17

STANDING COMMITTEE ON ENERGY

(2020-21)

SEVENTEENTH LOK SABHA

MINISTRY OF NEW AND RENEWABLE ENERGY

ACTION PLAN FOR ACHIEVEMENT OF 175 GIGAWATT (GW) RENEWABLE ENERGY TARGET

SEVENTEENTH REPORT

LOK SABHA SECRETARIAT
NEW DELHI

March, 2021/Phalguna, 1942 (Saka)

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Presented to Lok Sabha on 19th March, 2021

Laid in Rajya Sabha on 19th March, 2021

सत्यमेव जयते

LOK SABHA SECRETARIAT
NEW DELHI

March, 2021/Phalguna, 1942 (Saka)

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COMPOSITION OF THE STANDING COMMITTEE ON ENERGY (2020-21)

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31. Vacant #

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3.	Shri Kulmohan Singh Arora	Additional Director
4.	Smt. L.N. Haokip	Deputy Secretary
5.	Ms. Deepika	Committee Officer

^ Nominated as Member of the Committee w.e.f. 28.12.2020
** Vacant vice Shri Javed Ali Khan retired from Rajya Sabha on 25.11.2020*
 # Vacant since constitution of the Committee.

COMPOSITION OF THE STANDING COMMITTEE ON ENERGY (2019-20)

LOK SABHA

Shri Rajiv Ranjan Singh *alias* Lalan Singh - Chairperson

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34. Shri Nabam Rebia*****
35. Dr. Sudhanshu Trivedi*****
36. Shri K.T.S. Tulsi*****

1. Resigned from membership of the Committee w.e.f. 21.11.2019.
2. Retired from Rajya Sabha on 25.06.2020.
3. Retired from Rajya Sabha on 02.04.2020.
4. Nominated to the Committee w.e.f. 04.02.2020.
5. Retired from Rajya Sabha on 09.04.2020.
** Nominated to the Committee w.e.f. 22.07.2020*

INTRODUCTION

I, the Chairperson, Standing Committee on Energy, having been authorized by the Committee to present the Report on their behalf, present this Seventeenth Report on 'Action Plan for achievement of 175 Gigawatt (GW) Renewable Energy Target' relating to the Ministry of New and Renewable Energy.

2. The Committee had a briefing on the subject by representatives of the Ministry of New and Renewable Energy on 27th November, 2019. The Committee, with a view to examining the subject in detail, had evidence of representatives of the Ministry of New and Renewable Energy on 18th August, 2020. The Committee wish to express their thanks to the representatives of the Ministry of New and Renewable Energy for appearing before the Committee and furnishing the desired information in connection with the issues relating to the subject.

3. The Report was considered and adopted by the Committee at their sitting held on 18th March, 2021.

4. The Committee place on record their appreciation of the valuable assistance rendered to them by the officials of the Lok Sabha Secretariat attached to the Committee.

5. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in Part-II of the Report.

New Delhi
18th March, 2021
27 Phalguna, 1942 (Saka)

Shri Rajiv Ranjan Singh *alias* Lalan Singh
Chairperson,
Standing Committee on Energy

List of Abbreviations	
Abbreviation	**Full Form**
AD	Accelerated Depreciation
ADB	Asian Development Bank
AJAY	Atal Jyoti Yojana
APPC	Average Power Purchase Cost
BBMB	Bhakra Beas Management Board
BCD	Basic Custom Duty
BESS	Battery Energy Storage System
BIS	Bureau of Indian Standards
BNEF	Bloomberg New Energy Finance
CCDC	concessional custom duty exemption
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CFA	Central Finance Assistance
CPSU	Central Public Sector Undertaking
CUF	Capacity Utilisation Factor
DCR	Domestic Content Requirement
DISCOM	Distribution Company
DPR	Detailed Project Report
DST	Department of Science & Technology
EESL	Energy Efficiency Services Limited
EPC	Engineering Procurement Construction
FiT	Feed in Tariff
FPO	Farmer Producer Organisations
GBI	Generation Based Incentive
GCF	Green Climate Fund
GEC	Green Energy Corridor
GW	Gigawatt
IEX	India Energy Exchange
INDC	Intended Nationally Determined Contributions
IREDA	Indian Renewable Energy Development Agency
IRENA	International Renewable Energy Agency
IRR	Internal Rate of Return
ISA	International Solar Alliance
ISTS	Inter State Transmission System
JMR	Joint Meter Reading
LC	Letter of Credit
LiDAR	Light Detection and Ranging
MNRE	Ministry of New and Renewable Energy
MWp	Megawatt peak
NABARD	National Bank for Agriculture and Rural Development
NBMMP	National Biogas Manure Management Programme
NCSCM	National Centre for Sustainable Coastal Management

NER	North-East Region
NISE	National Institute of Solar Energy
NIWE	National Institute of Wind Energy
NLDC	National Load Dispatch Centre
NNBOMP	New National Biogas and Organic Manure Programme
NPA	Non Performing Asset
NSM	National Solar Mission
NVVN	NTPC Vidyut Vyapar Nigam Ltd
OEM	Original Equipment Manufacturers
PAC	Project appraisal Committee
PM KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan
PGCIL	Power Grid Corporation of India Limited
PPA	Power Purchase Agreements
PV	Photo Voltaic
R&D	Research & Development
REC	Renewable Energy Certificates
REGS	Renewable Energy Generating Stations
RESCO	Renewable Energy Service Company
RLMM	Revised List of Models and Manufacturers
RPO	Renewable Purchase obligation
RTS	Rooftop Solar
SCGJ	Skill Council of Green Jobs
SECI	Solar Energy Corporation of India
SERC	State Electricity Regulatory Commission
SHP	Small Hydro Power
SNA	State Nodal Agency
SPPD	Solar Power Park Developers
SRRA	Solar Radiation and Resource Assessments
SSS-NIBE	Sardar Swaran Singh National Institute of Bio Energy
STU	State Transmission Utilities
UMREPP	Ultra Mega Renewable Energy Power Parks
UNFCCC	United Nations Framework Convention on Climate Change
VGF	Viability Gap Funding
WTG	Wind Turbine Generator

PART I
NARRATION ANALYSIS

CHAPTER I
INTRODUCTORY

1.1 In the Nationally Determined Contributions as per the Paris Accord on Climate Change in December, 2015, India has made a pledge that by 2030, 40% of her installed power generation capacity shall be from clean energy sources. Keeping in view India's commitment for a healthy planet, it was decided during the year 2015 that 175 GW of renewable energy capacity will be installed by the year 2022 that includes 100 GW from solar, 60 GW from wind, 10 GW from biomass and the remaining 5 GW from small hydro power. Further, Hon'ble Prime Minister in his address at Climate Action Summit in 2019 has stated that India's renewable energy capacity would be increased to much beyond 175 GW and later till 450 GW.

1.2 A potential of 1490.73 GW has been estimated from various renewable energy Sources i.e. solar, wind, small hydro power and bio-power in the country, a substantial part of which is suitable for grid applications. State and Union territory wise estimated potential of renewable energy (source wise) in the Country is given at **Annexure-I**.

1.3 As on 31.01.2021, the total installed capacity of renewable energy in the Country is 92.54 GW which includes 4.76 GW from small hydro power, 38.68 GW from wind power, 10.31 GW from bio power and 38.79 GW from solar power. The State and Union territory wise installed capacity of grid connected renewable energy is given at **Annexure-II**.

1.4 Sector wise progress as on 31.01.2021, as furnished by the Ministry is given below:

					(in GW)
Sector	**Target by 2022**	**Installed capacity**	**Under Implementation**	**Tendered**	**Total Installed/ Pipeline**
Solar Power	100	38.79	36.03	23.87	98.69
Wind Power	60	38.68	8.68	1.20	48.56
Bio Energy	10	10.31	0.00	0.00	10.31
Small Hydro	5	4.76	0.44	0.00	5.20
Wind Solar Hybrid	0	0	2.55	0.00	2.55
Round the Clock (RTC)/ assured Peak Power supply	0	0	1.60	2.50	4.10
Total	**175**	**92.54**	**49.30**	**27.57**	**169.41**

1.5 The Committee were informed that as of March 2020, India stands among the top five countries in terms of renewable energy capacity. India stands 5th in solar power, 4th in wind power and 4th in total renewable power installed capacity. If large hydro power is included, India stands 3rd in renewable power capacity globally.

1.6 The share of renewable energy in total installed power capacity vis-à-vis thermal, large hydro, nuclear power etc. since 2010-11 is given below:

								(In MW)
As on date	**Mode wise breakup**						**Total**	**Share of Renewable Energy to total**
	Thermal			**Nuclear**	**Hydro**	**Renewable Energy**		
	Coal/Lig.	**Gas**	**Diesel**					
31.03.2011	93918.38	17706.35	1199.75	4780.00	37567.41	18454.52	173626.41	10.63%
31.03.2012	112022.38	18381.05	1199.75	4780.00	38990.40	24503.45	199877.03	12.26%
31.03.2013	130220.88	20109.85	1199.74	4780.00	39491.40	27541.70	223343.57	12.33%
31.03.2014	145273.39	21781.85	1199.75	4780.00	40531.41	34988.00	248554.39	14.08%
31.03.2015	164635.88	23062.15	1199.75	5780.00	41267.43	38959.16	274904.37	14.17%
31.03.2016	185172.88	24508.63	993.53	5780.00	42783.42	45924.04	305162.50	15.05%
31.03.2017	192162.88	25329.38	837.63	6780.00	44478.42	57244.23	326832.53	17.51%
31.03.2018	197171.50	24897.46	837.63	6780.00	45293.42	69022.39	344002.39	20.06%
31.03.2019	200704.50	24937.22	637.63	6780.00	45399.22	77641.63	356100.19	21.80%
31.03.2020	205134.50	24955.36	509.71	6780.00	45699.22	87027.68	370106.46	23.51%
May,2020 (2020-21)	205134.50	24991.51	509.71	6780.00	45699.22	87384.02	370498.96	23.59%

1.7 Regarding the estimated annual generation per MW from Renewable Power vis-a-vis Thermal Power, as furnished by the Ministry, is given below:

Source	Estimated annual generation per MW
Solar	2 MU
Wind	2.2 MU
Hydro	3-4 MU
Thermal	7.6 MU

1.8 Electricity Generation from Renewable Energy & conventional sources, as furnished by the Ministry, are as follows:

Year	Generation from Renewables	Total Generation including Renewables	Share of Renewable Generation (%) of total Renewable Generation
2014-15	61.71BU	1110.38 BU	5.56
2015-16	65.78 BU	1172.98 BU	5.60
2016-17	81.55 BU	1241.68 BU	6.57
2017-18	101.83BU	1303.37 BU	7.78
2018-19	126.76 BU	1375.96 BU	9.21
2019-20	138.32 BU	1390.93 BU	9.95
2020-21 **(Up to June, 2020)**	38.31 BU	315.4 BU	12.15

1.9 In response to a query about impact of Covid-19 on the renewable energy sector, the Ministry has stated that:

> ".....disruptions caused due to Corona virus may affect achievement of RE (renewable energy) targets in time."

CHAPTER II
SOLAR POWER

2.1 The Ministry submitted that the National Solar Mission (NSM) was launched on 11th January, 2010 and the Mission targets included the following:

(i) deployment of 20,000 MW of grid connected solar power by 2022,
(ii) 2,000 MW of off-grid solar applications including 20 million solar lights by 2022,
(iii) 20 million sq. m. solar thermal collector area,
(iv) to create favorable conditions for developing solar manufacturing capability in the country; and
(v) support R&D and capacity building activities to achieve grid parity by 2022.

2.2 The Cabinet in its meeting held on 17.06.2015 approved revision of cumulative targets under NSM from 20,000 MW to 1,00,000 MW by 2021-22 for grid connected solar power projects. The Ministry stated that the revised target of 1,00,000 MW has been planned to be achieved in 7 years period.

2.3 Against the target of 100 GW of solar energy, a total of 35.12 GW of solar power capacity has been installed in the Country as on 30.06.2020. Further, solar power projects of 31.48 GW are under various stages of implementation for which Letters of Intent have been issued.

2.4 The lowest Solar Power tariff in some of the leading countries, as furnished by the Ministry, is given below:

Countries	Lowest Solar Tariff
Qatar	0.01567 $/kWh
Dubai	0.0169 $/kWh
Portugal	0.01476 €/kWh
Brazil	0.01695 $/kWh
India	Rs 2.36/kWh

2.5 Regarding physical targets vis-à-vis achievements in respect of solar power, the Ministry replied as under:

"No year-wise targets were set under Grid interactive Solar Power, instead a target for installing 100 GW of solar power by Decemer-2022 has been set. Against this, a grid connected capacity of 35122.31 MW has been installed in the country as on 30.06.2020."

2.6 The year-wise solar energy capacity installed, as furnished by the Ministry, is as under:

S. No	Year	Capacity added during year	Cumulative capacity
1.	Upto 2010	--	11 MW
2.	2010-11	25 MW	36 MW
3.	2011-12	994 MW	1030 MW
4.	2012-13	656 MW	1686 MW
5.	2013-14	945.9 MW	2631.9 MW
6.	2014-15	1112.07 MW	3743.97 MW
7.	2015-16	3018.883 MW	6762.853 MW
8.	2016-17	5525.98 MW	12288.83 MW
9.	2017-18	9362.67 MW	21651.46 MW
10.	2018-19	6529.20 MW	28180.66 MW
11.	2019-20	6447.13 MW	34627.79 MW
12.	2020-21	494.51 MW	35122.31 MW (as on 30.6.2020)

2.7 When asked about the steps taken by the Ministry to ensure achievement of physical target with respect to Solar Energy, the Ministry has stated that it has launched the following schemes for achieving the target in solar energy:

(i) Solar Park Scheme for setting up of over 50 Solar Parks and Ultra Mega Solar Power Projects targeting over 40,000 MW of solar power projects.
(ii) Scheme for setting up of Grid-Connected Solar PV Power Projects by the Central Public Sector Undertakings (CPSUs) and the Government of India organisations with Viability Gap Funding (VGF).
(iii) VGF Scheme for setting up of 5000 MW of Grid Connected Solar PV Power Projects through SECI, which has a separate component of 1000 MW for N-E states.
(iv) Installation of Grid Connected Solar Rooftop Power Plants.
(v) Off-Grid Solar PV Scheme.

(vi) Pradhan Mantri – Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme to support farmers to set up small solar power projects and solar pumps for irrigation purpose.

2.8 In response to a query regarding financial allocation vis-à-vis achievement in respect of Solar Energy, the Ministry furnished the following:

Year	BE (Rs. Crore)	RE (Rs. Crore)	Actual Expenditure (Rs. Crore)
2010-11	349.4	349.40	349.40
2011-12	492	652.30	652.06
2012-13	572.88	638.64	598.77
2013-14	566.77	779.97	692.28
2014-15	1587.50	1158.50	1158.19
2015-16	1947.00	3147.00	3146.24
2016-17	3140.00	2866.70	2590.59
2017-18	3361.00	2102.10	1889.93
2018-19	2893.75	2970.25	2524.65
2019-20	3004.9	2280.51	1985.12
2020-21	3515.79	-	223.37

2.9 Regarding major reasons for low utilization of funds under grid connected solar power; the Ministry stated that funds reserved for North East States are not fully utilized on account of following reasons:

- The potential for solar energy in North-eastern region is much less in comparison to other states, thus making solar power produced in these areas non-remunerative. This has resulted in reluctance of state governments as well as private sector for setting up of solar power projects in this region.
- Due to low solar insolation, the output of such projects is less and cost is relatively high due to remoteness, etc. This results in higher tariff and it becomes unviable for DISCOMs to purchase. Even scheme with subsidy and VGF specially designed for these region find few takers as it is cheaper for utilities to purchase cheaper power from other states than to produce in their own state.
- Solar power projects are land intensive requiring large flat tracts of shadow free contiguous land with accessibility which is difficult to find in north eastern region.
- Non-receipt of adequate number of proposals from state governments for setting up of grid connected solar power projects in these region make achievements of targets much difficult.

2.10 The minimum Capacity Utilization Factor (CUF) of Solar Power Projects in India in order to ensure viability of the Project, as furnished by the Ministry, is given below:

	Minimum CUF	**Maximum auxiliary consumption**
Solar Power Projects	21%	0.25%
Solar Thermal Power Projects	23%	10%
Floating Solar Projects	19%	0.25%

Solar Parks and Ultra Mega Solar Power Projects

2.11 Regarding Solar Parks and Ultra Mega Solar Power Projects, the Ministry furnished the following:

> The Scheme for 'Development of Solar Parks and Ultra Mega Solar Power Projects' was rolled out on 12-12-2014 with aggregate capacity 20,000 MW. Further, the capacity of this Scheme was enhanced from 20,000 MW to 40,000 MW on 21-03-2017.
>
> Solar Park is a large chunk of land developed with all necessary infrastructures and clearances for setting up of solar projects. The capacity of the solar parks is generally 500 MW and above. However, smaller parks (up to 20 MW) are also considered in States/UTs where there is shortage of non-agricultural land. Approximately 4 to 5 acres per MW of land is required for setting up of solar parks. The total Central Grant approved under the Scheme is Rs. 8100 crore.
>
> Under the scheme, the Ministry provides Central Financial Assistance (CFA) of up to Rs. 25 lakh per solar park for preparation of Detailed Project Report (DPR). Besides this, CFA of up to Rs. 20 lakh per MW or 30% of the project cost, including Grid-connectivity cost, whichever is lower, is also provided on achieving the milestones prescribed in the scheme. The approved grant is released by Solar Energy Corporation of India Ltd. (SECI).

2.12 About the present status of the Scheme, the Ministry stated that it has approved 39 nos. of solar parks of aggregate capacity 22,879 MW being setup in 17 States. These parks are at different stages of development. Out of the approved solar park, infrastructure in 8 nos. of solar parks is almost fully developed where solar projects of aggregate capacity 6580 MW have also been commissioned. In addition, 4 nos. of solar parks are partially developed

where solar projects of aggregate capacity 1365 MW have been commissioned. The details of these solar parks are given below:

Sl. No.	Name of State/UTs	Name of Solar Park & Capacity (in MW)	Capacity commissioned (in MW)
1.	Andhra Pradesh	Ananthapuramu Solar Park (1500 MW)	900
2.		Kurnool Solar Park (1000 MW)	1000
3.		Kadapa Solar Park (1000 MW)	250
4.		Ananthapuramu-II Solar Park (500 MW)	400
5.	Kerala	Kasargod Solar Park (105 MW)	50
6.	Karnataka	Pavagada Solar Park (2000 MW)	2000
7.	Madhya Pradesh	Rewa Solar Park (750 MW)	750
8.		Mandsaur Solar Park (250 MW)	250
9.	Rajasthan	Bhadla Phase– II Solar Park (680 MW)	680
10.		Bhadla Phase – III Solar Park (1000 MW)	1000
11.		Bhadla Phase– IV Solar Park (500 MW)	500
12.	Uttar Pradesh	UP Solar Park (440 MW)	165
Total			**7945**

2.13 The State-wise list of sanctioned solar parks, as submitted by the Ministry, is given at **Annexure-III**.

2.14 On being asked about the reasons for non achievement of target under Solar Park Scheme, the Ministry stated that:

> "The major challenge in development of solar parks is the acquisition of land. In order to overcome this challenge, Ministry have recently introduced a new mode 'Mode-8' for development of solar parks, where the State Government has to provide necessary assistance to the Solar Power Park Developers (SPPDs) in identification & acquisition of land for setting up of Ultra Mega Renewable Energy Power Parks and also to facilitate all required statutory clearances. For this, the State Government may be paid a facilitation charge of Rs. 0.05/unit of power being generated from the projects in the UMREPPs for the entire PPA period of the project."

2.15 When asked about the estimated requirement of land for installation of 60 GW solar capacity of ground mounted projects, the Ministry has furnished that:

> "The land in the range of 4 to 5 acres per MW is required for installation of ground mounted solar PV project. Therefore, to install 60 GW ground mounted solar PV projects, around 3,00,000 acres (60,000 MW x 5 acres/MW) will be required."

2.16 About the progress made so far with regard to arrangement of land, the Ministry stated that under the Solar Park Scheme, around 1,17,000 acres of land have been identified for setting of various solar parks, out of which around 85,000 acres have been acquired.

Scheme for setting up of grid-connected solar PV power projects by the CPSUs and Government Organizations with Viability Gap Funding (VGF)

2.17 When asked about the Central Public Sector Undertakings (CPSUs) and Government Organizations that have participated in the Scheme for setting up of grid-connected solar PV power projects by the CPSUs and Government organizations with Viability Gap Funding (VGF), the Ministry stated that:

> Under 1000 MW CPSU Scheme, following CPSUs have participated till date:
>
> i. NTPC limited
> ii. BHEL
> iii. Rashtriya Ispat Nigam Ltd.
> iv. NHPC limited
> v. ONGC
> vi. GAIL
> vii. Scooters India Ltd.
> viii. Dadra & Nagar Haveli Power Distribution Corporation Ltd.
> ix. NLC India Ltd.
>
> Under CPSU Scheme Phase-II (12000 MW), following CPSUs/ Government Organizations have participated till date:
>
> i. NHDC Ltd.
> ii. The Singareni Collieries Company Limited
> iii. Assam Power Distribution Company Limited
> iv. Delhi Metro Rail Corporation Limited
> v. Nalanda University

vi. NTPC Limited
vii. Indore Municipal Corporation.

2.18 On being asked about the reasons for providing VGF under this scheme, the Ministry stated that:

> "As the scheme envisages to use domestically manufactured cells and modules, to cover cost difference between domestically produced solar PV cells and modules and imported solar PV cells and modules, VGF is provided under the Scheme."

2.19 The Ministry submitted that under CPSU Scheme Phase-II, there is no concept of quoting of tariffs and the bidders are required to quote Viability Gap Funding, the maximum permissible limit for which is Rs. 70 lakhs/MW.

2.20 On being asked about the quantum of funds that have been spent by the Ministry under above mentioned scheme so far, the Ministry furnished the following:

> "Till date, VGF of around Rs. 795 crore (including SECI's charges) has been released to SECI for disbursal of VGF to CPSUs/Govt. Organisations who have set up solar PV power projects under the 1000 MW CPSU Scheme. Whereas, under CPSU Scheme Phase-II, VGF of around Rs. 319 crore (including SECI's charges) has been released to SECI for onward disbursal of VGF to CPSUs/Govt. Organisations."

Solar Roof-Top Programme

2.21 Regarding the solar roof-top Programme, the Ministry stated as under:

- Phase II of the Grid connected rooftop solar programme was approved with a target for achieving cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022 in February 2019. The programme will be implemented with total central financial support of Rs. 11,814 crore through DISCOMs. Operational guidelines have been issued on 20th August 2019.
- In the Phase-II Programme Central Financial Assistance (CFA) for the residential sector has been restructured with the availability of 40% CFA for RTS systems up to 3 kW capacity and 20% for RTS system capacity beyond 3 kW and up to 10 kW. For Group Housing Societies/Residential Welfare Associations (GHS/RAW), CFA will be limited to 20% for RTS plants for supply of power to common facilities. However, the capacity eligible for CFA for GHS/RAW will be limited to

10 kW per house with maximum total capacity upto 500 kWp, inclusive of RTS put in individual houses in the GHS/RWA. Central financial support will not be available for other category i.e. institutional, educational, social, government, commercial, industrial, etc. Aggregate 515.96 MW has been sanctioned in FY 2019-20 to 57 DISCOMS/electricity departments of 27 States. In the current financial year 290 MW has been allocated to 14 DISCOMs.

- Performance based incentives is being provided to DISCOMs based on RTS capacity achieved in a financial year (i.e. 1st April to 31st March every year till the duration of the scheme) over and above the base capacity i.e. cumulative capacity achieved at the end of previous financial year as per following rates:

S.No.	Parameter	Incentive
1	For installed capacity achieved upto 10% over and above of installed base capacity within a financial year.	No incentive
2	For installed capacity achieved above 10% and up to 15% over and above of installed based capacity within a financial year	5% of the applicable cost for capacity achieved above 10% of the installed base capacity
3	For installed capacity achieved beyond 15% over and above of installed based capacity within one financial year.	5% of the applicable cost for capacity achieved above 10% and up to 15% of the installed base capacity plus 10% of the applicable cost for capacity achieved beyond 15% of the installed base capacity.

Incentive to the DISCOMs will be available for the initial 18,000 MW only.

2.22 The revised target of phase II of the rooftop solar programme, as furnished by the Ministry, is given below:

Year	Capacity to be Commissioned (MW)	Capacity commissioned (MW)
2019-20	3000	472
2020-21	6000	81
2021-22	12000	--
01.04.2022 to 31.12.2022	17000	--
Total	38000*	--

* about cumulative 1989MW has been reported as commissioned as on 30.06.2020

Above figures are as reported on the SPIN Portal. As all the non-subsidised installation is not reported on the SPIN Portal, as per market reports around 5000 MW of Rooftop Solar has been installed in the country as on date."

2.23 When asked about the physical achievement vis-a-vis targets of Solar Roof-top Programme, the Ministry furnished the following:

	2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**Total**
Target (MW)	200	4800	5000	6000	7000	8000	9000	40000
Achievement reported in the year (MW)	200	415	407	373	472	81	-	-

In addition, about 41 MW was reported as installed as on 31.03.2015

2.24 The year-wise cumulative installation details, as furnished by the Ministry, are as follows:

Upto 31.03.2015	**Upto 31.03.2016**	**Upto 31.03.2017**	**Upto 31.03.2018**	**Upto 31.03.2019**	**Upto 31.03.2020**	**Upto 30.06.2020**
41MW	241MW	656 MW	1063MW	1436 MW	1908 MW	1989 MW

2.25 State-wise installed capacity of Solar Roof-tops, as submitted by the Ministry, is given below:

S.NO.	**State /UTs**	**Installed capacity reported as on 30.06.2020 in SPIN portal**
1	Andaman and Nicobar Islands	4.59
2	Andhra Pradesh	88.03
3	Arunachal Pradesh	0.22
4	Assam	30.58
5	Bihar	6.95
6	Chandigarh	31.29
7	Chhattisgarh	10.39
8	Dadra and Nagar Haveli and Daman and Diu	0.87
9	Goa	1.05
10	Gujarat	303.16
11	Haryana	121.82
12	Himachal Pradesh	17.39
13	Jammu and Kashmir	10.95
14	Jharkhand	17.12
15	Karnataka	136.45
16	Kerala	46.62
17	Lakshadweep	0.00
18	Madhya Pradesh	52.98
19	Maharashtra	257.73
20	Manipur	6.35
21	Meghalaya	0.12
22	Mizoram	1.43

23	Nagaland	0.08
24	NCT of Delhi	119.11
25	Odisha	15.37
26	Puducherry	1.92
27	Punjab	68.28
28	Rajasthan	124.68
29	Sikkim	0.07
30	Tamil Nadu	158.21
31	Telangana	78.41
32	Tripura	2.96
33	Uttar Pradesh	149.42
34	Uttarakhand	78.05
35	West Bengal	47.06
36	Leh	0
TOTAL		**1989.71**

2.26 About the installation cost of solar roof-top, the Ministry furnished the following:

"The benchmark cost for grid connected rooftop solar projects has been arrived at based on cost details received from different agencies including State Nodal Agencies, Solar Energy Corporation of India, system integrators etc. The proposed benchmark cost for FY 2020-21 is as follows:

Capacity Range	**Benchmark Costs (Rs. per Watt)**	
	General Category States/ UTs	**Special Category States including North-East States, Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir, Laddakh, Andaman &Nicobar and Lakshadweep Islands**
1 kW	47	52
>1 to 2 kW	43	47
>2 to 3 kW	42	46
>3 to 10 kW	41	45
>10 to 100 kW	38	42
>100 to 500 kW	36	40

2.27 The Ministry submitted that solar roof-tops have been found to be remunerative and the average payback period of such projects varies from 5-6 years and the expected life is upto 25 years with subsidy.

2.28 On being asked about the steps taken by the Ministry to encourage people to install Solar Roof-tops, the Ministry stated as under:

"The cost of solar rooftop plants is decreasing and Ministry has also increased the subsidy amount to 40 % in comparison to earlier 30 % for capacity upto 3 kW. Consumer need to invest only 60 % of the cost of the system discovered by the DISCOM through bidding process. Recently discovered rates of few States and Union territories are as follows:

Rate in (Rs. per watt)

Name of State/UT	Name of DISCOM	1 KW	2 KW	3 KW	More than 3 kW to 10 kW	>10-100 KW	>100-500 KW
Andhra Pradesh	APEPDCL	44	44	44	44	43.65	43.65
Bihar		49.71	49.71	49.71	49.71	46	46
Chandigarh	Electrical Dept.	47	47	47	47	-	-
Delhi	IPGCL	37	37	37	37	37.79	33.931
Gujarat	ALL DISCOMs	46.827	46.555	46.337	45.738	38.006	33.999
Haryana	-	45.78	45.78	45.78	45.78	41	36.95
Jharkhand	JBVNL	45	45	45	42	40.5	
Punjab	PSPCL	37	37	37	37	38	35.5
Rajasthan	JVVNL	43	43	43	42.21	35	32
Rajasthan	AVVNL	43.25	43.25	43.25	42.6	35	32
Rajasthan	JVVNL	43.62	43.62	43.62	42.6	35	32
Telangana	Telangana	52	52	52	52	47.5	43.5
Uttar Pradesh	UP	38	38	38	38	32	-
Uttarakhand	located at height ≤ 2000 Plain region	50.8	50.8	50.8	50.8	42	41
Uttarakhand	Areas which are located at height >2000 ft.	53.8	53.8	53.8	53.8	45.4	43
Himachal Pradesh	-	42	42	42	42	37.2	37

For sectors other than residential the solar tariff has become quite competitive as compared to the tariff for the conventional electricity. So these systems have become cost competitive. Further, other business models such as RESCO model, utility model, on bill financing models etc. have also been evolved by various stakeholders. Even with 22-24 % panel efficiency, these systems can reduce significant amount of electricity billing amount for the consumers.

Ministry on regular intervals requested the implementing agencies to publicize the benefits for the information of the consumers through print and electronic media, workshops/conferences. Further, implementing agencies have also been requested to develop their online portal and wherever it is not there, is assisting the process of development of portal through various technical assistance programme."

2.29 When asked about the possible reasons for slow progress in Solar Roof-top Programme, the Ministry stated as under:

i) "Involvement of multiple stakeholder viz. State Nodal Agencies, DISCOMs, Public Sector Undertakings, Developers etc.
ii) Reluctance of DISCOMs due to revenue loss; availability of net—meter; CEIG inspection for smaller plants etc.
iii) Lack of mandatory notification/ Lack of State policies.
iv) Lack of uniform regulations."

2.30 Regarding Net-Metering, the Ministry has stated that:

"Net-Metering under the grid connected rooftop solar system is a metering arrangement under which a rooftop owner pays to the Power distributing company (DISCOM) on net metering basis. For example, if the rooftop solar plant generates 100 units of electricity out of which 50 units are consumed and balance 50 units are exported to the grid. At the same time 100 units are imported from the grid. Therefore, under net metering arrangement DISCOM will bill the consumer for net of units imported from the grid (100-50=50 units). If the units exported to the grid are more than the import from the grid, then DISCOM is supposed to pay the rooftop owner at a predetermined rate."

2.31 When the Committee desired to know the views of concerned agencies i.e. Regulators, States/UTs, Discoms, etc. on the aspect of net metering, the Ministry has stated that:

"Although, all the State/Joint Electricity Regulatory Commissions have issued net metering regulation/tariff orders, but there are various diverse parameters in terms of capacity allowed for net metering based on minimum capacity/maximum capacity/% of connected load, % of DT capacity, payment for excess exported solar electricity /category allowed for net –metering etc. Ministry has requested Forum of regulator to develop model regulations for this so that States may adopt. As far as DISCOMs are concerned issues like the revenue erosion due to adoption of solar by high electricity tariff paying customer, availability

of solar power during day time when there is less electricity demand by users and non-availability of solar power during peak demand time (say in evening) etc. are few of the concerns of the DISCOMs . Unanimity may be arrived through combined efforts of all relevant stakeholders in terms of uniform regulations /model operating procedures/ online unified portals etc."

2.32 About the payment mechanism in Net-Metering, the Ministry has furnished that:

"Generally, in most of the States there is no payment mechanism for excess units exported to the grid. These exported units are generally adjusted in the electricity bill itself."

2.33 Regarding achievement under Solar Roof-top targets without proper implementation of Net-Metering, the Ministry has stated that:

"In addition to Net-metering there are other metering arrangements also. In gross metering the energy generated from the rooftop solar plant is fed to the grid. In lieu to the energy fed to the grid, they are paid a feed in tariff. In addition to this there is net billing arrangement under which imported electricity units are billed separately from the exported electricity units instead of billing only for the net units of electricity. All the State/Joint Electricity Regulatory Commission have issued net metering regulation/tariff orders. However, implementation of the same is different in various DISCOMs. The revenue erosion due to adoption of solar by high electricity tariff paying customer, availability of solar power during day time when there is less electricity demand by users and non-availability of solar power during peak demand time (say in evening) etc. are few of the concerns of the DISCOMs. However, there is no data about regarding loss to DISCOMs on account of net metering. Tariff for electricity that is bought back by the DISCOMs is dynamic in nature and fixed by the regulator on year to year basis."

2.34 Regarding the steps taken by the Government to promote solar roof-tops in the Country, the Ministry has informed the Committee that:

(i) "Under phase II of the programme Electricity Distribution Companies (DISCOMs) have been made as implementing agencies and CFA is available for residential sector only. Incentives for the DISCOMs for achievement of additional capacity above baseline have also been provided for.

(ii) Persuading States to notify the net/gross metering regulations for RTS projects. Now 36 States/UTs/SERCs have notified such regulations and/or tariff orders.
(iii) Prepared model MoU, PPA and Capex Agreement for expeditious implementation of RTS projects in Govt. Sector.
(iv) Allocate Ministry-wise expert PSUs for handholding and support in implementation of RTS projects in various Ministries/Departments.
(v) Creation of SPIN-an online platform for expediting project approval, report submission and monitoring progress of implementation of RTS projects.
(vi) Facilitated availability of concessional loans from World Bank and Asian Development Bank (ADB) through SBI and PNB respectively, for disbursal of loans to industrial and commercial sectors, where CFA/incentive is not being provided by the Ministry.
(vii) Assisting States in development/integration of online portal and aggregation of demands related to rooftop solar projects."

Canal Top/ Canal Bank Solar Projects

2.35 About Canal top/ Canal Bank Solar Projects, the Ministry has furnished as follows:

"The MNRE has already implemented 44 MW canal-top solar PV projects and 50 MW of canal-bank solar power projects under its Pilot-cum-demonstration project for development of grid connected solar PV power plants on canal banks and canal tops. Canal-top and Canal-Bank Solar PV Power Projects commissioned under MNRE's Pilot-cum-demonstration project for development of grid connected solar PV power plants on canal banks and canal tops are as follows:

Canal-Top Solar PV projects			
Sl. No.	**State**	**Implementing Agency in the State**	**Capacity Commissioned**
1	Andhra Pradesh	New and Renewable Energy Development Corporation of Andhra Pradesh (NREDCAP)	1 MW canal-top
2	Gujarat	Sardar Sarovar Narmada Nigam Limited (SSNNL)	10 MW canal-top
3	Karnataka	Krishna Bhagya Jala Nigam Limited (KBJNL)	10 MW canal-top
4	Kerala	Kerala State Electricity Board Limited (KSEB)	2 MW canal-top
5	Punjab	Punjab Energy Development Agency (PEDA)	20 MW canal-top
6	Uttarakhand	Uttarakhand Jal Vidyut Nigam Limited	1 MW canal-top
Total			**44 MW canal-top**

Canal-Bank Solar PV Projects			
Sl. No.	**State**	**Implementing Agency in the State**	**Capacity Commissioned**
1	Andhra Pradesh	Andhra Pradesh Power Generation Corporation Limited (APGENCO)	5 MW canal-bank
2	Gujarat	Sardar Sarovar Narmada Nigam Limited (SSNNL)	15 MW canal-bank
3	Kerala	Kerala State Electricity Board Limited (KSEB)	1 MW canal-bank
4	Uttarakhand	Uttarakhand Jal Vidyut Nigam Limited	19 MW canal-bank
5	West Bengal	West Bengal State Electricity Distribution Company Limited (WBSEDCL)	10 MW canal-bank
Total			**50 MW canal-bank**

Floating Solar Projects

2.36 About Floating Solar Projects, the Ministry has stated as under:

"The MNRE, through Solar Energy Corporation of India, is implementing floating solar PV power projects in different States, as well. SECI is working on the following projects/proposals for floating solar projects:

(i) 3x50 MW floating solar project in Rihand, Uttar Pradesh: the projects have been awarded (under developer-mode) by SECI in Sept, 2019. PPAs have been signed at the rate of Rs. 3.29/kWh. Projects are scheduled to be commissioned in Nov, 2021. Bathymetry studies have been undertaken; plant layout and design are under finalization.

(ii) 4 MW floating solar + 1 MWh BESS project in Andaman & Nicobar: The project is proposed to be set up on Kalpong dam in Andaman & Nicobar Islands. Tender for selection of developer for setting up of the project was issued on 13.01.2020; bids have been received till 06.07.2020 and presently are under Techno-commercial evaluation.

(iii) 15 MW floating solar project in Bellanpally, Telangana: The project is planned to be set up in OC mine cavity near Dorly region in Bellanpally district. The project is being set up by SCCL for their captive use. SECI is providing project management consultancy services for the project. Tender for selection of EPC contractor has been issued and bids are being called.

(iv) 15 MW floating solar project in Nangal pond, Himachal Pradesh: The project is being developed by the Bhakra Beas Management Board (BBMB) in developer mode. SECI is providing project management consultancy services for the project. Tender for selection of developer has been floated on 02.07.2020 and bids are being called.

(v) 20 MW floating solar + 75 MWh BESS project in Lakshadweep: The project is proposed to be set up through SECI's own investment. The proposal is under detailed technical and environmental assessment by the National Centre for Sustainable Coastal Management (NCSCM).

(vi) 100 MW floating solar in Getalsud dam, Jharkhand: Bathymetry studies have been completed, report has been submitted to State Govt. DPR is under finalisation, ESIA is in progress. Final nod of State Govt. is awaited.

(vii) 500 MW floating solar project in Odisha: SECI is under discussions with State Govt. of Odisha for implementation of 500 MW floating solar project in Hirakud and Chiplima reservoirs. A joint working group is to be constituted. Detailed proposal for phase-I of 150 MW has been submitted by SECI to the State Govt. MoU is to be signed between SECI and GEDCOL for the same.

(viii) SECI is in discussion with the State Govt. of Bihar for development of floating solar plants at mini and micro hydel power plants. SECI has also expressed its desire to assist Bihar in implementation of the State Govt.'s 'Upar Bijli Niche Machli' programme."

Solar Projects with Energy Storage Systems

2.37 When asked about the solar projects with Storage capacity in the Country, the Ministry stated as under:

"Solar, wind, and solar-wind hybrid projects in conjunction with suitable energy storage systems have been explored in various tenders by SECI. In December 2019, SECI has awarded a 2-megawatt (MW) grid-connected solar photovoltaic power project with 1 megawatt hour (MWh) of Battery Energy Storage System (BESS) at Kaza, in the State of Himachal Pradesh."

2.38 About the tariff of solar projects with energy storage systems, the Ministry stated as under:

"The discovered tariff under various SECI tenders is as under:-

(i) The 2-megawatt grid-connected solar photovoltaic power project with 1 MW/1 megawatt hour of Battery Energy Storage System and 5 year O&M at Kaza, Lahaul Spiti, in the State of Himachal Pradesh is being set up by HRL (a Joint Venture Company of SECI and HPSEB). The final EPC price quoted by the L1 bidder as discovered through the e-RA process is Rs. 17,71,85,965. The tariff for this project is proposed as Rs. 8.9/kWh with above project cost.

(ii) In the 1.2 GW peak power projects with 50 MWh Storage tender by SECI, the peak power cost arrived as Rs. 6.12 and Rs. 6.85/kWh.

(iii) In the recently concluded Round the Clock renewable energy project which may include some capacity of storage, the first-year tariff of Rs. 2.9/kWh was quoted which will have 3% escalation for 15 years. The levelised tariff for 25 years is Rs. 3.59/kWh."

2.39 Regarding the cost of various energy storage technologies, the Ministry furnished as follows:

	Lead Acid	**Li –Ion**	**Sodium Sulphur**	**Flow Batteries**	**Flywheel**	**Compressed Air**	**Pumped Hydro**
Efficiency (%)	70 - 85	85 - 95	70 - 80	60 – 75	60 - 80	50 – 65	70 – 80
Cost range (US $/kWh)	120-291	223-323	400-1000	435-952	4320-11520	94-229	106-200
Life (cycles) (at 80% depth of discharge)	900	3,500	4,000	10,000	200,000	10,000	15,000

2.40 When asked about the details of innovations made in the field of storage of solar power, the Ministry stated that:

"Energy Storage Systems enable absorption of variable solar energy generation by storing surplus energy generated, and providing the stored energy for use whenever required. Energy storage includes a diverse range of technologies which may broadly be classified as Electrochemical (primarily batteries, including lead acid, Sodium-Sulfur, Lithium Ion, and Flow batteries); Thermal (heating or cooling a medium like ice, steam, molten salts); Mechanical (Pumped Hydro, Flywheels); Chemical (hydrogen or derived bio-fuels, ammonia, alcohols etc.); Electrical (Super-capacitors and cryogenic super-conducting magnets); and Compressed Air Energy Storage. These technologies are at various stages of development and differ vastly in terms of their performance capabilities, longevity, detailed in the following table:

Energy Storage technology	Stage of Development	Duration of storage[1]	Applications
Ultra Capacitors	Near Commercial	< 1 min.	Very fast (milli second) Power response
Flywheel	Near Commercial	< 5 min.	Frequency Response
Metal oxide based (Like Lithium, etc.)	Commercial	< 4 hours	Frequency Response, Voltage support, Black Start, Short Time shift of Energy, Peak Demand reduction & T&D network (& Substation) decongestion
Sodium Sulphur based	Commercial	6-7.2 hours	Frequency Response, Voltage support, Black Start, Medium term Time shift of Energy, Peak Demand reduction & T&D network (& Substation) decongestion
Flow Batteries	Commercial & Scaling up phase	< 5 hours	Frequency Response, Voltage support, Black Start, Long Time shift of Energy, Peak Demand reduction & T&D network (& substation) decongestion
Pumped Storage	Commercial	Upto 6-10 hours	Frequency Response, Voltage support, Black Start, Long term Time shift of Energy, Peak Demand reduction & Bulk power storage
Compressed Air	R&D and Development	8-20 hours	Long term Time shift of Energy & Peak Demand reduction
Molten Salt	R&D and Development	6-15 hours[2]	Long term Time shift of Energy & Peak Demand reduction
Hydrogen Storage	R&D and Development	> 25 hours[3]	Long term Time Shift of Energy & Seasonal Storage

[1]EPRI: Electricity Energy Storage Technology Options: A White Paper Primer on Applications, Costs, and Benefits
[2]Concentrating Solar Power and Thermal Energy Storage by Sandia National Laboratories
[3] IEA: Future of Hydrogen

Solar Thermal Projects

2.41 About the status of Solar Thermal Projects in the Country, the Ministry stated as under:

"Under Batch-I of Phase-I of National Solar Mission, implemented by NTPC Vidyut Vyapar Nigam Ltd (NVVN), following three solar thermal power plants have been commissioned in the country:

Sr. No.	Project Developer	Project Capacity (MW)	Location	Project State	Approved Tariff (Rs./kWh)	Date of commissioning
1	MEIL Green Power Ltd.	50	Virannapalle, Pamidi, District - Anantapur	Andhra Pradesh	11.31	November 2014
2	Godawari Green Energy Ltd.	50	Village Nokh, Tehsil - Pokharan, Distict - Jaisalmer	Rajasthan	12.20	June 2013
3	Rajasthan Sun Technique Energy Private Limited	100	Dhursar, Tehsil - Pokhran, District- Jaisalmer	Rajasthan	11.97	November 2014
TOTAL		**200**				

2.42 On being asked about tariff of Solar Thermal Power Plants, the Ministry stated that:

> "As per Orders issued by Central Electricity Regulatory Commission (CERC) for 2016-17, the Capital Cost of Solar Thermal Power Plant for 2016-17 was Rs. 12 Crore /MW and the levelised tariff for electricity from solar thermal power plants, as determined by CERC, for 2016-17, was Rs. 12.07/unit. Since presently, neither new solar thermal power plants are being awarded in India, nor CERC is issuing orders for capital costs or tariffs for solar thermal power plants, present capital cost and electricity tariffs for solar thermal power plant in India are not known."

Off-Grid and Decentralized Solar PV Applications Programme

2.43 The Ministry submitted that Off-grid and Decentralized Solar PV Applications Programme has been launched with the objective of installation of an additional off-grid solar capacity of 118 MWp by 2020 through following application-wise targets:

a) 3,00,000 solar street lights
b) 25,00,000 solar study lamps
c) 100 MWp of off-grid solar power plants

2.44 The Ministry submitted that the salient features of Off-grid and Decentralized Solar PV Applications Programme –Phase III are as under:

- "Installation of 3,00,000 numbers of solar street lights throughout the country, with special emphasis on areas where there is no facility for street lighting systems through grid power, North East States and Left-Wing Extremism (LWE) affected districts.
- Installation of solar power plants of individual size up to 25 kWp in areas where grid power has not reached or is not reliable. Such plants are mainly aimed at providing electricity to schools, hostels, panchayats, police stations and other public service institutions.
- Providing 25,00,000 solar study lamps in North East States and LWE affected districts to school going children, up to the level of SSC, in backward and remote areas in North East states and LWE affected districts.
- Central tender for procurement of solar street lights and solar study lamps being conducted by EESL."

2.45 When asked about the implementation status of Off-grid and Decentralized Solar PV Applications Programme, the Ministry furnished as under:

Application	Target	Sanctioned	Installed
Solar Street lights	3 lakhs	1.74 lakh	12167
Solar Study lamps	25 lakhs	13.48 lakh	60662
Solar Power Packs	100 MWp	4204 kW	1422 kW

2.46 The Ministry submitted that after completion of tendering process, the implementation on ground started in January 2020 and due to outbreak of COVID-19, the progress is slow. It was also stated by the Ministry that the Scheme has been extended till 31.03.2021 with following modifications:

(i) New sanctions only for NER during extended period.

(ii) Solar Power packs to be implemented in RESCO mode (only in NER).

2.47 State-wise expenditure details regarding Off-grid and Decentralized Solar Programme, as furnished by the Ministry, are placed at **Annexure-IV**.

2.48 On being asked about corrective steps taken by the Ministry in order to achieve the target, the Ministry stated as under:

(i) "Centralized tender have been introduced in Off-grid & Decentralized Solar PV Applications Phase-III Scheme and Atal Jyoti Yojana (AJAY) Scheme.

(ii) To expedite implementation, every selected supplier is required to have presence in every operational district. This will also ensure proper maintenance of the systems.

(iii) Off-grid solar power plants in NER States will be installed in RESCO mode during FY 2020-21. This will not involve any contribution by the State Government and preparation of DPR and tenders will be facilitated by PSUs."

2.49 When asked about the Central financial assistance provided under Off-grid and Decentralized Solar PV Applications Programme, the Ministry stated that:

- "Central financial assistance (CFA) of 30% of the benchmark cost of the system or the tender cost, whichever is lower for solar street lights and solar power plants in General Category States and CFA of 90% of the benchmark cost or tender cost whichever is lower, in North Eastern States including Sikkim, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Lakshadweep and A&N Islands.
- For Solar Study Lamps CFA of 85% of the lamp cost will be provided and balance 15% of the lamp cost will be borne by beneficiary student.
- Programme will be implemented through State Nodal Agencies (SNAs) which will be the designated Implementation Agency under the scheme. Public sector undertakings can be implementation agency for remote/hilly or border areas for the Solar power plants on the request of State Agencies.
- Implementing agencies will submit proposals through online portal to MNRE for approval. Offline proposals will not be accepted, unless MNRE has given a general exemption from the requirement of online submission for any specific period of time."

PM-KUSUM Scheme

2.50 Regarding PM-KUSUM Scheme, the Ministry stated that the Scheme consists of three components as given below:

(i) "Component-A: Farmers can install solar power plants up to 2 MW capacity on their barren/fallow land and sell power to Discom and thus increase their income. Solar power plant can be installed on even cultivable land on stilts, where crops can also be grown. Total 10000 MW capacity is targeted under the Scheme.

(ii) Component-B: 17.5 lakh Stand-alone Solar Water Pumps will be installed for replacement of diesel pumps reducing the input cost and pollution.

(iii) Component-C: 10 lakh existing Grid Connected Agriculture Pumps will be solarized to double the capacity of pump so that farmer can not only irrigate land during day time but also sell surplus power and get additional income.

The scheme is not only beneficial to the farmers but also States and Discoms. States will save on subsidy being provided for electricity to agriculture consumers and Discoms will get cheaper solar power at tail end saving transmission and distribution losses."

2.51 Further explaining about the present status of PM-Kusum Scheme, the Ministry stated:

"All three components combined, the scheme aims to add a solar capacity of 25,750 MW by 2022. The total central financial support provided under the scheme would be Rs. 34,422 crore including service charges of 2% on eligible CFA to implementing agencies as under:

Component	Approved capacity	Creation of Renewable Energy Capacity targeted (GW)	Total Project Cost (Rs. Cr.)	CFA including service charges (Rs. Cr.)
Component-A	10 GW	10	45,000	3,325
Component-B	17.5 lakh pumps	8.25	56,625	17,327
Component-C	10 lakh pumps	7.5	45,000	13,770
Total		**25.75**	**1,46,625**	**34,422**

2.52 The capacity sanctioned to States under PM-Kusum Scheme, as furnished by the Ministry, is given below:

S. No.	State	Capacity Sanctioned in 2019-20		
		Component-A (MW)	Component-B (Nos.)	Component-C (Nos.)
1	Haryana	25	15000	468
2	Chhattisgarh	-	20000	
3	Delhi	10	-	-
4	Gujarat	40	4000	18500
5	Himachal Pradesh	10	550	-
6	Jharkhand	10	10000	500
7	Karnataka	50	6000	-
8	Kerala	10	-	-
9	Madhya Pradesh	100	25000	15000
10	Maharashtra	300	30000	9000
11	Manipur	-	20	80
12	Meghalaya	10	1700	60
13	Mizoram	-	200	-
14	Odisha	-	2500	-
15	Punjab	30	4500	3900
16	Rajasthan	325	25000	12500
17	Tamil Nadu	-	17500	20000
18	Tripura	5	1300	1300
19	Uttar Pradesh	75	8000	1000
Total		**1000**	**171270**	**82308**

2.53 The Ministry stated that allocation of 2.21 lakh standalone solar pumps under Component-B has been made to 15 states for 2020-21 as given below and allocation to other States will be made on receipt of demand from these States:

S. No.	State	Capacity allocated under Component-B for 2020-21 (Nos.)
1	Haryana	8000
2	Himachal Pradesh	1000
3	Rajasthan	50000
4	Tripura	1300
5	Odisha	5000
6	Uttar Pradesh	15000
7	Madhya Pradesh	50000
8	Jharkhand	10000
9	Punjab	5000
10	Gujarat	2730
11	Maharashtra	50000
12	Karnataka	850
13	Meghalaya	500
14	Mizoram	2000
15	Chhattisgarh	20000
Total		**221380**

2.54 On being queried about the steps taken by the Ministry to ensure that Distribution Companies, which are already in financial stress, buy the power so produced by farmers under PM-Kusum scheme at a reasonable price, the Ministry stated as under:

> "Component-A and Component-C are aimed at generating income for the farmers. Under Component-A, renewable power projects of capacity 500 kW to 2 MW will be setup by individual farmers/ group of farmers/ cooperatives/ panchayats/ Farmer Producer Organisations (FPO). Farmer can install the project on their land and earn by selling power to Discom or provide their land on lease to a developer and get lease fee.
>
> Under Component-C, individual farmers having grid connected agriculture pump will be supported to solarise pumps. 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 solar power to meet the

irrigation needs and the excess solar power will be sold to DISCOM and generate extra income.

These components have been implemented in pilot mode during 2019-20 and will be scaled up after evaluation of performance in the pilot phase.

Discoms are currently providing high subsidy on power provided for agriculture purpose. Buyback of surplus power generated from solarization of agricultural pumps under Component-C would be met through avoided subsidy. Since the component has been implemented in pilot mode, sufficient flexibility has been provided in the Guidelines to States to work out a suitable mechanism. For example, in the State of Haryana, the State Government is bearing the cost of solarization, besides the MNRE subsidy, and the farmer will get Re. 1 / kWh for sale of surplus power. In Gujarat, settlement is done on net-metering basis, farmer can feed and draw power from the grid.

Further, Ministry has recently floated a Concept note on feeder level solarization wherein instead of solarizing the individual pumps, the agricultural feeders will be solarized and the involved cost will be met through MNRE and State subsidy and loan from NABARD. Farmers will get free power for agriculture through centralized solar plant."

2.55 The Ministry submitted that the Tariff under KUSUM Scheme will be decided by the concerned State Electricity Regulatory Commission (SERC). For Component-A, standard PPA has been provided with the Guidelines dated 22.07.2019. For Component-C, the PPA will be finalized by the State based on model adopted.

2.56 When asked about the details regarding tariff decided by various State Electricity Regulatory Commissions for power produced under KUSUM scheme, the Ministry stated as under:

"Status of tariff approval in various States is given below. In remaining States, tariff is yet to be decided for both Component-A and Component-C -

S.No.	State	Component-A	Component-C
1	Haryana	Tariff of Rs. 3.11 per unit announced by HERC	Re. 1 per unit for surplus power.
2	Himachal Pradesh	Tariff of Rs. 3.98 per unit declared	Not sanctioned
3	Gujarat	GERC have approved the tariff of Rs. 2.85 per unit. Request of the developers for reconsideration of the tariff Is under the consideration of the Government, on the basis of which petition could be filed by the DISCOM to GERC for tariff revision	Yet to be decided
4	Kerala	Tariff of Rs. 3.5/ unit fixed. In case of lease, rent of Rs. 0.10/unit will be provided to farmer.	Not sanctioned
5	Rajasthan	RERC has fixed a tariff of Rs. 3.14 per unit.	Tariff of Rs. 3.44/unit fixed for buyback
6	Tripura	Discom has filed petition to TERC for fixation tariff of Rs. 3.60/ unit. TERC meeting could not take place due to COVID-19	Gross energy charge of Rs. 3.55 per unit and fixed charge of Rs. 30 per kW per month. Surplus to be adjusted through net-metering
7	Uttar Pradesh	Ceiling tariff of Rs 3.10/unit to be kept in bids to be invited. Petition for approval of RfP and PPA will be filed after Lockdown period i.e 3rd May 2020.	Yet to be decided

Renewable Purchase Obligation and Renewable Energy Certificate

2.57 About Renewable Purchase Obligation and Renewable Energy Certificate, the Ministry stated as follows:

> **"Renewable Purchase Obligation**: Section 86(1)(e) of Electricity Act 2003 mandates that State Electricity Regulatory Commission (SERCs) will promote co-generation and generation from Renewable sources of energy by providing suitable measures for connectivity to Grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of total consumption of electricity in the area of distribution licensee. Renewable Purchase Obligation (RPO) originates from this mandate. On 14 June 2018, the Ministry of Power notified the uniform RPO trajectory that seeks 21 percent RPO (10.5 percent non-solar and 10.5 percent solar) by 2021-22.
>
> **Renewable Energy Certificate**: Tradable Renewable Energy Certificates (RECs) were introduced to address the disproportionate

distribution of renewable resources among states and assist states in meeting Renewable Purchase Obligations. REC is a market driven mechanism where the environment related attributes of renewable energy are traded in energy exchanges.

REC mechanism has provided an extra avenue for sale of renewable energy. The renewable energy generator may exercise any of the two routes for sale of energy: -

i) Sale of electricity to the obligated entities (DISCOMs, Captive Power Plants/Open Access consumers) wherein a buyer uses the purchased energy for compliance of RPO. In such cases, renewable energy generator(s) are not eligible for registration and issuance of RECs; and

ii) The renewable energy generator sets up a project under REC mechanism. In this, renewable energy generator(s) sell the generated electricity to the local DISCOM at Average Power Purchase Cost (APPC) or to Open Access (OA) consumer at mutually agreed rates or through Power Exchange(s). In such cases, the buyer of such a quantum of electricity is not allowed to use the purchased quantum for compliance of RPO. In such cases, energy sold to the purchaser is eligible for issuance of RECs.

For example, a renewable energy plant set up in a State, say Tamil Nadu, is registered under REC mechanism. The electricity generated from the plant can be sold to DISCOM at APPC or to OA consumer at mutually agreed rates. In lieu of each 1 MWh, the generator will get one REC that can be traded at Power Exchanges. Thus, the renewable energy generator will get revenue both from sale of electricity and also REC."

2.58 When asked about the mechanism for sale and purchase of Renewable Energy Certificates, the Ministry furnished that:

"The National Load Dispatch Centre (NLDC) acts as the National Registry for REC, and RECs are traded in India Energy Exchange (IEX) and Power Exchange of India Ltd (PXIL). There are 4 steps for REC trading process: accreditation by state agency; registration by central agency; issuance of RECs by central agency; and redemption of RECs through exchanges. Both sale and purchase of RECs take place in exchanges in an online trading platform."

2.59 The Ministry submitted that CERC is the governing body for deciding the floor and forbearance price of RECs. Currently, the forbearance price of REC is Rs 1000 and there is no floor price. The exact price at which RECs are traded is determined by exchanges through price discovery mechanism. REC

trading takes place on last Wednesday of every month. REC prices are to be bid in the online platform at exchanges before the actual trading process begins. REC prices discovered on IEX and PXIL from January 2020 to June 2020 are as under:-

Month, 2020	Solar	Non-solar
January	2400 (IEX&PXIL)	2200 (IEX), 2100 (PXIL)
February	2400 (IEX&PXIL)	1800 (IEX), 2050 (PXIL)
March	2400 (IEX&PXIL)	1000 (IEX), 1000 (PXIL)
April	2400 (IEX), 2000 (PXIL)	1000 (IEX), 1000 (PXIL)
May	2000 (IEX), 1800 (PXIL)	1000 (IEX), 1000 (PXIL)
June	1000 (IEX), 1010 (PXIL)	1000 (IEX), 1000 (PXIL)

2.60 When the Committee desired to know about the status regarding fulfillment of Renewable Purchase Obligation by States and Union territories, the Ministry stated that:

> "For 2019-20, the MoP trajectory mandated the share of renewable energy (excluding hydro power above 25 MW installed capacity) to be 17.50 percent (7.25 percent from solar and 10.25 percent from non-solar). However, against this, the achievement on a pan India basis was only 10.77 percent. As per in house preliminary analysis undertaken in MNRE, six States, namely Andhra Pradesh, Himachal Pradesh, Karnataka, Rajasthan, Sikkim and Tamil Nadu have achieved RPOs in full. Seven States/UTs, namely Gujarat, Mizoram, Nagaland, Madhya Pradesh, Telangana, Dadra & Nagar Haveli, and Maharashtra have achieved more than 55 percent RPO compliance. Remaining States/UTs have achieved less than 55 percent RPO compliance."

2.61 Details regarding State and Union territory wise RPO compliance (2019-20), as furnished by the Ministry, are given at **Annexure-V.**

2.62 When asked about the action that can be taken against the States and Union territories who fail to fulfill their RPOs, the Ministry stated as under:

> "Under Section 142 of the Electricity Act 2003, SERCs have powers to impose penalties in case of contravention of its regulations, including for RPO compliance. In past, SERCs in the States of Uttarakhand, Haryana, Rajasthan and the UT of Delhi have invoked penal provisions against obligated entities for non-compliance of RPOs.

The Ministry has been consistently following for ensuring RPO compliance with States/UTs. This issue has remained a major agenda for discussion in all meeting with States/UTs, including the Power and New and Renewable Energy Minister's conference. On 4 June 2019, Secretary, MNRE had written to all SERCs for ensuring RPO compliance and enforcing penal provisions against defaulting obligated entities. Further, on 29 August 2019, Secretary MNRE requested Chairperson APTEL's intervention to direct defaulting SERCs to ensure RPO compliance, align RPO trajectory, and not to permit carry forward or waiver of RPO. States were also requested to plan bids for contracting new renewable energy capacity, from within or outside the States, to achieve RPO targets and also ensure achievement of 175 GW renewable energy capacity target by the year 2022."

2.63 On being asked the reasons for non-compliance of RPO by State Utilities, the Ministry stated that:

"Reasons attributed for RPO non-compliance include perception of some of the Discoms that renewable energy costs more than other energy sources, resulting in cost-driven decisions and policies that avoid renewable energy. Some Discoms have perception that additional cost associated with integration may be very high. However, these are largely associated with system inertia and progressively Discoms have started realizing positive attributes of renewable energy."

2.64 In response to a query about the steps taken to ensure compliance of Renewable Purchase Obligation (RPO) by State Utilities, the Ministry furnished the following:

"The Electricity Act, 2003 mandates SERCs to ensure RPO compliance. The Forum of Regulators (A forum comprising of Chairperson of the Central Electricity Regulatory Commission and Chairpersons of the State Electricity Regulatory Commissions) has approved a Model Regulation for SERCs on RPO and its compliance, wherein there is a provision for levy of compliance charge on the basis of the shortfall in units of RPO at the forbearance price decided by the Central Commission, in event of obligated entities not fulfilling the RPO. Most of SERCs have adopted above referred FOR approved Model Regulation."

2.65 Explaining about the proposal for Robust RPO Compliance, the Ministry stated as under:

"It has been observed that provisions under Section 142 of the Electricity Act 2003 are not being complied by Obligated Entities regarding the requirement of RPO compliance. Accordingly, Under Section 142 of the Draft Electricity (Amendment) Bill 2020, penalty for non-compliance with the directions of the Appropriate Commission is proposed to be increased up to Rs 1 crore (from Rs 1 lakh), with an additional per day penalty in case of continuing non-compliance of Rs 1 lakh (from Rs 6000). Special penalty for failure to comply with purchase of renewable and hydro power as specified by the Central Government has been proposed. The Amendment Bill proposes a penalty of Rs 0.50/kWh for the shortfall in purchase in the first year of default, and if such default continues for the second successive year, then the penalty is proposed to be increased to Rs 1/kWh and thereafter Rs 2/kWh. In addition, under Section 146, penalty for non-compliance of orders or directions under the Electricity Act is proposed to be increased to up to Rs 1 crore (from Rs 1 lakh), with an additional per day penalty in case of continuing non-compliance of Rs 1 lakh (from Rs 5000)."

2.66 Explaining about the Monitoring mechanism to ensure RPO Compliance, the Ministry stated as under:

"Ministry has been following up with State Load Dispatch Centres (SLDCs) to share information on energy consumed (solar, non-solar & large hydro) on monthly basis. So far 7 States namely, Haryana, Himachal Pradesh, Karnataka, Manipur, Odisha, Punjab, and Tamil Nadu have provided the data up to 31 March 2020. With the increasing quantum of inter-state renewable power transactions, this information is necessary for precise monitoring of RPO compliance.

An online RPO Portal has been developed for collating information on RPO compliance by all obligated entities. The portal was popularized through workshops, training & capacity building of State Obligated Entities and SERCS/ SNAs. Haryana, Rajasthan, Assam, Nagaland, and Chhattisgarh have adopted the portal. Other States have initiated the data entry process."

2.67 Enumerating the provisions in draft Electricity (Amendment) Bill 2020 that addresses regulatory challenges confronting accelerated deployment of renewable energy, the Ministry stated the following:

"The proposed draft Electricity (Amendment) Bill 2020 has enabling provisions that addresses regulatory challenges confronting

accelerated deployment of renewable energy. These include: a) Central Government to notify a *National Renewable Energy Policy* for promotion of generation of electricity from renewable sources, including prescribing a minimum percentage of purchase of electricity from renewable and hydro sources of energy(RPO); b) introduction of provision for Distribution sub-licensee and Franchisee; c) putting in place a robust Payment Security Mechanism for ensuring timely payments to project developers and power generators; d) facilitative Open Access regime; e) ensuring that tariff reflects the cost of supply; f) determining tariff for retail sale of electricity without accounting subsidy; f) bringing a certainty in time taken for adoption of tariff determined through competitive bidding process; g) introduction of institutional mechanism for enforcing contracts; and h) strengthening of renewable purchase obligation compliance regime."

Suryamitra Scheme

2.68 About the Suryamitra Scheme, the Ministry stated that:

"In view of huge demand of skilled persons to install, operate & maintain the Solar Photovoltaic systems under the National Solar Mission, Ministry launched Suryamitra Skill Development Programme in 2015 with a target to develop 50,000 Suryamitras by March 2020 for the country. It is a three months residential programme of 600hrs duration, fully funded by the ministry and coordinated by National Institute of Solar Energy (NISE). Under this programme, NISE carry out identification of training institutions on pan India basis, allocation of no. of training courses to training Institutions, coordination with Skill Council of Green Jobs for certification of trainees and fund disbursement to the training Institutions. The major areas covered in the training include basics of electricity, fundamentals of solar energy, solar photovoltaic power plants and systems, balance of system components, tools and equipments used for site survey including load assessment, system installation and inspection.

The programme follows the M/o Skill Development & Entrepreneurship (MSDE) norms. The training centres and the trained personnel are certified by Skill Council of Green Jobs (SCGJ) administered by MSDE. The target participants are ITI/Diploma students. So far 47166 no. of Suryamitras have been trained upto March, 2020."

2.69 On being asked about the number of persons who were provided skill development training under this programme and got employment, the Ministry stated as under:

> "The Suryamitra programme along with the HRD scheme up to March 2017 has been evaluated by third party, namely, Indian Institute of Development Management (IIDM), Bhopal. Suryamitra training has been rated high impact on the basis of awareness generation, skill development and employability throughout the country by the study report. The report also presented the employment status of Suryamitra is 53-56% out of which 31.82% is in solar energy industry up to March 2017."

2.70 State and UT wise employment details of trained Suryamitras, as furnished by the Ministry, is given at **Annexure-VI.**

CHAPTER III
WIND POWER

3.1 The Ministry submitted that currently, the country has the fourth highest wind installed capacity in the World with total installed capacity of 37.94 GW (as on 31st July, 2020) and 64.639 billion units were generated from wind power during 2019-20. Out of the total target of 60 GW, the present status of wind power, as furnished by the Ministry, is as under:

Cumulative commissioned capacity till 31/07/2020	37.94 GW
Capacity under implementation	8.30 GW
Bids issued	3.10 GW
Total	**49.34 GW**

3.2 State-wise installed capacity of Grid-interactive Wind Power in the Country as on 31.07.2020, as furnished by the Ministry, is given below:

S. No.	STATE	Wind Power (MW)
1	Andhra Pradesh	4092.45
2	Gujarat	7721.92
3	Karnataka	4794.80
9	Kerala	62.50
4	Madhya Pradesh	2519.89
5	Maharashtra	5000.33
6	Rajasthan	4299.72
7	Tamil Nadu	9317.34
9	Telangana	128.10
10	Others	4.30
Total (MW)		**37940.95**

3.3 The year-wise electricity generation from Wind Energy, as per Ministry, is given below:

Sr. No.	Year	Wind (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

3.4 On being asked about the physical target vis-à-vis achievement in respect of Wind Energy since 2010-11, the Ministry furnished the following:

Year	Target (MW)	Achievement (MW)
2010-11	-	2349.25
2011-12	2400	3196.66
2012-13	2500	1700.30
2013-14	2500	2078.88
2014-15	2000	2311.78
2015-16	2400	3423.05
2016-17	4000	5502.37
2017-18	4000	1865.24
2018-19	4000	1480.97
2019-20	3000	2117.78

3.5 State-wise installed Wind Power Capacity since 2010-11, as submitted by the Ministry, is given below:

										in MW
STATE	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Andhra Pradesh	55.40	54.05	202.10	298.50	285.20	400.10	2187.45	348.10	123.50	2
Gujarat	312.80	789.85	208.30	279.80	190.73	392.40	1392.00	272.80	459.65	1468.45
Karnataka	254.05	206.65	201.65	183.00	320.10	230.90	882.30	857	86.50	95.70
Kerala	7.35	0.00	0.00	0.00	0.00	8.40	8.00	1.00	0.00	10
Madhya Pradesh	46.50	100.50	9.60	37.40	456.30	1261.40	356.70	22.10	0.00	0
Maharashtra	239.05	416.50	288.55	1074.00	350.45	207.85	117.55	12.60	10.20	206.20
Rajasthan	436.70	545.65	615.50	98.80	523.50	685.50	287.70	16	2	0
Tamil Nadu	997.40	1083.46	174.60	107.38	185.50	158.80	247.57	335.64	771.82	335.435
Telangana	-	-	-	-	-	77.70	23.10	0.00	27.30	0
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Total	**2349.25**	**3196.66**	**1700.30**	**2078.88**	**2311.78**	**3423.05**	**5502.37**	**1865.24**	**1480.97**	**2117.78**

3.6 When asked about the reasons for shortfall in achievement of the targets, the Ministry stated as follows:

"The capacity additions till 2017 (i.e. 32.27 GW) were through Feed in Tariff (FiT) mechanism. Subsequently, the tariff regime has been shifted from Feed-in-Tariff (FiT) to bidding route, which has slightly slowed the installation of projects. Presently, the wind power projects in the country are installed on the basis of commercial viability through tariff based competitive bidding process. In order to provide sufficient capacity to the developers, regular bids for wind energy projects are being issued. The status of bids and implementation of projects is being monitored regularly."

3.7 When the Committee wanted to know about the steps that have been taken by the Ministry to ensure achievement of target with respect to Wind Energy, the Ministry furnished the following:

"The Ministry, through SECI, is regularly issuing bids for awarding wind power projects through transparent competitive bidding process. The bids of adequate capacities are being issued for achieving 60 GW by 2022. Besides, NTPC Ltd and States are also issuing bids. The sum of commissioned, under implementation bids issued wind power project is 49.5 GW, the bids for remaining capacity of 10.5 GW (out of 60 GW) of projects are planned to be issued in current year, leaving sufficient time for commissioning of projects by 2022. The awarded projects are being monitored regularly. The Ministry has also given a detailed format to SECI to closely monitor the progress of all wind power projects."

3.8 On being queried about the financial allocation vis-à-vis achievement in respect of Wind Energy since 2014-15, the Ministry furnished as under:

		(Rs. In Crore)
Year	**Funds Allocated**	**Total Expenditure**
2014-15	566	566
2015-16	314	314
2016-17	1380.132*	1380.132
2017-18	750	750
2018-19	950	950
2019-20	1026	1026

*Including Bond Money of Rs. 891.182 Crore

3.9 When asked about the progress with respect to assessment and harnessing of off-shore wind energy, the Ministry furnished the following:

(i) "Based on the preliminary studies carried out by the National Institute of Wind Energy (NIWE) in collaboration with various multilateral agencies, the Government has identified eight zones each off the coast of Gujarat and Tamil Nadu as potential offshore wind energy zones.

(ii) Based on Meso scale mapping, it is estimated that, approximately 36 Giga Watt (GW) offshore wind power potential exists off the coast of Gujarat and 31 GW offshore wind power potential exists off the coast of Tamil Nadu. This needs to be rechecked by fresh long term measurements.

(iii) The National Institute of Wind Energy (NIWE), Chennai had commissioned a LiDAR (Light Detection and Ranging) equipment in November, 2017 for measurement of wind resource off the coast of Gujarat. Wind measurement data collection for two years has been completed and also validated with a ground mounted wind monitoring station at Jafrabad, Gujarat. NIWE has already published a report based on two years of collected data from the LiDAR. Further, required geophysical study for an area of about 365 Sq. km has been completed along with geotechnical studies for five bore holes in Gulf of Khambhat, off Gujarat Coast. A rapid Environment Impact Assessment study has also been conducted through the National Institute of Oceanography for the proposed one GW offshore wind energy project off Gujarat Coast. Further, NIWE/MNRE has prepared the Guidelines for 'Offshore Studies and Surveys' with a view to encourage private participation in studies and surveys for the development of offshore wind power in the country. NIWE /MNRE will provide the needed permission & approvals."

3.10 On being asked about the per megawatt cost and tariff of Off-shore Wind Projects, the Ministry stated as under:

"Currently, India is in initial phase of offshore wind energy development and exhaustive Off-shore wind and other Oceanographic measurements/ surveys are underway to understand the nature of subsurface, seabed topology etc. which are crucial for commercial scale offshore wind power projects and project cost estimation. Hence, the exact cost of the offshore turbine and tariff cannot be ascertained at this stage, since the determination of per Megawatt cost of the offshore turbine and tariff of offshore wind projects depends on various factors such as supply chain of the offshore WTGs in India, Offshore vessels for wind power projects, wind characteristics, environmental constraints etc.,

However, based on the preliminary studies, it is estimated that the per megawatt cost of the offshore wind turbine would be two to three times the cost of onshore wind turbines. However, with strong onshore wind turbine manufacturing base in India, the price of the offshore wind turbines and the tariff are expected to be competitive and at par with onshore wind turbine rates, at the time of large commercial scale deployment of offshore wind turbines in the country."

3.11 About the National Wind-Solar Hybrid Policy, the Ministry stated as under:

"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 grid connected wind-solar PV hybrid system 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."

3.12 Regarding the Wind-Solar Hybrid Projects in the Country, the Ministry furnished the following:

"SECI has awarded 1440 MW capacity of wind-solar hybrid projects through tariff based transparent bidding process including e-reverse auction, which are under implementation. The details of these projects are as under:

Sr. No.	Bidder's Name	Project Capacity (MW)	Tariff (INR/kWh)	Project Location	Scheduled Commissioning Date
1	Mahoba Solar (UP) Private Limited	390	2.69	Rajasthan	03.12.2020
2	SBE Renewables Ten Private Limited	450	2.67	Tamil Nadu	03.12.2020
3	Adani Renewable Energy (Park) Gujarat Limited	600	2.69	Rajasthan	17.02.2021
Total		**1440**			

In addition to this, Hero Future Energies has commissioned wind-solar hybrid project by adding 28.8 MW of solar project to an existing 50 MW wind project (Total 78.8 MW hybrid project) in Raichur district, Karnataka."

3.13 About the per megawatt cost of Wind-Solar Hybrid Projects, the Ministry stated that:

> "The per MW cost of hybrid projects depends on capacities of individual solar and wind power projects in the hybrid project. The estimated cost of wind and solar power projects are around Rs. 7 crore per MW and Rs. 5 crore per MW respectively."

3.14 The Ministry submitted the following about Blended Wind Power Project:

> "In order to encourage setting up of wind power capacity while at the same time keeping the tariff attractive, a 'Scheme for Tariff Based Competitive Bidding Process for procurement of Renewable Energy from 2500 MW ISTS Connected Blended Wind Power Projects' issued on 25.6.2020 which provide a framework for procurement of electricity from 2500 MW ISTS Grid Connected Wind Power Projects with up to 20% blending with Solar PV through a transparent process of bidding. The total capacity to be awarded under the scheme is 2500 MW, out of which the rated power capacity of wind power project shall be at least 80% of the total contracted capacity."

3.15 On being asked about the shift in tariff regime in Wind Energy Sector from Feed-in-Tariff (FiT) to bidding route, the Ministry furnished the following:

> "The capacity additions of wind power projects till 2017 (i.e. 32.27 GW) were through Feed in Tariff (FiT) mechanism, wherein the tariff was determined by respective state electricity regulatory commissions (SERC). The determined tariff was also known as preferential tariff, which was notified by SERCs for a defined period after due hearing and taking into account all the financial parameters (cost, interest, margin, etc). The electricity from wind power projects commissioned during the said period was purchased by the DISCOMs at determined tariff.
>
> Subsequently, the tariff regime has been shifted from Feed-in-Tariff (FiT) to bidding route and the wind power projects in the country are now installed on the basis of commercial viability through tariff based transparent competitive bidding process. Under the FiT route, power is procured at a predefined rate whereas under the bidding route, market forces determine the tariff at which market participants (developers & procurers) are willing to develop projects. The draft

guidelines for transparent competitive bidding were circulated for stakeholder's consultation and the same was finalized after suitably incorporating the stakeholders' comments."

3.16 Further explaining the advantage of adopting bidding route over Feed-in-Tariff (FiT) for awarding Wind Energy Projects:

"Tariff based competitive bidding process has reduced the tariff of wind power considerably, i.e. from over Rs 4 per units during FiT to around Rs 2.80 per unit in bidding regime." The capacity awarded and minimum tariff discovered from tenders auctioned for Wind Power are given below:

Sl. No.	Bid	Capacity Awarded (MW)	Min. Tariff (Rs./kwh)	Status
1.	SECI-I	1049.9	3.46	999.9 MW Commissioned and remaining 50 MW cancelled
2.	SECI-II	1000	2.64	684.5 MW commissioned and remaining under implementation
3.	SECI-III	2000	2.44	350.4 MW commissioned and remaining under implementation
4.	SECI-IV	2000	2.51	under implementation
5.	Tamil Nadu	450	3.42	49.5 MW Commissioned. For remaining capacity, case for is pending at TNERC
6.	Gujarat (GUVNL)	500	2.43	463.5 MW Commissioned and remaining under implementation
7.	Maharashtra (MSEDCL)	500	2.85	277 MW Commissioned and remaining under implementation
8.	SECI-V	1190	2.76	under implementation
9.	NTPC	850	2.77	under implementation
10.	SECI-VI	1200	2.82	under implementation
11.	SECI-VII	480	2.79	under implementation
12.	SECI-VIII	440	2.83	under implementation
13.	Gujarat (GUVNL)	202.6	2.80	under implementation
Sub Total		**11862.5**		2824.6 MW commissioned

3.17 On being asked about tariff of Wind Energy discovered through competitive bidding in leading countries including India, the Ministry furnished the following:

Sr. No.	Country	Tariff Range (Rs/ kWh)
1	Germany	4.76 – 5.13
2	France	5.03 – 5.19
3	Canada	2.06 – 2.28
4	India	2.44 – 2.86

3.18 When asked about the minimum Capacity Utilization Factor (CUF) of Wind Energy Projects in order to ensure viability, the Ministry furnished the following:

Wind Power Projects (CUF for annual mean wind power density)	
up to 220 W/m^2	22%
between 221-275 W/m^2	24%
between 276-330 W/m^2	28%
between 331-440 W/m^2	33%
above 440 W/m^2	35%

CHAPTER IV
BIOMASS AND SMALL HYDRO POWER

4.1 The Ministry submitted that the total capacity of 9.936 GW of Biomass Power and Cogeneration has been installed in the Country (as on 31.07.2020). Category wise details are as follows:

Biomass Power	1750 MW
Bagasse Cogeneration	7450 MW
Biomass (Non-Bagasse) Cogeneration	736 MW

4.2 State-wise installed capacity of Bio Power, as furnished by the Ministry, is given below:

State	Grid Connected (in MW)		Off-Grid (in MW)
	Biomass Power Projects (IPP)	Bagasse Cogeneration Projects	Non-Bagasse Cogeneration
Punjab	62.5	131	123.10
Telangana	60.1	98	1
Maharashtra	217	2283.5	16.40
Uttrakhand	0.12	72.6	57.50
Harayana	19.4	102	84.26
Gujarat	44.5	20.8	12
Rajasthan	114.3	4.95	2
Andhra Pradesh	171.2	206.9	98.98
Madhya Pradesh	92.5	0	12.35
Karnataka	137.3	1729.8	20.20
Chhattisgarh	222.4	20	2.5
West Bengal	300	0	19.92
Uttar Pradesh	28	1929.5	158.1
Tamil Nadu	218.7	750.4	28.55
Bihar	12	100.5	8.20
Odisha	50.4	0	8.82
Himachal Pradesh	-	-	7.20
Kerala	-	-	0.72
Meghalaya	**-**	**-**	13.80
Jharkhand	**-**	**-**	4.301
Sub Total	**1750.4**	**7449.95**	**-**
Total	**9200**		**679.81**

4.3 When asked about the physical target vis-à-vis achievement in respect of Grid connected Bio Power since 2010-11, the Ministry submitted as under:

Grid Connected Biomass Power and Bagasse Cogeneration (As on 31.05.2020)		
Year	**Target (MW)**	**Achievement (MW)**
2010-11	400	690.80
2011-12	400	642.15
2012-13	400	623.25
2013-14	400	787.50
2014-15	400	295.67
2015-16	400	304.85
2016-17	400	162
2017-18	340	519
2018-19	250 (including both Bagasse and non-bagasse cogeneration)	402
2019-20	250 (including both Bagasse and non-bagasse cogeneration)	97
2020-21	250	0

4.4 Physical targets vis-à-vis achievements regarding Off-Grid Bio Power (non-bagasse), as submitted by the Ministry, are given below:

Off-Grid Biomass (Non-Bagasse) Cogeneration Plants (As on 31.05.2020)		
Year	**Target (MW)**	**Achievement (MW)**
2010-11	60	80.73
2011-12	60	80.89
2012-13	60	88.65
2013-14	60	60.67
2014-15	60	60.05
2015-16	60	59.24
2016-17	Combined targets for Grid Connected and Off-Grid Biomass Power and Cogeneration Power Plants	9.6
2017-18		39.65
2018-19		27
2019-20		4.407
2020-21		5

4.5 On being asked about the problems being faced in the Biomass Power/Bagasse Cogeneration sector, the Ministry stated as follows:

a) "Non-signing of PPAs by DISCOMs,
b) Lack of working capital and
c) Non-availability of biomass."

4.6 Given below are the details regarding financial allocation *vis-a-vis* achievement in respect of Bio Power (including Biomass Power/Bagasse Cogeneration/Non Bagasse Cogeneration/Waste to Energy Programs) as furnished by the Ministry:

			(Rs. in crore)
Year	**BE**	**RE**	**Actual**
2010-11	75	75.30	74.61
2011-12	92	88	87.76
2012-13	129	91	83.49
2013-14	103	60.99	58.11
2014-15	71.50	41.50	41.40
2015-16	75	59	54.55
2016-17	60	43	30.97
2017-18	76	41.50	26.51
2018-19	48	48	10.17
2019-20	55	5.71	5.46

4.7 When asked about the reasons for non-utilisation of funds, the Ministry stated as under:

> "Funds are only released after successful commissioning of the project and receipt of 3 months performance inspection report prepared by independent agency & other documents such as consent to operate by Pollution Control Board, CA Certificate, etc. Non-receipt of complete requisite documents as per scheme guidelines from project developers resulted in delay of sanction of CFA and hence non utilisation of funds."

4.8 Corrective Steps taken by the Ministry for full utililization of the allocated funds are as under:

> "Regular follow-up with SNA and developers to submit required documents and organization of Project Appraisal Committee meetings to evaluate and recommend eligible proposals."

4.9 On being asked about the physical target vis-à-vis achievement since 2010-11 in respect of Bio gas power generation (off-Grid) and thermal energy application programme (BPGTP), the Ministry stated as follows:

"The BPGTP is demand based and no physical target is allocated to the States. The achievements under BPGTP are given as under:

S. No	Name of the State	Numbers of plants/ projects under Biogas Power Generation (Off-grid) and Thermal energy application Programme (BPGTP) installed year-wise, from 2010-11										Total
		2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	
1	Andhra Pradesh	4	7	5	-	2	1	6	-	2	-	27
2	Haryana	-	1	-	-	1	-	-	-	-	-	2
3	Karnataka	4	41	3	-	10	-	-	7	-	-	65
4	Maharashtra	15	-	-	4	5	-	-	7	-	1	32
5	Punjab	3	4	-	9	-	3	4	5	4	-	32
6	Rajasthan	-	1	-		-	-	-	-		-	1
7	Tamil Nadu	15	7	7	2	-	-	-	-	5	-	36
8	Uttarakhand	1	-	2	2	-	3	-	-	-	-	8
9	Uttar Pradesh	1	-	-	-	-	-	26	1	2	11	41
10	Madhya Pradesh	-	-	-	-	-	-	4	-	-	4	8
11	Kerala	4	-	-	-	-	-	-	-	-	-	4
12	Odisha	-	-	-	1	-	-	-	-	-	-	1
13	Telangana	-	-	-	-	2	1	-	-	1	-	4
Total		**47**	**61**	**17**	**18**	**20**	**8**	**40**	**20**	**14**	**16**	**261**

4.10 Details regarding physical targets vis-à-vis achievements since 2010-11 under New National Biogas and Organic Manure Programme (NNBOMP), as furnished by the Ministry are given below:

(No. in lakh)

Year	Target NNBOMP	Achievement
2010-11	1.50	1.51
2011-12	1.52	1.01
2012-13	1.35	1.15
2013-14	1.06	0.84
2014-15	1.10	0.85
2015-16	1.11	0.75
2016-17	1	0.55
2017-18	0.665	0.44
2018-19	1	0.27
2019-20	0.76	0.27*

**Physical achievement at the end of May, 2020, is likely to be over 0.30 Lakh plants.*

4.11 On being asked about the reasons for shortfall in achievements under New National Biogas and Organic Manure Programme, the Ministry stated as follows:

(i) "Impact of Ujjwala Scheme.
(ii) The increase in costs of construction of biogas plant mainly due to increase in prices of cement, sand, bricks, steel and balance of equipment and accessories which are the major contributors in total cost of a biogas plant, have resulted in lower installations of household biogas plant.
(iii) In order to see the impact of increased cost of installation and consider the same, the States Government Departments/ SNAs etc. have been asked to have re-estimate of the unit costs of various size biogas plants as approved under the NBMMP so as to assess the required level of support.
(iv) The back-to-back drought conditions during 2011-12 to 2014-15.
(v) Though, a biogas plant also helps in giving organic enriched bio-manure but the beneficiaries compare it with only cooking fuel. When it comes with cooking, then the LPG is an increasing challenge on account of its easy availability and very less upfront cost to be borne by the beneficiary as compared to a biogas plant and also comparatively more comfort in operation & maintenance. The extensive campaigning for the domestic LPG by rich Oil Marketing Companies (OMCs) and their wider dealer networks is also a positive side for LPG, which is not there for Biogas Plants.
(vi) Financial help in first registration of LPG connection in some States also distanced the potential biogas plant beneficiaries' from opting biogas plants."

4.12 When asked about the details regarding physical target vis-à-vis achievement since 2010-11 in respect of Waste to Energy Programme, the Ministry stated as under:

Year	Target (MWeq)	Achievement (MWeq)
2010-11	NA	14
2011-12	NA	18.27
2012-13	NA	35.04
2013-14	NA	20.21
2014-15	30	24.74
2015-16	20	5.67
2016-17	25	35
2017-18	25	29.5
2018-19	20	6.58
2019-20	12	28.43
2020-21	40	3.53

4.13 Explaining the reasons for shortfall in achievement of targets regarding Waste to Energy Programme, the Ministry stated that in previous 4 years, except one year, target for setting up of Waste to Energy projects were met. The major reasons for non-achievement of target in 2018-19 are as given below:

(i) Long delays in obtaining all statutory clearances by project developer from various agencies such as delays in obtaining NOC from State Pollution Control Board, loan approvals from the banks and Appraisal Note, signing of PPA, Approval for filling & storage of CBG/BioCNG from Petroleum and Explosives Safety Organisation (PESO), etc.
(ii) Delay in procurement of equipment, construction, leads to the delay in project commissioning and successful operational trial and hence delay in submitting Performance report for generation for 3 months, Inspection report of the Project by State Nodal agencies."

4.14 Following steps have been taken by the Ministry to ensure achievement of target with respect to Waste to Energy project:

(i) "Revision of Waste to Energy Programme to include support for Municipal Solid Waste based power projects to promote installation of such plants.
(ii) Development of Online portal to accept applications of availing Central Finance Assistance online in order to make procedure easy.
(iii) Regular follow-up with developers for submission of requisite documents."

Small Hydro Power

4.15 About Small Hydro Power, the Ministry stated as under:

"MNRE has been vested with the responsibility of developing Small Hydro Power (SHP) projects up to 25 MW station capacity. The contribution of small hydro power is envisaged to 5 GW only within the total target of Renewable Power generation capacity of 175 GW by 2022. Against this 5000 MW targeted capacity achievement by 2022 from small hydro, 4688.16 MW capacity from 1130 small hydro power projects have been achieved by 30th June 2020. In addition, 100 projects of about 509 MW are in various stages of implementation. The identified potential in the country for power generation from SHP projects is about 21133 MW at 7133 no. of sites. Thus only 22% of the potential has so far been harnessed.

The SHP Scheme 2014 ended on 31.03.2017. An evaluation of SHP programme was done by M/s Deloitte in 2017. Based on outcome/recommendations of evaluation report, proposal for continuation of SHP programme for three years from 01st April 2017 to 31st March 2020 (commensurate with the duration of 14th Finance Commission) was developed, which was referred to Economic Advisory Council of Hon'ble Prime Minister (EAC to the PM) in Dec. 2018. The EAC of PM strongly recommended to continue the SHP scheme. Since the proposed scheme was to come to end in March 2020, it is now proposed to develop the scheme afresh valid up to March 2025 (commensurate with the duration of 15th Finance Commission). All the projects commencing work on or after 1st April 2017 are proposed to be covered under the new scheme, being developed."

4.16 In response to a query regarding physical target vis-à-vis achievement in respect of Small Hydro Power, the Ministry furnished the following:

Period	Physical (MW)	
	Target	Achievement
2010-11	300	307
2011-12	350	353
2012-13	250	237
2013-14	300	171.40
2014-15	250	251.60
2015-16	250	218.6
2016-17	150	105.90
2017-18	100	105.96
2018-19	100	107.35
2019-20	100	90

4.17 Explaining the reasons for shortfall in achievement, the Ministry stated as under:

"The targets set for a particular year, as shown above, are the actual completion and commissioning of the projects in a particular financial year. SHP projects have a gestation period of about five years and there are a number of uncertainties associated in actual commissioning of the projects such as natural calamities (flood or draught), short working season in hilly areas, resistance of local communities, inadequate evacuation facilities or non-completion of planned evacuation facility on time, cost escalation etc. The targets shown/set are based on the progress conveyed by the State Government agencies or the SHP Developers. In addition, reluctance of DISCOMs to sign PPA at higher rate is also one of the main reasons for not coming up of new SHP projects."

4.18 When asked about the details regarding financial allocation vis-à-vis utilization since 2010-11 in respect of Small Hydro Power, the Ministry furnished the following:

S. No	Year	Financial support (Rs. in crore)			Surrendered amount (Rs. in crore)
		BE	RE	Expenditure	
I	2010-11	152	152	151.99	Nil
II	2011-12	144	155	154.81	Nil
III	2012-13	159	159	158.93	Nil
IV	2013-14	123.18	123.18	122.82	Nil
V	2014-15	108	108	107.99	Nil
VI	2015-16	105.50	105.50	104.99	Nil
VII	2016-17	125	125	124.70 +54.987 (from IREDA Bond Money) = 179.687	Nil
VIII	2017-18	138	123.50	123.92+23.57 (from IREDA Bond Money) =147.49	Nil
IX	2018-19	218.50	218.50	138.67	79.83
X	2019-20	190.90	94.14	77.29	16.86

4.19 Explaining the reasons for non-utilization of allocated funds, the Ministry stated as under:

> "As may be seen above, during the year 2016-17 and 2017-18, the actual expenditure is more than the budget made available at RE stage. In the year 2018-19 & 2019-20, allocated budget towards NE States could not be fully utilized as no new projects could be sanctioned, since the new SHP Scheme is still under consideration of the Ministry. An EFC Memorandum for continuation of the SHP Scheme from 2020-21 to 2024-25 has been prepared and is under consideration of the Ministry."

4.20 On being asked about the steps that have been taken by the Ministry to ensure achievement of target with respect to Small Hydro Power, the Ministry stated as under:

> "The Ministry has been continuously interacting with the implementing agencies for timely execution of the projects. The Ministry has been providing subsidies to the developers and is currently developing a new Small Hydro Power programme to provide an enhanced subsidy and also to remove free power and Local Area Development Fund being charged by the State Governments which will

encourage the developers to set up and complete the projects within a period of 4-5 years' time."

4.21 When asked about the minimum Capacity Utilization Factor (CUF) of Small Hydro Power Projects in order to ensure viability, the Ministry furnished the following:

Small Hydro Power Projects	**CUF**
located in Himachal Pradesh, Uttarakhand, West Bengal, and North-East States	45%
For others	30%

CHAPTER V
DOMESTIC MANUFACTURING IN THE RENEWABLE ENERGY SECTOR

SOLAR ENERGY SECTOR

5.1 The present installed Solar PV Manufacturing Capacity in the Country, as furnished by the Ministry, is as follows:

Solar PV Cells Capacity	Around 3 GW/year
Solar PV Modules capacity	Around 10-15 GW/year
Polysilicon/Wafer/Ingots	No manufacturing in India
Solar Inverters	5 GW

5.2 The approximate value of imports of components relating to Solar Projects in FY 2019-20, as furnished by the Ministry, is as follows:

Wafers	52 million USD
Solar cells and modules	1700 million USD
Solar inverters	800 million USD

5.3 In response to a query about quantum of imports related to Solar Power Projects**,** the Ministry furnished the following:

> "Based on the information available on the website of Department of Commerce, the details of import of solar PV cells and panels/ modules under the CTH 85414011, are as follows:

(in Million US $)

Financial Year		**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20 [till Dec. 2019 (prov.)]**
Value of Solar PV cells / modules imported in India under CTH 85414011 Total import	From China	597	603	1960	2817	3419	1694	1180
	From Germany	11	1	3	2	27	20	4
	From Malaysia	21	83	189	210	180	15	4
	From Taiwan	35	36	45	59	122	66	19
	From U.S.A	4	10	23	10	2	8	3
	From Other Countries	43	88	125	99	88	357	316
	Total import	**711**	**821**	**2345**	**3197**	**3838**	**2160**	**1526**

5.4 In response to Unstarred Question No. 1664 dated 28.11.2019 in Lok Sabha regarding reasons for dependence on China for Solar Hardware, the following was tabled:

> "Presently, the domestic solar cell and module manufacturers have the following disadvantages:
> (i) The country does not have a manufacturing base for Polysilicon, Ingots and wafers, the upstream stages of Solar Photovoltaic (PV) manufacturing chain, which is energy & capital intensive process.
> (ii) Lack of integrated set up, economies of scale & modern technology resulting in higher cost of production.
> (iii) High cost of land and electricity, low capacity utilization, high cost of financing, and lack of skilled workforce."

5.5 On being asked about the steps that have been taken by the Ministry to give boost to domestic manufacturing in Solar Energy Sector, the Ministry stated that it has taken following steps to give boost to the domestic manufacturing in the country:

> a) **Schemes with Domestic Content Requirement (DCR) and 'Preference to Make in India Order':**
> Through a number of Schemes like CPSU Scheme Phase-II, PM- KUSUM and Grid-connected Rooftop Solar Program Phase-II, DCR of more than 36 GW has been mandated which will promote domestic manufacturing. Through 'Implementation of Public Procurement (Preference to Make in India) Order' procurement and use of domestically manufactured solar PV cells and modules, has been mandated. This is expected to create enough demand for domestically manufactured solar PV cells & modules and thus reduce imports thereof.
> **b) Tenders for setting up Solar PV Manufacturing Capacities in India linked with Power Purchase Agreements (PPAs) for Solar PV Power Plant:**
> MNRE has recently concluded an innovative bid through which new additional manufacturing capacities of 3 GW of solar PV cells & 3 GW of solar PV modules will be set up without any direct financial subsidy through the Government exchequer.
> **c) Creation of Renewable Energy (RE) manufacturing hubs in and around ports:**
> MNRE is envisaging setting up RE manufacturing hubs in and around ports, which can cater to domestic demand as well as of exports. Through such manufacturing hubs, MNRE would endeavour to provide

affordable and hassle-free access to land, water, power, requisite clearances and approvals, financing etc. to RE manufacturers. MNRE has already written to various States and Ports/Port Trusts in this regard seeking their readiness to provide land/electricity/water/clearances and other incentives for setting up RE manufacturing hubs.

d) Phased Imposition of Basic Customs Duty (BCD) on import of solar PV cells & modules:

Pursuant to announcement in Budget 2020-21, regarding increase in rates of Basic Custom Duty on import of solar PV cells and modules, MNRE has recommended Ministry of Finance, for phased imposition of Basic Customs Duty (BCD) on import of solar PV cells & modules and is coordinating with Ministry of Finance and Department of Commerce for implementation of the same.

e) Formation of Renewable Energy Investment Promotion and Facilitation Board (REIPFB):

MNRE has constituted a Renewable Energy Investment Promotion and Facilitation Board (REIPFB), which will inter-alia, facilitate prospective investors willing to invest in manufacturing in RE sector in India.

f) Approved List of Solar PV Models and Manufacturers (ALMM):

The MNRE, on 02.01.2019, has issued 'Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019'. It is expected that this Order, which allows only solar PV cells and modules listed in ALMM List to be deployed in Government/Government assisted Projects, will help in restricting cheap & sub-standard imports. The order will be made effective at an appropriate time."

5.6 Explaining about the 'change in law' clause in the PPA and imposition of anti-dumping/safeguard/custom duty, the Ministry stated as under:

"Generally, under the 'Change-in-Law' provisions in Power Purchase Agreements, the RE developers can claim reimbursements from RE power procurers for any excess financial impact on RE generators due to imposition of any new duties/taxes or due to increase in rates of any duties/taxes."

5.7 When asked to explain if the solar cell manufacturing companies in the US, China, Taiwan, Malaysia and EU has been dumping their cells in Indian Markets earning profits at the expense of indigenous cell manufacturers, the Ministry replied as follows:

"The issue of dumping is examined by Directorate General of Trade Remedies (DGTR). Based on one such investigation, the Safeguard duty of 25-15%, on import of solar PV cells and modules, was imposed in 2018 by the Government."

5.8 Enumerating the steps taken by the Government to ensure quality and reliability of installed solar equipments, the Ministry stated as under:

"Grid connected solar power equipment

(a) In August 2017, Ministry of New & Renewable Energy has got notified, 'Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Solar PV Power Projects', which clearly specifies the Technical Requirements for Grid Connected Solar PV Power Plants, thereby ensuring the quality of material/ equipment being used in solar PV projects.

(b) In order to further ensure quality of material/ equipment being used in solar PV projects, MNRE, on 05.09.2017, has brought out a Quality Control Order titled 'Solar Photovoltaics, systems, Devices and Components Goods (Requirement for Compulsory Registration) Order 2017', thereby making BIS applicable for the Solar Sector. Bureau of Indian Standards (BIS) has accorded approval and registration for 250 manufacturers for their products based on performance testing reports issued by three test labs.

Off Grid/ Decentralized solar power equipment

Ministry has issued standards and specifications for various solar applications such as solar street lights, solar home lights, solar study lamps, solar pumps and solar power plants. These specifications are reviewed and revised from time to time to ensure quality in solar installations. Ministry has recently issued revised specifications and testing procedure for solar pumps and upgraded solar street lights specifications.

Ministry also has internal monitoring mechanism under various schemes. For example, under AJAY Phase-II Scheme which is being implemented by Energy Efficiency Services Limited (EESL), the installation work is being monitored by EESL and periodic inspections are conducted by EESL. Further, for overall monitoring of the Scheme, an inter-ministerial Committee has been constituted comprising of members from the Ministry of Power, Ministry of Panchayati Raj and Ministry of Statistics and Programme Implementation.

Under PM-KUSUM Scheme and Off-grid & Decentralized Solar PV Applications Phase-III Scheme, every selected supplier is required to have presence in every operational district to ensure proper maintenance of the systems."

WIND ENERGY SECTOR

5.9 On being asked about the status of domestic Manufacturing in the Wind Energy Sector in the country, the Ministry stated as under:

> "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 70-80% indigenization has been achieved with strong domestic manufacturing in the wind sector. All the major global players in this field have their presence in the country and over 40 different models of wind turbines are being manufactured by more than 17 different companies, through (a) joint ventures under licensed production (b) subsidiaries of foreign companies, and (c) Indian companies with their own technology. The unit size of machines has gone up to 3 MW. The current annual production capacity of wind turbines in the country is about 8000 MW to 10000 MW."

5.10 When asked about the steps that have been taken by the Ministry to give boost to domestic manufacturing in Wind Energy Sector, the Ministry stated as under:

> "The domestic manufacturing of wind turbines is encouraged through incentives such as concessional custom duty exemption (CCDC) on certain critical components of WTG. Further, the Government has introduced an online portal (RLMM Portal) for processing applications for including and updating wind turbine models in Revised List of Models and Manufacturers (RLMM)."

BIO ENERGY SECTOR

5.11 About the status of domestic Manufacturing in the Bio Energy Sector in the country, the Ministry stated as under:

> i) "India has indigenously developed biomass gasification systems of small and medium size raging from 5 kW to 1 MW capacity for power and thermal applications. Presently, 6-7 manufacturers are supplying complete gasification systems. 100% producer gas engines are also being manufactured by 5-6 companies in India.
>
> ii) Most of Municipal Solid Waste (MSW) based power plant's equipment except boilers and turbines power and thermal systems are manufactured in the Country.

iii) Presently most of the biomethanation plants and equipment are being manufactured in India. However, efficient bio-CNG production equipment / systems are also being imported by the IPPs."

5.12 In response to a query about steps taken by the Ministry to give boost to the domestic manufacturing in Bio Energy Sector, the Ministry stated the following:

"Government of India under Make in India initiative is promoting manufacturing of items including critical machinery and equipment required for setting up Bioenergy projects including Waste to Energy plants & Biomass programme. To boost domestic manufacturing in Bioenergy sector, the Biomass Programme guidelines enable developers to purchase Equipment conforming to Indian Standards (BIS Codes) which are required for setting up of biomass based cogeneration projects."

SMALL HYDRO SECTOR

5.13 Regarding the status of domestic Manufacturing in the Small Hydro Power Sector in the country, the Ministry stated as under:

"The country has adequate manufacturing capability of Small Hydro Power equipments which is around 2 to 3 GW and a large part of the equipments are being exported to other countries."

CHAPTER VI
GREEN ENERGY CORRIDOR

6.1 Explaining about the Green Energy Corridor scheme that was started during 2015, the Ministry stated as under:

> "The Green Energy Corridor (GEC) was initiated for evacuation of large scale renewable energy from Renewable Energy rich States and the implementation work started in 2015 with the approval of the Cabinet Committee on Economic Affairs. It is being implemented through the State Transmission Utilities (STUs) of 8 Renewable Energy rich States (Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan & Tamil Nadu) for evacuation of 20 GW Renewable Energy power within the States.
>
> The estimated project cost is Rs. 10,141 crore with funding mechanism consisting of 40% central grant from MNRE (i.e. Rs. 4056 crore), 40% loan from KFW, Germany (i.e. EUR 500 Million) and 20% as equity from the States. The total target of the scheme is installation of approx. 9700 circuit kilometres (ckm) of transmission lines and establishment of substations of aggregate capacity of 22600 Mega Volt-Amperes (MVA). Of this, total approx. 6500 ckm of transmission lines have been constructed and approx. 6812 MVA substations have been commissioned. The scheme was to be completed in March 2020, however it has been extended till December 2020 on the request from the States. Further, the States have indicated that they would need another year of extension due to lockdown, unavailability of migrant labour on site, disruption of equipment supply and imports from China, as a result of the global covid-19 pandemic. The States have indicated that they are under process to submit their requests to this Ministry in this regard."

6.2 When asked about the physical target vis-à-vis achievement since 2016-17 in respect of Green Energy Corridor (inter-state), the Ministry further stated as under:

Financial Year	Intra-State (Cumulative)		Inter-State (Cumulative)	
	Target (ckm)	Lines constructed (ckm)	Target (ckm)	Lines constructed (ckm)
2016-17	500	458	300	324
2017-18	1000	1200	1500	1804
2018-19	3200	3500	2800	2694
2019-20	6000	6490	3200	3200

6.3 Regarding the Green Energy corridor (Intra-State), the Ministry furnished the following:

State	Revised Target for Lines under the scheme # (ckm)	Transmission lines length constructed (ckm)
Tamil Nadu	1068	988
Rajasthan	1054	740
Andhra Pradesh	1073	429
Himachal Pradesh	502	147
Gujarat	1908	1055
Karnataka	618	479
Madhya Pradesh	2773	2186
Maharashtra	771	466
Total	**9767**	**6490**

#revised target for transmission lines after sanction of alternate/additional projects and dropping of projects.

6.4 In response to a query regarding steps taken by the Ministry to ensure achievement of target with respect to Green Energy Corridor, the Ministry stated as under:

> "Monthly monitoring of progress is being done by this Ministry and regular review meetings were convened at the highest level as means of corrective steps taken to speed up the process. The State implementing agencies are regularly being pursued to speed up tendering process."

6.5 On being asked about the details regarding financial allocation vis-à-vis achievement in respect of Green Energy Corridor since 2015-16, the Ministry furnished the following:

(in Rs. crore)

Financial Year	2015-16	2016-17	2017-18	2018-19	2019-20
Budget Estimates (BE)	300	500	500	600	500
Revised Estimated (RE)	300	200	500	500	52.61
Fund disbursed	300	639.38*	499.97	500	52.61

* The States requested for grant in the last quarter thus an amount of Rs. 439.38 crore was disbursed through IREDA bond money.

6.6 On being asked about the One Sun-One World-One Grid Initiative, the Ministry stated as under:

> During inaugural function of first assembly of International Solar Alliance, Hon'ble Prime Minister called for connecting solar energy supply across borders giving the mantra of 'One Sun One World One Grid'. 'We have a dream of One Sun One World One Grid. We generate round the clock electricity from Sun as it sets in one part of the world but rises in another part. Sun never sets for entire earth.'
>
> The vision behind the OSOWOG mantra is "The Sun Never Sets" and is a constant at some geographical location, globally, at any given point of time. With India at the fulcrum, the solar spectrum can easily be divided into two broad zones viz. far East and far West. India, through the OSOWOG initiative, plans to take another leap towards building a global ecosystem of interconnected renewable energy resources that are seamlessly shared for mutual benefits and global sustainability.
>
> Accordingly, the Ministry, in coordination with World Bank had issued a Request for proposal (RFP) on 26.05.2020 for Developing a Long Term Vision, Implementation Plan, Road Map and Institutional Framework for implementing 'One Sun One World One Grid'. A pre-bid meeting was held on 22nd June 2020 through Video conferencing, and around 30 bidders participated in the meeting. About 350 queries have been received from interested bidders. The bid submission date has been extended and final bids are yet to be submitted."

CHAPTER VII
FINANCIAL CHALLENGES IN THE RENEWABLE ENERGY SECTOR

7.1 Estimated standard capital cost per MW of installation for various Renewable Energy sources, as furnished by the Ministry, is as follows:

Source	Estimated average standard capital cost (Rs. Cr/MW)
Solar	4-5
Wind	7
Small Hydro	10
Bio	10

7.2 Further explaining about the requirement of funds for installation of 175 GW of Renewable Energy, the Ministry stated as under:

> "Approximately, to achieve the target of 175 GW from present, we need funding for balance 58 GW only. (As the current installed capacity is 87 GW & around 30 GW is under implementation). Requirement of funds for 58 GW capacity would be about Rs. 2,61,000 Crore (@ Rs 4.5 Cr/MW) i.e. Rs. 1,82,700 Cr in debt finance (70%) and Rs. 78,300 Cr in equity finance (30%) during next 2-3 years. The average annual investment has been around INR 82,300 Crore ($10.94 billion) for the past 5 years. Further cost reduction for wind and solar power technologies over the years is also expected."

7.3 In response to a query about steps taken to arrange investment for Renewable Energy Sector, the Ministry stated as under:

> "To boost investment in Renewable Energy sector, Government has taken various measures including permitting Foreign Direct Investment (FDI) up to 100 percent under the automatic route, strengthening of Power Purchase Agreements (PPAs), mandating requirement of Letter of Credit (LC) as payment security mechanism by distribution licensees for ensuring timely payments to Renewable Energy generators, setting up of Ultra Mega Renewable Energy Parks (UMREPs) to provide land and transmission on plug and play basis to investors, waiver of Inter State Transmission System (ISTS) charges and losses for inter-state sale of solar and wind power for projects to be commissioned by 31st December, 2022, notification of standard bidding guidelines to enable distribution licensee to procure solar and wind power at competitive rates in cost effective manner, declaration of trajectory for Renewable Purchase Obligation (RPO) up to the year 2022, laying of transmission lines under Green Energy Corridor Scheme for

evacuation of Power in Renewable rich States, finalization of manufacturing linked tender for setting up domestic manufacturing capacity, launching of new schemes, such as, Pradhan Mantri Kisan Urja Suraksha Evam Utthaan Mahabhiyan (PM-KUSUM), Solar Rooftop Phase II, 12000 MW CPSU Scheme Phase II, etc.

All the above factors have paved the way for several global funds that have either entered the sector or are in advanced stages of discussion regarding investing. The list includes Singapore based GIC Holdings, Abu Dhabi Investment Authority, Softbank, Brookfield, CPPIB and CPDQ from Canada, ORIX (Japan), Sembcorp and APG (Holland), among others, all of whom have decided to invest in the India renewables growth story. The private equity arms of Goldman Sachs, JP Morgan and Morgan Stanley have also entered the sector.

India has been issuing green bonds for development of renewable energy project. India is ranking second among emerging market economies (EMEs) in these issuances. As per Emerging Markets Green Bond Report, in 2019, India issued $ 3.2 billion worth of green bonds. Green bond provide access to scalable, long term, low cost debt capital from institutional investors. Also Masala bonds demonstrate that it is a new avenue for raising international funds with local currency for projects in India. IREDA has also raised Rs. 19.5 billion (US $ 300 million) through a 5-year rupee-denominated Green Bond at an annualised coupon rate of 7.125% p.a. NTPC, REC, Yes Bank, Axis Bank, Tata Cleantech, IFC etc. also raise money through Bonds.

As per Bloomberg New Energy Finance Research, the Investment trends in Indian Renewable Energy Sector during last 5 years are as follows:

	CY 2015	**CY 2016**	**CY 2017**	**CY 2018**	**CY 2019**
Investments	USD 9.9 Bn	USD 13.7 Bn	USD 11 Bn	USD 10.8 Bn	USD 9.3 Bn

7.4 On being asked about the details of foreign investment attracted so far in the Renewable Energy Sector, the Ministry furnished the following:

Sl No	**Year**	**FDI in million US$**
1	**2010-11 (Apr-Mar)**	214.40
2	**2011-12**	452.17
3	**2012-13**	1,106.52
4	**2013-14**	414.25
5	**2014-15**	615.95
6	**2015-16**	776.51
7	**2016-17**	783.57
8	**2017-18**	1,204.46
9	**2018-19**	1,446.16
10	**2019-20**	1,393.39
Grand Total		8,407.38

7.5 When asked about the details regarding Internal and Extra Budgetary resources targeted and the actuals thereof, the Ministry stated as under:

Financial Year	BE	RE	Expenditure
2010-11	950	1496.65	1400.85
2011-12	950	1755.64	2366.60
2012-13	1970	3080.36	1894.36
2013-14	2394	2966.23	1463.78
2014-15	3000	3346.58	3291.16
2015-16	3373.06	5430.93	6112.69
2016-17	9192.83	12301.52	8640.81
2017-18	8243.73	9465.70	10491.27
2018-19	10316.84	10835.14	10459.15
2019-20	12353.81	12466.32	-
2020-21	13726.74	-	-

7.6 On being asked about the details regarding Budget Estimates (BE)/Revised Estimates (RE) and actual expenditure regarding Renewable Energy Programmes, the Ministry furnished the following:

S. No.	Financial Year	Demand raised	BE	RE	Expenditure
					(Rs. In crore)
1.	2010-11	1885	1008.50	1007.95	986.27
2.	2011-12	3050	1212.38	1375.18	1357.57
3.	2012-13	5582	1438.22	1314.16	1226.05
4.	2013-14	6236	1533.55	1751.12	1613.97
5.	2014-15	5449	2534.39	2532.89	2492.53
6.	2015-16	6500	2803.21	4262.07	4244.78
7.	2016-17	8705.98	5035.79	4360.13	3828.96
8.	2017-18	5448.69	5472.84	4080	3644.62
9.	2018-19	5843.96	5146.63	5146.63	4470.80
10.	2019-20	6732.21	5254.83	3891.74	3562.1055
11.	2020-21	9523.04	5753	-	854.90

7.7 In response to a query about aggressive bidding in competitive auction and uncertainty over viability of projects, the Ministry stated as under:

> "The tariff is discovered through reverse auction biddings held in open and transparent manner which results low tariff. The resultant tariffs depend upon market forces. Further, reduction in solar power tariffs depends upon several factors like solar irradiance, cost of capital, logistics, Internal Rate of Return (IRR), guaranteed off-take and conducive Government policies for promotion of solar energy and it is

upto the project developers to bid for the projects keeping in view various factors including viability of projects."

7.8 When asked about the benefit of imposing tariff caps in Solar and Wind Energy Sector and if these caps are leading to under-subscription of the issued tenders, the Ministry stated as under:

"Tariff caps are the maximum ceiling tariffs that can be quoted by bidders in solar and wind power tenders. Tariff caps ensure that the bids received are at tariffs lower than the ceiling limit and thus more acceptable to Discoms.

However, the Ministry has decided to remove the tariff caps and currently, SECI's tenders for wind and solar power projects do not have any tariff caps. The reason for removing tariff caps was to let the market determine the tariff and eliminate any possibility of the tariff being kept artificially low because of a cap.

Under subscription was witnessed in both wind and solar tenders for some tenders issued by SECI in the calendar year 2019 when ceilings were in force. However, it is difficult to say that this was because of tariff ceilings. There could be other contributing factors such as land/substation availability, module prices, cost of financing, etc.

All the solar PV Projects awarded at the lowest tariff of Rs. 2.44/kWh (when ceilings were in force) in Bhadla Solar Park have been successfully commissioned. In case of wind sector also, part of the capacity awarded at the lowest tariff of Rs. 2.44/kWh has been commissioned. The delay in commissioning of rest of the capacities may be on account of changes in State policies and delay in necessary Government approvals, rather than tariff limits."

7.9 When asked about the number of companies that are involved in Renewable Energy Sector and reporting losses in their venture, the Ministry stated as follows:

"Most of wind/solar power projects are being implemented by private sector project developers selected through transparent competitive bidding process. The tariff quoted by these developers depends upon various market oriented factors such as cost of technology involved, Renewable Energy resources availability, developer margin, O&M costs, cost of financing etc."

7.10 Banks are reluctant to provide debt/loan to Renewable Energy Sector as there are lots of NPAs in Power Sector. On being asked about the measures adopted by the Ministry to address this situation, the Ministry stated as under:

> "The loans to renewable Energy sector have been categorized by Reserve Bank of India under Priority Sector lending. A major policy initiatives taken by the Government to mobilize long term financing for renewable energy projects, *inter alia*, include increasing the authorized capital of Indian Renewable Energy Development Agency and extending new lines of credit to enable it enhance its concessional loan to Renewable Energy projects, mobilizing project based concessional loans through multi- lateral and bi-lateral agencies *i.e.* World Bank, Asian Development Bank, KfW - Germany; inclusion of Renewable Energy Projects in Priority Sector Lending of Banks; and approval for issuance of tax free infrastructure bonds for funding renewable energy projects. Government is promoting development of solar energy in the country by providing various fiscal and promotional incentives such as capital subsidy, accelerated depreciation, waiver of Inter State Transmission System (ISTS) charges and losses, viability gap funding (VGF), financing solar rooftop systems as part of home loan, preferential tariff for power generation through renewables, and permitting Foreign Direct Investment up to 100 per cent under the automatic route."

7.11 Given below is the number of projects financed by IREDA in the total Renewable Power installed capacity of 88 GW, as furnished by the Ministry:

Number of Projects	229
Capacity	11830.69 MW
Loan amount	Rs 25922.60 crore

7.12 Regarding the details of NPAs and stressed accounts of IREDA, the Ministry furnished the following:

a) "Details of NPA accounts
There are 86 NPA accounts with total loan outstanding of ₹ 2110.64 crore as on 31.03.2020 (Provisional). The category wise breakup of NPAs is as under:

(₹ in crore)

Classification of Assets	**Status as on 31.03.2020 (Provisional)**		
	No of Accounts	**Loan Outstanding**	**Actual Loan Outstanding**
Sub Standard	13	804.13	804.13
Doubtful Assets	32	1306.47	1306.47
Loss Assets	41	0.04	215.12
Sub Total	**86**	**2110.64**	**2325.72**

b) Details of stressed accounts

Based on the overdue statement received from F & A Department and recent RBI Circulars, the overdue accounts as on 31.03.2020 (updated as on 21.05.2020), may be categorized as under:

(Amount in ₹ Lakh)

Category	Sector	No. of Projects	Total over dues	Total Loan Outstanding
SMA 0	BIOMASS	1	5.63	604.00
	ROOFTOP PV	1	2.24	241.52
	SHORT TERM	1	9.17	2674.90
	SPV	4	205.13	30148.52
	WIND	1	26.34	2824.32
	Total	**8**	**248.51**	**36493.26**
SMA 1	SHP	12	1384.63	63250.71
	SPV	1	437.56	26683.39
	Total	**13**	**1822.19**	**89934.11**
SMA 2	COG	1	582.53	2398.24
	SHORT TERM	2	873.95	857.83
	SHP	4	1021.46	15353.72
	SPV	2	1721.39	17010.45
	WIND	1	1064.19	12766.99
	Total	**10**	**5263.52**	**48387.23**
Grand Total		**31**	**7334.22**	**174814.60**

7.13 On being asked about steps taken to solve the problem of NPAs in Renewable Energy Sector, the Ministry stated that following steps have been taken to solve the NPA problem:

- IREDA has improved its due diligence and loan sanctioning process.
- IREDA has been taking external credit rating of the project and the promoter from the leading Credit Rating agencies like Crisil, ICRA, Care etc.
- Appointment of Lender's Independent Engineer (LIE) in case of large projects.
- IREDA has limited its loan exposure to the high risk sectors like Biomass, small hydro, waste of energy etc.
- IREDA is taking report from the AHEC, IIT Roorkee for small Hydro Projects.
- Follow-up with SMA category borrowers and take necessary actions.
- IREDA is initiating action under Negotiable Instruments Act, SARFAESI Act, DRT or NCLT for recovery of dues.

• Exploring the possibility of selling the assets to Asset Reconstruction Company (ARC).
• To contact the borrowers directly for understanding their problems and trying to find a viable solution.
• Monitoring of TRA accounts"

7.14 Details of Non Performing Assets in Small Hydro and Biomass Power Sectors, as furnished by the Ministry, are given in **Annexure-VII**.

7.15 When asked about the steps taken by IREDA to finance more Renewable Energy projects so that projects are not held up due to non-availability of required funds, the Ministry stated as under:

"IREDA has written to MNRE for infusion of equity and exemption of dividend. MNRE has sent a concept note on equity infusion for Rs. 1500 Crore to Department of Expenditure & Rs. 500 Crore PDI from CPSEs. Enhanced equity will enable IREDA to finance a larger number of projects."

7.16 In response to a query about out-standing dues owed by Distribution Companies to the Renewable Energy Generators/developers, the Ministry furnished the following:

Sr. No.	State	Total Dues (in Crore) (as on 03.07.2020)
1	Andaman & Nicobar Islands	0.91
2	Andhra Pradesh	4802.96
3	Bihar	0.54
4	Chhattisgarh	11.37
5	Gujarat	22.40
6	Himachal Pradesh	21.79
7	Karnataka	1600.83
8	Kerala	0.61
9	Madhya Pradesh	246.06
10	Maharashtra	243.70
11	Punjab	7.59
12	Rajasthan	385.78
13	Tamil Nadu	2546.40
14	Telangana	1656.59
15	Uttar Pradesh	54.97
16	Uttarakhand	0.32
17	West Bengal	0.37
18	Others	149.50
Total		**11752.71**

7.17 On being asked about steps that have been taken by the Ministry to ensure timely payment of dues, the Ministry stated as under:

> "The Ministry has taken up the matter of outstanding dues with respective States through letters as well as during several meetings. The standard bidding guidelines for solar, wind and wind-solar hybrid power projects provides provision for payment security through letter of credit and State guarantees. Further, Ministry of Power has issued order for implementation of Letter of Credit (LC) to be monitored by National Load Despatch Centre (NLDC) and MNRE is regularly monitoring status of implementation of LC for Renewable Energy generators/ developers."

7.18 In response to a query about the effect of Covid-19 lockdown on entities working in Renewable Energy Sector, the Ministry stated as under:

> "No such details regarding losses in renewable energy sector are available with the division."

7.19 Regarding job losses due to Covid-19 pandemic, the Ministry stated as under:

> "As per the report viz. 'Renewable Energy and Jobs Annual Review 2019' of International Renewable Energy Agency (IRENA), the total employment in renewable energy sector in India in 2018 was 7,19,000 jobs.
>
> In case of completed and ongoing renewable energy projects, there may not be impact with regard to job loss. Further, the MHA order No.40-3/2020-DM-I(A) dated 15th April 2020 allowed the construction activities in the renewable energy projects with effect from 20th April, 2020. There was no information from the Industry or its associations about job loss in the sector."

7.20 On being asked about the steps taken by the Ministry in order to mitigate the effects of COVID-19 lockdown, the Ministry stated as under:

> (i) "Requested States/UTs for facilitating/ ensuring uninterrupted essential operation of Renewable Energy Generating Stations (REGS) and provide facilitation /permission for material movement needed by them during the nation-wide lockdown for COVID-19 outbreak.
>
> (ii) Issued Orders for treating delay on account of disruption of the supply chains due to spread of corona virus in China or any other country, as *Force Majeure* and grant granting suitable extension of time

for projects, on account of corona virus, based on evidences/ documents produced by developers in support of their respective claims of such disruption of the supply chains due to spread of corona virus in China or any other country.

(iii) Issued orders for acceptance of invoices over email without insisting on submission of signed hard copy and in cases where Joint Meter Reading (JMR) cannot be signed due to lockdown, acceptance of Invoices generated by RE Developers on basis of photograph of meter reading/ downloaded meter data.

(iv) Issued orders clarifying that Renewable Energy (RE) Generating Stations have been granted 'Must-Run' status and this status of 'Must-Run' remains unchanged during the period of lockdown, and further directed DISCOMs that since RE Generating Stations comprise only a minor portion of the total electricity generation in the country, the payments to RE generators be done on regular basis as was being done prior to lockdown as per procedure established since 01.08.2019.

(v) Issued orders stating that Renewable Energy remains 'Must-Run' and any curtailment but for grid safety reason would amount to deemed generation.

(vi) Issued orders for treating lockdown due to COVID-19, as Force Majeure and granting blanket extension of time for RE projects, on account of lockdown due to COVID-19, equivalent to the period of lockdown and additional 30 (thirty) days for normalisation after end of such lockdown without any requirement of case to case examination or need to ask for any evidence for extension due to lockdown. It has been further clarified that the Developers, of the RE projects covered may also pass on the benefit of such time-extension, by way of granting similar time-extensions, to other stakeholders down the value chain like Engineering Procurement Construction (EPC) contractors, material/ equipment suppliers, Original Equipment Manufacturers (OEMs), etc."

PART –II
OBSERVATIONS/RECOMMENDATIONS OF THE COMMITTEE

1. The Committee note that India has made a pledge that by 2030, 40 percent of her installed power generation capacity shall be from clean energy sources. Keeping in view its commitment for a healthy planet, it has been declared that 175 GW of renewable energy capacity will be installed by 2022, which includes 100 GW from solar, 60 GW from wind, 10 GW from biomass and the remaining 5 GW from small hydro power. Against these set targets, it has been informed that the total installed capacity of renewable energy as on 1st January, 2021 is 92.54 GW, which comprises 38.79 GW from solar power, 38.68 GW from wind power, 10.31 GW from bio power and 4.76 GW from small hydro power. The Committee find that only little more than 50 percent of the target have been achieved and the remaining 82.46 GW capacity have to be installed in just one and a half year. The Committee are also informed that an additional capacity of 49.30 GW is under implementation and another 27.57 GW has been tendered. Even if these capacities are installed, the cumulative capacity will be 169.41 GW which is still short of the target of 175 GW. In such a situation, the Committee are apprehensive that any laxity on the part of the Ministry in achieving the assigned target may amount to reneging on our commitment. The Committee, therefore recommend that the Ministry should work on a mission mode so that the target of 175 GW is successfully achieved by the year 2022.

<u>Solar Energy</u>

2. The Committee observe that the National Solar Mission (NSM) was launched on 11th January, 2010 with the targets of (i) deployment of 20,000 MW of grid connected solar power by 2022 (ii) 2,000 MW of off-grid solar applications including 20 million solar lights by 2022 (iii) 20

million sq. m. solar thermal collector area (iv) to create favorable conditions for developing solar manufacturing capability in the country; and(v) support R&D and capacity building activities to achieve grid parity by 2022. Subsequently the Cabinet in its meeting held on 17.06.2015 approved revision of cumulative targets under NSM from 20,000 MW to 1,00,000 MW by 2021-22 for grid connected solar power projects. However, since the mission of achieving 175 GW Renewable Energy (including 100 GW from solar) was launched in the year 2015, the Committee enquired about the physical components through which the Ministry intended to achieve the target of 100 GW solar energy by 2022. The Committee were informed that these components are as follows:

(a) Solar Park Scheme for setting up of over 50 Solar Parks and Ultra Mega Solar Power Projects targeting over 40,000 MW of solar power projects;

(b) Scheme for setting up of Grid-Connected Solar PV Power Projects by the Central Public Sector Undertakings (CPSUs) and the Government of India organizations with Viability Gap Funding (VGF);

(c) VGF Scheme for setting up of 5000 MW of Grid Connected Solar PV Power Projects through SECI which has a separate component of 1000 MW for N-E States;

(d) Installation of Grid Connected Solar Rooftop Power Plants;

(e) Off-Grid Solar PV Scheme;

(f) Pradhan Mantri – Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme to support farmers to set up small solar power projects and solar pumps for irrigation purpose.

3. The Committee, however, observe that after more than 10 years of the launch of National Solar Mission in the year 2010 and subsequent more laudable declaration in the year 2015 of the target of 100 GW solar Energy as a part of the mission of achieving 175 GW Renewable Energy by the year 2022, the Government has been able to install only 38.79 GW of solar energy in the Country upto 31st January, 2021. The Ministry has though stated that solar power projects of 36.03 GW are under various stages of implementation and 23.87 are in tendering process but the real test lies in their actual commissioning within the scheduled time frame. The Committee while expressing their displeasure on the pace with which the Ministry have progressed in this significant area of renewable energy during the last 10 years, would recommend that the Ministry should speedily work out a strategic plan to achieve the target of 100 GW solar energy within the deadline of the 2022 which is approaching very fast.

<u>Solar Parks and Ultra Mega Solar Power Projects</u>

4. The Committee note that there is a target to install 40 GW of Solar Power by setting up over 50 Solar parks and Ultra Mega Solar Power Projects by 2022. Against this target, 39 solar parks of aggregate capacity of 22,879 MW have been approved to be setup in 17 States. Out of these approved Solar parks, infrastructure in 8 Solar parks is almost fully developed where solar projects of aggregate capacity of 6580 MW have also been commissioned and 4 Solar parks are partially developed where solar projects of aggregate capacity of 1365 MW have been commissioned. The Committee observe that the remaining 11 solar parks of aggregate capacity of 17,121 MW have not even got the approval of the Ministry although these Solar parks have to be developed and projects therein commissioned by 2022. Further, only 20 % of the

approved solar parks are fully developed so far and another 10% are only partially developed leaving as much as 70% unachieved. The Committee are disappointed with the slow progress made so far as the Ministry have been able to fully develop 8 Solar parks only in more than 5 years (2015-20) and an aggregate capacity of 32,055 MW is yet to be commissioned in order to achieve the stipulated target by 2022. The Committee have been informed that the major challenge in development of Solar parks is the acquisition of land that is dependent upon cooperation from the State Governments and other stakeholders. But it is inexplicable as to why 11 solar parks are yet to get approval of the Ministry even after lapse of more than three years. The Committee believe that the exercise of setting targets is rendered meaningless if Ministry-level approvals take such an undue long time. The Committee would therefore expect the process of granting approvals to be completed expeditiously so that the project can be implemented in a given time-frame. Keeping in view the fact that the solar power projects are land intensive projects, which require large flat tracts of shadow free contiguous land with accessibility, the Committee specifically recommend that:

i) The Ministry should actively explore the option of using surplus land available with various public sector undertakings and different State Governments for setting up of solar parks expeditiously.

ii) The Ministry should encourage all the airports in a time bound manner, to set up solar projects on the lines of Kochi Airport which is the first fully solar-powered airport in the world.

Scheme for setting up of Grid-Connected Solar PV Power Projects by the CPSUs and Government organizations with Viability Gap Funding (VGF)

5. The Committee note that nine Central Public Sector Undertakings (CPSUs) participated in 1000 MW CPSUs Scheme and viability gap funding (VGF) of Rs. 795 crore (including Solar Energy Corporation of India's charges) has been released to the Solar Energy Corporation of India (SECI) for disbursal to these nine CPSUs. Under CPSUs Scheme phase-II, around Rs. 319 crore has been released for disbursal to seven participating CPSUs/Government Organizations. It has also been submitted that this Scheme envisages the use of domestically manufactured cells and modules. The Committee appreciate the fact that there is a provision of domestic content requirement under the Scheme which may give a fillip to domestic manufacturing. In order to encourage domestic manufacturing for establishment of Solar PV power projects and to provide a sustained market to the domestic manufacturers, the Committee recommend that:

i) Target under the scheme for setting up of grid-connected solar PV power projects by the CPSUs and Government Organizations should be increased.

ii) Since only a few CPSUs have participated in the scheme till date, the Ministry should take pro-active steps and encourage more CPSUs/Government Organizations to participate in the scheme.

Solar Roof-top Programme

6) The Committee note that out of assistance provided by the Ministry, only 1948 MW of solar power roof-top could be installed in more than five years (i.e. from 01.04.2015 to 30.06.2020). The phase II of

the Grid connected rooftop solar programme was approved in February 2019 with a target for achieving cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022. However, against annual target of 3000 MW, only 472 MW could only be achieved during 2019-20, while still higher targets have been set for subsequent years that is 2020-21; 2021-22 and 2022-23 (upto 31 December, 2022) such as 6000 MW, 12000 MW and 17000 MW respectively. The Committee thus observe that the targets set with respect to solar roof-top are extremely unrealistic as compared to actual achievements. It is a matter of concern that since 2015-16, till date, the Ministry has never been able to cross the figure of 500 MW installed solar roof-top capacity in any year even as an exaggerated and unrealistic target of 17000 MW has been set to be achieved in just nine months of 2022-23 (April to 31 December, 2022). Even with such abysmal achievement record, the Ministry has shown the intent and increased the subsidy amount to 40 % from the earlier 30 % for capacity upto 3 kW. The Committee feel that if the intent has to be effectively translated into concrete achievement on the ground more people have to be encouraged to install solar roof-top facilities across all States and Union-territories in the Country. The Committee are of the view that given the performance of the Ministry in this Sector till date, the Roof-top Solar target of 40 GW by 2022 is highly unlikely to be achieved with the present pace of progress. In the Committee's view, one major reason for such a tardy progress is lack of awareness about this scheme amongst the masses. The Committee thus recommend that:

i) The Ministry should widely advertise the benefits of having roof-top solar power system and also about the incentives being provided by the Government for the same in all vernacular print and electronic media so as to spread awareness among the masses.

ii) Single Window Clearance System should be put in place, in the first phase, in all District headquarters in the country to provide all assistance/services/information to the customers and facilitate them in getting roof top solar system installed in hassle free manner.

iii) The process of subsidy disbursement should be made transparent, simpler and faster through the aforesaid Single Window Clearance System and preferably a digital platform be developed for this purpose to reduce the human interface in the process.

iv) The Ministry may consider providing of subsidy based on income criteria with a view to offer a higher subsidy for the customers in lower income group.

v) The Ministry need to draw a time bound plan across all States and Union-territories by which solar roof-tops system should be installed on all Government buildings.

7. The Committee note that all the State/Joint Electricity Regulatory Commissions have issued net metering regulations/tariff orders but there is lack of uniformity in this regard. It has been submitted that in most of the States and Union territories, there is no proper payment mechanism for excess units exported to the grid and the same are generally adjusted in the electricity bill itself. The Committee observe that in addition to Net-metering, there are also other metering arrangements like gross metering. The Committee are of the opinion that the target set for solar roof-tops cannot be achieved without proper implementation of the Net/Gross Metering and feel that there is a need to maintain uniformity in terms of regulations/model operating procedures/online unified portals etc. The Committee, therefore,

recommend that after analyzing the advantages and disadvantages of both the arrangements, the Ministry should ensure proper implementation of Net/Gross Metering arrangements in the Country through consultations with all the stakeholders so that both DISCOMs as well as the consumers get a fair deal.

Off-grid and Decentralized Solar PV Applications Programme

8. The Committee note that off-grid and decentralized Solar photo-voltaic (PV) Applications Programme has been launched with the objective of installation of 3 lakh solar street lights, 25 lakh solar study lamps and 100 MWp of off-grid solar power plants, mainly in North-East States and Left-Wing Extremism (LWE) affected districts and areas where grid power has not reached or is not reliable. The Ministry has submitted that the Scheme has been extended till 31.03.2021 due to outbreak of Covid-19. The Committee observe that against the targets of 3 lakh solar street lights, 25 lakh solar study lamps and 100 MWp solar power packs, merely 12,167 solar street lights, 60,662 solar study lamps and 1,422 kW solar power packs have been installed/distributed. The Committee understand that the implementation of this programme has been rather slow so far mainly due to outbreak of COVID-19, therefore with the normalization of the situation, the Ministry is expected to put in every effort to achieve the objectives and aim of the Scheme. When it comes to students and especially those from backward and remote areas in North-East States and LWE affected districts, the Committee feel that in order to enhance the learning experiences of the students living in rural, hilly and remote areas of the Country, reliable supply of good quality electricity be ensured to them by providing solar study lamps. The Committee, therefore recommend the following specific measures:

i) The Ministry should consider providing solar study lamps to students from backward and remote areas in the North-East States and LWE affected districts free of cost.

ii) Service Centers should be set up in every District in the country in a time bound manner to ensure timely and proper maintenance and repair services to the customers.

iii) The Ministry should encourage installation of Solar Lights along the State Highways, National Highways, Railway Stations, Irrigation Canals etc and State and Union territory wise status in this regard be given on the website of the Ministry for information of the general public .

PM-KUSUM Scheme

9. The Committee note that the Pradhan Mantri Kisan Urja Suraksha evem Utthan Mahabhiyan (PM-KUSUM) Scheme has been initiated after approval on 19.02.2019 with the aim to add a solar capacity of 25,750 MW by 2022. The Scheme has three Components: under Component-A, 10,000 MW capacity is targeted and farmers can install solar power plants up to 2 MW capacity on their barren/fallow land and sell power to DISCOM and thus increase their income, under Component-B, 17.5 lakh stand-alone Solar Water Pumps is to be installed for replacement of diesel pumps reducing the input cost, pollution, etc., under Component-C, 10 lakh existing Grid Connected Agriculture Pumps have been targeted to be solarized to double the capacity of each pump so that the farmer can not only irrigate land during day-time but also sell surplus power and get additional income. Against these targets, 1000 MW in 14 States under Component-A, 1,71,270 solar water pumps in 17 States under Component-B and solarization of 82,308 agriculture pumps in 12 States under Component-C have been sanctioned during 2019-20.

Allocation of 2.21 lakh stand-alone solar pumps under Component-B has been made to 15 states for 2020-21. The Committee find that participation of the States in the Scheme so far is low and the Ministry is also not setting the target of all components year-wise which could have ensured better monitoring of outcomes. The Committee observe that this scheme is not only beneficial to the farmers but also States and DISCOMs, as States will save on subsidy being provided for electricity to agriculture and DISCOMs will get cheaper solar power at tail-end, saving transmission and distribution losses. Further, this scheme envisages additional income for farmers and reduction of environmental pollution as well. However, the Committee find that for Component-A and C, only seven and three States respectively have approved the tariff and for remaining States, tariff is yet to be decided. Out of the seven States, DISCOMs in atleast two States have filed petition for revision/fixation of tariff. In light of the constraints brought before the Committee, it is recommended that:

i) The Ministry should devise a mechanism to ensure that the power produced by the farmers is bought by DISCOMs and timely payment to farmers is made in lieu of that.

ii) All States/Union Territories may be encouraged to implement the PM-KUSUM Scheme vigorously, as only 19 States have got the capacity sanctioned under the Scheme during 2019-20.

<u>Wind Power</u>

10. The Committee note from the reply of the Government that the Country has the fourth highest wind installed capacity in the World with total installed capacity of 37.94 GW (as on 31st July, 2020) and 64.639 billion units were reportedly generated from the wind power during

2019-20. The Committee however observe that since 2017-18, the Ministry has not been able to achieve its annual wind energy target. It has been submitted that the capacity additions till 2017 were through Feed in Tariff (FiT) mechanism and subsequently the tariff regime has been shifted from Feed-in-Tariff (FiT) to bidding route, which has slightly slowed the installation of projects. However, tariff based competitive bidding process has reduced the tariff of wind power considerably, i.e. from over Rs 4 per unit through FiT to around Rs 2.80 per unit in bidding regime. The Committee have been apprised that the Ministry, through SECI, is regularly issuing bids for awarding wind power projects through transparent competitive bidding process and the bids of adequate capacities are being issued for achieving 60 GW by 2022. The Committee hope that this shift would not hamper the achievement of overall target i.e. 60 GW by 2022.

The Committee also note that approximately 36 GW and 31 GW offshore wind power potential exist off the coast of Gujarat and Tamil Nadu respectively. India is in the initial phase of offshore wind energy development and exhaustive off-shore wind and other oceanographic measurements/surveys are underway to understand the nature of subsurface, seabed topology etc. Keeping in view the fact that India has a long coastline of more than 7500 Kilometers, the Committee recommend that:

i) Besides Gujarat and Tamil Nadu, the Ministry should extensively explore the offshore wind power potential in all other coastal States in a time bound manner.

ii) The Ministry should have consultations with all the stakeholders about shift in tariff regime so that achievement of overall target of 60 GW by 2022 does not get hampered.

Biomass Power

11. The Committee note that against the target of 10 GW, total capacity of 9.936 GW of Biomass Power and Cogeneration has been installed in the Country (as on 31.07.2020). The Ministry has submitted in this regard that the Sector has been facing problems like non-signing of power purchase agreements (PPAs) by DISCOMs, lack of working capital and non-availability of biomass. The Committee express their satisfaction that the Ministry is closer to achieve the target of 10 GW of Biomass Power. However, with regard to achievement of annual target under the New National Biogas and Organic Manure Programme (NNBOMP), the Committee observe that the Ministry has not been able to achieve its annual target during the last 9 years since the year 2011-12. Keeping in view the non-satisfactory performance of the Ministry under NNBOMP, the Committee recommend that:

i) The Ministry should conduct a comprehensive review of the programme with a view to ensure annual achievement under the programme atleast from now onwards.

ii) The list of targeted beneficiaries may be redrawn under NNBOMP in the light of Ujjwala Scheme so that the intended objectives of the Scheme are effectively achieved.

Small Hydro Power

12. The Committee note that the Ministry of New and Renewable Energy has been vested with responsibility of developing Small Hydro Power (SHP) projects up to 25 MW capacity. The identified potential in the Country for power generation from SHP projects is about 21,133 MW at 7133 number of sites. Against the target of 5000 MW, 4688.16 MW capacity from 1130 small hydro power projects have been achieved by 30th June 2020 and 100 projects of about 509 MW are in various stages of

implementation. It has been submitted that the SHP Scheme, 2014 ended on 31.03.2017 and the proposal for continuation of SHP programme for three years from 1st April 2017 to 31st March 2020 could not get approval of the Cabinet. It is now proposed to develop the scheme afresh valid up to March 2025 and an EFC (Expenditure Finance Committee) Memorandum for continuation of the SHP Scheme from 2020-21 to 2024-25 has been prepared and is under consideration of the Ministry. The Ministry has not furnished any reason, for this inordinate delay in coming up with a Scheme for SHP since 2017. The Committee would, therefore, recommend that:

i) The Ministry should expedite the process of formulation of Small Hydro Power Scheme on priority basis and get it approved from the EFC at the earliest.

ii) Targets may be set in a manner that would harness the available potential of 21,133 MW power in small hydro sector in a given time frame.

ii) All the Small Hydro Power (SHP) projects starting from 1st April 2017 should be covered under the new SHP Programme.

<u>Renewable Purchase Obligation (RPO)</u>

13. The Committee note that as per the Electricity Act, 2003, Renewable Purchase Obligation (RPO) mandates all the electricity licensees to purchase or produce a minimum specified quantity of their requirement from the renewable energy sources and the State Electricity Regulatory Commission (SERC) fix the minimum RPO for the State. They find that the Ministry of Power notified the uniform Renewable Purchase Obligation (RPO) trajectory on 14th June 2018 that seeks 21 percent RPO (10.5 percent non-solar and 10.5 percent solar) by 2021-22. For 2019-20, the trajectory mandated the share of renewable

energy (excluding hydro power above 25 MW installed capacity) to be 17.50 percent (7.25 percent from solar and 10.25 percent from non-solar), however the achievement was only 10.77 percent. It has been submitted that only six States namely Andhra Pradesh, Himachal Pradesh, Karnataka, Rajasthan, Sikkim and Tamil Nadu have achieved RPOs in full and seven States/UTs, namely Gujarat, Mizoram, Nagaland, Madhya Pradesh, Telangana, Dadra and Nagar Haveli and Maharashtra have achieved more than 55 percent RPO. The Committee observe that the RPO compliance in the Country varies from 3.7% for Manipur to 250% for Karnataka. While expressing their displeasure about the non-compliance of RPO trajectory so far, the Committee recommend that:

i) The Ministry should actively pursue all the SERCs/JERCs for ensuring RPO compliance, aligning their RPO trajectory with the one issued by the Ministry of Power and enforcing penal provisions against defaulting obligated entities.

ii) Carry forward or waiver of RPO should not to be permitted.

iii) Penalty for non-compliance may be increased as deterrence.

<u>Domestic manufacturing in the Renewable Energy Sector</u>

14. The Committee note that India has adequate domestic manufacturing capability for wind, biomass and small hydro power equipments with expert capability. One of the targets under National Solar Mission, launched in 2010, was creation of favorable conditions for developing solar manufacturing capability in the Country. As per the reply, the annual manufacturing capacity in the Country is around 3 GW for solar PV cells; around 10-15 GW for solar PV modules; 5 GW for solar inverters; while there is no commercial production in the Country for Polysilicon/Wafer/Ingots. The Committee observe that Wafers, solar inverters, solar PV cells and modules worth several million USD were

being imported from China, Germany, Malaysia, USA etc. since 2013-14. The Committee feel that excessive dependence on imports may put solar power sector at the risk of supply side disruptions. In the opinion of the Committee, it is very troubling that the Ministry has not come up with any long term policy for developing domestic solar manufacturing capability in the Country since 2010. Even after a decade of the launch of the National Solar Mission, the Ministry is still only envisaging to set up Renewable Energy manufacturing hubs in and around existing ports and waiting for an appropriate time to issue orders regarding approved list of Solar PV Models and Manufacturers. In pursuance of the Hon'ble Prime Minister's clarion call for 'Make in India', 'Atmanirbhar Bharat' and 'Vocal for Local', the Committee recommend that the Ministry should formulate a long term policy for developing and facilitating domestic solar manufacturing capabilities in the Country to create a strong supporting base to give boost in the solar energy segment of the renewable energy which will not only reduce our dependence on imports from other Countries but also open employment generation opportunities in the Country.

<u>Green Energy Corridor</u>

15. The Committee observe that the Green Energy Corridor Project aims at synchronizing electricity produced from renewable sources, such as solar and wind, with conventional power stations in the Grid. For evacuation of large-scale renewable energy, Intra State Transmission System project was sanctioned by the Ministry in the year 2015-16. The project is being implemented by eight renewable-rich states of Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Madhya Pradesh, Rajasthan and Himachal Pradesh through their respective State Transmission Utilities (STUs). Its regular monitoring is done by the

Ministry and it is understood that a Project Appraisal Committee in the Ministry also monitors the project and recommends on the disbursal of the central grant to the STUs. The Committee are however, pained to observe that despite having well placed mechanism, the project has not marched at the desired pace and the construction of cumulative 7365 ckm transmission lines and commissioning of 9976 MVA capacity substations during the last 5 years' period (as on 31.12.2020) have been far from satisfactory and much below the target fixed which was 9700 ckm transmission lines and 22600 MVA substations. In the Committee's opinion, among the various factors stated to be responsible for the slow pace in the progress of Green energy Corridor Project, the inadequate monitoring by the Ministry and lack of the priority which the project deserved to be given, have also contributed a lot in missing the target. The Committee are concerned about the already delayed implementation of the intra state Green Energy Project. The Committee observe that to meet the given target, 2335 ckm of transmission lines have to be installed and substations of aggregate capacity of 12624 MVA have to be charged by May 2021 so as to meet the extended deadline, which seems highly unlikely seeing the track of past performance. Keeping in view the importance of the project for evacuation of power from renewable energy rich States and its integration with the Grid, the Committee would like to know the action plan prepared by the Ministry and recommend that the Ministry should work on a mission mode to earnestly pursue with the States concerned to ensure timely completion of Green Energy Corridor so that renewable energy projects do not have to suffer due to lack of reliable evacuation infrastructure.

Financial Challenges in the Renewable Energy Sector

16. The Committee note that funding of Rs. 2,61,000 crore is required for installation of 58 GW of renewable power projects (the installed capacity is 87 GW and around 30 GW is under implementation as on June, 2020). It has been submitted that the average annual investment in renewable energy sector has been around Rs. 82,300 Crore in the past 5 years and cost reduction for wind and solar power technologies over the years is also expected. Keeping in view the situation arising out of the Covid-19 pandemic and resultant supply side disruptions as well as the non-performing assets in conventional power sector; the Committee feel that attracting an investment of Rs. 2,61,000 crores in next two years will not be an easy task. The Committee are of the opinion that Indian Renewable Energy Development Agency (IREDA) being the only dedicated public sector financial institution for financing of renewable energy projects, must gear itself up to take up the extra responsibility and make available necessary capital for installation of renewable energy projects, so that projects are not held up due to non-availability of required funds. The Committee, therefore recommend that the Ministry should mobilize more long term financing and concessional loans through multilateral and bilateral agencies as far as possible.

17. The Committee note that out of 88 GW of installed renewable power projects (as on June, 2020), IREDA has financed 229 projects of 11,830.69 MW with loan amount of Rs 25,922.60 crore. It has also been submitted that IREDA has 86 NPA (Non-Performing Assets) accounts with total outstanding loan of Rs. 2110.64 crore as on 31.03.2020 and 31 projects are overdue accounts with outstanding loan of Rs. 1748.146 crore. The Committee observe that 18 small hydro power projects and

11 biomass power projects, financed by IREDA, with outstanding loan of Rs. 24920.01 crore and Rs. 104.59 crore respectively have become non-performing assets. The Committee express their concern over the huge outstanding loan amount of IREDA and some of them now turning into NPA and feel that comprehensive analysis of the reasons responsible for such scenario need to be critically done to ensure better financial management by IREDA in future projects. The Committee, therefore desire that the issues relating to NPA need to be dealt with utmost sincerity and thus recommend that:

i) The IREDA should review its entire process of appraisal of the projects and disbursement of loan to incorporate stricter due diligence before sanctioning large projects involving huge investments to avoid them turning into NPA in future.

ii) Necessary follow-up need to be done with SMA (Special mention accounts) category borrowers in order to prevent them from becoming NPAs.

iii) Expeditious recovery of outstanding loan by auctioning of assets and other legal measures be initiated.

18. The Committee note that States and distribution companies owe Rs. 11,752.71 crore to renewable energy generators/developers (as on 03.07.2020). The Committee feel that non-payment of dues to generators/developers may result in accumulation of more stressed/non-performing assets which may in turn add to the stress of lending financial institutions thereby creating a vicious cycle with possible cascading effects. The Committee, therefore recommend that the Ministry should take up this matter with concerned State Governments without any further delay and the outstanding dues be

realized immediately and timely payment of dues to renewable energy generators/ developers be ensured in future.

19. The Committee note that the Ministry does not have information regarding effect of Covid-19 on renewable energy sector including the data regarding job losses so far in the sector. However, the Ministry has issued orders to mitigate the effects of COVID-19 like treating lockdown as well as delay on account of disruption of the supply chains due to spread of corona virus as *Force Majeure* and granting blanket extension of time for renewable energy projects, etc. It has also been submitted that disruptions caused due to Corona virus may affect achievement of renewable energy targets in time. The Committee are of the view that the situation arising out of spread of Covid 19 had been an unprecedented happening which impacted each sector of the economy but these challenges need now to be effectively encountered and therefore the Ministry should formulate a coherent plan for continuance of support to the renewable power sector so that the target of 175 GW by 2022 is achieved within the time frame announced. The Committee hope that the Ministry will achieve the target with their comprehensive plan and strategic implementation model.

New Delhi
18th March, 2021
27 Phalguna, 1942 (Saka)

Shri Rajiv Ranjan Singh *alias* Lalan Singh
Chairperson,
Standing Committee on Energy

Annexure - I

State and UT-wise estimated potential of Renewable Energy (Source-wise)

Sl. No	STATES / UTs	Wind Power (MW) @ 120m	Small Hydro Power (MW)	Bio-Energy			Solar (MW)	Total (MW)
				Bio mass Power (MW)	Bagase Cogeneration (MW)	Waste To Energy (MW)		
1	Andhra Pradesh	74906	409.32	578	300	123	38440	114756
2	Arunachal Pradesh	274	2064.92	8			8650	10997
3	Assam	246	201.99	212		8	13760	14428
4	Bihar	3650	526.98	619	300	73	11200	16369
5	Chhattisgarh	348	1098.20	236		24	18270	19976
6	Goa	8	4.70	26			880	918
7	Gujarat	142560	201.97	1221	350	112	35770	180215
8	Haryana	419	107.40	1333	350	24	4560	6793
9	Himachal Pradesh	151	3460.34	142		2	33840	37595
10	Jammu & Kashmir	3	1707.45	43			111050	112803
11	Jharkhand	0	227.96	90		10	18180	18508
12	Karnataka	124155	3726.49	1131	450		24700	154162
13	Kerala	2311	647.15	1044		36	6110	10149
14	Madhya Pradesh	15404	820.44	1364		78	61660	79326
15	Maharashtra	98213	786.46	1887	1250	287	64320	166744
16	Manipur	0	99.95	13		2	10630	10745
17	Meghalaya	1	230.05	11		2	5860	6104
18	Mizoram	0	168.90	1		2	9090	9261
19	Nagaland	0	182.18	10			7290	7482
20	Odisha	8346	286.22	246		22	25780	34681
21	Punjab	278	578.28	3172	300	45	2810	7183
22	Rajasthan	127756	51.67	1039		62	142310	271219
23	Sikkim	0	266.64	2			4940	5209
24	Tamil Nadu	68750	604.46	1070	450	151	17670	88695
25	Telangana	24835	102.25				20410	45347
26	Tripura	0	46.86	3		2	2080	2131
27	Uttar Pradesh	101	460.75	1617	1250	176	22830	26434
28	Uttarakhand	54	1664.31	24		5	16800	18547
29	West Bengal	1050	392.06	396		148	6260	8246
30	Andaman & Nicobar	1277	7.27				0	1284
31	Chandigarh	0				6	0	6
32	Dadra & Nagar Haveli	0					0	0
33	Daman & Diu	0					0	0
34	Delhi	0				131	2050	2181
35	Lakshwadeep	31					0	31
36	Puducherry	382				3	0	385
37	Others					1022	790	1812
	Total	695509	21133.62	17536	5000	2554	748990	**1490727**

Annexure-II

State and UTs wise Installed capacity of Grid Interactive Renewable Power as on 30.06.2020						
S. No.	**States/UTs**	**Small Hydro Power**	**Wind Power**	**Bio Power**	**Solar Power**	**Total Installed capacity**
		(MW)	**(MW)**	**(MW)**	**(MW)**	**(MW)**
1	Andhra Pradesh	162.11	4092.45	500.34	3618.77	8373.67
2	Arunachal Pradesh	131.105			5.61	136.72
3	Assam	34.11			41.23	75.34
4	Bihar	70.70		121.20	153.35	345.25
5	Chhattisgarh	76.00		244.50	231.35	551.85
6	Goa	0.05		0.34	4.78	5.17
7	Gujarat	68.95	7623.12	77.30	3053.69	10823.06
8	Haryana	73.50		206.86	252.62	532.98
9	Himachal Pradesh	911.51		7.20	40.14	958.85
10	Jammu & Kashmir	185.48			19.44	204.92
11	Jharkhand	4.05		4.30	39.04	47.39
12	Karnataka	1280.73	4794.80	1887.80	7277.93	15241.26
13	Kerala	222.02	62.50	0.72	146.62	431.86
14	Madhya Pradesh	95.91	2519.89	120.75	2311.80	5048.35
15	Maharashtra	379.575	5000.33	2528.69	1869.97	9778.57
16	Manipur	5.45			6.35	11.80
17	Meghalaya	32.53		13.80	0.12	46.45
18	Mizoram	36.47			1.52	37.99
19	Nagaland	30.67			1.00	31.67
20	Odisha	64.625		59.22	398.94	522.79
21	Punjab	173.55		327.85	947.10	1448.50
22	Rajasthan	23.85	4299.72	121.30	5222.86	9667.73
23	Sikkim	52.11			0.07	52.18
24	Tamil Nadu	123.05	9304.34	1003.95	3918.10	14349.44
25	Telangana	90.87	128.10	185.10	3689.36	4093.43
26	Tripura	16.01			9.41	25.42
27	Uttar Pradesh	25.10		2115.51	1174.10	3314.71
28	Uttarakhand	214.320		130.50	317.83	662.65
29	West Bengal	98.50		319.92	117.06	535.48
30	Andaman & Nicobar	5.25			12.19	17.44
31	Chandigarh				41.55	41.55
32	Dadrs & Nagar Haveli				5.46	5.46
33	Daman & Diu				19.86	19.86
34	Delhi			52.00	165.16	217.16
35	Lakshwadeep				0.75	0.75
36	Pondicherry				7.20	7.20
37	Others		4.30			4.30
Total (MW)		**4688.16**	**37829.55**	**10029.15**	**35122.33**	**87669.19**

Annexure-III

State wise list of sanctioned Solar Parks

Sl. No.	State	Solar Park	Capacity (MW)	Land identified at
1	Andhra Pradesh	Ananthapuramu-I Solar Park	1500	NP Kunta of Anantpuramu & Galiveedu of Kadapa Districts
2		Kurnool Solar Park	1000	Gani and Sakunala Village of Kurnool District
3		Kadapa Solar Park	1000	Vaddirala, Thalamanchi, Pannampalli, Ramachandrayapalli, Konna Ananthapuram and Dhidium villages in Mylavaram Madal, Kadapa district
4		Ananthapuramu-II Solar Park	500	Talaricheruvu & Aluru Villages, Tadipathri Mandal, Anathapuramu District of Andhra Pradesh
5		Hybrid Solar Wind Park	160	Kanaganapalli Mandal, Ananthapuramu District
6	Arunachal Pradesh	Lohit Solar Park	30	Tezu township in Lohit district
7	Gujarat	Radhnesada Solar Park	700	Radhnesada, Vav, Distt. Banaskantha
8		Harsad Solar Park	500	Villages-Harsad, Madhpura, Suigam and Navapara, Taluka-Suigam, District-Banaskatha
9		Dholera Solar Park Ph-I	1000	Dholera Special Investment Region (SIR), Taluka- Dholera, District-Ahmedabad, Gujarat
10		Dholera Solar Park Ph-II	4000	Dholera Special Investment Region (SIR), Taluka- Dholera, District-Ahmedabad, Gujarat
11	Jharkhand	Floating Solar Park	150	Getalsud and Dhurwa dam, Jharkhand
12	Karnataka	Pavagada Solar Park	2000	Villages- Valluru, Rayacharlu, Balasamudra, Kyathaganacharlu, Thirumani of Pavagada Taluk, Tumkur dist.
13	Kerala	Kasargod Solar Park	105	Paivalike, Meenja, Kinanoor, Kraindalam and Ambalathara villages of Kasargode district
14	Madhya Pradesh	Rewa Solar Park	750	Gurh tehsil, District Rewa, MP
15		Neemuch-Mandsaur Solar Park	750	Neemuch site: Villages Badi, Kawai and Bardwada in Singoli Tehsil; and Mandsaur site: Runija and Gujjarkhedi villages in Suwasra Tehsil, Mandsaur district
16		Agar Solar Park	550	Susner & Agar tehsil of Agar District
17		Shajapur Solar Park	450	Moman Badodiya tehsil & Shajapur tehsil of Shajapur District
18		Morena (Chambal) Solar Park	250	Morena
19	Maharashtra	Sai Guru Solar Park (Pragat)	500	Taluka-Sakri, Dhule District
20		Patoda Solar Park (Paramount)	500	Villages Tambarajuri and Wadzari, Taluka Patoda, Dist. Beed.
21		Dondaicha Solar Park	500	Villages- Vikhran & Methi, Taluka-Dondaicha, district Dhule, Maharashtra

Sl. No.	State	Solar Park	Capacity (MW)	Land identified at
22	Manipur	Bukpi Solar Park	20	Bukpi Village, Pherzawl District in Manipur
23	Meghalaya	Solar park in Meghalaya	20	Thamar, West Jaintia Hills & Suchen, East Jaintia Hills districts
24	Mizoram	Vankal Solar Park	20	Vankal, Khawzal RD Block Chmaphai Dist, Mizoram
25	Nagaland	Solar Park in Nagaland	23	Ganeshnagar (12 MW) of Dimapur dist. and Jalukie (11 MW) of Peren districts
26	Odisha	Solar Park in Odisha	275	Sambalpur and Boudh districts
27		Solar Park by NHPC	100	Landeihil Village, Jagannath Prasad Tehsil, Ganjam District, Odisha
28	Rajasthan	Bhadla-II Solar Park	680	Village-Bhadla, Jodhpur Dist, Rajasthan
29		Bhadla-III Solar Park	1000	Village-Bhadla, Jodhpur Dist, Rajasthan
30		Bhadla-IV Solar Park	500	Village-Bhadla, Jodhpur Dist, Rajasthan
31		Phalodi-Pokaran Solar Park	750	Villages Ugraas, Nagnechinagar & Dandhu, tehsil Phalodi, dist Jodhpur (450 MW) and villages Lavan & Purohitsar, tehsil Pokaran, dist Jaisalmer (300 MW)
32		Fatehgarh Phase-1B Solar Park	421	Fatehgarh & Pokaran, Jaisalmer, Rajasthan
33		Nokh Solar Park	980	Village-Nokh, Pokaran, Jaisalmer, Rajasthan
34	Tamil Nadu	Kadaladi Solar Park	500	Narippaiyur and nearby villages, Kadaladi Taluk in Ramanathapuram District
35	Uttar Pradesh	Solar Park in UP	440	Orai & kalpi Tehsils of Jalaun, Meja tehsil of Allahabad, Chaanbe tehsil of Mirzapur and Akbarpur tehsil in Kanpur Dehat districts
36		UP Kanpur Dehat Solar Park	50	Village Leharapur, Tehsil-Akbarpur, Dist. Kanpur Dehat
37		UP Jalaun Solar Park	50	Village-Mirzapur Jagir, Tehsil-Madhogarh, Dist. Jalaun
38		UP Kanpur Nagar Solar Park	30	Village Katar, Tehsil-Ghatampur, Dist. Kanpur Nagar
39	West Bengal	Solar park in West Bengal	125	Dadanpatrabar, Maina and Dakshin Purusottampur, Purba Medinipur, District
TOTAL (17 States)			**22,879**	

Annexure-IV

State wise expenditure details since 2010-11 regarding Off-grid and Decentralized Solar Programme (Rs . in Lakh)										
States/UTs	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Andhra Pradesh	631	288	134	29	3205	10368	3953	12397	11648	52
Arunachal Pradesh	373	250	582	428	261	57	694	770	0	1701
Assam	0	500	223	304	57	439	1358	981	0	1575
Bihar	0	577	20	350	648	1541	0	0	526	37
Chhattisgarh	2892	4841	5282	1115	3014	3327	6549	15486	9113	0
Delhi	0	0	0	0	102	124	0	0	0	0
Gujarat	14	100	0	7	1689	1797	2608	2622	0	0
Haryana	603	691	226	0	624	1922	0	0	65	0
Himachal Pradesh	440	515	191	2098	1628	4100	2650	1339	1829	809
Jammu & Kashmir	2146	7893	3361	3697	1915	4395	2466	0	1053	1000
Jharkhand	207	353	270	0	651	1551	0	555	0	855
Karnataka	96	58	114	840	834	66	3901	0	1484	1006
Kerala	5	551	855	0	2370	965	2359	779	150	0
Lakshadweep	1387	871	0	645	0	375	0	397	0	0
Madhya Pradesh	1072	1793	449	0	1570	41	66	6917	2847	8982
Maharashtra	115	126	28	0	3431	2442	0	0	613	3477
Manipur	266	499	1483	369	147	1160	442	652	0	1261
Meghalaya	619	179	0	502	573	312	1354	816	157	0
Mizoram	246	60	179	394	702	753	1354	1633	0	1523
Nagaland	15	866	1036	425	350	555	1501	884	206	1345
Odisha	13	113	0	0	1294	195	1700	867	735	1029
Puducherry	0	155	0	0	26	0	0	0	0	0
Punjab	490	160	97	203	1024	824	0	0	1323	1223
Rajasthan	3097	4774	3890	1248	11489	20063	6711	8951	3033	8812
Sikkim	223	1030	262	820	141	28	282	0	274	0
Tamil Nadu	45	2799	128	2029	2939	8262	207	0	0	1919
Telangana	0	0	0	0	2232	1502	0	2337	0	0
Tripura	91	0	402	0	113	347	1372	203	0	1265
Uttarakhand	2490	593	123	4057	115	2510	373	555	0	1087
Uttar Pradesh	635	2186	2675	17	4481	3851	1896	2670	2554	5705
West Bengal	1247	812	382	0	167	34	0	0	0	0
Chandigarh	0	0	0	0	276	0	0	0	0	0
Others (CEL, REIL, NABARD, Regional Rural Banks, NGOs, etc.) and other Channel Partners	5991	14691	17526	13059	13411	26515	11266	26614	22784	850
Total Expenditure (Rs in Lakh)	**25447**	**48326**	**39918**	**32636**	**61478**	**100422**	**55065**	**88425**	**60394**	**45513**
Allocation During the Year (Rs in Lakh)	**-**	**-**	**-**	**-**	**-**	**-**	**68500**	**68500**	**84050**	**51800**

Annexure-V

State/UT wise RPO Compliance (2019-20)									
States/UTs	**Energy Supplied excl. Hydro (MU)**	**Solar Obligation (MU)**	**Non-Solar Obligation (MU)**	**Total RE Obligation (MU)**	**Solar Consumption (MU)**	**Non-Solar Consumption (MU)**	**Total RE Consumption (MU)**	**RPO Compliance (%)**	
Karnataka	59537	4316.5	6102.6	10419.0	11948.8	14103.2	26052.0	250.0%	**> 100%**
Andhra Pradesh	62143	4505.4	6369.7	10875.1	5974.3	7486.0	13460.4	123.8%	
Rajasthan **	77139	5592.6	7906.8	13499.4	7572.0	6500.2	14072.1	104.2%	
Tamil Nadu **	103617	7512.3	10620.8	18133.0	4769.1	13559.5	18328.6	101.1%	
Gujarat **	112504	8156.6	11531.7	19688.3	3771.6	14134.7	17906.3	90.9%	**55%-100%**
Mizoram	488	35.4	50.1	85.5	19.8	49.6	69.4	81.2%	
Nagaland	565	41.0	57.9	98.9	0.0	75.9	75.9	76.7%	
Madhya Pradesh **	68552	4970.0	7026.6	11996.6	4213.6	4988.5	9202.1	76.7%	
Telangana	65150	4723.4	6677.8	11401.2	6325.1	513.6	6838.8	60.0%	
Dadar & Nagar Haveli	6528	473.3	669.1	1142.4	115.8	561.7	677.5	59.3%	
Maharashtra	148395	10758.7	15210.5	25969.2	3184.3	11791.7	14976.0	57.7%	
Jharkhand	7941	575.7	814.0	1389.7	290.3	453.4	743.7	53.5%	**<55%**
Punjab *	45742	3316.3	4688.6	8004.9	1358.6	2151.1	3509.7	43.8%	
Meghalaya	961	69.7	98.5	168.2	3.1	68.6	71.7	42.6%	
Delhi *	30045	2178.3	3079.6	5257.9	868.1	1209.2	2077.3	39.5%	
Assam *	7825	567.3	802.1	1369.4	206.7	284.9	491.5	35.9%	
Uttar Pradesh *	112873	8183.3	11569.5	19752.8	2496.8	4470.0	6966.8	35.3%	
Andaman and Nicobar	323	23.4	33.1	56.5	11.6	5.7	17.3	30.6%	
West Bengal	48032	3482.3	4923.3	8405.6	71.9	2128.5	2200.5	26.2%	
Puducherry	2846	206.3	291.7	498.1	4.1	122.8	126.9	25.5%	
Kerala	19056	1381.5	1953.2	3334.7	157.6	677.7	835.3	25.0%	
Odisha	22916	1661.4	2348.8	4010.2	434.8	683.9	1118.7	27.9%	
Chhattisgarh	29786	2159.5	3053.0	5212.5	340.5	720.7	1061.2	20.4%	
Daman & Diu	2574	186.6	263.8	450.5	23.2	49.5	72.7	16.1%	
Bihar	29792	2159.9	3053.6	5213.5	516.6	266.3	782.9	15.0%	

Goa *	4350	315.4	445.9	761.3	0.8	103.1	103.9	13.6%	
Haryana *	50189	3638.7	5144.4	8783.1	207.3	902.1	1109.5	12.6%	
Tripura	1300	94.3	133.3	227.6	2.4	25.3	27.7	12.2%	
Chandigarh	845	61.3	86.6	147.9	12.0	0.0	12.0	8.1%	
Lakshadweep	46	3.3	4.7	8.1	0.7	0.0	0.7	8.1%	
Manipur	646	46.9	66.2	113.1	2.7	1.5	4.2	3.7%	

Assumptions and Limitations

i. State-wise solar and wind consumption has been estimated based on the generation within the State, REC transactions and data provided by POSOCO for purchase of wind and solar energy through ISTS.

ii. The data for power supply 2019-20 and for large hydro consumption has been taken from CEA.

iii. Import/Export data for hydro for 2019-20 is not available, so the hydro rich States/UTs (Sikkim, J&K, Ladakh, Uttarakhand, Himachal Pradesh) have been excluded from the above table.

iv. Andaman & Nicobar Is. and Lakshadweep have stand-alone systems, which are not captured in the CEA data.

v. Data for solar and wind energy exported through ISTS is not available and has not been considered.

Himachal Pradesh	Hydro Rich States - Hydro Data for self consumption not available for 2019-20, these States not included in above table
Sikkim	
J&K, Ladakh	
Uttarakhand	
Punjab *	Significant proportion of import of Solar and Wind from ISTS projects, so ISTS import data shared by POSOCO has been included in consumption
Delhi *	
Assam *	
Uttar Pradesh *	
Goa *	
Haryana *	
Rajasthan **	Significant proportion of solar/wind energy is exported to other States, data for export for 2019-20 is not available, the above table overestimates the compliance for these states
Tamil Nadu **	
Gujarat **	

Annexure-VI

State and UT wise employment details of trained Suryamitras

No	State/UT	2015-16		2016-17		2017-18		2018-19		2019-20		Grand Total	
		Trained	Employed	Trained	Employed	Trained	Employed	Trained	Employed	Trained	Employed	Trained	Employed
1	Andaman & Nicobar	0	0	0	0	0	0	0	0	0	0	0	0
2	Andhra pradesh	235	205	398	256	211	142	464	18	488	41	1796	662
3	Arunachal Pradesh	30	0	0	0	0	0	0	0	0	0	30	0
4	Assam	30	14	151	33	252	66	400	349	561	446	1394	908
5	Bihar	30	2	402	206	287	166	420	1	568	0	1707	375
6	Chandigarh	0	0	0	0	58	42	90	0	90	0	238	42
7	Chhattisgarh	90	69	369	229	408	159	360	43	778	33	2005	533
8	D. & N. Haveli	0	0	0	0	0	0	0	0	0	0	0	0
9	Daman & Diu	0	0	0	0	0	0	0	0	0	0	0	0
10	Delhi	50	15	0	0	181	116	201	89	240	76	672	296
11	Goa	30	0	30	21	54	18	60	0	117	0	291	39
12	Gujarat	297	163	954	601	335	270	550	789	856	518	2992	2341
13	Haryana	52	47	121	89	374	230	390	79	480	0	1417	445
14	Himachal Pradesh	0	0	36	34	138	42	150	0	120	0	444	76
15	Jammu & Kashmir	26	2	0	0	60		158	0	306	0	550	2
16	Jharkhand	0	0	152	47	185	69	180	0	269	0	786	116
17	Karnataka	90	32	420	120	513	208	348	350	363	218	1734	928
18	Kerala	57	31	176	82	120	0	142	0	240	0	735	113
19	Lakshadweep	0	0	0	0	30	0	0	0	0	0	30	0
20	Madhya Pradesh	269	51	492	179	597	293	1164	102	1616	44	4138	669
21	Maharashtra	660	319	829	401	561	306	883	856	1275	95	4208	1977
22	Manipur	30	7	30	22	30	21	60	0	0	0	150	50
23	Meghalaya	0	0	0	0	0	0	0	0	0	0	0	0
24	Mizoram	0	0	0	0	0	0	0	0	0	0	0	0
25	Nagaland	30	0	0	0	30	0	0	0	0	0	60	0
26	Odisha	0	0	931	449	268	133	567	128	511	85	2277	795
27	Puducherry	0	0	62	19	0	0	0	0	0	0	62	19
28	Punjab	30	0	32	30	141	24	120	0	84	0	407	54
29	Rajasthan	53	37	581	391	597	373	775	50	1116	46	3122	897
30	Sikkim	0	0	0	0	0	0	0	0	0	0	0	0
31	Tamil Nadu	122	90	436	202	672	301	912	404	1132	175	3274	1172
32	Telngana	90	87	274	195	600	287	950	560	1401	267	3315	1396
33	Tripura	60	16	0	0	28	0	60	0	30	0	178	16
34	Uttar Pradesh	185	91	664	271	795	241	964	1049	1604	618	4212	2270
35	Uttrakhand	60	30	311	181	78	37	231	0	263	0	943	248
36	West Bengal	0	0	556	351	564	296	1313	759	1566	405	3999	1811
	Total	**2606**	**1308**	**8407**	**4409**	**8167**	**3840**	**11912**	**5626***	**16074**	**3067***	**47166**	**18250***

*** Note: The complete placement data of FY 2018-19 and 2019-20 is yet to be received.**

Annexure-VII

Details of IREDA's Non-Performing Assets from Small Hydro and Biomass Sector

A. Details of NPA from Small Hydro Sector

S.No	Name of the Borrower	Details of the Projects	Tariff Structure	Reason of NPA	Loan O/s (Rs. in Cr)	Remark
1	Gill power generation co. Pvt. Ltd.	1.5MW Babehalli SHP & 1.5MW Kunjar SHP, Gurdaspur Dist, Punjab	PPA with PSPCL Rs. 3.66/Unit for Babehalli for 20 years Rs. 5.16 for Kunjan SHP for 35 Years	Due to breakdown of gear boxes of both the projects i.e. Kunjur and Babehali SHP in October 2019, both the project are shutdown and IREDA has rescheduled the account in Dec 2019, but company has not paid dues till December-2019 amounting to Rs. 29.07 Lakh incuding NCEF.	18.45	COD: Babehalli - October 2006 Kunjan-July 2017 The project has faced number of issues since commissioning.
2	Taranda hydro power pvt. Ltd.	13 MW (2 X 6500 kW) Rala Small Hydro Power Project, Himachal Pradesh	PPA with Tata Power Delhi Distribution Limited (TPDDL), New Delhi with tariff of Rs. 4.25/ Unit for a period of 20 years	Delay in implementation due to extreme weather conditions & stoppage of work on the direction of DoE for dispute with downstream project	100	Project Commissioned on 02.01.2020.
3	Panchhor hydro power pvt. Ltd.	24.6 MW (3 X 8200 kW) Wanger-Homte Small Hydro Project, Himachal Pradesh	PPA with PTC India ltd. at a tariff of Rs. 4.10 for 15 years	Delay in implementation due to extreme weather conditions and bad geology during tunnel excavation. Re-alignment of tunnel needs to be carried by the Company.	177.21	The project is expected to be commissioned by September 2020.
4	SLS power corporation limited	24 MW (6 nos. x 4000 kW) Dummanudem Mini Hydel Project, Andhra Pradesh	No PPA, Power is being sold in open market.	Due to low generation and silt accumulation and no firm PPA has been signed by the company. The generation is being sold on open market. Hence, the revenue realisation is much lower than envisaged and account has been declared as NPA in 2014-15.	151.50	Project Commissioned December 2013.
5	NATL Power Ltd.	4.005 MW (3 x 1335 KW) Vemuleru Vagu Reserviour Small Hydro Project, Andhra Pradesh	Third party PPA with cluster of consumers on HT tariff of DISCOM. Tariff for FY 2019-20 was 6.9/ Unit.	Low generation due to severe drought in the state on continuous basis.	1.76	Project Commissioned on 02.08.2001.

S.No	Name of the Borrower	Details of the Projects	Tariff Structure	Reason of NPA	Loan O/s (Rs. in Cr)	Remark
6	SKJ Power	1.5 MW (2x0.75MW) at Ongole Branch canal, Prakasam District, Andhra Pradesh.	Third party PPA M/s. Vera Laboratories & M/s. Krebs Bio Chemicals @Rs.3 per unit.	Project is on right bank canal on Nagarguna Sagar which are built on Krishna River. The company has paid about 60% of total loan. After bifurcation of Andhra Pradesh and Telangana states, Andhra Pradesh Government made alternative arrangements for Krishna Delta Area by inter linking the Godavari and Krishna Rivers and water meant for Krishna Delta area is being diverted from Srisailam Reservoir to Rayalaseema district in Andhra Pradesh due to which only minimum water can be expected for generation from these small hydro projects on the above canals including proposed project.	2.01	Project Commissioned on 29.09.1999.
7	Saroj Energy Compnay Pvt. Ltd.	1.5 MW Iggalur Mini Hydel Scheme at Iggalur Barrage, Channapatna, Ramanagar, Karnataka.	Third Party PPA with Maverick holding & investment Pvt. Ltd. for a period of 10 years. Tariff is based on HT tariff.	Low generation w.r.t. envisaged in DPR due to low discharge and generated upto 50% of envisaged generation in any year since commissioning.	9.84	The project was commissioned on 21.01.2015.
8	Venika Hydro Projects Pvt. Ltd.	24.75 MW Mahan III HEP at Sarguja District, Chhattisgarh.	PPA for 35 years with CSPDCL on generic tariff of Rs. 5.96/ Unit.	Project damaged due to flood during construction and malaria outbreak in the region. Later, delay in implementation for paucity of funds with promoters.	243.88	
9	South West Hydro Power Pvt. Ltd	5 MW Gonal – II SHP at Gonal - Village, Shorapur – Taluk, Yadgir - Dist., Karnataka	PPA with GESCOM at a tariff of Rs. 3.40/unit without escalation for period of 20Years	Low generation w.r.t. envisaged in DPR due to low water availability and Pumps installed by farmers upstream of the project as state govt introduced free power policy to the farmers. Further, the project is low head and highly dependent on water availability i.e. rain fall. any change in rainfall affected generation of the project.	22.44	The project was commissioned on 04.11.2011.

S.No	Name of the Borrower	Details of the Projects	Tariff Structure	Reason of NPA	Loan O/s (Rs. in Cr)	Remark
				The project is able to operate upto 50% of its installed capacity and able to generate 25% of the envisaged generation.		
10	Venika Green Power Pvt. Ltd.	0.75 MW H. Malligeri SHP Project in Mandya Dist., Karnataka.	PA with GESCOM at a tariff of Rs. 2.80/unit without escalation for period of 20 Years.	Low generation due to low discharge. 50% of the debt paid.	1.33	The project was commissioned on 2.10.2007.
11	Andhra Pradesh Power Projects	2 MW SHP project in Andhra Pradesh	Not applicable	Project abandoned	3.36	Project abandoned
12	Sri Suryachandra Synergetics India Pvt. Ltd.	1.70 MW mini hydel projects in Andhra Pradesh	Not applicable	Project abandoned	3.98	Project abandoned
13	Sri Suryachandra Synergetics India Pvt. Ltd	1.70 MW mini hydel projects in Andhra Pradesh	Not applicable	Project abandoned	4.24	Project abandoned
14	Nido Energy Systems Pvt. Ltd.	10 MW (2 x 5000 kW) Pein SHP Phase – II, Lower Subansiri (District), Arunachal Pradesh.	PPA with the Subansiri Hydro Electric Power Company Ltd for sale of power @ Rs. 3.90/unit without any escalation for a period of 12 years.	The project abandoned due to dispute between promoters.	10.88	Under recovery
15	Silical Metallergic Ltd.	16MW (4x4MW) SHP, Ernakulam Dist., Kerala	Not applicable	Project abandoned	7.12	Project abandoned
16	Chizami Village Council	200 kW Tuphaleri Mini Hydel Power Project, Phek Dist., Nagaland	No PPA, since it was proposed to supply electricity of 2 villages as captive use.	Project shut down due to differences/ dispute between two villages with respect to sharing of water and power from the plant.	0.60	The project was commissioned 27.01.2009.

S.No	Name of the Borrower	Details of the Projects	Tariff Structure	Reason of NPA	Loan O/s (Rs. in Cr)	Remark
17	Bhadragiri Power Pvt. Ltd.	3 MW (2 Nos.x1.5 MW) Gondi SHP, Shimoga District of Karnataka.	PPA signed with MESCOM at Tariff of Rs. 2.80/ Unit for a period of 10 years.	Not commissioned	13.59	Dispute amongst the promoters.
18	Bonal Hydro Electric Company Private Limited	1MW Bonal SHP in Karnataka.	PA signed with MESCOM at Tariff of Rs. 2.91/ Unit for a period of 10 years.	As per the approval of Govt. of Karnataka, the water for the project was proposed to be directly taken from the Bonal Tank. However, during the project implementation, the local people raised concerns over the water availability for the irrigation purpose. Subsequently, Govt. of Karnataka allowed the Company to utilize only surplus water from the tank instead of directly taking from the tank. This has drastically reduced the water availability for the project and hence low generation	3.70	The project was commissioned in August 2011 after delay of 6 years due to stoppage of work by forest dept, non-availability of power evacuation facility by DISCOM and flooding 2009.

Note: Projects from S. No. 11 to 18 complete provisioning has been made in books of accounts with remaining outstanding amount of Rs 10,000/- each.

B. Details of NPA from Biomass Sector

S.No.	Name of the Borrower	State	Date of Commissioning	NPA Year	Loan O/s as on 31.03.20 in Rs. Crore	Reason for NPA
1.	Poweronics Ltd.	Karnataka	30.09.2004	2017-18	1.77	Unviable tariff and Unavailability of Working capital to run the plant.
2.	Konark Power Ltd.	Karnataka	05.05.2005	2013-14	8.84	Tariff was revised downward by State Electricity Regulatory Commission (SERC).
3.	Koganti Power Ltd.	Karnataka	26.11.2005	2013-14	15.43	Tariff was revised downward by State Electricity Regulatory Commission (SERC).
4.	Bhagyanagar Solvent Extractions (P) Ltd.	Karnataka	24.09.2003	2006-07	15.65	Tariff was revised downward by State Electricity Regulatory Commission (SERC).
5.	Rayapati power Generation Pvt. Ltd.	Chhattisgarh	04.04.2001	2013-14	20.14	Unviable tariff due to increase in biomass cost in area, Fire in Boiler etc.
6.	Saradambika Power Plant Pvt. Ltd.	Maharashtra	30.06.2008	2013-14	21.26	Lack of working capital, tariff related issues.

7.	Ind-Barath Energies Ltd.	Andhra Pradesh	10-10-2000	2018-19	1.78	The outstanding is against the interest subsidy recalled.
8.	Sree Rayalaseema Green	Andhra Pradesh	30.09.2001	2009-10	1.19	Due to unavailability of working capital.
9.	Suchand Power Gen (p) ltd.	Andhra Pradesh	28.12.2002	2011-12	4.29	Downward revision in tariff by SERC making plant operation unviable.
10.	Vamshi Industries	Andhra Pradesh	30.04.2001	2006-07	7.33	Downward revision in tariff by SERC making plant operation unviable.
11.	Sri Satyanarayana Power Pvt Ltd	Andhra Pradesh	Not commissioned	2004-05	6.91	Project was not implemented.

Note: Projects at S.No.4,8,9,10 and 11 complete provisioning has been made in books of accounts with remaining outstanding amount of Rs.10,000/- each.

Annexure - VIII

STANDING COMMITTEE ON ENERGY

MINUTES OF SIXTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2019-20) HELD ON 27th NOVEMBER, 2019, IN COMMITTEE ROOM 'C', PARLIAMENT HOUSE ANNEXE, NEW DELHI

The Committee met from 1600 hrs to 1700 hrs

LOK SABHA

Shri Rajiv Ranjan Singh alias Lalan Singh - Chairperson

2. Smt Sajda Ahmed
3. Shri Chandra Shekhar Bellana
4. Shri Thomas Chazhikadan
5. Shri Harish Dwivedi
6. Shri S. Gnanathiraviam
7. Shri Kishan Kapoor
8. Shri Ramesh Chander Kaushik
9. Shri Parbatbhai Savabhai Patel
10. Smt. Anupriya Patel

RAJYA SABHA

11. Shri B.K. Hariprasad
12. Dr. Prabhakar Kore
13. Shri S. Muthukaruppan
14. Dr. C.P. Thakur

SECRETARIAT

1. Shri N.K. Pandey - Director
2. Smt. L. Nemjalhing Haokip - Deputy Secretary

WITNESSES

MINISTRY OF NEW AND RENEWABLE ENERGY

1.	Shri Anand Kumar	Secretary
2.	Shri Praveen Kumar	Special Secretary
3.	Shri Amitesh Kumar Sinha	Joint Secretary
4.	Shri Bhanu Pratap Yadav	Joint Secretary
5.	Shri Dinesh Dayanand Jagdale	Joint Secretary
6.	Shri Jatindra Nath Swain	MD, SECI
7.	Shri Dilip Nigam	Scientist – G
8.	Dr. P.C. Maithani	Scientist – G

2. At the outset, the Hon'ble Chairperson welcomed the Members of the Committee and the representatives of the Ministry of New and Renewable Energy to the sitting and informed that the sitting had been called to discuss the Action Plan for achievement of 175 GW Renewable Energy Target. The Chairperson also apprised them about the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

3. During the discussion, a power-point presentation was made on the subject "Action Plan for achievement of 175 GW Renewable Energy Target" which, *inter-alia,* covered Position of India in the World in Renewable Energy Sector, Share of RE Capacity in Total Installed Capacity, Comparative Expansion of Conventional *v/s* Renewal, Generation from various Renewable Energy Sources during the last five years, Mission 175 GW by 2022, Sector-wise Achievements against Targets, Promotional Measures for Accelerated Deployment of Renewables, Decreasing Trend of Solar Tariff, Major Existing Schemes for Solar Sector, Development of Ultra Mega Renewable Energy Parks, Phase - II of the Grid connected Roof-top Solar Programme, Domestic Solar PV Manufacturing, Incentives for Wind Power Sector, Manufacturing Base for Wind Power, Off-Shore Wind, Wind-Solar Hybrid Projects, New Scheme for Small Hydro, Biomass Power, Waste to Energy, Green Energy Corridor, PM KUSUM Scheme, Atal Jyoti Yojana, Solar Study Lamps Scheme, etc.

4. The Committee raised following points with respect to the subject under consideration:

(i) Cost efficiency factor for the Renewable Energy Sector;
(ii) Steps taken to boost domestic solar manufacturing;
(iii) Status regarding compliance of RPOs;
(iv) Harnessing of Off-shore Wind Resources and initiatives taken in the field of Wind-Solar Hybrid;
(v) Status of Net -Metering in the Country;
(vi) Need to ensure durability and quality of Solar Lights/Solar Pumps/Solar Heaters;
(vii) Status of Green Energy Corridor;
(viii) Technological Advancements made in the field of Renewable Energy;
(ix) Measures adopted to address the issue of reluctance of Commercial Banks to provide debt/loan to Renewable Energy Sector.

The Committee then adjourned.

Annexure - IX

STANDING COMMITTEE ON ENERGY

MINUTES OF FOURTEENTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2019-20) HELD ON 18th AUGUST, 2020, IN MAIN COMMITTEE ROOM, PARLIAMENT HOUSE ANNEXE, NEW DELHI

The Committee sat from 1100 hrs to 1300 hrs

LOK SABHA

Shri Rajiv Ranjan Singh alias Lalan Singh - Chairperson

2. Shri Gurjeet Singh Aujla
3. Shri Thomas Chazhikadan
4. Dr. A. Chellakumar
5. Shri Jai Prakash
6. Shri Ramesh Chander Kaushik
7. Shri Shivkumar Chanabasappa Udasi

RAJYA SABHA

8. Shri T.K.S. Elangovan
9. Shri Javed Ali Khan
10. Shri Muzibulla Khan
11. Shri Jugalsinh Mathurji Lokhandwala
12. Shri Nabam Rebia
13. Dr. Sudhanshu Trivedi
14. Shri K.T.S. Tulsi

SECRETARIAT

1. Shri R.C. Tiwari - Joint Secretary
2. Shri Sundar Prasad Das - Director
3. Smt L. Nemjalhing Haokip - Deputy Secretary

WITNESSES
MINISTRY OF NEW AND RENEWABLE ENERGY

1.	Shri Indu Shekhar Chaturvedi	Secretary
2.	Shri Aniruddha Kumar	Additional Secretary
3.	Shri Amitesh Kumar Sinha	Joint Secretary
4.	Shri Bhanu Pratap Yadav	Joint Secretary
5.	Shri Dinesh Dayanand Jagdale	Joint Secretary
6.	Shri Jatindra Nath Swain	CMD, SECI
7.	Shri Pradip Kumar Das	CMD, IREDA

2. At the outset, the Hon'ble Chairperson welcomed the Members of the Committee and the representatives of the Ministry of New and Renewable Energy to the sitting and informed that the sitting had been called to take evidence on the subject 'Action Plan for achievement of 175 GW Renewable Energy Target'. The Chairperson also apprised them about the provision of Direction 55(1) of the Directions by the Speaker.

3. During the discussion, a presentation was made on the subject which, *inter-alia,* covered Renewable Energy Target, Renewable Energy at Glance, Status of Renewable Energy Projects, Measures to promote Renewable Energy, existing Schemes for Solar Sector, Transmission for Renewable Energy, Current support for Solar PV Manufacturing, Wind Power, Bio Energy, Steps taken so far by the Ministry to mitigate the impact of Corona Virus, etc.

4. The Committee, *inter-alia,* deliberated upon the following points with representatives of the Ministry of New and Renewable Energy:

(i) Implementation status of PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evem Utthan Mahabhiyan) Scheme;

(ii) Need to give boost to domestic manufacturing in the Solar Sector;

(iii) Implementation status of Green Energy Corridor;

(iv) Impact of lockdown imposed due to Covid-19 on Renewable Energy Sector;

(v) Need to install small Solar Plants in areas where there is shortage of available land;

(vi) Focus on research in order to reduce the size and increase the efficiency of solar panels;

(vii) Need to fix state-wise Renewable Energy Targets;

(viii) Need to ensure quality of Solar Lights/Solar Pumps/Solar Heaters;

(ix) Generation of Power from solid waste in urban areas or municipalities;

(x) Need to ensure compliance of Renewable Power Obligation;

(xi) Need to consider Border area districts at par with Special Category areas like Hilly regions and North-Eastern Region in order to provide them preferential treatment in the form of financial assistance and installation of Renewable Energy Projects;

(xii) Projected consumption and generation of Power in 2030;

(xiii) Need to ensure proper implementation of Net-Metering Mechanism;

(xiv) Funds needed for installation of remaining 87 GW of Renewable Energy by 2022;

(xv) Need to encourage installation of Solar panels on National and State Highways;

(xvi) Need to encourage other Airports to follow the example of Kochi Airport which is World's first Airport that is fully powered by Solar Energy;

(xvii) Need to spread awareness about subsidies offered by the Government in Solar Roof-top Sector and streamline the procedure of Subsidy disbursement.

5. The Members sought clarifications on various other issues relating to the subject and the representatives of the Ministry responded to some of the points raised. The Committee directed the representatives of Ministry of New and Renewable Energy to furnish written replies to those queries which could not be readily responded.

The Committee then adjourned.

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Annexure - X

STANDING COMMITTEE ON ENERGY

MINUTES OF THE EIGHTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2020-21) HELD ON 18th MARCH, 2021 IN COMMITTEE ROOM '2', PARLIAMENT HOUSE ANNEXE EXTENSION, NEW DELHI

The Committee met from 1500 hours to 1535 hours

LOK SABHA

Shri Rajiv Ranjan Singh alias Lalan Singh - Chairperson

2. Km. Shobha Karandlaje
3. Shri Ramesh Chander Kaushik
4. Shri Ashok Mahadeorao Nete
5. Shri Parbatbhai Savabhai Patel
6. Shri Dipsinh Shankarsinh Rathod
7. Shri N. Uttam Kumar Reddy
8. Shri Shivkumar Chanabasappa Udasi

RAJYA SABHA

9. Shri T.K.S. Elangovan
10. Shri Maharaja Sanajaoba Leishemba
11. Shri Jugalsinh Mathurji Lokhandwala
12. Dr. Sudhanshu Trivedi
13. Shri K.T.S. Tulsi

SECRETARIAT

1. Shri R.C. Tiwari - Joint Secretary
2. Shri R.K. Suryanarayanan - Director
3. Shri Kulmohan Singh Arora - Additional Director

2. At the outset, the Chairperson welcomed the Members and apprised them about the agenda of the sitting. The Committee then took up the following ten draft Reports for consideration and adoption:-

a) Report on Action-taken by the Government on the recommendations contained in the 28th Report (16th Lok Sabha) on 'National Solar Mission-An Appraisal';

b) Report on Action-taken by the Government on the recommendations contained in 37th Report (16th Lok Sabha) on Stressed/Non-performing Assets in Power Sector';

c) Report on Action-taken by the Government on recommendations contained in 40th Report (16th Lok Sabha) on 'Impact of RBI's Revised Framework for Resolution of Stressed Assets on NPAs in the Electricity Sector';

d) Report on Action-taken by the Government on recommendations contained in 42nd Report (16th Lok Sabha) on 'Stressed/Non-Performing Assets in Gas based Power Plants';

e) Report on Action-taken by the Government on the recommendations contained in the 43rd Report (16th Lok Sabha) on 'Hydro Power'; and

f) Report on Action-taken by the Government on the recommendations contained in the 1st Report (17th Lok Sabha) on Demands for Grants (2019-20) of the Ministry of New and Renewable Energy;

g) Report on Action-taken by the Government on the recommendations contained in the 2nd Report (17th Lok Sabha) on Demands for Grants (2019-20) of the Ministry of Power;

h) Report on Action-taken by the Government on the recommendations contained in the 3rd Report (17th Lok Sabha) on Demands for Grants (2020-21) of the Ministry of New and Renewable Energy'.

i) Report on Action-taken by the Government on the recommendations contained in the 4th Report (17th Lok Sabha) on Demands for Grants (2020-21) of the Ministry of Power.

j) Report on the subject 'Action Plan for achievement of 175 Gigawatt (GW) Renewable Energy Target'.

3. After discussing the contents of the Reports, the Committee adopted the aforementioned draft Reports without any amendment/modification. The Committee also authorized the Chairperson to finalize the above-mentioned Reports and present the same to both the Houses of Parliament in the current Budget Session.

The Committee then adjourned.

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