

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 11/SM/2017

Coram:

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

Date of Order: 31st August, 2017

In the matter of

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

ORDER

The 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 (hereinafter referred to as "DSM Regulations") to provide for the Framework on Forecasting, Scheduling and Imbalance Handling for Variable Renewable Energy Sources (Wind and Solar).

2. The above 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 the 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 DSM 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, it is stated:

"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 the 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. The Commission notified order dated 25.1.2016, for 'Determination of Average Power Purchase Cost (APPC) at the national level' (Petition No. 15/SM/2015) and prescribed the National APPC as Rs. 3.40/ kWh.

The above APPC value was applicable during the remaining months of FY 2015-16, as well as for FY 2016-17, for the purpose of deviation settlement in respect of open access and captive wind and solar generators fulfilling the requirement of regional entities.

5. 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."

6. Accordingly, APPC at the national level for FY 2017-18 has been 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.
7. Data for approved purchase cost and volume of power for FY 2016-17, from the respective FY 2016-17 Tariff Order of the States, have been considered. Data used for calculation of APPC in respect of all States and UTs, exceptions as well as the calculations are given in the Annexure to this Order.
8. 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.
9. The Commission invited comments of stakeholders on the proposed determination of APPC through an Order notified on 18.7.2017, by 4.8.2017. However, no comments were received on the same.



10. Based on the tariff orders issued by the SERCs/JERCs for FY 2016-17, the APPC at the National level has been determined as Rs 3.48/kWh. This APPC shall be applicable during FY 2017-18 and until further orders, for the purpose of deviation settlement in respect of the open access and captive wind and solar generators that are regional entities.

11. The petition is disposed of in terms of the above.

Sd/-
(Dr. M.K. Iyer)
Member

Sd/-
(A.S. Bakshi)
Member

Sd/-
(A.K. Singhal)
Member

Sd/-
(Gireesh B. Pradhan)
Chairperson

New Delhi

31st August 2017



Annexure

DETERMINATION OF APPC AT THE NATIONAL LEVEL

1. 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 2016-17 was obtained from the respective 2016-17 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 Tamil Nadu and Tripura, 2014-15 Tariff Order has been considered, as the SERCs have not issued an order for 2015-16 or 2016-17.



b. For Delhi, Jharkhand, Tariff Order of 2015-16 has been considered, as these SERCs have not issued tariff order for 2016-17.

c. For Rajasthan, Orders for determination of pooled cost of power purchase for FY 2016-17 for AVVNL, JVNL, JdVVNL issued dated 17.05.2017 in Petition No. RERC-1082/17, 1106/17 and 1060/17 respectively have been considered.

In addition, for States viz. Gujarat, Maharashtra, Assam and Kerala, quantum and cost of power purchase for FY 2016-17 has been taken from latest available Tariff Orders and/or MYT Orders as applicable.

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:

$X_1, X_2, X_3, \dots, X_n$ denoting average per unit power purchase cost for respective utilities in a state (excluding cost of renewables).

$Q_1, Q_2, Q_3, \dots, Q_n$ denoting power quantum purchased (excluding renewable power).

Then,

$$\text{APPC(state)} = (\sum_{n=1}^n X_n Q_n) / \sum_{n=1}^n Q_n$$

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.

$$\text{Power Quantum}_{(\text{Conventional Sources})} = \text{Power Quantum}_{(\text{Total})} - \text{Power Quantum}_{(\text{Renewable Sources})}$$

$$\text{Purchase Cost}_{(\text{Conventional Sources})} = \text{Purchase Cost}_{(\text{Total})} - \text{Purchase Cost}_{(\text{Renewable Sources})}$$



7. Furthermore, with a view to consider energy costs only, transmission charges have been excluded from these calculations.
8. Thus, if $APPC_1, APPC_2, \dots, APPC_N$ are state level APPCs, and Q_1, Q_2, \dots, Q_N are volumes of non-RE power procured by the States respectively, then, APPC at the national level is computed as follows:

$$APPC_{(national)} = (\sum_{i=1}^N APPC_i Q_i) / \sum_{i=1}^N Q_i$$

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 2016-17				
S No.	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 Islands	203	216	10.64
2	Andhra Pradesh	51,840	18,723	3.61
3	Arunachal Pradesh	560	179	3.20
4	Assam ^	8,466	2,849	3.36
5	Bihar	28,476	10,946	3.84
6	Chandigarh	1,927	624	3.24
7	Chhattisgarh	30,015	8,401	2.80
8	Dadra & Nagar Haveli	6,202	1,998	3.22
9	Daman & Diu	2,055	820	3.99
10	Delhi \$	34,482	14,465	4.19
11	Goa	3,776	933	2.47
12	Gujarat*	85,664	29,479	3.44
13	Haryana	53,473	19,185	3.59
14	Himachal Pradesh	9,007	2,113	2.35
15	Jammu & Kashmir	11,977	3,542	2.96
16	Jharkhand \$	16,392	6,527	3.98
17	Karnataka	58,592	18,955	3.23
18	Kerala ^	23,814	7,772	3.26



19	Lakshadweep	59	72	12.15
20	Madhya Pradesh	57,367	16,201	2.82
21	Maharashtra*	1,21,362	42,296	3.49
22	Manipur	1,056	302	2.86
23	Meghalaya	2,339	600	2.57
24	Mizoram	496	141	2.84
25	Nagaland	791	254	3.21
26	Orissa	24,540	6,703	2.73
27	Puducherry	3,150	1,032	3.28
28	Punjab	35,389	12,589	3.56
29	Rajasthan ^	62,450	21,432	3.43
30	Sikkim	850	167	1.96
31	Tamil Nadu #	72,515	26,912	3.71
32	Telangana	49,663	19,267	3.88
33	Tripura #	1,934	542	2.80
34	Uttar Pradesh	1,25,693	47,552	3.78
35	Uttarakhand	13,178	3,476	2.64
36	West Bengal	45,426	16,327	3.59
	ALL INDIA	10,45,177	3,63,589	3.479

Table- II. Link of Tariff Orders referred for obtaining State-level data for power purchase quantum and cost for calculation of State APPCs

S No.	State	Discoms	Tariff Order
1	Andaman & Nicobar Islands		http://jercuts.gov.in/writereaddata/UploadFile/mytani6416_1466.pdf
2	Andhra Pradesh	APEPDCL	http://www.aperc.gov.in/aperc1/assets/uploads/files/d8f3e-to-16-17.pdf
		APSPDCL	http://www.aperc.gov.in/aperc1/assets/uploads/files/d8f3e-to-16-17.pdf
3	Arunachal Pradesh		http://apserc.in/pdf/tariff-orders/7-Final-TARIFF-ORDER-2016-17.pdf
4	Assam ^		http://aerc.nic.in/APDCL%20Tariff%20Order%20dated%2031.03.2017.pdf
5	Bihar	SBPCL	http://berc.co.in/orders/tariff/distribution/sbpcl/157-tariff-order-of-sbpcl-for-fy-2016-17
		NBPCL	http://berc.co.in/orders/tariff/distribution/nbpcl/160-tariff-order-of-nbpcl-for-fy-2016-17
6	Chandigarh		http://jercuts.gov.in/writereaddata/UploadFile/chdmytfinal28416_1127.pdf
7	Chhattisgarh	CSPDCL	http://www.cserc.gov.in/pdf/Order%202016/Tariff_Order%202016-17.pdf



		JSPL	http://www.cserc.gov.in/pdf/order%202012/55-2012%20JSPL%20Distribution%20Order%202013-16%20-%20Final.pdf
		BSP(TEED)	http://www.cserc.gov.in/pdf/Order%202013/8,%2076%20of%202013%20BSP%20Tariff%20Order.pdf
8	Dadra & Nagar Haveli		http://jercuts.gov.in/writereaddata/UploadFile/mytdnh7416_1073.pdf
9	Daman & Diu		http://jercuts.gov.in/writereaddata/UploadFile/mytdd6416_1144.pdf
10	Delhi \$	TPDDL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/2015-16/TPDDL.pdf
		BYPL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/2015-16/BYPL.pdf
		BRPL	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/2015-16/BRPL.pdf
		NDMC	http://www.derc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/2015-16/NDMC.pdf
11	Goa		http://jercuts.gov.in/writereaddata/UploadFile/mytgoa18416_1675.pdf
12	Gujarat*	4 State Discoms	http://www.gercin.org/uploaded/document/53b22956-8e4e-4ce1-b6b3-b65283c8fed3.pdf
		Torrent Dahej	http://www.gercin.org/uploaded/document/69b37fe0-7d94-4405-80ac-3523b00c299d.pdf
		Torrent Ahmedabad and Surat	http://www.gercin.org/uploaded/document/5919b8e4-22a6-4e6c-aa1b-574566c10655.pdf
13	Haryana		https://herc.gov.in/writereaddata/orders/o20160801.pdf
14	Himachal Pradesh		http://hperc.org/File/tariff1617.pdf
15	Jammu & Kashmir		http://www.jkserc.nic.in/FINAL%20JKPDD-D%20Order%202nd%20MYT_07%20Oct%202016_v4.pdf
16	Jharkhand \$	TSL	http://jserc.org/pdf/tariff_order/tsl_2015.pdf
		JUSCO	http://jserc.org/pdf/tariff_order/jusco_2015.pdf
		SAIL BOKARO	http://jserc.org/pdf/tariff_order/sailbokaro2014.pdf
		JBVNL	http://jserc.org/pdf/tariff_order/jbvn12015.pdf
17	Karnataka	CESC	http://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2016/TARIFF_FY-17/ORDER_CESC.pdf
		GESCOM	http://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2016/TARIFF_FY-17/ORDER_GESCOM.pdf



		2016/TARIFF_FY-17/ORDER_GESCOM.pdf
	HESCOM	http://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2016/TARIFF_FY-17/ORDER_HESCOM.pdf
	BESCOM	http://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2016/TARIFF_FY-17/ORDER_BESCOM.pdf
	MESCOM	http://www.karnataka.gov.in/kercold/Downloads/COURT-ORDERS-2016/TARIFF_FY-17/ORDER_MESCOM.pdf
18	Kerala ^	http://www.erckerala.org/userFiles/636281120645520000_Chapter%201%20to%2016_18_4_2017-final%20CM-Final%20to%20web.pdf
19	Lakshadweep	http://jercuts.gov.in/writereaddata/UploadFile/mytlkd31316_1488.pdf
20	Madhya Pradesh	http://www.mperc.nic.in/050416-PNo-73-2015-tariff-2016-17.pdf
21	Maharashtra*	https://www.merc.gov.in/mercweb/faces/merc/common/outputClient.xhtml;jsessionid=c8a748d9ba7b79dbb69efe536366#
	MSEDCL	Order-48 of 2016
	BEST	Order 33 of 2016
	R Infra	Order-34 of 2016
	TPC Distribution	Order-47 of 2016
22	Manipur	https://jerc.mizoram.gov.in/downloads/file/201
23	Meghalaya	http://www.msrec.gov.in/orders/TariffOrders_31032016/MePDCL_31032016.pdf
24	Mizoram	https://jerc.mizoram.gov.in/downloads/file/202
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/Retail%20Tariff%20Order%202016-17.pdf
27	Puducherry	http://jercuts.gov.in/writereaddata/UploadFile/uploadingedp_1556.pdf
28	Punjab	http://pserc.nic.in/pages/PSPCL-TO-FY-2016-17-VOL-1.pdf
29	Rajasthan ~	http://rerc.rajasthan.gov.in/TariffOrders/Order262.pdf http://rerc.rajasthan.gov.in/TariffOrders/Order263.pdf http://rerc.rajasthan.gov.in/TariffOrders/Order264.pdf
30	Sikkim	http://www.sserc.in/sites/default/files/TARIFF%20ORDER%20-%202016-17%28FINAL%29%2011.4.2015.pdf



31	Tamil Nadu [#]		http://tnerc.tn.nic.in/orders/Tariff%20Order%202009/2014/Tariff%20Order/TANGEDCO/Tariff%20Order%209%20of%202014-TANGEDCO.pdf
32	Telangana		http://tserc.gov.in/file_upload/uploads/Tariff%20Orders/Current%20Year%20Orders/Retail%20Supply%20Tariff%20Order_2016-17.pdf
33	Tripura [#]		http://terc.nic.in/pdf/Tariff_Order_2014-15_in_PDF_form.pdf
34	Uttar Pradesh	All State Discoms	http://www.uperc.org/App_File/DVVNLTariffOrderFY2016-17-August1,2016-pdf81201633501PM.pdf
		NPCL	http://www.uperc.org/App_File/NPCLDraftOrderFY2016-17-August1,2016-pdf81201633539PM.pdf
35	Uttarakhand		http://www.uerc.gov.in/ordersPetitions/orders/Tariff/Tariff%20Order/2016-17/Tariff%20Orders%20for%20FY%202016-17/Tariff%20Order%20of%20UPCL%20for%20FY%202016-17.pdf
36	West Bengal	WBSEDCL	http://www.wberc.net/wberc/tariff/wbsedcl/Tariff/ordnpet2001/index.htm
		CESC	http://www.wberc.net/wberc/tariff/Cesc/Tariff/ordnpet2001/index.htm
		DVC	http://www.wberc.net/wberc/tariff/dvc/Tariff/ordnpet2001/Tariff%20Order_DVC_2014-2017_pdf.pdf
		DPL	http://wberc.net/wberc/tariff/dpl/Tariff/ordnpet2001/index.htm

Tamil Nadu, Tripura - Tariff Order issued in 2014-15 considered

\$ Delhi, Jharkhand - Tariff Order issued in 2015-16 considered

*Maharashtra - Approved ARR values for 2016-17 from MYT Order for 3rd Control Period FY 2016-17 to FY 2019-20 considered

* Gujarat - Approved ARR values for 2016-17 from MYT Tariff Order 2017-18 to 2020-21 for respective discoms considered

^ Assam - Approved ARR values for 2016-17 from Tariff Order for 2017-18 dated 31.03.2017 considered

^ Kerala - Approved ARR values for 2016-17 from Tariff Order for 2017-18 dated 17.04.2017 considered

~ Rajasthan - Orders for determination of pooled cost of power purchase for FY 2016-17 for AVVNL, JVVNL, JdVVNL issued dated 17.05.2017 in Petition No. RERC-1082/17, 1106/17 and 1060/17 respectively are considered

