MINUTES OF FIRST MEETING OF RECONSTITUTED "TECHNICAL COMMITTEE FOR IMPLEMENTATION OF FRAMEWORK ON RENEWABLES AT THE STATE LEVEL-GOUP-I and GROUP-II"

Venue	:	Upper Ground Floor CERC, New Delhi
Date	:	01-07-2019
List of Participants:		At Annexure –I **(Enclosed)**

1. The First meeting of reconstituted Standing Technical Committee was held on 1st July, 2019 under the Chairmanship of Shri Indu Shekhar Jha, Member CERC. Shri I.S. Jha welcomed all the participants and special invitees and at the outset expressed his gratitude to the Forum of Regulators for giving him the opportunity of chairing such an august Committee. He informed that the FOR Standing Technical Committee has been reconstituted as per the decision during 66th FOR Meeting on 18th January 2019. The Committee has been divided into two groups as Group- I and Group- I. Group-I majorly consists of RE rich States and will focus on implementation of Forecasting, Scheduling (F &S) and DSM Framework for RE at the State Level and related issues. Similarly Group- II consists of members from some non-RE rich States and will focus on implementation of Availability Based Tariff (ABT) at State level.

Agenda No.1 : Re-constitution of the Standing Technical Committee (Gr-I & Gr-II):

2. Shri Ravindra Kadam, Advisor RE, CERC gave a brief background of how formation of Technical Committee was conceptualized and highlighted some achievements of the Committee. (**Annexure-II**). A Technical Committee was constituted under the chairmanship of Member, CERC on 18.11.2015 for implementation of Framework on Renewables at State level.

3. As decided in the 66th meeting of the FOR, 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. Accordingly, the Competent Authority in FOR has reconstituted the Standing

Technical Committee of the Forum of Regulators (FOR) and this 1st meeting of the reconstituted FOR Sanding Technical Committee has been scheduled. It was also decided that the Standing Technical Committee shall provide periodic report to the FOR and may co-opt any other member, as deemed fit.

4. It was informed that Scope of Work of the Standing Technical Committee has remained same to evolve a roadmap for RE integration while ensuring larger participation from more States. The Scope of Work of the Committee includes:

- Deployment of Framework on Forecasting, Scheduling and Deviation Settlement of wind & solar generators;
- Implementation of Availability Based Tariff (ABT) framework;
- Introduction of Ancillary Services and Reserves;
- Implementation of Automatic Generation Control (AGC) and primary control

5. Advisor RE highlighted that the key initiatives of the Standing Technical Committee inter alia, include:

- Report on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST)
- Model Framework for Forecasting, Scheduling and Deviation Settlement for RE sources at the State level
- Model Deviation Settlement Mechanism (DSM) Regulations
- Development of Generic RPO Webtool & Model RPO Regulations
- Sub-group on Regional Co-operation for optimum utilization of Generation Resources
- Report on roll-out of Smart Meters
- Model Regulations for Intra-State Hydro Generating Stations
- Sub Group on Capacity Building of Load Dispatch Centres-CABIL
- Sub-group on Introduction of 5-minute Time Block
- Sub-Group on Challenges for Biomass and WtE Power Projects.
- Sub Group on Issues of Aggregators/ Qualified Coordinating Agency (QCA)
- Sub Group on Reserves and Ancillary Services at State Level

6. Thereafter the agenda items were taken up for discussion:-

7. **Discussions on the Agenda items**

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

- Update by Consultant

a. The Consultant (Idam Infra) made a presentation (**Annexure-III**) on the SAMAST implementation, Forecasting & Scheduling and DSM Regulations at State level for various States.

b. The Consultant briefly summarized the preparation of Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) report for evolving detailed action plan with time lines for implementation of ABT/DSM at State level.

c. The consultant apprised the Committee of the progress made for implementation of SAMAST framework, Forecasting & Scheduling and DSM Regulations since adoption of the report by FOR during its 55th Meeting held on 22nd July 2016.

d. 14 States have submitted DPR for SAMAST implementation out of which 4 DPRs have been approved. Remaining 18 States are either still in the process of preparing their DPRs. The consultant also highlighted the support provided by the Technical Committee to different States like Punjab, Haryana, Tamil Nadu etc. in implementing the above framework at State Level.

e. Shri Bakshi appreciated the support provided by NERPC to small States in North Eastern Region in preparing joint DPR for small States and suggested Technical Committee may assign this work to NERLDC to help in preparation of DPRs for small States. Chief Engineer, CERC informed the Committee that NERPC has already submitted the report and the same has to be adopted by North Eastern States. Shri Iyer suggested the report should be discussed with each of the North Eastern States and the process of finalising the DPRs for PSDF funding should be expedited. The Appraisal Committee for PSDF should provide support even for smaller States.

f. Shri. S.K. Soonee, Advisor, POSOCO highlighted that the PSDF funding is to provide funding exclusively for SAMAST implementation which requires prudence check of the cost submitted under DPR. This process sometimes takes more time in approving the DPRs prepared for SAMAST implementation. The Committee Members suggested to streamline the process by finalizing the standard rates as well as rationalization of the meters to expedite the approval process. The Committee Chairman Shri Jha requested the CMD of POSOCO to provide status update on the timeline for approving the DPRs for SAMAST implementation before the Technical Committee.

g. Chairperson KSERC provided updates on SAMAST and F&S Regulation for the State of Kerala. He highlighted that Kerala has already started the process of preparing DPR for SAMAST implementation.

h. The Committee also advised the consultant to support remaining States like Uttar Pradesh and Kerala in preparing the DPRs for SAMAST implementation

i. The consultant then presented State wise Status update on SAMAST framework, Forecasting & Scheduling and DSM Regulations. It was highlighted 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.

j. Shri Iyer suggested that the consultant should follow up with those States which have notified the draft F & S and DSM Regulation but yet to finalise the same. The Chairman suggested to write letters to the States which have not yet notified the Forecasting and Scheduling and DSM Regulations at the State Level.

k. It was suggested that as per the recommendations in the SAMAST report, States in which SAMAST framework has been implemented may share their experience with other States in which the framework is yet to be implemented. This will enable the transfer of knowledge and experience and challenges in implementation of SAMAST framework along with Forecasting & Scheduling and DSM mechanism through peer learnings.

l. It was further suggested that model IT architecture consisting software and hardware infrastructure required for SAMAST implementation can be prepared with required specifications. The architecture detailed out in the KABIL report for software and hardware requirement prepared by the Committee may be referred to prepare such standards. This recommended architecture by the Committee will help States to streamline the process and to shorten the period of system development.

m. The Member, MERC suggested, a standard specification in the system development consisting software and hardware and recommended by the Committee would help States in expediting the process.

n. It was suggested that the consultant may prepare a draft architecture detailing out standard specifications for IT architecture and present in the next meeting. The Committee will decide the follow up action after discussing the draft.

o. Dr S K Chatterjee, CERC suggested to have an exclusive meeting with States on best practises on implementation of ABT and SAMAST framework. Group –II of the Technical Committee focusing on implementation of ABT framework at State Level can have a separate agenda on this purpose.

p. The Consultant also pointed out that under the engagement of assistance to the Standing Technical Committee, around 11 States were supported in DPR

preparation for SAMAST framework and 6 to 8 States in preparing Forecasting & Scheduling and DSM Regulations along with support in amending grid code wherever required. In addition to this the consultant has assisted two sub groups of the Technical Committee on QCA / Aggregator and Biomass & WTE Projects.

q. The members appreciated the effort put by the consultant in providing support to different States and recommended assistance of the consultant to the Committee to continue for one more year.

Action points/ Decisions

i. *The Committee requested the POSOCO to submit status update on the approval of the DPRs submitted for SAMAST framework;*

ii. *The Committee agreed to have special session with States which have not yet initiated action on SAMAST implementation, and also to facilitate the approval of DPRs for North Eastern States;*

iii. *The Committee also suggested the consultant to support remaining States in preparing the DPRs for SAMAST implementation;*

iv. *The Committee suggested Group-II shall take an exclusive agenda on sharing best practises on ABT, SAMAST, Forecasting and Scheduling , DSM implementation in its next meeting for specific States;*

v. *The Committee suggested that the consultant may prepare a draft architecture detailing out standard specifications for IT architecture required under SAMAST framework in the next meeting;*

vi. *The Committee appreciated the support provided by the consultant to the Technical Committee and recommended extension of the term of the Consultant to support Technical Committee for one year more.*

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

a) The Chairperson KERC presented the report of the sub group on issues of Aggregator/QCA before the Committee and the recommendation made in the report. (**Annexure-IV**)

b) Chairperson KERC informed that the subgroup deliberated on international experience on aggregators and its relevance for India. It was observed that as the market evolves, the role of Aggregators assumed importance. The Aggregators can aggregate Demand Response (DR), Distributed Energy Resources (DER), imbalance market, grid support services etc. The international experience revealed that aggregation business models are mostly market driven and role of regulators is limited. The Experience from US shows that group of customers can come together through aggregators which can provide required service to the utility and system operators.

c) The Chairperson KERC informed that the sub group also studied the F&S Regulations, Operating Procedures and experiences in states where F&S

framework is already operational. Sub-Group has also interacted with key stakeholders SLDCs/QCAs and verified the existing practices, modalities of contracting arrangements. Based on the international and national experience the sub group identified the key issues to be address to understand the nuances of the QCA/Aggregator operations within the power system.

d) On the issue of providing legal status and regulatory oversight, the sub group recommended that 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 .

e) It was recommended that 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. Other recommendations of the sub-group were also presented.

f) Members appreciated the efforts of the sub group and agreed to discuss the report in detail in the next meeting. Meanwhile the report as circulated may be examined by the Members and comments be forwarded to FOR secretariat within 15 days, so as to enable focussed discussion in the next meeting.

Action points/ Decisions

- *The Committee appreciated the efforts of the sub group in preparing the report and agreed to discuss the recommendations in next meeting.*

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

a) Shri S. K. Soonee , Advisor 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 and informed that the committee has co-opted two experts namely Dr. S. K. Chatterjee, CERC and Prof. Abhijit Abhyankar, IIT Delhi. He informed the Committee that two meetings of the sub group were held and the sub group deliberated on the key design needs for implementation of reserves/ancillary services were recognized.

b) Shri Soonee 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. It is envisaged that the sub group would also frame the model regulations for harnessing the flexibility attributes, maintaining the mandated reserves and deploying them under normal and contingent scenario through intra-state reserve regulation ancillary services.

c) The Advisor POSOCO highlighted that mechanism presupposes implementation of intrastate ABT and SAMAST framework. Ramp-up / Ramp down constraints

were the key limiting constraints during the implementation of SCED (security constrained economic despatch at central level).

d) Shri Soonee 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 and MP 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.

e) Shri Soonee informed the group that the sub group will implement the pilots in the States preferably in western region and will formulate the Regulations for intra-state reserves and ancillary service.

Action points/ Decisions

- *The Committee noted the updates provided on the sub group activities.*

The meeting ended with a vote of thanks to Chair.

Annexure-I

LIST OF PARTICIPANTS AT THE FIRST MEETING OF RECONSTITUTED TECHNICAL COMMITTEE (GROUP-I & GROUP-II) FOR IMPLEMENTATION OF FRAMEWORK ON RENEWABLES AT THE STATE LEVEL HELD ON 1st JULY 2019 AT CERC, NEW DELHI

1	Sh. I.S. Jha, Member	CERC
2	Dr. M.K. Iyer, Member	CERC
3	Sh. A.S. Bakshi, Former Member	CERC
4	Sh. Preman Dinraj, Chairperson	KSERC
5	Ms. Kusumjit Sidhu, Chairperson	PSERC
6	Sh. P. Ramamohan, Member	APERC
7	Sh. P.J. Thakkar, Member	GERC
8	Sh. Rajeev Amit, Member	BERC
9	Sh. Mukesh Khullar, Member	MERC
10	Sh. Durgadas Goswami, Member	WBERC
11	Sh. H.M. Manjunatha, Member	KERC
12	Sh. S.C. Shrivastava, Chief (Engg.)	CERC
13	Dr. S.K. Chatterjee, Chief (RA)	CERC
14	Sh. S.K. Soonee, Advisor	POSOCO
15	Sh. N. Pradeep Kumar, Dy. Director	KERC
16	Sh. K.V.N. Pawan Kumar, Manager	POSOCO
17	Ms. Rashmi Nair, Deputy Chief (RA)	CERC
18	Sh. Arun Kumar, Assistant Secretary	FOR
19	Sh. Ajit Pandit, Director	IDAM
20	Sh. Ravindra Kadam, Advisor (RE)	CERC

FOR Standing Technical Committee on Implementation of Framework for Renewables at State Level Overview of Activities

Ravindra Kadam
Advisor (RE), CERC
1st July 2019

FOR Technical Committee on Implementation of Framework on Renewables at State Level

- 50th Meeting of the FOR held on 30th September 2015 decided to form a Technical Committee under Chairmanship of Technical Member, CERC to assist States to address challenges for RE integration through appropriate Regulatory Intervention

- Comprises Technical Members of State Commissions of RE rich States, viz.
  - Andhra Pradesh;
  - Gujarat;
  - Karnataka;
  - Maharashtra;
  - Rajasthan
  - Tamil Nadu
  - Madhya Pradesh
  - Telangana

- At the 61st meeting of FOR held on 22nd September, 2017, it was decided that this Committee will be designated as FOR Standing Technical Committee, so that the Committee could continue to remain in place on permanent basis and assist the FOR on technical matters

FOR Technical Committee on Implementation of Framework on Renewables at State Level

- Committee is mandated to evolve a roadmap for implementation and ensure timely action on:
  - Deployment of Framework on Forecasting, Scheduling and Deviation Settlement of wind & solar generators;
  - Implementation of Availability Based Tariff (ABT) framework;
  - Introduction of Ancillary Services and Reserves;
  - Implementation of Automatic Generation Control (AGC) and primary control

Scope of Activities of the Technical Committee

- Visits to Member States
- Senior officers of respective State SLDC, Discoms, TRANSCO, etc. are invited
- In-depth analysis of status of host state w.r.t. critical regulatory frameworks such as DSM and SAMAST, in addition to hydro resource utilization, load forecasting, etc.
- Sharing of experiences and best practices among the States
- Participants from other states of the respective region
- Consultant to the Committee assists States in drafting DPR & Regulations

Renewed vigour at State level to fast-track execution of Committee's recommendations is critical

Key Initiatives Taken by the Committee

1. Report on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST)
2. Model Framework for Forecasting, Scheduling and Deviation Settlement for RE sources at the State level
3. Model Deviation Settlement Mechanism (DSM) Regulations
4. Development of Generic RPO Webtool & Model RPO Regulations
5. Sub-group on Regional Co-operation for optimum utilization of Generation Resources
6. Report on roll-out of Smart Meters
7. Model Regulations for Intra-State Hydro Generating Stations
8. Sub Group on Capacity Building of SLDC (KABIL)
9. Sub-group on Introduction of 5-minute Time Block
10. Sub-Group on Challenges for Biomass and WtE Power Projects.
11. **Sub Group on Issues of Aggregators/ Qualified Coordinating Agency (QCA)**
12. **Sub Group on Reserves and Ancillary Services at State Level**

1) SAMAST: Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) Report

- SAMAST is the building block for advancing States towards intra-state grid discipline, smooth inter-State transactions, integration of renewables, etc.

- SAMAST report encompasses following requirements for implementation:
  - Hardware, including metering
  - IT infrastructure
  - Communication systems
  - Energy Accounting system and Settlement procedures
  - State Regulatory Pool Account
  - Human resources
  - Governance structures

2) State Level F &S Framework on Renewables

- FOR endorsed Model Regulations for State Level Forecasting & Scheduling Framework, as prepared by FOR Secretariat, at the 50th FOR Meeting (30.9.15)
- Critical for ensuring grid discipline of RE generators & robust management of variable RE power by SLDCs.
- Technical Committee deliberated upon the Framework in detail. At the 6th meeting of the Committee (held 22nd Aug 2016), consensus was reached on following key aspects
  - Qualified Coordinating Agency (QCA)
  - Operationalization of Virtual Pool and de-pooling mechanism
  - Funding the deficit in State Imbalance Pool
  - Mechanism for DSM for inter-state transactions of embedded entities
  - Metering arrangement

3) Model Deviation Settlement Mechanism (DSM) Regulations

- To facilitate scheduling, energy accounting and deviation settlement of all grid-connected entities (buyers & sellers), while ensuring intra-state grid discipline. Critical for States to know which entity causes deviations to what extent.

- Model Regulations agreed in principle at the 8th meeting of the Committee held on 2nd Dec 2016.

- FOR endorsed the Regulations at its 57th Meeting held on 16th Dec 2016

4) Development of Generic RPO Web-tool & related Regulatory Requirements

- A web enabled tool for all OEs can enable easy reporting and monitoring and ensure transparency at the State level.
- RPO compliance monitoring web-tool developed for Rajasthan, under USAID/PACE-D program- presented to FOR in Nov 2016; Generic RPO web-tool developed and launched on 27th Nov 2017
- National-level RPO tool as prepared by TERI at the behest of MNRE
- Decision to roll-out National-level RPO tool to ALL states; data integration with Generic RPO web-tool complete
- FOR referred to Technical Committee for scaling up and generalisation of the web-tool for other States

5) Sub-group on Regional Cooperation for Optimum Utilization of Generation Resources

- Increasing penetration of VRE needs sharing of generation resources across States for balancing purposes
- Sub-group constituted comprising of stakeholders from Northern, Western and Southern Region, headed by Member Secretaries of respective RPCs
- Mandated to examine feasibility and modality of co-operation for ensuring optimum utilization of generation resources.
- RPCs convened various meetings in respective regions. Following emerged during the meeting:
  - Some Regions predominantly "surplus" in power, leaving little scope for cooperation within region. This necessitates national level framework / product for optimum resource utilization.
  - Inter-state transactions need to be enabled closer to real-time => new intra-day market products at the national level are needed.

6) Report on Smart Meters examines many aspects

- Technical Committee was assigned to study advantages, costs, technical feasibility and total requirement of smart meters and provide suitable recommendations
- Discussions with various meter manufacturers, ISGF, DISCOMs and Industry Experts were held.
- Based on the discussions, CERC team prepared a report on "Proposed implementation plan for roll out of Smart Meters"
- Report suggested phased wise implementation with few pilots to understand cost benefits
- Report was presented at the 15th Meeting of the Technical Committee (30th Oct. 2017). Committee members unanimously agreed to the findings of the report
- Letter sent to MoP to include recommendations during planning for deployment of smart meters by the Government

7) Model Regulations for Intra-State Hydro Generating Stations

- In June 2017, POSOCO released Report on "Operational Analysis for Optimization of Hydro Resources & facilitating Renewable Integration in India"
- At the 13th Meeting of the Technical Committee, POSOCO presented on 'Optimization of Hydro resources'.
- Report recommended that States are also required to adopt aforementioned CERC principles in the state-level hydro tariff regulations
- At the 14th meeting, POSOCO presented the Model Regulations. Same were endorsed by the Committee and recommended for consideration by FOR

- **Model Regulations were endorsed in principle by FOR at the 61st FOR Meeting held on 22nd Sept 2017**

8) Sub-group on Introduction of 5-minute Time Block

- Tertiary reserves ancillary services implemented at ISTS level - actions at power plant happen 16-30 mins after instruction by NLDC
- Secondary regulation services through Automatic Generation Control (AGC) soon expected- necessitates moving to 5-minute settlement (atleast for plants under AGC)
- 5-minute scheduling and settlement offers many advantages- reduction of requirement of reserves, more accurate ramping estimates, creating value for flexibility, lowering of overall system costs, etc.
- Sub-group constituted comprising CEA, CTU, RPCs, POSOCO and CERC- to prepare a roadmap for implementation (including requirements for infrastructure, standards and regulations)
- Report was completed and uploaded on website February 2018
- **As per the recommendation, CERC issued Suo Order for Pilot on 5 Minutes Metering**

9) Sub-group on Challenges for Biomass and WtE Projects

- Technical Committee of Forum of Regulators (FOR), constituted a Sub- Group under Shri R.N Sen, Chairperson WBERC in its 20th Meeting held on 17th July, 2018 at CERC, New Delhi to
- Sub group submitted report before Technical Committee and deliberated on following issues :
- **Issue-1:** Allowance for use of limited quantity of RDF/MSW in Biomass Power plant and treatment thereof - **agreed for 15% blending** without change in Tariff and subject to adherence of environmental norms
- **Issue-2:** Allowance for use of limited quantity of Biomass in Waste to Energy (MSW/RDF) Projects and treatment thereof - **agreed for 15%** blending without change in Tariff and subject to adherence of environmental norms
- **Issue-3:** Mandate for procurement of biomass power and mode of procurement - proposed that FOR may consider recommending the mandatory procurement of biomass/biogas based power projects

10) Sub-group on Issues of Aggregators/ Qualified Coordinating Agency (QCA) & 11) Sub Group on Reserves and Ancillary Services at State Level

- 10) Sub-group on Issues of Aggregators/ Qualified Coordinating Agency (QCA)
  - Submitting the Report before the Technical Committee for approval

- 11) Sub Group on Reserves and Ancillary Services at State Level
  - Update on the activities of the sub-group

Thank you

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

1st Meeting of Reconstituted FOR Technical Committee

July 1, 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.
- The 1st meeting of both the Groups of Re-constituted FOR Technical Committee is scheduled on 1st July,2019.

Contents

1. Region wise Status of SAMAST implementation in the State
2. Region wise Status of Forecasting, Scheduling and Deviation Settlement Mechanism for Wind and Solar Generation Regulations for the State.
3. Region wise Status of Deviation Settlement Mechanism Regulations for the States
4. Summary

SAMAST : Background

- Technical Committee of the FOR, constituted a Sub-Committee on **20 January, 2016** for evolving detailed action plan with time lines for **implementation of ABT/DSM at State level**.
- The Sub-Committee undertook visits and interacted with several SLDCs to study the prevailing set-up of energy scheduling, metering, accounting and settlement system in the States and submitted the Report to Technical Committee i.e. **S**cheduling, **A**ccounting, **M**etering **a**nd **S**ettlement of **T**ransactions in Electricity (SAMAST)
- The project aims to implement a **robust, scalable and transparent framework** of scheduling, metering, accounting and settlement of energy transactions at intra-state as well as interstate level in India.
- The objective of SAMAST is to **assimilate the available experience** at the interstate/intrastate level and **evolve a uniform procedure** for SAMAST across all the States and Regions in India whether renewable-rich or otherwise.
- The report on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) was presented at the **5th meeting of the Technical Committee dated 15th July 2016**. The Forum of Regulators (FOR) at its 55th meeting, held on 22nd July 2016, adopted the SAMAST report.

SAMAST : Recommendations

- Demarcation of Interface boundary & identification of Pool Members
- Adequate Interface Energy Meters with AMR infrastructure
- Ex-Ante Scheduling
- Uniform Energy Accounting System
- Simple, robust, scalable but dispute-free settlement system
- Administration of transmission losses
- Reactive Energy Pricing
- Archival and Utilization of Energy Meter Data
- Integrity and Probity of Accounts
- Payment Security Mechanism and Risk Mitigation

Overview of SAMAST framework

Stage-I

Identification of Intra State Entities

Demarcation of Interface boundary for each Intra State Entity

Assessment of Meters - Main, Check and Standby

Assessment of Automatic Meter Reading logistics requirement

Assessment of IT infrastructure (Hardware and Software) requirement

Preparation of Bill of Quantities (considering logistics already in place

Preparation of DPR and completion of stakeholder workshop

Stage-II

Approval of the State-specific SAMAST scheme by SERC

Commencement of Load Forecasting by SLDC

Commencement of Interchange Scheduling by SLDC for all the Intra State Entities

Formation of a State Power Committee for preparation of Account

Establishment of State Regulatory Pool Account

Application for funding from Central Government/PSDF

Inviting tenders and Placement of Award

Adequacy of Human Resources in SLDC

Stage-III

Implementation of the recommended IT infrastructure-Hardware

Completion of boundary metering and AMR system (as per DPR)

Implementation of the recommended IT applications-Software

Computation of transmission losses for each 15-min by SLDC

Preparation of Energy Accounts by SPC/SLDC and Publication of the required documents on SPC/SLDC website

Clearing of Pool A/c Credit / Debit for at least four weeks and its reconciliation

USAID FROM THE AMERICAN PEOPLE

Key Components of SAMAST DPR

GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

Hardware Components-I

- ABT Meters
- Instrument Transformers (CT/PT)
- Calibration of Meters
- Automated Meter Reading Instruments (CMRI)
- Installation & testing

Hardware Components-II

- Servers (database, application, domain, web, anti-virus)
- Storage SAN
- UPS/firewall/Rack for Server,
- Laptops/Desktops Printers, Monitoring Screens
- Installation & testing

Software Components

- Operating Systems and Software Licensing
- Scheduling s/f Module
- OA s/f Module
- Energy Accounting Module
- Billing & SLDC Report Module
- Financial Accounting and Statutory Compliance
- Testing/Trial runs

Communication Components

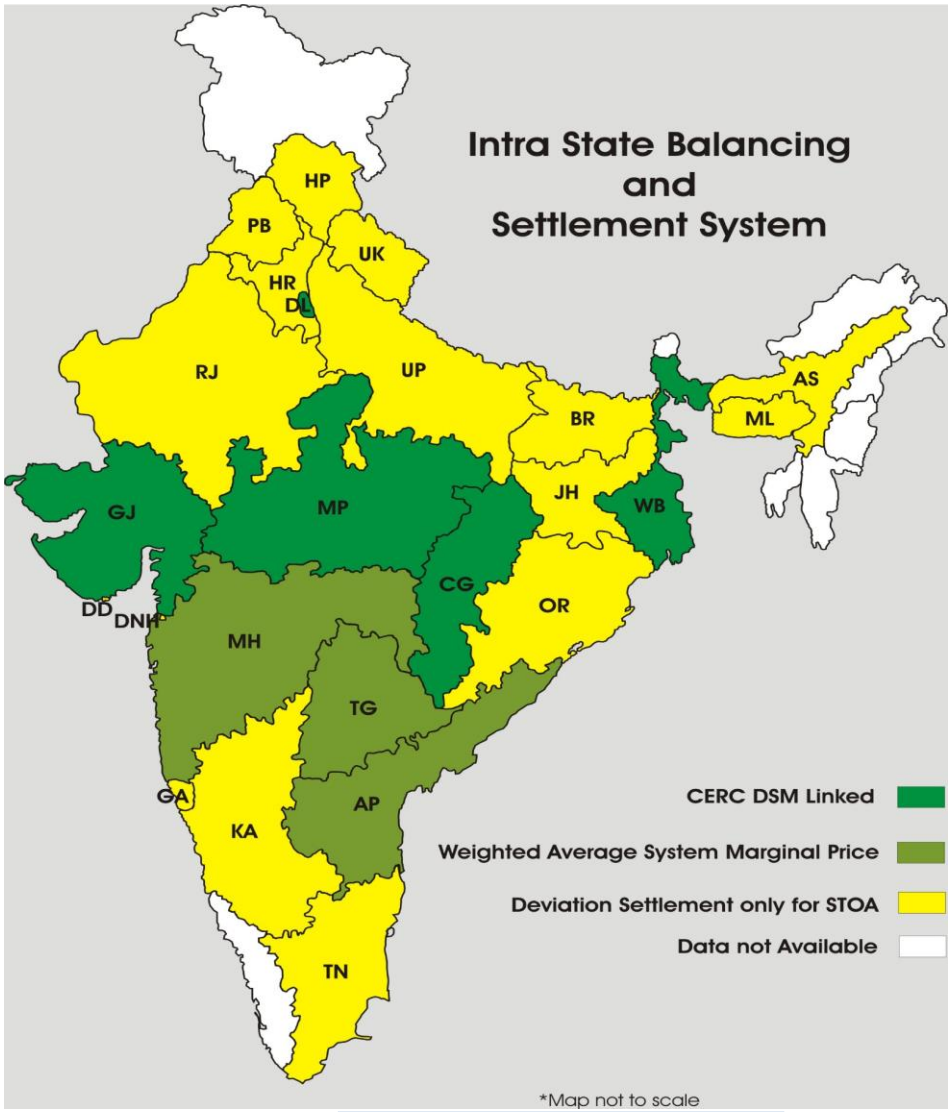
- Modems
- DCUs at field
- GPRS/GSM connectivity for sites
- MPLS communication lines
- Internet & telephone connectivity
- Installation & testing

Training, Cap. Building and Infra Dev. Components

- Training & Capacity Building
- AMC for Hardware & Software
- Office space within Building/ Premises
- Furniture & Fixtures
- Air-conditioning system
- Project Mgmt/IT consultant

Status Update of SAMAST DPR & Implementation

GOVERNMENT OF INDIA
MINISTRY OF POWER



States	SAMAST DPR (as on 30-04-2019)		
Region	DPR Submitted	DPR approved	WIP or Yet to Prepare
North	**3** HP, HR & PB	**1** RJ	**4** UK, UP, J&K, DL
West	**1** MP	-	**4** CG, Goa, GJ, MH, (ABT in implementation)
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	**14**	**4**	**18**

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

Status of SAMAST implementation in (Group II) States

States	SAMAST Category	Date of Submission	Estimated cost (in Cr)	Remarks
Punjab	Group B	19-Nov-2018	32.64	• DPR of SAMAST proposal was examined by TESG TESG recommended to PSDF committee for approval of 13.58 Crore
Uttar Pradesh	Group B	----	-----	Following activities have been completed: • Identification of Intra-State Entities • Demarcation of boundaries for Intra-State Entities. • Assessment of meters &, IT Infrastructure • State Power Committee formed, yet to functionalized
Assam	Group D	31-May-2018	18.53	• **Proposal was examined by TESG. Inputs from entities have been received.** • TESG scrutiny is in progress
Bihar	Group D	12-Sep-2018	93.76	• **Proposal was examined by TSEG, and inputs from entities have been received.** • Due to wide gap in the cost estimates for similar proposals by a number of utilities, bench marking cost under finalization by Appraisal committee
West Bengal	Group A	22-Dec-2017	25.96	• The proposal was examined by the TESG in the following meetings in 45th meeting . • **Representative of WBSLDC informed that, PSDF Appraisal Committee has recommended the DPR to** PSDF committee for Rs. 11.50 Crore. formal letter is expected to be received shortly.
Kerala	Group B	-	-	• Kerala SLDC has initiated the process of preparation of SAMAST DPR in March, 2019

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.

Technical Support to FOR Technical Committee under USAID/GTG-RISE initiative through Deloitte and Idam Infra

Sr.	State	SAMAST DPR	F&S Regulations	DSM Regulations	Grid Code
1	West Bengal	WBSLDC			
2	Tamil Nadu		TNERC	TNERC	
3	Telangana		TSERC	TSERC	
4	Haryana	Haryana SLDC	HERC	HERC	HERC
5	Punjab	PSTCL	PSERC		
6	Arunachal Pradesh	APSLDC			
7	Assam	AEGCL	AERC	AERC	AERC
8	Meghalaya	MPTCL	MSERC	MSERC	
9	Manipur	MSPCL			
10	Mizoram	P&ED, GOM			
11	Tripura	TSECL			
12	Nagaland	Dept of Power, GoN			
13	Himachal Pradesh	HPSLDC		HPERC	
14	Support to Task Force of FOR Technical Committee for power supply improvement in North-East States				
15	Support to the Sub-Group of Technical Committee on Challenges of Biomass and Waste-to-Energy (WTE) Power Projects				
16	Support to the Sub-group of FOR Technical Committee for addressing the challenges associated with QCA and Aggregator concept.				

USAID FROM THE AMERICAN PEOPLE

Status Update of F&S and DSM Regulations

GOVERNMENT OF INDIA
MINISTRY OF POWER

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 of F&S and DSM Regulations of Group-I States (as on June 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 June 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 implmentation.
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

Status of F&S and DSM Regulations of Group II States (as on June 2019)

States	F&S Regulations and Implementation	DSM Regulations and implementation
Punjab	• Regulations **Notified** (7th Jan, 2019) in line with Model F&S Regulations. • F&S implementation procedure preparation is in progress	• Yet to be initiated
Bihar	• Regulatory Process initiated by the Commission • No major Solar/Wind resources	• Regulatory Process initiated by the Commission
West Bengal	• Yet to be initiated • No major Solar /Wind resources	• ABT Mechanism **implemented as per CERC DSM Regulations through Order**, 4th amendment included
Kerala	• Draft Regulation under preparation	• Yet to be initiated
Assam	• Regulations **Notified** (6th Sept 2018) in line with Model F&S Regulations	• **Draft Published** (2Nov 2018) in line Model DSM Regulations • Consultant has submitted revisions in the draft in line with CERC 4th Amendment • Final Regulations are expected shortly
Uttar Pradesh	• Regulations notified on 11 February, 2019	• ABT framework for Thermal and Hydro power plants has been implemented in line with CERC DSM framework.

USAID FROM THE AMERICAN PEOPLE

Summary status of SAMAST, F&S and DSM Regulations

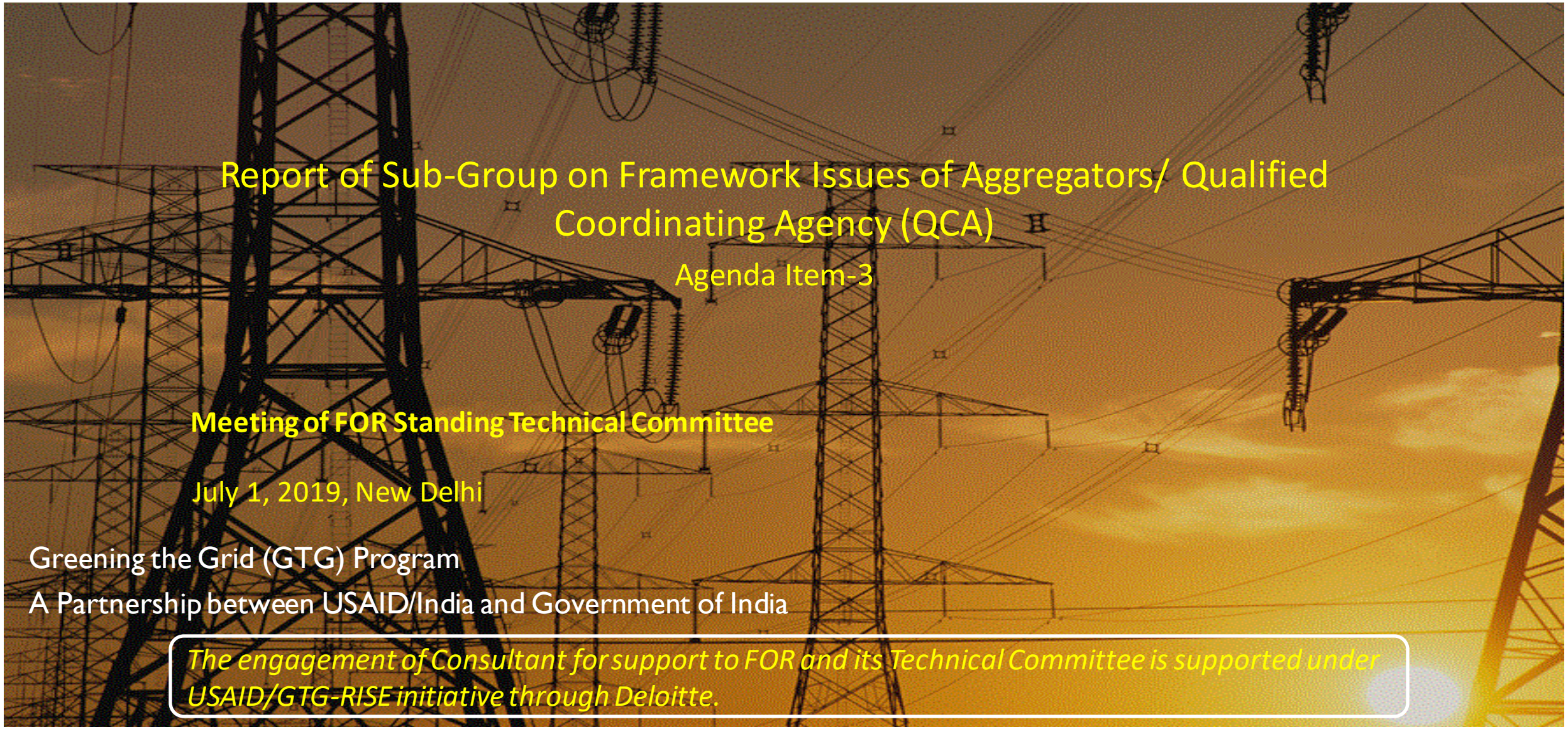
GOVERNMENT OF INDIA
MINISTRY OF POWER
सत्यमेव जयते

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: Shubhranshu Patnaik**, RISE, spatnaik@deloitte.com



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

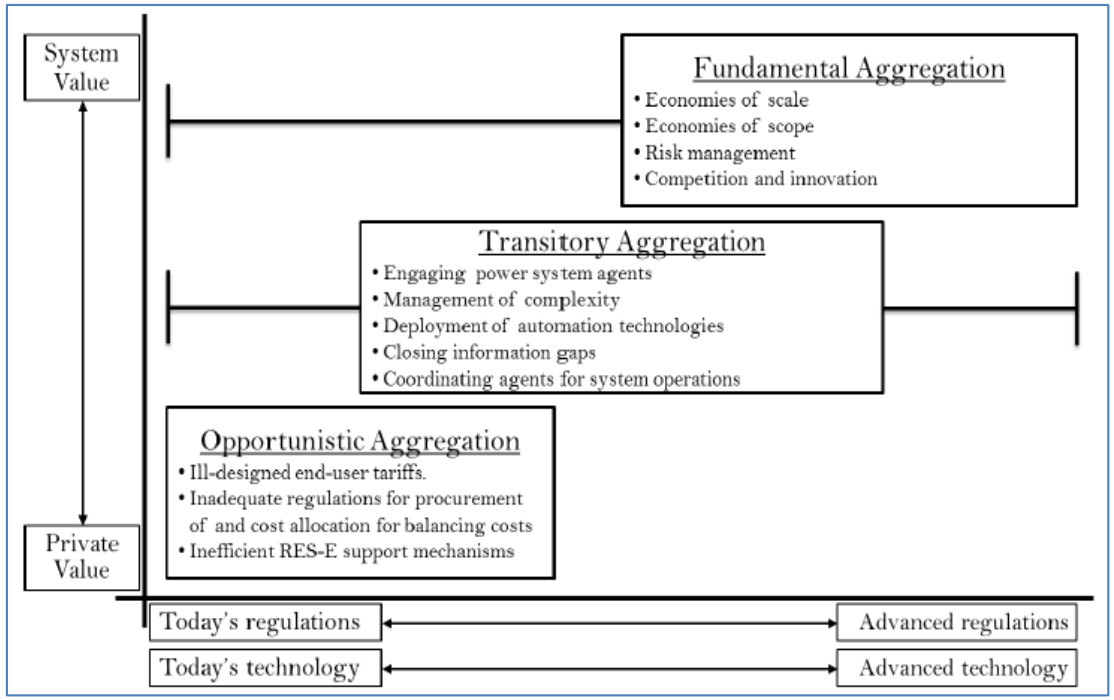
- **7th September, 2018 (CERC, New Delhi) – Presentations and deliberations covered following:**
  - draft contours of model agreement specifying the proposed roles and responsibilities of the parties
  - Wider role of the Aggregators in the ever emerging, electricity market scenario.
  - Need for demarcation 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 Demand Response(DR) and Distributed Energy Resources (DER)**, role of Aggregators would expand.
- At that Point of Time there should be regulatory oversight and **separate Model Regulations** have to 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

Status Update

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

01st July, 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
  - 22nd February, 2019

Constitution

- ***Shri S.K Soonee, Advisor , POSOCO - Chairman***
- **Members Representatives**
  - GERC (Gujarat)
  - MERC (Maharashtra)
  - MPERC (Madhya Pradesh)
  - TSERC (Telangana)
  - SLDC Gujarat
  - SLDC Maharashtra
  - SLDC Madhya Pradesh
  - SLDC Telangana
  - WRLDC, Mumbai
  - SRLDC, Bengaluru
  - NLDC, New Delhi
- ***Representative of CERC/FOR - Convenor***
- **Co-opted Members Representatives**
  - Sh. S K Chatterjee, Chief (RA), CERC
  - Prof. Abhijit Abhayankar, IIT Delhi

Meetings

- **First Meeting**: 06th May, 2019 at NLDC, Delhi
- **Second Meeting**: 07th June, 2019 at Vadodara, Gujarat
- Future Meetings in Pipeline
  - **Third Meeting** - July 2019 in Jabalpur, MP
  - **Fourth Meeting** - August 2019 in Maharashtra

Reserves and Ancillary Services – Key Design Aspects Recognized

- 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 Requirement (block wise)

Basic Parameters

1. Declared capability in MW
2. Declared capability on-bar (in MW)
3. Schedule in MW
4. Pmax = On bar installed capacity – Normative Auxiliary Consumption (MW)
5. Pmin = Technical Minimum generation (MW)
6. Variable charge (VC) in Rs/Kwh
7. Ramp-Up rate in (%age of on-bar Capacity) per minute
8. Ramp-down rate in (%age of on-bar Capacity) per minute

Derivable Parameters

1. Up-reserve
   - On bar installed capacity – Schedule (fig. in MW)
2. Down-reserve
   - Schedule – Technical Minimum (fig. in MW)
3. Cold reserve
   - DC – DC on bar …. (in MW)
4. Hot spinning reserve
   - DC on bar – Schedule ….(in MW)
5. Despatchable reserve =
   - Minimum (Hot spinning reserve & Regulation Up Reserve)

Intra-State Generators Data furnished by

- SLDC Gujarat
- SLDC Madhya Pradesh

Despatch of Ancillary Services (Essential Reliability Services) - Using Reserves

Survey questionnaires circulated by SLDC Gujarat

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

Sample optimisation module experimented using 'MS Excel Solver' based on some basic data for intra-state generators of Gujarat

Objective function of minimising production cost while honouring all extant technical & commercial constraints

Objective Function:

$$\sum \boldsymbol{Schedule} * \boldsymbol{VC} = \boldsymbol{Minimum}$$

Equality Constraint(s):

Total schedule = Total demand of state

Inequality constraint(s):

Pmin ≤ Station schedule ≤ Pmax;

Sample excel solver sheet shared by NLDC team with SLDCs for further exploration and customization

Model For Despatch of Reserves

Instructions for Users

General :

1. This is a model for despatch of reserves using linear programing based optimization which uses "Solver" in Excel for the solution
2. The "State_Details" contains various columns which are described below.
3. The model has been simplified wherein, the ramping constraints have not been included. The constraints included in this simplified version are as follows:
   (a) Total Schedule = Total Demand
   (b) Station schedule <= Pmax
   (c) Station schedule >= Pmin
   The optimization problem is solved by using the "SOLVER" add-in of EXCEL using Simplex. Run Solver from the "Data" Tab after selecting the "State_Details"
4. Adding the ramping constraints can be done carefully as we go along, learn and mature. Some of the constraints may also lead to infeasible solution
   Handling infeasibilities is done through classical methods such as relaxing constraints etc. which can be done in the second phase.
5. Automation needs to be added to this program to fetch station wise schedule related data from the Scheduling software of the concerned SLDC and also insert the optimisation results into the schedule program so that these are also communicated to the respective generators.
   Small Macros in Visual Basic or Python Script or any other such suitable platform can be used for the automation
6. The Solver gives output in the form of "Answer Report", "Sensitivity Report" and "Limits Report" only if you select the output.
   In the "Sensitivity Report", the Shadow Price represents SMP in Rs/MW
   Gradually, information systems can also built up around the results.

Gujarat

Reserves / Ancillary Services Despatch M	GUJARAT		Total Schd	otal Cost (Rs.Lac per hou	Average Rate (Rs./unit)	Net UP Reserve A
Forecast Demand	16000			455	2.81	1443
Reserve	200			Total Cost (Rs./hour)	SMP	Net Down Reserve Avail
Total Demand	16200		16200	45531823	3.33	1529
Tech. Min (%)	0.70					

Column Name -->	A	B	C	D	E=C*D	F	G=D-F	H	I	J
Column Totals -->	18983	12628		16200		16000	200	200	0	2848

S No	Station Name	P Max	Pmin	Variable Charge	Schedule for Block 'T'	Production Cost	Schedule for Block 'T-1'	Difference in Schedule of Blocks T & T-1	UP Ramping Needed from Block T-1 to T	DOWN Ramping Needed from Block T-1 to T	Declared Ramp-Up rate
1	UKAI(Hy)	300	210	0	300	0	300	0	0	0	45
2	KADANA(Hy)	220	154	0	220	0	220	0	0	0	33
3	KAPS	105	58	0	105	0	105	0	0	0	16
4	SSP	5	3	0	5	0	5	0	0	0	1
5	TAPS-I	150	83	0	150	0	150	0	0	0	23
6	TAPS-II	124	68	0	124	0	124	0	0	0	19
7	ACB Limited	210	147	74	210	155400	210	0	0	0	32
8	AKRIMOTA	160	112	111	160	177600	160	0	0	0	24
9	Korba-III	90	50	125	90	112680	90	0	0	0	14
10	Sipat-I	338	186	128	338	432302	338	0	0	0	51
11	Korba-I&II	331	182	128	331	425004	331	0	0	0	50
12	Sasan	0	0	132	0	0	0	0	0	0	0

The Solver Utility shared with SLDCs to further customise & share results

- Internal groups at SLDC Gujarat & MP are working on the likely saving with optimised despatch under different scenarios
- Based on their inputs the solver module would be further upgraded

Model For Despatch of Reserves

Instructions for Users

General :

1. This is a model for despatch of reserves using linear programing based optimization which uses "Solver" in Excel for the solution
2. The "State_Details" contains various columns which are described below.
3. The model has been simplified wherein, the ramping constraints have not been included. The constraints included in this simplified version are as follows:
   (a) Total Schedule = Total Demand
   (b) Station schedule <= Pmax
   (c) Station schedule >= Pmin
   The optimization problem is solved by using the "SOLVER" add-in of EXCEL using Simplex. Run Solver from the "Data" Tab after selecting the "State_Details"
4. Adding the ramping constraints can be done carefully as we go along, learn and mature. Some of the constraints may also lead to infeasible solution
   Handling infeasibilities is done through classical methods such as relaxing constraints etc. which can be done in the second phase.
5. Automation needs to be added to this program to fetch station wise schedule related data from the Scheduling software of the concerned SLDC and also insert the optimisation results into the schedule program so that these are also communicated to the respective generators.
   Small Macros in Visual Basic or Python Script or any other such suitable platform can be used for the automation

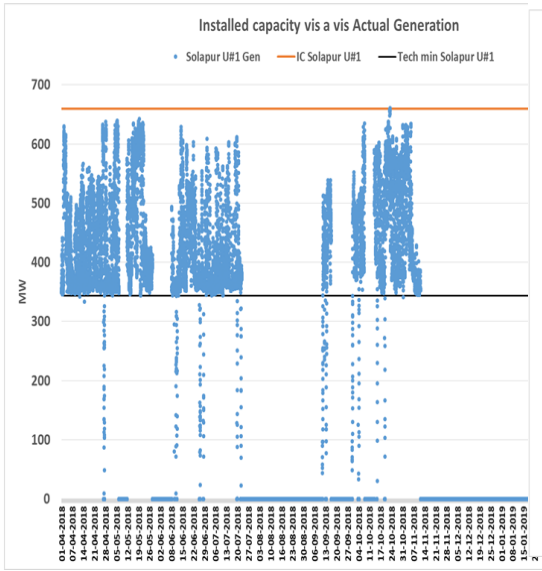
Madhya Pradesh

1	**Reserves / Ancillary Services Despatch Model :**		**MADHYA PRADESH**		**Total Schdl**	**Total Cost (Rs.Lac per hour)**	**Average Rate (Rs./unit)**	**Net UP Reserve Avail**
2		Forecast Demand	8457			59	2.39	100
3	18.06.19 (T=32 BLOCK)	Reserve	330			Total Cost (Rs./hour)	SMP	Net Down Reserve Avail
4		Total Demand	8787		2449	5851388	3.33	-532
5		Tech. Min (%)	0.70					
6	**Column Name -->**	A	B	C	D	E=C*D	F	G=D-F
7	**Column Totals -->**	2748	2815		2449		2359	90

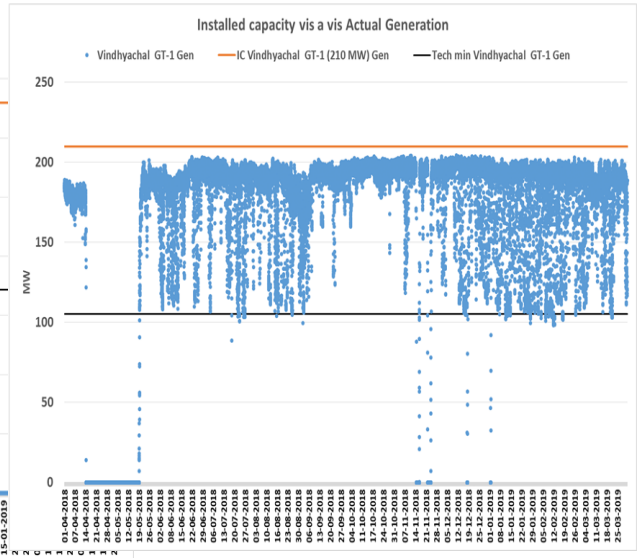
8 S No	Station Name	P Max	Pmin	Variable Charge	Schedule for Block 'T'	Production Cost	Schedule for Block 'T-1'	Difference in Schedule of Blocks T & T-1
9 20	Gandhi Sagar HPS	0.00	80	18	0	0	0	0
10 19	Bargi HPS	38.00	62	18	38	6992	38	0
11 18	Pench HPS	0.00	111	47	0	0	0	0
12 17	Bansagar-II HPS(SILPARA)	0.00	21	59	0	0	0	0
13 16	Bansagar-I HPS(TONS)	0.00	218	61	0	0	0	0
14 15	Birsinghpur HPS	0.00	14	71	0	0	0	0
15 14	Jhinna HPS	0.00	14	92	0	0	0	0
16 13	Bansagar-III HPS(DEOLONE)	59.40	42	145	59	85609	59	0
17 7	ATPS (210MW) Chachai	193.00	134	160	193	308800	193	0
18 10	Rajghat HPS	0.00	21	173	0	0	0	0
19 6	SGTPS -1x500	440.00	329	197	440	867240	400	40
20 9	Madikhera HPS	0.00	42	202	0	0	0	0
21 5	SGTPS -4x210	395.00	401	216	395	853990	395	0

Flexibilization to create reserve (Part-load operation of thermal plants)

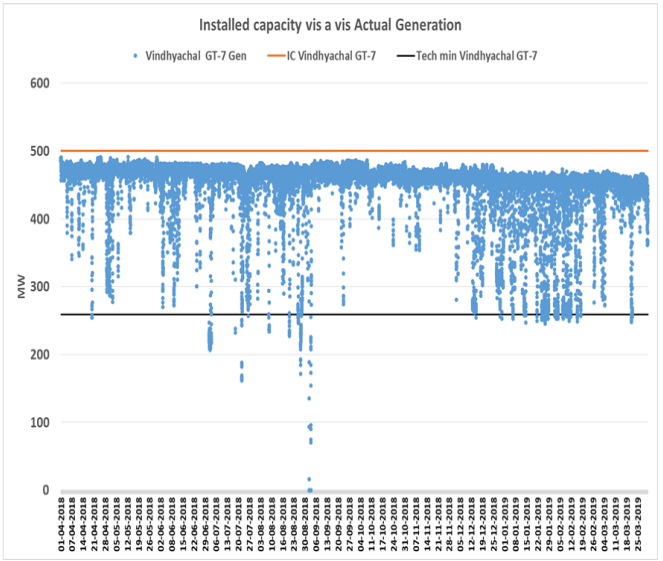
660 MW Solapur



210 MW Vindhyachal



500 MW Vindhyachal



- Technical minimum norm (55%) for CERC regulated stations ensured flexibility & reserve
- Past 1 year data for different vintage thermal units (in WR) demonstrates the part-load operation capability

Assessment of hygiene factor (for a pilot) (1 of 2)

- What is the tariff structure of intra-state power stations?
- What is the mechanism for conveying information on Declared Capability (DC) by the power stations to SLDC for scheduling?
- Is the fixed charge (FC) recovery linked with plant availability factor (PAF)?
- Can the PAF be verified by SLDC through the DC submitted by the generators?
- What is the mechanism for imbalance handling & settlement within the state?
- Is there any intra-state regulation on computation & despatch of spinning reserves?
- How is the intra-state reserve being computed?
- Is the operator able to see the trend of reserve available for next few time blocks?

Assessment of hygiene factor (for a pilot) (2 of 2)

- Is operator confident as to how much reserve is to be pressed in to service?
- Is operator able to assess the cost of these reserves?
- Is there a settlement system to pay for the reserve, utilised or unutilised?
- Is there a mechanism to establish that the most economic operation is followed?
- Should we have a mechanism for compensating the power station for reserves?
- Should we have a cost recovery mechanism for ensuring long term sustainability of the essential reliability services viz. reserves?
- Should there be a formal mechanism to replenish the depleted reserve?

Constitution of Working Groups at SLDCs State by State Gap Analysis

- Tariff
- Scheduling & Despatch, Imbalance
- Declaration of technical parameters & variable charge
- Reserves – Mandate, availability, computations, despatch,
- Metering, Accounting & Settlement Systems
- Sustainable recovery & payment mechanism for reserves, any incentives
- Availability of technology platform
- Manpower adequacy, skillsets needed
- Regulatory Framework

Key Inferences from deliberations (1)

- SAMAST framework – a prerequisite for reserves & RRAS
- Ramp-up / Ramp down constraints need to be factored
- Visibility of Merit order stack to the operators in real time for despatching.
  - Post facto moderation in the MOD stack would defeat the purpose.
- Quantum of reserves requirement would vary from State to State
- Well defined norms for technical minimum and compensation

Key Inferences from deliberations (2)

- Simplifying scheduling and settlement of reserves through
  - Scheduled based payments (vis-à-vis actual based)
  - Double entry system through a Virtual Ancillary Entity
- Adoption of causer-pays principle to enable the Intra-State pool to be self-sustainable
- Weekly settlement of ancillary despatch is desirable
- Adequate provision for IT, communication infrastructure and human resources is essential
- Inclusion of multi-purpose shared hydro stations and gas fired units

Steps Ahead

- Understanding deeper nuances through survey and working group findings

- Pilot project in Western Region
  - Telangana also suo-motu offered to initiate a pilot

- Formulating regulations for intra-state reserves and ancillary services

Thank You !

Discussions…