SOUTHERN POWER DISTRIBUTION COMPANY OF AP LTD

From
Chief General Manager (P&MM, IPC)
APSPDCL, Kesavayanagunta,
Besides Srinivasa Kalyanamandapam,
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To
The Secretary,
APERC, 4th Floor,
Singareni Bhavan,
Red Hills, Hyderabad.

Lr.No.CGM(P,MM&IPC)/APSPDCL/F. /D.No.183/18, Dt: 19.07.2018

Sir,

Sub: APDISCOMs intend to invite tender for procurement of 1000 MW distributed solar power at the interconnection point of 33 kV/11 kV substations covering the entire state- Approval - Requested- Reg.

Ref: 1. Lr.No.CGM (P,MM&IPC)/APSPDCL/DE2/F1000 MW/D.No.746/18, Dt:27.03.18
2. Lr.No.CGM/ P&MM,IPC/ APSPDCL/ F/ D. No. 38/ 18, dt. 25.04.2018
3. Lr.No.APERC/JD(PPP)/DD/PPP/F.No.E-1056/D.No.396./2018,dt.15.05.2018

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1. Kind Attention is invited to the reference (3) cited above, wherein the Hon'ble Commission has returned the APDISCOMs proposals submitted for approval for (i) invitation of tender for procurement of 1000 MW distributed solar power at the interconnection point of 33 kV/11 kV substations covering the entire state and (ii) the deviations & the modifications proposed in the draft PPA to initiate the Bidding Process, with a direction to DISCOMs to submit the need for power for this 1000 MW Distributed Solar Power at the interconnection point of 33/11 KV Substations covering the entire State in terms of the Resource Plan, Load Forecast, Power Procurement Plan and Distribution plan (Capital Investment Plan) and State Electricity Plan for 4th control period.

2. In compliance to the directions of the Hon'ble Commission, the following is submitted:

i. *APSPDCL on behalf of APDISCOMs intend to invite tender to procure 1000 MW distributed solar power across Andhra Pradesh to reduce power purchase cost for APDISCOMs which would also help in reducing the distribution losses.*

ii. *Solar power penetration in the country has seen multi -fold rise in the last two years in India (3 GW in FY 2015 to 12 GW in FY 2017) with solar tariffs falling*

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over 60 per cent during this period. For 500 MW solar plant at Bhadla/Rajasthan, solar power tariff of INR 2.44/unit was discovered, which is the lowest solar tariff discovered so far and also would be competitive with variable cost of thermal plants.

iii. *With fall in solar tariffs, APDISCOMS intend to displace part of existing thermal power source with 1,000 MW distributed solar generation spread across Andhra Pradesh. As per Merit Order Dispatch (MOD) approved in Tariff Order 2018-19, following are the list of stations with highest variable cost (in descending order):*

Table 1: Merit Order Dispatch (MOD) for FY 2018-19 as per Tariff Order 2018-19

Sl. No.	Station	Variable Cost (INR/kWh)	Energy (MU)
1	Kudigi	3.58	103.77
2	RTPP Stage IV	3.14	826.37
3	RTPP Stage III	3.14	435.16
4	RTPP Stage II	3.14	1,065.34
5	RTPP Stage I	3.14	1,714.47

iv. Karnataka Renewable Energy Development Limited (KREDL) had tendered 860 MW of grid-connected solar PV to be developed across 43 taluks in Karnataka in December 2017 and power purchase agreements have been signed for 640 MW. For the 640 MW solar projects, the tariffs discovered ranged from INR 2.94/kWh to INR 3.36/kWh across different taluks of Karnataka. For 1,000 MW distributed solar tender in AP, APDISCOMs also anticipates to discover solar tariffs less than INR 3.00/kWh.

v. Replacing daytime power from above stations with distributed solar generation shall decrease power purchase cost for DISCOMS (NPV savings of INR 3,444 Cr. due to distributed solar generation with annual savings in range of INR 200 Cr. to INR 855 Cr. for 25 years as illustrated below). Other key benefits of distributed solar generation are:

- Farmers shall be provided with day time power supply for agriculture for 8-9 hours with support of existing solar capacity

- Solar power generation shall reduce usage of coal during non-peak months and result in saving unused coal for peak months. As a result, DISCOMs shall decrease purchase of power at high prices from exchange and other sources during peak months. Due to 1000 MW distributed solar generation (~1,800 MUs annually), DISCOMs shall save coal of ~1.32 Million tonnes per annum to be used during peak season.

- Transmission evacuation costs of ~ INR 0.60-1.00/kWh can be avoided due to distributed solar generation

- Transmission and distribution losses (33 kV losses) adding upto ~ 7-8% on power purchase cost can be avoided due to distributed solar generation.

vi. In tender floated by APDISCOMS for procurement of 5 MW Solar power injected at 33kV/11kV Makkuva substation, tariff discovered after e-Reverse auction is INR 3.20/kWh. Hence, for the savings computation for distributed solar, the cost of power generation from distributed solar plants is assumed to be INR 3.20/kWh. The annual CUF for solar is assumed to be 21% with annual degradation of solar panels assumed as 0.5%.

Table 2: Key Assumptions for 1000 MW Distributed Solar plants

Parameter	Units	Value
Annual CUF	%	21%
Annual solar generation	MU	1,839.60
Cost of solar generation	INR/kWh	3.20

vii. Further it is to submit that, SECI initiated the bidding process for development of 750 MW Solar Power Project at Kadapa Ultra Mega Solar Park and the tariff of Rs 2.70/unit for 500 MW and Rs 2.71/unit for 250 MW is discovered. Net tariff payable by APDISCOMs including the trading Margin (Rs 0.07/unit) is works out to Rs 2.77/unit for 500 MW and Rs 2.78/unit for 250 MW. Adding transmission costs, transmission losses and 33 kV distribution losses, the total cost of power from Solar park till 33 kV substation is INR 3.61/kWh as shown below. This corresponds to annual savings of INR 75 Cr. with distributed solar generation. The NPV savings are estimated to be INR 654 Cr. for 25 years.

Table 3: Savings with distributed solar plants vis-à-vis Solar Park

Parameter	Units	Value
Solar park tariff in SECI tender including Trading margin	INR/kWh	2.77
Transmission costs	INR/kWh	0.60
Transmission losses and 33 kV distribution losses	INR/kWh	7%
Total cost of power from solar park	INR/kWh	3.61
Annual Savings with distributed solar vis-à-vis Solar Park	INR Cr.	75
NPV of savings	INR Cr.	654

viii. The actual variable cost for RTPP for FY17 is INR 3.79/kWh. Assuming an Year Over Year increase of 3% in variable cost for RTPP, the annual savings with distributed Solar vis-à-vis thermal plants is estimated to be INR 200 Cr. with NPV savings of INR 3,444 Cr. (Calculations annual savings listed in Annexure-1).

Table 4: Savings with Distributed Solar plants vis-à-vis Thermal power source

Parameter	Units	Value
Actual variable cost for RTPP in FY17	INR/kWh	3.79
Increase in Variable cost	%	3%
Levelized Variable cost of RTPP	INR/kWh	5.11
Transmission losses and 33 kV distribution losses	%	7%
Annual Savings with distributed Solar vis-à-vis thermal source	INR Cr.	200
NPV of savings	INR Cr.	3,444

3. In view of the above, APDISCOMs opined that structuring of the tender from a technical and economic standpoint which takes into account the unique aspects of distributed solar power generation can enable the electricity distribution companies in the state of Andhra Pradesh to successfully tap solar energy at an optimal cost and reduce power purchase cost for APDISCOMs. As agricultural consumption has a key

bearing on the load incident on the system in Andhra Pradesh, 33 kV/11 kV sub-stations can be selected based on the quantum of agricultural demand at that particular substation.

4. In view of the advantages in de-centralized solar generation, APDISCOMs intend to invite tender to procure 1,000 MW distributed solar power at the interconnection point of 33 kV/ 11 kV sub- stations covering the entire state.

5. Further it is to submit that, in compliance to the directions of the Hon'ble Commission, the proposal for procurement of 1000 MW grid connected Solar power at 33/11 KV SS across AP State is included in the resource plan, load forecast, power procurement plan, and distribution plan for the 4th control period (FY2019-2020 to 2023-24) which will be submitted to Hon'ble APERC shortly.

6. Hence, Hon'ble Commission is requested to grant the permission to APSPDCL to initiate the tender process for procurement of 1,000 MW distributed solar power at the interconnection point of 33 kV/ 11 kV sub- stations covering the entire state.

Yours faithfully,

Chief General Manager (P&MM, IPC)

APSPDCL

Annexure-1

Savings for distributed solar vis-à-vis Thermal plants

Year	Units	1	5	10	15	20	25
Variable cost of thermal power from RTPP	INR/ kWh	4.10	4.80	5.83	7.10	8.64	10.51
Transmission and 33 kV Distribution loss	INR/ kWh	0.26	0.26	0.26	0.26	0.26	0.26
Cost of thermal power	INR/ kWh	4.36	5.06	6.10	7.36	8.90	10.77
Cost of Solar power	INR/ kWh	3.20	3.20	3.20	3.20	3.20	3.20
Annual generation	MU	1,839.6	1,803.1	1,763.3	1,714.90	1,672.50	1,631.10
Savings due to Solar power	INR Cr.	199.8	286.8	407.6	539.7	688.4	854.5
NPV of savings	INR Cr.	3,443.9					