CENTRAL ELECTRICITY REGULATORY COMMISSION NEW DELHI

Petition No. 15/SM/2015

Coram:

Shri Gireesh B. Pradhan, Chairperson Shri A.K. Singhal, Member Shri A.S. Bakshi, Member Shri M.K. Iyer, Member

Date of Order: 03.12.2015

In the matter of

Calculation of Average Power Purchase Cost (APPC) at the national level

ORDER

The Central Commission, in discharge of its responsibilities under the Electricity Act 2003, viz. "regulating inter-state transmission of electricity, specifying grid code, and specifying standards with respect to quality and reliability of service," has notified the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Third Amendment) Regulations, 2015, and the Central Electricity Regulatory Commission (Deviation Settlement Mechanism and related matters) (Second Amendment) Regulations, 2015 to provide for the Framework on Forecasting, Scheduling and Imbalance Handling for Variable Renewable Energy Sources (Wind and Solar).

2. The aforesaid regulations provide for a framework to enable forecasting and scheduling of wind and solar generating stations that are regional entities. The framework is aligned with the existing settlement mechanism applicable to conventional generating stations under the control of RLDCs, to the extent that the wind and solar generators are paid by beneficiaries as per schedule, and deviation from schedule is settled with the Regional DSM pool. The graded deviation settlement band provides an incentive for improving accuracy of forecasting, and uses the PPA rate of generators in long-term PPAs as the 'fixed rate' for deviation settlement. The relevant provision of the CERC (Deviation Settlement Mechanism and related matters) Regulations in this context (Regulation 5, clause 1, sub-clause v) is extracted below:

"Where the Fixed Rate is the PPA rate as determined by the Commission under section 62 of the Act or adopted by the Commission under section 63 of the Act. In case of multiple PPAs, the weighted average of the PPA rates shall be taken as the Fixed Rate."

3. However, this fixed rate is not applicable to generators that are not in long-term PPAs, such as open access entities. In this context, the same clause as above states that:

"Fixed Rate for Open Access participants selling power which is not accounted for RPO compliance of the buyer, and the captive wind or solar plants shall be the Average Power Purchase Cost (APPC) rate at the National level, as may be determined by the Commission from time to time through a separate order. A copy of the order shall be endorsed to all RPCs."

This implies that for Open Access wind or solar sellers that are regional entities and selling power under REC framework, and for Captive plants where PPAs do not exist, settlement shall be done at APPC determined at the national level. In pursuance of this provision, the Commission is required to determine the national level APPC.

4. In this context, it would be pertinent to mention that Regulation 5(c) of Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 defines Average Power Purchase Cost (APPC) as follows:

"for the purpose of these regulations 'Pooled Cost of Purchase' means the weighted average pooled price at which the distribution licensee has purchased the electricity including cost of self generation, if any, in the previous year from all the energy suppliers long-term and short-term, but excluding those based on renewable energy sources, as the case may be."

- 5. Accordingly, APPC at the national level is proposed to be determined by computing the average of APPC of all States and Union Territories, weighted by volume of conventional power purchased by the respective State/UT.
- 6. Data for approved purchase cost and volume of power for 2014-15, from the respective 2014-15 tariff orders of the States, have been considered. This approach has been followed as trued-up data for FY 2014-15 are not available in tariff orders of 2015-16 issued by majority of States. Data used for calculation of APPC in respect of all States

and UTs as well as the calculations and exceptions are given in the Annexure to this order.

- 7. The total cost of power purchase considered for computation of APPC excludes cost of generation or procurement from renewable energy sources and transmission charges. Exclusion of cost of generation or procurement from renewable sources is in alignment with the objective of determining APPC, which is to ascertain the average cost of power from conventional sources of electricity. Furthermore, with a view to consider energy costs only, transmission charges have been excluded from these calculations.
- 8. Based on the tariff orders issued by the SERCs/JERCs for the year 2014-15, the APPCs at the National level has been worked out as Rs. 3.40/kWh. It is proposed that APPC shall be applicable during the year 2015-16 for the purpose of deviation settlement in respect of the open access and captive wind and solar generation fulfilling the requirement of regional entities.
- 9. The Commission invites comments of the wind and solar power generators as well as other stakeholders on the draft determination of APPC as per the Annexure to the order, by 21.12.2015.

Sd/- Sd/- Sd/- Sd/
(Dr. M.K. Iyer) (A. S. Bakshi) (A.K. Singhal) (Gireesh B. Pradhan)

Member Member Member Chairperson

DETERMINATION OF APPC FOR WIND & SOLAR GENERATORS

 Regulation 5(c) of Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 defines Average Power Purchase Cost (APPC) as follows:

"for the purpose of these regulations 'Pooled Cost of Purchase' means the weighted average pooled price at which the distribution licensee has purchased the electricity including cost of self generation, if any, in the previous year from all the energy suppliers long-term and short-term, but excluding those based on renewable energy sources, as the case may be."

- 2. Thus, Average Power Purchase Cost (APPC) at the national level has been obtained by computing the average of APPC of all States and Union Territories, weighted by volume of conventional power purchased by the respective State/UT.
- 3. Data for approved purchase cost and volume of power for 2014-15 was obtained from the respective 2014-15 tariff orders of the States/UTs. Links to these tariff orders can be found in Table-II below. In case there were separate tariff orders for different utilities, they have been listed separately.
- 4. Exceptions to this dataset were as follows:
 - a. For Tripura, 2013-14 tariff order has been considered, as the state had not issued an order for 2014-15.
 - b. For Maharashtra, tariff order of 2015-16 has been used, as the state had not issued an order for 2014-15.
 - c. For Telangana, 2015-16 tariff order has been considered as the state was newly formed.
 - d. For Punjab, self-generation cost data has not been included due to unavailability in the tariff order.
- 5. In case of multiple utilities operating in a state, average of power purchase cost weighted by power quantum of respective utilities was computed to derive APPC for entire state.

Illustration:

 X_i , X_{ii} , X_{iii} , X_n denoting average per unit power purchase cost for respective utilities in a state (excluding cost of renewables).

 $Q_{i\text{,}}\,Q_{i\text{i}},Q_{i\text{i}}....Q_{n}\,denoting\;power\;quantum\;purchased\;(excluding\;renewable\;power).$

Then,

$$APPC_{(state)} = \left(\sum_{n=i}^{n} XnQn\right) / \sum_{n=i}^{n} Qn$$

6. The total cost of power purchase considered excludes cost of generation or procurement from renewable energy sources. In orders where renewable energy cost and quantum has been mentioned in total power purchase summary, it has been subtracted from the totals to obtain values corresponding to conventional sources.

Power Quantum (Conventional Sources) = Power Quantum(Total) - Power Quantum(Renewable Sources)

Purchase Cost(Conventional Sources) = Purchase Cost(Total) - Purchase Cost(Renewable Sources)

- 7. Furthermore, with a view to consider energy costs only, transmission charges have been excluded from these calculations.
- 8. Thus, if APPC₁, APPC₂,....APPC_N are state level APPCs, and Q_1 , Q_2 ,... Q_N are volumes of non-RE power procured by the states respectively, then, APPC at the national level is computed as follows:

$$APPC_{(national)} = (\sum_{i=1}^{N} APPCiQi) / \sum_{i=1}^{N} Qi$$

9. Data for each state is given in Table- I below. Table – II gives links to the respective tariff orders from which data was extracted.

Table- I : State-wise Power Procurement Volume / Cost / Average Cost Per Unit for FY 2014-15				
SNo	State	Volume of Power procured from Non-RE Sources (Estimated) "X" (MUs)	Cost of Power procured from Non- RE Sources "Y" (INR Crores)	Average Cost of Non-RE Power "Y*10/X" (INR)
1	Andaman & Nicobar	172	178	10.36
2	Andhra Pradesh	39,485	16,000	4.05
3	Arunachal Pradesh	336	108	3.20
4	Assam	6,714	2,580	3.84
5	Bihar	20,980	8,136	3.88
6	Chandigarh	1,710	471	2.76
7	Chhatisgarh	23,499	4,929	2.10
8	Dadra Nagar Haveli	5,868	1,974	3.36
9	Daman Diu	2,206	763	3.46
10	Delhi	37,113	15,157	4.08
11	Goa	3,649	810	2.22
12	Gujarat	1,01,076	35,424	3.50
13	Haryana	52,226	18,450	3.53
14	Himachal Pradesh	2,784	731	2.63
15	Jammu & kashmir	11,272	3,278	2.91
16	Jharkhand [#]	4,623	1,912	4.14
17	Karnataka	54,863	16,926	3.09
18	Kerala	21,812	6,159	2.82
19	Lakshdweep	55	108	19.84
20	Madhya Pradesh	59,058	13,725	2.32
21	Maharashtra #	1,21,279	42,251	3.48
22	Manipur	836	246	2.94
23	Meghalaya	2,128	542	2.55
24	Mizoram	418	242	5.79
25	Nagaland	540	170	3.15
26	Orissa	24,530	6,456	2.63
27	Puducherry	2,996	872	2.91
28	Punjab*	19,188	7,186	3.75
29	Rajasthan	61,337	21,600	3.52
30	Sikkim	810	140	1.72
31	Tamilnadu	72,515	26,912	3.71
32	Telangana [#]	46,748	17,881	3.82
33	Tripura ^{\$}	693	199	2.88
34	Uttar Pradesh	92,090	32,677	3.55
35	Uttarakhand	11,904	3,003	2.52
36	West Bengal	44,357	15,871	3.58
	All INDIA	9,51,870	3,24,067	3.40

Tabl	Table- II. Link of Tariff Order referred for obtaining state-level data for power purchase quantum and cost for calculation of state APPCs			
Sr. No.	State	Discoms	Tariff Order	
1	Andaman & Nicobar		http://jercuts.gov.in/writereaddata/Files/tarifforderani114 14.pdf	
	Andhra Pradesh	APEPDCL	https://www.apeasternpower.com/ShowProperty/EP_CM_ REPO/WhatsNew/ARR%20For%20Retail%20Supply%20for% 20FY%202014-15	
2		APSPDCL	http://www.apspdcl.in/ShowProperty/SP_CM_REPO/Whats New/Retail%20supply%20ARR%20for%20the%20FY%20201 4-15	
3	Arunachal Pradesh		http://apserc.in/pdf/Aggregate-Reveneue-Requirement- and-Tariff-Order-2014-15.pdf	
4	Assam		http://www.apdcl.gov.in/irj/go/km/docs/internet/ASSAM/webpage/PDF/TARIFF_ORDER_2014_15.pdf	
5	Bihar	SBPCL	http://berc.co.in/media/Tariff- Order/SBPDCL%20Tariff%20Order%20FY%202014-15.pdf	
3	bilidi	NBPCL	http://berc.co.in/media/Tariff- Order/NBPDCL%20Tariff%20Order%20FY%202014-15l.pdf	
6	Chandigarh		http://jercuts.gov.in/writereaddata/Files/tarifforderchd114 14final.pdf	
		CSPDCL	http://www.cserc.gov.in/pdf/Order%202014/Tariff%20Order%20for%20FY%2014-15%20dt%2012.06.2014.pdf	
7	Chhatisgarh	JSPL	http://www.cserc.gov.in/pdf/order%202012/55- 2012%20JSPL%20Distribution%20Order%2013-16%20- %20Final.pdf	
		BSP(TEED)	http://www.cserc.gov.in/pdf/Order%202013/8,%2076%200 f%202013%20BSP%20Tariff%20Order.pdf	
8	Dadra & Nagar Haveli		http://jercuts.gov.in/writereaddata/Files/tarifforderDNH14 15.pdf	
9	Daman & Diu		http://jercuts.gov.in/writereaddata/Files/tarifforderdd1415 .pdf	
10	Delhi	TDDPL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff %20Order/Tariff%20Order%20for%20FY%202014-15/TPDDL%20Tariff%20order%20FY%202014-15.pdf	

		BYPL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff %20Order/Tariff%20Order%20for%20FY%202014- 15/BYPL%20Tariff%20order%20FY%202014-15.pdf
		BRPL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff %20Order/Tariff%20Order%20for%20FY%202014- 15/BRPL%20Tariff%20order%20FY%202014-15.pdf
		NDMC	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff %20Order/Tariff%20Order%20for%20FY%202014- 15/NDMC%20Tariff%20order%20FY%202014-15.pdf
11	Goa		http://jercuts.gov.in/writereaddata/Files/tariffordergoa154 14.pdf
	Gujarat	State Discoms combined	http://www.gercin.org/tarifforderpdf/en_1399290922.pdf
12		Torrent	http://www.gercin.org/tarifforderpdf/en_1401365864.pdf
		Torrent Ahmedabad	http://www.gercin.org/tarifforderpdf/en_1400308056.pdf
		Torrent Surat	http://www.gercin.org/tarifforderpdf/en_1399462789.pdf
13	Haryana		http://www.herc.gov.in/writereaddata/orders/o20140529b .pdf
14	Himachal Pradesh		http://www.hperc.org/orders/tariff14-15.pdf
15	Jammu & Kashmir		http://jkserc.nic.in/Distribution%20Tariff%202014- 15%20%28Final%29.pdf
		TSL	http://jserc.org/pdf/tariff_order/tsl_2015.pdf
16	Jharkhand [#]	JUSCO	http://jserc.org/pdf/tariff_order/jusco_2015.pdf
		SAIL BOKARO	http://jserc.org/pdf/tariff_order/sailbokaro2014.pdf
47	Karnataka	CESC	http://www.karnataka.gov.in/kerc/Downloads/COURT- ORDERS-2014/TARIFF-ORDER-CESC-2014.pdf
17		GESCOM	http://www.karnataka.gov.in/kerc/Downloads/COURT- ORDERS-2014/TARIFF%20ORDER-GESCOM-2014.pdf

		HESCOM	http://www.karnataka.gov.in/kerc/Downloads/COURT-ORDERS-2014/TARIFF-ORDER-HESCOM-2014.pdf
		BESCOM	http://www.karnataka.gov.in/kerc/Downloads/COURT-ORDERS-2014/TARIFF%20ORDER-BESCOM-2014.pdf
		MESCOM	http://www.karnataka.gov.in/kerc/Downloads/COURT-ORDERS-2014/TARIFF-ORDER-MESCOM-2014.pdf
18	Kerala		http://www.erckerala.org/userFiles/635439576817650000 _ARR&ERC%20for%20website%2018.8.2014.pdf
19	Lakshdweep		http://jercuts.gov.in/writereaddata/Files/tarifforderlkd114 14.pdf
20	Madhya Pradesh		http://www.mperc.nic.in/FINAL%20%20%20Tariff%20Order %20FY%202014-15%20May%2024.pdf
	Maharashtra [#]	MSEDCL	http://www.mercindia.org.in/pdf/Order%2058%2042/Order_Case_No_134%20of%202012.pdf
21		BEST	http://www.mercindia.org.in/pdf/Order%2058%2042/BEST %20MYT%20Order%20-%20Final%20Order%20-%20Case%2026%20of%202013-28%2008%202013.pdf
		R Infra	http://www.mercindia.org.in/pdf/Order%2058%2042/Order_Case_No%20_9_of_2013.pdf
		TPC Distribution	http://www.mercindia.org.in/pdf/Order%2058%2042/TPC-D%20MYT%20Order-Case%20No%20179%20of%20201128-06-2013-04-30pm.pdf
22	Manipur		https://jerc.mizoram.gov.in/downloads/file/146
23	Meghalaya		http://mserc.gov.in/orders/2014-15/ARR_MPDCL_2014- 15.pdf
24	Mizoram		https://jerc.mizoram.gov.in/uploads/files/mizoram-tariff- order-fy-2014-15-pdfpdf
25	Nagaland		http://www.nerc.org.in/index.php?option=com_content&view=category&layout=blog&id=42&Itemid=58
26	Orissa		http://www.orierc.org/orders/2011/Final_DISCOMs_Order _2014_15.pdf

27	Puducherry		http://jercuts.gov.in/writereaddata/Files/tarifforderpudu14 -15.pdf
28	Punjab*		http://pserc.nic.in/pages/PSPCL_TO_2014_15_Volume_I.pd f
29	Rajasthan		http://rerc.rajasthan.gov.in/TariffOrders/Order203.pdf
30	Sikkim		http://www.sserc.in/tariff-orders
31	Tamilnadu		http://tnerc.tn.nic.in/orders/Tariff%20Order%202009/2014 /Tariff%20Order/TANGEDCO/Tariff%20Order%209%20of%2 02014-TANGEDCO.pdf
32	Telangana [#]		http://www.tserc.gov.in/file_upload/uploads/Tariff%20Orders/Current%20Year%20Orders/Retail%20Supply%20Tariff%20Order%20for%20FY%202015-16.pdf
33	Tripura ^{\$}		http://terc.nic.in/Tariff_Order.pdf
2.4	Uttar Pradesh	State Discoms	http://www.uperc.org/App_File/DVVNLTariffOrderFY2014-151Oct2014-pdf101201441940PM.pdf
34		NPCL	http://www.uperc.org/App_File/NPCLTariffOrderFY2014- 151Oct2014-pdf101201440808PM.pdf
35	Uttarakhand		http://www.uerc.gov.in/orderspetitions/orders/Tariff/Tariff %20Order/2014- 15/Tariff%20Orders%20of%20UPCL,%20PTCUL,%20SLDC%2 0&%20UJVN%20Ltd.%20for%20FY%202014- 15/Tariff%20Order%20of%20UPCL%20for%20FY%202014- 15.pdf
36	West Bengal	WBSEDCL	http://www.wberc.net/wberc/tariff/wbsedcl/Tariff/ordnpe t2001/index.htm
		CESC	http://www.wberc.net/wberc/tariff/Cesc/Tariff/ordnpet20 01/index.htm
		DVC	http://www.wberc.net/wberc/tariff/dvc/Tariff/ordnpet200 1/Tariff%20Order_DVC_2014-2017_pdf.pdf
		DPL	http://wberc.net/wberc/tariff/dpl/Tariff/ordnpet2001/inde x.htm

*Does not include own	
generation	
# Data is taken for FY 2015-16	
\$ Data is taken for FY 2013-14	