S. No.	States & UTs	DISCOM or Electricity Department	Allocation in FY 19-20 (MW)	Allocation in FY 20-21 (MW)
20	**Nagaland**	Electricity Department	**1**	**3.8**
21	**NCT of Delhi**	Tata Power Delhi Distribution Ltd	**2**	**8**
		BSES Rajdhani Power Ltd	**10**	**nil**
		New Delhi Municipal Council	**nil**	**1.5**
		BSES Yamuna Power Ltd	**10**	**10**
22	**Odisha**	CESU (now TPCODL) TP Central Odisha Distribution Ltd	**1**	**nil**
		Southern Electricity Supply Co Of Odisha Ltd	**1**	
		Western Electricity Supply Co of Odisha Ltd	**1**	
		North Eastern Electricity Supply Co of Odisha Ltd	**1**	
23	**Puduchery**	Electricity Department	**5**	**25**
24	**Punjab**	Punjab State Power Corp. Ltd	30	**50**
25	**Rajasthan**	Jaipur Vidyut Vitran Nigam Ltd	**25**	**nil**
		Ajmer Vidyut Vitran Nigam Ltd	**5**	**nil**
		Jodhpur Vidyut Vitran Nigam Ltd	**15**	**nil**
26	**Sikkim**	Energy And Power Department	**5**	**nil**
27	**Tamil Nadu**	Tamil Nadu Generation and Distribution Corp. Ltd	**5**	**50**
28	**Telangana**	Southern Power Distribution Co of Telangana Ltd	**10.78**	**20**
		Northern Power Distribution Co of Telangana Ltd	**1.5**	**5**
29	**Uttarakhand**	Uttarakhand Power Corp. Ltd	**2**	**26**
30	**Uttar Pradesh**	Madhyanchal Vidyut Vitran Nigam,	**19**	**nil**
		Pooravanchal Vidyut Vitran Nigam	**10**	**nil**
		Paschimanchal Anchal Vidyut Vitran Nigam	**12**	**nil**
		Dakshinanachal Vidyut Vitran Nigam	**11**	**nil**
		Kanpur Electricity Supply Co Ltd.	**4**	**nil**
		Noida Power Co Ltd	**2**	**nil**
		Torrent Power	**2**	**nil**
31	**West Bengal**	West Bengal State Electricity Distribution Co Ltd	**0**	**50**
	31 STATEs/UTs	**65 DISCOMs**	**510.96**	**2096.3**

3.6.11 Grid-connected Rooftop and Small Solar Power Plants Programme Phase-I

Earlier, Ministry has been implementing Grid Connected Rooftop and Small Solar Power Plants Programme which was providing subsidy upto 30% of benchmark cost for the general category states and upto 70 % of benchmark cost for special category states, i.e. North Eastern States including Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir and Lakshadweep, Andaman & Nicobar Islands for installation of grid connected rooftop solar power plants in building of residential, institutional and social sector for the sanctioned projects under phase-I. For Government sector achievement linked incentives upto 25% of the benchmark cost in general category States and UTs and 60 % of the

benchmark cost for special category States and UTs has been provided for the sanctioned projects under Phase-I.

An amount of ₹ 261.62 crore has been released to various agencies towards full or / partial settlement of projects in FY 2020-21.

As reported by DISCOMs, overall 3737 MW capacity of grid connected rooftop solar plant has been installed in the country as on 31.12.2020 **(Table 3.8)**.

Table 3.8 : Overall installed capacity (with or without CFA) as on 31.12.2020

S. No.	States and UTs	DISCOM/Electricity Department	Capacity installed as on 31.12.2020 (in MW)
1	**Andaman & Nicobar Island**	Electricity Department of Andaman & Nicobar	4.177
2	**Andhra Pradesh**	Eastern Power Distribution Co. of Andhra Pradesh Ltd.	138.258
		Andhra Pradesh Southern Power Distribution Co. Ltd.	
3	**Arunachal Pradesh***	Department of Power	0.215
4	**Assam**	Assam Power Distribution Co. Ltd.	8.275
5	**Bihar**	North Bihar Power Distribution Co. Ltd.	38.815
		South Bihar Power Distribution Co. Ltd.	
6	**Chandigarh**	Chandigarh Electricity Department	38.815
7	**Chhattisgarh**	Chhattisgarh State Power Distributing Co. Ltd.	27.282
8	**Goa**	Electricity Department Goa	6.488
9	**Gujarat**	Dakshin Gujarat Vij Co. Ltd.	894.150
		Madhya Gujarat Vij Co. Ltd.	
		Paschim Gujarat Vij Co. Ltd.	
		Uttar Gujarat Vij Co. Ltd.	
		Torrent Power Ltd, Ahmedabad	
		Torrent Power Ltd, Surat	
10	**Haryana**	Uttar Haryana Bijali Vitran Nigam Ltd.	277.0298
		Dakshin Haryana Bijli Vitran Nigam Ltd.	
11	**Himachal Pradesh**	Himachal Pradesh State Electricity Board	14.165
12	**Jammu and Kashmir***	Power Development Department of J & K	12.149
13	**Jharkhand**	Tata Steel Licensee, Jamshedpur	29.581
		JUSCO Licensee	
		Jharkhand Bijli Vitran Nigam Ltd.	

S. No.	States and UTs	DISCOM/Electricity Department	Capacity installed as on 31.12.2020 (in MW)
14	**Karnataka**	Bangalore Electricity Supply Co. Ltd.	225.902
		Hubli electricity supply Co. Ltd.	
		Chamundeshwari Electricity Supply Corp. Ltd.	
		Gulbarga Electricity Supply Co. Ltd.	
		Mangalore Electricity Supply Co. Ltd.	
15	**Kerala**	Kerala State Electricity Board	89.75
16	**Ladakh***	Power Development Department	0
17	**Lakshadweep***	Electricity Development of Lakshadweep	0
18	**Madhya Pradesh**	Madhya Pradesh Madhya kshetra Vidyut Vitaran Co. Ltd.	76.91
		Madhya Pradesh Paschim Kshetra Vidyut Vitaran Co. Ltd.	
		Madhya Pradesh Poorva Kshetra Vidyut Vitaran Co. Ltd.	
19	**Maharashtra**	Tata power Co. Ltd.	647.7252
		Brihanmumbai Electric Supply & Transport Undertaking	
		Adani Electricity Mumbai Limited	
		Maharashtra State Electricity Distribution Co. Ltd.	
20	**Manipur**	Electricity Department of Manipur	4.5
21	**Meghalaya***	Meghalaya Power Distribution Corp. Ltd.	0.123
22	**Mizoram**	Electricity Department	1.365
23	**Nagaland***	Department of Power, Nagaland	0.08
24	**NCT of Delhi**	Tata Power Delhi Distribution Ltd.	139.4
		BSES Rajdhani Power Ltd.	
		BSES Yamuna Power Ltd.	
25	**Odisha**	CESU (now TPCODL) TP Central Odisha Distribution Ltd.	18.15254
		Southern Electricity Supply Co. of Odisha Ltd.	
		Western Electricity Supply Co. of Odisha	
		North Eastern Electricity Supply Co. of Odisha Ltd.	
26	**Puducherry**	Electricity Department	9.3
27	**Punjab**	Punjab State Power Corp. Ltd.	63.047
28	**Rajasthan**	Jaipur Vidyut Vitran Nigam Ltd.	374.21
		Ajmer Vidyut Vitran Nigam Ltd.	
		Jodhpur Vidyut Vitran Nigam Ltd.	
29	**Sikkim***	Energy And Power Department	0.071
30	**Tamil Nadu**	Tamil Nadu Generation and Distribution Corp. Ltd.	84.36
31	**Telangana**	Southern Power Distribution Co. of Telangana Ltd.	149.587
		Northern Power Distribution Co. of Telangana Ltd.	

S. No.	States and UTs	DISCOM/Electricity Department	Capacity installed as on 31.12.2020 (in MW)
32	**The Dadra and Nagar Haveli And Daman and Diu***	Electricity Department	0
33	**Tripura***	Tripura State Electricity Corp. Ltd.	3.127
34	**Uttarakhand**	Uttarakhand Power Corp. Ltd.	257.25
35	**Uttar Pradesh**	Madhyanchal Vidyut Vitran Nigam	113.6259
		Puravanchal Vidyut Vitran Nigam	
		Paschimanchal Vidyut Vitran Nigam	
		Dakshinanachal Vidyut Vitran Nigam	
		Kanpur Electricity Supply Co. Ltd.	
		Noida Power Co. Ltd.	
		Torrent Power	
36	**West Bengal**	State Electricity Distribution Co. Ltd.	7.9
		Total	**3737.64 MW**

***Data submitted by State nodal agency (SNA)/Project developer in SPIN portal**

3.6.12 Off Grid and Decentralised Solar PV Applications Programme

Under Off-Grid and Decentralized Solar PV Applications Programme, Ministry has been providing Central Financial Assistance (CFA) for deployment of Solar Street lights, Solar Study Lamps and Solar Power Packs to meet out the electricity and lighting needs of the local communities/institutions/ individuals in the rural areas. Programme is being implemented mainly through State Nodal Agencies (SNAs). Further, installation of standalone solar pumps, solarization of existing agricultural pumps and installation of grid-connected solar power plants up to 2 MW is being done under PM-KUSUM Scheme.

Over 216 MW capacity solar PV off-grid power packs / power plants have been installed till 31.12.2020.

Some major Off Grid Solar PV projects under implementation during 2020-21 are as follows. The combined status is given in **Table 3.9.**

- Over 3 lakh Solar Study Lamps have been distributed to school going children, in North Eastern States and LWE affected districts.
- About 1 lakh Solar Street Lights have been installed, particularly in North Eastern and Hill States and UTs.
- Under Atal Jyoti Yojana: Phase-II, cumulatively 90,901 nos. of Solar Street Lights have been installed till 31.12.2020.

» Solar Off-grid power plants of capacity 710 kWp have been installed at Public Service Institutions in the State of Mizoram.

» Solar Off-grid power plants of capacity 870 kWp have been installed at Public Service Institutions in the State of Odisha.

Table 3.9: Cumulative Systems Installed up to 31.12.2020

SPV Systems System	Cumulative up to 31.12.2020
Lanterns and Study lamps (No.)	78,30,685
Home Lights (No.)	17,23,479
Street Lights (No.)	8,13,132
Solar Pumps (No.)	2,72,700
SPV Plants (MWp)	216.4

Cumulative numbers and capacity of the off-grid solar applications installed in various States as on 31.12.2020 is as given in **Table 3.10**.

Table 3.10 : State-wise Cumulative Capacity installed under Off-grid SPV Programme

S. No.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)	Solar Power Plant (kW)
1	Andhra Pradesh	22972	77803	15468	34045	3815.595
2	Arunachal Pradesh	35065	76401	13741	22	963.2
3	Assam	46879	647761	16338	45	1605
4	Bihar	12303	1735227	46032	2813	6800
5	Chhattisgarh	42232	3311	2792	61970	31372.9
6	Delhi	0	4807	301	90	1269
7	Goa	393	1093	707	15	32.72
8	Gujarat	9253	31603	5004	11522	13576.6
9	Haryana	56727	93853	34625	5014	2321.25
10	Himachal Pradesh	22592	33909	92500	15	1905.5
11	Jammu & Kashmir	144316	51224	22900	39	8129.85
12	Jharkhand	9450	790515	13572	4800	3769.9
13	Karnataka	52638	7781	5069	7435	7854.01
14	Kerala	41912	54367	1735	818	16048.39
15	Madhya Pradesh	7920	529101	13611	23156	3654
16	Maharashtra	3497	239297	10420	11315	3857.7
17	Manipur	24583	9058	22217	40	1580.5
18	Meghalaya	14874	40750	5800	19	2004
19	Mizoram	12060	91201	10117	37	3885.6
20	Nagaland	1045	6766	11107	3	1506
21	Odisha	5274	99843	17815	9599	2191.515

S. No.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)	Solar Power Plant (kW)
22	Punjab	8626	17495	43448	4663	2066
23	Rajasthan	187968	225851	7114	53423	30449
24	Sikkim	15059	23300	504	0	850
25	Tamil Nadu	298641	16818	39908	6289	13052.6
26	Telangana	0	0	1958	424	7450
27	Tripura	32723	253443	6284	151	867
28	Uttar Pradesh	235909	2346365	289355	29600	10638.31
29	Uttarakhand	91595	163386	31535	26	4059.53
30	West Bengal	145332	17662	15302	653	1730
31	Andaman & Nicobar	468	6296	920	5	167
32	Chandigarh	275	1675	901	12	730
33	Lakshadweep	600	5289	4465	0	2190
34	Puducherry	25	1637	417	21	121
35	Others	24047	125797	9150	609	23885
36	NABARD (2015 onwards)	116226	0	0	4012	0
	Total	**1723479**	**7830685**	**813132**	**272700**	**216398.7**

Capacity installed in various States during 2020-21 (as on 31.12.2020) is as given in **Table 3.11.**

Table 3.11 : Capacity installed under Off-grid SPV Programme during 2020-21

S. No.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)	Solar Power Plant (kW)
1	Andhra Pradesh	0	0	4981	0	0
2	Arunachal Pradesh	0	39707	8331	0	0
3	Assam	0	0	5782	0	0
4	Bihar	0	0	7600	0	30
5	Chhattisgarh	0	0	750	0	0
6	Gujarat	0	0	250	2	0
7	Haryana	0	0	0	3721	0
8	Himachal Pradesh	0	0	14400	9	0
9	Jammu & Kashmir	0	0	7513	0	0
10	Jharkhand	0	0	839	130	0
11	Karnataka	0	0	1859	15	0
12	Kerala	0	0	0	0	223
13	Madhya Pradesh	0	0	1928	5343	0
14	Manipur	0	0	10250	0	0
15	Mizoram	0	56689	4492	0	710
16	Nagaland	0	0	4872	0	0
17	Odisha	0	0	218	48	870

S. No.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)	Solar Power Plant (kW)
18	Punjab	0	0	690	250	0
19	Rajasthan	0	0	0	5248	0
20	Tamil Nadu	2136	0	489	830	0
21	Tripura	0	188642	4294	0	0
22	Uttar Pradesh	0	16282	10450	950	0
23	Uttarakhand	0	0	3796	0	0
24	West Bengal	0	0	3489	0	0
25	Andaman & Nicobar	0	0	530	0	0
26	Chandigarh	0	0	3	0	0
27	Lakshadweep	0	0	297	0	0
Total		**2136**	**301320**	**98103**	**16546**	**1833**

3.6.13 Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyaan (PM-KUSUM) Scheme

(i) The Cabinet Committee on Economic Affairs approved PM-KUSUM scheme in its meeting held on 19.2.2019. Subsequently, expansion of Scheme was announced in the Budget for 2020-21, which was later approved by Ministry of Finance. The Scheme consists of three components:

- **Component-A:** 10,000 MW of Decentralized Ground Mounted Grid Connected Solar Power Plants.
- **Component-B:** Installation of 20 lakh standalone Solar Powered Agriculture Pumps.
- **Component-C:** Solarisation of 15 Lakh existing Grid-connected Agriculture Pumps.

(ii) The Scheme has been expanded during FY 2020-21 to add a solar capacity of 30.8 GW by 2022. The total central financial support provided under the scheme would be ₹ 34,035 crore including service charges of 2% on eligible CFA to implementing agencies. Revised physical and financial targets are given in **Table 3.12**.

Table 3.12 : PM KUSUM Programme Components

Component	Approved capacity	Creation of RE Capacity targeted (GW)	CFA including service charges (₹ Cr)
Component-A	10 GW	10	3,325
Component-B	20 lakh pumps	9.6	15,912
Component-C	15 lakh pumps	11.2	14,798
Total		**30.8**	**34,035**

(iii) Under Component A, renewable power plants of capacity 500 KW to 2 MW will be setup by individual farmers/ cooperatives/panchayats /farmer producer organisations (FPO) on their barren or cultivable lands. The power generated will be purchased by the DISCOMs at Feed in Tariffs (FIT) determined by respective SERC. The scheme will open a stable and continuous source of income to the rural land owners. Procurement Based Incentives @ ₹ 0.40 per unit for five years will be provided to DISCOMs.

(iv) Under Component B, individual farmers will be supported to install standalone solar pumps of capacity up to 7.5 HP. This will help in replacement of diesel pumps in areas where grid power for agriculture is not available/reliable.

(v) Under Component C of the scheme, individual farmers will be supported to solarise pumps of capacity up to 7.5 HP. Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme. The farmer will be able to use the generated energy to meet the irrigation needs and the excess available energy will be sold to DISCOM. This will help to create an avenue for extra income to the farmers, and for the States to meet their RPO targets. States can also opt for Feeder level solarisation, where single solar plant can be installed through RESCO/CAPEX mode for feeding power to single or multiple agriculture feeders.

(vi) For both Component-B and Component-C, Central Financial Assistance (CFA) of 30% of the benchmark cost or the tender cost, whichever is lower, will be provided. The State Government will give a subsidy of 30%; and the remaining 40% will be provided by the farmer. Bank finance may be made available for meeting 30% of the cost. The remaining 10% will be provided by the farmer. Higher CFA of 50% will be provided for North Eastern States, Sikkim, Jammu & Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Lakshadweep and A&N Islands.

(vii) The Scheme will have substantial environmental impact in terms of savings of CO_2 emissions. All three components of the Scheme combined together are likely to result in saving of about 32 million tonnes of CO_2 emission per annum. Further, Component-B of the Scheme on standalone solar pumps may result in saving of 1.4 billion litres of diesel per annum and associated savings in the foreign exchange due to reduction of import of crude oil.

(viii) Under Component-B and Component-C it is mandatory to use indigenously manufactured solar modules with indigenously manufactured solar cell and therefore, the scheme will open-up opportunities for local manufacturing of solar cells and modules to the tune of 20.8 GW.

(ix) Implementation Status: The MNRE issued implementation guidelines/modalities on 22.7.2019. Based on the demand received from the States, capacities were sanctioned to them under the three components during 2019-20 and 2020-21. The cumulative capacity sanctioned to the States under the three components of the Scheme are given in **Table 3.13**.

Table 3.13 State-wise and Component-wise Implementation of PM KUSUM Scheme

S. No.	State	Component-A (MW)	Component-B (Numbers)	Component-C (Numbers)	
				Individual Pumps Solarization	Feeder Level Solarization
1	Andaman & Nicobar	0	0	0	0
2	Andhra Pradesh	0	0	0	0
3	Arunachal Pradesh	0	50	0	0
4	Assam	0	0	0	0
5	Bihar	0	0	0	0
6	Chandigarh	0	0	0	0
7	Chhattisgarh	0	20,000	0	0
8	Dadra & Nagar Haveli	0	0	0	0
9	Daman & Diu	0	0	0	0
10	Delhi	62	0	0	0

S. No.	State	Component-A (MW)	Component-B (Numbers)	Component-C (Numbers)	
				Individual Pumps Solarization	Feeder Level Solarization
11	Gujarat	500	2,199	7,000	0
12	Goa	10	200	7,000	0
13	Haryana	65	37,000	468	0
14	Himachal Pradesh	20	1,550	0	0
15	Jammu & Kashmir	5	5,000	0	0
16	Jharkhand	50	11,000	500	0
17	Karnataka	500	10,500	1,000	50000
18	Kerala	40	100	100	0
19	Ladakh	0	600	0	0
20	Lakshadeep	0	0	0	0
21	Madhya Pradesh	300	60,000	0	25,000
22	Maharashtra	500	1,00,000	0	50,000
23	Manipur	0	150	0	0
24	Meghalaya	5	700	0	0
25	Mizoram	0	0	0	0
26	Nagaland	0	50	0	0
27	Odisha	500	6,000	0	0
28	Puducherry	7	0	0	0
29	Punjab	220	9,500	0	12,500
30	Rajasthan	1,200	75,000	37,500	0
31	Sikkim	0	0	0	0
32	Tamil Nadu	75	6,500	20,000	0
33	Telangana	500	0	0	30,000
34	Tripura	5	3,900	2,600	0
35	Uttar Pradesh	225	23,000	0	0
36	Uttarakhand	0	0	200	0
37	West Bengal	0	0	700	0
	Total	**4,789**	**3,72,999**	**77,068**	**1,67,500**

(x) Out of the sanctioned capacities shown above, under Component-B, 16,546 standalone solar pumps have been installed in various States. Under Component-C, a pilot project of 24 nos. of solarizations has been completed by Distribution Companies in the State of Rajasthan. Under Component-A, capacities have been allocated by the states of Haryana, Himachal Pradesh and Rajasthan.

(xi) Recently, Feeder level solarization Guidelines have been issued which allow the distribution companies to solarize agriculture feeders. This is in addition to existing provision of solarization of individual grid-connected agricultural pumps. This provision will allow the State Governments to carry out solarization of agriculture feeders in CAPEX or RESCO mode and provide power to farmers free or at nominal rates.

3.6.14 Off-Grid & Decentralised Solar PV Applications Scheme: Phase-III

(i) Phase-III of Off-grid and Decentralised Solar PV Applications Progrmme was launched in August, 2018 with target of 3,00,000 solar street lights, 25,00,000 solar study lamps and 100 MW capacity of off-grid solar power plants. Scheme is available till 31.03.2021.

(ii) Under the scheme for Solar Street lights and off-grid Solar Power Plants, CFA of 30% of the benchmark cost or tender cost, whichever is lower, of the system is available for General category States and 90% of the benchmark cost or tender cost, whichever is lower, of the system is available for NE States, Hilly States/UTs and Island UTs. Solar study lamps for students are being provided in North-eastern States and Left Wing Extremism (LWE) affected areas with 85% financial support from the Central Government.

(iii) Status of sanctions and installations as on 31.12.2020 are given in **Table 3.14**.

Table 3.14 : Status of Off-Grid & Decentralised Solar PV Applications Programme

S. No.	States/Union Territories	Solar Street Lights (Nos.)		Solar Study Lamps (Nos.)		Solar Power Packs (kWp)	
		Sanctioned Quantity	Installed Quantity	Sanctioned Quantity	Installed Quantity	Sanctioned Quantity	Installed Quantity
1	Andhra Pradesh	12,000	1,968	-	-	-	-
2	Andaman & Nicobar	1100	530	-	-	-	-
3	Arunachal Pradesh	20,000	8,733	2,00,000	57,850	-	-
4	Assam	20,000	3,116	2,32,342	-	-	-
5	Bihar	-	-	-	-	240	30
6	Himachal Pradesh	20,000	14,000	-	-	-	-
7	Jammu & Kashmir	20,000	5,000	-	-	-	-
8	Kerala	-	-	-	-	2,000	180
9	Manipur	20,000	10,250	75,000	-	25	25
10	Meghalaya	-	-	1,02,000	-	-	-
11	Mizoram	20,000	4,792	1,50,000	80,689	939	710
12	Nagaland	9,810	4,872	24,000	-	-	-
13	Odisha	-	-	-	-	1,000	870
14	Sikkim	-	-	43,034	-	-	-
15	Telangana	-	-	2,00,000	-	-	-
16	Tripura	12,000	3,570	3,00,000	1,89,431	-	-
17	Uttarakhand	19,665	2097	-	-	-	-
18	Uttar Pradesh	-	-	21,122	16,282	-	-
	Total	**1,74,575**	**58,928**	**13,47,498**	**3,44,252**	**4,204**	**1,815**

Note: No demand was received from States not shown above, in any of the three components.

(iv) Projects are being implemented by State Nodal Agencies. Centralised tendering was done through Energy Efficiency Services Ltd. (EESL), for procurement of solar streetlights and solar study lamps.

3.6.15 Atal Jyoti Yojana (AJAY): Phase-II

(i) Considering the success of the AJAY Phase-I scheme, coverage of the scheme in Phase-II launched in December, 2018 was expanded for implementation in North Eastern States including Sikkim and hilly States/UTs of Jammu & Kashmir, Ladakh, Himachal Pradesh and Uttarakhand and Island UTs and also in the aspirational districts of other States. A total of 3,04,500 Solar Street Lights (SSLs) were proposed to be installed.

(ii) Under Phase-II, 2000 numbers of SSLs are provided in the Parliamentary Constituencies of NE States, Hilly States/UTs and Island UTs. In the five States covered under AJAY Phase-I, 1000 numbers of SSLs will be provided in each of the Parliamentary Constituencies, which are irrespective of number of SSLs already installed in Phase-I of AJAY scheme. Further, out of total 115 aspirational districts, 67 districts are lying in the states/UTs mentioned above and hence are automatically covered. Parliamentary constituencies lying in uncovered balance 48 aspirational districts not covered in above mentioned States/UTs, are provided with up to 2000 numbers of SSLs based on the extent the Parliamentary Constituency lies in the aspirational district.

(iii) Due to stoppage of funds under MPLADS for two years on account of challenges due to COVID-19 pandemic, the Scheme was closed for new sanctions w.e.f. 01.04.2020. However, already sanctioned lights are being installed subject to availability of funds from MPLADS.

(iv) Till 31.03.2020, sanctions were issued by District Administrations for 1.48 lakh solar street lights. Out of this, 90,901 nos. of solar street lights have been installed till 31.12.2020.

3.6.16 Off-Grid and Decentralized Concentrated Solar Thermal (CST) Technologies for Community Cooking, Process Heat and Space Heating and Cooling Applications in Industrial, Institutional and Commercial Establishments' Scheme

Ministry has been implementing the 'Off-Grid and Decentralized Concentrated Solar Thermal (CST) Technologies for Community Cooking, Process Heat and Space Heating and Cooling Applications in Industrial, Institutional and Commercial Establishments' Scheme for the promotion of renewable energy for thermal applications till 31.03.2020. No new sanctions were issued in the F.Y. 2020-21. The details of the project which are commissioned in this F.Y. 2020-21 are as follows:

i. M/s. Kasturi Estates Pvt. Ltd., Chennai, Tamil Nadu

A CST based solar project having a reflector area of 600m^2 was implemented in the premises of M/s. Kasturi Estates Pvt. Ltd., Chennai, Tamil Nadu for process heating application (**Fig. 3.4**). The project was implemented with a total cost of ₹ 156 lakhs and CFA support of ₹ 36 lakhs for Govt. of India. As per the reports, the system is delivering hot water with a saving of about 116g of LPG per day with a saving of about ₹ 8,236 per day (Approx.).

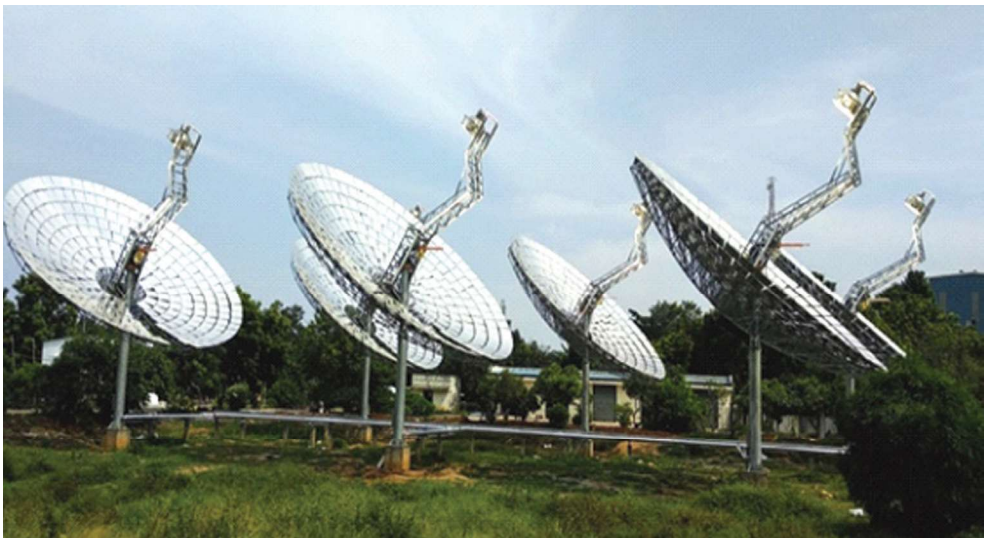


Fig. 3.4: CST-based Solar Project at M/s. Kasturi Estates Pvt. Ltd., Chennai, Tamil Nadu

ii. M/s. Mondelez India Foods Pvt. Ltd. (AP)

Mondelez India Foods Pvt. Ltd. is one of India's popular food processing companies **(Fig.3.5).** They were utilizing LPG/High Speed Diesel (HSD) in centralized heating system for process requirements. In order to reduce the usage of fossil fuels a Paraboloid dish with fully two axes tracking based CST system was installed for process heating application. The system with a total reflector area of 380 M^2 comprising of 4 dual–axis tracking paraboloid dish each of 95 M^2 concentrator area. The CST system was installed at a total cost of ₹ 84.195 lakh with a CFA support of ₹ 22.80 lakh. The system generates around 5.15 lakh kcal/day, saving 51 kg of conventional fuel per day equivalent to ₹ 3,500 per day.

Fig. 3.5: CST based solar project at M/s. Mondelez India Foods Pvt. Ltd., A.P.

3.6.17 Solar Off-grid Programme in Ladakh

160 nos. of off-grid solar power plants of 5 kWp each have been installed in Kargil under Prime Minister Development Package announced in the year 2015 with financial support by MNRE.

3.7 GREEN ENERGY CORRIDOR

1) In order to facilitate integration of large scale renewable generation capacity addition, the Cabinet Committee of Economic Affairs (CCEA) in FY 2015-16, approved the creation of Intra-State Transmission System in the Renewable Energy rich states of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu.

2) The scheme includes establishment of grid sub-stations at different voltage levels with aggregate transformation capacity of approx. 22600 Mega Volt Ampere (MVA) and installation of approx. 9700 circuit kilo metres (ckm) of transmission lines in these eight states. The creation of the Intra-State Transmission System under the scheme will facilitate the evacuation of over 20 GW of power from renewable energy generation stations to load despatch centres. The project is anticipated to be completed by year 2021.

3) The funding of the GEC scheme consists of 40% Central Grant, 40% KfW loan (Euro 500 million) and the remaining 20 percent as State contribution. The scheme had an estimated cost of Rs.10,141.68 crore including grant of Rs.4056.67 crore from Government of India. As on 31.12.2020, a total grant of approx. ₹ 2,064 crore has been disbursed to the States.

4) As on 31.12.2020, works related to installation of transmission towers and their stringing for an aggregate approx. 7362 ckm have been completed, and substations of aggregate capacity of approx. 9656 MVA have been charged.

5) The following works, mentioned in the States below, have been completed/charged during FY 2020-21:

a) Gujarat:

(i) 320 MVA at 220 kV Moti Gop substation in Jamnagar district,

(ii) 620 MVA at 220 kV Babara substation in Amreli district,

(iii) Up-gradation of 132 kV Wankaner substation to 220 kV level (district Rajkot),

(iv) 1820 MVA at 400/220/66 kV Bhogat GIS substation in Jamnagar district.

b) Karnataka:

(i) 220 kV Double Circuit (DC) line on DC towers from existing 220/66 kV Chitradurga substation to existing 220/66 kV Hiriyur substation,

(ii) 200 MVA at 220/110 kV & 10 MVA at 110/11 kV at Mughalkod Substation in Belgaum district,

(iii) Line In Line Out (LILO) both circuits of 220 kV Chikkodi –Ghataprabha line

c) Madhya Pradesh:

(i) 132 kV DC Double Strung line from 220 kV Sendhwa substation to 132 kV Pansemal Substation,

(ii) 220 kV DC line from 220 kV Kanwan substation to 220kV Dhar substation,

(iii) 400kV DC line from 400kV Nagda Substation to 400kV Mandsaur Substation,

(iv) LILO both circuits of 220kV Nagda - Neemuch line at 400kV Mandsaur Substation,

(v) 383 MVA transformer at 220/132kV level at 400kV Ratangarh substation,

(vi) Second circuit stringing of DC Single Strung line from 220kV Sabalgarh substation to 132 kV Vijaypur substation,

(vii) 40 MVA additional transformer at 132/33kV in existing 132kV Vijaypur substation,

(viii) Second circuit stringing of DC Single Strung line from 400kV Astha substation to 132 kV Ichhawar substation,

(ix) Second circuit stringing of DC Single Strung line from 132kV Susner (Nalkheda) substation to 132 kV Moman Badodiya substation,

(x) Second circuit stringing of DC Single Strung line from 132kV Susner substation to 132 kV Jeerapur substation,

(xi) Second circuit stringing of DC Single Strung line from 132kV Tarana substation to 132 kV Makdon substation.

d) Rajasthan:

(i) 132 kV DC line from Chhatargarh substation to Loonkaransar substation,

(ii) LILO one circuit of 400kV DC Akal- Jodhpur(new) line at 400kV Jaisalmer-2 substation.

e) Tamil Nadu:

(i) 230 kV line from Cuddalore substation to SP Koil (Veerapuram) substation

f) Maharashta:

(i) 2nd circuit stringing of 220 kV SCDC line from Miraj substation to Ichalkaranji (Tilawani) substation,

(ii) 2nd circuit stringing of 132 kV SCDC line from Aundh substation to Dahiwadi substation,

(iii) 2nd circuit stringing of 132 kV DC line from Nandurbar substation to Visarwadi substation,

(iv) 2nd circuit stringing of 132 kV DC line from Shevgaon substation to Pathardi substation,

(v) 2nd circuit stringing of 132 kV SCDC line from Georai substation to Beed substation,

(vi) 132 kV DC line from Kadegaon substation to Kirloskarwadi substation.

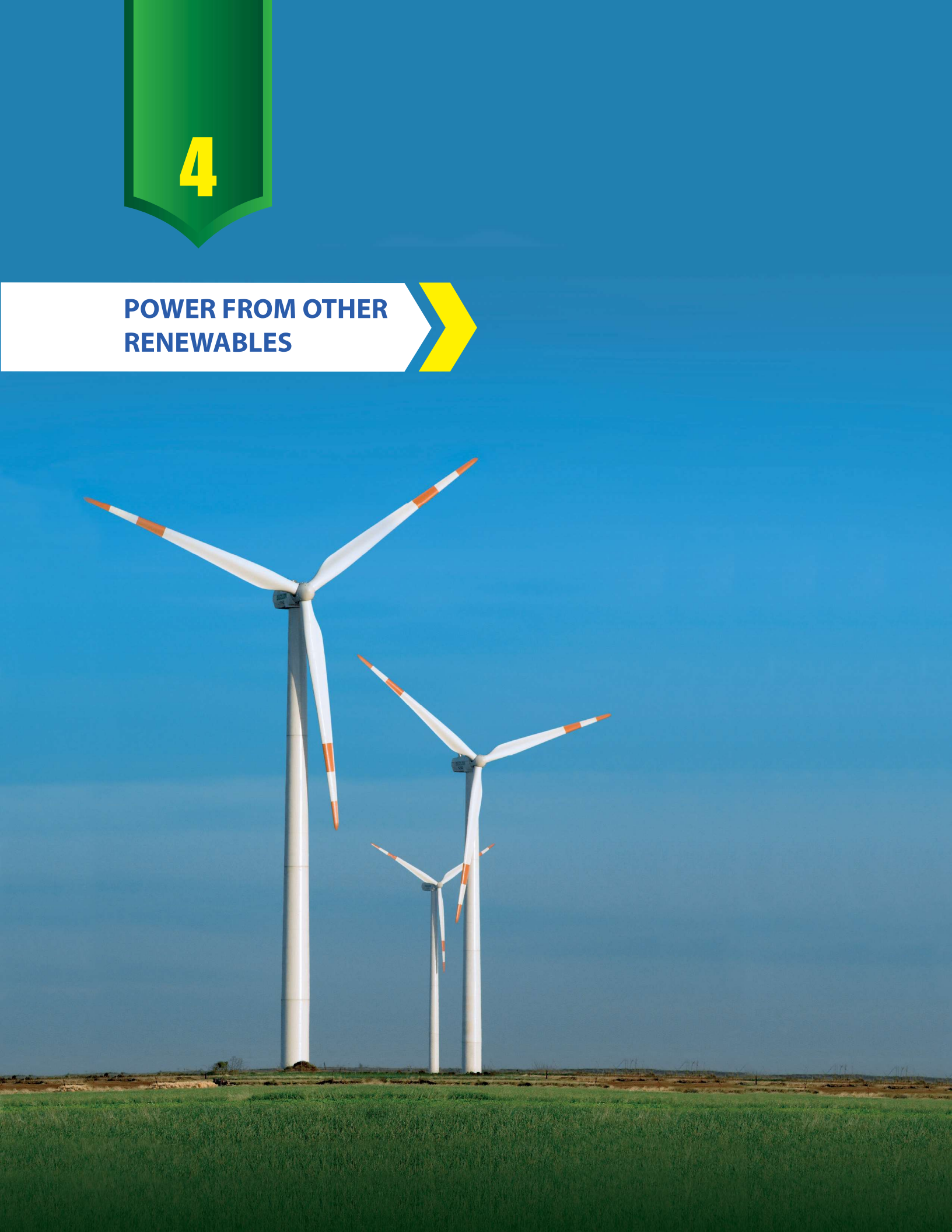
g) Himachal Pradesh:

(i) 31.5 MVA additional transformer at 33/132 kV level in the 31.5 MVA 33/132 kV Pandoh substation in Mandi district,

(ii) Line In Line Out (LILO) one circuit of 33 KV DC Shahpur - Kangra line at proposed 33/132 KV Chambi substation and LILO of 33kV single circuit Gaj - Shahpur line at 33/132kV Chambi substation.

4

POWER FROM OTHER RENEWABLES



POWER FROM OTHER RENEWABLES

4.1 GRID-INTERACTIVE AND OFF GRID RENEWABLE POWER

4.1.1 India has large renewable energy potential from sources such as wind, solar, biomass, small hydro, among others. As per estimates, India has a wind potential of more than 300 GW at a hub height of 100 metre, solar potential of ~750 GW, assuming 3% wasteland is made available, small hydro potential of~20 GW, and bio-energy potential of 25 GW. Further, there exists significant potential from decentralized distributed applications for meeting the hot water requirement for residential, commercial and industrial sector through solar energy and also meeting cooking energy needs in the rural areas through biogas. Renewable energy also has the potential to usher in universal 'energy access'. In a decentralized or standalone way renewable energy is appropriate, scalable and a viable solution for providing power to un-electrified or power-deficient villages and hamlets.

4.1.2 India has achieved a cumulative installed renewable energy capacity of **92.54 GW** of which **5.47 GW** was added in the period April 2020 till January, 2021.

4.2 WIND ENERGY

4.2.1 Introduction: India's wind energy sector is led by indigenous wind power industry and has shown consistent progress. The expansion of the wind industry has resulted in a strong ecosystem, project operation capabilities and manufacturing base of about 10,000 MW per annum. The country currently has the fourth highest wind installed capacity in the world with total installed capacity of 38.62 GW (as on 31st December, 2020) and 64.64 Billion Units were generated from wind power during 2019-20.

4.2.2 Potential of Wind Energy in India

Wind is an intermittent and site-specific source of energy and therefore, an extensive Wind Resource Assessment is essential for the selection of potential sites. Over a period of time, the Ministry, through National Institute of Wind Energy (NIWE), has installed 890 wind-monitoring stations all over the country and issued wind potential maps at 50 m, 80 m, 100 m and 120 m above ground level. The latest assessment indicates gross wind power potential of 302.25 GW and 695.50 GW in the country at 100 meter and 120 meter respectively, above ground level. Most of this potential exists in seven windy States as given in **Table 4.1** below:

Table 4.1 Wind Power Potential in India at 100 meter and 120 meter, above ground level

S. No.	State	Wind Power Potential at 100 mtr agl in GW	Wind Power Potential at 120 mtr agl (GW)
1	Andhra Pradesh	44.23	74.90
2	Gujarat	84.43	142.56
3	Karnataka	55.86	124.15
4	Madhya Pradesh	10.48	15.40
5	Maharashtra	45.39	98.21
6	Rajasthan	18.77	127.75
7	Tamil Nadu	33.80	68.75

S. No.	State	Wind Power Potential at 100 mtr agl in GW	Wind Power Potential at 120 mtr agl (GW)
	Total (7 windy States)	292.97	651.72
	Other States	9.28	43.78
	All India Total	**302.25**	**695.50**

The wind atlas is available on the NIWE's website **http://www.niwe.res.in** and wind potential map at 100 m and 120 m above ground level is given below in **Fig. 4.1** and **Fig. 4.2** respectively.

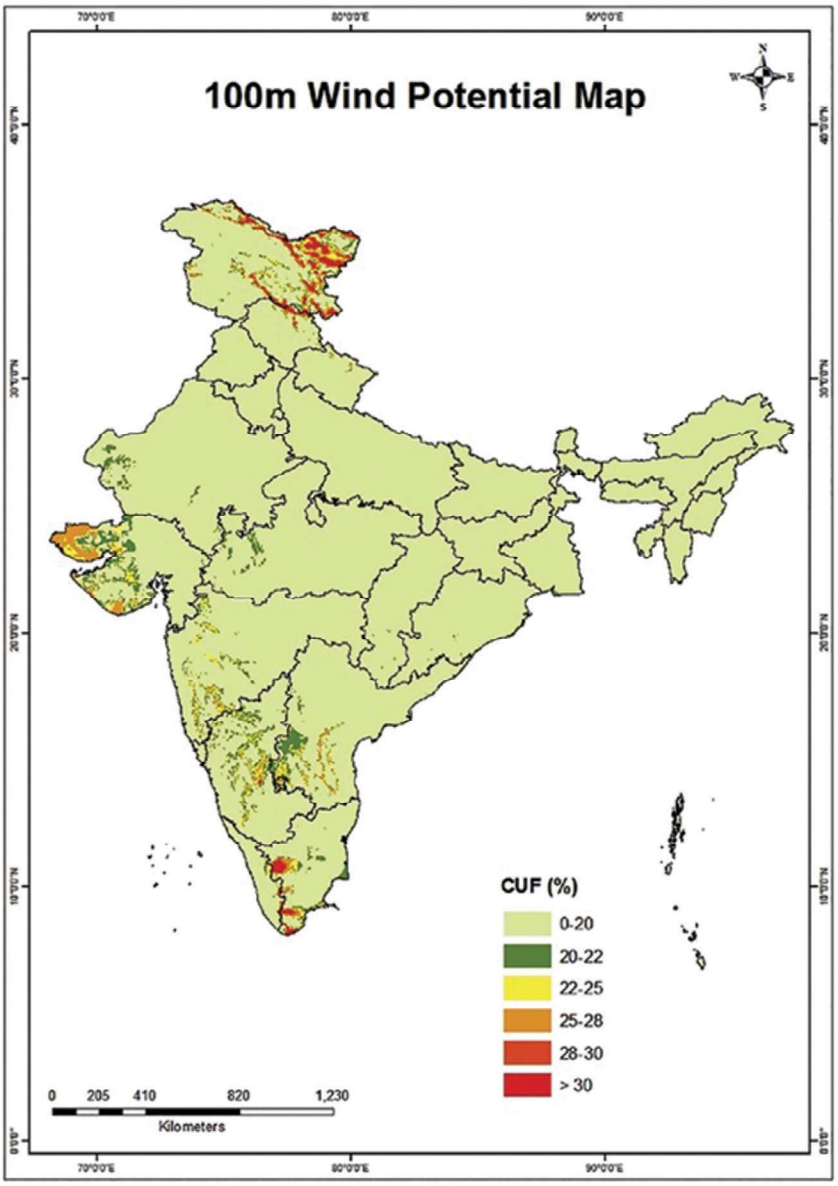


Fig. 4.1: Wind Potential Map at 100 Metres above ground level

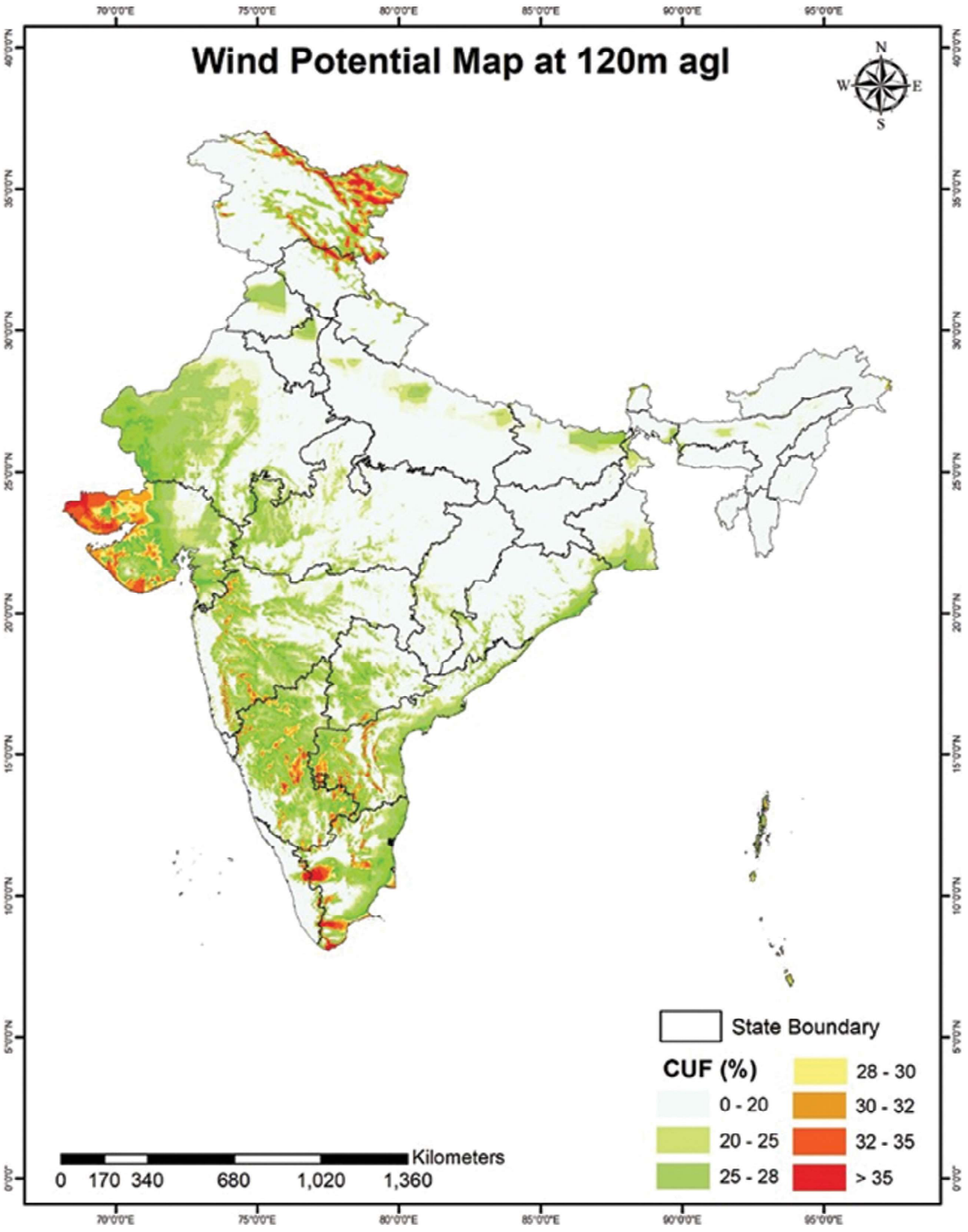


Fig. 4.2: Wind Potential Map at 120 Meters above ground level

4.2.3 Installed capacity of Wind Power in the country

The installed capacity of grid-interactive wind power in the country as on 31.12.2020 is 38.62 GW and state-wise installed capacity (in MW) is shown in **Table 4.2**.

Table 4.2: State wise Wind Power installed as on 31.12.2020

S. No.	STATE	Installed Capacity (MW)
1	Andhra Pradesh	4092.450
2	Gujarat	8192.52
3	Karnataka	4868.80
9	Kerala	62.500
4	Madhya Pradesh	2519.890
5	Maharashtra	5000.330
6	Rajasthan	4326.82
7	Tamil Nadu	9428.44
9	Telangana	128.100
10	Others	4.300
	Total (MW)	**38624.15**

The year-wise electricity generation from wind energy source is shown in **Table 4.3**.

Table 4.3: Year wise Electricity Generation from Wind Energy Sources

Sr. No.	Year	Generation (MU)
1	2014-15	33768
2	2015-16	33029
3	2016-17	46004
4	2017-18	52666
5	2018-19	62036
6	2019-20	64639
7	2020-21 (up to Nov, 2020)	46367

4.2.4 Technology development and manufacturing base for Wind Power

The Wind Turbine Generator technology has evolved and state-of-the-art technologies are available in the country for the manufacture of wind turbines. Around 75% localization has been achieved with strong domestic manufacturing capacity for wind energy turbines and its components in the country. All the major global players in this field have their presence in the country and over 31 different models of wind turbines are being manufactured by more than 13 different companies, through (i) joint ventures under licensed production (ii) subsidiaries of foreign companies, and (iii) Indian companies with their own technology. The unit size of the largest machine has gone up to 3.46 MW.

Wind turbines and components manufactured in India are also being exported to various countries. The current annual production capacity of wind turbines in the country is about 10,000 MW.

4.2.5 Tender/bidding in Wind Energy sector

Government issued Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Wind Power Projects vide resolution notified on 8th December, 2017. This was done with an objective to provide a framework for procurement of wind power through a transparent process of bidding including standardization of the process and defining of roles and responsibilities of various stakeholders. These Guidelines aim to enable the Distribution Licensees to procure wind power at competitive rates in a cost-effective manner.

Based on past bidding experience and after consultation with stakeholders, the standard bidding guidelines for wind power projects were amended on 16th July, 2019 to reduce the investment risks related to the land acquisition and Capacity Utilisation Factor (CUF). Incentives were also provided for early part commissioning of project. The subjectivity in penalty provisions was removed and the penalty rate was fixed. The risk of wind power developers in case of delay in signing of Power Sale Agreement (PSA) has been mitigated by starting timeline of execution of project from date of signing of Power Purchase Agreement (PPA) or PSA, whichever is later.

The Scheme for procurement of blended wind power from 2,500 MW ISTS connected projects was introduced. The objective of the Scheme is to provide a framework for procurement of electricity from 2,500 MW Interstate Transmission System (ISTS) Grid Connected Wind Power Projects with up to 20% blending with Solar PV Power through a transparent process of bidding. Solar Energy Corporation of India Ltd. (SECI) is the nodal agency for implementation of the Scheme. It has provisions for payment security mechanism, commission schedule, power offtake constraints, power purchase agreement, among others. SECI has awarded 970 MW of projects under this scheme at discovered tariff of ₹ 2.99-3.00 per unit.

4.2.6 Status of tenders for Wind Power Projects

To enable DISCOMs of the non-windy States to fulfil their non-solar Renewable Purchase Obligation (RPO), through purchase of wind power at a tariff determined by transparent bidding process, MNRE through SECI has auctioned wind power capacity in nine tranches. Further, NTPC and the states of Gujarat, Maharashtra and Tamil Nadu have also auctioned wind power capacities.

1) Cumulative commissioned capacity till 31/12/20: 38.624 GW

2) Capacity under implementation: 8.729 GW

3) Total ongoing bids: 1.2 GW

Total (1+2+3): 48.55 GW

The Minimum Tariffs discovered from tenders auctioned for Wind Power are shown in **Table 4.4.**

Table 4.4: Minimum Tariffs discovered from Tenders Auctioned for Wind Power

Sl. No.	Bid	Capacity Awarded (MW)	Type	Min. Tariff (Rs./kwh)
1.	SECI-I	1049.9	Central	3.46
2.	SECI-II	1000	Central	2.64
3.	SECI-III	2000	Central	2.44
4.	SECI-IV	2000	Central	2.51
5.	Tamil Nadu	450	State	3.42
6.	Gujarat (GUVNL)	500	State	2.43
7.	Maharashtra (MSEDCL)	500	State	2.85
8.	SECI-V	1190	Central	2.76
9.	NTPC	850	Central	2.77
10.	SECI-VI	1200	Central	2.82
11.	SECI-VII	480	Central	2.79
12.	SECI-VIII	440	Central	2.83
13.	Gujarat (GUVNL)	202.6	State	2.80
14	SECI-IX	970	Central	2.99
	Sub Total	**12832.5**		

4.2.7 Incentives available for Wind sector

The Government is promoting wind power projects in entire country through private sector investment by providing various fiscal and financial incentives such as Accelerated Depreciation benefit; concessional custom duty exemption on certain components of wind electric generators. Besides, Generation Based Incentive (GBI) Scheme was available for the wind projects commissioned up to 31st March 2017.

In addition to fiscal and other incentives as stated above, following steps have also been taken to promote installation of wind capacity in the country. Firstly, Technical support including wind resource assessment and identification of potential sites through NIWE, Chennai.

Secondly, in order to facilitate inter-state sale of wind power, the inter-state transmission charges and losses have been waived off for wind and solar projects to be commissioned by June, 2023.

4.2.8 Offshore Wind development in India

India is blessed with a coastline of about 7600 kms surrounded by seawater on three sides and has tremendous power generation potential from offshore wind energy. Considering this, the Government had notified the National Offshore Wind Energy Policy as per the Gazette Notification dated 6th October 2015. As per the policy, Ministry of New and Renewable Energy will act as the nodal ministry for development of Offshore Wind Energy in India and work in close coordination with other government entities for Development and Use of Maritime Space within the Exclusive Economic Zone (EEZ) of the country in an effective manner for production of enormous quantity grid quality electrical power for national consumption.

National Institute of Wind Energy (NIWE), Chennai has been designated as the nodal agency to execute various pre-feasibility activities relating to resource assessment, surveys and studies within EEZ (Exclusive Economic Zone), demarcation of offshore potential blocks and facilitating offshore wind energy project developers for setting up offshore wind energy farms.

4.2.9 Present status

» Based on the preliminary assessment from satellite data and data available from other sources, 8 (eight) zones each in Gujarat and Tamil Nadu have been identified as potential zones for exploitation of offshore wind energy. Initial assessment of offshore wind energy potential within the identified zones has been estimated to be about 70 GW off the coast of Gujarat & Tamil Nadu only. (**Fig. 4.3 and Fig. 4.4**).

» In order to attract the large investment needed/required for development of the sector in India, Government of India has already announced its intention of developing 5 GW of offshore wind energy project by 2022 and 30 GW by 2030.

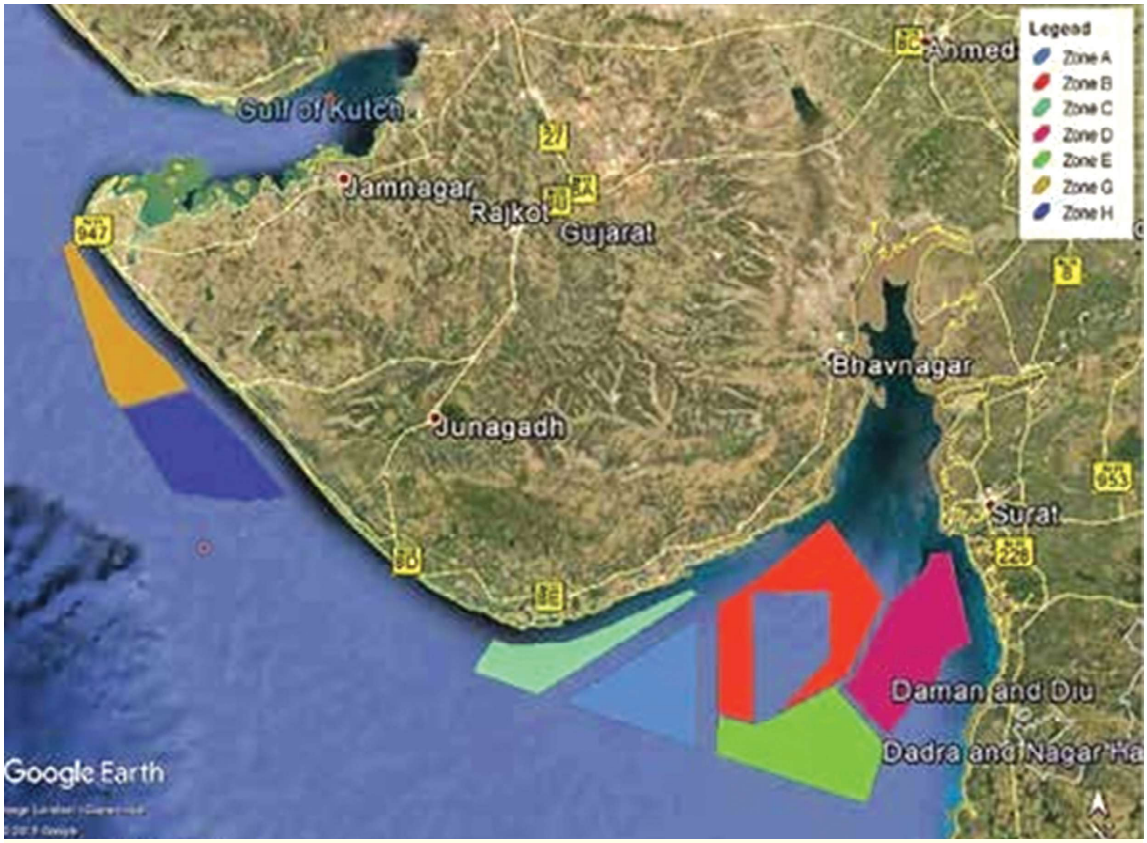


Fig. 4.3 Gujarat Offshore Wind Potential Zone

4.2.10 Studies to Assess the Potential on the Gujarat Coast

1. Offshore measurements off Gujarat coast:

LiDAR based offshore wind potential measurements for 2 years have been completed at Gulf of Khambhat off Gujarat coast. The offshore LiDAR wind data measurement report for the first and

second years have been published for benefit of stakeholder. Raw data files (time series) of two years of LiDAR measurement carried out at Gulf of Khambhat has also been uploaded in NIWE website. Four more LiDARs have been procured by NIWE for carrying out offshore wind resource assessment off Gujarat and Tamil Nadu coast. The LiDARs have already been validated in the WTRS test station Kayathar.

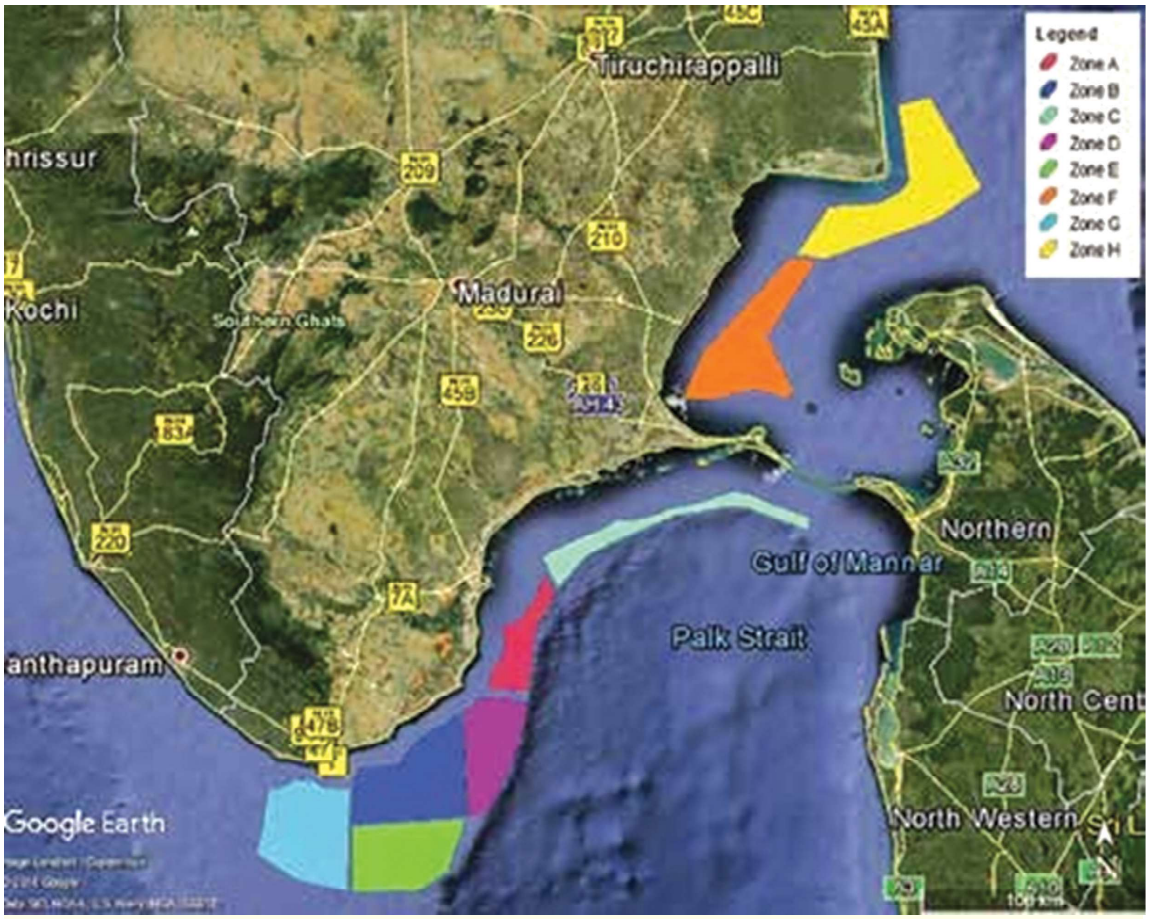


Fig. 4.4: Tamil Nadu Offshore Wind Potential Zone

2. Geophysical investigation at Gulf of Khambhat off Gujarat coast:

In order to ascertain the nature of sub sea surface and soil profile available at recommended depths for the design of foundation for offshore structures, a detailed geophysical survey is required to be carried out. Onsite Geo-physical investigation (single beam bathymetry survey, side scan sonar, sub-bottom profiling, and magnetometer survey and sediment samples) covering an area of 365 sq. km for 1GW offshore project in Gulf of Khambhat off Gujarat Coast has been completed.

3. Geotechnical Investigation at Gulf of Khambhat off Gujarat coast:

In order to understand the subsoil profile and load bearing capacity of the seabed geotechnical studies were carried out at five locations off the coast of Gujarat. The geotechnical investigations at three locations off the coast of Tamil Nadu have been completed. Based on the results of the geotechnical investigations the offshore structure (LiDAR platform) will be designed and fabricated.

4. **Rapid Environmental Impact Assessment for 1 GW offshore wind farm project at Gulf of Khambhat off Gujarat coast:**

The Rapid EIA work has been completed by National Institute of Oceanography (NIO) and the report has been finalized after carrying out the stakeholder's consultation and submitted to NIWE. The report has been shared with MoD for publication and based on the inputs received from MoD the report has been published in NIWE website.

5. **Offshore Wind Energy Lease Rules:**

In order to formulate the required framework for regulating the lease of offshore areas within the Exclusive Economic Zone (EEZ) of India for offshore wind energy development, Ministry is framing Lease Rules under the 'Territorial Waters, Continental Shelf, EEZ and Other Maritime Zones Act, 1976'. Stakeholders consultation with various Ministries and Departments including private players have been completed. Ministry is in the process of consultation with MEA, the administrative ministry for the Act for getting it notified.

6. **Offshore Wind Turbine Research and Test Centre at Dhanushkodi, Tamil Nadu:**

In order to strengthen the domestic capacity for design and development of new offshore wind energy turbines, a testing cum research facility was necessary and NIWE has already identified the suitable site at Dhanushkodi, Tamil Nadu for establishment of the testing cum research centre. The required land for the purpose has been allotted by Govt. of Tamil Nadu. NIWE is in the process of preparing a detailed project report for the centre.

7. **Committee to Finalise a Strategy for Offshore Wind Energy Development in India**

Ministry has constituted a committee to examine the various issues relating to offshore wind energy development in the country including the optimal capacity for the first project, adequate project pipeline, development models and financing mechanisms and recommend the strategy for development of this sector. The committee is in the process of deliberation on these issues and various stakeholder consultations are going on. Based on the recommendations of this committee a definitive plan will be made for establishment of offshore wind energy project in India.

4.3 ENERGY FROM WIND-SOLAR HYBRID

4.3.1 National Wind-Solar Hybrid Policy:

The Ministry issued National Wind-Solar Hybrid Policy on 14th May, 2018. The main objective of the policy is to provide a framework for promotion of large-scale grid connected wind-solar PV hybrid systems for optimal and efficient utilization of wind and solar resources, transmission infrastructure and land. The wind-solar PV hybrid systems will help in reducing the variability in renewable power generation and achieving better grid stability. The policy also aims to encourage new technologies, methods and way-outs involving combined operation of wind and solar PV plants.

4.3.2 The Major Highlights of the Policy are as under:

» A wind-solar plant will be recognized as hybrid plant if the rated power capacity of one resource is at least 25% of the rated power capacity of other resource.

- Both AC and DC integration of wind-solar hybrid project are allowed.
- The power procured from the hybrid project may be used for fulfilment of solar RPO and non-solar RPO in the proportion of rated capacity of solar and wind power in the hybrid plant respectively.
- Existing wind or solar power projects, willing to install solar PV plant or Wind Turbine Generators (WTGs) respectively, to avail benefit of hybrid project, may be allowed.
- All fiscal and financial incentives available to wind and solar power projects will also be made available to hybrid projects.
- The Central Electricity Authority (CEA) and Central Electricity Regulatory Commission (CERC) shall formulate necessary standards and regulations including metering methodology and standards, forecasting and scheduling regulations, REC mechanism, grant of connectivity and sharing of transmission lines, etc., for wind-solar hybrid systems.
- Storage may be added to the hybrid project to ensure availability of firm power for a particular period.

4.3.3 Wind-Solar Hybrid Projects

4.3.4 The following are the Projects under the Wind-Solar Hybrid Programme

- In order to implement the National Wind-Solar Hybrid Policy, a scheme for setting up of 2500 MW Inter State Transmission System (ISTS) connected wind-solar hybrid projects was sanctioned on 25.05.2018. The Solar Energy Corporation of India (SECI) was the nodal agency for implementation of the scheme through tariff based transparent competitive bidding process.
- Guidelines for Tariff Based Competitive Bidding Process for procurement of power from Grid Connected Wind Solar Hybrid Projects were issued on 14.10.2020. The objective is to provide a framework for procurement of electricity from ISTS Grid Connected Wind-Solar Hybrid Power Projects through a transparent process of bidding. Individual minimum size of project allowed is 50 MW at one site and a single bidder cannot bid for less than 50 MW. The rated power capacity of one resource (wind or solar) shall be at least 33% of the total contracted capacity. It has provisions for payment security mechanism, commission schedule, power offtake constraints, power purchase agreement, etc. SECI is the nodal agency for implementation of the Scheme.
- SECI has awarded 2550 MW capacity of wind-solar hybrid projects after e- reverse auction, as shown in **Table 4.5**.

Table 4.5: Minimum Tariffs discovered from tenders auctioned for Wind-Solar Hybrid Power Projects

Sl. No.	Bid	Capacity Awarded (MW)	Min. Tariff (Rs./kwh)
1.	SECI Hybrid – I	840	2.67
2.	SECI Hybrid -II	600	2.69
3.	SECI Hybrid -III	1110	2.41
	Total	**2550**	

4.3.5 Issuance of Concessional Customs Duty Certificates for Manufacturing of Wind Turbines

Ministry is issuing Concessional Customs Duty Certificates (CCDC) to the manufacturers of wind operated electricity generators as per Ministry of Finance tariff notification no. 50/2017-customs dated 30.06.2017. For this purpose the eligible turbine and component manufacturers are required to get the bill of material for turbine models approved, which are listed in Revised List of Manufacture and Models (RLMM) and then apply in prescribed formats to Ministry for issue of CCDC (Concessional Custom Duty Certificate) for their import consignments. In order to make the entire process fast and transparent, an online portal was developed and is active since Oct, 2019. A total 245 nos. of CCDC have been issued in the FY 2020-21 till 31.12.2020.

4.4 GRID CONNECTED BIOMASS POWER AND BAGASSE BASED CO-GENERATION

4.4.1 Ministry has been promoting Biomass Power and Bagasse Co-generation Programme with the aim to recover energy from biomass including bagasse, agricultural residues such as shells, husks, de-oiled cakes and wood from dedicated energy plantations for power generation. A scheme to support promotion of biomass-based cogeneration in sugar mills and other industries was notified on 11.05.2018. The potential for power generation from agricultural and agro-industrial residues is estimated at about 18,000 MW. With progressive higher steam temperature and pressure and efficient project configuration in new sugar mills and modernization of existing ones, the potential of surplus power generation through bagasse cogeneration in sugar mills is estimated at around 8,000 MW. Thus the total estimated potential for biomass power is about 26,000 MW.

4.4.2 Sugar industry has been traditionally practicing incidental cogeneration by using bagasse as a fuel for meeting the steam and power requirements of sugar processing and sugar mill complex. With the advancement in the boiler and turbine technologies for generation and utilization of steam at high temperature and pressure, sugar industry has been producing electricity and steam for their own requirements and selling surplus electricity to the grid by optimally utilizing the bagasse. The sale of surplus power generated through optimum cogeneration is helping improvement of viability of sugar mills and their profitability, apart from creating additional power generation capacity in the country.

4.4.3 More than 550 Nos of Biomass IPP and Bagasse Cogeneration based power plants with aggregate capacity of 9373 MW have been installed in the country upto December, 2020.

4.4.4 Bagasse based cogeneration in sugar mills for export of surplus power to grid is the main grid connected component of the Programme. India has more than 540 Nos of sugar mills, out of which around 360 sugar mills have installed cogeneration power plant capacity of 7547 MW.

4.4.5 Objectives of the Programme are:

- To promote efficient and economic use of surplus biomass for power generation.
- To maximize surplus power generation from sugar mills using improved technologies.
- To promote technologies of co-generation for supplementing conventional power.

4.4.6 For the purpose of biomass-based cogeneration programme following nomenclature are broadly adopted:

- **Biomass Resources:** The programme will provide CFA for projects utilizing biomass like bagasse,

agro-based industrial residue, crop residues, wood produced through energy plantations, weeds, wood waste produced in industrial operations, among others.

- **Financing Institutions:** All registered financial Institutions, development and investment corporations; all nationalized bank, private banks, Central & State Cooperative Banks, State/Public Sector Leasing and Financing corporations.
- **Promoters:** Promoters include individual / independent registered companies, Joint Sector / public sector companies/ state agencies and private and public sector investors having technical and managerial capabilities for implementing Bagasse cogeneration projects.
- **Central Financial Assistance (CFA):** As per the scheme, to support biomass-based cogeneration in sugar mills and other industries Central Financial Assistance (CFA) will be provided at the rate of Rs.25 Lakh / MW for bagasse cogeneration projects on surplus exportable capacity under the scheme. CFA is calculated on surplus exportable power as mentioned in Power Purchase Agreement (PPA)/ Appraisal Report. The CFA is back-ended and is released in one instalment after successful commissioning and commencement of commercial generation and performance testing of the plant to the term loan account to reduce the loan component of the promoter. No advance CFA is released under the scheme and is provided only for projects which install new boiler and turbines.
- **Achievements:** A cumulative capacity of 9,373 MW in over 550 of power plants has been commissioned so far mainly in the states of Maharashtra, Uttar Pradesh, Karnataka, Tamil Nadu, Andhra Pradesh, Chhattisgarh, West Bengal and Punjab. This includes 7547 MW from Bagasse Cogeneration Sector and 1826 MW from Biomass IPP Sector.

4.4.7 New Initiatives

- The Ministry has launched Bio-urja Portal to facilitate the online submission of proposal and requisite documents for availing Central Financial Assistance (CFA) under the scheme.
- An MNRE sponsored study to assess the Biomass Power and Bagasse Co-generation Potential in India is being conducted by Administrative Staff College of India, Hyderabad.

4.5 SMALL HYDRO POWER

4.5.1 The Ministry of New and Renewable Energy (MNRE) is vested with the responsibility of developing hydro power projects of capacity up to 25MW, categorized as Small Hydro Power (SHP) Projects. These projects have potential to meet power requirements of remote and isolated areas in a decentralized manner besides providing employment opportunity to local people. **(Fig. 4.5 and Fig. 4.6)** Small Hydro Power projects are further categorized into small, mini and micro hydel projects based on their capacity as follows:

Micro hydel ≤ 0.1 MW

Mini hydel > 0.10 MW to ≤ 2.00 MW

Small Hydel > 2.00 MW to ≤ 25.00 MW

Fig.4.5: *Khandi SHP (1000kW), District Kargil , UT of Ladakh – View of Power House & Switchyard*

Fig.4.6: *TG sets of Baitarani SHP (24 MW) commissioned in August 2020 in Keonjhar District of Odisha*

4.5.2 The estimated potential of small, mini and micro hydel projects in the country is 21,133.65 MW from 7,133 sites located in different States of India. The SHP projects in the country are being set-up both in public and private sectors. Setting up of SHP projects normally require about 3-4 years depending upon its size and location. The national target for SHP is to achieve a cumulative capacity of 5,000 MW by 2022, under overall targets of achieving a cumulative grid connected Renewable Energy Power Projects of 175,000 MW. Against this target of achieving an aggregate capacity of 5,000 MW by the year 2022, an aggregate capacity of 4,750.46 MW been achieved by 31st December 2020 through 1,134 small hydro power projects. In addition, 96 projects of aggregate capacity of 450.80 MW are at various stages of implementation. **Table 4.6** provides state-wise details of identified potential, projects completed and those under execution.

4.5.3 For the year 2020-21, a target of commissioning of 100 MW small hydro projects was set. Against this target, six projects of aggregate capacity of 67.29 MW have been synchronized to the grid by 31st December, 2020 (**Table 4.7**). Actual physical achievement from 01.01.2020 to 31.12.2020 and estimated physical achievement from 01.01.2021 to 31.03.2021 is given in **Table 4.8**.

4.5.4 Under the 'Ladakh Renewable Energy Initiative (LREI)', one mini hydel project namely, Turtuk MHP (500kW) in village Turtuk in Leh was commissioned during current financial year by Ladakh Renewable Energy Development Agency (LREDA). In addition, two Mini Hydro Power Projects in Kargil district, namely, Matayeen (550 kW) and Khandi MHP (1,000 kW) were also completed in all respects during current financial year by Kargil Renewable Energy Development Agency (KREDA) and are ready for commissioning.

Table 4.6 State wise list of potential sites, installed projects and on-going projects in SHP sector (as on 31.12.2020)

Sl. No.	State	Total Potential		Projects Installed						Projects under Implementation	
		Nos.	Total Capacity (MW)	Upto 2019-20		2020-21		Total		Nos.	Capacity (MW)
				Nos.	Capacity (MW)	Nos.	Capacity (MW)	Nos.	Capacity (MW)		
1	Andhra Pradesh	359	409.32	44	162.11	0	0	44	162.11	0	0.00
2	Arunachal Pradesh	800	2064.92	156	131.11	0	0	156	131.11	9	6.05
3	Assam	106	201.99	6	34.11	0	0	6	34.11	1	2.00
4	Bihar	139	526.98	29	70.70	0	0	29	70.70	0	0.00
5	Chhattisgarh	199	1098.2	10	76.00	0	0	10	76.00	0	0.00
6	Goa	7	4.7	1	0.05	0	0	1	0.05	0	0.00
7	Gujarat	292	201.97	14	68.95	1	9.99	15	78.94	7	32.22
8	Haryana	33	107.4	9	73.50	0	0	9	73.50	0	0.00
9	Himachal Pradesh	1049	3460.34	196	911.51	0	0	196	911.51	13	151.60
10	UT of Jammu & Kashmir	103	1311.79	18	141.34	1	5.00	19	146.34	6	31.90
11	UT of Ladakh	199	395.65	28	39.14	1	0.50	29	39.64	9	10.15
12	Jharkhand	121	227.96	6	4.05	0	0	6	4.05	0	0.00
13	Karnataka	618	3726.49	170	1280.73	0	0	170	1280.73	3	13.00

Sl. No.	State	Total Potential		Projects Installed						Projects under Implementation	
		Nos.	Total Capacity (MW)	Upto 2019-20		2020-21		Total		Nos.	Capacity (MW)
				Nos.	Capacity (MW)	Nos.	Capacity (MW)	Nos.	Capacity (MW)		
14	Kerala	238	647.15	34	222.02	0	0	34	222.02	8	80.50
15	Madhya Pradesh	299	820.44	12	95.91	1	3.80	13	99.71	2	7.60
16	Maharashtra	270	786.46	70	379.58	0	0	70	379.58	9	10.40
17	Manipur	110	99.95	8	5.45	0	0	8	5.45	0	0.00
18	Meghalaya	97	230.05	5	32.53	0	0	5	32.53	2	25.50
19	Mizoram	72	168.9	18	36.47	0	0	18	36.47	2	8.50
20	Nagaland	98	182.18	12	30.67	0	0	12	30.67	1	1.00
21	Odisha	220	286.22	10	64.63	1	24.00	11	88.63	2	33.00
22	Punjab	375	578.28	56	173.55	0	0	56	173.55	6	4.30
23	Rajasthan	64	51.67	10	23.85	0	0	10	23.85	0	0.00
24	Sikkim	88	266.64	17	52.11	0	0	17	52.11	1	3.00
25	Tamil Nadu	191	604.46	21	123.05	0	0	21	123.05	0	0.00
26	Telangana	94	102.25	30	90.87	0	0	30	90.87	0	0.00
27	Tripura	13	46.86	3	16.01	0	0	3	16.01	0	0.00
28	A&N Islands	7	7.27	1	5.25	0	0	1	5.25	0	0.00
29	Uttar Pradesh	251	460.75	9	25.10	1	24.00	9	49.10	1	1.50
30	Uttarakhand	442	1664.31	102	214.32	0	0	102	214.32	14	28.58
31	West Bengal	179	392.06	24	98.50	0	0	24	98.50	0	0.00
Total		**7133**	**21133.62**	**1129**	**4683.17**	**6**	**67.29**	**1134**	**4750.46**	**96**	**450.80**

Table 4.7: List of SHP Projects Commissioned during 2020-21 (till 31.12.2020)

S. No.	State	Name of the project	Capacity (MW)	Name of the Agency/Developer
1	Gujarat	Kachchh Branch Canal, SHP-1, Banaskantha	**9.99**	Sardar Sarovar Narmada Nigam Limited
2	Jammu & Kashmir	Ichoo SHP, Anantnag	**5.0**	M/s O2Z Trading and Industries Pvt. Ltd.
3	Madhya Pradesh	Amhata-III, Rewa	**3.80**	M/s Amhata Hydro Energy Pvt. Ltd.
4	Odissa	Baitarani SHP, Keonjhar	**24.0**	M/s Baitarani Power Project Pvt. Ltd.
5	UT of Ladakh	Turtuk SHP, Nubra Valley	**0.50**	Ladakh Renewable Energy Development Agency
6	Uttar Pradesh	Dhukwan SHP, Jhansi	**24.0**	THDC India Limited
Aggregate Capacity			**67.29**	

Table 4.8: Actual Physical Achievement from 01.01.2020 to 31.12.2020 and Estimated physical achievement from 01.01.2021 to 31.03.2021.

Actual physical achievement from 01.01.2020 to 31.12.2020	Estimated physical achievement from 01.01.2021 to 31.03.2021
78.95 MW	**35 MW**