MINUTES OF SECOND MEETING OF "FOR STANDING TECHNICAL COMMITTEE GROUP-I : RENEWABLE ENERGY INTEGRATION AND RELATED MATTERS

Venue	:	Upper Ground Floor Chanderlok Building 36, Janpath Road, New Delhi 110 001
Date	:	23-08-2019 (Friday)

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

1. The Second meeting of the reconstituted Standing Technical Committee of FOR – Group-I was held on 23rd August, 2019 under the Chairmanship of Shri Indu Shekhar Jha, Member CERC. At the outset, Chairperson Shri I.S. Jha welcomed all the members and special invitee for participation in the meeting. With Government setting the target beyond 2022, he emphasised that the role of this committee is very crucial for effective and efficient integration of renewable energy into the system. He gave brief background of the agenda items to be discussed in the meeting and requested the Committee to discuss QCA report.
2. Dr. S.K. Chatterjee Chief (Regulatory Affairs), CERC gave brief background of the FOR Technical Committee Group-I and highlighted the agenda items scheduled for the Meeting.
3. Thereafter agenda items were taken up for discussion:-

Agenda No.1:Report of the Sub group on issues of Aggregator /QCA:

4. Dr. S.K. Chatterjee, Chief (RA) CERC, gave a brief background of the subgroup on issues of Aggregator/ QCA before the Committee and the recommendations made in the report. He informed the Committee that as per the direction in the last meeting, the draft report was circulated for comments and in response Karnataka Electricity Regulatory Commission submitted detailed comments on the report. He briefed the committee on the issues discussed in the last joint meeting of the Group-I and Group-II and highlighted key issues for deliberations before seeking approval from the Committee.
5. Shri Ajit Pandit, the consultant assisting the Technical Committee, made presentation on the report of the sub-group. (**Annexure-II**) He informed that the Committee on the constitution of the subgroup and comprehensive meetings

undertaken by the Subgroup to deliberate on its mandate. He informed the Committee that the subgroup deliberated on wider concept of Aggregators in developed countries in Demand Response (DR), Distribution Energy Resources (DER), imbalance market, etc. and emphasised that as the market evolves, the role of Aggregators would assume importance.

6. On the issue of providing legal status and regulatory oversight, the sub group recommended that QCA shall operate under control of SLDC on similar precedence of Professional Members, Principle Generator, etc. 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.
7. Member APERC also shared experience of implementation of forecasting and scheduling Regulations for RE projects from the State and updated the Committee that around 99 percent of the pooling stations in the State have appointed QCA. Only a few stations in which the old projects having small capacities connected to the pooling stations are finding it difficult to comply with the forecasting and scheduling. However these RE projects have been directed to either provide their own forecasting and scheduling or accept the scheduling provided by the SLDC.
8. Shri Mukesh Khullar, member MERC, shared experience in the State of Maharashtra in appointing QCA at some polling stations.
9. The 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 in that case those RE generators shall have responsibility to make their own arrangements separately and bear all the cost of necessary investment to provide individual schedule directly to SLDC.
10. The Committee also recommended that in case as in RE generator connected to a pooling station has not appointed any QCA and/or not providing any schedule to respective SLDC, in that case the schedule prepared by the SLDC/REMC

whichever is the case, will be binding on such RE generator Any deviation from actual generation in that case will be borne by the RE generators.

11. Shri Mukesh Khullar, Member MERC, suggested that even after giving sufficient time for appointment of QCA, if some pooling stations remain without any appointment of QCA in the absence of any consensus on appointment of QCA by RE generators, SLDC can empanel/appoint QCA on behalf of those RE generators. The Committee appreciated the suggestion.
12. Shri S.K. Soonee emphasized that forecasting is a technology while scheduling is a commercial strategy. He suggested to keep REMCs /SLDCs away from any commercial treatment. The Committee also expressed concerns about the capacity of SLDC to handle such large number of RE generators directly for their schedule and deviation.
13. Representative of KERC shared their comments on the QCA and sought appropriate mechanism in place to handle the de-pooling of RE curtailment between QCA and RE generators in case of grid security. It was clarified that the report covers this aspect of real time coordination between QCA and RE generators and it has been recommended that rules and protocols have to be pre-agreed among the parties in case of any curtailment with proper records. However it was also clarified that in case of any RE curtailment due to grid security issue, QCA and RE generators should not be made to bear the cost of penalty
14. Dr. S.K. Chatterjee emphasised 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 and hence. 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 to ensure real time communication with RE generators of such curtailment along with appropriate proof of records. The Committee endorsed the principle of equitable curtailment subject to security constraints could be followed while implementing the RE curtailment among QCA and RE generators.
15. The Committee accepted the subgroup report and requested to modify the report based on the deliberations of the Committee on appointment of QCA and allow appropriate options for State Regulators to adopt based on the State specific situation.

16. The Committee also highlighted the need for amendment of the extant model regulations of the FOR on Forecasting and Scheduling and Deviation Settlement Mechanism based on the deliberations of the Committee to bring QCA related aspects.
17. Shri S.K. Soonee highlighted the issue of Distribution System Operator (DSO) which may emerge in near future to aggregate the local demand to behave as replica of SLDC. With increase in new technologies like battery storage, role of DSO will become prominent for distribution level management. He suggested that separate discussion paper on the role and scope of DSO may be considered by the Committee in near future. The committee decided that distribution utilities may be invited for sharing their view on the DSO.
18. The Committee also accepted suggestions from the Member MERC to consider a study on the operational experience of Forecasting and Scheduling experience in the country for cross learning benefit. The Committee urged the consultant to assist the technical committee to 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 taken.

<u>Action Points /Decisions on the Agenda item:</u>

1. *The Committee endorsed the subgroup report on issues of Aggregator/QCA with following recommendations :*
   i) *There would be 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.*
   ii) *If any RE generator chooses to not accept the QCA appointed by the majority principle, it will have the responsibility to make its own arrangement separately and bear all costs of necessary investment to provide individual schedule directly to SLDC.*
   iii) *RE generators or QCA shall not be charged with deviation charge for any RE curtailment due to grid security issue.*
   iv) *Principle of equitable curtailment subject to security constraints could be followed while implementing RE curtailment among QCA and RE generators.*
2. *The Committee agreed that the consultant may assist in reviewing the model regulations of the FOR on Forecasting and Scheduling and Deviation Settlement Mechanism based on the deliberations of the Committee to suitable incorporate QCA related aspects in the model Regulations.*

3. *The committee decided that distribution utilities may be invited for sharing their view on the DSO.*
4. *The Committee agreed the consultant may assist technical committee for 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 for RE generators can be undertaken.*

Agenda Item No. 2: Status of update on the PSDF Fund and related issues

19. Shri K.V.S. Baba, CMD POSOCO presented on the update on PSDF fund (**Annexure –III**). He informed the Committee PSDF has covered all States in the country except Sikkim and Arunachal Pradesh which are under consideration. Some projects have been sanctioned for every State under PSDF fund. He briefed on the evolution of PSDF fund since notification of the PSDF Regulation by the Hon'ble CERC in year 2010.
20. Shri K.V.S. Baba updated the Committee on five broad categories of the projects/schemes which are eligible for PSDF funding covering creating necessary transmission systems, renovation and modernization of T & D system, improvement of voltage profile, pilot and demonstrative projects, technical and capacity building studies etc. He detailed out the roles and responsibility of various committees like Appraisal Committee, Inter-ministerial Monitoring Committee in disbursing the funds under PSDF along with their constitution. He informed that NLDC has been designated as Nodal Agency for all these committees to perform secretariat work. He informed that sufficient leverage is given to the State to execute the projects taking into consideration variation in their institutional structure. Also in order to monitor the progress of the implementation of the approved projects, the fund is disbursed in five tranche with disbursement of part fund starting with letter of award of the projects. He also informed the committee about delay in execution of some projects by States which results into delay in disbursement of the PSDF fund. He also requested the Technical Committee to recommend an oversight by Regulatory Commission's for monitoring delay in implementation of different schemes/projects under PSDF.

21. The Committee observed that SAMAST is very crucial especially for smooth integration of RE and expressed concerns over the long process of approval of grants for SAMAST. The Committee also pointed out that the grants disbursed under SAMAST are relatively small and can be prioritised.

Action points/ Decisions

1. *The Committee noted the update provided by the CMD POSOCO on the PSDF funds.*
2. *The committee reiterated the need for streamlining the approval process for releasing of PSDF support, especially for States intending to implement SAMAST.*

Agenda Item No. 3: Status of implementation of Regulations on Forecasting, Scheduling & Deviation Settlement

22. The Consultant (Idam Infra) made a presentation (**Annexure-III**) on Forecasting & Scheduling (F& S) and DSM Regulations at State level for various States especially focusing on RE rich States.
23. The consultant presented State wise Status update on Forecasting & Scheduling and DSM Regulations for RE rich States. It was highlighted that all RE rich States have notified Forecasting and Scheduling Regulations (F & S Regulations). The procedure which needs to be formulated as a part of this regulations have also been finalised in all RE rich states except Gujarat and Tamil Nadu. Member of the Committee from Gujarat and Tamil Nadu updated that the procedure along with Qualified Coordinated Agency (QCA) will soon be finalised.The consultant also updated on the State wise IT software and Trial Operation along with commercial implementation of the F& R and DSM Regulations.
24. The Consultant updated that 21 States have come up with either Draft or Final Forecasting & Scheduling Regulations (1 Draft and 20 Final). While 10 States have notified the DSM Regulation and in 5 States, the DSM Regulations are at draft Stage. The consultant further suggested the Committee to consider the required revision in Model FOR DSM Regulations in view of the recent Amendments in CERC DSM Regulations.
25. The Consultant also updated on the status of various court cases in the Hon'ble High Courts on implementation of F & S and DSM Regulations for RE generators. It was informed that that in most of the appeals, the Hon'ble High Courts have

referred the matter back to respective State Regulatory Commissions to address the concerns of some RE generators. However, in all the cases High Court have not stayed the implementation of F&S and DSM Regulations. It was reiterated that the consultant should present a study report on the operational experience of Forecasting and Scheduling framework in the country and provide status update.

26. Shri S.K. Soonee also requested the Committee to include update on the KABIL report prepared by the Technical Committee and approved by the Forum of Regulators. The Committee agreed to include the regular update on the KABIL in its meetings.
27. Shri A.K. Bakshi suggested the Technical Committee to monitor implementation of RPO web tool at State Level . The Committee accordingly directed the consultant to provide update on the status of implementation of RPO web tool at State Level.

Action points/ Decisions

1. *The Committee noted the update provided by the Consultant on the agenda item and agreed to have a special session with States which are yet to initiate action on F&S ad DSM Regulations.*
2. *The Committee agreed that the consultant may present a study report on the operational experience of Forecasting and Scheduling framework in the country and provide status update.*
3. *The Committee decided to monitor implementation of the KABIL report on the capacity building of SLDCs.*
4. *The Committee also decided to monitor implementation of RPO web tool at State Level.*

Agenda Item No. 4: Proposed Framework on the Real Time Market for Electricity

28. 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-IV**). 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.

29. 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.
30. 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.
31. 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 .
32. 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

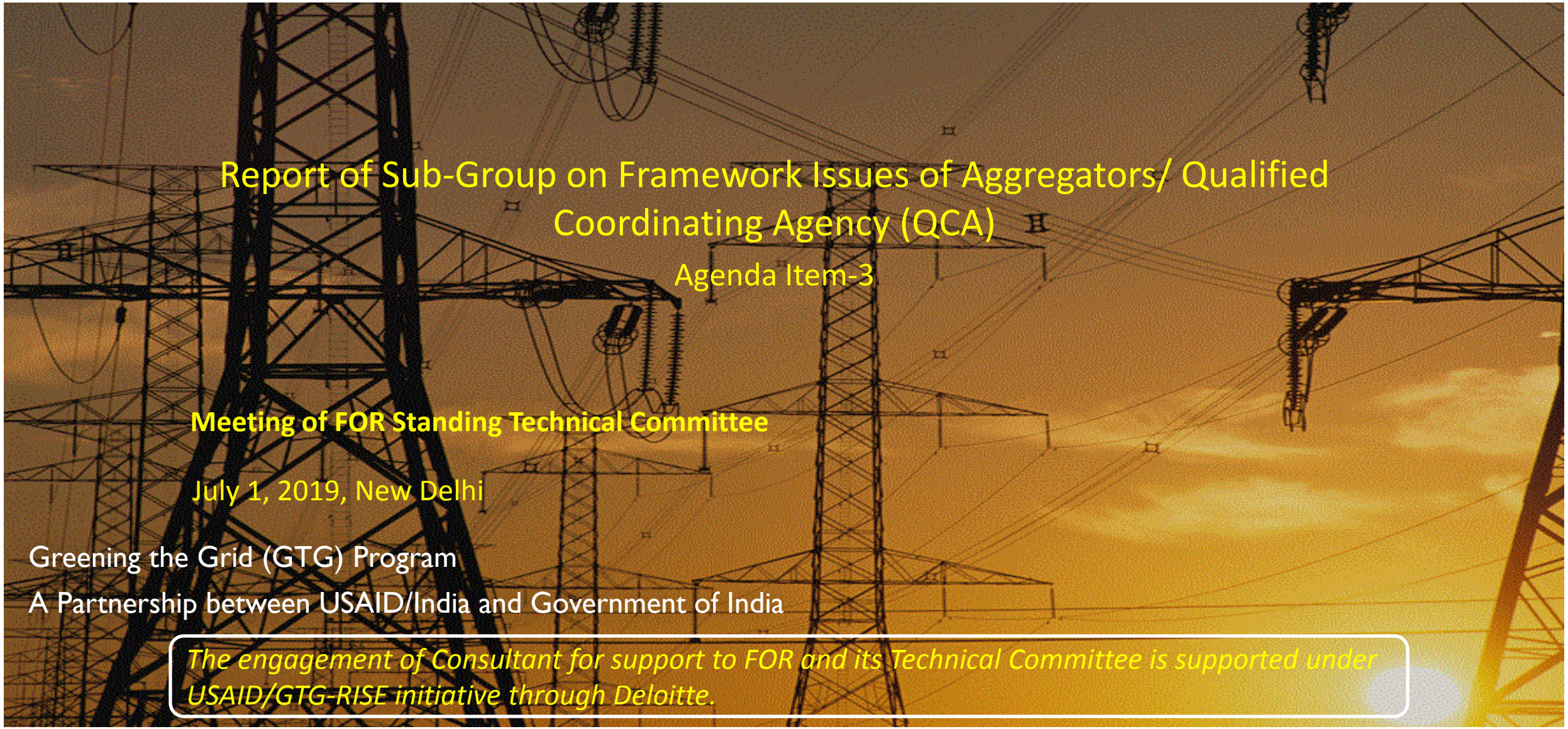
33. The meeting ended with a vote of thanks by Shri S.K. Jha , Secreatry CERC .

*****

Annexure-I

LIST OF PARTICIPANTS AT THE SECOND MEETING OF RECONSTITUTED TECHNICAL COMMITTEE (GROUP-I) FOR IMPLEMENTATION OF FRAMEWORK ON RENEWABLES AT THE STATE LEVEL HELD ON 23rd AUGUST, 2019 AT CERC, NEW DELHI

Sr. No.	Name & Designation	Office
1.	Sh. I.S. Jha, Member, Member	CERC
2.	Dr. M.K. Iyer, Member	CERC
3.	Sh. A.S. Bakshi, Former Member	CERC
4	Sh. P. Ramamohan, Member	APERC
5.	Sh. P.J. Thakkar, Member	GERC
6.	Sh. Mukesh Khulllar, Member	MERC
7.	Sh. H M Manjunatha, Member	KERC
8.	Sh. Sh. Prabakar Rao, Member	TNERC
9.	Sh. S.C. Shrivastava, Chief (Engg.)	CERC
10.	Dr. S.K. Chatterjee, Chief (RA)	CERC
11.	Sh. K.V. S. Baba, CMD	POSOCO
12.	Sh. S.K. Soonee, Advisor	POSOCO
13.	Sh. Himanshu Khurana, Director	RERC
14.	Sh. N. Pradeep Kumar, Dy. Director	KERC
15.	Sh. S.C. Saxena, Gm (Market Operations)	NLDC, POSOCO
16.	Ms. Rashmi Nair, Deputy Chief (RA)	CERC
17.	Sh. Debasis De	POSOCO
18.	Sh. Ajit Pandit, Director	IDAM
19.	Sh. Anand Sant	IDAM
20.	Sh. Ravindra Kadam, Advisor (RE)	CERC
21.	Sh. Tushar	GTG-Rise



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

Agenda Item-3

Meeting of FOR Standing Technical Committee

July 1, 2019, New Delhi

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

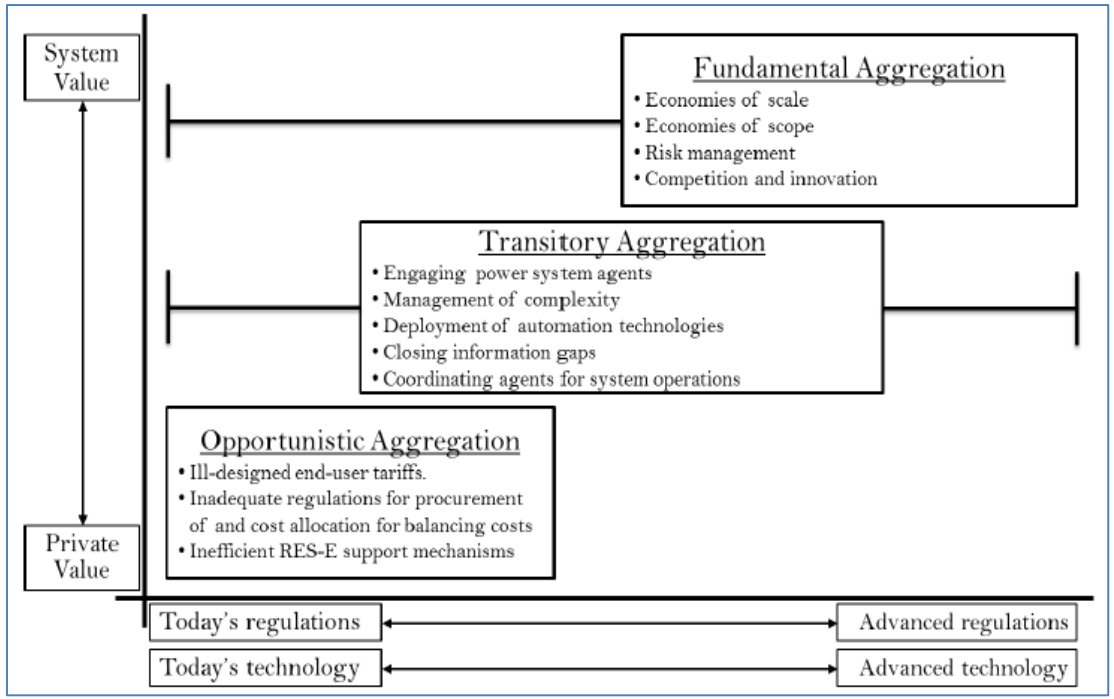
- **7th September, 2018 (CERC, New Delhi) – Presentations and deliberations covered following:**
  - draft contours of model agreement specifying the proposed roles and responsibilities of the parties
  - Wider role of the Aggregators in the ever emerging, electricity market scenario.
  - Need for demarcation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

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

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.

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 **'Franchisee Arrangement'** 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.
- 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.

Summary of Recommendations

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.

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

- **RISE Contracting Officer Representative: Monali Zeya Hazra**, USAID India, mhazra@usaid.gov
- **Chief of Party: Shubhranshu Patnaik,** RISE, spatnaik@deloitte.com

Power System Development Fund

An update

2nd meeting

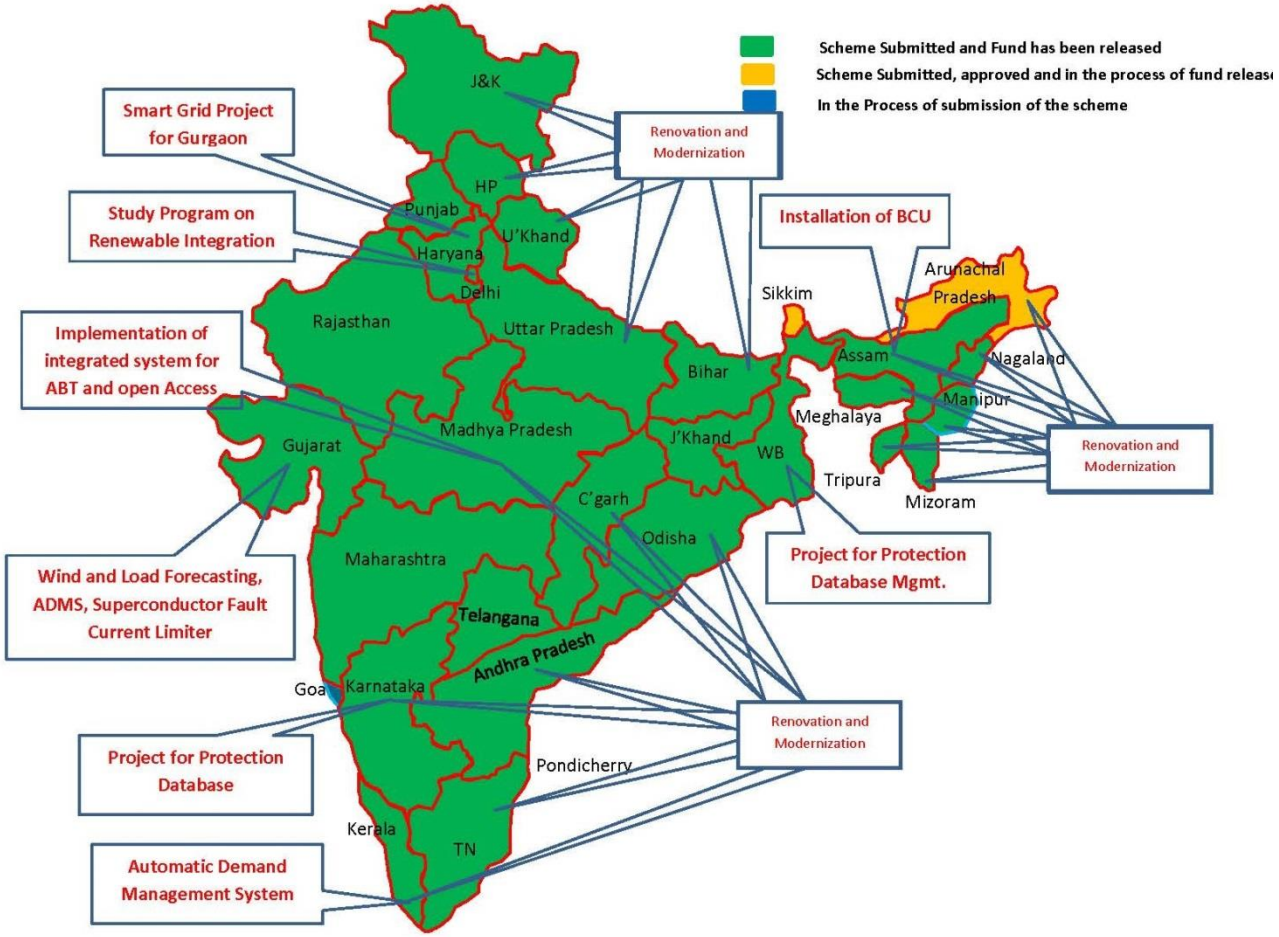
of

FOR Standing Technical Committee (Group-I)

23rd August, 2019

New Delhi

Reforming the Indian Power System through Power System Development Fund (PSDF)



Power System Development Fund (PSDF)

- PSDF Regulations, 2010 were notified by CERC
- Scheme for operationalization of PSDF approved by Govt. of India in Jan, 2014
- PSDF Regulations, 2014 were notified by CERC
  - In line with GOI Approval
  - PSDF Regulations, 2010 repealed
- Scheme for utilisation of PSDF for stranded gas projects approved in March, 15
  - PSDF Regulations amended by CERC in July, 15
- Surplus from Pool Accounts maintained by NLDC/RLDCs transferred to PSDF
  - Funds maintained under the Public Account with GOI
- Entities eligible for availing the funds
  - Transmission Licensees
  - Distribution Licensees
  - Generating Companies
  - Load Despatch Centers
  - Regional Power Committees
  - Private sector not eligible

Projects Eligible for PSDF funding

- Creating necessary transmission systems of strategic importance based on operational feedback by Load Despatch Centers for relieving congestion in Inter-State Transmission Systems (ISTS) and intra-state system which are incidental to the ISTS. - Funding upto 75%
- Installation of shunt capacitors, series compensators and other reactive energy generators including reactive energy absorption, dynamic reactive support etc. for improvement of voltage profile in the Grid. - Funding upto 90%
- Installation of standard and special protection schemes, pilot and demonstrative projects, projects for setting right the discrepancies identified in the protection audits on regional basis, any communication/measurement/ monitoring scheme including installation of Phasor Measurement Units (PMUs) etc. - Funding upto 90%
- Renovation and Modernization (R&M) of transmission and distribution systems for relieving congestion. - Funding upto 75%
- Any other scheme/project in furtherance of the above objectives, such as, conducting technical studies and capacity building, etc. - Funding upto 100%
- Notes
  - Up to 100% funding for NER and other hilly states
  - 50% funding for implementation of OPGW based reliable Communication at 132kV and above

Process of approval of the schemes

- Scrutiny and prioritization by Appraisal Committee
  - Headed by Chairperson, CEA
    - Other members, CEO POSOCO, JS (OM) MoP, Secretary CERC,
    - Assisted by a Techno Economic Sub Group
      - Chief Engr. (NPC), CEA, Representatives of CTU & POSOCO
- Concurrence of CERC
  - For ascertaining the scope in accordance with PSDF Regulations
- Approval by Inter-Ministerial Monitoring committee
  - Headed by Secretary, MoP
  - Other members - Chairperson CEA, Addl. Secy MoP, JS (Trans) MoP, JS & FA MoP, JS (Dept. of Expend.) MoF, JS MNRE,

    Adviser NITI AAYOG

    CEO POSOCO - Member Secretary of the Committee
- NLDC designated as Nodal Agency
  - Secretariat functions

Disbursement of the funds

- Guidelines/procedures approved by the Monitoring Committee in consultation with CERC
  - Issued by MoP in Sept, 14
- First Stage
  - 10% after signing of agreement
- Second Stage
  - 20% after placing the LOA
  - To be disbursed in not more than 5 Tranches
- Third / Intermediate Stage
  - 60% after utilization of first installment and consumption of self contribution
- Final Stage
  - Balance 10% on completion

Committees Meetings held for Approval of Projects

Sl. No.	Appraisal Committee Meeting	Monitoring Committee Meeting
1	Feb-14	Jul-14
2	Feb-14	Oct-14
3	Jul-14	Mar-15
4	Aug-14	Jul-15
5	Nov-14	Oct-15
6	Jan-15	Dec-15
7	Mar-15	Feb-16
8	Jun-15	Aug-16
9	Sep-15	Nov-16
10	Nov-15	April- 17
11	Mar-16	May- 17
12	May-16	August-17
13	Sep-16	May-18
14	Oct-16	Jan-19
15	Nov-17	
16	Mar- 7	
17	July 17	
18	Feb-18	
19	Mar-18	
20	Jun-18	
21	Nov-18	
22	July, 19	

Fifty(50) Techno Economic Sub Group (Assisting the Appraisal Committee) meetings also held for examination of the proposal

Status of approval of proposals

Amount in Rs crore

Status of proposals	Number	Estimated Cost		Grant approved / recommended
		By entity	Accepted	
Approved by Monitoring Committee	140	20451.12	16770.19	11282.09
Proposals recommended by the Appraisal Committee	22	1086.20	419.76	382.04
Schemes examined & inputs sought from the entities	33	2986.4		
Schemes received recently. Under examination	10	1600.88		
Proposals not eligible for funding, deemed returned	75	17045.54		
Total	**280**	43170.13	17189.95	11282.09

Objective wise summary of projects approved for PSDF funding

Amount in Rs crore

Objectives of the projects	Number	Estimated cost	Grant
Creating transmission system of strategic importance (HVDC BNC-Agra funding)	1	5778.00	2889.00
Renovation & Upgradation of Protection System	50	4140.87	3688.06
OPGW fibre based Communication by the States	21	3321.62	1629.85
Voltage Improvement- Installation of Reactors, Capacitor Banks & STATCOMs	31	2139.72	1937.15
Recondutoring of lines with HTLS conductor for relieving congestion	8	752.74	626.38
Intrastate ABT for scheduling metering and accounting by the States (SAMAST)	4	51.97	46.77
Automatic demand management system (ADMS)	12	63.79	59.00
Wind Forecasting /Load Forecasting	2	5.32	5.32
WAMS and PMUs- URTDSM project for improving network visibility and dynamic assessment of the network by POWERGRID	2	407.00	291.37
Development of systems for protection data management system at regional level and Capacity Building through RPCs	9	109.16	109.16
Total	140	16770.19	11282.06

Status of funds, commitments as on date, proposals submitted by the entities and projected fund requirement

Sr. No.	Description	Amount (Rs. crore)
1	Funds under PSDF as on 30.06.2019	15330.84
2	Funds committed for 140 Proposals approved for PSDF funding	11282.09
3	Funds released by MOP for Stranded Gas Projects	1509.00
4	Balance funds under PSDF (1-2-3)	2537.65
5	22 Projects at an estimated cost of Rs 1038.21 crore recommended by Appraisal Committee for PSDF grant	382.04
6	44 Proposals under examination, estimated cost approx. Rs.4500 crore, projected requirement of grant Rs 2000 crore	2000.00
7	Balance funds under PSDF after meeting projected requirements (4-5-6)	157.65

Status of transfer of Funds to MOP as on 30.6.2019

- Year wise transfer

Amount in Rs. Cr

2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	TOTAL
1825.4	1419.9	1053.5	1693.7	2959.8	3089.95	1388.5	350.8	346.51	13987.4

- Month wise transfer for FY 2019-20

APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	TOTAL
42.4	0.6	1.8										44.8

- Transfer from different pools to PSDF and from PSDF to MOP

UI/DSM	Congestion Revenue (Power Exchange)	Congestion Charges (Real Time)	Reactive Energy Charges	Total	Interest and other credits	Grand Total	Transferred to MOP
10006.9	3982.1	35.4	147.7	14172.1	1158.7	15330.8	15330.8

Status of Funds released by MoP and disbursement to entities

(Figures Rs in crore)

FY	Released by MoP	Disbursed to project entities
FY 2014-15	185.46	0.00
FY 2015-16	175.00	138.83
FY 2016-17	219.31	279.13
FY 2017-18	772.21	913.55
FY 2018-19	6048.70	4759.19
FY 2019-20 (up to 22.07.19)		357.87
Total	**7400.68**	**6448.57**

Implementation of SAMAST

- Status of approval
  - Proposals submitted 21
  - Proposals approved 4
    (MP, Rajasthan, AP and TN)
  - Proposals recommended 9
    (HP, Haryana, Punjab, Bihar, WB, Karnataka, Telangana, Assam, Meghalaya)
  - Proposals under examination 5
    (Tripura, Mizoram, Manipur, Arunachal, Nagaland)
  - Proposals received recently 3
    (Jharkhand and Kerala, Uttrakhand)
  - Implemented from own fund 1 (Gujarat)
  - Yet to submit the proposal 9
    (Delhi, UP, J&K, Maharashtra, Pudduchery, Chhattisgarh, Goa, Odhisa, Sikkim)

Prioritization of the proposals for PSDF funding

- Prioritization, subject to availability of funds
  - In accordance with para 7.5 of the Guidelines for Disbursement of Fund from PSDF

    - While prioritizing the schemes, the intent would be to include those schemes which are planned with the objective to render special help towards power system development and not forming a part of business as usual
    - Prioritization shall be done mainly on the criteria of the schemes
      - Addressing grid safety and security concerns
      - Being of national importance
      - Being in the order of National/Multi utility/Regional/State importance
      - Being inter-state in nature
    - Large number of schemes rather than large size schemes.

Prioritization of the proposals for PSDF funding—contd.1

- Funds position reviewed by Monitoring Committee in 14th meeting in Jan, 19
- Prioritization of the Proposals done for one year
  - Renovation and upgradation of protections systems at 220 kV and above level
  - Establishing reliable communication using OPGW by the States at 132 kV and above
  - Implementation of SAMAST by the States
  - Implementation of ADMS
  - load forecasting, wind and solar generation forecasting
  - Capacity building and technical studies
  - Development of web based protection data base.
  - No new Proposals for Distribution Systems for one year
  - Review after one year

Thanks

PSDF update

- Total fund of ₹ 15,330.80 crore (up to 30.06.2019)
- 280 proposals submitted by the entities
  - 140 proposals approved for PSDF Grant of ₹ 11,282.09 crore
  - 22 proposals under approval.
  - 43 proposals at an estimated cost of ₹ 4,500 crore are under examination
  - 75 proposals found not eligible for funding, deemed returned

Implementation of SAMAST---1

- SAMAST Proposals submitted by the States considered for PSDF funding
- Benchmark cost approved by the Appraisal Committee
  - Interface Rs. 36000/- per meter
    - Approved in 20th meeting held in June, 2018
  - Upper cap of Rs. 10 crore for HW, SW and other components
    - Approved in 21st meeting held in Nov, 2018
- Present status of approval
  - Proposals of MP, Rajasthan, AP and TN approved. Gujarat implemented from own funds
  - Nine Proposals recommended by Appraisal Committee
  - Five Proposals of under examination
  - Fresh proposals submitted recently by Jharkhand and Kerala
  - Yet to submit the proposal
    - Delhi, UP, Uttrakhand, J&K, Maharashtra, Pudduchery, Chhattisgarh, Goa, Odhisa, Sikkim

Implementation of SAMAST---2

- Proposals of Arunachal Pradesh, Mizoram, Manipur, Nagaland and Tripura under examination
- Observations of Techno Economic Subgroup (TESG) of PSDF
  - Entire system working as a single DISCOM
  - Considering the number of intra state Generators, IPP, /CPPs, Open Access Customers, there may not be any requirement of implementation of SAMAST
- Observations of TESG discussed by Appraisal Committee of PSDF
  - Restructuring completed in case Manipur and Tripura
  - Arunachal Pradesh, Mizoram and Tripura being run as state department
  - TESG directed to consider the proposals of Manipur and Tripura and further examine the proposals of Arunachal Pradesh, Mizoram and Tripura
- Fresh proposals submitted recently by Jharkhand and Kerala
  - To be examined by
- States yet to submit the proposal
  - Delhi, UP, Uttrakhand, J&K, Maharashtra, Pudduchery, Chhattisgarh, Goa, Odhisa, Sikkim

Status of approval of SAMAST proposals

Amount in Rs crore

Sr. No	Entity	Estimated cost accepted	Grant recommended	No of Meters
Approved				
1	Madhya Pradesh	4.00	3.60	-
2	Rajasthan	13.18	11.86	
3	Tamil Nadu	13.31	11.98	
4	AP	21.48	19.33	2444
5	Gujarat*	-	-	-
*Gujarat has implemented the Project from their own funding				
Recommended by the Appraisal committee				
1	Telangana	13.77	12.39	1254
2	Bihar	7.61	6.85	Not Requested
3	Haryana	17.9	16.12	2255
4	West Bengal	11.2	10.08	1035
5	Karnataka	10	9	Not Requested
6	Himachal Pradesh	9.09	9.09	223
7	Punjab	13.58	12.22	1228
8	Meghalaya	8.48	8.48	225
9	Assam	10.25	10.25	560

- Proposals from Manipur, Mizoram, Nagaland,Arunachal Pradesh & Tripura under examination
- Proposals from Kerala & Jharkhand received recently, to be examined
- Delhi, UP, Uttrakhand, J&K, Maharashtra, Pudduchery, Chhattisgarh, Goa, Odhisa, Sikkim yet to submit

Reasons for delay in implementation of the Projects

Reasons for delay	Projects
Agreement yet to be signed	26 project entities Long pending - 6 Bihar (1), Maharashtra (1), Chhattisgarh (2) Puducherry (1), NRPC (1)
Agreement signed, claim for initial 10% grant yet to be submitted	Arunachal Pradesh , Gujarat, Tamil Nadu West Bengal (2)
Agreement signed, 10% grant disbursed more than one year ago. Contract awards yet to be placed	Maharashtra (3), Manipur (2), Telangana (1) Gujarat (1)
Short closed. Reasons Reduction in scope, Some awards before approval of grant Awarded cost lower than (40 to 60%) of the estimates	9 project entities Rajasthan (1), WBSETCL(1), Odhisa (1) Assam(1), Uttar Pradesh(1), MP (1) Haryana(1), Maharashtra (2)
Projects withdrawn	Rajasthan (1), Uttar Pradesh(1) Gujarat (1)

Issues

- Procurement related issues
  - Decentralized awards
    - Number of contracts exceeding even more than 100 in case of Kerala, WB, UP, TN
    - Difficulty in coordination, monitoring , processing of the claims for disbursement of grant
  - Awards placed before approval
    - funding disallowed in such cases
      - Rajasthan, Implementation of ABT
      - UP, Recondutoring by HTLS conductor
      - West Bengal, Kerala, Odhisa, Rajasthan
  - Short closure due to reduction of scope by Raj, WB, Odhisa,
  - Project withdrawn after approval
    - Gujarat, Installation of short circuit fault current limiter
- Projects pending for long time
  - Signing of agreement pending for more than one year
    - Maharashtra (RTUs), Chhattisgarh (reliable communication), Pudduchery (reliable communication), NRPC (Protection data base), Bihar (renovation of protection of 132 kV substations)
- Delayed implementation and its effect
  - Projects funded from PSDF are of urgent nature
  - Delay hampers the objectives of the projects
  - Time extension granted twice, entities asked to complete in the extended timeline
  - **Gap in the projected fund requirement and utilization , leading to issues in the release of grant by GOI**

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

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

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

August 23, 2019

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 –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 it deems 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 is scheduled on 23rd August, 2019.

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 and subcontractor Idam Infrastructure Advisory Private Limited (Idam) 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 for 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

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)	In progress (draft)	N	In progress	NA
3	Maharashtra	Notified (July 2018)	Y (approved)	Y	Y	In progress
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)	In progress (draft)	N	In progress	NA
7	Himachal Pradesh	Notified (Oct 2018)	As part of DSM	Not applicable	Under trial for DSM	NA

Status of F&S and DSM Regulations of Group-I States (as on August 2019)

States	F&S Regulations and Implementation	DSM Regulations and implementation
Gujarat	• **Notified** (19th Jan, 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. • The Commercial implementation of the Regulation is scheduled from 1st July,2019. • QCA registration & implementation in process; (total 99 Pooling S/S. for 6036 MW comprising Wind 70 Nos Pooling S/S with 4610 MW and Solar 29 Pooling S/S with 1426 MW)	• The State is presently implementing FBSM Mechanism since 2011. • State has **Notified** DSM Regulations on 1st March, 2019 in line with CERC DSM Framework. • The Commercial implementation is expected by 1st April, 2020
Tamil Nadu	• **Notified** (20th March, 2019)	• **Notified** DSM Regulations in line with CERC DSM Regulations (20th March, 2019) • DSM Software Development is in progress
Karnataka	• **Notified** (31 May, 2016) • Implementation from 1st June 2017.	• ABT mechanism implemented from 20 June, 2006 **for Open Access**

Status of F&S and DSM Regulations of Group I States (as on August 2019)

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	• **Notified** (08th 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	• **Balancing and Settlement Code implemented** as on 11 Aug, 2006 **for 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. • Draft(First Amendment) (3rd May,2019) issued in line CERC 4th and 5th Amendment to DSM Regulations

USAID FROM THE AMERICAN PEOPLE

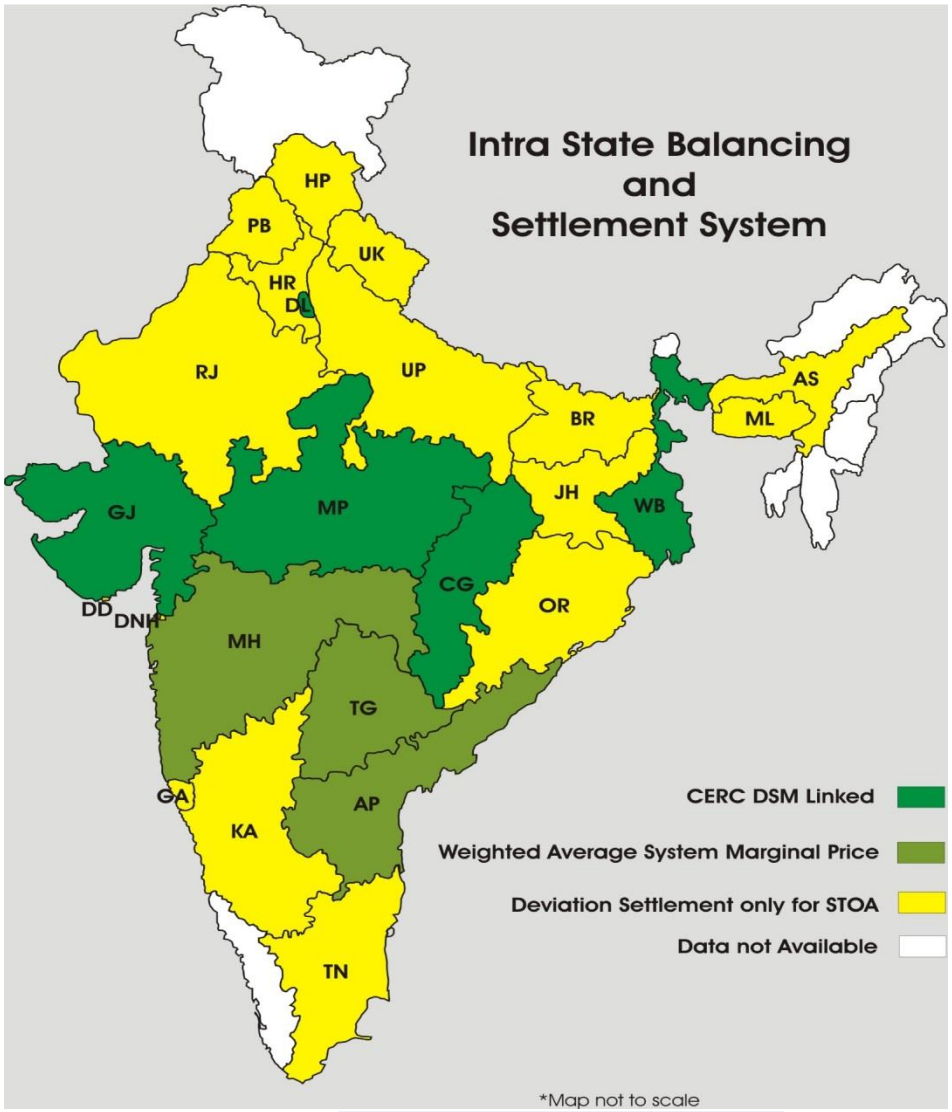
Status Update of F&S and DSM Regulations

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

States	F&S Regulations			DSM Regulations		
Region	Notified	Draft Published	WIP or Yet to initiate	Notified	Draft Published	WIP or Yet to initiate
North	**5** RJ, UP, UK, HR, PB		**3** DL, J&K, HP (only Hydro potential)	**5** HP, DL,RJ, UK,HR		**3** J&J, PB, UP,
West	**4** CG, MP, MH, GJ		**1** Goa (no major Wind/Solar Potential)	**3** GJ, CG, MP, MH		**1** Goa
South	**4** AP, KR, TS, TN		**1** KL	**1** TN	**1** TS	**3** AP, KR, KL (AP and KR ABT for OA)
East	**2** JH, SK	**1** OR	**2** BR, WB		**2** WB, OR	**3** JH, SK, BR
North-East	**5** AS, MN, ML, MZ,TR		**2** AR,NL	**1** ML	**2** AS, TR	**4** AR, MN, MZ,NL
UT			**6** CH, PY, DD, DNH, LD, AN			**6** CH, PY, DD, DNH, LD, AN
TOTAL	**20**	**1**	**15**	**10**	**5**	**20**

Status Update of SAMAST DPR & Implementation

GOVERNMENT OF INDIA
MINISTRY OF POWER



States	SAMAST DPR (as on 30-06-2019)		
Region	DPR Submitted	DPR approved	WIP or Yet to Prepare
North	**3** HP, HR & PB	**1** RJ	**4** UK, UP, J&K, DL
West	**4** MP (DSM implementation) GJ, MH, CG	-	**1** Goa
South	**2** KA, TS	**2** AP, TN	**1** KL
East	**1** BR	**1** WB	**3** JH, OR, SK
North-East	**7** AR, AS, MN, ML, MZ,NL, TR		
UT			**6** CH, PY, DD, DNH, LD, AN
TOTAL	**17**	**4**	**15**

DPR preparation → Scrutiny & TSEG Approval Recommendation by Appraisal Committee → Concurrence by CERC → Grant approval by Monitoring Committee → Issuance of Sanction Order by MoP

Status of SAMAST implementation in (Group I) States –1/2

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.
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 envisaged by 1April, 2020. • MSLDC has initiated process for implementation of DSM Regulations. Draft Scheduling and Despatch Procedure and DSM Procedure is published for public comments. • MSLDC has also published the Tender for selection of Vendor for Software Development for DSM Implementation.
Tamil Nadu	Group-C	Following activities have been completed: • DPR is approved for Rs. 11.98 Cr for PSDF fund for intra-state ABT • **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 • Provision of ABT meters have been completed to the extent of 67%

Status of SAMAST implementation in (Group I) States ---2/2

States	Category as per SAMAST	Date of Submission	Estimated cost (in Cr)	Remarks
Karnataka	Group-B	22-Dec-2017	43.34	• DPR for SAMAST implementation has been submitted to PSDF for approval 22 Dec,2017 for Rs. 43.34 Crs. • The proposal was examined by the TESG in the following meetings: 39th TESG: 20.03.2018, 42nd TESG: 24.07.2018 45th TESG: 19.09.2018. • Due to a wide gap in the cost estimates for similar proposals by a number of utilities, bench marking of cost estimates under finalization by the Appraisal Committee
Rajasthan	Group-B		11.86 Crs Sanctioned	• State Transmission Operation Management System (STOMS) project implemented by RVPN, akin to SAMAST, in the State having additional features as compared to SAMAST. • 87% field level implementation of the have been achieved.
Andhra Pradesh	Group-B	6 April-2017	52.72	• DPR is approved 19.33 Cr by PSDF Committee • **Letter of approval issued by MoP on 27 July, 2018**
Himachal Pradesh	Group-D	8 Oct-2018	15.45	• TESG vide its letter dated 8 May, 2019 has informed HPSLDC that, **TESG has recommended the SAMAST DPR to PSDF committee** for approval for Rs 9.09 Crore • Vendor for DSM Software has been selected. DSM Software development is in progress

USAID FROM THE AMERICAN PEOPLE

Summary status of SAMAST, F&S and DSM Regulations

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

States	SAMAST DPR			F&S Regulations			DSM Regulations		
Region	DPR Submitted	DPR approved	WIP or Yet to Prepare	Notified	Draft Published	WIP or Yet to initiate	Notified	Draft Published	WIP or Yet to initiate
North	**3** HP, HR & PB	**1** RJ	**4** UK, UP, J&K, DL	**5** RJ, UP, UK, HR, PB		**3** DL, J&K, HP (only Hydro potential)	**5** HP, DL,RJ, UK,HR		**3** J&J, PB, UP,
West	**1** MP	-	**4** CG, Goa, GJ, MH, (ABT in implementation)	**4** CG, MP, MH, GJ		**1** Goa (no major Wind/Solar Potential)	**3** GJ, CG, MP, MH		**1** Goa
South	**2** KA, TS	**2** AP, TN	**1** KL	**4** AP, KR, TS, TN		**1** KL	**1** TN	**1** TS	**3** AP, KR, KL (AP and KR ABT for OA)
East	**1** BR	**1** WB	**3** JH, OR, SK	**2** JH, SK	**1** OR	**2** BR, WB		**2** WB, OR	**3** JH, SK, BR
North-East	**7** AR, AS, MN, ML, MZ,NL, TR			**5** AS, MN, ML, MZ,TR		**2** AR,NL	**1** ML	**2** AS, TR	**4** AR, MN, MZ,NL
UT			**6** CH, PY, DD, DNH, LD, AN			**6** CH, PY, DD, DNH, LD, AN			**6** CH, PY, DD, DNH, LD, AN
TOTAL	**14**	**4**	**18**	**20**	**1**	**15**	**10**	**5**	**20**

USAID
FROM THE AMERICAN PEOPLE

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

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

The Real Time Market – RTM

2nd Meeting of Standing Technical Committee – Group –I

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

23.08.19

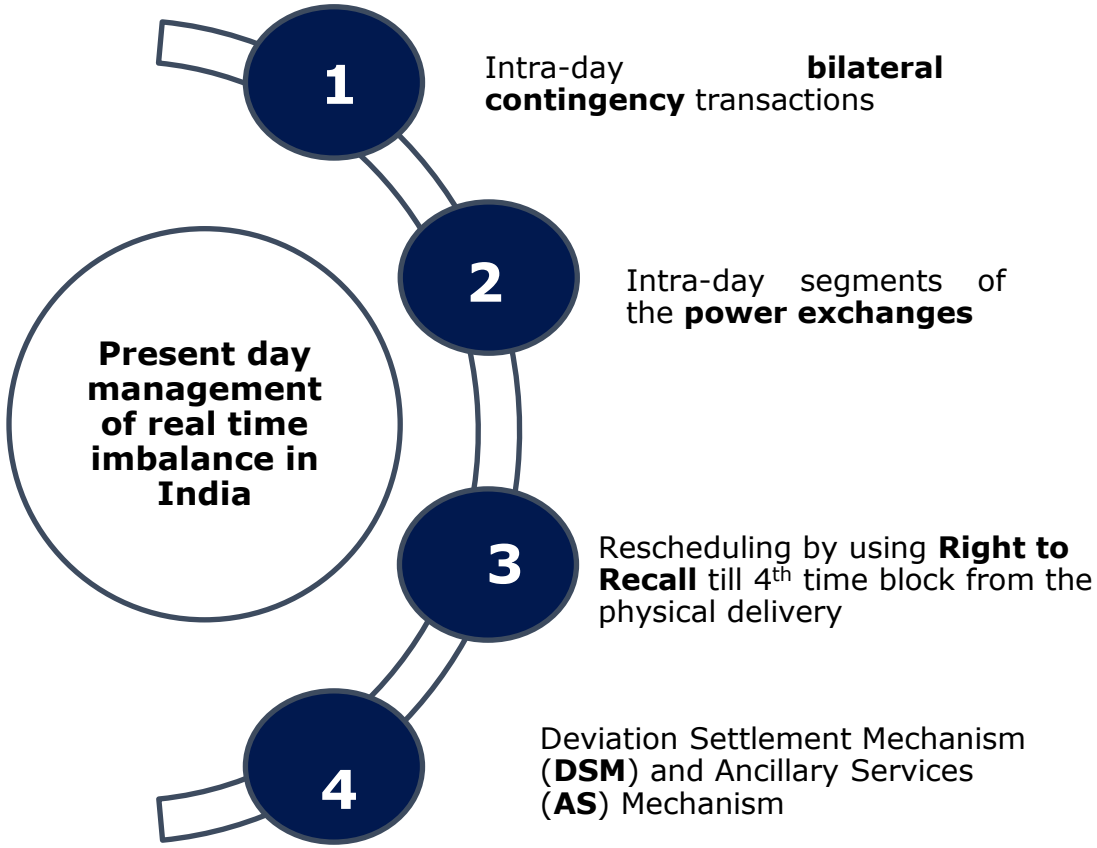
Contents

- 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

International Experiences

International Study

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.

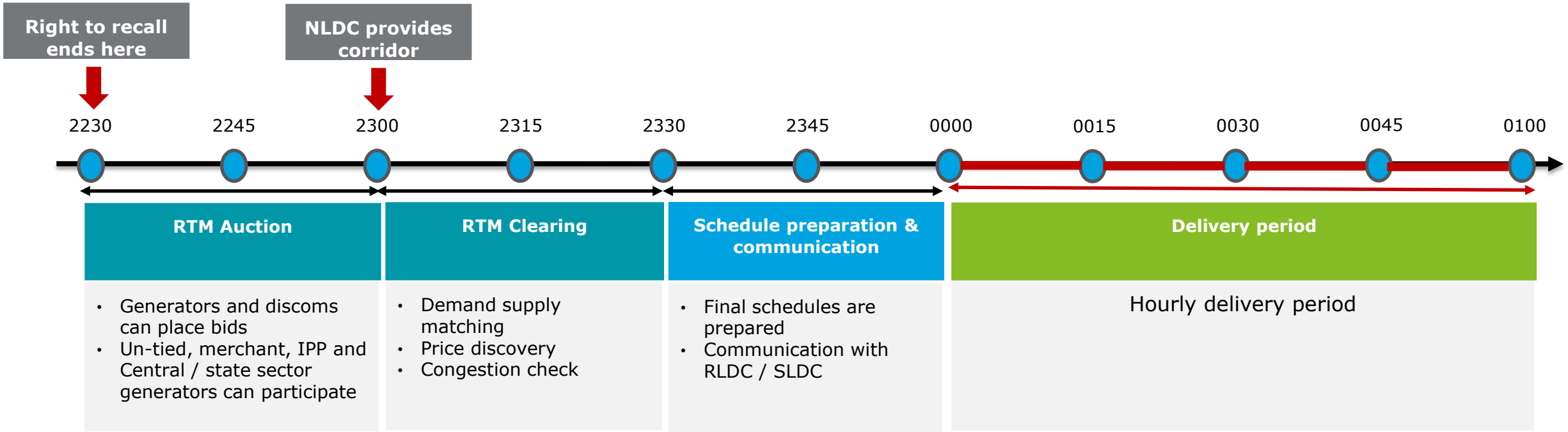
Benefits of Real time markets

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

- 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

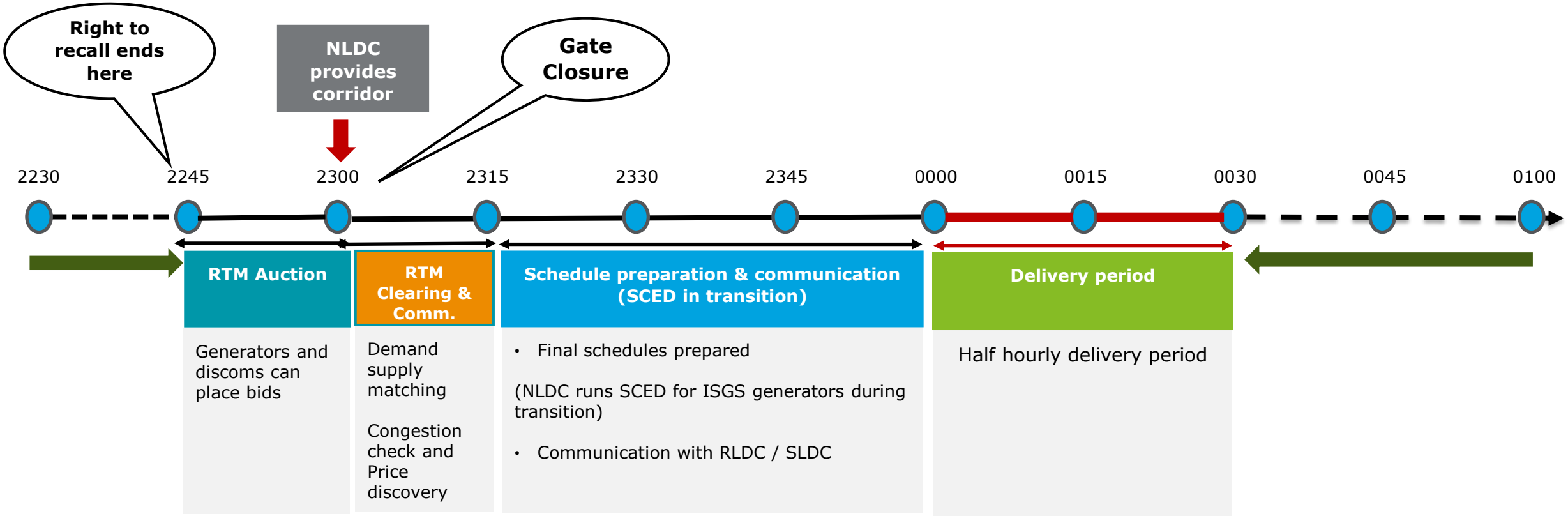
Comments Received by Stakeholders

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

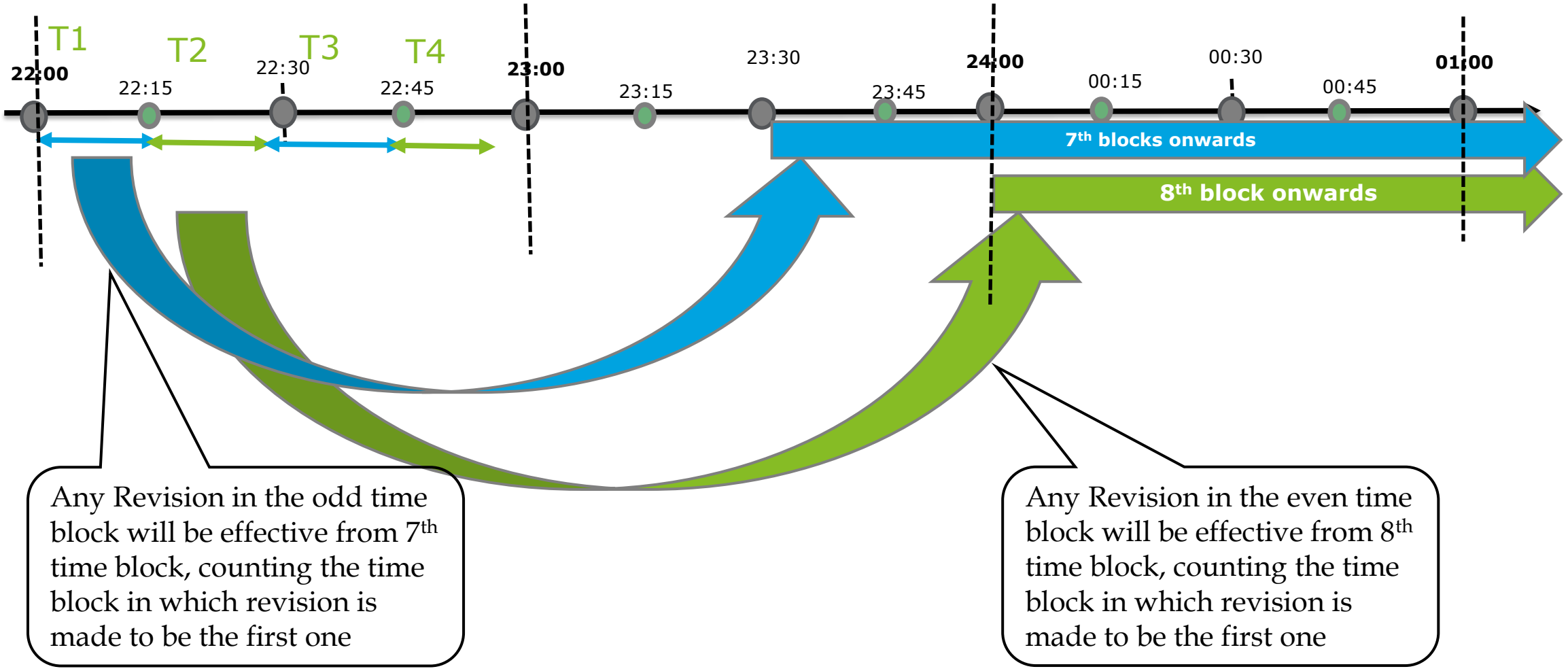
Scenario 2: Half hourly Real Time Market



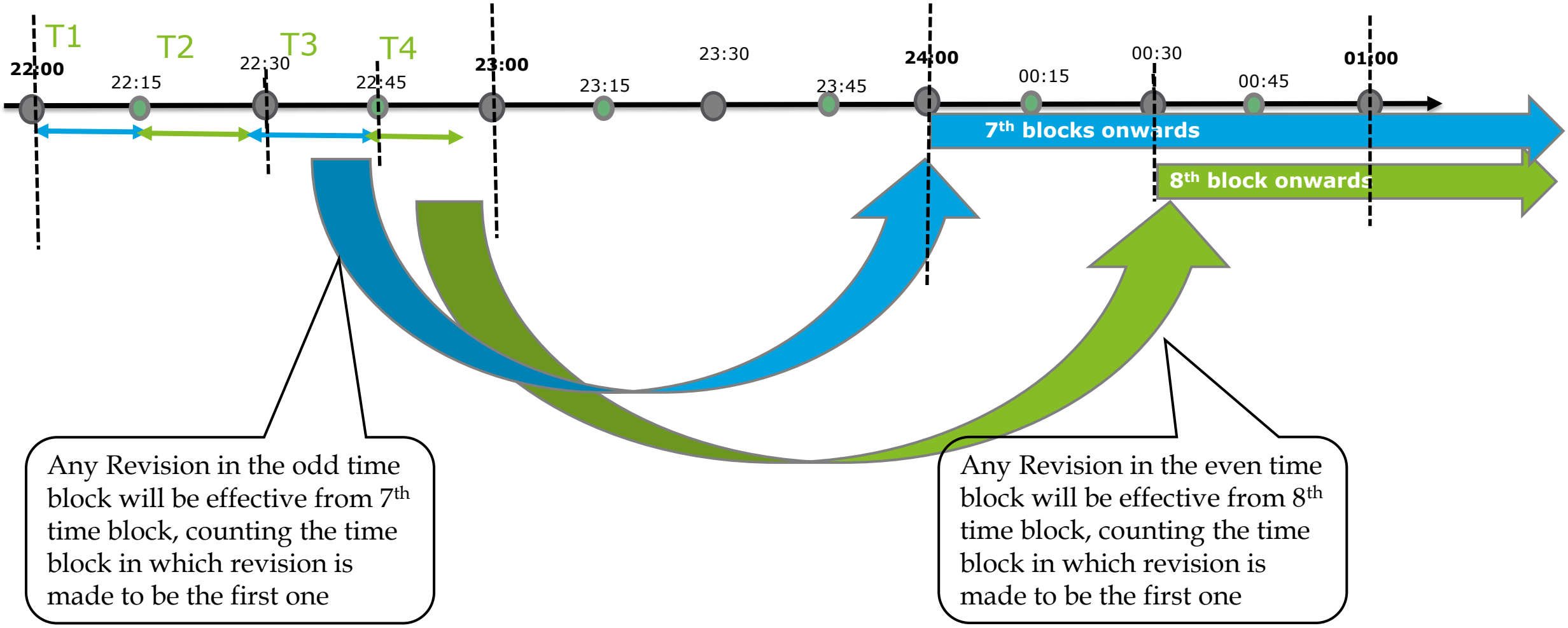
RTM auction start time	RTM auction end time	RTM clearing interval	Schedule prep and Communication	Delivery period (MCP and MCV will be discovered for each 15 minute block)
22:45 Hrs (of the previous day)	23:00 Hrs (of the previous day)	23:00-23:15 Hrs (of the previous day)	23:15-24:00 Hrs	00:00-00:30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

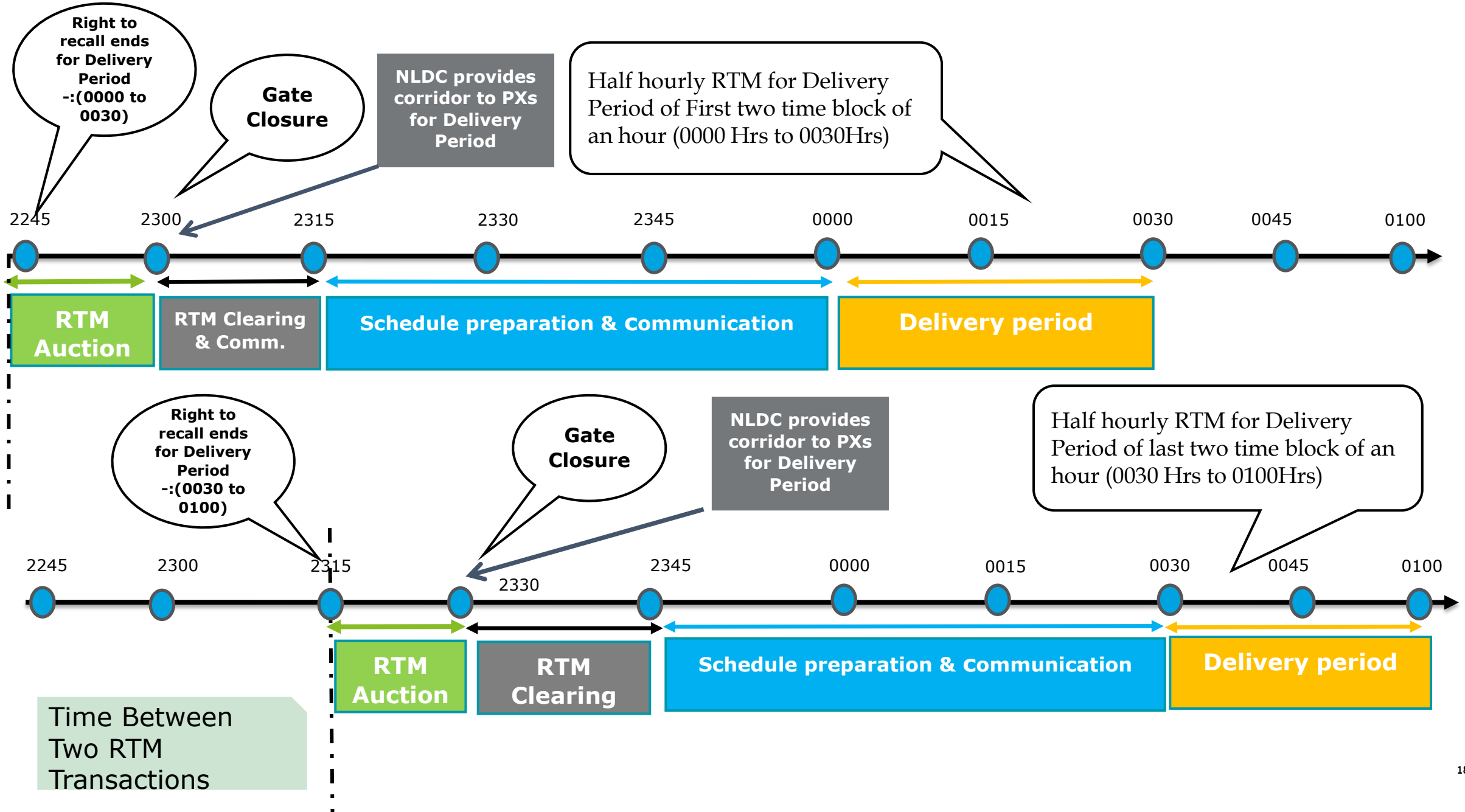
Timeline for Right to revise the schedule



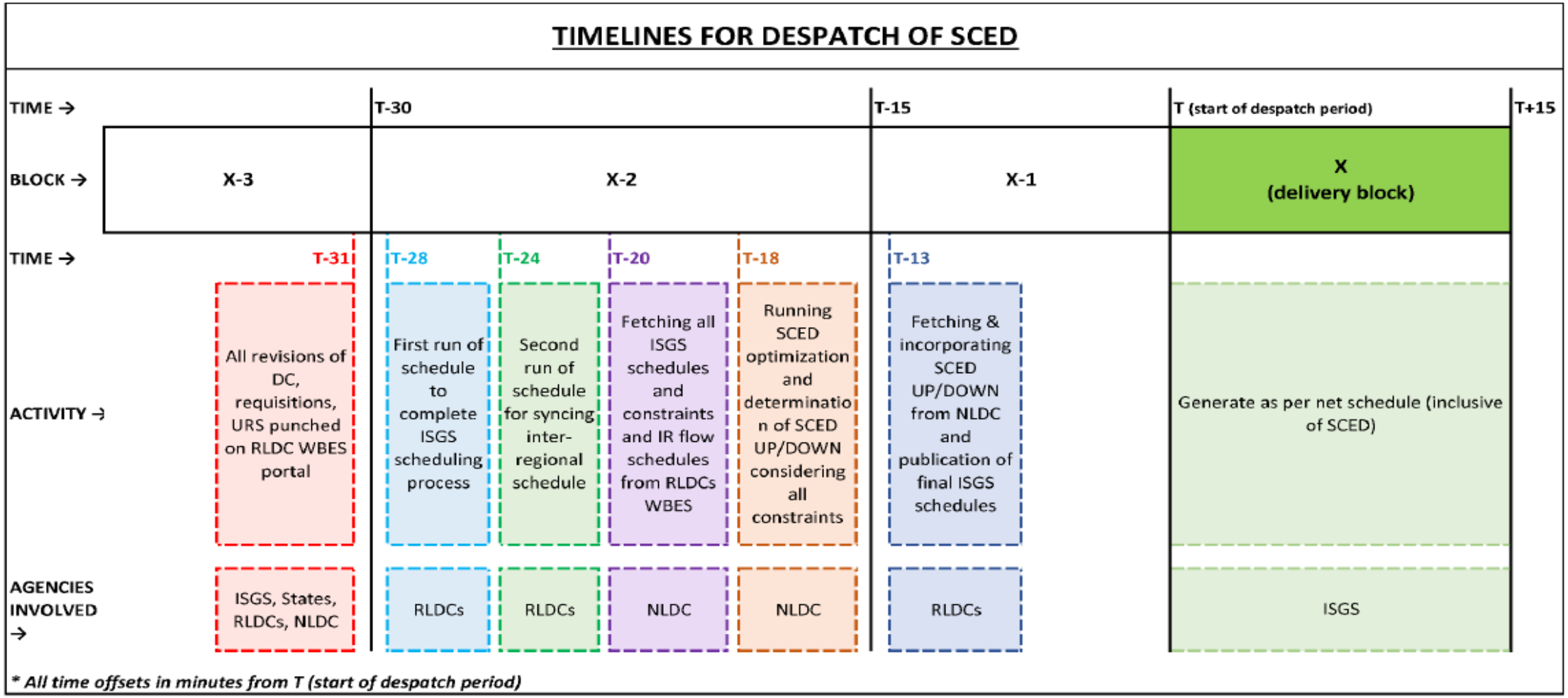
Timeline for Right to revise the schedule



Timeline for Two Half hourly RTM



Existing SCED Timeline- Half an Hour before delivery of 15 minutes



Source: POSOCO

Go to Hourly RTM

Go to 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

Required Regulatory Amendments…….1/5

Regulations	Provisions	Relevant Clause
Indian Electricity Grid Code Regulations, 2010	• Provision for Right to recall	**6.5.18.** [Revision of declared capability by the ISGS(s) having two part tariff with capacity charge and energy charge [ ] and requisition by beneficiary (ies) for the remaining period of the day shall also be permitted with advance notice. ~~Revised schedules/declared capability in such cases shall become effective from 4th time block and counting the time block in which the request for revision has been received in the RLDC to be the first one.~~] Any revision in the schedule or declared capability made in the first two time blocks of an hour~~,~~ shall become effective from the 3rd ~~-~~time block of the 2nd hour, counting the first hour as the hour in which revision has been made. Similarly, any revision in the schedule or declared capability made in the last two time blocks of an hour shall become effective from the 1st time block of the 3rd hour, counting the first hour as the hour in which the revision has been made. **Note: Hour referred - in this clause means the duration of four time blocks, namely 00:00 to 01:00 as one hour and so on.** [**18(a)** ~~Notwithstanding anything contained in Regulation 6.5.18, in~~ In case of forced outages of a unit, for those stations who have a two part tariff based on capacity charge and energy charge for long term and medium term contracts, the RLDC shall revise the schedule on the basis of revised declared capability. The revised declared capability and the revised schedules shall become effective from the ~~4th~~ time block and in the manner as specified in Regulation 6.5.18.~~,counting the time block in which the revision is advised by the ISGS to be the first one.~~]

Required Regulatory Amendments…….2/5

Regulations	Provisions	Relevant Clause
Indian Electricity Grid Code Regulations, 2010	• Provision for Right to recall	***19.*** ~~*Notwithstanding anything contained in Regulation 6.5.18, I*~~ *In case of forced outage of a unit of a generating station (having generating capacity of 100 MW or more) and selling power under Short Term bilateral transaction (excluding collective transactions through power exchange), the generator or electricity trader or any other agency selling power from the unit of the generating station shall immediately intimate the outage of the unit along with the requisition for revision of schedule and estimated time of restoration of the unit, to SLDC/RLDC, as the case may be. The schedule of beneficiaries, sellers and buyers of power from this generating unit shall be revised accordingly. The revised schedules shall become effective*~~*from 4th time block*~~ from the time block and in the manner as specified in Regulation6.5.18.~~*, counting the time block in which the forced outage is declared to be the first one.*~~ *The SLDC/RLDC as the case may be shall inform the revised schedule to the seller and the buyer. The original schedule shall become effective from the estimated time of restoration of the unit. However, the transmission charges as per original schedule shall continue to be paid for two days.* *Provided that the schedule of the buyers and sellers shall be revised after forced outage of a unit, only if the source of power for a particular transaction has clearly been indicated during short-term open access application and the said unit of that generating station goes under forced outage.* ~~*Provided also that the provisions of this sub-regulation in respect of revision of schedule by electricity traders and any other agency (except the generating station) shall be operative with effect from 1st July 2012.]*~~

Required Regulatory Amendments……3/5

Regulations	Provisions	Relevant Clause
Indian Electricity Grid Code Regulations, 2010	• Scheduling for RTM Transactions	**6.5 Scheduling and Despatch procedure for long-term access, Medium – term and short-term open access** **5. Scheduling of Day-Ahead collective transaction:** **Inserting a new clause 6.5.5(a)** **6.5.5 (a) Scheduling of Real-time collective transaction:** NLDC shall indicate to Power Exchange(s), –margin available in each of the transmission corridors before window for trade closes for a specified duration. . Power Exchange(s) shall clear the buy and sell bids for the said duration under consideration on various interfaces or control areas or regional transmission systems as intimated by NLDC. The limit for scheduling of collective transaction during real time for respective Power Exchanges shall be worked out in accordance with the directives of the Commission. NLDC shall furnish the available transmission corridors to the Power Exchange(s) before the trading for real time market or a specified duration closes. Based on the information furnished by NLDC, Power Exchange shall clear the RTM bids and announce the Market Clearing price and volume. Based on the volume cleared by the –Power Exchanges, NLDC shall communicate the schedules to the respective RLDCs. After getting confirmation from RLDCs, NLDC shall convey the acceptance of scheduling of collective transaction to Power Exchange(s). RLDCs shall schedule the Collective Transaction at the respective periphery of the Regional Entities.

Required Regulatory Amendments……4/5

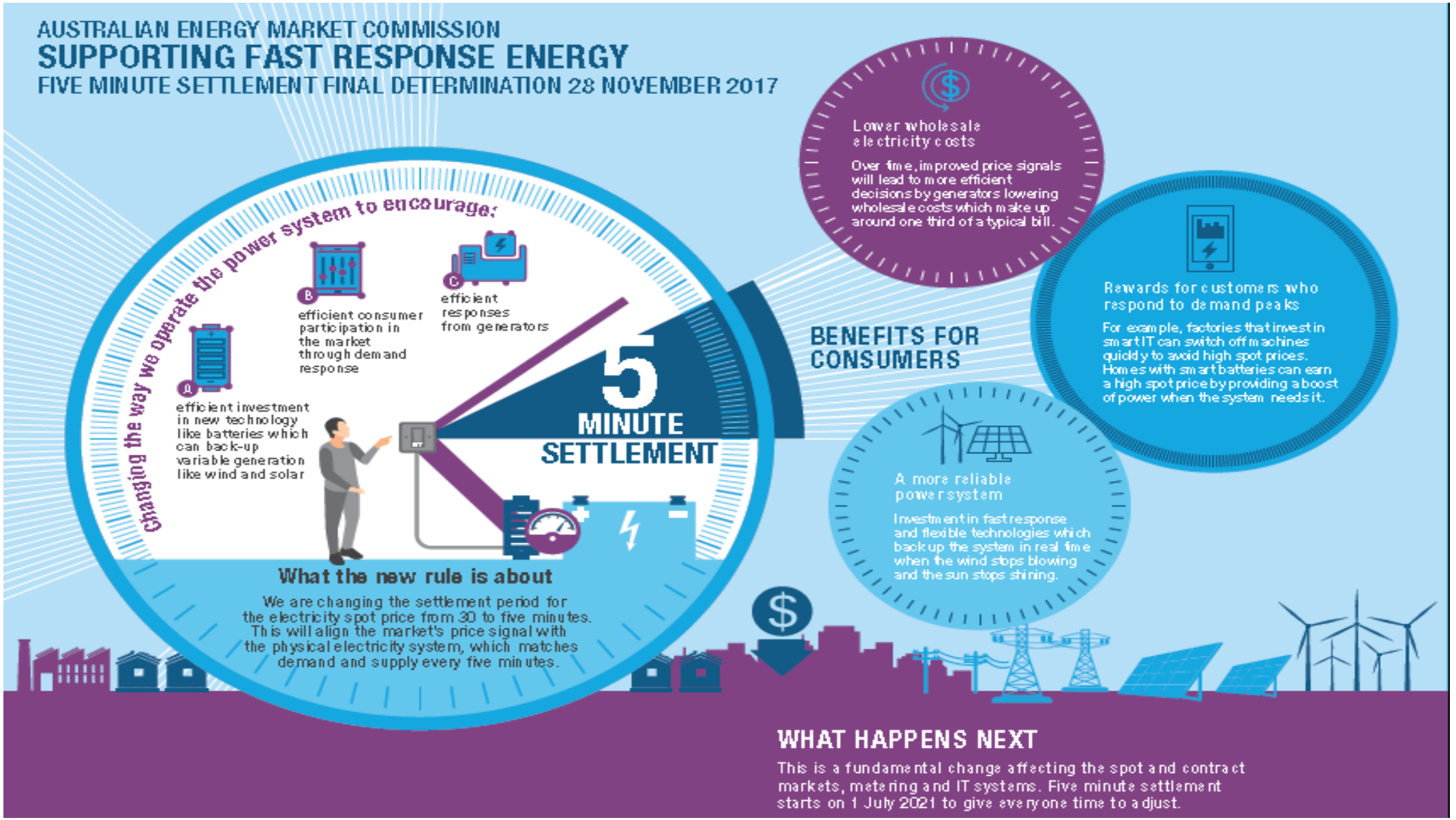
Regulations	Provisions	Relevant Clause
Indian Electricity Grid Code Regulations, 2010	• Settlement under RTM	**6.5 (A) Scheduling and commercial settlement of energy exchanged under Ancillary services, Spinning Reserves, URS and Real-time transactions:** (c) In case of sale of share of original beneficiaries in market by ISGS in case of day ahead transactions, for which consent has been given, and in case of real-time transactions, for which consent is not required after the gate closure, the realized gains shall be shared between the ISGS and the concerned beneficiary in the ratio of 50:50 or as mutually agreed by the ISGS and concerned beneficiary in the billing of the following month. This gain shall be calculated as the difference between selling price of such power and fuel charge including incidental expenses. Provided that such sale of power by ISGS shall not result in any adverse impact on the original beneficiary(ies) including in the form of higher average energy charge vis-à-vis the energy charge payable without such sale: Provided further that there shall be no sharing of loss between the ISGS and the beneficiary(ies): **6.5.7. By 6 PM each day, the RLDC shall convey:** ..... (iii) The final despatch schedule and drawal schedule shall take into account the changes in schedule after the execution of the Real-time Market.

Future Regulatory Interventions

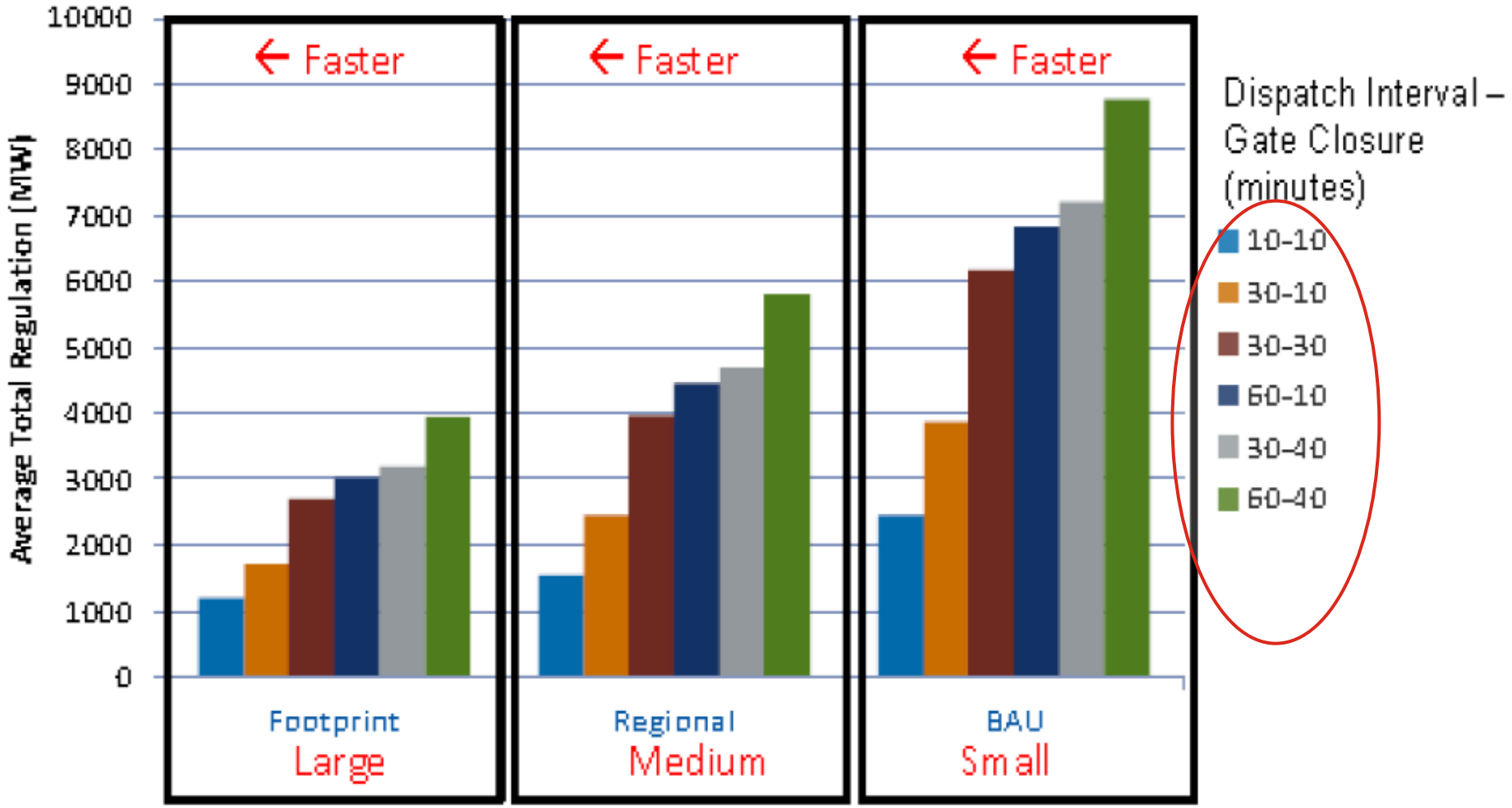
- Ancillary Services Market
- Co-optimisation of Energy and Ancillary Services
- Market Based Economic Dispatch on Day Ahead
- Following complimentary Mechanism at State Level
  - Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST)
  - Forecasting Scheduling and Deviation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

Thank you

International Experience – Australia



Dispatch Interval and Regulations



Milligan, Kirby, King, Beuning (2011), The Impact of Alternative Dispatch Intervals on Operating Reserve Requirements for Variable Generation. Presented at 10th International Workshop on Large-Scale Integration of Wind (and Solar) Power into Power Systems, Aarhus, Denmark. October

International Experience – USA

Table i. ISO's intraday timeline summary[4]

ISO	Procedure	Frequency	Look-ahead	Commitment	Dispatc	Prices[5]
CAISO	Residual unit commitment (RUC)	Daily	24-168 h	Long start units		Availability[6]
	Short-term unit commitment (STUC)	1 h	4 h	Medium/short		
	Real-time unit commitment and FMM	15 min	60-105 min	Fast start units	✓	✓
	Real-time economic dispatch	5 min	Up to 60 min		✓	✓
ISO-NE	Resource Adequacy Analysis (RAA)	Daily	Oper. day	Non-fast start		
	Additional RAAs	As needed	Oper. day	✓		
	Unit dispatch software	5 min	60 min		✓	Ex-post
MISO	Reliability Assessment Commitment	Daily	Oper. day	✓		
	Intraday RAC	As needed	Oper. day	✓		
	Look-ahead commitment (LAC)	15 min	3 h	✓		
	Real-time SCED	5 min	N/A		✓	Ex-post
NYISO	Supplemental resource evaluation	As needed	Oper. day	✓		
	Real-time commitment (RTC)	15 min	150 min	✓		
	Real-time dispatch (RTD)	5 min	60 min		✓	✓
PJM	Reliability Assessment Commitment	Daily	Oper. day	✓		
	Combustion Turbine Optimizer (CTO)	As needed	Oper. day	✓		
	Ancillary Service Optimizer (ASO)	1 h	60 min	✓		
	Intermediate-term SCED	15 min	60-120 min	✓		
	Real-time SCED	5 min	15 min		✓	✓
ERCOT	Day-ahead Reliability Unit	Daily	Oper. day	✓		
	Hourly RUC	1 h	Oper. day	✓		
	SCED	5 min	N/A		✓	✓

USA ISOs Intraday Timeline Summary (Source: MIT Energy Initiative)