction • Procedure for Scheduling the RTM transactions • UI charges

Future Regulatory Interventions

- Ancillary Services Market
- Co-optimisation of Energy and Ancillary Services
- Market Based Economic Dispatch on Day Ahead
- Following complimentary Mechanism at State Level
  - Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST)
  - Forecasting Scheduling and Deviation Settlement of RE
  - Reserves / Ancillary Services

Thank you

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