NATIONAL RENEWABLE ENERGY LABORATORY

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OBSERVATIONS TO CERC PROPOSED RENEWABLE ENERGY FORECASTING REGULATIONS FOR RENEWABLE ENERGY GENERATION SCHEDULING & DISPATCH

Introduction and Background

The National Renewable Energy Laboratory (NREL) has been invited by India's Central Electricity Regulatory Commission (CERC) to comment on its proposal to revise the "Renewable Energy (RE) Forecasting Regulations for Renewable Energy Generation Scheduling and Grid Dispatch" in India. Existing RE forecasting regulations face challenges, as they are understood to be largely ineffective.

This document represents collective observations, conclusions, and recommendations by NREL staff for CERC's "Proposed Framework for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) Generating Stations based on Wind and Solar at Inter-State Level".

Comments from Lawrence Berkeley National Laboratory (LBNL) were submitted separately and are included (as attachment) in the Appendix section of this document.

The observations are organized to provide both conclusive observations and detailed commentary, comprising of:

1. Summary
2. Recommendations
3. Detailed Review of CERC RE Forecasting Proposal by Topic
4. Appendix 1: Detailed comments per proposal sections
5. Appendix 2: Comments from LBNL

These comments and suggestions are intended to reflect observations based on NREL's experience and drive discussions for designing and implementing RE forecasting regulations in India with key stakeholders.

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1 Summary of Observations of CERC Renewable Energy Forecasting Proposal

- **Scope:** The current proposal for RE forecasting is limited to only RE generators connected on the Regional Load Despatch Centre (RLDC) inter-state transmission grid and excludes those on the State Load Despatch Centre (SLDC) grid. Ultimately, it would be desirable to cover all utility-scale RE generators on the grid under future RE forecasting regulations.
- **Technology:** The proposed RE forecasting regulations covers wind and solar energy generation. Wind generation currently represents about 66 % of total RE capacity in India. However, over the next 8 years, solar PV market is expected to increase to 100GW and represent about 57% of the 175 GW RE target by 2022. The technology and application of solar energy forecasting is less mature compared to wind energy, in India and internationally. A reasonable approach could be to initially focus on regulations for wind energy while organizing, developing, and implementing reliable solar energy forecasting models and systems specific to India over a period.
- **Regulation Coordination:** In parallel, there is a need for CERC and SERC to collaborate on regulations covering RE generators on the SLDC grid, ensuring they are compatible with forecasting regulations under CERC jurisdiction.
- **Roles and Responsibilities:** Roles and responsibilities of system operators (between RLDC, and SLDC) vs. regulators (between CERC and SERCs) should be clearly defined. Issues to be addressed should include: types, timescales, and quality of forecasting requirements, applications for generation nominations and its terms and conditions thereof for RE generators.
- **Scheduling:** Rules and regulations for nominations and scheduling for hydro, thermal and pumped storage and their applications should be consistent with those proposed for RE forecasting and its applications for nominations and scheduling. Balancing mechanism may need to be revisited and, if necessary, revised to reflect proposed RE forecasting regulations.
- **Empirical and Analytical Basis:** A robust forecasting program requires supporting analysis and justification for 1) determining RE forecasting bandwidth, 2) frequency of forecasting and basis for value of penalty or incentive payment terms, and 3) mechanisms behind settlement of deviations for wind and solar generation.
- **Cost-Benefit Considerations:** The costs and benefits of proposed RE forecasting regulations by stakeholders should be addressed. Considerations should be given to market-driven incentives and penalties since the proposed regulations will have significant impacts on RE generators. Incentives and penalties for RE generators to enforce RE forecasting regulations should be articulated effectively.
- **Impact on Agreements:** The impacts of proposed RE forecasting regulations on existing PPAs, interconnection agreements, transmission agreements, and grid codes need to be

addressed. Mechanisms or processes may need to be defined to ensure compatibility between RE forecasting regulations and terms and conditions of relevant PPAs and interconnection and transmission agreements for RE generators.

- **Critical Factors:** Enabling conditions and critical factors for effective implementation of RE forecasting scheduling regulations are not in place but are at various stages of development, including:
    - PGCIL-led pilot project for centralized renewable resource data acquisition, management, and applications to forecast modeling that can be used to create site-specific RE generation forecasts;
    - Development and application of RE forecasting models tailored to the Indian market (either at the central level or at the RE generator level) using commercially-proven modeling tools and state-of-the-art meteorological data for the geographic regions around India;
    - Formulation of relevant tools for applying RE forecasting such as value-based ancillary services and increased flexibility of base load generation and peaking capacity;
    - Use of RE forecasting for market participants at the regional and state levels should be addressed.

2 Recommendations for CERC Renewable Energy Forecasting Development and Regulations

1. **Coordination between state and central government organizations** (i.e. POSOCO vs. SLDC and CERC vs. SERCs) is essential in establishing rules and regulations to create a common and consistent framework at the state, regional and national levels. This should include:
    a. Standardization of grid codes for all RE generators at the national level and applicable to all states;
    b. Proposed RE forecasting regulations for RE generation scheduling should be compatible and consistent with those for thermal, hydro and pumped storage.
    c. Technical and telemetry specifications and related requirements for RE forecasting and schedule nomination should be standardized nationally and applied to all states
2. **System operators** at the state and regional level should:
    a. Coordinate operational requirements of RE forecasting (e.g. data, format, frequency of nomination revision) to be compatible with system balancing practices, as well as reliability and power quality standards,
    b. Define how RE forecasting requirements will be applied to system balancing and management and conduct cost-benefit analysis of RE forecasting impacts on system operations.

c. Determine tangible cost-benefits of forecasting rules in consultation with key industry and public sector stakeholders.

POSOCO and SLDCs, as a unified body, may propose a set of rules for CERC review and apply for establishing regulations by central and state regulators to establish consistency and application of international best practices used in RE forecasting. Legal opinion is likely needed to navigate through the process and stakeholders necessary to ratify the rules.

3. **RE forecasting regulations should be applicable to all RE generators.** Coordination with relevant and applicable RE generators' power purchase agreements, interconnection agreements, and transmission agreements is recommended to mitigate disputes between concerned parties.
4. The **centralized RE resource forecasting system should be structured to enable site-specific RE generation forecasting** by either generators or by system operators. Two possible ways to structure the system are:

    a. A national agency (e.g. PGCIL or POSOCO) that undertakes macro and micro level RE resource forecasting using a centrally-developed and administered forecasting modeling system for wind and solar resources. Historical and real time site-specific renewable energy data are also acquired by the said national agency. The agency then applies the model to produce RE generation forecasts for all generators. This centralized system will be able to generate short and medium term RE forecasting for site-specific grid-connected RE generators as well as aggregate forecasts for SLDC and RLDC.[1]
    b. The national agency mentioned above is responsible for acquisition and processing of macro-and micro-level meteorological data, simulated forecasts, creating tailor-made models, and making the database and real-time forecast available to all RE generators. The generators are required to undertake generation forecasting using in-house simulation models based on international best practice from a set of approved vendors. The generators will use the generation forecast to submit their scheduled nominations to the system operator and off-takers. The system operators (SLDC or RLDC as applicable) will then be able to use the scheduling from RE generators to optimize real-time net load balancing and ensure system reliability.[2]

[1] The PGCIL Pilot Project for RE Forecasting (with support from GIZ) may be a good reference point to create centralized, uniformity and consistency in data management system.

[2] Note that in the US, the standard approach is for both of these methods to occur. The individual generators (over a threshold size) must provide forecast, which are then regulated. In addition, the independent system operator/regional transmission organization produces its own forecast for use to ensure reliability.

Adaptation of a centralized RE (wind, solar, hydro) forecasting system should allow a suitable period for data collection, monitoring, and establishment of a modeling system.

A critical decision needs to be made on whether all RE generators would accept RE generation forecasting done by a third party, such as the system operator (e.g. PGCIL Pilot RE Forecasting/REMC), or if each generator would have the choice to develop its own forecast using technology from approved vendors.

5. An independent **third party should conduct statistical modeling** and analysis of existing wind energy forecasting to establish statistically sound (e.g. +- 2CV level band) forecasting variance band as the basis for RE forecasting requirements. These forecasting bands most likely will require revision, especially if a centralized RE forecasting system is implemented over the next few years. A timeline with appropriate milestones should be established for the statistical modeling to be administered by an independent third party. The schedule should allow between two to three years to achieve efficient, reliable and consistent forecasting mechanisms to be used by RE generators, system operators, and wholesale market participants. The validation of confidence levels of proposed forecasting for wind, solar and hydro resources may require two to three years.
6. Wind energy is both the largest source of RE generation capacity and has the longest operating experience in India. Deployment of both solar PV and Concentrated Solar Power (CSP) technologies are at an early stage with few years of commercial operating experience and represent only about 15% of the current renewable capacity. Therefore, **separate milestones should be considered for forecasting regulations for wind, PV, and CSP** technologies.
7. In addition to the phased development process for RE resource forecasting and RE generation forecasting mentioned above, other **critical factors to create enabling environments** for practical and effective RE forecasting regulations include:
    a. RE forecasting band-width and frequency of revisions or reforecasting should be defined between system operators and RE generators based on empirical and trend analysis.
    b. Creation of complimentary markets for ancillary services and peaking capacity, as well as more effective market trading and settlement/clearance models
    c. Define further opportunities for RE generators to use RE forecasting to provide ancillary services at the SLDC and RLDC level.
8. **A public stakeholders engagement and participation process** should be applied during various phases of RE forecasting regulation development. Examples include:
    a. Inform the decision of the type of forecasting system.
    b. Establishing rules for application of RE forecasting by system operators at the RLDC and SLDC level

c. Identify use and benefits of RE forecasting by RE generators, DISCOs, utility companies and central and state regulators.

9. Consider a **multi-phase schedule with critical milestones** for development and implementation of rules and regulations, as shown in Figure1. Proposed RE Forecasting Regulation Development and Implementation Plan (attached)

3 Review of CERC Renewable Energy Forecasting Proposal

This section summarizes, by topics, NREL's comments and questions on the current and proposed RE forecasting system in India. While the spirit of the proposal aims to address both wind and solar energy forecasting, the proposal itself, in large part, focuses on wind energy which has a much longer history of operational experinece and represents the majority of the renewable generation capacity. Hence, the focus of NREL's comments are also proportionally more focused on wind forecasting and its regulations. The NREL team has made strategic observations and recommendations on solar forecasting methodology and regulations.

3.1 Scope of RE Capacity Covered by the Proposal

3.1.1 Questions

- What percentage of the current and projected Renewable Energy (RE) capacity would be covered under the proposal, i.e. inter-state (Under proposed regulations) vs. intra-state (excluded from the proposal)? Are there any exemption proposed?
- What sizes of solar projects are encompassed in the proposal? Are CSP Projects included under this proposal?
- What coordination efforts will be taken with state regulators to address generators on the intra-state grid?
- What is the consideration behind paying generators based on forecasted generation vs. actual generation?

3.1.2 Comments

- It would be desirable to have all wind/solar plants follow a standardized procedure for wind/solar energy forecasting (short-term, i.e. up to 24 hours) preferably using standardized, centralized data collection, monitoring, and modeling. Application to actual generation should be specific to each site, generation plant, and technology.
- The proposal focuses on forecasting for RE generators on RLDC, but excludes generators on the SLDC. We recommend designing a consistent set of policies and regulations for RE forecasting for generation scheduling at both the SLDC and RLDC levels, and reflect or revise relevant PPA, transmission or wheeling agreement and or grid codes.

- We recommend outlining a logical, common methodology for projecting solar and wind generation, particularly for short-term projections.

3.2 Stakeholder Roles, Accountability, and Cost-Benefit Considerations

3.2.1 Questions

- What have been the role and inputs from POSOCO/RLDC vs. SLDC in formulating these regulations?
- What specific benefits are expected from the proposed regulations and who will be placed at a disadvantage?
- Has there been any cost-benefit analysis done from the proposed regulations?
- How do penalties for deviation from scheduled generation nomination compare for RE generators vs. thermal and hydro generators under the proposal?
- Has the total new investment required for RE forecasting been estimated? Who will be required to make such investments and what will be the mechanism for recovery of these investments?
- Besides system operators (i.e. RLDC), what other parties would benefit from RE forecasting based nominations?

3.2.2 Comments

- Benefits of using RE forecasting to various stakeholders should be defined and considered. Some examples include: leveraging RE forecasting to manage or reduce the cost of balancing the system (ancillary service requirements), improving system reliability, reducing load shedding or outages, or reducing the RE backing charges paid to RE generators.
- Considerations should be given to creating mechanisms to allow RE generators to offer ancillary services.
- The case for multiple forecasters is appropriate when it is a centralized function and not imposed on individual RE generators.

3.3 Critical Factors for Effective Regulations

3.3.1 Empirical Model for Forecasting Band Range:

3.3.1.1 Questions:

- What is the statistical confidence level (e.g. +/-2CV) of the proposed solar and wind energy forecasting band-width for RE projects in India?
- What is the methodology for arriving at the +/- 12% operating band as proposed? Are relevant data for Indian RE generators available and has statistical analysis been done?

3.3.1.2 Comments:

- The proposed band of +/- 12% variability for solar and wind should be backed with empirical or simulation modeling for at least representative regions of wind (Tamilnadu and Gujarat) and solar (Gujarat and Rajasthan), with seasonality taken into consideration. The exact band

range has to be established separately for solar and wind while addressing a number of variables.

- Consider a 2-tiered mechanism to 1) allow the balancing of variance within a statistically acceptable band (e.g. +/-2CV) over a defined period of time (e.g. monthly); and 2) to allow for a second mechanism for balancing variance outside of the +/-2CV variance band.
- A practical consideration would be the fact that not all forecast errors are adverse. For example, if wind is under forecast during a time when load is also under forecast, this could produce a net benefit to the system. Penalties should be commensurate with the effect on the system.

3.3.2 Scheduling and Nomination:

3.3.2.1 Questions:

- How does the 16 revisions per day proposed compare to frequency of nominations by thermal and hydro generators and balancing by the system operator?

3.3.2.2 Comments:

- Considerations associated with having 16 revisions vs. 8 revisions: In general, frequency of revising nomination by renewable generators should be consistent with what is used by System Operators to balance the system, which is already in place with other generators (thermal and hydro).
- Note that in most US markets, the nomination revisions are at least hourly and many cases it is every 15 minutes for RE generator at specified nodal points.

3.3.3 Mechanisms for Incentivizing Performance:

3.3.3.1 Questions:

- How do the unscheduled interchange (UI) charges compare to the proposed charges for deviation of wind energy generation vs. forecast?
- What incentives exist for wind farms to achieve better than 76% accuracy (i.e. to 76% accuracy based on +/- 12% proposed band)?
- Are there studies undertaken to determine viability of using Deviation Settlement Mechanism (DSM) Pool to settle penalties and or bonuses from these regulations?
- What types of generators participate in the DSM Pool currently?
- How did CERC arrive at the pre-defined fixed rate at which RE generators pay to the DSM Pool for shortfall energy below 88%, and the fixed rate at which RE generators will be paid for actual generation in the range of 100%-112% of schedule?

3.3.3.2 Comments:

- Consequences of deviations from nominations by all generators (thermal, hydro, renewable) and their economic and technical impacts on balancing need to be considered. Regulations and settlement mechanisms for imbalances should incentivize generators to provide the most accurate forecast at the agreed-upon frequency within the statistical confidence levels.

- Payment based on nomination (and not actual generation) for RE generators may lead generators to under or over-estimate generation forecasts to skew the cost of deviations under proposed regulations.
- A more holistic approach to value excess generation or shortfall should be considered
- The proposal does not provide payment from DSM Pool for generation in excess of 12% of scheduled generation. There may be cases in which generators should not be disincentivized to generate excess of 112% of the nomination for the forecast period (particularly during peak demand). Beyond getting RECs for excess generation (above 12% of its forecast nomination), the RE Generator may be credited for excess energy production at market value at the time.
- If the generator produces below 88% of the nomination, the generator should face penalties to discourage under-estimation and/or gaming. Current proposal may run the risk of RE generators intentionally under-nominating to reduce penalty payments. Penalty may be based on market price of electricity during the shortfall period (vs. the proposed fixed rate).

3.3.4 Ancillary Services:

3.3.4.1 Questions

- Are RE generators allowed to provide frequency regulation service, and if so what is the compensation scheme?
- What is the mechanism for settlement if the RLDC backs off RE generation already nominated due to congestion or other reasons such as optimizing the cost of balancing?

3.3.4.2 Comments:

- The impact of the proposed RE forecasting regulations and the mechanisms for frequency regulation/ancillary services should be evaluated.
- If the proposed RE forecasting regulations do not improve the accuracy of RE forecast and nomination, it may actually have more adverse effect on need for frequency regulations and related services.

3.4 Telemetry and Communication Technical Requirements

3.4.1.1 Questions

- Does the current RE forecasting/Renewable Energy Management Centre (REMC) pilot project include specifications and technical requirements for metering of RE generators?
- Does the pilot project define specific technical parameters for input/output signals for renewable resource data transmission and processing, as relevant to RE forecasting regulations?
- Will the existing telemetry requirement from RE Generators be adequate for implementing proposed regulations?

3.4.1.2 Comments

- When the RE forecasting modeling system is adopted, its outputs should be synchronized with the data acquisition and processing requirements of system operations facilities.
- Technical and operational requirements for metering and related telemetry demands from system operations[3] should be addressed before the proposed regulations are finalized.
- It is recommended that the proposal or future regulations include more technical specifications for telemetry and communications facilities. These should be developed by POSOCO (RLDC) in conjunction with SLDCs.
- As additional costs of proposed telemetry requirements are estimated based on the PGCIL pilot project (RE Forecasting/REMC), cost recovery and allocation plans should be established.

3.5 General Comments and Notes

- Uncertainty pertains to the predictability of the variability. Therefore, forecasting is only able to reduce uncertainty but not the variability.
- The proposal addresses wind and solar forecasting with limited references to thermal or load forecasting. An integrated approach would increase the effectiveness of RE generation forecasting.

[3] REMC specifications are under development

Appendix 1: Detailed Comments Per Proposal Sections

CERC PROPOSAL REFERENCE	PROPOSED PROVISION / TOPIC	NREL COMMENTS
Section 1.0	Introduction	
Section 2: Existing Provisions in IEGC for Scheduling and Dispatch of RE Generation	Reviews existing provisions in IEGC for scheduling and dispatch of RE generation with specific reference to Reg. 6.5.	• How do the unscheduled interchange (UI) charges compare to the proposed charges for deviation of wind energy generation vs. forecast? • There should be a common methodology for projecting wind and solar forecasting, especially for short term.
Existing Regulations 6.5 and Annexure -1	Applicable to new wind farms larger than 10MW and connected to 33KV and above.	• What percentage of renewable generators is included in the proposed regulations? What percentage of current wind generation capacity is inter-state vs. intra-state? What percentage of capacity is exempted or grandfathered? . • How effective is the current UI charge mechanism, and what are the cost/benefits to states, generators, utilities, and national authorities? • What are the incentives for wind farms to achieve greater than 70% accuracy (i.e. to 76% accuracy based on +/- 12% proposed band)?
Section 3 Proposed Methodology for Forecasting, Scheduling & Imbalance Handling	Proposed methodology for forecasting, scheduling & imbalance handling for infirm RE generators	• A national wind and solar resource standard should be set based on centralized renewable resource data collection, monitoring and forecasting (short-term <24 hours). Application to actual generation should be specific to each site and generation plant.
Section 3.1 Forecasting	Addresses proposed RE forecasting with REMC developed by PGCIL	• What do current grid codes (RLDC vs. SLDC) require and how will they be changed per this proposal? • CERC and RLDC may consider the scheduling and nomination requirements from RE generators vs. thermal power generators to be consistent in terms of use of these nominations for balancing and managing the grid by its operator(s). • The case for multiple forecasters may be appropriate for use by centralized RE resource forecasting to create real-time regression and trend analysis and should not be imposed on individual RE generators.

Section 3.2 Scheduling	Mechanism specifies generators will be paid for scheduled and not actual generation.	• What is the reason for moving from 8 revisions to 16 revisions? • In general, frequency of revising nomination by renewable generators should be consistent with what is already in place with other generators under PPA; 2) Note that in most US markets, the nomination revisions are at least hourly and many cases it is every 15 minutes for RE generator at specified nodal points.
Section 3.3 Metering		• What are the existing vs. proposed practices and requirements for metering?
Section 3.4 Imbalance Handling	Use of CERC DSM regulations to settle imbalances as it relates to variability of RE to the grid.	• Regulations and settlement mechanisms for imbalances should incentivize generators to provide the most accurate forecast at the agreed-upon frequency. • Consider a 2-tiered mechanism to 1) allow the balancing of variance within a statistically acceptable band (e.g. +/-2CV) over a defined period of time (e.g. monthly); and 2) to allow for a second mechanism for balancing variance outside of the variance band. • What is the statistical confidence level (e.g. +/- 2CV) of the proposed solar and wind energy forecasting band? • What is the justification for the +/- 12% operating band as proposed? One possible reference may be from DA wind power forecasting MAE values being about 12% of capacity. However, this does not take into account the shape of distribution; RE power plants with good forecasts could be outside of this band. • The exact band range should be established separately for solar and wind as there are a number of variables that need to be addressed. • The proposed band of +/- 12% variability for solar and wind should be backed with empirical or simulation modeling for at least representative regions of wind (Tamilnadu and Gujarat) and solar (Gujarat and Rajasthan). • Seasonality's affect on (e.g. Monsoon vs. winter or summer) the band width should be taken into consideration. • Another consideration is to prevent RE generator from intentionally choose under nomination to avoid or minimize paying penalty and then receiving bonus for extra generation. Rules and mechanism should prevent "gaming" or misuse of regulations by all generators on the grid. • Does the DSM Pool affect the inter-state and intra-state dispatch of RE generation? Who administers it and who participates? • Proposal seems to allow for collecting RECs for over-generation. There could be market-based incentives for generation in times such as high

		peak demand. • Proposed mechanism for creation and settlement of RPO obligations needs further development. Specifically, is it possible to segregate treatment of RPO obligations for interstate RE generators purely based on actual generation and not based on the nominations? One can have a separate mechanism for settling RPO imbalances between RE generator and the buyer of RPO obligations since it is believed to be a financial transaction largely independent of physical energy balancing on the grid. • The proposal implies that motivating the RE generator to stay within +/-12% band can be an incentive for better forecasting. This is debatable, particularly if RE generators depend upon centralized RE resource forecasting (for their particular site) to forecast their own generation for nomination. The current proposal may be susceptible to misuse or gaming by market participants. Alternative mechanisms can be explored; they are typically tied to how the market clearance mechanism works within a grid system. • The proposal assumes the incremental cost of RE generation is zero. However, RE generators do have O&M costs, which may need to be reflected in the formula for designing rates. • The proposal includes no payment from the DSM Pool for generation in excess of 12% over scheduled capacity. There are two considerations: 1) in the unusual circumstances if the generator is able to produce in excess of 112% for a period of time (especially if it is during peak demand) it might be justifiable to not disincentivize; 2) if the generator produces below 88% of its capacity, generator would be penalized, but the rate set by the CERC should not encourage generators to under estimate generation. • Are RE generators allowed to provide frequency regulation service and if so what is the compensation scheme? • If this is not in practice, the mechanism proposed may lead to sub-optimization of energy supply and frequency/voltage control at the RLDC level. There may be times when it would be more cost effective to back off renewable generation and compensate generation otherwise. • CERC and RLDC may consider incentivizing RE generators to provide frequency regulation and broader ancillary services. • How do PPAs currently address backing off of RE generation due to congestion and is the issue addressed in the proposal? • Has CERC estimated the total new investment required for RE forecasting and cost recovery?

		• Benefits of using RE forecasting to various stakeholders should be considered. For example, it would be a good idea to explore the feasibility of leveraging RE forecasting to manage or reduce the cost of ancillary services. • While the proposal focuses on RE forecasting for RE generators on RLDC, it is important to address RE generators that are on SLDC. • Recommended to design a consistent set of policies and regulations for RE forecasting for RE generation scheduling at both the SLDC and at RLDC level and to reflect or revise relevant PPA, transmission or wheeling agreement and or grid codes.
Section 4	Fulfillment of RPO	• What and how is RPO compliance by RE generator vs. RE off-taker or DISCOs or utility companies being managed?
Section 5:	Data telemetry and communication facilities	• Are there standard telemetry requirement from RE generators already in place at state or regional level? • PGCIL RE forecasting pilot project will define telemetry requirements and reveal cost estimates of such requirements. These can be analyzed to allocate the cost across different stakeholders efficiently. • More technical specifications should be given for telemetry and communication facilities and data.
Section 6:	Compliance with technical standards	
Section 7:	Other Issues	
Section 7.a	REC mechanism and accountability	• The issue of roles and responsibilities on RE forecasting for RE generation scheduling between CERC and SERC is critical and should be addressed in detail.
Section7.b	REC reporting to SERC	
Section 7.c	Identifies need to create new entities required under this proposal	• This is an important issue and relates to market mechanism for trading and balancing all energy on the grid. It is also important to define who will administer such a mechanism.
Section 7.d	Role of RE generators as “seller” and “buyer”	
Section 7.e		

Appendix 2: Comments on Forecasting, Scheduling, and Imbalance Handling of Interstate RE generators in India from Lawrence Berkley National Laboratory

Comments on Forecasting, Scheduling, and Imbalance Handling of Interstate RE generators

See Attachment