From: **ShubhaSarma Secretary** <secy@cercind.gov.in>
Date: Thu, Apr 30, 2015 at 8:10 PM
Subject: Fwd: GE's Recommendations on CERC's "Proposed Framework for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) Generating Stations based on wind and solar at Inter-State Level", and Draft Amendments to IEGC Regulations, 2010, DSM Regula
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---------- Forwarded message ----------
From: "Barathan, Sharmila (GE Global Growth)" <sharmila.barathan@ge.com>
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Date: Thu, 30 Apr 2015 07:50:12 +0000
Subject: GE's Recommendations on CERC's "Proposed Framework for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) Generating Stations based on wind and solar at Inter-State Level", and Draft Amendments to IEGC Regulations, 2010, DSM Regula

Sub: GE's Recommendations on CERC's *"Proposed Framework for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) Generating Stations based on wind and solar at Inter-State Level", and Draft Amendments to IEGC Regulations, 2010, DSM Regulations, 2014 and REC Regulations,*

Dear Ms Sarma
Greetings from GE!
GE congratulates CERC for its leadership in promoting consolidated growth of renewables in India. Further, GE is excited about the opportunities that the Indian renewables market present and our global presence has helped us gain significant experience with design of renewable energy policies in emerging markets. As you draft policies and regulations in the wind energy sector, we respectfully submit the following recommendations for your consideration:
GE strongly supports CERC's vision for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) Generating Stations and specifically:
(i) The methodology proposed for forecasting, scheduling and imbalance handling
(ii) The forecast by the wind energy generator would be wind facility centric and would form the basis of scheduling; and any commercial impact on account of scheduling based on the forecast would be borne by the wind energy generator
(iii) That there may be one revision for each time slot of one and half hours starting from 00:00 hours of a particular day subject to maximum of 16 revisions during the day
(iv) Delinking of the charges for deviation from schedule with the system frequency, which is beyond the control of the wind energy generator

We appreciate CERC's draft framework for Forecasting, Scheduling & Imbalance Handling for Renewable Energy (RE) based power plants and amendments to IEGC Regulations, DSM Regulations and REC Regulations. These guidelines will encourage wind and solar power generators to make sure that the power generated does not impact grid security.
Following are GE's recommendations to the aforementioned draft guidelines and regulations:-

1) Regulations should be made applicable for Intra-state wind farms

Draft Amendment to IEGC says: "This section deals with the procedure to be adopted for scheduling and Despatch of generation of the Inter-State Generating Stations (ISGS)"
GE Recommendation: Since most of the wind farms are presently connected to intra-state, these regulations should be made applicable for intra-state wind farms as well.

2) Reconsider the operating band of ± 12%

Draft CERC framework says: "…the desired operating band of ±12% is being proposed for the wind and solar energy generators"
GE Recommendation: An operating band of ±12% is too stringent. Past experience suggests that the requirement of actual generation to fall within the operating band of ±30% in earlier regulations was not met by many wind operators.
Hence, GE recommends that the CERC reconsiders the proposed operating band of ±12% to something that is more likely to be demonstrated in Indian conditions. GE has been demonstrating a pilot project at its customer-owned wind farm in Western India, based on erstwhile operating band of ± 30%, with 8 updates a day. GE's experience from operating this pilot project from the period June 15th, 2014 to March 31st, 2015, resulted in 80.04% energy complying with the operating band.
GE also simulated the same wind farm's data for the same period, while forecasting in an operating band of ± 12% with 16 updates a day. However, GE results with this approach resulted in 71.72% energy complying with the operating band. This experience highlights the limitations of forecasting within a tighter operating band.
A summary of the 2 scenarios is presented below:

Scenario	GE Experience	Data Period	Energy % Within Operating Band
Operating Band ± 30% with 8 updates a day	Pilot demo at a GE site	June 15th, 2014 to March 31st, 2015	80.04%
Operating Band ± 12% with 16 updates a day	Lab simulation	June 15th, 2014 to March 31st, 2015	71.72%

3) Deviation charges should be a percentage of PPA instead of a fixed charge, and there should not be any charge for deviation within the operating band

Draft Amendment to DSM Regulations, 2014 says: "If the actual generation is in the range 88% to 100% of schedule, the wind and solar generator would pay to the Regional DSM Pool, for the shortfall energy at a fixed rate as may be determined by the Commission from time to time through separate order. In addition, the wind and solar energy generator will buy the Renewable Energy Certificates (RECs), equivalent to the shortfall energy and transfer them to the buyer to enable it to fulfil its RPO obligation." *Similar recommendations have been noted in the amendment for deviation within and outside the operating band.*

GE Recommendation: Having a fixed charge in case of deviations leads to situations in which the wind energy generator incurs a net loss or gain in revenue, depending on the relation between the PPA rate, fixed imbalance rate and REC rate. For the same amount and polarity (under or over generation) of deviation, the generator in two states could have a different impact on revenue, due to this inter-relationship between the 3 rates. This inconsistency is not desirable.
In order to avoid such a scenario, GE recommends that instead of using a common fixed imbalance rate for all wind farms, the charges should be linked to PPA (a percentage of PPA). This will also avoid any possibility of gaming by over or under forecasting on purpose to make undue commercial gain.
The attached spreadsheet presents the impact of these inter-relationships on the wind energy generator's net revenue.
Furthermore, the spirit of an operating band requires that there should not be any net impact on the revenue of the wind energy generator for deviations within the band. GE recommends that there should not be any charges payable by, or to the wind energy generator for deviation within the operating band.

4) Stringent disincentive should be specified in case of deviation beyond the operating band on higher side (> 112%)

Draft Amendment to DSM Regulations, 2014 says: "For actual generation beyond 112% of the schedule, the wind and solar energy generator would be compensated by way of issuance of RECs only"
GE Recommendation: For deviations below 88% (lower end of operating band), the amendment specifies a strong disincentive. To maintain symmetry, GE recommends that a similar disincentive should be specified for deviation beyond 112% (higher end of operating band).
Again the charges for deviation should be linked to PPA (a percentage of PPA), rather than a common fixed rate.

5) Emails should be established as the medium for sending forecast communication across all states

GE Recommendation: Currently, different states adopt different media for communicating forecast information leading to IT security issues, inconsistency and complexity. In order to avoid this, GE recommends that Emails should be established as the sole medium for sending forecast communication across all states to ensure consistency, traceability of forecast communication and IT security.

6) Other Recommendations/Clarifications

a) **Draft CERC framework says:** "There may be a maximum of 16 revisions for each fixed one and half hour time slot starting from 00:00 hours during the day", and

Draft Amendment to IEGC says: "There may be one revision for each time slot of one and half hours starting from 00:00hours of a particular day subject to maximum of 16 revisions during the day"
The above clauses are ambiguous and we request CERC to provide clarity and regularize the two statements. GE requests CERC to provide more clarity pertaining to the role and scope of forecasting and fee chargeable by the REMCs for providing the forecasting services. Furthermore, the industry would greatly benefit if CERC furnishes illustrations/examples for each case of calculating incentives/disincentives.

Please find attached our Excel sheet that aims to simulate the impact of deviations in forecasting on wind energy generator's net revenue with changes in PPA rate and REC rate.

Thanking you

Sincerely

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PPA Rate	3.70	INR/kWh
Schedule	100.00	kWh
REC Rate	1.50	INR/kWh

Actual (kWh)	PPA Paid (INR)	Settlement 1 (INR)	Settlement 2 (INR)	Net Revenue With Forecasting (INR)
50.00	370.00	(54.00)	(209.00)	107.00
60.00	370.00	(54.00)	(154.00)	162.00
75.00	370.00	(54.00)	(71.50)	244.50
85.00	370.00	(54.00)	(16.50)	299.50
88.00	370.00	(54.00)		316.00
99.00	370.00	(4.50)		365.50
100.00	370.00			370.00
101.00	370.00	5.50		375.50
112.00	370.00	66.00		436.00
115.00	370.00	66.00	4.50	440.50
120.00	370.00	66.00	12.00	448.00
130.00	370.00	66.00	27.00	463.00
140.00	370.00	66.00	42.00	478.00
150.00	370.00	66.00	57.00	493.00

PPA Rate	5.93	INR/kWh
Schedule	100.00	kWh
REC Rate	1.50	INR/kWh

Actual (kWh)	PPA Paid (INR)	Settlement 1 (INR)	Settlement 2 (INR)	Net Revenue With Forecasting (INR)
50.00	593.00	(54.00)	(209.00)	330.00
60.00	593.00	(54.00)	(154.00)	385.00
75.00	593.00	(54.00)	(71.50)	467.50
85.00	593.00	(54.00)	(16.50)	522.50
88.00	593.00	(54.00)		539.00
99.00	593.00	(4.50)		588.50
100.00	593.00			593.00
101.00	593.00	5.50		598.50
112.00	593.00	66.00		659.00
115.00	593.00	66.00	4.50	663.50
120.00	593.00	66.00	12.00	671.00
130.00	593.00	66.00	27.00	686.00
140.00	593.00	66.00	42.00	701.00
150.00	593.00	66.00	57.00	716.00

PPA Rate	3.70	INR/kWh		
Schedule	100.00	kWh		
REC Rate	3.00	INR/kWh		

Net Revenue In Absence Of Forecasting (INR)	Difference In Revenue In Presence & Absence Of Forecasting (INR)	Actual (kWh)	PPA Paid (INR)	Settlement 1 (INR)
185.00	(78.00)	50.00	370.00	(72.00)
222.00	(60.00)	60.00	370.00	(72.00)
277.50	(33.00)	75.00	370.00	(72.00)
314.50	(15.00)	85.00	370.00	(72.00)
325.60	(9.60)	88.00	370.00	(72.00)
366.30	(0.80)	99.00	370.00	(6.00)
370.00	-	100.00	370.00	
373.70	1.80	101.00	370.00	7.00
414.40	21.60	112.00	370.00	84.00
425.50	15.00	115.00	370.00	84.00
444.00	4.00	120.00	370.00	84.00
481.00	(18.00)	130.00	370.00	84.00
518.00	(40.00)	140.00	370.00	84.00
555.00	(62.00)	150.00	370.00	84.00

PPA Rate	5.93	INR/kWh		
Schedule	100.00	kWh		
REC Rate	3.00	INR/kWh		

Net Revenue In Absence Of Forecasting (INR)	Difference In Revenue In Presence & Absence Of Forecasting (INR)	Actual (kWh)	PPA Paid (INR)	Settlement 1 (INR)
296.50	33.50	50.00	593.00	(72.00)
355.80	29.20	60.00	593.00	(72.00)
444.75	22.75	75.00	593.00	(72.00)
504.05	18.45	85.00	593.00	(72.00)
521.84	17.16	88.00	593.00	(72.00)
587.07	1.43	99.00	593.00	(6.00)
593.00	-	100.00	593.00	
598.93	(0.43)	101.00	593.00	7.00
664.16	(5.16)	112.00	593.00	84.00
681.95	(18.45)	115.00	593.00	84.00
711.60	(40.60)	120.00	593.00	84.00
770.90	(84.90)	130.00	593.00	84.00
830.20	(129.20)	140.00	593.00	84.00
889.50	(173.50)	150.00	593.00	84.00

Settlement 2 (INR)	Net Revenue With Forecasting (INR)	Net Revenue In Absence Of Forecasting (INR)	Difference In Revenue In Presence & Absence Of Forecasting (INR)
(266.00)	32.00	185.00	(153.00)
(196.00)	102.00	222.00	(120.00)
(91.00)	207.00	277.50	(70.50)
(21.00)	277.00	314.50	(37.50)
	298.00	325.60	(27.60)
	364.00	366.30	(2.30)
	370.00	370.00	-
	377.00	373.70	3.30
	454.00	414.40	39.60
9.00	463.00	425.50	37.50
24.00	478.00	444.00	34.00
54.00	508.00	481.00	27.00
84.00	538.00	518.00	20.00
114.00	568.00	555.00	13.00

Settlement 2 (INR)	Net Revenue With Forecasting (INR)	Net Revenue In Absence Of Forecasting (INR)	Difference In Revenue In Presence & Absence Of Forecasting (INR)
(266.00)	255.00	296.50	(41.50)
(196.00)	325.00	355.80	(30.80)
(91.00)	430.00	444.75	(14.75)
(21.00)	500.00	504.05	(4.05)
	521.00	521.84	(0.84)
	587.00	587.07	(0.07)
	593.00	593.00	-
	600.00	598.93	1.07
	677.00	664.16	12.84
9.00	686.00	681.95	4.05
24.00	701.00	711.60	(10.60)
54.00	731.00	770.90	(39.90)
84.00	761.00	830.20	(69.20)
114.00	791.00	889.50	(98.50)