

F.No. 30/27/2015-16/NSM
Government of India
Ministry of New and Renewable Energy
NSM Division

Subject: Performance analysis of Grid Connected Solar Power projects commissioned under Phase – I of JNNSM for the period of January 2014 to December 2014

1)

A) Total Grid connected solar power Projects installed capacity under various schemes till date (18.05.2015) is as under

MNRE Projects	State Schemes	REC	CPSUs	Total
1243	1932.5	582.62	119.51	3877.63

B) Total Grid connected solar power Projects **State wise** installed capacity under various schemes till date (18.05.2015) is as under:

Sr. No.	State/UT	Total MNRE Projects MW	State Policy MW	REC Scheme MW	CPSUs MW	Total Commissioned capacity till 18.05.2015 (MW)
1	Andhra Pradesh	94.75	105.01	37.7	10	247.46
2	Arunachal Pradesh	0.025	0	0	0	0.025
3	Chhattisgarh	4	0.5	3.1	0	7.6
4	Gujarat	20	974.05	6	0	1000.05
5	Haryana	7.8	0	0	5	12.8
6	Jharkhand	16	0	0	0	16
7	Karnataka	5	64.22	0	9	78.22
8	Kerala	0.025	0	0	0	0.025
9	Madhya Pradesh	185.25	232.55	80.78	65	563.58
10	Maharashtra	57	184.43	121.32	0	362.75
11	Odisha	12	5.42	4.5	10	31.92
12	Punjab	10.5	176.25	7.52	0	194.27
13	Rajasthan	789.1	65	193	0	1047.1
14	Tamil Nadu	16	33.82	98.16	0	147.98
15	Telangana	0	39.35	23.4	0	62.75
16	Tripura	0	0	5	0	5
17	Uttar Pradesh	12	43.75	0	15.51	71.26
18	Uttarakhand	5	0	0	0	5
19	West Bengal	2.05	5.16	0	0	7.21
20	Andaman & Nicobar	0.1	0	0	5	5.1
21	Delhi	0.335	2.99	2.14	0	5.465
22	Lakshadweep	0.75	0	0	0	0.75
23	Puducherry	0.025	0	0	0	0.025
24	Chandigarh	4.5	0	0	0	4.5
25	Others	0.79	0	0	0	0.79
TOTAL		1243	1932.5	582.62	119.51	3877.63

2) Month wise Average net exported solar power (Kwh/MW) and CUF (%) for Phase-I

S.no	Month (Jan 2014- Dec 2014)	Average Net Exported Solar Power, kWh/MW Phase-I, Batch-I	CUF (%) Phase-I, Batch-I	Average Net Exported Solar Power, kWh/MW Phase-I, Batch-II	CUF (%) Phase-I, Batch-II
1	January	87095	11.71	133579	17.95
2	Feb	97007	14.44	138929	20.67
3	March	122674	16.49	167663	22.54
4	April	125562	17.44	170424	23.67
5	May	158218	21.27	168351	22.63
6	June	117373	16.3	163306	22.68
7	July	95749	12.87	148093	19.90
8	August	103912	13.97	152380	20.48
9	September	113361	15.74	154815	21.50
10	October	108104	14.53	154058	20.71
11	November	88797	12.33	143274	19.90
12	December	86048	11.57	137534	18.49
	Average	108658	14.89	152700	20.92

Remark:

- a) It has been observed that solar power generation under Batch-I have lot of variation from CUF- 11.57 % to 21.27 % and maximum CUF is during month of May 2014. Average CUF is 14.89 % and Average Solar power generation is 108658 KWh/MW. This variation is due to the fact that projects are installed in thirteen States (State wise analysis is also done and given below)
- b) Under Batch-II, there is no such variation of CUF. Minimum CUF is 17.95 % in the month of January. Average CUF is 20.92 % and Average Solar power generation is 152700 KWh/MW. Under Batch II, maximum solar power projects have been installed in the state of Rajasthan and show CUF of more than 20 %.

3) State wise Average net exported solar power(Kwh/MW) and CUF(%) for Phase-I, Batch-I& Batch-II

A) Phase-I, Batch-I

S.no	State	Average Net Exported Solar Power, kWh/MW (period jan 2014- Dec 2014)		Average CUF (%) (period jan 2014- Dec 2014)	
		Crystalline Technology	Thin Film Technology	Crystalline Technology	Thin Film Technology
1	Andhra Pradesh	129903	144233	17.81	19.78
2	C.G.	137320	--	18.99	--
3	Haryana	101848	106745	13.99	14.63
4	Jharkhand	110982	114033	15.22	15.64
5	Karnataka	127914	--	17.59	--
6	M.P.	133832	109886	18.36	15.67
7	Maharashtra	129286	--	17.73	--
8	Odisha	100310	130779	13.77	17.94
9	Punjab	121610	116941	16.67	16.01
10	Rajasthan	152198	129752	20.85	17.78
11	Tamilnadu	122968	124139	16.87	17.01
12	U.P.	127731	89512	17.49	12.27
13	Uttarakhand	114400	113906	15.67	15.61
	Average	123869	117992.6	17.00	16.23

Remark:

- a) Both technologies have been used in Batch I.
- b) In MP, Rajasthan and UP, CUF of Crystalline Technology is more than thin film but in A.P., Odisha CUF of thin film is more than Crystalline Technology.
- c) Overall CUF of Crystalline Technology is more than thin film technology.

- d) Average power generation per MW of all above states with Crystalline Technology is more in comparison to thin film technology.
- e) Average % CUF for the stated period of a project with crystalline technology comes to 17.00
- f) Average % CUF for the stated period of a project with thin film technology comes to 16.23
- g) CUF more than 20 % is in the state of Rajasthan.

B) Phase-I, Batch-II

S.no	State	Average Net Exported Solar Power, kWh/MW (period jan 2014- Dec 2014)		Average CUF (%) (period jan 2014- Dec 2014)	
		Crystalline Technology	Thin Film Technology	Crystalline Technology	Thin Film Technology
1	Rajasthan	152958	158360	20.96	21.70
2	Maharashtra	--	111052	--	15.25
3	A.P.	--	155414	--	21.31
	Average	152958	141608	20.96	19.42

Remark:

- a) Thin film is producing more power per MW in the state of Rajasthan. No other comparison can be made because projects with same technology are not available in other states.
- b) In Batch II, Average CUF is 20 % because maximum solar power projects have been installed in the state of Rajasthan

4) Technology wise Average net exported solar power(Kwh/MW) and CUF(%) for Phase-I, Batch-I & Batch-II

A) Batch I Phase I

S.no	Month	Avg CUF %		Average net exported solar power(Kwh/MW)	
		Crystalline Technology	Thin Film Technology	Crystalline Technology	Thin Film Technology
	For Year 2014				
1	January	16.95	14.62	127865	110302
2	Feb	19.19	16.59	131038	114035
3	March	21.72	18.70	164415	141144
4	April	21.67	18.78	158121	137383
5	May	21.77	18.15	162891	137102
6	June	21.51	17.67	154686	129269
7	July	18.13	14.79	139026	111735
8	August	19.08	15.20	143172	115038
9	September	18.71	16.43	136356	123972
10	October	18.28	16.06	138763	121185
11	November	18.64	14.47	135383	105755
12	December	16.76	13.98	126150	105655
	Average	19.36	16.28	143155	121047

Remark:

- a) Overall in Phase I, Average power generation per MW with crystalline technology is higher than thin film.

B) Batch II Phase I

S.no	Month	Avg CUF %		Average net exported solar power(Kwh/MW)	
		Crystalline Technology	Thin Film Technology	Crystalline Technology	Thin Film Technology
	For Year 2014				
1	January	17.55	18.95	131583	142758
2	Feb	21.56	21.41	145827	146255
3	March	23.51	23.23	176018	174177
4	April	24.54	24.49	177696	178228
5	May	23.38	23.54	175054	175930
6	June	23.06	23.61	171400	175054
7	July	20.49	20.75	153674	155686
8	August	21.36	21.26	159495	160182
9	September	22.29	22.37	162353	161630
10	October	22	21.41	164937	160808
11	November	21.25	20.63	153956	149055
12	December	20.02	18.99	150064	142718
	Average	21.75	21.72	160171	160206

Remark:

- a) Average power generation per MW with both technologies is nearly same because maximum projects are in Rajasthan
- b) In month of January, power generation per MW with thin film is higher than crystalline technology.