Our understanding about RRF Mechanism

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Fundamentals of RRF Mechanism

- **Definition of RRF:**
- RRF stands for Renewal Regulatory Fund
- Maintained By NLDC(National Load Dispatch Center)
- It is a mechanism defined in IEGC 2010 (Indian Energy Grid code 2010 Dt:28.04.2010 to promote Renewal Energy which is decided by CERC.
- CERC has issued several orders and revisions on RRF mechanism.
- Detailed procedure for RRF was defined in order no. L-1/18/2010-CERC Dt:18-2-2011
- Latest Suo Motto Petitions no. 209/2011 Dt; 16.01.2013 wherein it is stated that implementation date of RRF is:01/07/2013 (Mock drill from 01/02/2013)

- **Wind Farms Eligible for RRF/UI Accounting:**
- Wind farms connected at pooling stations commissioned after 03/05/2010 shall fall under the RRF Mechanism.
- The Rational behind this cutoff date is, notification date of IEGC 2010.

Fundamentals Of RRF Mechanism

- **Highlights of the Latest order Dated:16.01.2013 (Suo Motu Petition No.209/2011)**

- CERC has defined the reference rate to address the problem of different contract rates in the same pooling stations

- Special Energy meters to be installed at the pooling stations .

- Special energy meter should be capable of measuring time differentiation.

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Elaboration of Wind Scheduling

- Based on the Forecasted Wind Power (data received from Forecasting Company), the generators shall submit the forecasted Power Schedule to SLDC (government entity) in the prescribed format (96 time blocks)

- The revisions recd. from forecaster shall be sent to SLDC (government entity) in the prescribed scheduling format

- Maximum 8 revisions per day (one each in 3 hour time slot) is acceptable by SLDC (government entity) as per IEGC Grid code.

- The revised schedule should be submitted to SLDC at least 1½ hours ahead i.e. revision applicable from 06:00 hrs can be submitted latest by 04:30 Hrs. The forecast from forecaster shall be available accordingly.

- All the energy generated by Wind Farm/s flows to the particular Pooling station and is recorded in ABT meter installed at Pooling station.

- ABT meter data shall either be collected automatically (by using interface) or shall be collected manually initially for some time (once in a week).

Elaboration of Wind Scheduling

- On receipt of Actual Power Generation data, the Scheduled data shall be compared with actual generation for each 15 minute time block and shall check the over/under generation thus calculating the generation above/below prescribed limits and finally the applicable UI (for each particular 15 minute time block) shall be incorporated to get a figure of bonus/penalty.

- *This settlement can be done on total energy generated on weekly basis among all generators on pro rata basis also.*

- Prescribed limits are defined under the head UI mechanism

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RRF Mechanism - UI Calculation (Un-Scheduled Interchange Calculation)

- It is the average price of Power in a 15 minute time block when grid Frequency is between 50.20 Hz and 49.5 Hz. This price shall be payable for over-drawl by the buyer and under-injection by the Generator and receivable for under-drawl by the buyer and over-injection by the Generator.

- Wind generators shall be responsible for forecasting their Generation up-to an accuracy of 70%. If the generation is beyond +/-30% of the schedule then UI charges would be applicable to the Wind Power Generator (WTG). For actual generation within +/- 30 % of the schedule no UI would be payable or receivable by the Generator. The implication due to deviations outside +30% would be settled directly between RPC and Generator or their representatives.

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Unscheduled Interchange Rate Chart

UI RATE CHART					
Below	Not Below	Rs. / MWH	**Below**	Not Below	Rs./ MWH
	50.20	0			
50.20	50.18	165	**49.84**	49.82	4215
50.18	50.16	330	**49.82**	49.80	4500
50.16	50.14	495	**49.80**	49.78	4781
50.14	50.12	660	**49.78**	49.76	5062
50.12	50.10	825	**49.76**	49.74	5343
50.10	50.08	990	**49.74**	49.72	5625
50.08	50.06	1155	**49.72**	49.70	5906
50.06	50.04	1320	**49.70**	49.68	6187
50.04	50.02	1485	**49.68**	49.66	6468
50.02	**50.00**	**1650**	**49.66**	49.64	6750
50.00	49.98	1935	**49.64**	49.62	7031
49.98	49.96	2220	**49.62**	49.60	7312
49.96	49.94	2505	**49.60**	49.58	7593
49.94	49.92	2790	**49.58**	49.56	7875
49.92	49.90	3075	**49.56**	49.54	8156
49.90	49.88	3360	**49.54**	49.52	8437
49.88	49.86	3640	**49.52**	49.50	8718
49.86	49.84	3930	**49.50**		9000

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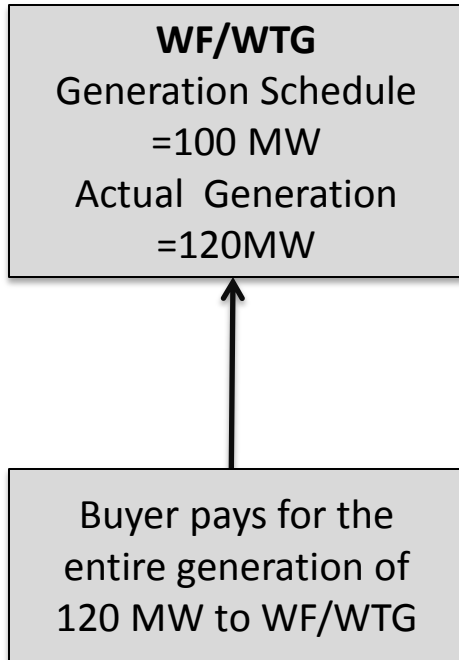# Examples for UI calculations as per RRF Mechanism

➢ Higher Limit & Lower Limit of Schedule = +30% & –30% of Schedule respectively.

➢ Case-1 & Case-2 are examples for generation with in +30% & -30% of the Scheduled power respectively. In Case 1 & 2 Wind Farm/WTG are not liable for UI implication being within +30% range.

• Case-3 is an example for over generation (i.e. +30%) but below 150%.

• Case-4 is an example for over generation (i.e. +30%) and above 150%.

• Case-5 is an example for under generation (i.e. - 30%).

NOTE:-

➢ CERC (government entity) has defined the reference rate to address the problem of different contract rates in the same pooling stations as Rs.4/unit for NEW (North East West) grid and Rs.5/unit for Southern grid.

➢ UI Rate corresponding to Frequency Range 50 - 50.02Hz will be applicable in case of over generation i.e. for more than 50% of the Schedule, WTG will not get benefit of Real Time UI rate and will be caped @ UI rate applicable for 50-50.02 Hz

RRF Accounting Mechanism-Intrastate: Case 1

WF/WTG
Generation Schedule
=100 MW
Actual Generation
=120MW

Buyer pays for the entire generation of 120 MW to WF/WTG
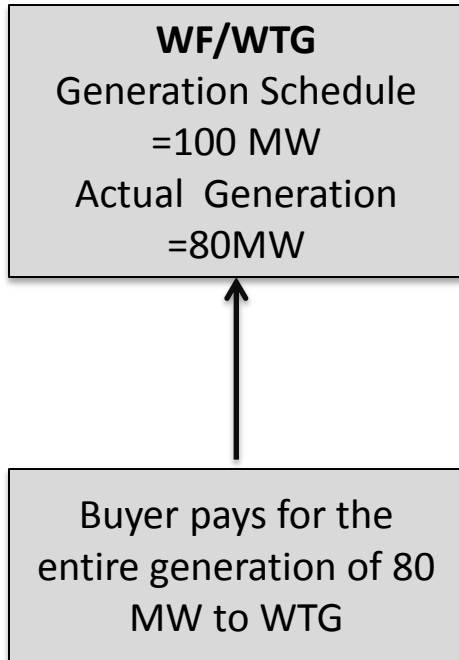
CASE:1

Generation Schedule-100 MW

Actual Generation-120 MW

- Buyer pays to Wind Farm at Contracted Rate as per actual(i.e. 120 MW)

Note: WF/WTG will not be liable to pay/receive any UI as generation is within +30% band.

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RRF Accounting Mechanism-Intrastate: Case 2

WF/WTG
Generation Schedule
=100 MW
Actual Generation
=80MW

Buyer pays for the
entire generation of 80
MW to WTG

Case:2

Generation Schedule -100 MW

Actual Generation – 80 MW

- Buyer pays to Wind Farm at contracted rate as per actual generation (i.e.80 MW).

Note: WF/WTG will not be liable to pay/receive any UI as generation is within -30% band.

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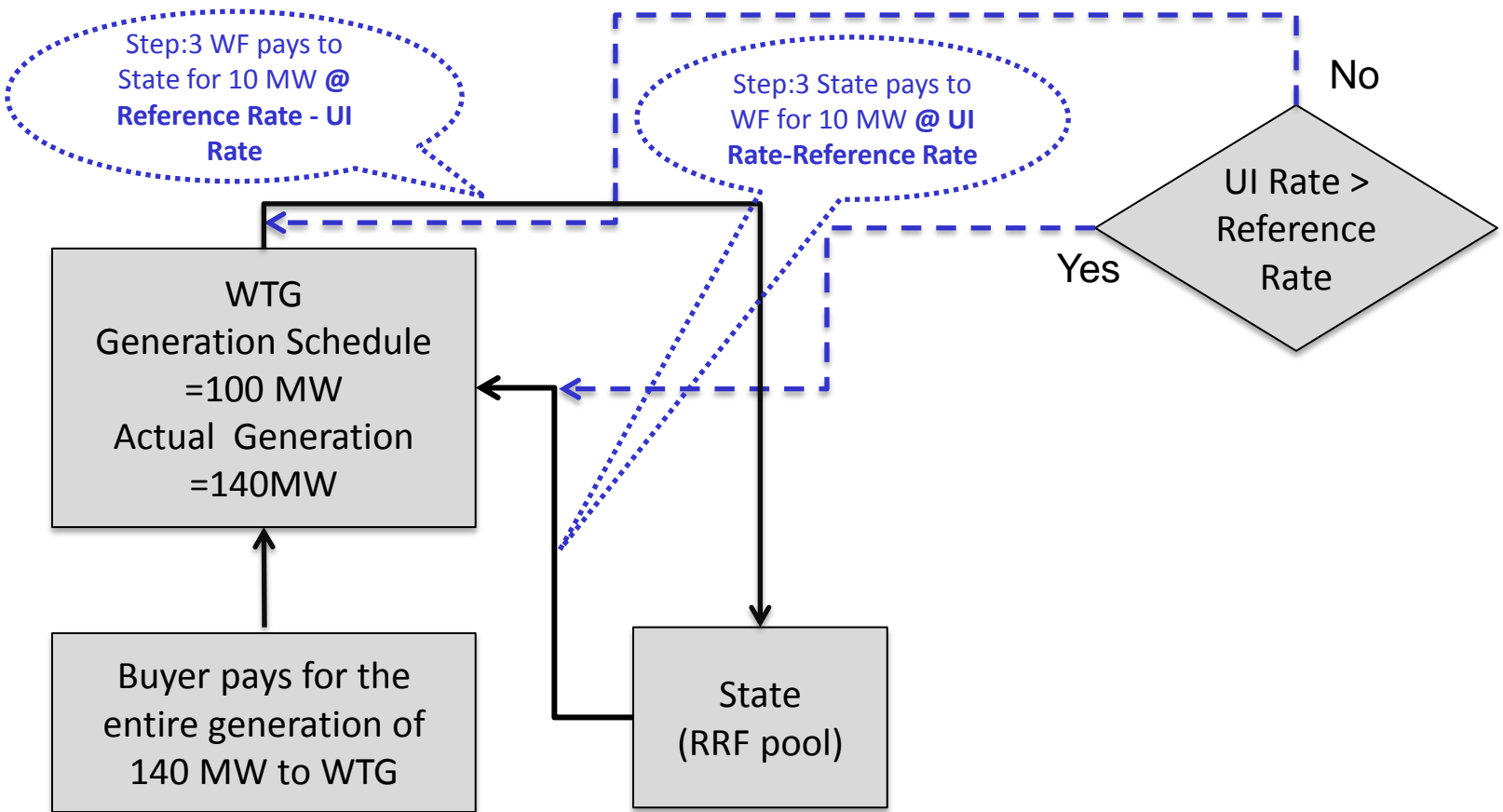# RRF Accounting Mechanism-Intrastate: Case 3

Case - 3

Generation Schedule -100 MW

Actual Generation – 140 MW

- Step - 1 : Buyer pays to Wind Farm at contracted rate as per actual generation (i.e.140 MW).

- Step - 2 : State pays to RRF for the difference between higher limit of schedule after which the wind farm is responsible (i.e. +30%) and the schedule (i.e. 30 MW) @ UI rate - reference rate, if UI rate is greater than reference rate.

   Or   State receives from RRF for this difference (i.e. 30 MW) @ reference rate - UI rate, if reference rate is greater than UI rate.

- Step - 3 : State pays to Wind Farm for difference between higher limit of schedule after which the wind farm is responsible (i.e. +30%) and the actual generation (i.e. for 10 MW) UI rate - reference rate, if UI rate is greater than reference rate.

   Or   State receives from Wind Farm for this difference (i.e. 10 MW) @ reference rate - UI rate, if reference rate is greater than UI rate.

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RRF Accounting Mechanism-Intrastate: Case 3

Step:3 WF pays to State for 10 MW **@ Reference Rate - UI Rate**

Step:3 State pays to WF for 10 MW **@ UI Rate-Reference Rate**

No

UI Rate > Reference Rate

Yes

WTG
Generation Schedule
=100 MW
Actual Generation
=140MW

Buyer pays for the entire generation of 140 MW to WTG

State
(RRF pool)

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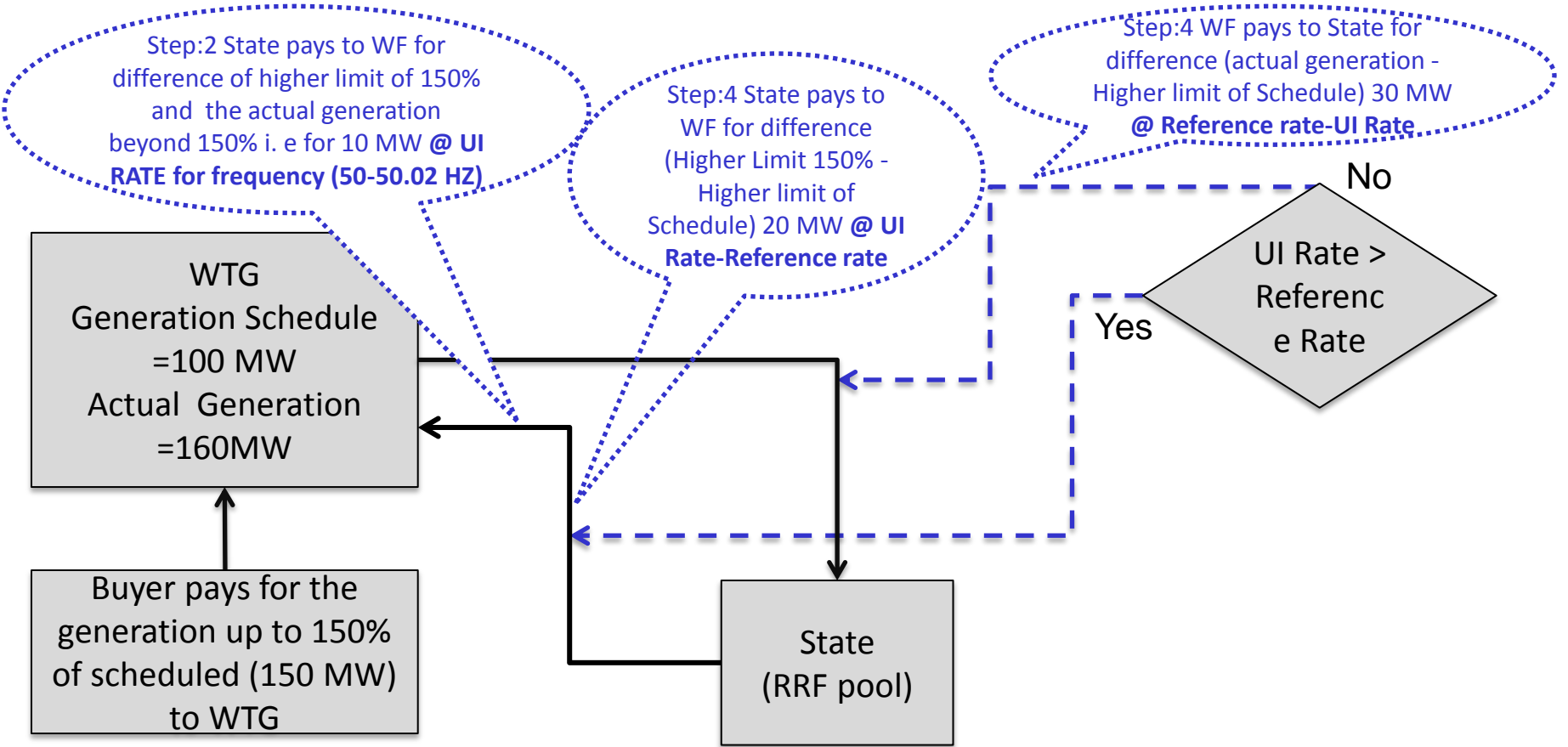# RRF Accounting Mechanism-Intrastate: Case 4

Case - 4

Generation Schedule -100 MW

Actual Generation – 160 MW

- Step - 1 : Buyer pays to Wind Farm at contracted rate as per actual generation upto 150% of schedule (i.e. 150 MW).

- Step - 2 : State pays to Wind Farm at UI rate corresponding to frequency range 50- 50.02 Hz. for difference between higher limit of 150% and the actual generation for generation beyond 150% (i.e. for 10 MW).

- *Step3: is not relevant to wind generators*

- Step - 4 : State pays to Wind Farm for difference between higher limit of schedule after which the wind farm is responsible (i.e. +30%) and the higher limit of 150% (i.e. for 20 MW) at UI rate - reference rate, if UI rate is greater than reference rate.

- **Or** State receives from Wind Farm for this difference (i.e. 30 MW) @ reference rate - UI rate, if reference rate is greater than UI rate.

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RRF Accounting Mechanism-Intrastate: Case 4

Step:2 State pays to WF for difference of higher limit of 150% and the actual generation beyond 150% i. e for 10 MW **@ UI RATE for frequency (50-50.02 HZ)**

Step:4 State pays to WF for difference (Higher Limit 150% - Higher limit of Schedule) 20 MW **@ UI Rate-Reference rate**

Step:4 WF pays to State for difference (actual generation - Higher limit of Schedule) 30 MW **@ Reference rate-UI Rate**

No

UI Rate > Reference Rate

Yes

WTG
Generation Schedule =100 MW
Actual Generation =160MW

Buyer pays for the generation up to 150% of scheduled (150 MW) to WTG

State
(RRF pool)

RRF Accounting Mechanism-Intrastate: Case 5

- **Case - 5**

Generation Schedule -100 MW

Actual Generation – 60 MW

- Step - 1 : Buyer pays to Wind Farm at contracted rate as per actual generation (i.e. 60 MW).

- Step - 2 *: is not relevant to wind generators*

- Step - 3 : Wind Farm pays to the host State for difference between the lower limit of schedule after which the wind farm is responsible (i.e. -30%) and the actual generation of the wind farm (i.e. 10 MW) @ UI rate - contracted rate, if UI rate is greater than reference rate.

   Or   Wind Farm receives from the host State for the difference (i.e. 10 MW) @ reference rate - UI rate, if reference rate is greater than UI rate.

RRF Accounting Mechanism-Intrastate: Case 5

Step:3 WF pays to host state for difference (lower limit -30% of Schedule - actual generation i.e. 10 MW) @UI Rate –Reference Rate

Step:3 State pays to WF for difference (lower limit -30% of Schedule - actual generation i.e. 10 MW) @ Reference Rate –UI Rate

Yes

No

UI Rate > Reference Rate

WTG
Generation Schedule
=100 MW
Actual Generation
=60MW

Buyer pays for the entire generation of 60 MW to WTG

State
(RRF pool)