

STAFF PAPER

Proposal for revision of Renewable Purchase Obligation (RPO) for FY 2018-19 & FY 2019-20 and specifying RPO for FY 2020-21 & FY 2021-22 and draft Amendment-2 in Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) Regulations, 2011

The Electricity Act, 2003 (Act), under Section 86(1)(e) mandates the Commission to promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee.

2. Ministry of Power, Government of India, vide its Resolution dated 20.01.2011 published in The Gazette of India Extraordinary on 22.01.2011, made an amendment in the title of para 6.4 and contents of para 6.4 (1) of the Tariff Policy notified under Section 3 of the Electricity Act, 2003. Vide the said amendment, it was provided that within the minimum percentage of the total consumption of electricity in the area of a distribution licensee for purchase of electricity from renewable sources of energy to be specified, SERCs shall also reserve a minimum percentage for purchase of solar energy which will go up to 0.25% by the end of 2012-13 and further up to 3% by 2022.

3. The Commission, in Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) Regulations, 2011 (Notification No. PSERC/Secy./Reg./55 dated 03.06.2011), published in Punjab Government Gazette dated 10.06.2011, to comply with the aforementioned provisions specified the minimum percentages of electricity to be purchased from sources of renewable energy (RE) by the obligated entity, of the total consumption of electricity in the area of distribution licensee including solar in the State for the period 2011-12 to 2014-15 as follows:

Year	2011-12	2012-13	2013-14	2014-15
Non-Solar RPO(%)	2.37	2.83	3.37	3.81
Solar RPO (%)	0.03	0.07	0.13	0.19
Total	2.4	2.9	3.5	4.0

4. The RPO was finalized after inviting comments suggestions from various stakeholders and consultative discussion with PEDA and PSPCL on the basis of renewable energy capacity likely to be added/ installed in the State and committed to PSPCL.

5. The Commission, in Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) (Amendment-1) Regulations, 2015 (Notification No. PSERC/Secy./Reg./100 dated 06.05.2015), published in Punjab Government

Gazette dated 06.05.2015 specified the minimum percentages of electricity to be purchased from sources of renewable energy (RE) by the obligated entity, of the total consumption of electricity in the area of distribution licensee including solar in the State for the period 2015-16 to 2019-20 as follows:

Year	2015-16	2016-17	2017-18	2018-19	2019-20
Non-Solar RPO(%)	3.9	4.1	4.2	4.3	4.5
Solar RPO (%)	1.0	1.3	1.8	2.2	2.5
Total	4.9	5.4	6.0	6.5	7.0

6. The revised Tariff Policy notified on 28.01.2016 by the Government of India provides as under:

“6.4 Renewable sources of energy generation including Co-generation from renewable energy sources:

(1) Pursuant to provisions of section 86(1)(e) of the Act, the Appropriate Commission shall fix a minimum percentage of the total consumption of electricity in the area of a distribution licensee for purchase of energy from renewable energy sources, taking into account availability of such resources and its impact on retail tariffs. Cost of purchase of renewable energy shall be taken into account while determining tariff by SERCs. Long term growth trajectory of Renewable Purchase Obligations (RPOs) will be prescribed by the Ministry of Power in consultation with MNRE.

Provided that cogeneration from sources other than renewable sources shall not be excluded from the applicability of RPOs.

- (i) Within the percentage so made applicable, to start with, the SERCs shall also reserve a minimum percentage for purchase of solar energy from the date of notification of this policy which shall be such that it reaches 8% of total consumption of energy, excluding Hydro Power, by March 2022 or as notified by the Central Government from time to time.
- (ii) Distribution Licensee(s) shall compulsorily procure 100% power produced from all the Waste-to-Energy plants in the State, in the ratio of their procurement of power from all sources including their own, at the tariff determined by the Appropriate Commission under Section 62 of the Act.
- (iii) It is desirable that purchase of energy from renewable sources of

energy takes place more or less in the same proportion in different States. To achieve this objective in the current scenario of large availability of such resources only in certain parts of the country, an appropriate mechanism such as Renewable Energy Certificate (REC) would need to be promoted. Through such a mechanism, the renewable energy based generation companies can sell the electricity to local distribution licensee at the rates for conventional power and can recover the balance cost by selling certificates to other distribution companies and obligated entities enabling the latter to meet their renewable power purchase obligations. The REC mechanism should also have a solar specific REC.

- (iv) Appropriate Commission may also provide for a suitable regulatory framework for encouraging such other emerging renewable energy technologies by prescribing separate technology based REC multiplier (i.e. granting higher or lower number of RECs to such emerging technologies for the same level of generation). Similarly, considering the change in prices of renewable energy technologies with passage of time, the Appropriate Commission may prescribe vintage based REC multiplier (i.e. granting higher or lower number of RECs for the same level of generation based on year of commissioning of plant).

.....”

7. Punjab Energy Development Agency (PEDA), the designated nodal agency for promotion of renewable energy projects in the State of Punjab, vide its letter no. 6213 dated 19.02.2016 requested the Commission to fix the RPO targets for Solar Power such that it reaches 8% of total consumption of energy, excluding hydro power by March, 2022 in line with the amendment in the Tariff Policy of January, 2016. Further, PEDA vide letter no. 816 dated 17.05.2016 requested the Commission to re-fix the RPO target for solar such that it reaches 8.5% of total consumption of energy, excluding hydro power by March, 2022.

8. The Government of India has announced a target of 175 GW of renewable capacity by 2022 in February, 2015. In order to achieve the target of 175 GW of

renewable capacity by March, 2022, Ministry of Power, Government of India, in consultation with Ministry of New and Renewable Energy, vide its Order dated 22.07.2016 notified the long term growth trajectory of RPOs for Non-solar as well as Solar uniformly for all States / Union Territories. Ministry of Power requested that SERCs may consider notifying RPO for their respective States in line with the following uniform RPO trajectory, initially for three years from FY 2016-17 to FY 2018-19:

Year	2016-17	2017-18	2018-19
Non-Solar RPO(%)	8.75%	9.50%	10.25%
Solar RPO (%)	2.75%	4.75%	6.75%
Total	11.50%	14.25%	17.00%

The aforementioned non-solar long term trajectory for FY 2016-17 to FY 2018-19 has been calculated by excluding hydro power from the total consumption of electricity by the distribution licensee.

9. Secretary, Ministry of New and Renewable Energy, Gol vide D.O. No. 66/188/2016-WE dated 14.09.2016 requested the Commission to notify the RPOs as per long term growth trajectory specified by Ministry of Power.

10. Principal Secretary, Deptt. of NRES, Govt. of Punjab vide D.O. No. 4155 dated 24.10.2016 requested the Commission to consider amending the RPO trajectory in accordance with Ministry of Power order dated 22.07.2016.

11. Thereafter, Chief Engineer (R&R), Ministry of Power, Government of India, vide Order dated 14.06.2018, in continuation of the earlier order dated 22.07.2016, notified the long term growth trajectory of RPOs for Non-solar as well as Solar uniformly for all States / Union Territories for further three years from FY 2019-20 to FY 2021-22 and requested that SERCs may consider notifying the RPO for their respective states in line with the following uniform RPO trajectory:

Year	2019-20	2020-21	2021-22
Non-Solar RPO(%)	10.25%	10.25%	10.50%
Solar RPO (%)	7.25%	8.75%	10.50%
Total	17.50%	19.00%	21.00%

The aforementioned solar and non-solar RPO trajectory of a DISCOM for FY 2019-20 to FY 2021-22 has to be calculated by excluding consumption met from hydro sources of power.

12. In order to revise the RPO for FY 2018-19 & FY 2019-20 and to specify the RPO for FY 2020-21 & FY 2021-22 in line with the trajectory specified by Ministry of Power, Gol, this staff paper has been prepared for inviting comments/suggestions of various stakeholders on the same before the same is finalized by the Commission.

13. (a) The projections given by PEDDA for RE capacity addition in the State in its letter dated 28.01.2015 are as follows:

Projections for RE capacity addition							
Capacity (MW)	Likely Upto 31.03.2015	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Solar	270	250	750	1000	1000	850	4120
Small Hydro	135	15	9.80	6	2.5	10	178.3
Biomass	62.5	20	30	30	30	30	202.5
Co-gen.	153	10	18	20	30	30	261
Biogas	1	-	2	-	5	5	13
Total	621.5	295	809.8	1056	1067.5	925	4774.8

(b) Further, in the letter dated 11.04.2018, PEDDA has intimated the capacity addition for Renewable Energy Generation in FY 2017-18 and projections for the FY 2018-19 as under:-

(i) RE Capacity addition in FY 2017-18 submitted by PEDDA

Sr. No.	Type of RE Projects	RE capacity installed during FY 2017-18	Cumulative RE installed capacity as on 31.03.2018
		MW	MW
1.	Solar Power Projects	104	894
2.	Solar Power Projects (Canal Top)	7.50	12.5
3.	Small Hydro Projects	22.65	167.8
4.	Biomass Cogeneration Projects	20	433.40
5.	Biomass Power Project	Nil	62.5
6.	Waste to Energy	Nil	1.50
7.	Total	154.15	1571.70

(ii) Projections of RE capacity addition submitted by PEDDA for FY 2018-19

RE Capacity Addition Projections for FY 2018-19					
Bio-mass	Non-fossil Fuel Cogeneration	Small Hydro	Solar	Biogas + waste to energy	Total
(MW)	(MW)	(MW)	(MW)	(MW)	(MW)
15.00	30.00	10	250	Nil	305

14. PSPCL vide letter no. 545 dated 23.05.2018 has intimated the capacity addition for Renewable Energy Generation in FY 2017-18 and projections for the FY 2018-19 as under:-

(i) RE Capacity addition in FY 2017-18

Sr. No.	Type of RE Projects	RE capacity installed during FY 2017-18	Cumulative RE installed capacity as on 31.03.2018
		(MW)	(MW)
1.	Solar Power Projects	84.8	929.27
2.	Solar Power Projects (Canal Top)	7.50	12.5
3.	Small Hydro Projects	22.65	164.85
4.	Biomass Cogeneration Projects	13.5	170.7*
5.	Biomass Power Project	Nil	63.2
6.	Waste to Energy	Nil	1.50 (1.00 MW based on dairy waste + 0.5 MW based on biogas/ cattle dung)
7.	Total	128.45	1342.02

* Committed to PSPCL out of the total installed capacity.

(ii) Projections submitted by PSPCL for FY 2018-19

RE Capacity Addition Projections for FY 2018-19					
Bio-mass (MW)	Non-fossil Fuel Cogeneration (MW)	Small Hydro (MW)	Solar (MW)	Biogas + waste to energy (MW)	Total (MW)
14.00	24.5	8.65	57.5 [7.5 MW (canal solar) + 50 MW]	Nil	104.65

(iii) Projections submitted by PSPCL for FY 2019-20

PSPCL vide its email dated 25.05.2018 and 31.07.2018 has intimated the projections for renewable energy capacity addition as under:

RE Capacity Addition Projections for FY 2019-20						
Bio-mass (MW)	Non-fossil Fuel Cogeneration (MW)	Small Hydro (MW)	Solar (MW)	Biogas + waste to energy (MW)	Wind (MW)	Total (MW)
30.00	0.00	0.00	60.00 (10 + 50)	0.00	350.00	

15. Considering the data submitted by PSPCL, the details of Non-Solar and Solar capacity viz-a-viz expected generation in FY 2018-19 and FY 2019-20 are as under:

Estimated RE capacity and generation in FY 2018-19 & FY 2019-20

FY	2018-19		2019-20	
	Capacity (MW)	Generation (MU)	Capacity (MW)	Generation (MU)
Solar	999.27 [929.27 (as on 31.03.2018)+12.5+ 7.5 + 50]	1663.18	1059.27 [999.27 (as on 31.03.2019) +10+50]	1763.04
Non-Solar				
Biomass	77.2 [63.2 (as on 31.03.2018) + 14]	541.02	107.2 [77.2 (as on 31.03.2019) +30]	751.26
Non-fossil Fuel Cogeneration (MW)	194.7 [170.7(as on 31.03.2018) + 24]	903.95	194.7	903.95
Small Hydro (MW)	173.5 [164.85(as on 31.03.2018) + 8.65]	456.00	173.5	456.00
Biogas + waste to energy (MW)	1.50 (including 0.5 MW biogas IPP)	10.51	1.50	10.51
Wind	-	-	350.00 (as per PSAs with SECI)	919.8
Total Non-Solar	446.90	1911.48	826.90	3041.52

16. In case the proposed revised RPO trajectory specified in the MoP Order dated 22.07.2016 (for FY 2018-19) and 14.06.2018 (for FY 2019-20 to FY 2021-22) is adopted, the renewable energy requirement for FY 2018-19 to FY 2021-22 would be as follows.

The RE requirement is based on the following assumptions:

- i. The total energy availability for distribution in the area of PSPCL for FY 2019-20 onwards has been considered by allowing an annual increase of 5%.
- ii. Hydro capacity addition in the State for FY 2019-20, FY 2020-21 & FY 2021-22 has been considered as 'NIL'.

(i) RE requirement for FY 2018-19

Sr. No.	Description	FY 2018-19	
1.	Energy requirement at State periphery (as per T.O. for FY 2018-19 at Pg. 80)	55717.63 MU	
2.	Hydro Generation	13568.80 MU	
3.	Energy Input for RPO compliance (1-2)	42148.83 MU	
4.	RPO specified by MoP and proposed to be adopted by the Commission		
	i. Non-Solar	10.25 %	4320.26 MU
	ii. Solar	6.75 %	2845.05 MU
5.	RPO already specified by the Commission		
	i. Non-Solar	4.3%	1812.39 MU
	ii. Solar	2.2%	927.27 MU
6.	Additional RE requirement to be complied with in FY 2018-19 (4-5)		
	i. Non-Solar	5.95 %	2507.87 MU
	ii. Solar	4.55 %	1917.78 MU
	iii. Total		4425.65 MU

(ii) RE requirement for FY 2019-20

Sr. No.	Description	FY 2019-20	
1.	Energy requirement at State periphery (5% increase in energy requirement for FY 2018-19)	58503.51 MU	
2.	Hydro Generation	13568.80 MU	
3.	Energy Input for RPO compliance (1-2)	44934.71 MU	
4.	RPO specified by MoP and proposed to be adopted by the Commission		
	i. Non-Solar	10.25 %	4605.80 MU
	ii. Solar	7.25 %	3257.76 MU
5.	RPO already specified by the Commission		
	i. Non-Solar	4.5%	2022.06 MU
	ii. Solar	2.5%	1123.36 MU
6.	Additional RE requirement to be complied with in FY 2019-20 (4-5)		
	i. Non-Solar		2583.74 MU
	ii. Solar		2134.40 MU
	iii. Total		4718.14 MU

(iii) RE requirement for FY 2020-21

Sr. No.	Description	FY 2020-21	
1.	Energy required at State periphery (5% increase in energy requirement for FY 2019-20)	61428.68 MU	
2.	Hydro Generation	13568.80 MU	
3.	Energy Input for RPO compliance (1-2)	47859.88 MU	
4.	RPO specified by MoP and proposed to be adopted by the Commission		
	i. Non-Solar	10.25 %	4905.64 MU
	ii. Solar	8.75%	4187.74 MU
5.	RPO already specified by the Commission for FY 2020-21 (yet to be notified and considered same as that of FY 2019-20)		
	i. Non-Solar	4.5%	2153.69 MU
	ii. Solar	2.5%	1196.49 MU
6.	Additional RE requirement to be complied with in FY 2020-21 (4-5)		
	i. Non-Solar		2751.95 MU
	ii. Solar		2991.25 MU
	iii. Total		5743.20 MU

(iv) RE requirement for FY 2021-22

Sr. No.	Description	FY 2021-22	
1.	Energy required at State periphery (5% increase in energy requirement for FY 2020-21)	64500.11 MU	
2.	Hydro Generation	13568.80 MU	
3.	Energy Input for RPO compliance (1-2)	50931.31 MU	
4.	RPO specified by MoP and proposed to be adopted by the Commission i. Non-Solar ii. Solar	10.50 % 10.50 %	5347.78 MU 5347.78 MU
5.	RPO already specified by the Commission for FY 2021-22 (yet to be notified and considered same as that of FY 2019-20) i. Non-Solar ii. Solar	4.5% 2.5%	2291.91 MU 1273.28 MU
6.	Additional RE requirement to be complied with in FY 2021-22 (4-5) i. Non-Solar ii. Solar iii. Total		3055.87 MU 4074.50 MU 7130.37 MU

17. The Commission in its Order dated 16.03.2018 in petition no. 51 of 2017 allowed the carry forward of shortfall in Non-Solar RPO of FY 2015-16 & FY 2016-17 to the next year i.e. FY 2017-18 and adjusted the excess Solar energy after meeting the Solar RPO against the Non-Solar RPO shortfall. The Commission held that the remaining shortfall in Non-Solar RPO of 1872.40 MUs shall be in addition to the RPO compliance for FY 2017-18 specified in the PSERC (Renewable Purchase Obligation and its compliance) Regulations, 2011, read with Amendment-1 notified by the Commission on 06.05.2015.

18. Additional Financial burden for meeting enhanced RPO target specified by MoP

PSPCL may be able to comply with the Solar RPO trajectory by procuring Solar power from sources within the State as well as outside the State and Non-Solar power which includes compliance with the 'NGT' directions and 'Tariff Policy Guidelines' by procuring power from a mix of Non-Solar energy sources or purchasing RECs.

- (a) (i) Cost of Non-Solar Power: It has been observed that the cost of power from Non-Solar renewable energy sources such as Wind has declined gradually over the years and has become competitive with conventional power. However, the cost of power from other Non-Solar renewable energy sources such as Biomass, Bagasse, Biomass Gasifier and Biogas based power projects is still high. Power from Waste to Energy projects being at even higher cost, shall have to be compulsorily procured by distribution licensee as per clause 6.4(1)(ii) of Tariff

Policy, 2016. The National Green Tribunal has also directed that rice-straw generated in the State has to be used for power generation to save the environment. This would cost more than conventional power. Small Hydro power, which is cheaper than conventional power, is not available in such a large quantity.

(ii) Cost of Solar Power: It is also observed that the cost of power from Solar renewable energy sources has declined considerably over the years and has become competitive with conventional power as mentioned below.

(b) As per the data submitted by PSPCL in its petition for APR for 2017-18 and Revised Estimates for FY 2018-19 under Format 7, 2017-18 (H1+H2), the cost for long term purchase of Non-Solar and Solar power is 567.01 paise per unit and 674.71 paise per unit respectively.

(c) PSPCL has signed two PSAs for procurement of wind power with Solar Energy Corporation of India (SECI) for 150 MW @ Rs. 2.72 / kWh and 200 MW @ Rs. 2.52 / kWh respectively. As per the PSAs the said power is expected to be available in May, 2019 and December, 2019 respectively. The recent rates of Wind power (Non-Solar power) as per Economic Times dated 06.04.2018 are Rs. 2.51 per unit in the auction of around 2000 MW held by SECI.

(d) It has further been gathered as under:

- i) Maharashtra Electricity Regulatory Commission vide order dated 09.01.2018 passed in case no. 164 of 2017 has decided the rate of Rs. 3.00 / kWh for a 200 MW solar power plant.
- ii) Rajasthan Electricity Regulatory Commission vide order dated 09.10.2017 has decided the generic tariff for Solar PV Power Plants / Rooftop Solar PV installations as Rs. 3.93 / kWh, if Accelerated Depreciation (AD) benefit is not availed.
- iii) Tamil Nadu Electricity Regulatory Commission vide order no. 5/2018 dated 28.03.2018 has passed Suo-Motu tariff order on solar power at the tariff of Rs. 3.11 / kWh, if AD benefit is not availed.
- iv) Recent rates for Solar power as per Economic Times dated 11.07.2018 are between Rs. 3.48 – Rs. 3.55 per unit in the latest auction for 1000 MW held by UPNEDA showing a rising trend.

(e) It may be mentioned here that if PSERC does not revise the RPO trajectory, PSPCL would have had to procure this additional power from conventional sources. The fixed cost would have to be paid whether power is purchased from RE or conventional sources. However, the difference would be in respect of the variable charges. As per data submitted by PSPCL in Format 7, 2017-18 (H1+H2) in its petition for APR for FY 2017-18 and Revised Estimates for FY 2018-19, the variable charges for IPPs within the State of Punjab are as follows:

Sr. No.	Name of IPPs	FY 2017-18		
		Variable Charges (Rs. per Unit)	Units purchased (MU)	Total variable Charges (Rs. in million)
1.	M/s NPL, Rajpura	2.1596	8946.98	19321.90
2.	M/s TSPL, Talwandi Sabo	2.7590	7257.97	20024.74
3.	M/s GVK, Goindwal Sahib	3.0273	757.98	2294.63
4.	Total		16962.93	41641.27
5.	Average variable charges for IPPs	41641.27 ÷ 16962.93 = Rs. 2.45		

(f) Estimated cost of purchase of RECs:

As per CERC order dated 30.03.2017 in petition no. 02/SM/2017, the Price of Solar & Non-Solar RECs has been fixed as under:

- i) Floor price of Non-Solar REC : Rs. 1000 per REC
(Comprising of 1000 units)
- ii) Floor price of Solar REC : Rs. 1000 per REC
(Comprising of 1000 units)

As the Solar and Non-Solar RECs are available in abundance, the floor price of RECs has been considered for working out the estimated additional financial burden.

(g) In view of the above, the following has been considered for working out the estimated additional financial burden.

- i) Weighted average variable cost of IPPs in Punjab @ Rs. 2.45 per unit,
- ii) Non-Solar energy mix @ Rs. 5.00 per unit,
- iii) Solar energy @ Rs. 3.50 per unit and
- iv) Floor price of Solar/ Non-Solar REC's @ Rs. 1000 per REC

19. Estimated Cost of purchase of RE Power:

Considering the above, the year wise estimated additional financial burden from FY 2018-19 to FY 2021-22 for compliance of proposed RPO trajectory as per para-16 above, is worked out as under:

A) Through purchase of RE power

Estimated Additional Financial Burden

Sr. No.	Year	Estimated Additional Financial Burden		Total (Rs. in cr.)	Energy sale within the State (MU)	Effect on Tariff
		Non-Solar	Solar			
1	2	3	4	5 = (3+4)	6	7 = [(5÷6/10)×(100)]
i.	2018-19	Rs. 2.55 (5.00-2.45) x 2507.87 MU = 639.51 cr.	Rs. 1.05 (3.50-2.45) x 1917.78 MU = 201.37 cr.	840.88	49092.80 (as per Tariff Order for PSPCL for FY 2018-19, Page 62)	17.13 paise per unit
ii.	2019-20	Rs. 2.55 (5.00-2.45) x 2583.74 MU = 658.85 cr.	Rs. 1.05 (3.50-2.45) x 2134.40 MU = 224.11 cr.	882.96	51547.44 (5% increase in energy sale for FY 2018-19)	17.13 paise per unit
iii.	2020-21	Rs. 2.55 (5.00-2.45) x 2751.95 MU = 701.75 cr.	Rs. 1.05 (3.50-2.45) x 2991.25 MU = 314.08 cr.	1015.83	54124.84 (5% increase in energy sale for FY 2019-20)	18.77 paise per unit
iv.	2021-22	Rs. 2.55 (5.00-2.45) x 3055.87 MU = 779.25 cr.	Rs. 1.05 (3.50-2.45) x 4074.50 MU = 427.82 cr.	1207.07	56831.08 (5% increase in energy sale for FY 2020-21)	21.24 paise per unit

B) Through purchase of RECs, considering REC (Non-Solar/ Solar)

Estimated Additional Financial Burden

Sr. No.	Year	Additional Non-Solar RE required (MU)	Additional Solar RE required (MU)	Total Additional RE required (MU)	Estimated Additional Financial burden (Rs. in million)	Energy sale within the State (MU)	Effect on Tariff
1	2	3	4	5 = (3+4)	6 = (5 x Rs. 1.00)	7	8 = [(6÷7)×100]
i.	2018-19	2507.87	1917.78	4425.65	4425.65	49092.80 (as per Tariff Order for PSPCL for FY 2018-19, Page 62)	9.01 paise per unit
ii.	2019-20	2583.74	2134.40	4718.14	4718.14	51547.44 (5% increase in energy sale for FY 2018-19)	9.15 paise per unit
iii.	2020-21	2751.95	2991.25	5743.20	5743.20	54124.84 (5% increase in energy sale for FY 2019-20)	10.61 paise per unit
iv.	2021-22	3055.87	4074.50	7130.37	7130.37	56831.08 (5% increase in energy sale for FY 2020-21)	12.55 paise per unit

20. Further, Renewable power is variable and intermittent. To integrate the renewable power commensurate with the proposed RPO trajectory, investments for stabilizing the grid viz. in ancillary services, telecoms, automatic generation control etc. would also be required. Further, to accommodate the renewable power, own conventional generating stations / IPPs would have to be backed down resulting in higher Station Heat Rate and Auxiliary Consumption for these plants.

These aspects may also affect the tariff adversely and cast a significant burden on the consumers of the State as mentioned under para-19 A&B above.

21. (a) RPO Proposal

The RPO trajectory specified by MoP vide its orders dated 22.07.2016 and 14.06.2018 is as follows:

Year	2018-19	2019-20	2020-21	2021-22
Non-Solar RPO(%)	10.25%	10.25%	10.25%	10.50%
Solar RPO (%)	6.75%	7.25%	8.75%	10.50%
Total	17.00%	17.50%	19.00%	21.00%

(b) Amendment required as per Gol Trajectory

Keeping in view the above, if approved, the proposed trajectory, in Table-1 in Regulation 3 of the Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) Regulations, 2011, would be as follows:

Table-1 (in Regulation 3)

Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Non-Solar RPO (%)	2.37	2.83	3.37	3.81	3.9	4.1	4.2	10.25	10.25	10.25	10.50
Solar RPO (%)	0.03	0.07	0.13	0.19	1.0	1.3	1.8	6.75	7.25	8.75	10.50
Total	2.4	2.9	3.5	4.0	4.9	5.4	6.0	17.00	17.50	19.00	21.00

22. Suggestions of all Stakeholders are invited on the above proposal.

23. The views expressed in the Staff Paper are not necessarily those of the Commission.