



**REPORT ON THE ISSUES OF
AGGREGATORS/ QUALIFIED COORDINATING
AGENCY (QCA)**

January 2020

Forum of Regulators



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

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केन्द्रीय विद्युत विनियामक आयोग
CENTRAL ELECTRICITY REGULATORY COMMISSION



P. K. Pujari

Chairperson

&

Chairperson

Forum of Regulators

10th February, 2020

Message

The Forum of Regulators has been taking up various initiatives to nurture growth of independent regulations and empowerment of all stakeholders in the electricity sector. The State and the Central Electricity Regulatory Commission as well as the Forum of Load Despatchers in India have been providing unflinching support in these endeavors.

2. The report “Issues of Aggregator/ Qualified Coordinating Agency” was endorsed on 23rd August, 2019 by Group-I and on 2nd September, 2019 by Group-II of the Technical Committee constituted by FOR and was subsequently adopted by the FOR in its 69th meeting in Amritsar on 20th September 2019. The report crystalizes the collective views based on deliberations of the practitioners and experts on the subject and recommends the suitable course of action for assimilating QCAs into the electricity ecosystem in India.

3. The report lays the foundation for Aggregators in the context of the Indian Power System and defines their roles and responsibilities vis-à-vis other participants in the electricity market. It opens the door for not only the QCAs but also for a larger market participation of Aggregators with roles that surpass the length and breadth of the activities undertaken by QCAs.

4. Successful integration of QCAs in the Indian Power Ecosystem would help in improving the quality on generation forecasts and bring about discipline in the grid.


(P.K. Pujari)



सत्यमेव जयते

Indu Shekhar Jha
Member

केन्द्रीय विद्युत विनियामक आयोग

CENTRAL ELECTRICITY REGULATORY COMMISSION



Foreword

With a goal of achieving carbon free energy, India has set a target of installed capacity of 175 GW from Renewable Energy Sources by 2022. Declining costs of RE sources have given them the footing to compete with conventional sources of energy. While renewable energy certainly seems to fill the gap for a cost efficient sustainable energy source, integration of energy into the power system poses a challenge due to the inherent intermittency of these sources.

Towards the objective of achieving grid discipline and ensuring grid security, accurate forecasting and scheduling of variable generation has assumed significant importance. The Electricity Act, 2003 entrusts the Load Dispatch Centers with the responsibility of ensuring reliability, economy and efficiency of the power system. However, with around 85 GW of solar and wind generation capacity contributed by small and large RE generators, coordinating with each individual generator becomes a mammoth task for the Load Dispatch Centers.

The concept of Qualified Coordinating Agency was introduced in the Model Regulations for Forecasting and Scheduling to co-ordinate, manage, facilitate and control interface, energy accounting and settlement and interactions of small scale and individual renewable energy generators with power system operators. Given the role of QCA, as envisaged in the regulatory framework, the need for a holistic perspective covering the broader guidelines for aggregation, role of aggregator in the power system and their regulatory challenges was felt to provide a more foundational and comprehensive view of their responsibilities, legal status and interactions etc. vis-a-vis other participants in the power system. To this end, the Technical Committee constituted by the Forum of Regulators (FOR) formed a sub-group under Shri Preman Dinaraj, Chairperson, KSERC in its 20th Meeting held on 17th July, 2018 at CERC, New Delhi.

This report is an outcome of extensive consultation and collaboration with the various stakeholders under the guidance of the Technical Committee and is a humble attempt to identify the areas for intervention to clearly define the roles and responsibilities of the Qualified Coordinating Agency in India.

(Shri I.S. Jha)



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

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

Resolution

In view of the need of greater understanding of regulatory and framework issues of Aggregators and Qualified Coordinating Agency (QCA) and to understand its nuances within power system, a Sub group under the Chairmanship of the Chairperson, KSERC was constituted consisting of the undersigned members. The members thank the Technical Committee of the Forum of Regulators for constituting the sub-group and creating a platform for developing a very forward looking terms of reference for examining the issues in a holistic perspective covering the broader guidelines for the need for aggregation, roles of aggregator/QCA and regulatory challenges in aggregation.

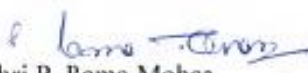
The scope for work of Sub-Group was to study international experience, analyze demarcation on workings of Aggregators and QCA and to suggest business models suitable for Indian scenario.

The Sub-Group had four meetings to understand generic concept of aggregator its relevance in Power Sector and to discuss feasibility of drafting Model Agreements to specify roles and responsibilities of QCA to be presented before Forum of Regulators (FOR).

The Sub-group hereby submits the **Report of the Subgroup on Issues of Aggregators/Qualified Coordinating Agency (QCA)** before the technical Committee of Forum of Regulators.


Shri S K Soonee
Advisor, POSOCO


Shri S K Chatterjee
JC(RA), CERC


Shri P. Rama Mohan
Member, APERC


Shri Preman Dinaraj
Chairperson, KSERC



Acknowledgement

It gives me immense pleasure in presenting this Report on "**Framework Issues of Aggregators/Qualified Coordinating Agency (QCA)**" to the Forum of Regulators. The report documents the work of Sub-Group on Issues of Aggregators/Qualified Coordinating Agency (QCA). The Sub-Group was constituted to examine the issues of Aggregators/QCA in detail, make recommendations and to study feasibility of model Agreements to specify roles and responsibilities of QCA. The Sub-Group deliberated on various issues related with Aggregators/QCAs and has come up with this report elaborating the various aspects on the same.

Presently Qualified Coordinating Agency (QCA) is defined in the Model Deviation and Settlement Mechanism (DSM) Regulations for Wind and Solar Energy transactions, as the agency coordinating on behalf of Renewable Energy (RE) Generators, connected to a Pooling Sub-Station. Globally, in many countries the term Aggregator is used and is defined as an intermediary between electricity end user/prosumer and the power system participants, who wish to serve these end users. In this context, aggregation in the electricity market implies the act of grouping distinct agents in a power system when engaging in power system markets or selling services to the system operator. The report lays emphasis on guidelines for governing/regulating operations of QCA.

I would like to express my gratitude to Shri P.K Pujari, Chairperson, FOR for his constant guidance, and all the members of the sub-group for their valuable inputs and participation and FOR secretariat for coordinating the meetings and driving the enthusiasm of the Sub-group.

I would like to thank Shri P. Rama Mohan, Member, APERC and Shri H.D Arun Kumar, Ex. Member KERC, Shri Shambhu Dayal Meena, Chairperson, KERC for providing valuable inputs in drafting the report. I would like to thank to Dr S.K Chatterjee, JC(RA), CERC for providing constructive insights. I would like to thank Shri K.V.S Baba, CMD, POSOCO, Shri S.K Soonee, Advisor, POSOCO, S.C Saxena, DGM, POSOCO for their valuable inputs. I would also like to thank Ms Rashmi Nair, DC(RA), Shri Ravindra Kadam, Advisor (RE), for all the efforts put in. I would also like to place on record the Committee's special thanks to Deloitte Consulting LLP and Mr. Ajit Pandit of Idam Infrastructure Advisory Pvt. Ltd for their efforts in materializing this report.

Shri Preman Dinaraj
Chairperson, KSERC



1 Executive Summary

Aggregator in the international context is defined as an intermediary between electricity end user/prosumer and the power system participants, who wish to serve these end users. In this context, aggregation in the electricity market implies the act of grouping distinct agents in a power system when engaging in power system markets or selling services to the system operator.

Qualified Coordinating Agency (QCA) is defined in the Model Deviation and Settlement Mechanism (DSM) Regulations for Wind and Solar Energy transactions, as the agency coordinating on behalf of Renewable Energy (RE) Generators, connected to a Pooling Sub-Station. QCA may be one of the generators or any other mutually agreed agency and entrusted with coordinating schedules/ durations and to undertake commercial settlement for deviations.

Role of the QCA, envisaged in the Regulatory framework, is similar to the Aggregator and needs to be examined in detail. In order to understand the nuances of the QCA/Aggregator operations within the power system and to examine the issues faced and likely to be faced by Aggregators/ QCAs, the Technical Committee constituted by the Forum of Regulators (FOR) formed a Sub-Group under Shri Preman Dinaraj, Chairperson KSERC in its 20th Meeting held on 17th July, 2018 at CERC, New Delhi.

The meetings of the Sub-Group were held on 7th September 2018, 21st December 2018, 22 February, 2019 and on 14th June 2019 to examine the issue in detail and deliberate on the following.

- Generic concept of aggregator in the Power Sector, international experience and its relevance in Indian context.
- Feasibility of drafting a Model Agreement to specify roles and responsibilities of QCA and RE generators

1.1 Generic concept of Aggregator in the Power Sector

The Sub-Group examined the concept of Aggregator from a holistic perspective covering the broader guidelines for the need for aggregation, roles of aggregator and the regulatory challenges in aggregation. The Sub-Group deliberated on the salient features, which demarcate the distinction between the broader roles of an Aggregator and the QCA which is mandated for coordination. The Sub-Group discussed the regulatory challenges in envisaging a broader role for QCA in the Indian context. The Sub-Group agreed that RE Generator should be responsible for Forecasting and Scheduling of RE generation and limiting the role of QCA as a coordinating agency between RE-Generators and SLDC.



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The Sub-Group also studied the existing aggregation models in the international market. The International Market has Aggregators that operate in Demand Response, Distributed Energy Resources and Ancillary Services. The Sub-Group also considered the most prevalent business models and the operational criteria set for aggregation in terms of maximum and minimum capacity. The Sub-Group concluded that the role of regulators is minimal and limited to activities such as certification of Aggregators as the operational models are predominantly market driven.

The Sub-Group acknowledged that an opportunity is presented to address all three fundamental concerns of the power market: Adequacy, Ancillary and Aggregation. Further, there exists a few questions that needs to be addressed from the Indian context including the need for an aggregator, business models for aggregators, role of regulators in aggregation, and other operational aspects.

The Sub-Group acknowledged that the role of ‘Aggregators’ is much wider, and it can undertake several value-added services particularly under evolving electricity market structure with proliferation of distributed renewable energy resources. The key learnings from international experiences and its relevance in the Indian context was also highlighted and deliberated at length during Sub-Group meetings. Accordingly, the Sub-Group opined that there is a need for separate sets of Regulations governing activities of “Aggregator”, as the market evolve.

Further, the Sub-Group deliberated on the role of different stakeholders including Qualified Coordinating Agency (QCA) in operationalizing forecasting and scheduling framework for Wind and Solar Generating Stations at regional/inter-state level and at state level. The Sub-Group opined that clear demarcation of roles of various entities, is of utmost importance for smooth operation under F&S regime.

In view of above, it was decided that the guidelines for governing/regulating operations of QCA shall be covered under this Report, while the enabling clauses to regulate Aggregators in general shall be made through separate Regulations.

1.2 Draft Model Agreement between the QCA and RE generators

QCA may be one of the generators or any other mutually agreed agency and entrusted with coordinating schedules/ durations and to undertake commercial settlement for deviations. The QCA shall undertake its operations with respect to pooling S/S that forms the basic building block of forecasting, scheduling and the deviation settlement mechanism framework. The RE generators shall appoint no more than one QCA per pooling substation by the Majority Principle (i.e. consent of Generators having more than 50% of the installed capacity at Pooling Sub-Stations). In the absence of consensus, SLDC may appoint the QCA. The cost associated with the QCA in such cases will be borne by the RE generators.



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The Sub-Group discussed the legal status of QCA, which according to the Model DSM Regulations is to be treated as a State Entity. Every QCA needs to register themselves with SLDC as per the Detailed Procedures prepared by SLDC and approved by Appropriate Commission.

The Sub-group acknowledged the existing regulatory precedents of ‘Lead Generator’, ‘Principal Generator’, ‘Professional Member’ and ‘Solar Park Developer’ which aid in enabling legal sanctity to QCA.

The Sub-group recommended that the Regulators may exercise their power under Section 66 of Electricity Act, 2003 (EA,2003) for development of the Market, enable legal status to the QCA and to bring it under the command and control of SLDC. This will facilitate secure and reliable grid operations along with necessary regulatory oversight. Curtailment made in case of security constraints should be de-pooled on proportionate RE capacity (installed in MW) basis.

Further, the Central Commission/State Commission while formulating or amending the Power Market Regulations/ IEGC/ State Grid Code may recognize ‘Aggregators’ in general and QCA in particular, as Regional Entity/State Entity, for the purpose of bringing such entities under the jurisdiction of RLDC/SLDC, as the case may be, to facilitate secure and reliable grid operations along with framing conditions for necessary regulatory oversight by Appropriate Commission over their operations.

The Sub-Group deliberated on the regulatory perspective on the interaction between the QCA-SLDC and QCA- RE generator. The Sub-group agreed that QCA-SLDC interactions shall be regulated by the respective SERCs, while the QCA-RE Generator interaction need not be under the regulatory purview. The Sub-Group concluded that the contour of the interactions should be defined as part of the Model Regulations. The QCA-RE Generator interactions shall be based on mutually agreed contract between the parties. However, a model template for the terms of agreement between the QCA and RE Generator(s) is proposed to ensure uniformity and to facilitate the standard contracting arrangements.

The Sub-group also examined the contours of the model agreement between QCA and RE Generator. However, 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 the evolution of standard contract framework. RE Generators would be free to formulate their own commercial agreement based on terms to be mutually decided between parties. Further, this report in no way suggests that the principles/broad contours covered under this Model Agreement guidelines shall be binding on the parties.

Standing Technical Committee reconstituted by the FOR has deliberated on the recommendation of the sub-group report during its 1st joint meeting of Group-I and Group-II on 1st July 2019. Thereafter, the draft report was discussed during the meeting of Group-I on 23rd August, 2019 at CERC and Group-II on 2nd September, 2019 at Patna, Bihar of Technical Committee re-constituted



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by the FOR. Based on the deliberations, the Draft Report of the Sub-Group was endorsed by both groups of the Technical Committee and recommended for presentation before the Forum of Regulators with the following directions:

- a) 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
- b) 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.
- c) RE generators or QCA shall not be charged with deviation charge for any RE curtailment due to grid security issue.
- d) Principle of equitable curtailment subject to security constraints could be followed while implementing RE curtailment among QCA and RE generators.

According to the above recommendations of the Technical Committee the report has been updated and the same was deliberated by the Forum of Regulators in the 69th Meeting held at Amritsar.

The Forum appreciated the efforts by Standing Technical Committee and the Consultant to bring out the Report that deals with issues associated with QCA and implementation framework for Forecasting and Scheduling regime for RE Generators in a comprehensive manner. After deliberations, the Forum endorsed the report with the following recommendations:

- a) CERC/ SERCs should incorporate necessary amendments in the IEGC/ State Grid Code to recognize QCA as Regional Entity/ State Entity, which will operate under control of RLDC/ SLDC.
- b) The RE Generators shall appoint one QCA per pooling substation by majority principle (i.e. consent of Generators having more than 50% of installed capacity at Pooling Sub-stations). In the absence of consensus, SLDC may appoint the QCA.
- c) Penalty should not be levied in case of curtailment, under emergency conditions/ security constraints.
- d) Deviation/ Error band and DSM charges thereof under Model F&S Regulations should be reviewed and revised over the period in light of operational experience, advancement in F&S techniques and other regulatory developments.
- e) In future, role of Aggregators would evolve to operate in DR, DER, balancing/ ancillary market service providers etc. There should be regulatory oversight and need for separate Model Regulations to govern their operations, as electricity market evolves



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The report was further updated based on the recommendations during the FOR Meeting. Further, it was decided that Standing Technical Committee re-constituted by the FOR would suitably modify the FOR Model Regulations on F&S and DSM as per the recommendation of the report.

2 Introduction

Central Electricity Regulatory Commission (CERC) has developed the framework for Forecasting & Scheduling (F&S) and Deviation Settlement of Wind and Solar generation through the second Amendment to its Deviation Settlement Mechanism Regulations. The Forum of Regulators (FOR) prepared the Model Regulations on F&S and Deviation Settlement of Wind and Solar Generating Stations at the State level in 2015. The role of Qualified Coordinating Agency (QCA) has been envisaged in the FOR Model Regulations at the Intra-State level as an Aggregator for Renewable Energy (RE) with Pooling Sub-station as the basic building block.

QCA is defined in the FOR Model Regulations as, the agency coordinating on behalf of the Renewable Generators connected to a Pooling Sub-Station. QCA may be one of the generators or any other mutually agreed agency coordinating for schedules and to undertake commercial settlement for deviations. FOR Model Regulations also propose that, the QCA shall be treated as a State Entity and shall be registered with State Load Dispatch Centre (SLDC).

The majority of RE rich States have initiated the Regulatory process for notifying F&S Regulations for their States in line with FOR Model Regulations. States such as Karnataka and Andhra Pradesh have permitted Aggregation by QCA at the state level, whereas States such as Rajasthan, Maharashtra, Madhya Pradesh & Telangana have permitted aggregation at Pooling Sub-Station level only and not at state level.

2.1 Constitution of Sub-Group for QCA

During 20th Meeting of Technical Committee constituted by the FOR, 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.

Accordingly, the 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. The mandate of the subgroup was as follows:



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1. 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.

Other Members of the Sub-Group include Shri SK Soonee, Advisor POSOCO, and representatives from KERC, APERC and FOR Secretariat.

2.2 Meetings of the Sub-Group on QCA

The first meeting of the Sub-Group of the Technical Committee on Issues of QCA/Aggregators was held on 7th September 2018 under the Chairmanship of Shri Preman Dinaraj, Chairman, KSERC. Shri Preman Dinaraj presented a draft model agreement specifying the proposed roles and responsibilities of the parties in detail. Sri S.K. Soonee, Advisor, POSOCO in his presentation highlighted the wider role of the Aggregators in the ever emerging, electricity market scenario.

The Members debated *inter-alia* the issue as to whether the role of QCA be initially limited only to deviation settlement or to any other services (or such other role as may be decided by the appropriate commission) or include both energy accounting and deviation settlement. It was agreed that RE Generator should be responsible for Forecasting and Scheduling of RE generation and such forecasting shall be the basis for de-pooling of funds in the State Pool account. The Sub-Group also deliberated on the areas of the possible disputes that may arise between the RE generators and QCA due to de-pooling.

After deliberations, the Sub-Group proposed that it is important to understand the existing RE Regulations, provisions and agreements, on the issue of QCA in States where such Agreement exists. Further a copy of such Agreements need to be collected from such States. Additionally, the sub-group also proposed that Technical Assistance can be sought through consulting firms under technical assistance from USAID, including advice on technical and legal issues involved, in collating the national and international experience on the subject and in evolving a suitable model regulation.

The Second meeting of Sub-Group of Technical Committee on issues of Aggregators/QCA was held on 21st December 2018. Representative from Idam Infrastructure Advisory presented the experience of QCA in India and the way forward focusing on the contours of the model agreement. Representative from Deloitte presented international experience of Aggregators highlighting the business models operating in US and EU markets.

The Members deliberated on the challenges to be addressed on Aggregators in the Indian context. The Sub-Group proposed on setting the legal framework for QCA to be based on the regulatory precedents of 'Lead Generator', 'Principal Generator', 'Professional Member' and 'Solar Park Developer'. The Sub-group recommended that aggregation by QCA be carried out preferably at Pooling Sub-Station level.



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The Sub-Group also discussed the regulatory aspects of the twin interactions of QCA-SLDC and QCA-RE Generator. The Sub-group agreed that QCA-SLDC interactions be regulated by the respective SERCs while the QCA-RE Generator interaction being based on mutually agreed contracts need not be under regulatory purview. Instead the QCA-RE generator interactions shall be guided by the terms of contract to be mutually agreed between the parties.

Third Meeting of the Sub-Group was held in Delhi on 22nd February 2019 wherein the structure and contents of the draft report were discussed in detail. Subsequently the Fourth meeting of the Sub-Group was held in Kochi on 14th June 2019 wherein the Report was accepted by the Sub-Group. The Sub-Group acknowledged that the role of ‘Aggregators’ is much wider, and it can undertake several value-added services particularly under evolving electricity market structure with proliferation of the distributed renewable energy resources. The key learnings from international experiences and its relevance in the Indian context was also highlighted and deliberated at length during these meetings. The references to international experience and literature survey is extensively covered under Bibliography section of this Report. Accordingly, the Sub-Group opined that there is a need for separate sets of Regulations governing activities of “Aggregator”, as the market evolve.

Further, the Sub-Group deliberated on the role of different stakeholders including Qualified Coordinating Agency (QCA) in operationalizing forecasting and scheduling framework for Wind and Solar Generating Stations at regional/inter-state level and state level. The Sub-Group opined that clear demarcation of roles of various entities, is of utmost importance for smooth operation under F&S regime.



3 Emergence of concept of Aggregator in Power System: International and Indian Experience

3.1 Role of Aggregators under emerging electricity market

During the first meeting the Sub-Group, deliberated on the broad contours of the concept of Aggregator, role of the Aggregators and the need for introduction of “Aggregator” as a New Player in Indian Electricity Market.

The potential role of Aggregators in the current power system, business models for aggregations along with the associated barriers was also highlighted. The differences between the role, functions and powers of Trader vis-à-vis Aggregator was also discussed. It was emphasized that the role of Aggregator is beyond the RE-Generation and extends to other segments including Real Time Market and Retail level Market. It was underscored that the proposed Model Regulation should cover all dimensions of the concept of Aggregators. A copy of the presentation made by Shri Soonee, Advisor POSOCO and Member of Working Group is attached at **Annexure – I**.

3.2 International Experience on Aggregators

During the second meeting held on 21st December 2018, the Sub-Group deliberated on the role and scope of Aggregators. The Consultant delivered a presentation covering the International Experience on Aggregators covering the operational models in European and United States Energy Markets. It was explained that the role of Scheduling Coordinators operating in the US Energy Market are similar to what currently QCAs are envisaged to undertake in the Indian context. The roles and responsibilities of Aggregators were presented, operating models discussed and the regulatory need, enablement and evolution to operationalize Aggregators were also covered. In most developed jurisdictions, Aggregators are defined to act as an intermediary between the end-users and owners of Distributed Energy Resources (DER). Different value levers of Aggregation viz. fundamental and opportunistic aggregation in the technology/regulatory framework were also discussed.

During deliberations, it was understood that the Demand Response Aggregators are more prevalent than DER Aggregators in the US Market. The presentation also covered Market models for Aggregators explaining the interaction between different market players. An overview of Aggregators operating in the Imbalance Market in the U.S. and EU region was also provided. The key regulatory aspects governing the eligibility criteria, and regulatory challenges for Aggregators were also elaborated. The presentation is available as **Annexure- II**.

Detailed analysis of international experiences regarding Aggregators and its relevance in Indian context have been elaborated under Chapter-4.



3.3 Need for recognizing distinction between ‘Trader’ and ‘Aggregator’

The Sub-Group deliberated at length on the different attributes between an Aggregator and Trader. The role of aggregator is much more dynamic than static nature of trader. Aggregators combine smaller participants to enable distributed resources in order to participate in larger markets. The aggregator's job is to enable the customer services and bring it to the wholesale market. On the other hand, trader is like purveyor of electricity who fulfills the need of the utilities by arranging electricity supply at the utilities desired delivery point mostly in short term.

An aggregator needs much more technical and financial expertise to manage the risk on behalf of market participants than a trader. The revenue stream of an aggregator, unlike trader, is not only dependent on volume of electricity transacted but also on various types of value-added services offered to the market participants. A trader has minimum customer interface whereas aggregator has sophisticated communication and automation controls with the consumers. An aggregator may have to make forecasts and/or control the customers' loads/injections and accordingly react in the market whereas a trader is concerned only with financial settlement.

The interaction of trader with the system operators is limited to the extent of contract information and commercial settlement. On the other hand, an aggregator sends his planned schedules for load control to Load Despatch Centres (LDC). He must identify the network nodes to which each involved customer is connected. The LDCs then evaluate if power quality constraints will be violated by the load control actions, and send the validation result back to the aggregator.

3.4 Legal status and need for distinct regulations for Regulating activities of ‘Aggregators’

The Sub-Group acknowledged that the role of an aggregator can be taken up by a combination of different roles such as an incumbent energy supplier offering aggregation services, a service provider specialized in aggregation services collaborating with a supplier or a joint venture between a traditional supplier and a service provider or by an independent market actor.

Therefore, there is a need for suitable business model for aggregators under competitive framework and hence, the same needs to be introduced as a ‘regulated’ activity by the Appropriate Government as well as Appropriate Commission. It has to be further explored if the aggregator is under competition and regulated, then, it will be technology specific or agnostic.

The Sub-Group recognized that the Appropriate Commission may recognize ‘Aggregators’ in general and QCA in particular, as Regional Entity/State Entity, for the purpose of bringing such entities under command and 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.



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Further, the Sub-group noted that there is need to specify Technology and IT requirements for Aggregators. In the trading license regulations, Central Commission has stipulated explicit requirements on the qualification of personnel engaged by traders (electrical engineers *et al*). In case of aggregators, also there is a need to have provisions regarding specialized personnel, technology and IT. The issue becomes more complex as one engages in distribution/interacts with distribution retail side of business where more ancillary services are desired from DERs. Unlike traders, the aggregator is expected to have more involvement that is continuous and interactions with LDCs and therefore the importance of people and technology becomes more important.

Thus, the Sub-Group opined that there is a need for separate sets of Regulations governing activities of “Aggregator”, as the market evolve.

3.5 Experience of QCA in India

The concept of Qualified Co-ordinating Agency (QCA) in the Indian context was introduced to co-ordinate, manage, facilitate and control interface, energy accounting and settlement and interactions of small scale and individual renewable energy generators with power system operators. During the first meeting of Sub-Group held on 7th September 2018, the Sub-Group deliberated on the contours of the draft model tri-partite agreement specifying the proposed roles and responsibilities of the parties in detail. The presentation defined the roles of QCA in detail such as providing day ahead and week ahead schedules, coordinating with the stakeholders for metering and data, and undertaking settlement of all charges on behalf of the RE generators. It was also highlighted that the dispute between the RE generators connected to a Pooling Sub-Station and QCA shall be settled between them as per their agreement.

The Presentation also emphasized that a mechanism is required to sort out difference which may arise between the QCA and RE Generators and recognized a need to define and bring clarity to their roles. Further, since the provisions of such agreement carry significant financial implications, this Sub-Group could examine such implications and suggest adequate legal coverage for dispute resolution between the QCA and RE Generators and SLDC as the case may be, at a later stage. A copy of the presentation made by Chairman of Working Group is attached at **Annexure – III**.

Further, the Sub-Group decided to further deliberate the contours of commercial arrangement, governing rules for technical operations/interactions and applicable commercial conditions in more detail, including the need for tripartite agreement during subsequent meetings.

During its second meeting, the Sub-Group deliberated on the aspects of introduction of the concept of Aggregator/Qualified Co-ordinating Agency in the Indian context with specific references to proliferation of renewable energy capacity and emergence of multiple stakeholders for development and harnessing of renewable power into Indian power system.

During this meeting of the Sub-group, the Consultant delivered a presentation covering in detail the Indian experience of QCA and emerging issues in QCA operations. Further the deliberations



were facilitated on the technical conditions and commercial principles that could be covered through Model Agreement and regulatory oversight for governing QCA operations in Indian context. The presentation also covered the major guidelines covering the interaction between QCA and RE-Generator. The Presentation showcased the prevalent variation in regulatory provisions of the F&S regulations at State level especially in permitting aggregation at State level or Pooling S/S level. The key challenges to be addressed in engagement of QCA including the powers, functions and role of QCA, and RE Generators, Data access and sharing protocol amongst the parties, Metering, Billing, Energy Accounting and Commercial arrangements were also discussed.

The model guidelines for agreement between QCA and RE Generator covering the payment modalities for settlement, dispute resolution mechanism and other contractual terms were also presented. It was emphasized on the need to bring clarity on aspects including rule for curtailment and level and quantum of payment security and treatment of defaulters for delays in payment. The Presentation highlighted the major decision points for the Sub-Group while framing a model agreement for QCA-RE Generator interaction. The presentation is available as **Annexure-IV**.

3.6 Role of Aggregator/QCA and different Stakeholders in operationalizing F&S regime

The Sub-Group deliberated on the role of different stakeholders in operationalizing forecasting and scheduling framework for Wind and Solar Generating Stations at regional/inter-state level and state level. The Sub-Group opined that clear demarcation of roles of various entities, is of utmost importance for smooth operation under F&S regime. Broad demarcation of role and responsibilities of various entities as deliberated during the meetings are as under:

- a) **RE Generators**
 - Provide schedule with periodic updates to the concerned SLDC/RLDC as per IEGC through Aggregators/QCA
 - Provide Data Acquisition System (DAS) data telemetry and communication facility for transfer of information to the concerned LDCs.
- b) **State Load Dispatch Centre (SLDC)**
 - Undertake scheduling and accounting for intra-state entities
 - Provide Schedule and actual generation meter data to concerned RLDC and RPC.
 - Payments/receipts to concerned generators and settlement of account.
 - Responsible for checking that there is no gaming and regulatory compliance
- c) **Regional Load Dispatch Centre (RLDC)**
 - Provide processed data of energy meters along with final schedule to RPCs on weekly basis
 - Vetting of RE generation schedule and monitor performance checks
 - Direct co-ordination with Regional entities, Aggregators, QCAs for contracts and energy meter data



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- Responsible for checking that there is no gaming and regulatory compliance
- d) **Regional Power Committee (RPC)**
 - Issuance of Regional DSM Pool Account / Regional Energy Account
 - Interact with LDCs/Aggregators/QCAs on regional basis
- e) **Renewable Energy Management Centres (REMCs)**
 - REMCs are being implemented at State/Regional/National level co-located with respective LDCs and integrated with real time measurement & information flow.
 - REMCs are being equipped with advanced forecasting aggregation tools from multiple forecast providers for better confidence levels/lower forecast errors.
 - REMC is envisaged to act as single source information repository and coordination point for RE penetration.
- f) **Aggregator/QCA**
 - Provide schedules with periodic updates to the concerned SLDC/RLDC as per IEGC on behalf of all RE generators connected to the pooling station.
 - Manage meter data acquisition and transmission, communication, co-ordination with DISCOMS, RLDC, SLDC
 - Undertake de-pooling of payments and collection

3.7 Interface and interactions between LDC and Aggregator/QCA

The Load Despatch Centres (LDCs) would facilitate transactions based on contracts. The Act has clearly laid down functions and role of LDCs as interface between various entities in the electric supply industry. LDCs act as service providers and information aggregators for smooth operation of the market. LDCs collect information from various sources, undertake accounting and disseminate information amongst the users and stakeholders.

It is recognized that interconnection point of any entity with the ISTS grid has some sanctity since all metering and interaction with LDCs has to be done at this point and LDCs should not be expected to go behind the interconnection point. Deviations, if any, to this general principle, should be very few and far between and wherever done should be only on the basis of a regulatory order or mandate. This has been the situation in case of MEPL/SEPL, AD Hydro / Malana-II projects where meters behind a dedicated system had to be used for accounting and settlement at the regional level. Similar is the case of ISTS connected renewable energy (RE) projects where the CERC approved procedure dated 3rd March 2017 is being followed. Presence of such deviations should not lead to the same being considered as a matter of right as the basic philosophy and sanctity of the point of interconnection must be honored. Otherwise, it has the potential to create disputes.

It may be emphasized in the Standards that scheduling should be done at a common interface point and segregated amongst the generators by Aggregator / SPPD / WPPD/ QCA / any other entity as may be notified by the Appropriate Commission.



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Further, in order to address the segregation of schedule for each generator and for accounting of actual energy generated by each generator (for computation of DSM accounts), special energy meters (Main, Check and Standby) are required to be installed on each generator (usually 33kV Lines) before the common pooling point i.e. ICT/Bus.

Hence, it may be emphasized that the responsibility of installation of all these meters should be that of Aggregator/SPPD/WPPD/any other entity as may be notified by the Appropriate Commission. Such meters shall have the same specifications as that of interface meters.



4 International Experience on Aggregators

The Sub-Group reviewed the international experience on similar entities operating as QCA or Aggregators, their role and responsibilities and their Regulatory status.

4.1 Definition of Aggregators

Aggregation is defined as the act of grouping distinct agents in a power system (i.e. consumers, producers, prosumers, or any mix thereof) to act as a single entity when engaging in power system markets (both wholesale and retail) or selling services to the system operator(s). An Aggregator is an entity who acts as an intermediary between electricity end-users and Distributed Energy Resources (DER) owners and the power system participants.

Adopting a narrow scope for aggregation, limited only to Demand Response (DR), can simplify the development of wholesale market rules and procedures, as well as retail utility tariffs and programs.

Disadvantage of adopting such a narrow scope is that it forgoes the potential benefits of aggregating other types of DERs. A narrow scope also precludes the possibility that combinations of different types of DERs can potentially create synergistic value

Key benefits from Aggregators (Customer Perspective)

Aggregation expands the opportunities to extract economic value from DERs. Without aggregation, individual DERs can *theoretically* provide energy, capacity, and ancillary services at the ISO/RTO level or the distribution level, but in practice, most of that potential will go unrealized due to a variety of barriers, including:

1. Minimum thresholds for participation in ISO/RTO markets are high
2. ISO/RTO market rules and procedures are complex - In short, the transaction costs of market participation are substantial
3. Utilities (and system operators) may not have “visibility” of DERs or the ability to dispatch/control them

An industrial customer may be able (or willing) to participate in a DR program but may be able to curb demand only once per month. Thus, it may be unable to participate in a DR market due to market rules and constraints. However, as part of a portfolio, an aggregator may be able to call on this constrained resource once per month, while calling on other similar resources to meet the requirements.

4.2 Global Experience of Aggregators

United States

Traditionally, Demand Response (DR) aggregators have been more prevalent than Distributed Energy Resources (DERs) in the United States. However, in 2016, FERC recognized DER aggregation as a new type of market resource that may supply energy and ancillary services, similar to traditional generating facilities. Each ISO has specified different requirements for an entity to become an aggregator as follows: -

NYISO	CAISO
<ul style="list-style-type: none"> • Aggregation should consist of resources connected to the same transmission node • Demand response, generation, and storage can qualify for aggregation • Restriction has been placed on aggregations of less than 1 megawatt (MW) to participating in wholesale energy markets 	<ul style="list-style-type: none"> • For DER aggregation, DR and behind the meter resources will not qualify. • Combined capacity must be at least 0.5 MW / 20 MW if aggregations spans single / multiple price nodes respectively • The aggregator needs to have an agreement with ISO specifying the list of DERs, notification to distribution utility etc. • CAISO requires each DER to have provision for recording actual generation data.

In CAISO, DER Providers (DERPs), or lead DER provider, have been designated to bid into wholesale energy and ancillary services markets through a **certified scheduling coordinator (SC)**. Scheduling coordinators are responsible for submitting bids on behalf of the DERs, paying ISO charges, coordinating to provide ancillary services and undertaking commercial settlements. The technical and financial eligibility requirements for SCs vary from one ISO to the other. The scheduling coordinator is also responsible for collecting metered data for each DER in its aggregation. Based on the aggregated data submitted by the scheduling coordinator, CAISO will calculate the DERP's "settlement balance," reflecting the amount owed to or by it.

Various other ISOs have established provisions which allow for greater participation of aggregators in the wholesale markets. Few of them have been illustrated below: -

Parameter	Details
Eligibility for participation	<ul style="list-style-type: none"> • CAISO: Generating facilities with capacity greater than 1 MW are not allowed to be part of aggregation

through aggregators	<ul style="list-style-type: none"> ISO NE / PJM: Participants of wholesale market should have a capacity of at least 1 MW; this suggests that any generation unit with less than 1 MW capacity needs to come through aggregators
Minimum portfolio size by aggregators	<ul style="list-style-type: none"> ISO-NE: At least 100 kW PJM: At least 100 kW

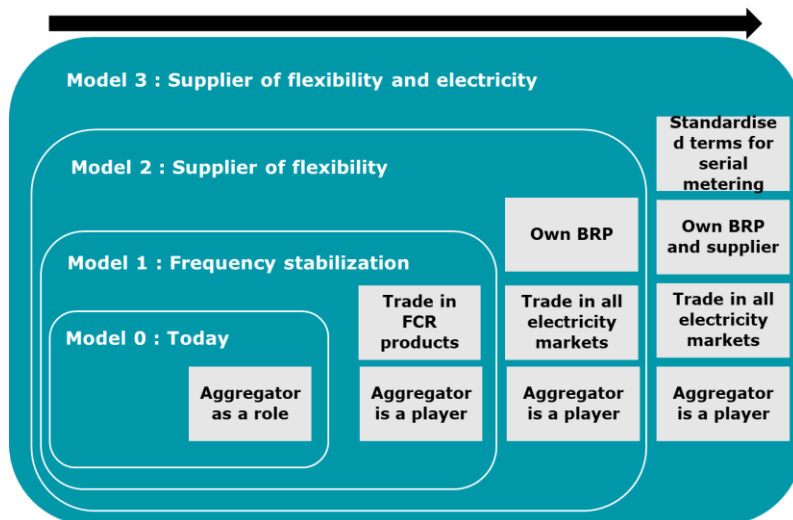
Europe/ EU Region

Energy Efficiency Directive 2012/27/EU (EED) for the European Union recognizes the Aggregators as active participants in the energy market and defines them as predominantly demand service providers. Other associated regulations also provide for participation of final customers in providing balancing services to the markets.

Aggregators in EU have been envisioned to expand gradually from an embryonic stage to a full fledge player as shown alongside. From being a mere aggregator of resources, to be a supplier of flexible / balancing services to system operator, the trajectory for the growth of aggregators has been envisioned in a sequential phase.

Aggregators have been primarily defined as demand service providers.

Participation in the demand side response has been identified as a primary objective of the balancing market. Various countries have also specified the enabling conditions by which aggregators can play an important role in the energy markets, highlighted as follows: -



Parameter	Details
Eligibility for participation through aggregators	<ul style="list-style-type: none"> Technical preconditions for single generation unit to participate in electricity trade include min bid/offer contract size as follows: - <ul style="list-style-type: none"> ➤ 0.1 MWh (relevant for Day Ahead markets in Germany and Denmark and Intraday market in Germany) and ➤ 1 MWh, which is also common for Power Exchange markets: Future (Denmark, Germany Poland, UK), Day Ahead (Poland and UK) and Intraday (Denmark).
Minimum portfolio size by aggregators	<ul style="list-style-type: none"> Austria: There was a reduction in technical prequalification of the minimum pool size to 5 MW from 10 MW enabling smaller aggregators to participate in the market.

- | | |
|--|--|
| | <ul style="list-style-type: none">• UK: Minimum size for market participation of an aggregator is 2 MW |
|--|--|

In addition to the Aggregator, the role of a Balance Responsible Party (BRP) is primarily aimed at maintaining imbalances in real time. BRP can participate in energy markets to correct the aggregator's portfolio in real time in case of any deviations in actual generation / resource provision. BRPs can avoid imbalances by exchanging energy with other BRPs on the intraday markets by placing bids as required. Any last mile deviations post corrections made by BRPs is ultimately managed by the TSO. Countries like Belgium have specified the requirement for an entity to be a BRP. The entity who wants to be a BRP needs to provide the TSO with a bank guarantee for the entire term of this contract and for the entire duration of execution of all the financial obligations arising from the contract. The amount of the guarantee varies based on the quantum of generation / demand side resource present in its portfolio.

4.3 Key Take-away from International Experience:

From a regulatory perspective, the following are the key take- away from the international experiences:

1. Aggregator of Retail Customers (ARCs) can specialize in certain types of DERs (e.g., DR or storage) or certain grid services (e.g., emergency load reduction or frequency response)
2. Aggregation of DERs by ARCs also promotes competition in energy services and mitigate the potential abuse of monopoly in providing energy, capacity and ancillary services
3. ARCs can profit by bringing more and more DERs into the electricity markets, whereas traditionally regulated utilities have incentives to discourage DERs
4. The need for oversight of ARCs by utility regulators is generally less than the level of oversight that is expected when utilities serve as aggregators, because regulators do not set or approve prices offered by third parties to participating customers. However, it needs to be ensured that ARCs comply with standard of supply and service to retail consumers.
5. In order 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.
6. Aggregators operate in Demand Response, Distributed Energy Resources and Imbalance Markets.
7. Role of regulators is restricted for aggregation as aggregation business models are mostly market driven. In certain markets the limited to certification.



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8. Areas where State Commission may want to consider promulgating (model) regulations are:
 - a. Minimum standards for service quality
 - b. Providing consumers with sufficient information to make informed decisions about choosing an aggregator or retail customers
 - c. Requirements of transparency in transactions
 - d. Model contracts suggesting standardized clauses on contract terms, privacy protection for customer information, terminal process, etc. in such contracts by Aggregators with customers



5 Analysis and Key Findings

5.1 Existing Regulatory Provisions

QCA is defined in Model F&S Regulations as the agency coordinating on behalf of Wind/Solar Generators connected to a Pooling Sub-Station. The Model F&S Regulations also proposes that, QCA shall be treated as a State Entity. QCA may be one of the generators or any other mutually agreed agency for the following purposes:

- Provide schedules with periodic revisions as per Regulations on behalf of all the Renewable Generators connected to the Pooling Sub-Stations,
- Responsible for meter data collection and its transmission, communication, coordination and reconciliation with DISCOMS, SLDC and other agencies.
- Undertake commercial settlement of all DSM related charges on behalf of the generators within the Pooling Sub-Station, including payments to the State DSM pool accounts through the concerned SLDC.
- Undertake de-pooling of payments payable /receivable on behalf of the generators to/from the State DSM Pool account and settling them with the individual generators
- Undertake commercial settlement of any other charges on behalf of the generators as may evolve from time to time.
- Undertake such other functions as may be specified by Appropriate Commission

The regulations further elaborate that the QCA shall coordinate the aggregation of schedules of all generators connected to a Pooling Sub-Station and communicate it to the SLDC. The QCA shall undertake all commercial settlement on behalf of the wind or solar generators connected to the respective Pooling Sub-Stations, i.e. to cover the commercial settlement of deviations.

The majority of States including RE rich States are developing Regulatory framework for Forecasting, Scheduling and Deviation Settlement by notifying F&S Regulations for their States in line with FOR Model Regulations. States like Gujarat, Maharashtra, Tamil Nadu, Kerala Rajasthan, Telangana, Andhra Pradesh, Madhya Pradesh, Karnataka have initiated the Regulatory process, out of which Gujarat, Maharashtra, Telangana, Andhra Pradesh, Karnataka, Rajasthan and Madhya Pradesh have notified the Regulations. States like Rajasthan, Andhra Pradesh, Karnataka and Maharashtra have also framed the detailed procedures for implementation of F&S Regulations. The variations in regulatory provisions related to QCA of the F&S Regulations at State level is depicted in the Table 1 below:



Table 1: State specific variations in QCA related provisions

State	QCA related provisions
Karnataka	Aggregation by QCA at State level permitted
Andhra Pradesh	<ul style="list-style-type: none"> • Aggregation by QCA at State level permitted
Maharashtra, Rajasthan, Madhya Pradesh, Telangana, Tamil Nadu and Gujarat	<ul style="list-style-type: none"> • Aggregation at Pooling Sub-Station level only and not at state level

5.2 Institutional Structure of QCA

Multiple wind and solar generators would be connected to the pooling substations. These renewable generators have different owners with varied offtake arrangements. FOR Model Regulations on Forecasting, Scheduling and Deviation Settlement of Wind and Solar Generating Stations at the State Level, (Model F&S Regulations) stipulate that the pooling substation shall act as the basic building block of forecasting, scheduling and deviation settlement mechanism. Therefore, an institutional structure in the form of ‘Qualified Co-ordinated Agency’ may be desirable to coordinate for forecasts/scheduling and commercial settlement of deviations with RE Generators on one hand and with SLDC on the other hand.

The QCA shall undertake its operations with respect to pooling S/S that forms the basic building block of forecasting, scheduling and the deviation settlement mechanism framework. Hence it is essential to strengthen the mechanism of selection of the QCA. Designing the institutional and governance structure of the QCA holds the key once the roles and responsibilities are clearly demarcated. In this regard, it is important to evaluate the various possibilities of QCA engagement. Various options considered for the evaluation of institutional structure arrangement for the QCA is shown in Table below.

Table 2: Options for the evaluation of institutional structure arrangement for the QCA

Options	Basic structure	Description of operating mechanism
Option 1	Empaneled Entity with SLDC	Condition/Qualification/Registration requirements for ‘Registered Entities’ to undertake scheduling and deviation settlement of RE power at pooling S/S needs to be defined under the State Grid Code Regulations and Procedures for Registration/Empanelment to be formulated by SLDC with approval of SERCs.



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Options	Basic structure	Description of operating mechanism
Option 2	Agent or Representative of Generators	QCA will act as Agent/Representative of Generators, for and on behalf of RE Generators connected to the pooling S/S
Option 3	Committee of RE Generators	Representatives from RE Generators connected to the pooling S/S form a group/committee to carry out the functions of QCA

The evaluation of various options for the institutional structure for the QCA is presented in Table 3.

Table 3: Evaluation of various options for institutional structure of the QCA

Key features	Option 1:	Option 2:	Option 3:
Eligibility criteria	Compliance to technical and financial criteria for empanelment with the SLDC to be laid down under the Grid Code	Technical capabilities and financial credentials to be decided by the RE Generators. (Registration of QCA at State Level with minimum criteria determined by Appropriate Commission)	All RE Generators connected to the pooling S/S form a Committee or Association
Constitution and composition	Regulatory oversight through the SLDC Composition of QCA shall be Guided by technical requirements to have Technical Experts in Renewable Energy, Power Systems, Communication with an understanding of the technical functions, financial credentials of handling large number of transactions and computational capabilities	Responsibility of selection of suitable QCA rests with RE Generators Experts in the field of forecasting and scheduling, having capabilities to undertake large financial transactions and settlement for an entity that acts as an agent to the RE Generators	Representatives from each constituent RE Generators to be member of Committee to undertake role of the QCA Composition in the form of loose association or group with business rules/charter of operations



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Key features	Option 1:	Option 2:	Option 3:
Mandatory roles	<p>Ensure submission of schedules and revisions at pooling S/S</p> <p>Deviation settlement</p> <p>Coordination with SLDC</p> <p>Provide generator data to SLDC</p>	<p>Ensure submission of schedules and revisions at pooling S/S</p> <p>Deviation settlement</p> <p>Coordination with SLDC</p> <p>Ensure submission of generator data to the SLDC</p>	<p>Ensure submission of Provide schedules and revisions at pooling S/S</p> <p>Deviation settlement</p> <p>Coordination with SLDC</p> <p>Provide generator data to SLDC</p>
Fees to be paid to SLDC related to F&S Procedures	Fees and charges regarding F&S operations to be stipulated by the SLDC upon approval by SERC (to be covered under SLDC fees and charges – F&S Procedures)	Fees and charges regarding F&S operations to be stipulated by the SLDC upon approval by SERC (to be covered under SLDC fees and charges – F&S Procedures)	Fees and charges regarding F&S operations to be stipulated by the SLDC upon approval by SERC (to be covered under SLDC fees and charges – F&S Procedures)
Revenue model for QCA	QCA and RE Generators to mutually decide professional charges for scheduling and deviation settlement in Rs. /MWh or MW	Decided by concerned RE Generators or QCA and RE Generators to mutually decide professional charges for scheduling and deviation settlement in Rs. /MWh or MW	<p>To be decided by members</p> <p>Not applicable</p> <p>Organized on the principle of cost sharing</p>
Default and remedy measures	<p>Financial penalty both by the SLDC and the RE Generators considering commercial implications</p> <p>Dispute resolution between the RE Generator and the QCA as per their respective contracts</p>	<p>Financial penalty by the RE Generators and the SLDC</p> <p>Disputes to be resolved in terms of dispute resolution or arbitration mechanism outlined under the Agreement</p>	<p>Financial penalty by the SLDC</p> <p>Disputes among the Generators to be resolved through negotiations</p> <p>Committee cannot sue or be sued upon unless</p>



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Key features	Option 1:	Option 2:	Option 3:
	Dispute resolution between the QCA and the SLDC by the SERC Blacklisting by the SLDC in case of any major Errors/frauds		separate structure as a cooperative society or an association is formed
Contractual Agreement	Tri-partite between the RE Generators, QCA and SLDC Conditions for Empanelment to guide the SLDC and the QCA	Bilateral Agreement between the RE generators and the QCA No agreement is required between the QCA and the SLDC. Governed by the Regulations/Procedure	Agreement among all the RE Generators to form a Committee Agreement between the Committee and the SLDC

For all the above options, the generators will be involved in the selection process of QCA and the selection will be on the basis of consent by majority of the number of generators connected to the pooling Sub-Station considering their installed capacity i.e. generators having more than 50% of the installed capacity of the Pooling Sub-Stations shall nominate the QCA on their behalf.

Upon debating various options for institutional structure of QCA, the Sub-Group makes following recommendations,

Recommendation:

- Considering the simplicity and ease for operationalization, the Institutional structure at Option-2 for QCA as Agent/Representative of Generators is the preferred one.
- RE Generators at Pooling Sub-Station can engage Lead/Principal Generator or Third-Party Agency through 'Agreement' to perform role of QCA.
- Every QCA needs to register themselves with SLDC/RLDC as per the Detailed Procedures prepared by SLDC/RLDC and approved by Appropriate Commission.
- One QCA to be appointed per Pooling Sub-station with majority principle i.e. consent of Generators having more than 50% of the installed capacity at Pooling Sub-Stations for acting on behalf of them subject to condition of minimum threshold capacity limit to be specified by Appropriate Commission.
- Above such threshold capacity limit, **RE Generators will have choice** either to schedule directly or schedule through QCA.



- Once the QCA will be appointed by following majority principle, **it will act on behalf of all the generators** within Pooling Sub-Station. However, if RE generators opt for separate QCA in line with minimum threshold capacity limit specified by the Commission, they will provide their schedule separately through their QCA within same Pooling Station.
- In case the RE generators failed to appoint QCA within stipulated time frame SLDC, shall nominate the professional agency from among the list of empaneled list of QCAs which shall be binding on the RE generators at the PSS, until such time the RE generators appoint their own QCA. The cost associated with the QCA in such cases will be borne by the RE generators.

5.3 Legal Status of QCA

QCA has been recognized as a ‘State Entity’ in the FOR Model Regulations on Forecasting, Scheduling and Deviation Settlement of Wind and Solar Generating Station at the State Level. Further, number of States have also recognized QCA as a State Entity. State Entity means an entity which is in the SLDCs control area and whose metering and energy accounting is done at the state level. However, the need for recognizing QCA as a State Entity and Legal Status of QCA is also being debated at various fora.

The Sub-Group deliberated on the Legal Status of QCA and need of recognizing QCA as State Entity.

As a State Entity, the RE generators are supposed to undertake the following activities:

- a) Provide schedules on “day-ahead” for each 15-minute duration of time-block of the following day and forecasts for the week ahead basis.
- b) Receive a “despatch schedule” from the SLDC, detailing how much a generator will produce and when (based on the system constraints and load-generation balance prepared by the SLDC)
- c) Provide revision(s) in schedules/available capacity, if any, based on the latest available forecast of Renewable generation, before the finalization of the despatch schedule.
- d) Despatch generation as per the “schedule”, received from the SLDC.
- e) Back-down or ramp-up the generation, within the available capacity, as per the despatch instruction from the SLDC, depending on system conditions including high frequency.



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- f) Abide by terms and conditions outlined under the State Grid Code and conform to the instructions issued by SLDC from time to time.
- g) Review, confirm and arrange for commercial settlement of Deviation Accounts from time to time.
- h) Arrange for payment security and make payments to (or receive payment from) State Imbalance Pool, as necessitated by Terms of Agreement with QCA.
- i) Such other functions as may be specified by Appropriate Commission

As discussed under Point 1 above, if above activities, are to be assigned to the QCA on behalf of Renewable generators, the QCA needs to be recognized under the Regulatory Framework. In this context, the Sub-Group considered that in the case of power markets the ‘**Professional Member**’ concept is distinct from traders, as the former is only facilitative in nature. The ‘**Professional Member**’ is a less formal institution that can collate demand from Open Access consumers. **Solar Park Developers** recognized as ‘users’ of SLDC is another similar regulatory precedent which was defined specific to the Indian context, Further, the Central Commission under Open Access Regulations and Grid Code has also recognized the concept of ‘**Lead Generator**’ and ‘**Principal Generator**’ to facilitate the implementation of F&S regime and connectivity requirements of RE Generators at inter-state level.

As regards the system operation function, the Sub-Group noted that as per S.28 of EA 2003, the Regional Load Despatch Centre (RLDC) shall be apex body and responsible for ensuring the integrated operation of the power system in the region. In the discharge of its functions, it shall comply with the principles, guidelines, and methodologies specified in the State Grid Code. Further, as per S.29 of EA 2003, RLDC shall give such directions and shall exercise such supervision and control as may be required, for ensuring stability of grid operations and to ensure maximum economy and efficiency in operation of the power system in the region under its control.

Similar role has been envisaged and powers have been entrusted to the State Load Despatch Centres (SLDC) to enable it to discharge its functions in pursuance of the S.32 and S.33 of the EA 2003 to ensure integrated, reliable, economic and optimal real-time despatch and control of power system operations under the State jurisdiction. Every licensee, generating company, generating station, substation and any other person connected with the operation of the power system shall comply with the direction issued by the State Load Despatch Centre under S.33 of EA 2003. Relevant provisions of Section 28, 29, 32 and 33 of Electricity Act, 2003 are as under:

Section 28. (Functions of RLDC):

28. (1) The Regional Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in the concerned region.



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(2) The Regional Load Despatch Centre shall comply with such principles, guidelines and methodologies in respect of the wheeling and optimum scheduling and despatch of electricity as the Central Commission may specify in the Grid Code.

(3) The Regional Load Despatch Centre shall -

- (a) be responsible for optimum scheduling and despatch of electricity within the region, in accordance with the contracts entered into with the licensees or the generating companies operating in the region*
- (b) monitor grid operations*
- (c) keep accounts of the quantity of electricity transmitted through the regional grid;*
- (d) exercise supervision and control over the inter-State transmission system; and*
- (e) be responsible for carrying out real time operations for grid control and despatch of electricity within the region through secure and economic operation of the regional grid in accordance with the Grid Standards and the Grid Code.*

....

Section 29. (Compliance of directions of RLDC):

29. (1) The Regional Load Despatch Centre may give such directions and exercise such supervision and control as may be required for ensuring stability of grid operations and for achieving the maximum economy and efficiency in the operation of the power system in the region under its control

.....

Section 32. (Functions of SLDC):

32. (1) The State Load Despatch Centre shall be the apex body to ensure integrated operation of the power system in the State.

(2) The State Load Despatch Centre shall -

- (a) be responsible for optimum scheduling and despatch of electricity within the state, in accordance with the contracts entered into with the licensees or the generating companies operating in that state*
- (b) monitor grid operations*
- (c) keep accounts of the quantity of electricity transmitted through the State grid;*
- (d) exercise supervision and control over the intra-State transmission system; and*



- (e) *be responsible for carrying out real time operations for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with the Grid Standards and the State Grid Code.*

....

Section 33. (Compliance of directions of SLDC):

33. (1) The State Load Despatch Centre in a State may give such directions and exercise such supervision and control as may be required for ensuring integrated grid operations and for achieving the maximum economy and efficiency in the operation of the power system in that State

.....

Thus, it is important that all State Entities including Qualified Co-ordinating Agencies acting for and on behalf of RE Generators should also be covered so as to enable the SLDCs to exercise supervision, control and oversight on the integrated power system operations.

In view of above, the Sub-Group is of the view that, the respective Regulators needs to exercise their power under Section 66 of the Electricity Act, 2003 (EA,2003) for development of the Market by enabling legal status to QCAs and to bring it the under command and control of SLDC to facilitate secure and reliable grid operations along with necessary regulatory oversight.

The Regulators have earlier exercised these powers under S.66 of the EA,2003 for development of the REC market and have also enabled recognition of RPO compliance auditors. Provisions of S.66 of the EA,2003 are reproduced as below:

Section 66. (Development of market):

The Appropriate Commission shall endeavor to promote the development of a market (including trading) in power in such manner as may be specified and shall be guided by the National Electricity Policy referred to in section 3 in this regard.

Accordingly, this Sub-Group recommends that, the SERCs need to specifically refer to S.32, S.33 and S.66 of the EA,2003 while framing the Regulations for F&S and DSM mechanism for wind and solar generators. Further, the Appropriate Commission while formulating or amending the Power Market Regulations/ IEGC/ State Grid Code can draw upon its powers under S.66 of the EA,2003 and recognize RLDC's / SLDC's powers and functions under S.28, S.29, S.32, S.33 and accordingly may recognize 'Aggregators' in general and QCA in particular, as Regional Entity/State Entity, for the purpose of bringing such entities under command and 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.

Further, the Sub-group noted that there is need to specify Technology and IT requirements for Aggregators. In the trading license regulations, Central Commission has stipulated explicit requirements on the qualification of personnel engaged by traders (electrical engineers *et al*). In



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case of aggregators, also there is a need to have provisions regarding specialized personnel, technology and IT. The issue becomes more complex as one engages in distribution/interacts with distribution retail side of business where more ancillary services are desired from DERs. Unlike traders, the aggregator is expected to have more involvement that is continuous and interactions with LDCs and therefore the importance of people and technology becomes more important.

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.

Recommendation:

- Concept of QCA is already recognized by Regulators. The existing Regulatory precedents of ‘Lead Generator’, ‘Principal Generator’, ‘Professional Member’ and ‘Solar Park Developer’ provide references to enable similar legal sanctity to QCA. The regulatory precedents may be used to confer legal status to the QCA under the command and control of SLDC, subject to conditions. The SERCs may specifically refer the S.32, S.33 and S.66 of the EA,2003 while framing the Regulations for F&S and DSM mechanism for wind and solar generators.
- Further, Appropriate Commission while formulating or amending the Power Market Regulations/ IEGC/ State Grid Code can draw upon its powers under S.66 of the EA, 2003 and recognize RLDC’s/SLDC’s powers and functions under S.28, S.29, S.32, S.33 and recognize ‘Aggregators’ in general and QCA in particular, as Regional Entity/State Entity, for the purpose of bringing such entities under command and 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.
- In future, the role of Aggregators would evolve and there would be many entities interested to operate in Demand Response scenario, Distributed Energy Resources and Imbalance Markets. There should be regulatory oversight over these entities 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.**

5.4 QCA-SLDC Interaction

QCA is recognized as a State entity which will coordinate with the SLDC for prescribed functions as brought out in Section 5.3. The Sub-Group after due deliberation came to the conclusion that, the appointment of QCA should be for a certain time period in order to maintain seamless co-ordination between SLDC and Generators within the Pooling Sub-Station. The Sub-Group is of the view that, the business rules between SLDC and QCA need to be regulated as it will have direct impact on system operation of SLDC. However, the SERC may not intervene in the contractual arrangement between QCA and Generators within the Pooling Sub-Station.



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Since the QCA is expected to be appointed after consent by majority of generators within a Pooling Sub-Station, the generators should not propose change in QCA frequently. The QCA once appointed by generators and registered with SLDC, will continue to function for initial period of two (2) years from the date of appointment or match with the tenure of QCA registration period with SLDC. Accordingly, the minimum term of agreement between QCA and SLDC will be two year or tenure of registration of QCA with SLDC, whichever is lower. Until new arrangement is put in place, existing QCA shall continue for further period up to 1 year. The respective provisions in the DSM regulations and similar provisions as applicable to conventional generation should apply to QCA-SLDC interaction.

Recommendation:

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

5.5 QCA-RE Generator Interaction

The Sub-Group agreed that the Role of Regulators should be limited to regulate the interactions between system operator and QCA. The QCA-RE generator relationship shall be governed as per contractual agreement to be mutually decided. RE generators shall be at liberty to mutually decide among themselves the major parameters governing the contract such as rules of curtailment and commercial settlement. However, the minimum term of agreement between QCA-RE Generator should match the QCA-SLDC agreement to ensure smooth functioning. The minimum term of two years or registration period as per SLDC procedures should be maintained as a mandatory clause in the contract. Until new arrangement is put in place, existing QCA shall continue for further period up to 1 year. The provision of extra ordinary circumstances may be specified in the contract to change QCA by RE Generators.

Further, the Sub-Group opined that the Appropriate Commission may clarify the qualification criterions viz. Business Rules/Net worth requirement etc., upfront to remove ambiguity regarding engagement of QCA by RE Generators. Besides, it would be desirable that the consensus or clear



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understanding on risk/responsibility sharing with clear demarcation of role/responsibilities/risk sharing arrangement is carved out under Model Franchisee Agreement otherwise it may lead to commercial disputes.

As per following clause of Part XVI, Section 158 of the Act,

“Where any matter is, by or under this Act, directed to be determined by arbitration, the matter shall, unless it is otherwise expressly provided in the licence of a licensee, be determined by such person or persons as the Appropriate Commission may nominate in that behalf on the application of either party; but in all other respects the arbitration shall be subject to the provisions of the Arbitration and Conciliation Act, 1996”

Since the Electricity Act, 2003 does not direct any dispute between the QCA and RE generators to be determined by arbitration, any such disputes arising between the two parties would be subject to the provisions of the Arbitration and Conciliation Act, 1996 and will be outside the Appropriate Commission’s regulatory jurisdiction

Recommendation:

- The QCA-RE Generator interactions shall be as per their mutual agreement and shall not be under regulatory purview; except when it concerns the SLDC operations. To facilitate the development of QCA and to bring in uniformity, a template or guidelines for Model Agreement are provided in the report.
- Any disputes arising between the QCA and RE generators would be subject to the provisions of the Arbitration and Conciliation Act, 1996 and will be outside the Appropriate Commission’s regulatory jurisdiction

5.6 One QCA per Pooling Sub-Station

The Sub-Group debated on the operational limits of QCA noting the variation in the State F&S Regulations. The Sub-Group was of the view that, there should not be multiple QCAs within the Pooling Sub-Station to avoid multiple interaction points for SLDC while operationalizing the F&S Regulations. To ensure this, the Sub-Group has already recommended to appoint QCA by following the Majority principles.

At the same time, the Sub-Group recognizes that the right and responsibility of the Generating Station to forecast and schedule cannot be diluted. In order to simplify SLDC and QCA interactions, it is important and desirable to operationalize principle of no more than one QCA per Pooling Sub-station as far as possible. Accordingly, the Sub-Group opined that there could be



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‘minimum threshold capacity limit’ at Pooling Sub-Station that may be specified below which RE Generators will have to necessarily Aggregate and appoint QCA for their interactions with SLDC. Above such threshold capacity limit, RE Generators will have choice either to schedule directly or schedule through QCA.

Similar, arrangement is prevalent at regional level as per NLDC/RLDC F&S Procedures approved by the Central Commission wherein Minimum Threshold Capacity Limit of 50 MW has been specified.¹ (Ref. Annexure IV of Procedure for Implementation of F&S framework for RE Generators at inter-state level). Appropriate Commission may stipulate such ‘threshold capacity limit’ at state level depending on state specific considerations.

The Sub-Group also debated that, once the QCA is appointed by the majority principle, it will act on behalf of all the generators within the Pooling Sub-Stations and not only the generators who have supported that QCA for its appointment. The SERCs need to provide this clarity in the F&S Regulations to avoid any dispute among the generators and QCA. The concept of Lead Generator and Principal Generator as recognized under Central Commission Regulations may be referred in this context and as reproduced below:

Lead Generator: *The lead Generator shall be as termed in the CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) (Amendment) Regulations, 2010 as follows:*

One of the generating stations using renewable sources of energy, individually having less than 50 MW installed capacity, but collectively having an aggregate installed capacity of 50 MW and above, and acting on behalf of all these generating stations, and seeking connection from CTU at a single connection point at the pooling sub-station under CTU or connecting at pooling substation within the Solar or Wind power park, termed as the Lead generator. Lead Generator shall formalize a written agreement/arrangement among all the associated generators to undertake all operational and commercial responsibilities for the renewable energy generating station(s) in following the provisions of the Indian Electricity Grid Code and all other regulations of the Commission, such as grid security, scheduling and dispatch, collection and payment/adjustment of Transmission charges, deviation charges, congestion and other charges etc.

Principal Generator: *The Principal Generator, shall be as recognized in the CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) (Third Amendment) Regulations, 2013, as follows:*

¹ Procedure for implementation of F&S Framework for RE Generators (Wind and Solar) at inter-state level
<https://posoco.in/wp-content/uploads/2017/03/pro.pdf>



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The existing generating station which agrees to act as the "Principal Generator" on behalf of the renewable energy generating station(s) which is seeking connectivity through the electrical system of the existing generating station and formalizes a written agreement/arrangement among them to undertake all operational and commercial responsibilities for the renewable energy generating station(s) in following the provisions of the Indian Electricity Grid Code and all other regulations of the Commission, such as grid security, scheduling and dispatch, collection and payment/adjustment of Transmission charges, deviation charges, congestion and other charges etc., and submit a copy of the agreement to the CTU, along with the application for connectivity, with copy to the respective RLDC in whose control area it is located.

The Sub-Group also debated that, while the QCA may undertake F&S for multiple Pooling Sub-Stations, aggregation of scheduling and forecasting of multiple Pooling Sub-Stations may be decided by States with due consideration of State specific constraints. In this case, the deviation accounting and energy accounting should ideally be for each Pooling Sub-Station and maintained separately.

Recommendation:

- One QCA will be appointed per pooling substation subject to condition of minimum threshold capacity limit to be stipulated by Appropriate Commission. Above such threshold capacity limit, RE Generators will have choice either to schedule directly or schedule through QCA. Once the QCA is appointed by following the majority principle, it will act on behalf of all the generators within the Pooling Sub-Station.
- The QCA may undertake operation of multiple Pooling Sub-Stations, however, aggregation of scheduling and forecasting of multiple Pooling Sub-Stations may be decided by States with due consideration of State specific constraints. In such cases, the deviation accounting and energy accounting should ideally be for each Pooling Sub-Station and maintained separately.
- In case of curtailment in case of grid security, the curtailment shall be in proportion of RE capacity (installed in MW) basis. Further, the RE generator or the QCA shall not be charged with deviation charges for any RE curtailment due to grid security issues.

5.7 Regulating QCA and Aggregators

As per the existing legal provisions RE Generator is responsible for Forecasting and Scheduling of RE generation. The QCA is expected to settle the deviation charges and not perform any energy settlement which also marks a variation from wider role of Aggregators in the International Context.



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The Sub-Group acknowledges that an opportunity is available to address all three fundamental concerns of power market: Adequacy, Ancillary and Aggregation. However, there are a quite a few issues that needs to be addressed in the Indian context including the need for aggregator, business models for aggregators, role of regulators in aggregation, and other operational aspects. Further, the Sub-group noted that there is need to specify Technology and IT requirements for Aggregators. In the trading license regulations, Central Commission has stipulated explicit requirements on the qualification of personnel engaged by traders (electrical engineers *et al*). In case of aggregators, also there is a need to have provisions regarding specialized personnel, technology and IT. The issue becomes more complex as one engages in distribution/interacts with distribution retail side of business where more ancillary services are desired from DERs. Unlike traders, the aggregator is expected to have more involvement that is continuous and interactions with LDCs and therefore the importance of people and technology becomes more important.

Hence, it was proposed that the guidelines for governing and regulating operations of QCA shall be covered under this Report while enabling the provisions to regulate Aggregators in general shall be made in the Power Market Regulations/ IEGC/ State Grid Code or separate sets of Regulations for regulating activities of Aggregators may be formulated as the electricity market evolve.

Recommendations:

- The Sub-Group debated and agreed that the role of QCA would cover deviation settlement accounting at this stage, however the same would progressively evolve over the period of time.
- It was also agreed that considering the fact that DR and DER markets are in the nascent stage, for the time being, the focus be limited to outlining the conditions related to QCA operations. However, Appropriate Commission may consider enabling clauses to regulate Aggregators in general in the Power Market Regulations/ IEGC/ State Grid Code or formulate separate regulations to regulate activities of Aggregators and in future, Model Regulations governing Aggregators may be formulated.



6 Proposed Key Provisions for Model Agreement between QCA and RE Generators

The Sub-Group discussed the various issues during the two meetings of Sub-Group and identified following key provisions to be incorporated in the Model Agreement between QCA and RE Generators. It is clarified that these guidelines for Model Agreement between QCA and RE Generators are only indicative and suggestive. The same may be considered only for guidance purpose to facilitate evolution of a standard contract framework. RE Generators will be free to deviate or formulate their own commercial agreement based on terms to be mutually decided between parties. This Sub-Group emphasizes that the following principles/broad contours covered under this Model Agreement guidelines are in no way binding on the parties concerned.

Key Provisions	Principles or broad contours of the provisions
Premise <ul style="list-style-type: none">Parties to AgreementProject DetailsPremise for Appointment	<ul style="list-style-type: none">The Agreement is being executed between [Names of Parties] i.e. [QCA] and [RE Generators]Shall cover Project Details [Site details / Pooling S/S / Location / Capacity/ Generator]Reference to Authorisation by Generator Company(ies) for appointment of selected QCA and Board Resolution thereof [Standard Documents]Reference to Consent of QCA to discharge functions of the QCA as per the Agreement
Objective / Purpose of Agreement	<ul style="list-style-type: none">Reference to Governing Regulations [SERC] F&S and [SLDC] ProceduresPurpose is to outline conditions for appointment of QCA and to enable such QCA to undertake, act, co-ordinate and discharge functions as QCA, for and on behalf of the concerned RE Generators at Pooling S/S(Sub-stations).
Important Definitions <ul style="list-style-type: none">Effective DateAbsolute ErrorPooling Sub-stationInter-connection Point	<ul style="list-style-type: none">From the date of Execution of the Agreement subject to satisfaction of conditions of mobilisation, but not later than [2 months or period to be specified], whichever is later.Standard Definitions to be in conformity with Definitions covered as per [SERC] F&S Regulations and Procedures, with [site specific details] to be incorporated, as appropriate.



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Key Provisions	Principles or broad contours of the provisions
<ul style="list-style-type: none"> Interface/Metering Point Generator Metering De-pooling 	<ul style="list-style-type: none"> Definitions of Absolute Error, Pooling Sub-station, Inter-connection Point, Interface/Metering Point, Generator Metering Point, De-pooling shall be adopted from the F&S Regulations of SERC or Model Regulations of FOR in absence of SERC Regulations.
Functions and Role of QCA [Part-A] <ul style="list-style-type: none"> Registration and Establishment 	<ul style="list-style-type: none"> To collect, verify, ascertain and maintain records of Generator-wise static project information [turbine/inverter] To establish Control Centre and associated hardware/software/facilities for voice/data communication for [Project Site] To register or empanel itself and [Project Site] with concerned SLDC. To arrange to pay necessary Registration Fees and to establish Payment Security arrangements with SLDC. To act as ‘single point of contact’ between [SLDC] and RE Generators for all matters pertaining to implementation of [SERC] F&S Regulations. Exclusive right to act as QCA during the validity of the Agreement.
Functions and Role of QCA [Part-B] <ul style="list-style-type: none"> Forecasting, Scheduling, revision of schedules and real time co-ordination for implementation 	<ul style="list-style-type: none"> To co-ordinate with RE Generator(s) for the forecasts / schedule(s) To communicate aggregate forecast(s)/schedule(s) to SLDC (day ahead) and revision of schedules during intra-day operations in line with the relevant Regulations. To receive instructions from SLDC for curtailment, real-time operations and cause to implement such SLDC instructions. Curtailment would be done based on RE capacity (installed in MW) basis. To monitor and maintain records of information of forecast(s)/implemented schedule(s) / Curtailment instructions (if any) – aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level.



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Key Provisions	Principles or broad contours of the provisions
Functions and Role of QCA [Part-C] <ul style="list-style-type: none"> Metering, Data collection, Communication, Co-ordination, Real time Data management and Information Exchange 	<ul style="list-style-type: none"> To facilitate/co-ordinate with STU/SLDC for establishment of facilities for communication of meter data / RTU data as required. To ensure maintaining meter data readings at Generator [turbine/inverter] and communicate to SLDC, if required. To maintain data of [Declared Available Capacity] at Generator [turbine/inverter] and communicate to SLDC, if required. To undertake verification of [Declared Available Capacity] on SLDC instructions. To establish data/information exchange protocol and keep records of data collected for each Generator [Turbine/Inverter] as per agreed F&S procedure.
Functions and Role of QCA [Part-D] <ul style="list-style-type: none"> Commercial settlement and De-pooling Payment modalities for settlement Treatment for delay in payment/part payment 	<ul style="list-style-type: none"> To maintain accounts and records of time block-wise information of Schedule, Declared Available Capacity and Actual Generation - aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level. To receive information / Statements of Energy Account / Deviation Account [Weekly/Monthly] and Deviation Charge Bill Amount from SLDC. To verify, reconcile and ascertain the Deviation Pool Account and Deviation Charge Billed Amount vis-à-vis Accounting records To prepare and share Generator-wise 'Statement of De-pooling Account' as per approved Regulations. To receive/make payments from/to RE Generator(s) and to make/receive payments to the State Deviation RE Pool Account, as per approved procedure/F&S Regulations. To claim and receive payment for interest/delayed payment charges from RE Generators. To recoup and maintain the requisite payment security with SLDC and to cause RE Generator(s) to (recoup) maintain the same on back-to-back basis. Quantum of Payment Security as mutually agreed upon by QCA-generators in their Agreement.



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Key Provisions	Principles or broad contours of the provisions
	<ul style="list-style-type: none"> In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days. For delay in payment > 30 days beyond due date, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in a year shall entitle the QCA to declare such RE Generator as a Defaulter and inform SLDC accordingly.
Functions and Role of RE Generators [Part-A] <ul style="list-style-type: none"> Mobilisation, registration, establishment 	<ul style="list-style-type: none"> To provide Generator-wise static project information [turbine/inverter] to QCA To facilitate and provide support to QCA to mobilise and establish facilities for communication [voice/data] and information exchange protocol. To establish necessary metering/Telemetry [AMR/RTU] infrastructure and to bear cost of such infrastructure facilities at Generator [Turbine/Inverter] and Pooling S/S as required by STU/SLDC for [Project Site]. To establish Payment Security arrangement with the QCA
Functions and Role of RE Generators [Part-B] <ul style="list-style-type: none"> Forecasting, Scheduling, revision of schedules and real time co-ordination for implementation 	<ul style="list-style-type: none"> To provide RE Generator-wise [Turbine/Inverter] level time-block-wise declared Available Capacity, forecasts / schedule(s), incl. revision of Schedules, as necessary. To receive instructions from SLDC communicated through QCA for curtailment, real-time operations and to implement such SLDC instructions. Curtailment would be done based on RE capacity (installed in MW) basis.



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Key Provisions	Principles or broad contours of the provisions
Functions and Role of RE Generators [Part-C] <ul style="list-style-type: none"> Metering, Data collection, Communication, Co-ordination, Real time Data management and Information Exchange 	<ul style="list-style-type: none"> To establish and to agree to share cost for establishment of facilities for communication of meter data / RTU data specified by CEA or CERC or SERC as the case may be, , to be finalised in consultation with STU/SLDC.
Functions and Role of RE Generator [Part-D] <ul style="list-style-type: none"> Commercial settlement and De-pooling Payment modalities for settlement Treatment for delay in payment/part payment 	<ul style="list-style-type: none"> To receive information / Statements of Energy Account / Deviation De-pooling Account [Weekly/Monthly] and Deviation De-pooling Charge Bill Amount from QCA. To confirm or raise discrepancy (if any) on the 'De-pooling Account' Statement within 7 days of its receipt. To receive/make payments to QCA in a timely manner and to enable QCA make/receive payments to the State Deviation RE Pool Account, as per approved procedure/F&S Regulations. In case of any dispute in Billed Amount as per De-pooling Account, arrange to make payment for 95% of the Billed Amount within the due date and balance to be paid within 3 days of resolution, along with applicable interest. To make payment for interest/delayed payment charges as claimed by QCA. To update and maintain the requisite payment security with QCA. Quantum of Payment Security to be maintained by RE Generator(s) with QCA shall be as per mutual agreement between QCA- Generators. In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days.



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Key Provisions	Principles or broad contours of the provisions
	<ul style="list-style-type: none"> For delay in payment > 30 days beyond due date, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in year shall entitle QCA to declare such RE Generator as Defaulter and inform SLDC accordingly.
Information/Data Requirement and Sharing Protocol <ul style="list-style-type: none"> Data sharing and data management policy 	<ul style="list-style-type: none"> This section shall cover the various data/information requirement to be shared by RE Generator(s) [Turbine/Inverter] with QCA <ul style="list-style-type: none"> Format-A: Static information about RE Generator [Turbine/Inverter] Format-B1: (Day Ahead/Week Ahead) Time-block-wise Declared Capacity, Forecast and Schedule Format-B2: (Intra-Day) Time-block-wise Revision in Schedule Online data sharing to be mandatory. Sharing protocol with rules for authorised person/log-in. Protocol in case of Failure of data link, protocol for real-time data substitution. Procedure for data access, data security, authorised use, data share with Govt. entities, confidentiality protocol, data storage/archival procedure.
Metering, Energy Accounting and Billing <ul style="list-style-type: none"> Metering Energy Account Statement De-Pool Billing Statement 	<ul style="list-style-type: none"> This section shall cover the protocol and scope for metering, energy accounting, billing and to be shared by QCA with RE Generator(s) [Turbine/Inverter] <ul style="list-style-type: none"> Format-A: [Weekly/Monthly] Energy Account Statement [DC, Actual Gen.] Format-B: [Weekly/Monthly] Deviation Account Statement by SLDC for Pooling S/S Format-C: [Weekly/Monthly] De-pooling Account Statement Process for Verification, Validation, Reconciliation and Certification of Statements shall be outlined.



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Key Provisions	Principles or broad contours of the provisions
Payment modalities and Payment Security Mechanism <ul style="list-style-type: none"> Payment terms for pooling and De-pooling charges Delayed payment charges/ interest Payment security mechanism 	<ul style="list-style-type: none"> This section shall cover Payment modalities and Payment Security mechanism related to ‘Pooling’ and ‘De-pooling Charges’ that QCA needs to collect from RE Generator(s) [Turbine/Inverter] <ul style="list-style-type: none"> Weekly/Monthly payment with due date of payment (within 15 days) Min. 95% payment in case of disputed Bill amount Balance payment with interest upon resolution/addressing of dispute within 3 days Payment Security in the form of LC [or BG] back-to-back equiv. to 1.1 times the average [Weekly/Monthly] Bill amount of De-Pooling Charges or to be determined as 1.1 times LC Amount (or BG) to be provided by QCA to SLDC to be computed in [per MW], whichever is higher Timely replenishment of LC [or BG] - or two-tier payment security [LC equiv. to one cycle billed amount and BG equiv. to three cycle equiv. amount] –can be structured.
Commercials for QCA Fees and Charges <ul style="list-style-type: none"> QCA Fees and charges Recovery of other Costs Payment terms 	<ul style="list-style-type: none"> This section shall cover the QCA Commercials for Fees/Charges and Recovery of other costs that RE Generator(s) [Turbine/Inverter] need to provide to QCA <ul style="list-style-type: none"> Option-1: Fixed Fee - Rs __/MW/month (with or without annual escalation) Option-2: Fixed Fee Rs __/MW/month and Variable/Incentive linked to Accuracy of Forecasts/Schedules > 90% (% of fixed fee) Option-3: Two Part Fees - Part-I Fee Rs __/MW/month (for accuracy >90%) and Part-II Fee Rs __/MW/month (for accuracy <90%) In addition, one-time costs, initial charges, annual recurring costs for value added services can be devised, if necessary.



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Key Provisions	Principles or broad contours of the provisions
Representation & Warranty <ul style="list-style-type: none"> By QCA By RE Generator 	<ul style="list-style-type: none"> This section shall cover the Representation and Warranty by either parties – viz. RE Generator(s) and QCA to each other. <ul style="list-style-type: none"> By QCA: In terms of its organisation, governance, statutory compliance, technical capability and financial eligibility, abidance by SLDC instructions, no prior default/blacklist, authorised/empowered to undertake QCA role. By RE Generator: In terms of its organisation, authorisation, project data, eligibility to participate in F&S Regulations.
Term and Termination <ul style="list-style-type: none"> Period (Min/Max) Termination by mutual consent Termination for default 	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Term and Termination under agreement <ul style="list-style-type: none"> Term: Minimum tenure of 2 years or to match the tenure of the QCA-SLDC agreement Until new arrangement is put in place, existing QCA shall continue for further period up to 1 year. (In case of Termination on mutual consent prior to the conclusion of the Term of the Agreement, parties shall have provision for 1 month notice with or without any compensation, as may be mutually agreed and shall inform SLDC accordingly, with at least one month notice) Termination for Default by QCA: As per mutually agreed termination proceedings by giving notice of one month. Termination for Default by RE Generator: Concerned Generator not to be scheduled for despatch. Default Entity to be communicated to SLDC.
Events of Default and treatment (By QCA) <ul style="list-style-type: none"> Events Remedy/treatment 	<ul style="list-style-type: none"> This section shall cover the Events of Default by QCA and Treatment thereof. <ul style="list-style-type: none"> Failure to comply with SLDC instructions Non-submission of requisite data/forecasts/schedule to SLDC for two billing period Continued default to provide De-pooling Statements and/or Energy Account Statements for two consecutive billing periods



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Key Provisions	Principles or broad contours of the provisions
	<ul style="list-style-type: none"> Failure to make payment to State Deviation Pool or failure to provide/replenish Payment Security to SLDC. Remedy/Treatment: Notice of one month to be given to remedy otherwise Terminate on completion of Notice Period. Shall intimate SLDC to recover charges, encash LC/BG and blacklist QCA.
Dispute Resolution <ul style="list-style-type: none"> Reconciliation Arbitration Governing jurisdiction 	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Dispute Resolution between parties i.e. RE Generator and QCA under agreement Parties shall attempt to 'Reconcile' through management interactions to resolve difference(s). Unresolved differences/disputes to be referred for Arbitration as per provisions under Arbitration and Reconciliation. Disputes entailing information from SLDC or acts arising due to implementation /non implementation of SLDC instructions to be referred to Appropriate Commission for adjudication.
Miscellaneous <ul style="list-style-type: none"> Change of Law Force Majeure Change of Taxes/ Duties/Levies Confidentiality / Use of information Limitation of Liability 	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Standard Clauses to be covered between parties i.e. RE Generator and QCA under agreement Change of Law: to be covered for risks of either parties due to change of Law/F&S Regulations/Code/Practice Directions leading to commercial implications for either party of +/- 10% in Fees. Force Majeure conditions: As per standard clause/treatment Change of Taxes/Duties: To be covered for levy of new taxes/duties or revision in rate of taxes/duties for either party. Confidentiality/Use of Information: Confidentiality and commercial interest of parties to be protected except as required for disclosure to Government Entity, Statutory Compliance, Regulatory proceedings etc.



Key Provisions	Principles or broad contours of the provisions
	<ul style="list-style-type: none">• Limitation of liability: to be mutually discussed. (Typically limited to 10% of Fees)

7 Summary of Recommendations

The key recommendations of the Sub-Group are as follows:

1. 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. Concept of QCA is already recognized by Regulators. QCA will operate under control of SLDC, subject to conditions.
2. 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.
3. 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.
4. As QCA is a State Entity, the QCA-SLDC interactions will be regulated. The 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.
5. Considering the simplicity for operationalization, the Institutional structure for QCA as an Agent or Representative of Generators may be preferred.
6. RE Generators at Pooling Sub-Station can engage Lead/Principal Generator or Third-Party Agency through ‘Franchisee Arrangement’ to perform role of QCA.
7. Every QCA need to register themselves with SLDC as per the Detailed Procedures to be laid down by the SLDC.
8. QCA to be appointed 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.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

9. In case the RE generators failed to appoint QCA within stipulated time frame SLDC, shall nominate the professional agency from among the list of empaneled list of QCAs which shall be binding on the RE generators at the PSS, until such time the RE generators appoint their own QCA. The cost associated with the QCA in such cases will be borne by the RE generators.
10. In case of grid security, if there is requirement of curtailment of RE generation, the curtailment shall be in proportion to RE capacity (installed in MW) basis. Further, the RE generator or the QCA shall not be charged with deviation charges for any RE curtailment due to grid security issues.
11. 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. Any disputes arising between the QCA and RE generators would be subject to the provisions of the Arbitration and Conciliation Act, 1996 and will be outside the Appropriate Commission's regulatory jurisdiction.
12. No more than one QCA will be appointed per Pooling Sub-station subject to condition of minimum threshold capacity limit to be stipulated 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.
13. The QCA may undertake operation of multiple Pooling Sub-Stations, however, aggregation of scheduling and forecasting of multiple Pooling Sub-Stations may be decided by States with due consideration of State specific constraints. The deviation accounting and energy accounting, in such cases should ideally be for each Pooling Sub-Stations and maintained separately.
14. The role of QCA shall be limited only to deviation settlement accounting. It was also agreed considering that DR and DER markets are in nascent stage for the time being the focus might be limited to outlining conditions related to QCA operations. However, enabling clauses to regulate Aggregators in general shall be made in the Power Market Regulations/ IEGC/ State Grid Code or through separate regulations.
15. 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



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

that the principles and broad contours covered under this Model Agreement guidelines are binding on parties.

16. In future, role of Aggregators would evolve and there would be many entities interested to operate in Demand Response, Distributed Energy Resources and Imbalance Markets. 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.
17. FOR Model Regulations may be suitably modified to make appropriate provisions regarding QCA as per the report. The provision regarding including tolerance limit of + / - 10% of Schedule and Penalty amount may also be reviewed based on operational experience.
18. Areas where State Commission may want to consider promulgating (model) regulations for governing the operations of Aggregators and cover them through regulatory oversight are:
 - a. Minimum standards for service quality
 - b. Providing consumers with sufficient information to make informed decisions about choosing an aggregator or retail customers
 - c. Requirements of transparency in transactions
 - d. 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.
 - e. Model contracts suggesting standardized clauses on contract terms, privacy protection for customer information, terminal process, etc. in such contracts by Aggregators with customers.



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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

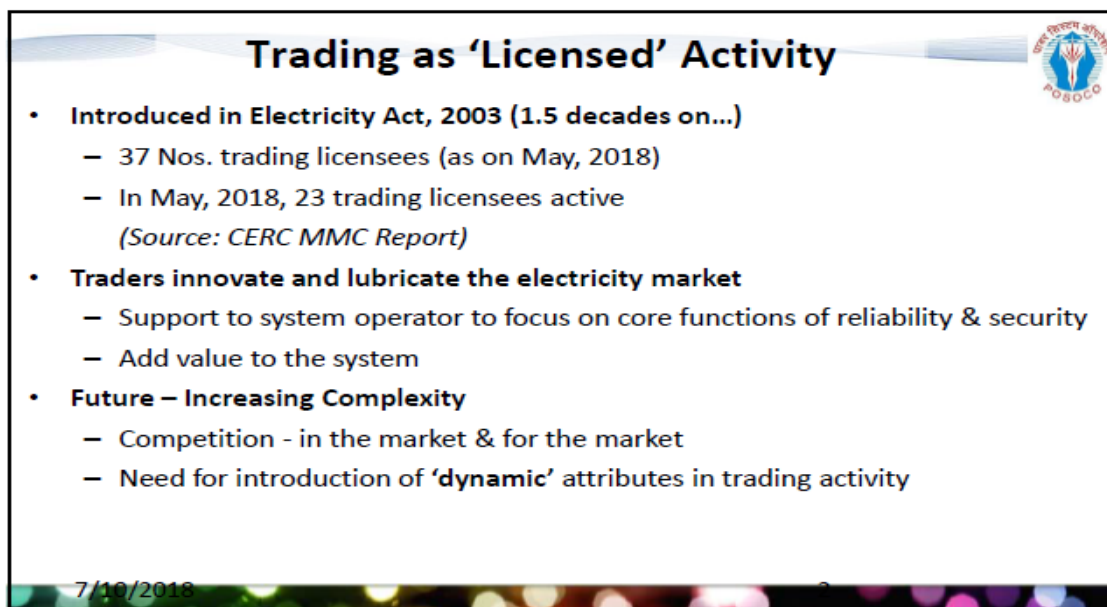
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9 Annexures

Annexure 1

Role of the Aggregators in the ever emerging, electricity market scenario by Shri S.K. Soonee, Advisor POSOCO



Legal Provisions for Trading

- Section 2, Electricity Act 2003

(71) "trading" means purchase of electricity for resale thereof and the expression "trade" shall be construed accordingly;

- CERC (Procedure, Terms and Conditions for Grant of Trading Licence & related matters) Regulations, 2009
- Trading a licensed activity

7/10/2018

Policy and Regulatory Provisions

- **Ministry of Power Technical Committee Report on Renewable Integration**
 - Recommended introduction of new entities (Aggregators)
- **CERC-FOR Model Regulatory Framework for Renewables at Intra-state level**
 - Role of Qualified Coordinating Agency (QCA) has been envisaged
- **FOR SAMAST report**
 - Need for defining role & responsibility of Aggregators (QCAs) in the regulations
- **CERC Staff Paper on Aggregation / Disaggregation of Trader Contracts**
 - Trader buy electricity from different generators or sellers at different prices/single generator at one price and sell it to a single Discoms or buyer at one price/ multiple buyers at different prices.
- **Wind/Solar Park Developer Provisions for Aggregation at Inter-State level**
 - SECI, NTPC, NVVN etc.

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Aggregator as 'Distinct' Player



- **Renewed thrust at the policy level towards innovations in electricity market**
 - Ancillary Services, Gate closure, Real Time Market, Retail level Market
 - Various roles of Aggregators
 - Act as service providers and information aggregators
 - Collect, extract value and disseminate information amongst the stakeholders
 - Exponential growth in the number of markets players and energy transactions
 - Innovative products

Need for Introduction of "Aggregator" as a New Player in Indian Electricity Market

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CERC-FOR Model Regulatory Framework for Renewables at Intra-state level



- **Role of Qualified Coordinating Agency (QCA)- Aggregator for RE developers**
- QCA may be one of the generators /any other mutually agreed agency for the following purposes:
 - Provide schedules with periodic revisions on behalf of all the Wind/Solar Generators connected to the pooling station(s),
 - Responsible for metering, data collection/transmission, communication, coordination with DISCOMS, SLDC and other agencies.
 - Undertake commercial settlement of all charges on behalf of the generators, including payments to the State UI pool accounts through the concerned SLDC.
 - Undertake de-pooling of payments received on behalf of the generators from the State UI Pool account and settling them with the individual generators
 - Undertake commercial settlement of any other charges on behalf of the generators as may be mandated from time to time.

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Present Status in India



- **17 States - Draft /Final Forecasting & Scheduling Regulations**
 - (6 Draft (TN, Gujarat...) and 11 Final)
 - Variations in certain parameters like applicability, error band, etc.
 - **Karnataka**
 - Implemented Aggregation at QCA level
 - In all 96 nos. time blocks of 15 minute with 16 revisions
 - **Andhra Pradesh**
 - Implemented Aggregation at QCA level.
 - Wind energy in all 96 nos. time block with 16 revisions
 - Solar energy in 54 nos. time blocks with 9 revisions
 - **Maharashtra, Rajasthan, Madhya Pradesh & Telangana**
 - Permitted aggregation at Pooling Station level only and not at QCA level
- "The QCA shall undertake all commercial settlement on behalf of the generator(s) connected to the respective pooling station(s)."*

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Aggregators – Issues and Challenges



- Uniformity needed in forecast formats
- Uniformity needed in real time data transfer
- Clarity on deviation charges calculations and aggregation benefits of Inter-state and Intrastate transactions at Pooling station by respective SLDCs
- Sharing of Energy deviation and charges for deviation is awaited from RE regulations implemented states.
- Legal mandate needed

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Definition



- 'Aggregation' is collection into an unorganized whole.
- Aggregation in electricity market
 - Act of grouping distinct agents in a power system (i.e. consumers, producers, prosumers, or any mix thereof) to act as a single entity when engaging in power system markets (both wholesale and retail) or selling services to the system operator(s).
- Aggregators aim at optimizing energy supply and consumption either technically or economically

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Trader Vs Aggregator




Role	<ul style="list-style-type: none">• Trader is like purveyor of electricity who fulfils the needs of the utilities in short term.• Aggregators combine smaller participants to participate in larger markets.
Market Participation	<ul style="list-style-type: none">• Traders participate in markets, which include aggregators and other qualified entities• An aggregator acts as intermediary between electricity end-users, and power system participants.
Expertise level	<ul style="list-style-type: none">• The trader needs expertise in the financial contracts only.• Aggregator has to develop deep technical knowledge about different types of end-users and their potential as providers of various services. In addition the aggregator must study other parameters e.g. time span, storage characteristics and usage constraints.

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Contd... 10

Trader Vs Aggregator




Revenue Stream	{	<ul style="list-style-type: none"> • Trader's revenue is the profit by buying and selling energy only. • Aggregator's revenue is earned through market participation of various types of services from both supply side and demand side. Other revenue streams are reserves management, imbalance handling, demand response, spot market participation, information processing etc.
Classification	{	<ul style="list-style-type: none"> • The classification of trader depends only upon volume of energy traded. • There are different types aggregators viz. Retailer Aggregator, Demand Aggregator, Generation Aggregator, Network Aggregator, Payment Aggregator, Financial Contracts Aggregator, Information and Data Aggregator
Customer	{	<ul style="list-style-type: none"> • There is minimum customer interface of the trader as the main role is in the financial settlement • Aggregator can communicate with the customer's automation system either directly or or through the LDC also.

Contd... 11

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Trader Vs Aggregator



Risk Management	{	<ul style="list-style-type: none"> • Traders act as risk absorbers between generators and Discoms; ensuring that generators are paid on time by bringing in their finances in case there is a delay in payment by a buyer. • The real time price information from the market limits the risk exposure of the aggregator.
Transparency	{	<ul style="list-style-type: none"> • The trader need not convey the information to the general public. • The aggregator has to make his offer known to the public in an easily understandable way.
Control & Communication	{	<ul style="list-style-type: none"> • The trader has no physical control and communication with the customer. He is responsible for the financial settlement only. • Signals must be received, appliances controlled, and measurements sent in an automated manner. The aggregator takes care of installing the proper control and communication equipment.

Contd... 12

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Trader Vs Aggregator

Financial Incentives	<ul style="list-style-type: none"> • Trader offers no incentives to the end consumer as the contract has been facilitated upon the request of the consumer only. • Aggregator provides financial incentives to the customers to participate by monitoring the customer's performance.
Forecasting Requirement	<ul style="list-style-type: none"> • Trader does not forecast requirements of the customer. He only arranges the contract volume fixed by the customer. • Aggregator anticipates the requests, make forecasts, control the customers' loads in a more profitable way and reacts on the requests ex post (afterwards) also.
Economies Scale	<ul style="list-style-type: none"> • Trader cannot realize the value of the economies of scale in the bilateral contracts. • Aggregator can take advantage of economies of scale in controlling a large group of customers and acquire sophisticated optimization software to support the load control decisions.
Interface System Operators	<ul style="list-style-type: none"> • Trader sends only contract information to the system operator. • Aggregator does validation of load control decisions by consulting system operators. There is a tight coupling of interactions and communication.

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Value of Aggregators based on Technological & Regulatory Contexts

The diagram illustrates the value of aggregators based on technological and regulatory contexts. It compares 'System Value' and 'Private Value' across three aggregation models: Fundamental, Transitory, and Opportunistic. The diagram also shows the progression from 'Today's' to 'Advanced' regulations and technology.

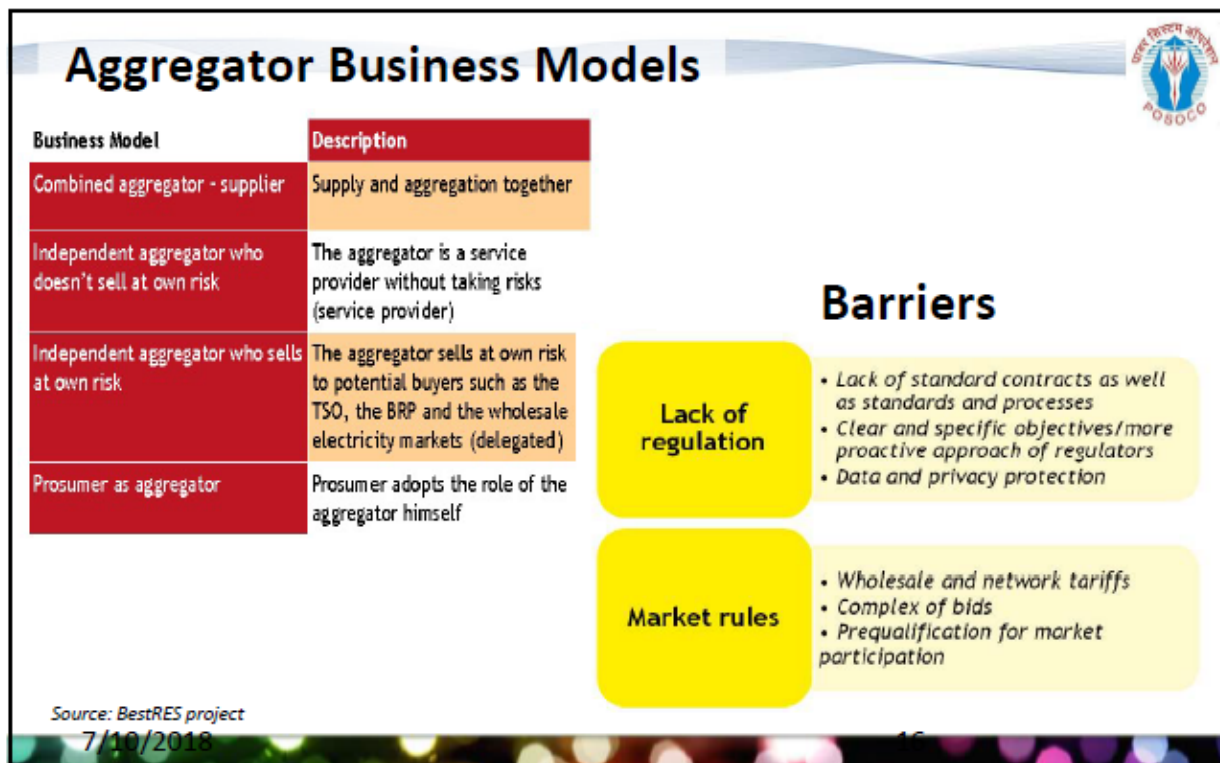
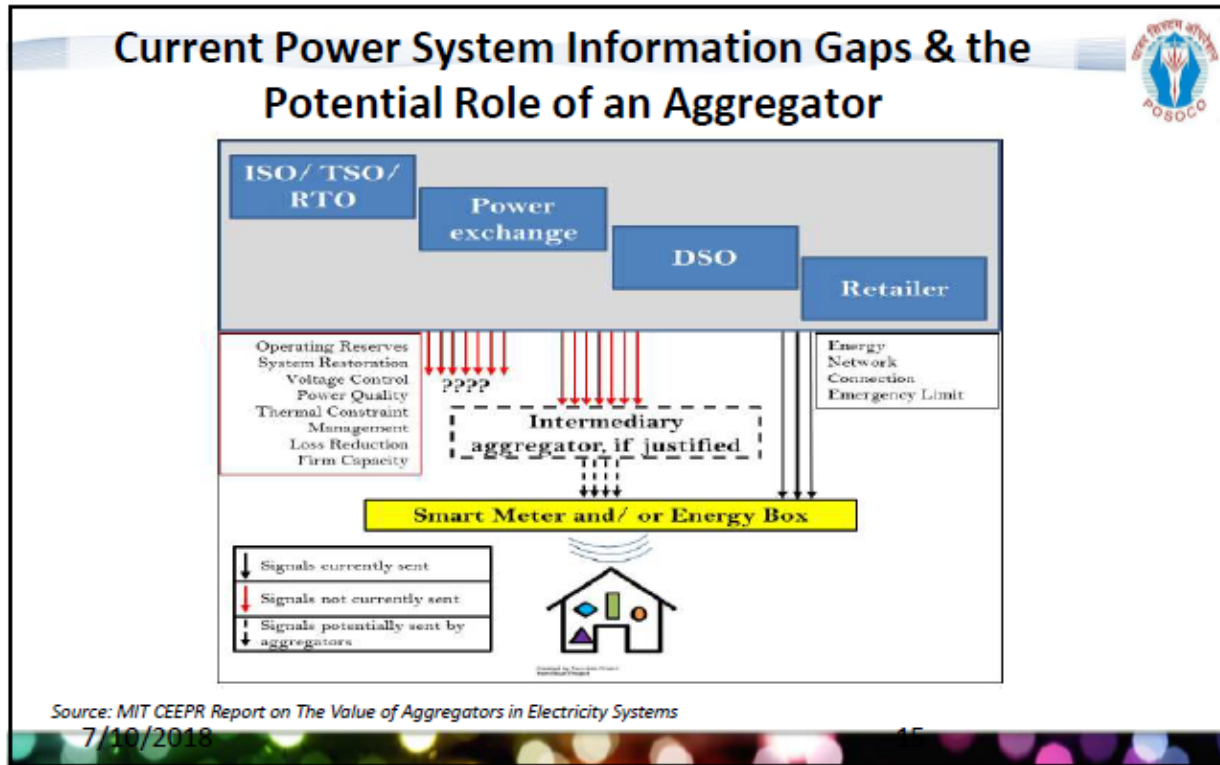
Aggregation Model	Key Features
Fundamental Aggregation	<ul style="list-style-type: none"> • Economies of scale • Economies of scope • Risk management • Competition and innovation
Transitory Aggregation	<ul style="list-style-type: none"> • Engaging power system agents • Management of complexity • Deployment of automation technologies • Closing information gaps • Coordinating agents for system operations
Opportunistic Aggregation	<ul style="list-style-type: none"> • Ill-designed end-user tariffs. • Inadequate regulations for procurement of and cost allocation for balancing costs • Inefficient RES-E support mechanisms

Today's regulations → Advanced regulations

Today's technology → Advanced technology

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

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Next Steps...



- Need for suitable business model for aggregators - There is need to describe nine 'building blocks' of a business model for aggregators:
 - key partners,
 - key activities,
 - key resources,
 - customer value proposition,
 - customer relationships,
 - channels,
 - customer segments,
 - cost structure and
 - revenue stream

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Thank You !



Literature Review & References



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<https://upcommons.upc.edu/bitstream/handle/2117/117315/56-energies-11-00822-Pol.pdf>

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Present Status in India




- Maharashtra
 - F&S Regulations notified on 20th July, 2018
 - Aggregation of schedules at Pooling Substation level only, and not of multiple pooling station capacity.
 - Role of QCA
- Telangana
 - F&S Regulations notified on 30th May, 2018
 - No provision to provide an aggregated forecast. The QCA will only be forecasting on PSS level.
 - Role of QCA
- Rajasthan
 - F&S Regulations notified on 14th September, 2017
 - No provision to provide an aggregated forecast. The QCA will only be forecasting on PSS level.
- Andhra Pradesh
 - F&S Regulations notified on 21st August, 2018
 - Virtual Pool: To enable benefits of larger geographical area and diversity, aggregation of forecast is permitted under “Virtual Pool” where Generators have an option to account for their deviations at an aggregated level through a Qualified Coordinating Agency (QCA).
 - Aggregation “seems” to be allowed between wind and solar generation as the concept of virtual pool aims to capture not only the larger geographical area but also the diversity (among different asset class).

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Present Status in India

- **Madhya Pradesh**
 - Draft F&S Regulations notified on 25th May, 2017
 - Settlement will be done through the “Qualified Coordinating Agency” or QCA. However there is no mention of Aggregation.
- **Gujarat**
 - Draft F&S Regulations notified on 13th January, 2017
 - Aggregation of more than one pooling station is allowed.
- **Karnataka**
 - F & S Regulations notified on 31st May, 2016 w.e.f. 01st June, 2017
- **Jharkhand**
 - F & S Regulations notified on 08th December, 2016
 - QCA shall not be a compulsory requirement for the process.
 - Some large solar or wind plants in future may aggregate their generation at one or more pooling stations themselves.
- **Odisha**
- **Tamil Nadu**
- **Chhattisgarh**
- **Haryana**

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Annexure 2

International Experience on Aggregators by Consultant



Contents

Aggregators – Definition and relevance

Business models of aggregators

US experience

Current regulatory framework

Key challenges

EU experience

Business models

Current regulatory framework

Key challenges

Key learnings

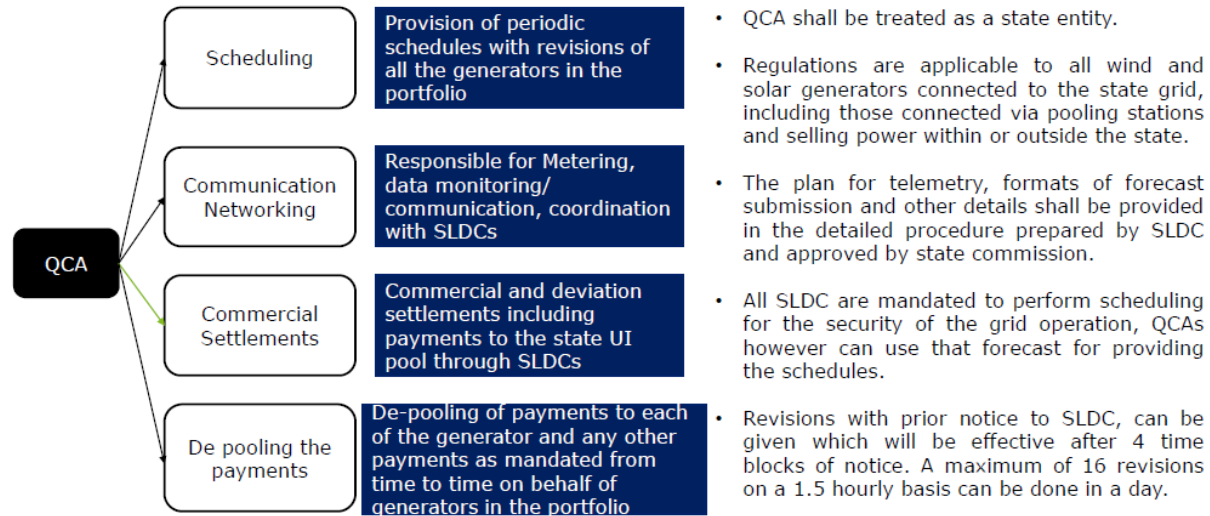
Business models for aggregators



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Proposed Framework of QCAs in Indian Context

Model Regulatory Framework for Renewables at Intra-state level



Business models for aggregators 4

Scheduling Coordinator

A player in U.S. market, acting similar to QCA in the Indian context

- ☐ DERs above 1MW capacity can participate in the market using an CAISO approved Scheduling Coordinator.
- ☐ Generators that are above 1MW capacity are not allowed to participate in CAISO through an aggregator.
- ☐ To participate in the ISO market, a DERP must be a certified scheduling coordinator (SC) or retain the services of a certified SC to act on their behalf.
- ☐ SCs can directly bid or self-schedule resources as well as handle the settlements process.

Definition

A Scheduling Coordinator is a scheduling agency which can be chosen by the market participants, that is approved by CAISO to provide the schedules on behalf of the DERs or DERPs.

Roles of a Scheduling Coordinator

- Maintain 24/7 scheduling centers: Scheduling or maintaining the schedules of each of the participants and communicating the same with CAISO.

Business models for aggregators 5



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Scheduling Coordinator

Responsibilities and Eligibility criteria in CAISO

Responsibilities of a Scheduling Coordinator

- Paying CAISO's charges in accordance with Tariff
- Submit bids and interchange Schedules on behalf of its serving consumers
- Revisions in Demand, Supply, exports and imports
- Settlement of any Inter-Scheduling Coordinator trades that might have happened through CAISO markets
- Provision of Ancillary Services
- Business Practice Manuals: Ensuring compliance of each of the market participants which it represents
- Financial Responsibility: Settlement of all the finances for all the schedules and other applicable charges with its portfolio.
- Tax Compliance

Following are the requirements to be met by an agency for becoming a Scheduling coordinator

- Should be technically credible for meeting the aforementioned tasks
- Should be able to evaluate the eligibility of consumers
- Meets the Financial criteria set by the CAISO

Business models for aggregators 6

Aggregators

Definition

An Aggregator is a company who acts as an intermediary between electricity end-users and DER owners and the power system participants who wish to serve these end-users or exploit the services provided by these DERs (aggregation is defined here as the act of grouping distinct agents in a power system (i.e. consumers, producers, prosumers, or any mix thereof) to act as a single entity when engaging in power system markets (both wholesale and retail) or selling services to the system operator(s).)

- MISO's definition of Aggregator encompasses DG and potentially other DERs, while the mandatory provisions in FERC Order 719 apply only to aggregation of DR



Adopting a narrow scope for aggregation, limited only to DR, can simplify the development of wholesale market rules and procedures, as well as retail utility tariffs and programs.



Disadvantage of adopting such a narrow scope is that it forgoes the potential benefits of aggregating other types of DERs. A narrow scope also precludes the possibility that combinations of different types of DERs can potentially create synergistic value

In late 2016, FERC released a Notice of Proposed Rulemaking (NOPR) – which solicited public comments on possible reforms to RTO and ISO market rules that would remove barriers to the participation of electric storage resources and DER aggregations in organized wholesale electricity markets. The comment period for that NOPR closed in February 2017, but FERC has yet to take any final action

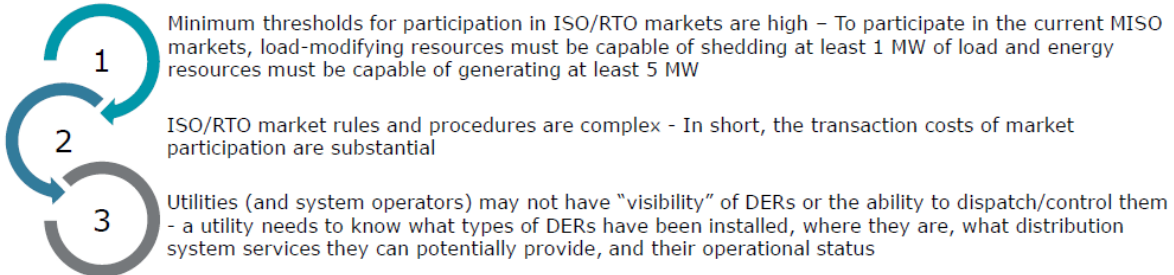
Business models for aggregators 8

Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Principal benefit from Aggregator / Customer perspective

Aggregation expands the opportunities to extract economic value from DERs

Without aggregation, individual DERs can *theoretically* provide energy, capacity, and ancillary services at the ISO/RTO level or the distribution level, but in practice most of that potential will go unrealized due to a variety of barriers, including:

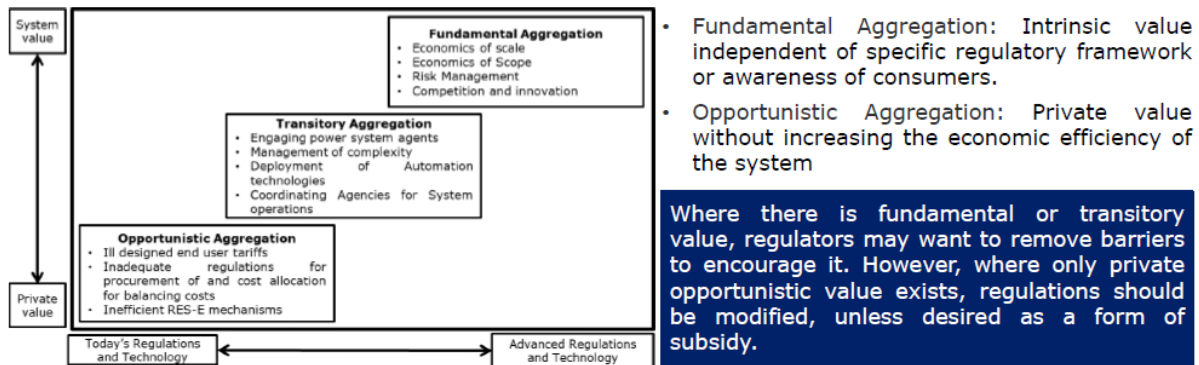


Aggregation of DERs can overcome most of these barriers. Acting on behalf of many customers who have small DERs, an aggregator can easily meet the size thresholds for market participation and learn market rules and procedures. Aggregation can also bring visibility, direct control, and the ability to plan for and dispatch DERs as grid resources

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Value of Aggregators in Electricity Markets

Present and Future Value of Aggregation



An industrial customer may be able (or willing) to participate in a DR program, but may be able to curb demand only once per month. Thus, it may be unable to participate in a DR market due to market rules and constraints. However, as part of a portfolio, an aggregator may be able to call on this constrained resource once per month, while calling on other similar resources to meet the requirements.

Business models for aggregators 10



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

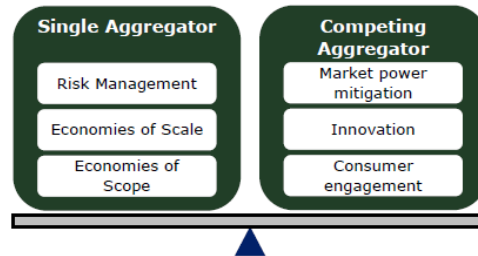
Value of Aggregators in Electricity Markets Single Aggregator vs Competing Aggregator

Economies of Scale and Scope:

Increasing the quantity of the service and bundling of multiple common services by a single aggregation creates economic value

Uncertainty and Risk Management:

Single/ Large Aggregators, as intermediaries between small consumers/producers and volatile markets, may provide hedging solutions (ex. through CfD) to market players, which small agents are unable to do.



Competition and Innovation:

Competition may incentivize aggregators to provide customized and innovative solutions to agents, engage otherwise unengaged agents, enable the optimal adoption of DERs, and enable active participation in electricity markets

Consumer Engagement: Competition can drive efficiency in operations and improved customer experience

Business models for aggregators 11

Overview of US markets

Business models for aggregators 12



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Regulatory provisions

DR response aggregators are more prevalent than DERs currently

Regulatory enablers by FERC

2000 - 2008	FERC approved proposals by several ISO/RTOs to allow wholesale and certain retail customers to bid demand response into the day-ahead and real-time energy markets, alongside generation
2008	FERC issued Order 719 requiring all ISO/RTOs to accept bids from demand response aggregators acting on behalf of retail customers
2016	Revision in Market Administration and Control Area Services Tariff (MST) to establish a framework for DER aggregations to participate in CAISO's real-time and day-ahead wholesale energy markets and ancillary services markets (the "DER program") <i>"Under CAISO's amended MST, DER aggregations are recognized as a new type of market resource that may supply energy and ancillary services, similar to traditional generating facilities"</i>

Currently NYISO, CAISO, PJM etc. have launched stakeholder interactions to enable market participation by DERs

As per FERC requirement, only CAISO is currently in compliance with the requirement due to ongoing DER program

FERC announcement – Nov 2016

Each RTO/ISO to revise its tariff to define [DER] aggregators as a type of market participant that can participate in the organized wholesale electric markets under the participation model that best accommodates the physical and operational characteristics of its distributed energy resource aggregation

Business models for aggregators 13

Aggregation of DERs

Requirements specified by NY ISO for aggregators

NY ISO

Technology agnostic	• It calls for the adoption of aggregation rules that allow a mix of resources (e.g. demand response, generation, and storage) to be included in a single DER aggregation
Geographic limitation	• NYISO has suggested that aggregations should be geographically limited, only consisting of resources connected to the same transmission node.
Size	• NYISO has also proposed requiring all aggregations to be at least 100 kW in size. It would restrict aggregations of less than 1 megawatt (MW) to participating in wholesale energy markets only, but allow larger aggregations to participate in markets for both energy and ancillary services

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Aggregation of DERs

Requirements specified by CAISO for DER aggregation

Requirement	
Eligibility	<ul style="list-style-type: none"> • Except demand response resources • Except distributed and behind-the-meter generating facilities: with a capacity greater than 1 MW • Except any resource, regardless of type or size, that participates in a retail NEM program
Geographic limitation	<ul style="list-style-type: none"> • There are no restrictions on the number of individual resources that can be aggregated. • The re-sources in an aggregation may span multiple pricing nodes, but must be within a single sub-load aggregation point, i.e., on the same side of a transmission constraint identified by CAISO. • The combined capacity of all resources must be at least 0.5 MW and, if the aggregation includes resources located at different pricing nodes, must not exceed 20 MW
Metering	<ul style="list-style-type: none"> • Equipped with a revenue meter capable of accurately measuring the amount of energy produced and consumed by the re-source each hour; meter must comply with any standards prescribed by the relevant local regulatory authority / CAISO
Participation requirement	<ul style="list-style-type: none"> • Contract Agreement with CAISO • Provide CAISO with a list of the DERs that will comprise its aggregation(s); • notify the distribution utility or metered subsystem in whose service area the DERs are located; • obtain a concurrence letter from the distribution utility or metered subsystem, indicating that it has no concerns about the DER's wholesale market participation

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Aggregation of DERs

Scheduling, Dispatch and settlement procedures by CAISO

- Scheduling**
- DERPs may only bid into wholesale energy and ancillary services markets through a **certified scheduling coordinator**; a DERP may elect to become a scheduling coordinator itself
 - When the resources in the DERP's aggregation span multiple pricing nodes - bids submitted by the scheduling coordinator must include generation distribution factors, reflecting the share of resources at each node.
 - CAISO will treat the **aggregation as a single resource**, regardless of the location of the individual DERs.
 - The **DERP has to disaggregate** CAISO's instructions to the DERs.

Settlement	
1 Telemetry	2 Metering
<ul style="list-style-type: none"> • CAISO will require certain aggregations, as a whole, to submit "real-time" data through telemetry. • Initially, only aggregations providing ancillary services or with a rated capacity of 10 MW or more will be required to submit data, but CAISO may reduce the size of resources at which these requirement apply 	<ul style="list-style-type: none"> • CAISO will require the scheduling coordinator to collect, for each DER in an aggregation, data reflecting its actual production and/or consumption of energy • Aggregated data, reflecting the total production or consumption of all DERs in the aggregation, must be submitted to CAISO daily

- Based on the aggregated data submitted by the scheduling coordinator, CAISO will calculate the DERP's "settlement balance," reflecting the amount owed to or by it

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Key regulatory challenges

Business models for aggregators 17

Participation in markets

Key regulatory challenges

Relaxing 24*7 settlement requirement


- CAISO wants DER aggregations to provide service as reliably and transparently as conventional generators, without them being able to take advantage of price fluctuations by stepping out of the marketplace at times when they may have to buy power at high prices or sell at lower prices.
- It is especially consequential for behind-the-meter battery systems, for two reasons:
 - Requiring 24/7 settlement results in behind-the-meter batteries pay-ing twice for the energy they use to charge. Battery owners must pay both retail prices for energy drawn through the meter and the wholesale LMP for the same energy
 - Due to the 24/7 settlement requirement, if a battery discharges to meet onsite electricity needs at a time when the LMP is negative, the owner must make payments into the wholesale market, despite the fact that no power was exported onto the bulk grid
- Should CAISO allow DERPs to "opt-out" of the wholesale market when performing behind-the-meter operations and only subject them to whole-sale market settlement at times when they have opted in (i.e., when the DERP, through its scheduling coordinator, bids into the wholesale market and is dispatched by CAISO) - there is no way to "split" the electricity used to charge a storage device such that wholesale rates would only apply to energy later discharged as exports into the bulk power system (and compensated by CAISO markets) and retail rates would only apply to electricity later discharged to meet onsite load.
- Should CAISO allow DERPs to "opt-out" of wholesale market when LMPs are negative

Business models for aggregators 18

Participation in markets Key regulatory challenges

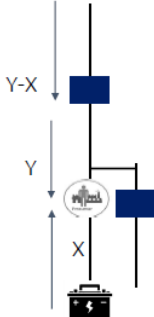
Relaxing 24*7 settlement requirement

- 24/7 settlement effectively prohibits any behind-the-meter operation, and thus also effectively prohibits at least some of the multiple-use application functions like batteries/ storage



Case: Charging of storage system

Battery owner pays for both retail prices for energy drawn ($X+Y$) through the meter and the wholesale LMP (X).



Case: Discharging of storage system

If a battery discharges to meet onsite electricity needs at a time when the LMP is negative, the owner must make payments into the wholesale market, despite the fact that no power was exported onto the bulk grid

- The situation is likely to discourage behind the meter storage systems from participating in the wholesale market.
- To the extent that DERs do participate, they are likely to do so through CAISO's PDR/RDR programs, which do not require 24/7 settlement. Under those programs, however, DERs cannot provide energy or ancillary services to the bulk power system and thus their full value cannot be realized.
- DERPs could opt out of wholesale market during negative LMP periods

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Participation in markets Key regulatory challenges

Metering and Telemetry Requirements

- CAISO requires each DER in an aggregation to be equipped with a revenue meter that accurately records the amount of energy produced and consumed
- In addition, where the aggregation provides ancillary services, telemetry systems capable of transmitting data at one minute intervals must also be installed.
- For some small operators, the cost of metering and telemetry may be prohibitive.

Addressing Low net revenues

High overhead costs applicable to small DERs are also applicable for similar conventional generators of larger size; signifying lesser net revenue for small DER (scheduling coordinators needs to be paid \$1000 per month)

Disincentives to utilities

Increase in penetration of DERs will result in decrease in revenues to utilities so this could act as a possible disincentive for utilities to take up DER programs

Business models for aggregators 20



Overview of EU market

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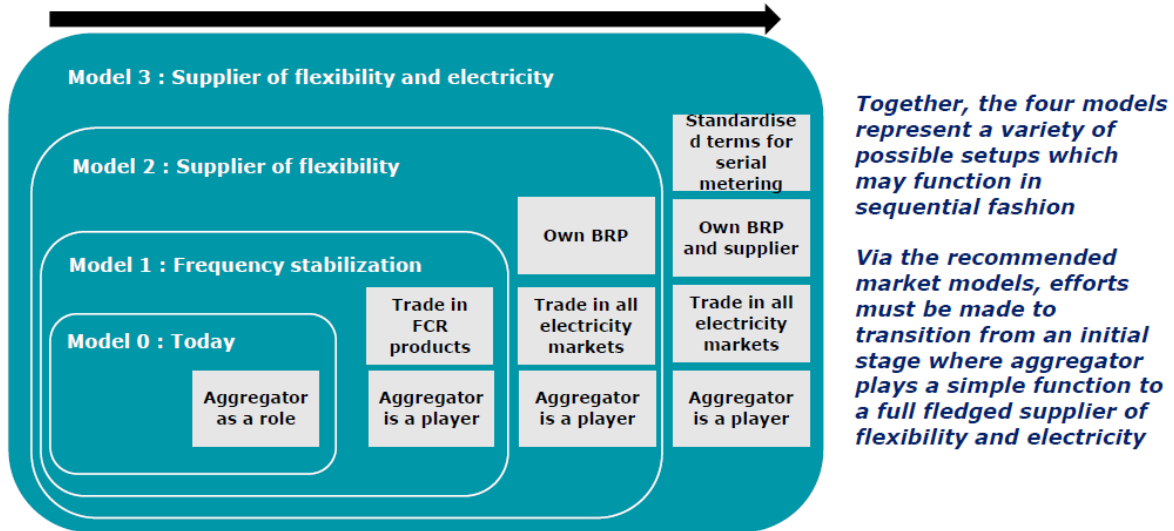
Business models for Aggregators

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Market models for aggregators

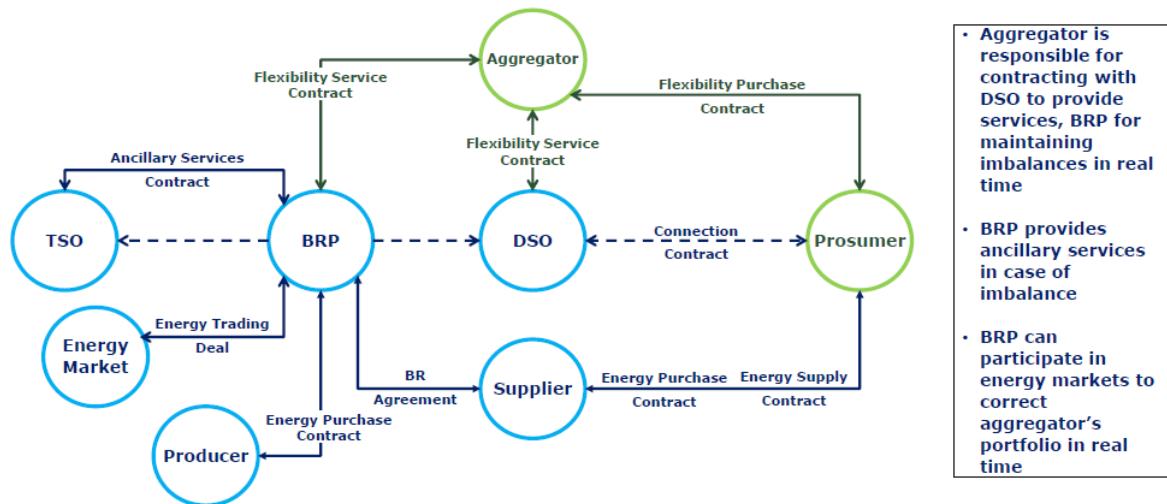
Aggregators need to expand gradually from an embryonic stage to a full fledged player



Business models for aggregators 23

Market models for aggregators

Interactions with various market players



Business models for aggregators 24

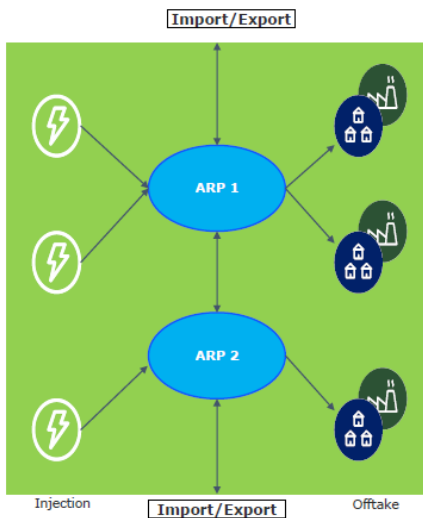
Imbalance management through BRP

Case study - Belgium

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Imbalance management through ARPs

Case study - Belgium



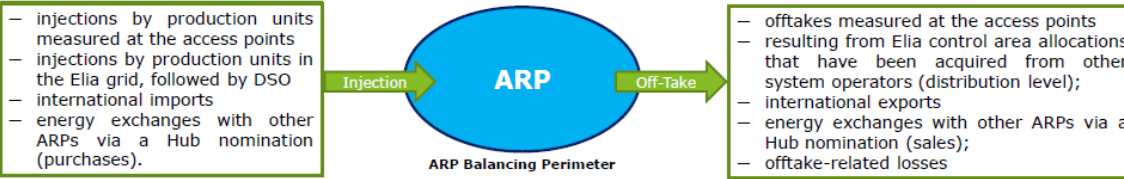
- The responsibility of maintaining instantaneous balance between the load and generation lies with the TSO.
- To help maintain the balance between generation and consumption, Elia has appointed balance responsible parties (BRP)
- For each access point there must be a designated BRP. A balance responsible party is also called an access responsible party (ARP).
- Either the supplier takes on the role itself or else it appoints an ARP which enters into a contract with Elia.
- ARPs are authorized under an ARP contract signed with Elia.
- Elia applies imbalance tariffs if a 15 minute time block imbalance is observed.
- ARPs can avoid imbalances by:
 - exchanging energy with other ARPs on the 'intraday hub'. In this case, they submit their nominations to Elia before noon the following day;
 - importing or exporting energy for the south border on an intraday basis

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Imbalance management through ARPs

Case study - Belgium

An Imbalance occurs when there is a difference for one quarter-hour between the total Injection to the Elia Grid allocated to ARP's Balancing Perimeter and the total Off-take from the Elia Grid allocated to ARP's Balancing Perimeter



ARP's perimeter is made up of injection and offtake points for which it has been designated access responsible party.

Positive imbalance:	injection exceeds offtake
Negative imbalance:	offtake exceeds injection

ARP is responsible to balance its perimeter on an Qtr hr basis

- Day-ahead nominations of ARP must be balanced
- ARP pays an imbalance tariff if the final position of its perimeter is not balanced
- ARPs react on real-time imbalance tariffs to restore their perimeter balance
- ARP which also provide ancillary services has the right to offer ancillary services to Elia (via CIPU contract)

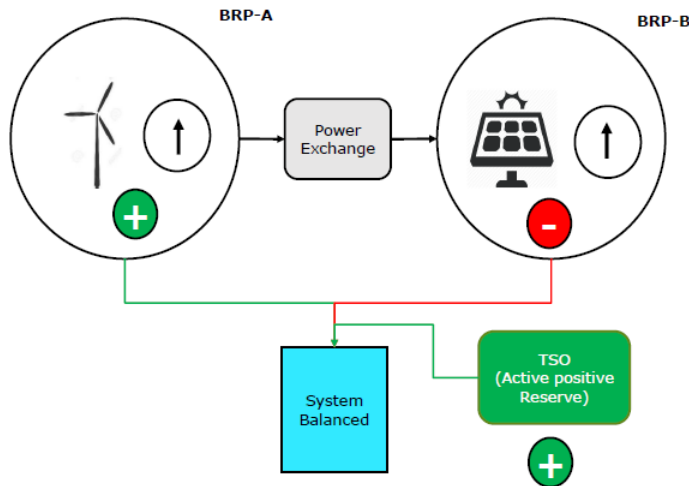
In real time, the residual imbalance of the zone is solved by the TSO

- TSO will restore residual imbalances by activation of balancing services
- Balancing actions by TSOs are reflected in imbalance tariffs

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Imbalance management through ARPs

Case study - Belgium



Meeting Imbalance: Consider a portfolio of BRP-A containing load and wind farms, and another BRP-B containing load and solar parks. On a typical day, BRP-A has excessive generation than its load and in BRP-B, there is lesser generation than its load. Both of these BRPs can trade power via power exchange.

BRP-B buys power from BRP-A to maintain balance of the system. The leftover imbalance in BRP-B is resolved by Elia from its contracted Reserves.

Financial Settlement: This happens after the actual delivery of the electricity. Elia imposes a tariff on BRP-A and BRP-B is rewarded.

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Imbalance management through ARPs - Belgium Financial Requirement

- Any customer, supplier, generator or trader can sign an ARP contract.
- The contract will only enter into force once the ARP provides Elia with a bank guarantee for the entire term of this Contract and for the entire duration of execution of all the financial obligations arising from the Contract
- The guarantee is a security for the requested and punctual execution of all the obligations arising from this Contract, including, but not restricted to, the payment of the Tariffs for Imbalance and/or external inconsistencies.
- The guarantee must have an initial term of at least one calendar year and will be renewed for the entire term of this Contract and for the entire duration of execution of all the financial obligations arising from the Contract.

Position of ARP (ARP-P)	Variable guarantee amount
ARP-P \leq 50 MW	€ 93,000
50 MW < ARP-P \leq 100 MW	€ 186,000
100 MW < ARP-P \leq 200 MW	€ 372,000
200 MW < ARP-P \leq 300 MW	€ 558,000
300 MW < ARP-P \leq 450 MW	€ 837,000
450 MW < ARP-P \leq 600 MW	€ 1,116,000
600 MW < ARP-P \leq 750 MW	€ 1,395,000
750 MW < ARP-P \leq 900 MW	€ 1,674,000
900 MW < ARP-P \leq 1050 MW	€ 1,953,000
1050 MW < ARP-P \leq 1200 MW	€ 2,232,000
1200 MW < ARP-P \leq 1500 MW	€ 2,790,000
ARP-P \leq 1500 MW	€ 3,000,000

- The amount of the guarantee is a variable amount based on ARP's position.
- ARP's position is the highest of the daily Off-take averages allocated to ARP calculated on the basis of the previous calendar month.
- The daily averages are based on the daily quarter-hourly values of the offtake.

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Regulatory framework

Business models for aggregators 30

Regulatory framework in EU

EU directives have been focused on participation of aggregators through Demand response



Particulars	<p>Energy Efficiency Directive 2012/27/EU (EED) defines the term 'aggregator' as a "demand service provider that combines multiple short-duration consumer loads for sale or auction in organized energy markets"; definition includes only consumer loads and not the generation of energy</p> <p>EU Member States shall ensure that transmission system operators and distribution system operators, in meeting requirements for balancing and ancillary services, treat demand response providers, including aggregators, in a non-discriminatory manner, on the basis of their technical capabilities.</p> <p>Network regulation and tariffs "shall not prevent network operators or energy retailers from making system services available for demand response measures, demand management and distributed generation on organised electricity markets, in particular: [...] (b) energy savings from demand response of distributed consumers by energy aggregators."</p>
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EED incorporates the aggregators as active participants in the energy market and defines them as demand service providers.

Business models for aggregators 31

Regulatory framework in EU

EU directives have been focused on participation of aggregators through Demand response



Particulars	<p>Transmission system operators should facilitate participation of final customers and final customers' aggregators in reserve and balancing markets.</p> <p>Member States shall ensure the implementation of intelligent metering systems that shall assist the active participation of consumers in the electricity supply market. This should happen based on an economic assessment and where the roll-out of smart meters is assessed positively, at least 80 % of consumers shall be equipped with intelligent metering systems by 2020</p>
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IEM directive facilitates final customers in providing balancing services to the markets

Business models for aggregators 32

Regulatory framework in EU

EU directives have been focused on participation of aggregators through Demand response



Particulars	<p>Articles 6 to 11 of the RES Directive content regulation on so-called Cooperation Mechanisms which provide Member States with the option to agree on cross-border support of RES.</p> <p>The RES Directive provides different options for the cooperation between Member States:</p> <ul style="list-style-type: none"> • (1) Statistical transfers: Renewable energy which has been produced in one Member State is transferred to the RES statistics of another Member State, counting towards the national RES target of that Member State; • Joint projects between Member States: RES electricity or heating/cooling projects are developed under framework conditions jointly set by two or more Member States • Joint projects with third countries: Joint projects can also be implemented between Member States and third countries • Joint support schemes: Member States coordinate (parts of) their RES support schemes.
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The regulation does not explicitly refer to aggregators but sets the directive for deployment of renewable energies in the European Union

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Regulatory framework in EU

EU directives have been focused on participation of aggregators through Demand response









Particulars	<p>The framework guidelines on electricity balancing declares that the Network Code on Electricity Balancing shall take precedence over relevant national frameworks (legislation, regulation, codes, standards, etc.) for cross-border and market integration issues and national frameworks shall be adapted to the extent necessary</p> <p>The Network Code on Electricity Balancing (NC EB) declares in Art. 10 the "facilitating [of] the participation of Demand Side Response including aggregation facilities and energy storage" to one of its general objectives of the balancing market.</p> <p>Furthermore, the Network Code contains that "the conditions for aggregation of Demand Side Response, the aggregation of generation units or the aggregation of both should be part of the terms and conditions for Balancing Service Providers</p>
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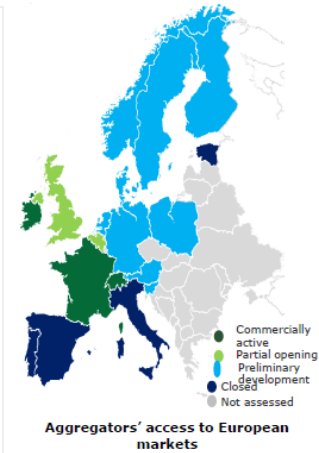
Participation of demand side response has been identified as a primary objective of the balancing market

Business models for aggregators 34

Participation in markets

Provisions have been made for participation of aggregators; lesser focus on DERs

+	Policy / Regulatory support
	In Germany , ordinance for enabling DSM in an organized market through regular tenders was passed.
	Revisions in regulatory framework for secondary and tertiary reserves; day ahead participation for providing flexibility from small renewable generators introduced in 2016
	In Austria , in 2014, reduction in technical prequalification of the minimum pool size to 5 MW from 10 MW enabling
	In Belgium , participation of DSM in frequency containment was allowed by Elia (TSO) paving way for active participation by aggregators
	Liquidity of tertiary reserves increased by decreasing tendering frequency of tertiary reserves from yearly to monthly; enabled a framework where aggregators can participate in shorter time frames
	In the UK , Aggregators are not required to obtain a Supply licence (or other licence) in order to engage with consumers.
	Non-accredited Aggregators could still continue to operate, engage with consumers and sell services to the SO.



Business models for aggregators 35

Participation in markets

International examples on eligibility for participation through aggregators

Eligibility for participation through aggregators	<ul style="list-style-type: none"> Technical preconditions for single generation unit participation in electricity trade are based on electricity market requirements and include min bid/offer contract size <ul style="list-style-type: none"> 0.1 MWh (relevant for Day Ahead markets in Germany and Denmark and Intraday market in Germany) and 1 MWh, which is also common for Power Exchange markets: Future (Denmark, Germany Poland, UK), Day Ahead (Poland and UK) and Intraday (Denmark). The small sized and micro-generation unit unable to meet the technical preconditions can do so in aggregations of power generation units of all RES/DG generation types, including conventional types of power generation
minimum portfolio capacity for aggregators	<ul style="list-style-type: none"> Austria: <ul style="list-style-type: none"> In 2014, the reduction in technical prequalification of the minimum pool size has been decreased to 5 MW from 10 MW enabling smaller aggregators to participate in the market. UK: <ul style="list-style-type: none"> Minimum size for market participation is 2 MW

Business models for aggregators 36

Key regulatory challenges

Business models for aggregators 37

Key challenges

Regulatory enablers and governing mechanisms need to be adequate structured

Policy and standards

- The formal definition of 'aggregator' is just seen from the load side and does not include the generation side
- Existence of price caps on the secondary reserves market makes it difficult for aggregators to offer with new technologies
- Lack of standard contracts and the lack of standards and processes have more relevance for aggregators operating in countries with less stable frameworks

Market rules and participation

- Complexity of the market entry and the lack of relevant infrastructure (smart meters, home management systems, platforms) can hinder operation of aggregators
- Need for adapting the market rules so that the flexibility provided by demand side measures and all sizes of generation can compete on a level playing field with existing actors in these markets
- Adequate openness of primary / secondary / tertiary reserves market for enabling ancillary services by aggregators is essential
- Model contracts help determining roles, responsibilities and balances required for interactions between BRP and retailer

Data protection

- Adequate data protection and cyber security exists in all European countries
- All data management will in particular be in line with privacy regulation of EU countries

Business models for aggregators 38



Key learnings

Business models for aggregators 39

Options for aggregation and pros/cons of the options

Who may aggregate DERs / Can a Discom become an aggregator?

Aggregators, as currently defined in Arkansas statutes and MISO business practices, excludes utility aggregation of DERs within their own service territory.



1. Aggregation of DERs by can be customized to the needs of individual customers in a way that may not be possible when regulated utilities offer similar programs
2. ARCs can specialize in certain types of DERs (e.g., DR or storage) or certain grid services (e.g., emergency load reduction or frequency response)
3. They can specialize in the administrative aspects of aggregation – i.e., customer acquisition and customer service – as a core business function rather than as a non-essential activity
4. Aggregation of DERs by ARCs also promotes competition in energy services and mitigates the potential abuse of monopoly in providing energy, capacity and ancillary services
5. ARCs can profit by bringing more and more DERs into electricity markets, whereas traditionally regulated utilities have incentives to discourage DERs (i.e., the throughput incentive and a rate-based investment bias)
6. The need for oversight of ARCs by utility regulators is generally less than the level of oversight that is expected when utilities serve as aggregators, because regulators do not set or approve prices offered by third parties to participating customers.

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Regulations for third party aggregators Certification of Aggregators

In order 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.

Areas where Commission may want to consider promulgating regulations are:

1. Providing minimum standards for service quality
2. Providing consumers with sufficient information to make informed decisions about choosing an aggregator or retail customers
3. Protecting consumers against misleading, deceptive, unfair, and unconscionable acts and practices in the marketing, solicitation, and sale of aggregated DR services and in the administration of any contract for that service
4. Requirements of transparency in transactions
5. Standardized contracts for all similarly situated customers
6. Marketing materials should be consistent with contract terms – no bait
7. Contract term
8. Privacy provisions for customer information; and,
9. Termination process
10. Impose penalties and corrective actions, including suspension or termination of certifications

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Key questions for consideration

1. If utilities fulfill their obligation to procure adequate capacity to serve the full requirements of all their customers, and those costs are socialized across the rate classes, could that result in unfair rates or subsidies if some customers (through Aggregated Retail Consumers - ARCs) can essentially sell their capacity reduction in the wholesale market and thereby, minimize their contributions toward paying for that capacity? They can specialize in the administrative aspects of aggregation – i.e., customer acquisition and customer service – as a core business function rather than as a non-essential activity
2. Would allowing ARCs to bid into wholesale markets be a breach of the implied “regulatory compact” wherein utilities are granted an exclusive franchise and opportunity to recover all prudent costs and earn a reasonable return in exchange for providing universal service?
3. Will ARCs cannibalize utility-administered DR programs
4. Could the activities of ARCs complicate or even undermine utility planning and resource acquisition decisions
5. Can DERPs participate in both utility programs (for instance, CAISO’s Proxy Demand Response / Reliability Demand Response program) as well as in wholesale markets to provide energy / ancillary services?

Allowing third parties to aggregate DERs and sell those services to utilities can capture many of the benefits of ARCs, while avoiding most of the complications that arise with allowing ARCs to participate directly in wholesale markets

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Annexure & Key references

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Participation in markets

International examples on eligibility for participation through aggregators

Eligibility for participation through aggregators	<p>CAISO</p> <ul style="list-style-type: none">Generating facilities with capacity greater than 1 MW are not allowed to be part of aggregation <p>ISO NE / PJM</p> <p>Participants of its wholesale market to have a capacity of at least 1 MW; this suggests that any generation unit with less than 1 MW capacity needs to come through aggregators</p>
minimum portfolio capacity for aggregators	<ul style="list-style-type: none">CAISO:<ul style="list-style-type: none">At least 0.5 MW and, if the aggregation includes resources located at different pricing nodes, must not exceed 20 MW.ISO-NE:<ul style="list-style-type: none">Capacity of at least 100 kWNYISO:<ul style="list-style-type: none">Aggregations to be at least 100 kW in size.Aggregations of less than 1 MW restricted from participating in wholesale energy markets only, but larger aggregations allowed to participate in markets for both energy and ancillary services.PJM:<ul style="list-style-type: none">Capacity of at least 100 kW

Business models for aggregators 45

Key references

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<https://www.caiso.com/Documents/DistributedEnergyResourceProviderParticipationGuideandChecklist.pdf>
<http://www.caiso.com/Documents/ListofDistributedEnergyResourceProviderMarketParticipants.pdf>



Annexure-3

Model Tripartite agreement between RE generator(s) AND Qualified Coordinating Agency AND State Load Despatch Centre by Shri Preman Dinraj, Chairman KSERC

**Model
Tripartite agreement
BETWEEN
RE generator(s)
AND
Qualified Coordinating Agency
AND
State Load Despatch Centre**

This tripartite agreement is entered into at on
thethe day of ..2018) by and

BETWEEN

RE generators/WTG owners (as per annexure 1)
of _____pooling station (referred to hereafter
as RE generator(s) which expression shall and
unless repugnant to the context or meaning
thereof include its successors and assigns) as
party of the First part.

Cntd..



AND

Qualified Coordinating Agency, a company incorporated under the Companies Act, 2013 and entrusted with the role & responsibility as defined in theElectricity Regulatory Commission (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 201.., (hereafter referred to as Forecasting Regulations) having its Registered Office at -----(hereafter referred to as QCA, which expression shall unless repugnant to the context or meaning thereof include its successors and assigns) as party of the Second part.

Contd...

AND

State Load Despatch Centre, constituted and functional under Section 32 & 33 of Electricity Act, 2003, -----(hereafter referred to as SLDC which expression shall unless repugnant to the context or meaning thereof include its successors and assigns) as party of the Third part.

Contd..



The parties to the agreement hereby agreed as follows...

1. TheElectricity Regulatory Commission (Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 201.., (hereafter referred to as Forecasting Regulations) form the integral part of the agreement and the provisions of the said Regulations is binding on RE generators connected to the pooling station, the QCA and the SLDC on mutatis mutandis.

Contd..

2. The RE generator(s)/ Wind Turbine Generator (WTG) of the pooling station appointas QCA in accordance with the ..ERC((Forecasting, Scheduling, Deviation Settlement and Related Matters of Solar and Wind Generation Sources) Regulations, 201...



3. Role and Responsibilities of QCA

QCA shall;

- 3.1 Provide day ahead and week ahead schedule in 15 minutes blocks as per the Forecasting Regulations on behalf of the respective RE generators connected to the pooling stations to the SLDC. In the event the QCA accept the forecasting given by the SLDC, the QCA shall be responsible for the commercial consequence on accepting the forecast of the SLDC.
- 3.2 Coordinate with the distribution licensees, STU, SLDC and RE Generators connected to the pooling station, for metering, data collection, data telemetry and communication among the parties.
- 3.3 Take monthly meter readings of the RE generators connected to the pooling station and forward the same to the SLDC.
- 3.4 Undertake settlement of all charges on behalf of the RE generators including the payment to the State Pool Account.

Role of QCA...

- 3.5 Responsible for de-pooling of payments received on behalf of the RE generators from the State Pool Account and settle them with the individual RE generators of the pooling station.
- 3.6 Responsible for collection and settlement of any other charges on behalf of the RE generators as may be mandated from time to time in the Forecasting Regulations.
- 3.7 Collect the applicable deviation charges from the RE generators connected to the pooling station and remit it to the SLDC.
- 3.8 Provide payment security to the SLDC, by way of bank guarantee and/or revolving Letter of Credit covering DSM payments for six months, as assessed by SLDC as per the procedures approved by the Commission.
- 3.9 Intimate the details of the defaulting RE generators in payment of deviation charges, to the SLDC.



4. Role of RE Generators

4.1 Provide all the necessary details as per the Forecasting Regulations to the SLDC, either directly or through the QCA.

4.2 Responsible for any commercial impact, in schedule given by the forecast of QCA on their behalf.

4.3 Intimate any change in the holding pattern of the RE generators including Solar Generators/ WTG owners, in writing to the SLDC with legal notarized statement and it become part of this agreement.

Role and Responsibilities of RE Generators...

4.4 The payment of deviation charges as per the Forecasting Regulation.

4.5 Provide full data telemetry and communication facilities to the SLDC directly or through QCA.



Role of SLDC

The SLDC shall;

5.1 Forecast the schedule of generation from each RE generators connected to the pooling station with the objective of ensuring secure grid operation by planning for the requisite balancing of resources and smooth grid operation.

5.2 Calculate the Absolute Error which occurred in the scheduled energy and actual energy for each RE generators connected to the pooling station.

5.3 Prepare the energy account and deviation charges for the pooling station and the individual generators connected to the pooling station.

Role of SLDC...

5.4 Disconnect the RE generator who default in making payment of the deviation charges to the QCA.

5.5 Create Virtual Pool Account for RE generators within the State DSM pool.

5.6 Take steps to meet the deficit in virtual pool account if any, as per the procedures laid down in the Forecasting Regulation.



6. Dispute Resolution

6.1 The dispute between the RE generator(s)/ QCA as the case may be with the SLDC shall be subject to the jurisdiction of the SERC.

6.2 The dispute between the RE generators connected to the pooling station and QCA shall be settled between them as per their agreement, failing which shall be subject to the jurisdiction of the SERC.

7. General

A co-ordination committee between the representatives of the RE generators connected to the pooling station, QCA and SLDC at appropriate level shall be constituted by the parties for the smooth implementation of the provisions of the Forecasting Regulations.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Annexure 4

Experience of QCA in India and way forward, by Consultant



1



Background



- During 20th Meeting of the FOR Technical Committee, representatives from APSLDC and few QCAs made presentations sharing their experience of operationalizing F&S Regulations for Wind/Solar power projects in various states.
- A need for undertaking detailed study on QCA, their responsibility and accountability was highlighted. In addition, possibility of introduction of DSO/Aggregators was also discussed.
- FOR Technical Committee constituted a Sub-group headed by Shri Preman Dinaraj, Chairperson KSERC in its 20th Meeting held on 17th July, 2018 at CERC, New Delhi to develop Model Agreement clearly explaining role and responsibilities of QCA/Aggregators.
- Other Members of the Sub-Group include Shri Soonee, Advisor POSOCO, representatives from KERC, APERC and FOR Secretariat.
- First meeting of Sub-Group held on 7th Sep. 2018 at CERC, New Delhi to deliberate on the issues.
- Based on interactions with stakeholders and feedback received from state entities, **Key issues** to be addressed for **implementation of F&S Regulations** and **Engagement of QCA** have been covered in this presentation.
- **Termsheet for Model Agreement** between QCA and RE Generators with detailed terms and conditions is also presented for further deliberations.

2



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



CERC-FOR Model Regulatory Framework for Renewables at Intra-state level



- CERC developed the framework for F&S and Deviation Settlement of Wind and Solar generation through 2nd Amendment to its DSM Regulations.
- FOR prepared Model Regulations on F&S and Deviation Settlement of Wind and Solar Generating Stations at the State level in 2015.
- **'Qualified Coordinating Agency or QCA'** means the agency coordinating on behalf of Wind/Solar Generators connected to a pooling station. QCA may be one of the generators or any other mutually agreed agency for the following purposes:
 - Provide schedules with periodic revisions on behalf of all the Wind/Solar Generators connected to the pooling station(s),
 - Responsible for metering, data collection/transmission, communication, coordination with DISCOMS, SLDC and other agencies.
 - Undertake commercial settlement of all charges on behalf of the generators, including payments to the State UI pool accounts through the concerned SLDC.
 - Undertake de-pooling of payments received on behalf of the generators from the State UI Pool account and settling them with the individual generators
 - Undertake commercial settlement of any other charges on behalf of the generators as may be mandated from time to time.
- The Model Regulations also proposes that, **QCA shall be treated as a State Entity.**



National and State level Development



- The majority of RE rich States initiated the Regulatory process for notifying F&S Regulations for their States in line with FOR Model Regulations.
- RE rich States like Guj, Mah, TN, Raj, Telangana, AP, MP, KR has initiated the Regulatory process, out of which Mah, Telangana, AP, KR and MP has notified the Regulations. (Total 13 State Notified and 5 States –Draft)
- States like Raj, AP, KR and Mah have also framed the detailed procedures for implementation of F&S Regulations.
- It is observed that, there are Variations in certain provisions of the F&S Regulations at State level like applicability, error band, etc.

State	QCA related provisions
Karnataka	<ul style="list-style-type: none"> ▪ Aggregation at QCA level permitted
Andhra Pradesh	<ul style="list-style-type: none"> ▪ Aggregation at QCA level permitted ▪ Wind energy : Day ahead scheduling with intra-day 16 revisions ▪ Solar energy: Day ahead scheduling with intra-day 9 revisions
Mah, Raj, MP & Telangana	<ul style="list-style-type: none"> ▪ Permitted aggregation at Pooling Station level only and not at QCA level

- Further, the procedures outline the conditions for QCA Registration, Applicable charges, data/information requirement to be shared with SLDC, but type of Agreements, roles of parties, payment modalities/security mechanism, events of default, dispute redressal mechanism, regulatory oversight etc. needs to be resolved.
- Hence, it necessary to deliberate these issues and develop the guidelines/model termsheet for engagement of QCA which will be helpful for Stakeholders/RE Generators to implement the F&S Regulations at State Level

4



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Key Issues to be addressed concerning Engagement of QCA



GOVERNMENT OF INDIA
MINISTRY OF POWER

- Agreement structure
- Powers, Functions and role of QCA
- Powers, Functions and role of RE Generator(s)
- Data/Information access, sharing responsibility, protocol and cost sharing arrangements
- Metering, Billing, Account and Commercial arrangements
- Payment modalities and payment security arrangements
- Commercials for QCA Fees/Charges recovery
- Term and Termination
- Events of default (by QCA and by RE Generator) and treatment thereof
- Regulatory oversight and dispute resolution mechanism



Model Termsheet for Agreement between QCA and RE Generators



GOVERNMENT OF INDIA
MINISTRY OF POWER

- Premise
- Objective / Purpose of Agreement
- Important Definitions
- Powers, Functions and Role of QCA
- Responsibility of RE Generators
- Information/Data Requirement and Sharing Protocol
- Metering, Energy Accounting and Billing for Deviation Accounting
- Payment Modalities and Payment Security mechanism
- Commercials for Fees, Charges and Other Cost recovery
- Representation and Warranty
- Term and Termination
- Events of Default and Treatment thereof
- Dispute Resolution mechanism
- Miscellaneous



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 1/11



Key Clauses	Principles or broad contours of the provisions
Premise <ul style="list-style-type: none"> - Parties to Agreement - Project Details - Premise for Appointment 	<ul style="list-style-type: none"> • The Agreement shall be executed between [Names of Parties] i.e. [QCA] and [RE Generators] • Shall cover Project Details [Site details / Pooling S/S / Location / Capacity/ Generator] • Reference to Authorisation by Generator Company(ies) for appointment of selected QCA and Board Resolution thereof [Standard Documents] • Reference to Consent of QCA to discharge functions of the QCA as per the Agreement
Objective / Purpose of Agreement	<ul style="list-style-type: none"> • Reference to Governing Regulations [SERC] F&S and [SLDC] Procedures • Purpose is to outline conditions for appointment of QCA and to enable such QCA undertake, act, co-ordinate and discharge functions as QCA, for and on behalf of concerned RE Generators at Pooling S/S.
Important Definitions <ul style="list-style-type: none"> - Effective Date - Absolute Error - Pooling Sub-station - Inter-connection Point - Interface/Metering Point - Generator Metering Point (Turbine/Inverter) - De-pooling 	<ul style="list-style-type: none"> • From date of Execution of Agreement subject to satisfaction of conditions of mobilisation, not later than [2 months or period to be specified], whichever is later. • Standard Definitions to be in conformity with Definitions covered as per [SERC] F&S Regulations and Procedures, with [site specific details] to be incorporated, as appropriate.



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 2/11



Key Clauses	Principles or broad contours of the provisions
Power, Functions and Role of QCA [Part-A] <ul style="list-style-type: none"> - Mobilisation, registration, establishment 	<ul style="list-style-type: none"> • To collect, verify, ascertain and maintain records of Generator-wise static project information [turbine/inverter] • To establish Control Centre and associated hardware/software/facilities for voice/data communication for [Project Site] • To register or empanel itself and [Project Site] with concerned SLDC. • To arrange to pay necessary Registration Fees and to establish Payment Security arrangements with SLDC. • To act as 'single point of contact' between [SLDC] and RE Generators for all matters pertaining to implementation of [SERC] F&S Regulations. Exclusive right to act as QCA during the validity of the Agreement.
Power, Functions and Role of QCA [Part-B] <ul style="list-style-type: none"> - Forecasting, Scheduling, revision of schedules and real time co-ordination for implementation 	<ul style="list-style-type: none"> • To co-ordinate with RE Generator(s) for the forecasts / schedule(s) • To communicate aggregate forecast(s)/schedule(s) to SLDC (day ahead) and revision of schedules during intra-day operations as per framework. • To receive instructions from SLDC for curtailment, real-time operations and to cause to implement such SLDC instructions. QCA-Generators given freedom to decide rule for curtailment. Proportionate curtailment to be default option. • To monitor and maintain record of information of forecast(s)/ implemented schedule(s) / Curtailment instructions (if any) – aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 3/11



Key Clauses	Principles or broad contours of the provisions
Power, Functions and Role of QCA [Part-C] <ul style="list-style-type: none"> - Metering, Data collection, Communication, Co-ordination, Real time Data management and Information Exchange 	<ul style="list-style-type: none"> • To facilitate/co-ordinate with STU/SLDC for establishment of facilities for communication of meter data / RTU data. • To ensure maintaining meter data readings at Generator [turbine/inverter] and communicate to SLDC, if required. • To maintain data of [Declared Available Capacity] at Generator [turbine/inverter] and communicate to SLDC, if required. • To undertake verification of [Declared Available Capacity] on-SLDC instructions. • To establish data/information exchange protocol and keep records of data collected for each Generator [Turbine/Inverter] as per agreed F&S procedure.



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 4/11



Key Clauses	Principles or broad contours of the provisions
Power, Functions and Role of QCA [Part-D] <ul style="list-style-type: none"> - Commercial settlement and De-pooling - Payment modalities for settlement - Treatment for delay in payment/part payment 	<ul style="list-style-type: none"> • To maintain accounts and records of time-block-wise information of Schedule, Declared Available Capacity and Actual Generation - aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level. • To receive information / Statements of Energy Account / Deviation Account [Weekly/Monthly] and Deviation Charge Bill Amount from SLDC. • To verify, reconcile and ascertain the Deviation Pool Account and Deviation Charge Billed Amount vis-à-vis Accounting records • To prepare and share Generator-wise 'Statement of De-pooling Account' as per approved Rules. • To receive/make payments from/to RE Generator(s) and to make/receive payments to State Deviation RE Pool Account, as per approved procedure/F&S Regulations. • To claim and receive payment for interest/delayed payment charges from RE Generators. • To update and maintain the requisite payment security with SLDC and to cause RE Generator(s) to update/maintain the same on back-to-back basis. Quantum of Payment Security as mutually agreed upon by QCA-generators • In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days. • Any further delay in payment, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in year shall entitle QCA to declare such RE Generator as Defaulter and inform SLDC accordingly.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 5/11



Key Clauses	Principles or broad contours of the provisions
Power, Functions and Role of RE Generators [Part-A] <ul style="list-style-type: none"> - Mobilisation, registration, establishment 	<ul style="list-style-type: none"> • To provide Generator-wise static project information [turbine/inverter] to QCA • To facilitate and provide support to QCA to mobilise and establish facilities for communication [voice/data] and information exchange protocol. • To establish necessary metering/Telemetry [AMR/RTU] infrastructure and to bear cost of such infrastructure facilities at Generator [Turbine/Inverter] and Pooling S/S as required by STU/SLDC for [Project Site]. • To establish Payment Security arrangement with QCA.
Power, Functions and Role of RE Generators [Part-B] <ul style="list-style-type: none"> - Forecasting, Scheduling, revision of schedules and real time co-ordination for implementation 	<ul style="list-style-type: none"> • To provide RE Generator-wise [Turbine/Inverter] level time-block-wise Declared Available Capacity, forecasts / schedule(s), incl. revision of Schedules, as necessary. • To receive instructions from SLDC communicated through QCA for curtailment, real-time operations and to implement such SLDC instructions. Curtailment, if necessary, shall be implemented as per the agreement between QCA-Generators . The default curtailment will be in proportion to schedule(s).
Power, Functions and Role of RE Generators [Part-C] <ul style="list-style-type: none"> - Metering, Data collection, Communication, Co-ordination, Real time Data management and Information Exchange 	<ul style="list-style-type: none"> • To establish and to agree to share cost for establishment of facilities for communication of meter data / RTU data, as required by QCA, to be finalised in consultation with STU/SLDC.



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 6/11



Key Clauses	Principles or broad contours of the provisions
Power, Functions and Role of RE Generator [Part-D] <ul style="list-style-type: none"> - Commercial settlement and De-pooling - Payment modalities for settlement - Treatment for delay in payment/part payment 	<ul style="list-style-type: none"> • To receive information / Statements of Energy Account / Deviation De-pooling Account [Weekly/Monthly] and Deviation De-pooling Charge Bill Amount from QCA. • To confirm or raise discrepancy (if any) on the 'De-pooling Account' Statement within 7 days. • To receive/make payments to QCA in timely manner and to enable QCA make/receive payments to State Deviation RE Pool Account, as per approved procedure/F&S Regulations. • In case of dispute in Billed Amount as per De-pooling Account, arrange to make payment for 95% of Billed Amount within due date and balance to be made within 3 days of resolution, alongwith applicable interest. • To make payment for interest/delayed payment charges as claimed by QCA. • To update and maintain the requisite payment security with QCA. Quantum of Payment Security to be maintained by RE Generator(s) with QCA shall be as per mutual agreement between QCA- Generators. • In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days. • For delay in payment > 30 days beyond due date, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in year shall entitle QCA to declare such RE Generator as Defaulter and inform SLDC accordingly.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 7/11



Key Clauses	Principles or broad contours of the provisions
Information/Data Requirement and Sharing Protocol <ul style="list-style-type: none"> - Data sharing and data management policy 	<ul style="list-style-type: none"> • This section shall cover the various data/information requirement to be shared by RE Generator(s) [Turbine/Inverter] with QCA <ul style="list-style-type: none"> • Format-A: Static information about RE Generator [Turbine/Inverter] • Format-B1: (Day Ahead/Week Ahead) Time-block-wise Declared Capacity, Forecast and Schedule • Format-B2: (Intra-Day) Time-block-wise Revision in Schedule • Online data sharing to be mandatory. Sharing protocol with rules for authorised person/log-in. • Protocol in case of Failure of data link, protocol for real-time data substitution. • Procedure for data access, data security, authorised use, data share with Govt. entities, confidentiality protocol, data storage/archival procedure.
Metering, Energy Accounting and Billing <ul style="list-style-type: none"> - Metering - Energy Account Statement - De-Pool Billing Statement 	<ul style="list-style-type: none"> • This section shall cover the protocol and scope for metering, energy accounting, billing and to be shared by QCA with RE Generator(s) [Turbine/Inverter] <ul style="list-style-type: none"> • Format-A: [Weekly/Monthly] Energy Account Statement [DC, Actual Gen.] • Format-B: [Weekly/Monthly] Deviation Account Statement by SLDC for Pooling S/S • Format-C: [Weekly/Monthly] De-pooling Account Statement • Process for Verification, Validation, Reconciliation and Certification of Statements shall be outlined.



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 8/11



Key Clauses	Principles or broad contours of the provisions
Payment modalities and Payment Security Mechanism <ul style="list-style-type: none"> - Payment terms for De-pooling charges - Delayed payment charges/ interest - Payment security mechanism 	<ul style="list-style-type: none"> • This section shall cover the Payment modalities and Payment Security mechanism related to 'De-pooling Charges' that RE Generator(s) [Turbine/Inverter] need to provide to QCA <ul style="list-style-type: none"> • Weekly/Monthly payment with due date of payment (within 15 days) • Min. 95% payment in case of disputed Bill amount • Balance payment with interest upon resolution/addressing of dispute within 3 days • Payment Security in the form of LC [or BG] back-to-back equiv. to 1.1 times the average [Weekly/Monthly] Bill amount of De-Pooling Charges or to be determined as 1.1 times LC Amount (or BG) to be provided by QCA to SLDC to be computed in [per MW], whichever is higher • Timely replenishment of LC [or BG] - or two tier payment security [LC equiv. to one cycle billed amount and BG equiv. to three cycle equiv. amount] –can be structured.
Commercials for QCA Fees and Charges <ul style="list-style-type: none"> - QCA Fees and charges - Recovery of other Costs - Payment terms 	<ul style="list-style-type: none"> • This section shall cover the QCA Commercials for Fees/Charges and Recovery of other costs that RE Generator(s) [Turbine/Inverter] need to provide to QCA <ul style="list-style-type: none"> • Option-1: Fixed Fee - Rs __/MW/month (with or without annual escalation) • Option-2: Fixed Fee Rs __/MW/month and Variable/Incentive linked to Accuracy of Forecasts/Schedules > 90% (% of fixed fee) • Option-3: Two Part Fees - Part-I Fee Rs __/MW/month (for accuracy >90%) and Part-II Fee Rs __/MW/month (for accuracy <90%) • In addition, one time costs, initial charges, annual recurring costs for value added services can be devised.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 9/11



Key Clauses	Principles or broad contours of the provisions
Representation & Warranty <ul style="list-style-type: none"> - By QCA - By RE Generator 	<ul style="list-style-type: none"> • This section shall cover the Representation and Warranty by either parties – viz. RE Generator(s) and QCA to each other. <ul style="list-style-type: none"> • By QCA : In terms of its organisation, governance, statutory compliance, technical capability and financial eligibility, abidance by SLDC instructions, no prior default/blacklist, authorised/empowered to undertake QCA role. • By RE Generator: In terms of organisation, authorisation, project data, eligibility to participate in F&S Regulations.
Term and Termination <ul style="list-style-type: none"> - Period (Min/Max) - Termination for convenience - Termination for default 	<ul style="list-style-type: none"> • This section shall cover the applicable conditions for Term and Termination under agreement <ul style="list-style-type: none"> • Term: Minimum tenure of 5 years or to match the tenure of the QCA-SLDC agreement Until new arrangement is put in place, existing QCA shall continue for further period upto 1 year. • Termination for Default by QCA: as per mutually agreed termination proceedings By giving notice of one month. • Amendment for Default by RE Generator: Concerned Generator not to be scheduled for despatch. Default Entity to be communicated to SLDC. Agreement to be modified.



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 10/11



Key Clauses	Principles or broad contours of the provisions
Events of Default and treatment (By QCA) <ul style="list-style-type: none"> - Events - Remedy/treatment 	<ul style="list-style-type: none"> • This section shall cover the Events of Default by QCA and Treatment thereof. <ul style="list-style-type: none"> • Failure to comply with SLDC instructions • Non-submission of requisite data/forecasts/schedule to SLDC for two billing period • Continued default to provide De-pooling Statements and/or Energy Account Statements for two consecutive billing periods • Failure to make payment to State Deviation Pool or failure to provide/replenish Payment Security to SLDC. • Remedy/Treatment: Notice of one month to Remedy otherwise Terminate. Shall intimate SLDC to recover charges, encash LC/BG and blacklist QCA.
Events of Default and treatment (By RE Generator) <ul style="list-style-type: none"> - Events - Remedy/treatment 	<ul style="list-style-type: none"> • This section shall cover the Events of Default by RE Generator and Treatment thereof <ul style="list-style-type: none"> • Failure to comply with QCA/SLDC instructions • Failure to make timely payment to QCA as per De-pooling Statement or failure to provide/replenish Payment Security to QCA. • Remedy/Treatment: For delay in payment > 30 days beyond due date, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in year shall entitle QCA to declare such RE Generator as Defaulter and inform SLDC accordingly.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Draft Provisions and Model Termsheet (QCA<> RE Generators) – 11/11



Key Clauses	Principles or broad contours of the provisions
Dispute Resolution <ul style="list-style-type: none"> - Reconciliation - Arbitration - Governing jurisdiction 	<ul style="list-style-type: none"> • This section shall cover the applicable conditions for Dispute Resolution between parties i.e. RE Generator and QCA under agreement <ul style="list-style-type: none"> • Parties shall attempt to 'Reconciliation' through management interactions to resolve difference. • Unresolved differences/disputes to be referred for Arbitration as per provisions under Arbitration and Reconciliation. • Disputes entailing information from SLDC or acts arising due to implementation of SLDC instructions to be referred to Appropriate Commission for adjudication.
Miscellaneous <ul style="list-style-type: none"> - Change of Law - Force Majeure - Change of Taxes/ Duties/Levies - Confidentiality / Use of information - Limitation of Liability 	<ul style="list-style-type: none"> • This section shall cover the applicable conditions for Standard Clauses to be covered between parties i.e. RE Generator and QCA under agreement <ul style="list-style-type: none"> • Change of Law: to be covered for risks for either parties due to change of Law/F&S Regulations/Code/Practice Directions leading to commercial implications for either party of +/- 10% in Fees. • Force Majeure conditions: As per standard clause/treatment • Change of Taxes/Duties : To be covered for levy of new taxes/duties or revision in rate of taxes/duties for either party. • Confidentiality/Use of Information: Confidentiality and commercial interest of parties to be protected except as required for disclosure to Government Entity, Statutory Compliance, Regulatory proceedings etc. • Limitation of liability: to be mutually discussed. (Typically limited to 10% of Fees)



Way forward



- Finalise the Termsheet for Model Agreement between QCA and RE Generator(s)
- Draft Model Agreement
- Finalise Model Agreement/Termsheet upon Approval of FOR



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)

Annexure 5

Presentation by Consultant during 3rd Meeting of Sub-Group dated 22 February, 2019



1



Background



- During 20th Meeting of the FOR Technical Committee, representatives from APSLDC and few QCAs made presentations sharing their experience of operationalizing F&S Regulations for Wind/Solar power projects in various states.
- A need for undertaking detailed study on QCA, their responsibility and accountability was highlighted. In addition, possibility of introduction of DSO/Aggregators was also discussed.
- FOR Technical Committee constituted a Sub-group headed by Shri Preman Dinaraj, Chairperson KSERC in its 20th Meeting held on 17th July, 2018 at CERC, New Delhi to develop Model Agreement clearly explaining role and responsibilities of QCA/Aggregators.
- Other Members of the Sub-Group include Shri Soonee, Advisor POSOCO, representatives from KERC, APERC and FOR Secretariat.
- Two meetings of the Sub-Group were held on 7th September 2018 and 21st December 2018 at CERC, New Delhi to examine the issue in detail
- Based on deliberations during two meetings Draft Report was prepared and circulated among the Sub-Group for review.
- The Draft Report is presented in the subsequent slides for discussions

2



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



USAID
FROM THE AMERICAN PEOPLE

CERC-FOR Model Regulatory Framework for Renewables at Intra-state level



GOVERNMENT OF INDIA
MINISTRY OF POWER

- **'Qualified Coordinating Agency or QCA'** is defined in Model F&S Regulations as the agency coordinating on behalf of Wind/Solar Generators connected to a pooling station. QCA may be one of the generators or any other mutually agreed agency for the following purposes:
 - Provide schedules with periodic revisions on behalf of all the Wind/Solar Generators connected to the pooling station(s),
 - Responsible for metering, data collection/transmission, communication, coordination with DISCOMS, SLDC and other agencies.
 - Undertake commercial settlement of all charges on behalf of the generators, including payments to the State UI pool accounts through the concerned SLDC.
 - Undertake de-pooling of payments received on behalf of the generators from the State UI Pool account & settling them with the individual generators
 - Undertake commercial settlement of any other charges on behalf of the generators as may be mandated from time to time.
- The Model Regulations also proposes that, **QCA shall be treated as a State Entity.**

State	QCA related provisions
Karnataka	• Aggregation by QCA at State level permitted
Andhra Pradesh	• Aggregation by QCA at state level permitted
	• Wind energy : Day ahead scheduling with intra-day 16 revisions
	• Solar energy: Day ahead scheduling with intra-day 9 revisions
Maharashtra, Rajasthan, Madhya Pradesh, Telangana and Gujrat	• Permitted aggregation at Pooling Station level only and not at state level

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Analysis and Key Findings



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Discussion point 1: Institutional Structure of QCA -1/4

- Multiple wind and solar generators connected to the pooling substation.
- An institutional structure in the form of 'Qualified Co-ordinated Agency' to coordinate with SLDC for forecasts/scheduling and commercial settlement of deviations of RE Generators.
- **Pooling S/S shall be basic building block for QCA to undertake its operations of F&S and DSM.**
- It is essential to strengthen the mechanism of selection of the QCA.
- Designing the institutional and governance structure of the QCA holds the key once the roles and responsibilities are clearly demarcated.
- Various options considered for the evaluation of institutional structure arrangement

Options	Basic structure	Description of operating mechanism
Option 1	Registered Entity with SLDC	Condition/Qualification/Registration requirements for 'Registered Entities' to undertake scheduling and deviation settlement of variable power at pooling S/S needs to be defined under the State Grid Code Regulations and Procedures for Registration/Empanelment to be formulated by SLDC
Option 2	Generator Franchisee	QCA will act as Generation Franchisee, for and on behalf of RE Generators connected to the pooling S/S
Option 3	Committee of RE Generators	Representatives from RE Generators connected to the pooling S/S form a group/committee to carry out the functions of QCA

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Analysis and Key Findings



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Discussion point 1: Institutional Structure of QCA -2/4

Key features	Option 1: Registered Entity with SLDC	Option 2: Generator Franchisee	Option 3: Committee of RE Generators
Eligibility criteria	<ul style="list-style-type: none"> Technical and financial criteria for registration with the SLDC to be specified in the Grid Code 	<ul style="list-style-type: none"> Technical capabilities and financial credentials to be decided by the RE Generators. 	<ul style="list-style-type: none"> All RE Generators connected to the pooling S/S form a Committee or Association.
Constitution and composition	<ul style="list-style-type: none"> Regulatory oversight through the SLDC Composition of QCA shall be Guided by requirement/qualification of technical experts Financial credentials of handling large number of transactions and computational capabilities 	<ul style="list-style-type: none"> Responsibility of selection of suitable QCA rests with RE Generators Experts in the field of forecasting and scheduling, having capabilities to undertake large financial transactions An entity that acts as a franchisee to the RE Generators 	<ul style="list-style-type: none"> Representatives from each constituent RE Generators to be member of Committee to undertake role of the QCA Composition in the form of loose association or group with business rules/charter of operations
Mandatory roles	<ul style="list-style-type: none"> Provide schedules and revisions at pooling S/S Deviation settlement Coordination with SLDC Provide generator data to SLDC 		
Fees to be paid to SLDC	<ul style="list-style-type: none"> Fees and charges to be stipulated by the SLDC upon approval by SERC (to be covered under SLDC fees and charges) 		
Participation fees to be paid to QCA	<ul style="list-style-type: none"> As stipulated by the SLDC 	<ul style="list-style-type: none"> Decided by concerned RE Generators appointing QCA 	<ul style="list-style-type: none"> NIL (To be decided by members)



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Analysis and Key Findings



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Discussion point 1: Institutional Structure of QCA -3/4

Key features	Option 1: Registered Entity with SLDC	Option 2: Generator Franchisee	Option 3: Committee of RE Generators
Default and remedy measures	<ul style="list-style-type: none"> Financial penalty as specified by SLDC and by RE Generators for commercial implications Dispute resolution between RE Generator and QCA as per contract Dispute resolution between QCA and SLDC by the SERC Blacklisting by the SLDC in case of any major Errors/frauds 	<ul style="list-style-type: none"> Financial penalty as specified by SLDC and by RE Generators for commercial implications Disputes to be resolved as outlined under the Franchisee Agreement 	<ul style="list-style-type: none"> Financial penalty by SLDC Disputes among RE Generators to be resolved through negotiations Committee cannot sue or cannot be sued unless separate structure as cooperative society or association is formed
Revenue model for QCA	<ul style="list-style-type: none"> QCA and RE Generators to mutually decide professional charges for scheduling and deviation settlement in Rs./MWh or MW 	<ul style="list-style-type: none"> QCA and RE Generators to mutually decide professional charges for scheduling and deviation settlement in Rs./MWh or MW 	<ul style="list-style-type: none"> Not applicable Organised on the principle of cost sharing
Contractual Agreement	<ul style="list-style-type: none"> Tri-partite between the RE Generators, QCA and SLDC Conditions for Registration/Empanelment to guide the SLDC and the QCA 	<ul style="list-style-type: none"> Bilateral Agreement between the RE generators and the QCA No agreement is required between the QCA and SLDC. Governed by the Regulations 	<ul style="list-style-type: none"> Agreement among all the RE Generators to form a Committee Agreement between the Committee and the SLDC



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Discussion point 1: Institutional Structure of QCA -4/4

➤ Recommendations

- Considering the simplicity for operationalization, Institutional structure **Option-2 for QCA as Generator Franchisee** is preferred.
- RE Generators at pooling station can engage **Lead/Principal Generator** or **Third Party Agency** through '**Franchisee Arrangement**' to perform role of QCA.
- However, **every QCA need to register themselves with SLDC** as per the Detailed Procedures to be laid down by the SLDC.
- QCA to be appointed with majority principle i.e. consent of Generators having **more than 50%** of the installed capacity at pooling stations for acting on behalf of them.

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Discussion point 2: Legal Status of QCA

- QCA has been recognized as a 'State Entity' in FOR Model F&S Regulations.
- '**State Entity**' means an entity which is in the SLDC control area and whose metering and energy accounting is done at the state level.
- Sub-Group deliberated the **Legal Status of QCA & need of recognizing QCA as State entity**, the Wind/Solar generators are supposed to undertake the following major activities:
 - Provide schedules on day-ahead for each 15 min duration time-block
 - Receive "unconstrained dispatch schedule " from SLDC
 - Provide revision in schedules/ available capacity
 - Despatch generation as per the "Constrained schedule", received from SLDC
 - Back-down or ramp-up the generation and respond to SLDC instructions

➤ Recommendations

- Concept of QCA is already recognized by Regulators.
- Existing **Regulatory precedents** of '**Professional Member**' '**Solar Park Developer**' may be used to recognize legal status to QCA.
- SERCs may specifically **refer the S.66 (market Operation)** of the EA,2003 while framing the Regulations for F&S and DSM mechanism for wind and solar generators.
- Central Commission while **formulating or amending the Power Market Regulations** under S.66 may recognize '**Aggregators**' in general and QCA in particular, as **Regional /State Entity**.

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Discussion point 3: QCA-SLDC Interactions

- QCA is recognized as a **State entity** which will coordinate with the SLDC for prescribed functions.
- **Business rules between SLDC and QCA needs to be regulated**, as it will have direct impact on system operation of SLDC.
- SERC need not regulate the contractual arrangement between QCA & RE Generators .
- QCA once appointed by generators & registered with SLDC, will continue to **function for certain time (may be 5 year) period**
- **Minimum term of agreement between QCA & SLDC will be (5 years) or tenure of registration of QCA with SLDC, whichever is lower.**

➤ Recommendations

- As QCA is a State Entity, the QCA-SLDC interactions will be regulated.
- The **major aspects governing the interactions** including eligibility criteria, registration with system operator, information exchange protocol, monitoring and reporting requirements, commercial terms 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.

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Analysis and Key Findings



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Discussion point 4: QCA-RE Generator(s) Interactions

- Role of Regulators should be limited to regulate the interactions between system operator & QCA.
- **QCA-RE generator relationship** shall be governed as per contractual agreement to be mutually decided.
- RE generators shall be at liberty to mutually decide among themselves the major parameters governing the contract such as rules of curtailment & commercial settlement.
- Minimum term of agreement between QCA-RE Generator should match the QCA-SLDC agreement to ensure smooth functioning.
- **Minimum term of 5 years or registration period** as per SLDC procedures should be maintained as a mandatory clause in the contract

➤ Recommendation

- The QCA-RE Generator interactions are not under regulatory purview.
- To facilitate the development of QCA and to bring in uniformity a **template for principles for model agreement** is to be provided.

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Discussion point 5: One QCA per pooling station

- Multiple QCAs for a Pooling Station shall not be allowed, to avoid multiple interaction points for SLDC.
- Appointment of another QCA shall not possible if majority principle is followed for appointment of QCA.
- Once the QCA is appointed by the majority principle, it will act on behalf of all RE generators within the Pooling Stations & not only the generators who have supported that QCA for its appointment.
- SERCs needs to provide this clarity in the F&S Regulations to avoid dispute among the generators & QCA.
- **The QCA may undertake F&S for multiple pooling stations, however aggregation of Scheduling within multiple pooling stations shall not be allowed.**
- Deviation accounting & energy accounting of each pooling station shall be separately maintained

➤ Recommendations

- One QCA for each pooling substation by following majority principle
- Once the QCA will be appointed it will act on behalf of all the generators within pooling station.
- QCA may undertake operation of multiple pooling stations, however deviation accounting & energy accounting of each pooling station shall be maintained separately.
- No aggregation of scheduling and forecasting of multiple pooling stations shall be allowed.

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International Experience on Aggregators



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Discussion point 6: Regulating QCA and Aggregators 1/3

Definition of Aggregators:

Aggregation is defined as the act of grouping distinct agents in a power system (i.e. consumers, producers, prosumers, or any mix thereof) to act as a single entity when engaging in power system markets (both wholesale and retail) or selling services to the system operator(s). An Aggregator is an entity who acts as an intermediary between electricity end-users and Distributed Energy Resources (DER) owners and the power system participants.

- *Adopting a narrow scope for aggregation, limited only to DR, can simplify the development of wholesale market rules and procedures, as well as retail utility tariffs and programs.*
- *Disadvantage of adopting such a narrow scope is that it forgoes the potential benefits of aggregating other types of DERs. A narrow scope also precludes the possibility that combinations of different types of DERs can potentially create synergistic value*

➤ Key benefits from Aggregators (Customer Perspective)

Aggregation expands the opportunities to extract economic value from DERs. Without aggregation, individual DERs can *theoretically* provide energy, capacity, and ancillary services at the ISO/RTO level or the distribution level, but in practice, most of that potential will go unrealized due to a variety of barriers, including:

1. Minimum thresholds for participation in ISO/RTO markets are high
2. ISO/RTO market rules and procedures are complex - In short, the transaction costs of market participation are substantial
3. Utilities (and system operators) may not have "visibility" of DERs or the ability to dispatch/control them

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Analysis and Key Findings



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Discussion point 6: Regulating QCA and Aggregators 2/3

- QCA is the entity created in the Indian context with the objective to co-ordinate with SLDC for F&S.
- As per Regulatory provisions **RE Generator is responsible for Forecasting & Scheduling** of RE generation.
- **QCA is allowed to collect payment only for deviation & not for energy settlement which marks a variation from wider role of Aggregators in International Context.**
- Sub-Group considers 3 fundamental concerns of power market - Adequacy, Ancillary and Aggregation.
- There are few questions that needs to be addressed from Indian context including need for aggregator, business models for aggregators, role of regulators in aggregation, and other operational aspects.
- Hence, it proposed that **the term-sheet for regulating operations of QCA** shall be covered under this Report, while **enabling clauses to regulate Aggregators** shall be covered in Power Market Regulations.

➤ Recommendations

- Sub-Group debated & agreed that the **role of QCA be limited only to deviation settlement accounting.**
- It was also agreed that as DR and DER markets are in nascent stage, the focus might be limited to outlining conditions related to QCA operations.
- However, enabling clauses to regulate Aggregators in general shall be made in the Power Market Regulations.

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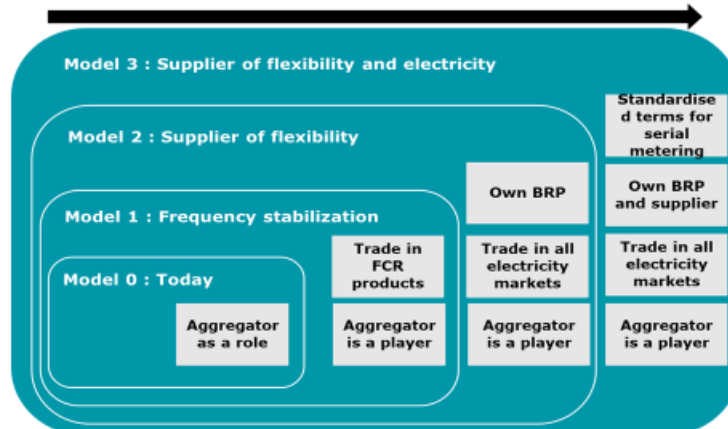
International Experience on Aggregators (EU Market)



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Discussion point 6: Regulating QCA and Aggregators 3/3

- Aggregators needs to expand gradually from an embryonic stage to a full fledged player



- Together, the four models represent a variety of possible setups which may function in sequential fashion
- Via the recommended market models, efforts must be made to transition from an initial stage where aggregator plays a simple function to a full fledged supplier of flexibility & electricity

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Key Take-away from International Experience for Regulators



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- ARC (Aggregator of Retail Customers) can **specialize in certain types of DERs** (e.g., DR or storage) or certain grid services (e.g., emergency load reduction or frequency response)
- Aggregation of DERs by ARCs also **promotes competition in energy services** & mitigates the potential abuse of monopoly in providing energy, capacity and ancillary services
- ARCs can profit by bringing more and more DERs into electricity markets, whereas traditionally regulated utilities have incentives to discourage DERs
- The **need for oversight of ARCs by utility regulators is generally less than** the level of oversight that is expected when utilities serve as aggregators, because regulators do not set or approve prices offered by third parties to participating customers. However, it needs to be ensured that ARCs **comply with standard of supply and service to retail consumers**.
- In order 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**.
- Areas where State Commission may want to consider promulgating (model) regulations are:
 - a. **Minimum standards for service quality**
 - b. Providing consumers with **sufficient information** to make informed decisions about choosing an aggregator or retail customers
 - c. Requirements of **transparency** in transactions
 - d. Model contracts suggesting **standardized clauses on contract terms**, privacy protection for customer information, terminal process, etc. in such contracts by Aggregators with customers

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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (1/9)



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Key Provisions	Principles or broad contours of Provision
Premise <ul style="list-style-type: none"> • Parties to Agreement • Project Details • Premise for Appointment 	<ul style="list-style-type: none"> • The Agreement shall be executed between [Names of Parties] i.e. [QCA] and [RE Generators] • Shall cover Project Details [Site details / Pooling S/S / Location / Capacity/ Generator] • Reference to Authorisation by Generator Company(ies) for appointment of selected QCA and Board Resolution thereof [Standard Documents] • Reference to Consent of QCA to discharge functions of the QCA as per the Agreement
Objective/Purpose of Agreement	<ul style="list-style-type: none"> • Reference to Governing Regulations [SERC] F&S and [SLDC] Procedures • Purpose is to outline conditions for appointment of QCA and to enable such QCA undertake, act, co-ordinate and discharge functions as QCA, for and on behalf of concerned RE Generators at Pooling S/S.
Important Definitions <ul style="list-style-type: none"> • Effective Date • Absolute Error • Pooling Sub-station • Inter-connection Point • Interface/Metering Point • Generator Metering • De-pooling 	<ul style="list-style-type: none"> • From date of Execution of Agreement subject to satisfaction of conditions of mobilisation, not later than [2 months or period to be specified], whichever is later. • Standard Definitions to be in conformity with Definitions covered as per [SERC] F&S Regulations and Procedures, with [site specific details] to be incorporated, as appropriate. • Definitions of Absolute Error, Pooling Sub-station, Inter-connection Point, Interface/Metering Point, Generator Metering Point, De-pooling shall be adopted from the F&S Regulations of SERC or Model Regulations of FOR

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (2/9)



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Key Provisions	Principles or broad contours of Provision
Power, Functions & role of QCA (Part-A) Mobilisation, registration, establishment	<ul style="list-style-type: none"> To collect, verify, ascertain and maintain records of Generator-wise static project information [turbine/inverter] To establish Control Centre and associated hardware/software/facilities for voice/data communication for [Project Site] To register or empanel itself and [Project Site] with concerned SLDC. To arrange to pay necessary Registration Fees and to establish Payment Security arrangements with SLDC. To act as 'single point of contact' between [SLDC] and RE Generators for all matters pertaining to implementation of [SERC] F&S Regulations. Exclusive right to act as QCA during the validity of the Agreement.
Power, Functions & role of QCA (Part-B) Forecasting, scheduling, revision of schedule	<ul style="list-style-type: none"> To co-ordinate with RE Generator(s) for the forecasts / schedule(s) To communicate aggregate forecast(s)/schedule(s) to SLDC (day ahead) and revision of schedules during intra-day operations as per framework. To receive instructions from SLDC for curtailment, real-time operations and to cause to implement such SLDC instructions. QCA-Generators given freedom to decide rule for curtailment. Proportionate curtailment to be default option. To monitor and maintain record of information of forecast(s)/ implemented schedule(s) / Curtailment instructions (if any) – aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level.

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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (3/9)



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Key Provisions	Principles or broad contours of Provision
Power, Functions & role of QCA (Part-C) Metering, Data Collection, Co-ordination, Real time data management & Information exchange	<ul style="list-style-type: none"> To facilitate/co-ordinate with STU/SLDC for establishment of facilities for communication of meter data / RTU data. To ensure maintaining meter data readings at Generator [turbine/inverter] and communicate to SLDC, if required. To maintain data of [Declared Available Capacity] at Generator [turbine/inverter] and communicate to SLDC, if required. To undertake verification of [Declared Available Capacity] on SLDC instructions. To establish data/information exchange protocol and keep records of data collected for each Generator [Turbine/Inverter] as per agreed F&S procedure.
Power, Functions & role of QCA (Part-D) Commercial Settlement, Payment modalities, Treatment for delay in payment	<ul style="list-style-type: none"> To maintain accounts of time-block-wise information of Schedule, Declared Available Capacity and Actual Generation - aggregate at Pooling S/S and Generator-wise [Turbine/Inverter] level. To receive information / Statements of Energy Account / Deviation Account [Weekly/Monthly] and Deviation Charge Bill Amount from SLDC. To verify, reconcile and ascertain the Deviation Pool Account and Deviation Charge Billed Amount vis-à-vis Accounting records To prepare and share Generator-wise 'Statement of De-pooling Account' as per approved Rules. To receive/make payments from/to RE Generator(s) and to make/receive payments to State Deviation RE Pool Account, as per approved procedure/F&S Regulations. To claim and receive payment for interest/delayed payment charges from RE Generators. To update and maintain the requisite payment security with SLDC and to cause RE Generator(s) to update/maintain the same on back-to-back basis. Quantum of Payment Security as mutually agreed upon by QCA-generators In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (4/9)



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Key Provisions	Principles or broad contours of Provision
Power, Functions & role of RE Generators (Part-A) Mobilisation, registration, establishment	<ul style="list-style-type: none"> To provide Generator-wise static project information [turbine/inverter] to QCA To facilitate and provide support to QCA to mobilise and establish facilities for communication [voice/data] and information exchange protocol. To establish necessary metering/Telemetry [AMR/RTU] infrastructure and to bear cost of such infrastructure facilities at Generator [Turbine/Inverter] and Pooling S/S as required by STU/SLDC for [Project Site]. To establish Payment Security arrangement with QCA
Power, Functions & role of RE Generators (Part-B) Forecasting, scheduling, revision of schedule	<ul style="list-style-type: none"> To provide RE Generator-wise [Turbine/Inverter] level time-block-wise Declared Available Capacity, forecasts / schedule(s), incl. revision of Schedules, as necessary. To receive instructions from SLDC communicated through QCA for curtailment, real-time operations and to implement such SLDC instructions. Curtailment, if necessary, shall be implemented as per the agreement between QCA-Generators. The default curtailment will be in proportion to schedule(s).
Power, Functions & role of RE Generators (Part-C) Metering, Data Collection, Co-ordination, Real time data management & Information exchange	<ul style="list-style-type: none"> To establish and to agree to share cost for establishment of facilities for communication of meter data / RTU data, as required by QCA, to be finalised in consultation with STU/SLDC.



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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (5/9)



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Key Provisions	Principles or broad contours of Provision
Power, Functions & role of RE Generators (Part-D) Commercial Settlement, Payment modalities, Treatment for delay in payment	<ul style="list-style-type: none"> To receive information / Statements of Energy Account / Deviation De-pooling Account [Weekly/Monthly] and Deviation De-pooling Charge Bill Amount from QCA. To confirm or raise discrepancy (if any) on the 'De-pooling Account' Statement within 7 days. To receive/make payments to QCA in timely manner and to enable QCA make/receive payments to State Deviation RE Pool Account, as per approved procedure/F&S Regulations. In case of dispute in Billed Amount as per De-pooling Account, arrange to make payment for 95% of Billed Amount within due date and balance to be made within 3 days of resolution, alongwith applicable interest. To make payment for interest/delayed payment charges as claimed by QCA. To update and maintain the requisite payment security with QCA. In case of delay in payment or part payment [Weekly/Monthly] settlement of De-pooling Account by any RE Generator, QCA shall make payment out of available Funds and through available Payment Security. Concerned RE Generator to make immediate payment and replenish its Payment Security within 10 days. For delay in payment > 30 days beyond due date, such RE Generator shall not be scheduled for despatch until payment is cleared and payment security replenished. Such default on 3 occasions in year shall entitle QCA to declare such RE Generator as Defaulter and inform SLDC accordingly.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



Proposed Key Provisions for Model Agreement between QCA & RE Generators - (6/9)



Key Provisions	Principles or broad contours of Provision
Information/ Data Requirement and Sharing Protocol Data sharing and data management policy	<ul style="list-style-type: none"> Various data/information requirement to be shared by RE Generator(s) [Turbine/Inverter] with QCA <ul style="list-style-type: none"> -Format-A: Static information about RE Generator [Turbine/Inverter] -Format-B1: (Day Ahead/Week Ahead) Time-block-wise Declared Capacity, Forecast and Schedule -Format-B2: (Intra-Day) Time-block-wise Revision in Schedule Mandatory online data sharing. Sharing protocol with rules for authorised person/log-in. Protocol in case of Failure of data link, protocol for real-time data substitution. Procedure for data access, data security, authorised use, data share with Govt. entities, confidentiality protocol, data storage/archival procedure.
Metering, Energy Accounting & Billing	<ul style="list-style-type: none"> The protocol and scope for metering, energy accounting, billing and to be shared by QCA with RE Generator(s) [Turbine/Inverter] <ul style="list-style-type: none"> -Format-A: [Weekly/Monthly] Energy Account Statement [DC, Actual Gen.] -Format-B: [Weekly/Monthly] Deviation Account Statement by SLDC for Pooling S/S -Format-C: [Weekly/Monthly] De-pooling Account Statement Process for Verification, Validation, Reconciliation and Certification of Statements



Proposed Key Provisions for Model Agreement between QCA & RE Generators - (7/9)



Key Provisions	Principles or broad contours of Provision
Payment modalities & Payment Security Mechanism	<ul style="list-style-type: none"> The Payment modalities and Payment Security mechanism related to 'De-pooling Charges' that RE Generator(s) [Turbine/Inverter] need to provide to QCA <ul style="list-style-type: none"> -Weekly/Monthly payment with due date of payment (within 15 days) -Min. 95% payment in case of disputed Bill amount -Balance payment with interest upon resolution/addressing of dispute within 3 days Payment Security in the form of LC [or BG] back-to-back equiv. to 1.1 times the average [Weekly/Monthly] Bill amount of De-Pooling Charges or to be determined as 1.1 times LC Amount (or BG) to be provided by QCA to SLDC to be computed in [per MW], whichever is higher Timely replenishment of LC [or BG] - or two tier payment security [LC equiv. to one cycle billed amount and BG equiv. to three cycle equiv. amount] -can be structured.
Commercials for QCA fees and charges	<ul style="list-style-type: none"> The QCA Commercials for Fees/Charges and Recovery of other costs that RE Generator(s) [Turbine/Inverter] need to provide to QCA <ul style="list-style-type: none"> -Option-1: Fixed Fee - Rs __/MW/month (with or without annual escalation) -Option-2: Fixed Fee Rs __/MW/month and Variable/Incentive linked to Accuracy of Forecasts/Schedules > 90% (% of fixed fee) -Option-3: Two Part Fees - Part-I Fee Rs __/MW/month (for accuracy >90%) and Part-II Fee Rs __/MW/month (for accuracy <90%) In addition, one time costs, initial charges, annual recurring costs for value added services can be devised.
Representation & Warranty <ul style="list-style-type: none"> By QCA By RE Generator 	<ul style="list-style-type: none"> The Representation and Warranty by either parties – viz. RE Generator(s) and QCA to each other. <ul style="list-style-type: none"> -By QCA : In terms of its organisation, governance, statutory compliance, technical capability and financial eligibility, abidance by SLDC instructions, no prior default/blacklist, authorised/empowered to undertake QCA role. -By RE Generator: In terms of organisation, authorisation, project data, eligibility to participate in F&S Regulations.



Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (8/9)



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Key Provisions	Principles or broad contours of Provision
Term and Termination	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Term and Termination under agreement Term: Minimum tenure of 5 years or to match the tenure of the QCA-SLDC agreement Until new arrangement is put in place, existing QCA shall continue for further period upto 1 year. Termination for Default by QCA: as per mutually agreed termination proceedings By giving notice of one month. Amendment for Default by RE Generator: Concerned Generator not to be scheduled for despatch. Default Entity to be communicated to SLDC. Agreement to be modified.
Events of Default & Treatment (By QCA)	<ul style="list-style-type: none"> This section shall cover the Events of Default by QCA and Treatment thereof. Failure to comply with SLDC instructions Non-submission of requisite data/forecasts/schedule to SLDC for two billing period Continued default to provide De-pooling Statements and/or Energy Account Statements for two consecutive billing periods Failure to make payment to State Deviation Pool or failure to provide/replenish Payment Security to SLDC. Remedy/Treatment: Notice of one month to Remedy otherwise Terminate. Shall intimate SLDC to recover charges, encash LC/BG and blacklist QCA.

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Proposed Key Provisions for Model Agreement between QCA & RE Generators - (9/9)



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MINISTRY OF POWER

Key Provisions	Principles or broad contours of Provision
Dispute Resolution	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Dispute Resolution between parties i.e. RE Generator and QCA under agreement Parties shall attempt to 'Reconciliation' through management interactions to resolve difference. Unresolved differences/disputes to be referred for Arbitration as per provisions under Arbitration and Reconciliation. Disputes entailing information from SLDC or acts arising due to implementation of SLDC instructions to be referred to Appropriate Commission for adjudication.
Miscellaneous	<ul style="list-style-type: none"> This section shall cover the applicable conditions for Standard Clauses to be covered between parties i.e. RE Generator and QCA under agreement Change of Law: to be covered for risks for either parties due to change of Law/F&S Regulations/Code/Practice Directions leading to commercial implications for either party of +/- 10% in Fees. Force Majeure conditions: As per standard clause/treatment Change of Taxes/Duties: To be covered for levy of new taxes/duties or revision in rate of taxes/duties for either party. Confidentiality/Use of Information: Confidentiality and commercial interest of parties to be protected except as required for disclosure to Government Entity, Statutory Compliance, Regulatory proceedings etc. Limitation of liability: to be mutually discussed. (Typically limited to 10% of Fees)

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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Summary Recommendations of the Sub-Group (1/2)



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1. Legal Status for QCA shall be established on the lines of Regulatory precedents for aggregators; (such as Professional Member or Solar Park Developer)
2. Central Commission while formulating or amending the Power Market Regulations under Section 66 may recognize 'Aggregators' in general and QCA in particular, as Regional /State Entity.
3. As QCA is a State Entity, the QCA-SLDC interactions will be regulated. However, QCA-RE Generator interactions are not under regulatory purview.
4. RE Generators can engage Lead/Principal Generator or Third Party Agency through 'Franchisee Arrangement' to perform role of QCA.
5. Every QCA need to register themselves with SLDC as per the Detailed Procedures to be laid down by the SLDC.
6. QCA to be appointed with majority principle i.e. consent of Generators having more than 50% of the installed capacity at pooling stations for acting on behalf of them.

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Summary Recommendations of the Sub-Group (1/2)



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7. Only one QCA per pooling substation shall be permitted. The QCA may undertake operation of multiple pooling stations, however deviation accounting and energy accounting of each pooling station shall be maintained separately.
8. Role of QCA be limited only to accounting of deviation and its settlement. Considering that DR and DER markets are in nascent stage for the time being, the focus might be limited to outlining conditions related to QCA operations.
9. Term-sheet or principles for Model Agreement between QCA and RE Generators provided under this Report are only indicative and suggestive.
10. RE Generators would be free to deviate or formulate their own commercial agreement based on terms to be mutually decided between parties and in no way suggests that the principles/broad contours covered under this Model Agreement term-sheet/principles are in any way binding on parties.

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Report on the Issues of Aggregators/ Qualified Coordinating Agency (QCA)



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