ANNUAL REPORT 2019-20

Ministry of New and Renewable Energy
Government of India


AGRICULTURAL SOLAR PUMP SET

Hon'ble Prime Minister Shri Narendra Modi with Dr. Angela Merkel, German Federal Chancellor along with other dignitaries during 5th round of Inter-Governmental consultations at New Delhi (31st October - 1st November, 2019)

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OVERVIEW

OVERVIEW

INTRODUCTION

1.1 As nations contend with the increasingly devastating impact of climate change, largely caused by anthropocentric developmental activities, the role of renewable energy in the energy and electricity mix becomes primary. Across the world, many of the developed and developing countries have started giving primacy to rapidly increase the percentage of renewable energy in the overall energy mix of their economies. Renewable Energy has become one of the most important factors and hope for the world to preserve the pristine environment and the planet's resources for future generations. India has been leading the world on this front showing the developing nations of the world a way forward for socio-economic growth without degradation of the environment.

1.2 India is very ambitious in its targets for promoting renewable energy. In India, renewable energy has started playing an increasingly important role in the augmentation of grid power, providing energy access, reducing the consumption of fossil fuels and helping India pursue its low carbon development path. Ahead of COP 21, India submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC, outlining the country's post-2020 climate actions. India's INDC builds on its goal of installing 175 gigawatts (GW) of renewable power capacity by 2022 by setting a new target to increase the country's share of non-fossil-based installed electric capacity to 40 percent by 2030.

1.3 The INDC also commits to reduce India's GHG emissions intensity per unit GDP by 33 to 35 percent below 2005 levels by 2030 and to create an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide through additional tree cover. Prime Minister Narendra Modi while addressing the 74th session of the United Nations General (UNGA) in New York said while from a historic and per capita emission perspective India's contribution to Global Warming is very low, India is one of the leading nations when it comes to taking steps to address this issue.

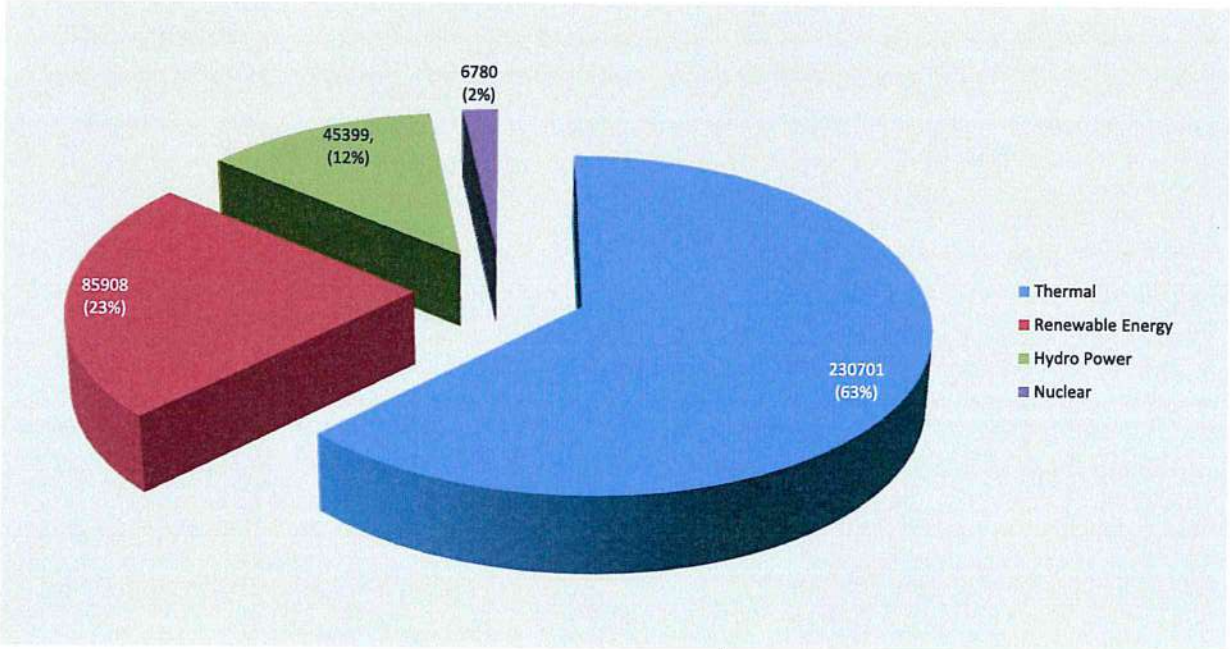
MULTIPRONGED APPROACH FOR GROWTH OF THE SECTOR

1.4 To meet its ambitious targets and commitment to the entire world in the fight against climate change, India has been rolling out multiple initiatives, programs, policies and incentives to accelerate the development of the renewable energy sector. It has driven the growth of the sector by holistically driving investments, resolving industry issues proactively, including the perspective of the stakeholders in charting the growth story, addressing policy concerns, all the while generating employment for the nations burgeoning youth population and skilling them keeping the needs of the sector in mind.

THE MISSION

1.5 Launched in January 2010, the National Solar Mission (NSM) was the first mission to be operationalized under the National Action Plan on Climate Change (NAPCC). Using a three-phase approach, the mission's objective is to establish India as a global leader in solar energy, by creating the policy conditions for solar technology diffusion across the country as quickly as possible. The initial target of the mission of installing 20 GW grid-connected solar power plants by the year 2022 was enhanced to 100 GW to be achieved by the same target year.

Figure 1.1: India - Source Wise Installed Power Generation Capacity (MW) as on 31.12.2019



1.6 In 2015, the Government of India announced a target for 175 GW cumulative renewable power installed capacity by the year 2022. A capacity of 85.90 GW has been set up by December 2019 constituting more than 23 percent of the total installed capacity. India has 4th and 5th global positions in the wind and solar power deployment respectively. Since 2013-14 till December 2019, the renewable power deployment has more than doubled. Annually more than 10 million man-days employment is being created in the sector. Solar power capacity has increased by more than 14 times in the last five years from 2630 MW to 37505 MW in December 2019.

POLICY INITIATIVES

1.7 A range of policy instruments has been adopted to implement this mission. The revised tariff policy requires all States to reach eight percent solar RPO by the year 2022. The first phase of the mission opted for a reverse bidding mechanism; reverse bids (discounts) on benchmark tariffs set by the Central Electricity Regulatory Commission (CERC) were invited from prospective project developers. Solar water heaters and rooftop systems have been promoted in certain government, commercial and residential areas through regulatory intervention such as mandates under building by-laws and its incorporation in the National Building Code. Off-grid and rooftop solar applications have been promoted through the provision of subsidies from the central government. Research and development is also being encouraged through approvals of R&D projects and the establishment of Centres of Excellence by the Ministry. These measures led to a decline in the purchase prices of solar power in India much more than expectations. Overall, NSM is proceeding well according to schedule.

1.8 Several policy measures were undertaken in the last five years including guidelines for procurement of solar and wind power through tariff-based competitive bidding process, repowering of wind power

projects, quality standards for deployment of Solar Photovoltaic systems and devices, provision of rooftop solar and 10 percent renewable energy as mandatory under Mission Statement and Guidelines for development of smart cities, amendments in building bye-laws for mandatory provision of rooftop solar for new construction or higher Floor Area Ratio, infrastructure status for solar projects, raising tax-free solar bonds, providing long tenor loans, incorporating measures in Integrated Power Development Scheme (IPDS) for encouraging distribution companies and introducing net-metering.

1.9 With an aim to enhance farmers' energy independence, income and de-dieselise the farm sector, the Government had announced a new scheme Pradhan Mantri – Kisan Urja Suraksha Evam Utthan Mahaabhiyan (PM-KUSUM).

1.10 Ministry is aware of the technological edge that India can provide in the key RE sector and has provided the necessary impetus for investments and incentivizing new technology. The availability of funds at the competitive price for further growth of the sector is another important challenge. This issue has been addressed by making fresh project finance available at competitive rates for all new projects, especially for SMEs.

EMPLOYMENT GENERATION AND SKILLING

1.11 To support the Make in India policy and to create decent employment to the youth, improving the credit flow to the SMEs, Ministry brought manufacturing linked project development with suitable incentives. As the size of the development is increasing, the associated taxes, duties need special attention. Ministry has come up with timely recommendations to the Finance Ministry to create a conducive environment for orderly growth of the RE sector.

1.12 The focus of the promotion of renewable energy policies and initiatives taken in the last four years has led to large-scale penetration of and use of such technologies across the rural countryside. Such initiatives have created employment opportunities at multiple levels. Around 12 million man-days' employment is being created per annum in the sector. More than 40,000 Suryamitras have been trained in the last five years to cater to the growing needs of the solar energy sector and its service industry.

TACKLING EMERGENT CHALLENGES AND BARRIERS PROACTIVELY

1.13 As the country is racing towards achieving the target of 175 GW of RE installed capacity, new challenges are emerging in the form of huge capital requirements, protection of foreign capital investments in RE projects from payment delays, providing adequate ISTS transmission & distribution infrastructure and developing suitable land resources. Ministry handled these issues with effective policy interventions and consultations with States. During the year, few of the major focus areas of action was to address barriers confronting large-scale adoption of renewable power, including available land, low-cost finance, domestic manufacturing capacity, and skilled manpower. Major areas of action remained to strengthen the planned infrastructure, protocols and power grid infrastructure.

1.14 To address the specific emergent issues, on 4 December 2019, Ministry of Power (MoP) was requested to amend the 13 February 2018 order: for ISTS waiver for sale of power from Government producers; to extend ISTS wavier for projects set up beyond RPO; waiver for hybrid power projects consisting of

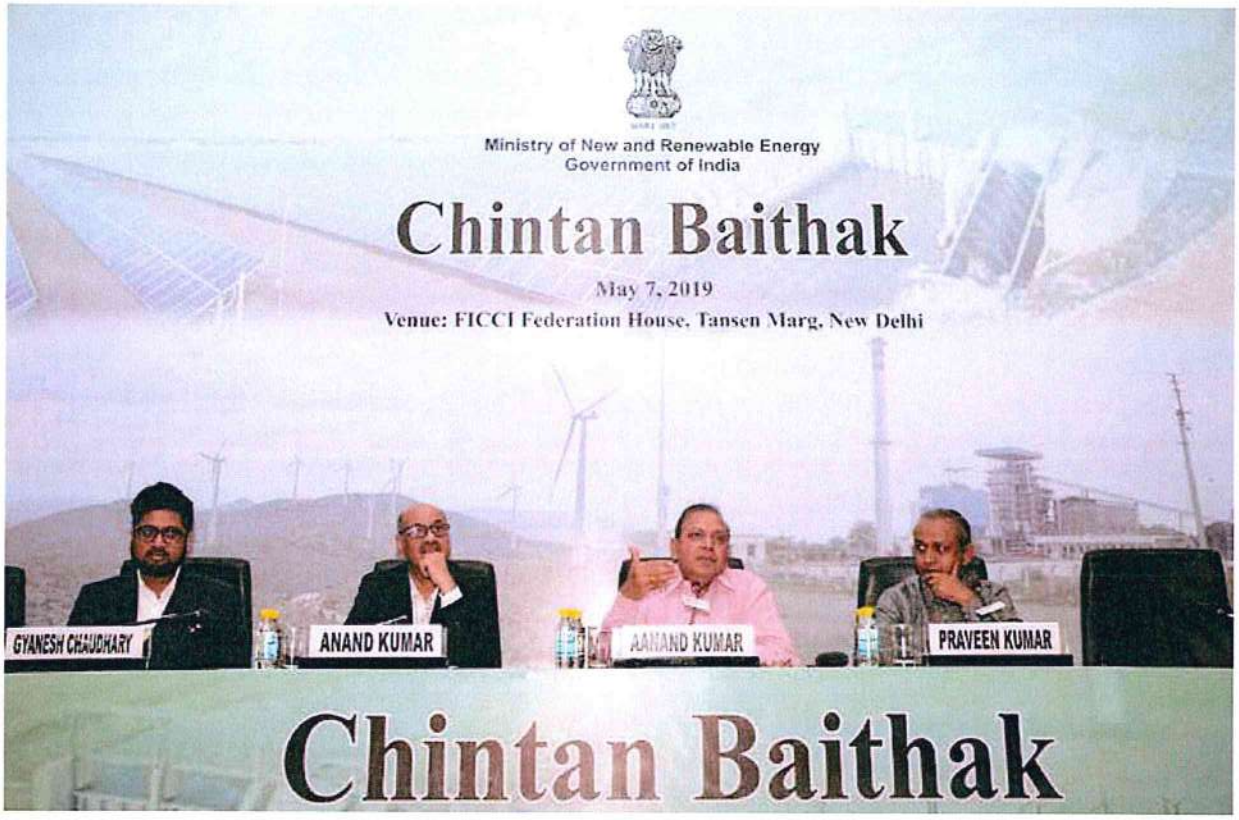
The Minister of State for Power, New & Renewable Energy (Independent Charge) and Skill Development & Entrepreneurship, Shri Raj Kumar Singh addressing the 68th meeting of Forum of Regulators, in New Delhi on June 20, 2019. The Secretary, MNRE, Shri Anand Kumar and the Chairperson CERC, Shri P.K. Pujari are also seen.

wind and solar with or without battery storage; wavier of ISTS charges and loses for projects set up under UMREPP under EPC mode; and waiver for solar projects set up under manufacturing linked solar PV projects.

1.15 The Ministry continued to make concerted efforts for ensuring Renewable Purchase Obligation (RPO) compliance. State Electricity Regulatory Commissions (SERCs) were requested for ensuring RPO compliance and enforcing penal provisions against defaulting Obligated Entities. Ministry has also requested for APTEL's intervention to direct defaulting SERCs to ensure RPO compliance through timely monitoring and invoking penal provisions for non-compliance; aligning RPO trajectory notified by the Ministry of Power (MoP) up to the year 2021-22, and not to permit carry forward or waiver of RPO. So far, Arunachal Pradesh, Delhi, Karnataka, and Sikkim have aligned with MoP trajectory and Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Odisha, and Tamil Nadu have drafted notification as per MoP trajectory.

INCLUSIVE GROWTH: SABKA SATH SABKA VIKAS – INVOLVING THE INDUSTRY AND STAKEHOLDERS IN THE GROWTH STORY OF THE SECTOR

1.16 A 'Chintan Baithak' with the stakeholders of Renewable Energy sector was held in May 2019, chaired by Secretary, MNRE, Shri Anand Kumar, saw good participation from Renewable Energy (RE) sector including the representatives of major RE developers, equipment manufacturers, financiers, regulators,



The Secretary, MNRE, Shri Anand Kumar chairing 'Chintan Baithak' with the stakeholders of Renewable Energy Sector, in New Delhi on May 07, 2019.

think-tanks, industry bodies, and skill developers. The meet deliberated upon various issues pertaining to the RE sector viz. solar, wind, bio-energy, small-hydro, regulatory issues, bidding & pricing, demand forecasting, financing of RE projects, energy storage, Make in India, Skilling India's RE workforce, etc. Various policy interventions were suggested for the sector by the stakeholders.

1.17 As a result thereof, the Ministry formed a three-member Dispute Resolution Committee to consider the unforeseen disputes between solar/wind power developers and SECI/NTPC, beyond contractual agreement. As a result of Chintan Baithak payment dues of renewable power developers form DISCOMs are reflected in PRAAPTI portal.

RESEARCH AND DEVELOPMENT

1.18 R&D is a bedrock for sustaining the growth of any sector. MNRE has been extremely focussed on giving impetus to Renewable Energy R&D through various initiatives.

1.19 Research and Development efforts in renewable energy continued to make advances in making such technologies affordable and sturdy with assured quality. With this in mind, the government has notified the National Laboratory Policy on testing, standardization, and certification, with six laboratories being recognized by the Bureau of Indian Standards. Besides, Quality Control Order titled Solar Photovoltaics,

The Minister of State for Power, New & Renewable Energy (Independent Charge) and Skill Development & Entrepreneurship, Shri Raj Kumar Singh addressing at the inauguration of the Elecrama 2020, at India Expo Mart, in Greater Noida on January 18, 2020.

Systems, Devices, and Components Goods (Requirement for Compulsory Registration) Order 2017 for Solar PV systems and components under the BIS Act. New initiatives were also taken up for Quality Control Orders on Solar Thermal Collectors and Grid Tied Inverters.

ACHIEVEMENTS OF THE MINISTRY OF NEW AND RENEWABLE ENERGY

1.20 New achievements have been made by the Ministry during the last year including:-

i. SECI has awarded 1440 MW capacity after e-reverse auction under Solar – Wind Hybrid policy;

ii. CPSU Scheme Phase II launched with VGF funding with 922 MW awarded under Tranche I and 1104 MW awarded under Tranche II;

ii. Phase II of Grid Connected Solar Rooftop Programme launched in February 2019 with the target of 40000 MW capacity by the year 2022

iv. Tender invited for setting up Solar PV manufacturing capacities linked with assured off-take of 10000 MW;

v. Revised Tariff Policy mandating Renewable Purchase Obligation (RPO) and Renewable Generation Obligation (RGO);

vi. Waiver of Inter-State Transmission charges for Solar and Wind Energy;

vii. RPO trajectory for 2022 being enforced through CERC and SERC interventions;

viii. Transparent bidding process continued – which has led to a significant reduction in per-unit cost of solar and wind power;

ix. Three solar parks Kurnool (1000 MW) in Andhra Pradesh and Bhadla-II (680 MW) in Rajasthan and Pavagada (2000 MW) in Karnataka are fully operational;

x. More than 74 lakh solar lanterns and study lamps; more than 17 lakh home lights have been distributed under the Off-Grid and Decentralised Solar Programme. Besides, more than 6.80 lakh street lights have been set up in the villages of India. More than 2.46 lakh Solar PV Pumps have been installed in the rural areas for irrigation and drinking water purposes.

xi. The Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme has been launched in March 2019 consisting of three components namely Component-A: Setting up of 10,000 MW of Decentralized Grid Connected Solar or other Renewable Energy Power Plants on barren / fallow land; Component-B: Installation of 17.50 Lakh stand-alone solar agriculture pumps; and Component-C: Solarisation of 10 Lakh Grid Connected Agriculture Pumps.

xii. The current annual manufacturing capacity of wind turbines in the country is about 10,000 MW;

xiii. To enable Discoms of the non-windy States to fulfill their non-solar Renewable Purchase Obligation (RPO), through the purchase of wind power at a tariff determined by a transparent bidding process, MNRE through SECI has auctioned wind power capacity in 8 tranches. Further, NTPC and the states of Gujarat, Maharashtra and Tamil Nadu have also auctioned wind power capacities. The Cumulative commissioned capacity until 31/12/19 stands at 37.505 GW. Capacity under implementation is 9.355 GW.

xiv. An online portal has been developed and launched in December 2019 by Ministry for issuing concessional custom duty exemption certificates (CCDC) to the manufacturers of wind operated electricity generators as per the Ministry of Finance tariff notification.

xv. India's offshore wind potential has been recognized under the National Offshore Wind Policy under which NIWE has been authorized to allocate offshore wind blocks to developers based on open international competitive bidding. To formulate the required framework for regulating the lease of offshore areas within the EEZ of India for offshore wind energy development, Ministry is framing lease rules under the 'Territorial Waters, Continental Shelf, Exclusive Economic Zone, and Other Maritime Zones Act, 1976'. The draft offshore wind energy lease rules have already been circulated to stakeholders Ministries and Departments and their comments have been received.

xvi. 12 biogas based projects have been commissioned with a power generation capacity of 212 kW and corresponding biogas generation capacity of 1805 m^3 per day. With this, the cumulative total of 316 biogas based projects with a total power generation capacity of 7.166 MW with a cumulative total biogas generation of 69,500 m^3 per day has been set up in the country, up to 31.12.2019.

xvii. Under the Green Energy Corridor project, approx. Rs.2000 crore has been disbursed to the States from the Government of India share to cover projects awarded under it.

xviii. On 22 May 2018, the Ministry of New and Renewable Energy constituted RPO Compliance Cell to coordinate with States, SERCs and CERC on matters relating to RPO Compliance. A centralized online platform has been developed to monitor RPO compliance status for all states, enabling States to feed information on RPO compliance in the portal by Obligated Entities in respective States, and collation of data at the national level.

xix. Around 60.61 lakh solar study lamps were distributed to the students under 70 lakh solar study lamp scheme in the States of Assam, Bihar, Jharkhand, Odisha and Uttar Pradesh. Under the Scheme, over 7436 nos. of women were trained as solar lighting technicians, 1769 nos. of repair and maintenance centers were established, around 1896 people were trained in entrepreneurship development and 832 nos. of solar shops have been opened.

xx. Financing scheme developed jointly with IREDA and MNRE, to provide financial support to Concentrated Solar Thermal (CST) projects by bundling the MNRE's subsidy and a soft loan from IREDA, thereby providing upfront access to 75% of CST project cost;

xxi. NIWE has created an operational forecast system with simulation tools, to predict the wind power up to 7 days ahead. To improve the forecasting model, NIWE has signed MoU with ISRO SAC for Development of Wind and Solar Power Forecasting using High-Resolution Numerical Model. Currently, NIWE has developed the indigenous Intra-day forecasting model and also carrying out various activities to improve/fine-tune the day ahead model from the inputs received during the delivery of pilot operational forecasts to RE SLDCs.

xxii. NIWE has signed MoUs with SLDC's of Tamilnadu, Gujarat, Andhra Pradesh, Karnataka, Maharashtra & SRLDC for providing wind/solar power forecasting services. The Pilot Wind/Solar power forecasting services have been initiated for Tamilnadu, Gujarat, Karnataka, Andhra Pradesh, Maharashtra and SRLDC (NP Kunta Solar Park & Chandragiri wind farm).

xxiii. Under the Suryamitra program, Suryamitra Trainings are being organized through 223 training centers/organizations in different states across the country under the coordination by the National Institute of Solar Energy since March 2018. During the current year, i.e. 2019-20, 20,700 youth are targeted to be trained as Suryamitras in 690 batches across the country. Total 40,441 no. of Suryamitras have been trained cumulatively up to 31st December 2019.

1.21. During the year 2019-20 a total of 7,591.99 MW renewable energy capacity has been added in the country till 31.12.2019 as given in **Table 1.1**.

Fig. 1.2: Sector Wise Renewable Energy Cumulative Achievements (MW as on 31.12.2019)

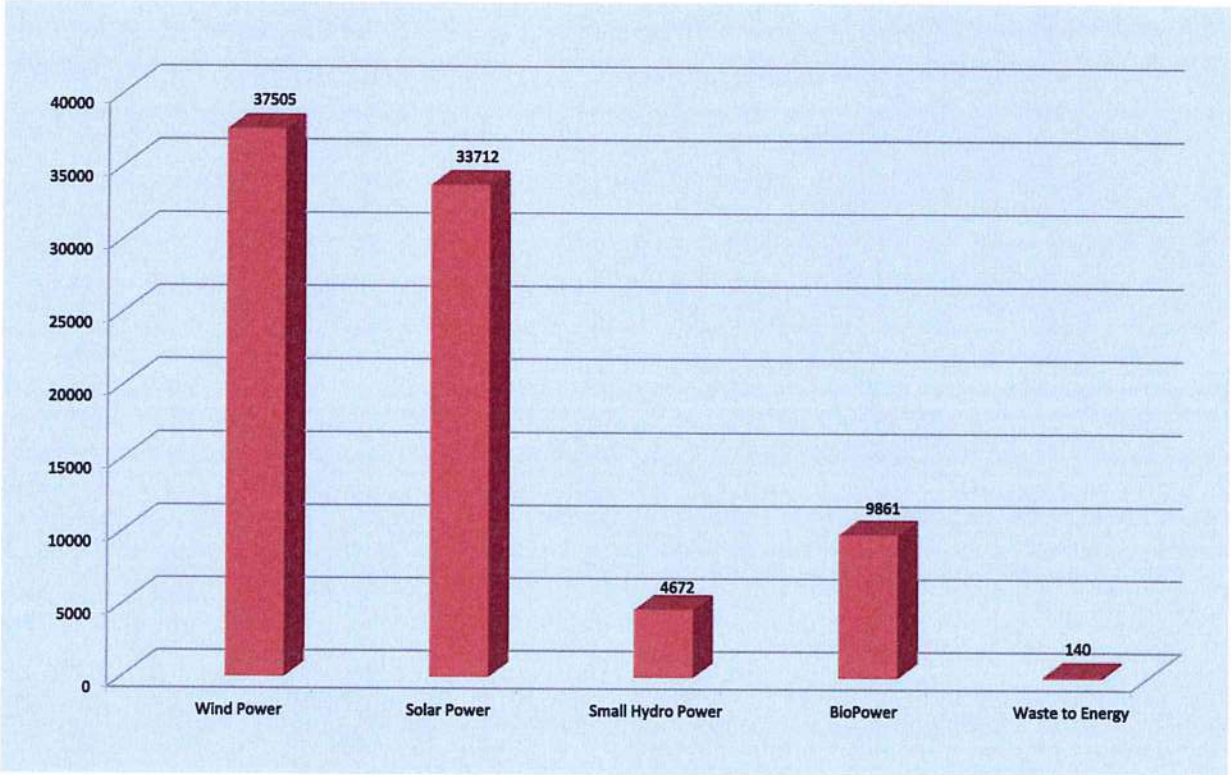


Table 1.1: Achievement in Grid Connected Renewable Power		
Sector	**Achievement (April-Dec 2019)**	**Cumulative Achievements (on 31.12.2019)**
Wind Power	1879.21	37505.18
Solar Power - Ground Mounted	5013.00	31379.30
Solar Power - Roof Top	536.88	2333.23
Small Hydro Power	78.40	4671.55
Bio Power (Biomass & Gasification and Bagasse Cogeneration)	83.00	9861.31
Waste to Power	1.50	139.80
Total	**7591.99**	**85908.37**

2

INTRODUCTION

INTRODUCTION

2.1 In 1982, a separate Department of Non-Conventional Energy Sources (DNES) was created in the Ministry of Energy to look after all the aspects relating to New and Renewable Energy. The Department was upgraded into a separate Ministry of Non-Conventional Energy Sources (MNES) in 1992 and was re-christened as Ministry of New and Renewable Energy (MNRE), in October 2006.

2.2 ALLOCATION OF BUSINESS RULES

2.2.1 Under the Allocation of Business Rules, the MNRE has been assigned the following specific items:

- Research and development of bio-gas and programmes relating to bio-gas units.
- Commission for Additional Sources of Energy (CASE).
- Solar Energy - including photovoltaic devices and their development, production and applications.
- All matters relating to small/mini/micro hydel projects of and below 25 MW capacity.
- Programmes relating to improved chulhas and research and development thereof.
- Indian Renewable Energy Development Agency.
- Research and development of other non-conventional/renewable sources of energy and programmes relating thereto.
- Tidal Energy.
- Integrated Rural Energy Programme (IREP).
- Geothermal Energy.

2.3 STRUCTURE OF THE MINISTRY

2.3.1 Shri Anand Kumar is the Secretary in Ministry of New and Renewable Energy with effect from 23rd June 2017. The Ministry has one Financial Adviser, three Joint Secretaries, one Economic Adviser, one Deputy Director General and 43 Scientists. Various programmes are being implemented by the Ministry through State Nodal Agencies (SNAs) and channel partners.

2.4 INSTITUTIONS UNDER THE MINISTRY

2.4.1 To support the Ministry, there are five institutions consisting of three autonomous bodies i.e. National Institute of Solar Energy **(NISE)**, National Institute of Wind Energy **(NIWE)** and National Institute of Bio Energy **(NIBE)** and two public sector undertakings i.e. Indian Renewable Energy Development Agency **(IREDA)** and Solar Energy Corporation of India **(SECI)**.

National Institute of Wind Energy (NIWE), Chennai, Tamil Nadu

NISE is located at Gurugram, Haryana and serves as the technical focal point for research & development in solar energy sector. NIWE is located at Chennai, Tamil Nadu and serves as the technical focal point for research & development in wind energy sector. NIBE is located at Kapurthala, Punjab and is focusing on research & development in bio-energy sector. IREDA, a Non-Banking Financial Institution under the administrative control of this Ministry, provides term-loans for renewable energy and energy efficiency projects. SECI is a Section 3 company under the Companies Act, situated in New Delhi. It functions as the implementing and executing arm of the Ministry for implementation of the National Solar Mission and Wind energy projects.

National Institute of Solar Energy(NISE), Gurugram, Haryana

National Institute of Bio Energy (NIBE), Kapurthala, Punjab

2.5 PUBLIC GRIEVANCES REDRESSAL

2.5.1 Grievances are received in the Ministry through President's Secretariat, Prime Minister's Office, Department of Administrative Reforms and Public Grievances (DARPG), other Ministries/Departments and from the individuals concerned on MNRE's Window of CPGRAMS portal of DARPG. With a view to deliver expedition redressal of grievances in a responsible and effective manner, the following measures have been put in place in the MNRE.

i. Sh. K Salil Kumar, Deputy Secretary has been designated as Liaison Officer for SC/ST/OBC for implementation of scheme of reservation for persons of Schedule Caste (SC)/ Scheduled Tribe (ST)/ Other Backward Class (OBC) categories.

ii. A committee has been constituted to enquire into the complaints of sexual harassment, if any, for the women working in this Ministry.

iii. Grievances/petitions/complaints received are forwarded by Public Grievance Cell, MNRE to the Division Head concerned for redressal/taking necessary action and final disposal, with the request to send a final reply to the petitioner, as per time schedule provided. These petitions are monitored on regular basis to keep track of their disposal by reminders etc. The position regarding final disposal of petitions is also intimated to the authority from which the grievance was received, by post or through CPGRAMS and the individuals concerned.

iv. Time Frame for Redressal of the Grievance/petition:

Sl. No.	Subject	Time Frame
1.	Issue of acknowledgement to the petitioner	03 days
2.	Forwarding of the grievances/petition to the concerned authority	07 days
3.	Issue of interim reply to the petitioner or to send communication seeking additional information from petitioner.	15 days
4.	Final disposal of petition/grievance and time limit for informing the position of the outcome.	60 days

2.6 CITIZEN'S/CLIENTS' CHARTER OF MNRE

2.6.1 In order to ensure timely delivery of services to its Clients/Citizens and redressal of their grievances in a time-bound manner the Ministry has brought out a Citizens'/Clients' Charter(CCC), incorporating its mission, main services/transactions and commitment to its clients and the people of India in general, is available on MNRE's website. It aims at providing a mechanism for redressal of clients'/citizens' grievances. It also aims at addressing problems of interface between the Ministry and its clients'/citizens' and also continuously improving the quality of public services for the people at large to make them responsive to their needs and wishes.

3

NATIONAL SOLAR MISSION

NATIONAL SOLAR MISSION

3.1 INTRODUCTION

National Solar Mission (NSM), launched on 11th January, 2010, had set a target for development and deployment of 20 GW solar power by the year 2022. The Cabinet in its meeting held on 17/6/2015 had approved revision of target under NSM from 20 GW to 100 GW.

3.2 1000 MW CAPACITY GRID-CONNECTED SOLAR POWER PROJECTS IMPLEMENTED THROUGH NTPC VIDYUT VYAPAR NIGAM LIMITED (NVVN) UNDER NATIONAL SOLAR MISSION (NSM) PHASE-I:

This scheme covered large solar power plants of total 1,000 MW capacity connected to grid at 33 kV and above - 500 MW capacity each based on Solar Thermal (ST) and Solar Photovoltaic (SPV) technologies. It included three stages: (i) Migration Scheme (ii) NSM Phase-I, Batch-I and (iii) NSM Phase-I, Batch-II.

3.3 MIGRATION SCHEME

With a view to facilitate quick start-up to NSM and also speedier implementation of the then on-going projects under advanced stage of implementation in different States, this scheme was introduced in Feb 2010 to allow the migration of such projects to NSM. A total of 16 projects of 84 MW capacity (54 MW SPV and 30 MW ST) were approved under this scheme for long-term procurement of power by NVVN at Central Electricity Regulatory Commission (CERC) notified tariff for 2010-11 viz. Rs.17.91/unit for SPV and Rs.15.31/unit for ST. Eleven SPV projects of 48 MW capacity were commissioned under this scheme.

3.4 NSM PHASE-I, BATCH-I & BATCH-II

(i) Under NSM Batch-I and Batch-II of NSM, solar power projects were allotted through a process of reverse bidding. Bids for same were invited in two batches: Batch-I of 150 MW SPV and 470 MW ST in Aug 2010 and Batch-II of 350 MW SPV in Aug 2011.

(ii) In Batch-I the eligible project capacities were 5 MW for SPV and upto 100 MW for ST. 28 SPV Projects with an aggregate capacity of 140 MW and 7 ST Projects with an aggregate capacity of 470 MW were allotted. The bid tariffs for SPV projects were in the range of Rs.10.95-12.76 per unit, with average of Rs.12.12 per unit and for ST projects in the range of Rs.10.49-12.24 per unit, with average of Rs.11.48 per unit. 28 SPV projects of aggregate 140 MW capacity and 3 ST projects of aggregate 200 MW capacity have been commissioned under NSM Phase-I, Batch-I.

(iii) In Batch-II for SPV, the project capacity fixed was 5-20 MW. 27 SPV projects with an aggregate capacity of 340 MW were allotted at tariff ranging between Rs.7.49-9.44 per unit, with average of Rs.8.77 per unit. 26 SPV projects of aggregate 330 MW capacity have been commissioned under NSM Phase-I, Batch-II.

(iv) A 5 MW SPV project by Delhi Mumbai Industrial Corridor Development Corporation Limited (DMICDC) and a 10 MW SPV project by Solar Energy Corporation of India (SECI) has also been set up under the MNRE bundling scheme of NSM Phase-I.

(v) Thus, under NSM Phase-I, 533 MW solar PV projects and 200 MW solar thermal power projects have been commissioned under the bundling scheme.

(vi) Power generated from the commissioned plants is being purchased by the NVVN and being sold to State Utilities/ Discoms under a mechanism of bundling with power from unallocated quota of power from coal

based stations of NTPC on equal capacity basis to effectively reduce the average per unit cost of bundled solar power to the purchasing Utilities. A Payment Security Mechanism involving a revolving fund of Rs.486 crore has been put in place to ensure timely payments to developers in the event of delays/ defaults in payments by the purchasing State Utilities to NVVN.

3.5 FOCUS AREA UNDER PHASE-II OF NSM

A) Grid connected Projects

(i) Unlike Phase-I, NSM Phase-II aim for achieving significantly higher scales of targets of 100 GW. Hence, Ministry has contemplated all possible options for implementation of the Mission. Selection of capacity for Phase-II, grid connected projects is being done via different schemes such as Bundling, Generation Based Incentive (GBI), Viability Gap Funding (VGF). This allocation of target capacity may be altered depending upon the availability of resources. The Government has finalized tendering trajectory in order to achieve the Mission target of 100 GW by 2022 with the details as given in **Table 3.1**

Table 3.1: Year-wise targets under National Solar Mission

Year	Tendering target (MW)
2019-20	30,000
2020-21	30,000

(ii) Solar Energy Potential and Achievements

As on 31-12-2019, a total solar power capacity installed is 33,730 MW. In addition, tenders of around 22,839 MW are in pipeline for which LoI has been issued but not commissioned and for around 28,578 MW tender issued but LoI yet to be issued. Based upon availability of land and solar radiation, the potential solar power in the country has been assessed to be around 750 GWp. State-wise details of estimated solar energy potential in the country and the cumulative installed capacity (as on 31-12-2019) are given in **Table 3.2** and **Table 3.3** respectively.

(B) CUMULATIVE CAPACITY OF SOLAR POWER INSTALLED TILL 31-12-2019

Expected Achievements till 31.03.2020: It is expected that a capacity of around 40000 MW will be installed under different solar programmes by end of Financial Year 2019-20.

Figure 3.1: Top 10 States in Solar Installation (capacity in MW as on 31-12-2019)

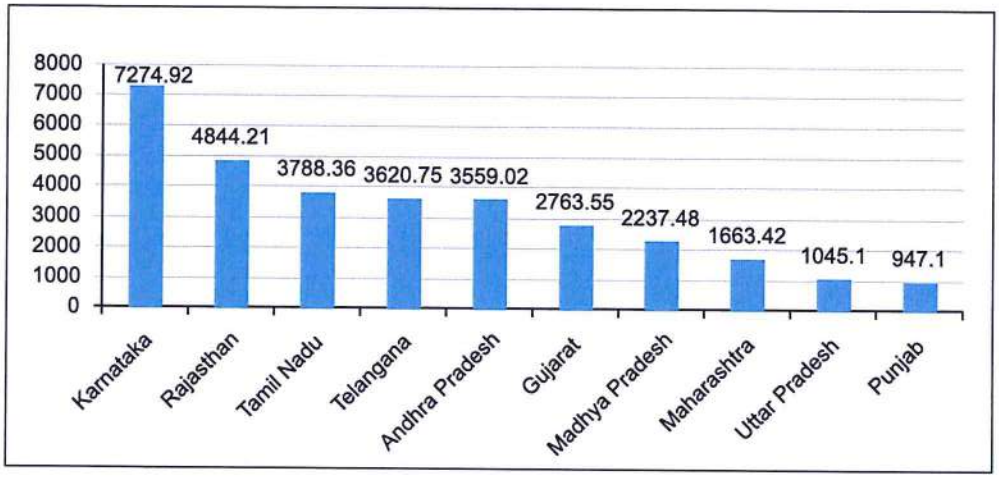


Table 3.2: State-wise estimated Solar Energy Potential in the Country		
Sr. No.	**State/UT**	**Solar Potential (GWp) #**
1	Andhra Pradesh	38.44
2	Arunachal Pradesh	8.65
3	Assam	13.76
4	Bihar	11.20
5	Chhattisgarh	18.27
6	Delhi	2.05
7	Goa	0.88
8	Gujarat	35.77
9	Haryana	4.56
10	Himachal Pradesh	33.84
11	Jammu & Kashmir	111.05
12	Jharkhand	18. 18
13	Karnataka	24.70
14	Kerala	6.11
15	Madhya Pradesh	61.66
16	Maharashtra	64.32
17	Manipur	10.63
18	Meghalaya	5.86
19	Mizoram	9.09
20	Nagaland	7.29
21	Odisha	25.78
22	Punjab	2.81
23	Rajasthan	142.31
24	Sikkim	4.94
25	Tamil Nadu	17.67
26	Telangana	20.41
27	Tripura	2.08
28	Uttar Pradesh	22.83
29	Uttarakhand	16.80
30	West Bengal	6.26
31	UTs	0.79
TOTAL		**748.98**

 # Assessed by National Institute of Solar Energy

Table 3.3: Commissioning Status of Grid Connected Solar Projects as on 31-12-2019				
Sr. No.	**State/UT**	**Cumulative Capacity till 31-03-2019 (MW)**	**Capacity added in 2019-20 till 31-12-2019 (MW)**	**Cumulative Capacity till 31-12-2019 (MW)**
1	Andaman & Nicobar	11.73	0.46	12.19
2	Andhra Pradesh	3085.68	473.34	3559.02
3	Arunachal Pradesh	5.39	0.22	5.61
4	Assam	22.40	18.83	41.23
5	Bihar	142.45	6.90	149.35
6	Chandigarh	34.71	2.28	36.99
7	Chhattisgarh	231.35	0.00	231.35
8	Dadra & Nagar Haveli	5.46	0.00	5.46
9	Daman & Diu	14.47	2.09	16.56
10	Delhi	126.89	29.23	156.12
11	Goa	3.89	0.89	4.78
12	Gujarat	2440.13	323.42	2763.55
13	Haryana	224.52	24.75	249.27
14	Himachal Pradesh	22.68	9.89	32.57
15	Jammu & Kashmir	14.83	4.47	19.30
16	Jharkhand	34.95	3.45	38.40
17	Karnataka	6095.55	1179.37	7274.92
18	Kerala	138.59	3.16	141.75
19	Lakshadweep	0.75	0.00	0.75
20	Madhya Pradesh	1840.16	397.33	2237.48
21	Maharashtra	1633.54	29.88	1663.42
22	Manipur	3.44	1.14	4.58
23	Meghalaya	0.12	0.00	0.12
24	Mizoram	0.50	1.02	1.52
25	Nagaland	1.00	0.00	1.00
26	Odisha	394.73	3.11	397.84
27	Puducherry	3.14	2.37	5.51
28	Punjab	905.62	41.48	947.10
29	Rajasthan	3226.79	1617.42	4844.21
30	Sikkim	0.01	0.06	0.07
31	Tamil Nadu	2575.22	1213.14	3788.36
32	Telangana	3592.09	28.66	3620.75
33	Tripura	5.09	4.32	9.41
34	Uttar Pradesh	960.10	85.00	1045.10
35	Uttarakhand	306.75	8.74	315.49
36	West Bengal	75.95	33.46	109.41
Total		**28180.66**	**5549.87**	**33730.53**

3.6 SCHEMES UNDER NATIONAL SOLAR MISSION

3.6.1 NTPC STATE SPECIFIC BUNDLING SCHEME

A scheme namely State Specific Bundling Scheme was introduced in the year 2015. Under the scheme, generation from solar power projects was allowed to bundle with coal based power projects in the ratio of 2:1 to bring the tariff at lower rate. Out of target capacity of 3000 MW under this scheme, 2750 MW has been commissioned in previous years and 200 MW was commissioned in current financial year at Kadapa Ultra Mega Solar Park, Andhra Pradesh. Remaining 50 MW is ready for commissioning.

3.6.2 SCHEME FOR DEVELOPMENT OF SOLAR PARKS AND ULTRA MEGA SOLAR POWER PROJECTS

(i) 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 the Solar Park Scheme was enhanced from 20,000 MW to 40,000 MW on 21-03-2017 to set up at least 50 solar parks by 2021-22.

(ii) The capacity of the solar parks is generally 500 MW and above. However, smaller parks (up to 20 MW) are also considered in 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 grants approved under the Scheme is Rs.8100 crore (Rupees Eight Thousand and One Hundred Crore).

(iii) 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). Beside this, CFA of up to Rs.20.00 lakh

Solar Panel with Robot Cleaning Technology at 2000 MW Pavagada Solar Park, District Tumkur, Karnataka

per MW (Rs.12 Lakh/MW for development of internal infrastructure of solar park and Rs.8 Lakh/MW for development of external power evacuation infrastructure of solar park) 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) as per milestones.

(iv) The target of the Solar Park Scheme is to develop at least 50 solar parks with aggregate installed capacity of 40,000 MW of solar power by 2021-22.

- **Capacity approved:** Based on the proposals received from the States, 39 solar parks of aggregate capacity 22,879 MW have been approved to 17 States up to December 2019. These solar parks are at different stage of development.
- **Land:** Over 1,31,000 lakh acres of land identified for various solar parks out of which over 82,600 acres have been acquired.
- **Commissioned capacity inside solar parks:** Solar projects of aggregate capacity 7767 MW have been commissioned inside various solar parks as given in the **Table 3.4**.

(v) Expected Achievements till 31.03.2020:- It is expected that a capacity of around 10,000 MW will be installed under the scheme by end of Financial Year 2019-20.

3.6.3 SCHEME FOR SETTING UP OVER 300 MW OF GRID-CONNECTED SOLAR PV POWER PROJECTS BY DEFENCE ESTABLISHMENTS UNDER MINISTRY OF DEFENCE AND PARA MILITARY FORCES WITH VIABILITY GAP FUNDING UNDER PHASE-II/III OF NSM.

(i) The Cabinet had approved the Scheme in its meeting held on 10th December, 2014. The Ministry issued Administrative Approval on 07th January, 2015.

Table 3.4: Solar Projects commissioned inside Solar Parks till 31.12.2019

Sl. No.	Solar Park	Capacity Approved (MW)	Capacity Commissioned (MW)
1	Ananthapuamu SP, AP	1500	887
2	Kadapa SP, AP	1000	200
3	Kurnool SP, AP	1000	1000
4	Ananthapuamu-II SP, AP	500	400
5	Kasargod SP, Kerala	200	50
6	Pavagada SP, KA	2000	2000
7	Neemuch-Mandsor SP,MP	750	250
8	Rewa Solar Park, MP	750	735
9	Bhadla-II SP, Raj	680	680
10	Bhadla-III SP, Raj	1000	900
11	Bhadla-IV SP, Raj	500	500
12	UP Solar Park, UP	440	165
	Total	**10320**	**7767**

(ii) In-principle approval of 241 MW has been given to different Defence Organisations. Out of this, 128 MW is already commissioned and balance capacities are under implementation stage. **Table 3.5** shows the present status of Defence Scheme as on 31.12.2019.

Table 3.5: Present Status of Defence Scheme (as on 31-12-2019)

Sl. No.	Ministry	Org.	Capacity Approved (MW)	Capacity Commissioned (MW)
1	Department of Defence Production (116.5 MW)	OFB, Kolkata	7	7
2		BEL	75.5	62.5
3		BDL	10	10
4		HAL, Nashik	15	15
5		OF, Kanpur	5	5
6		MIDHANI	4	4
7	Department of Defence	DOD/MES	125.45	25
		Total	**241.95**	**128.5**

Expected Achievements till 31.03.2020:- It is expected that a capacity of around 200 MW will be installed under the scheme by end of Financial Year 2019-20.

3.6.4 PILOT-CUM-DEMONSTRATION PROJECT FOR DEVELOPMENT OF GRID CONNECTED SOLAR PV POWER PLANTS ON CANAL BANKS AND CANAL TOPS.

The Scheme is closed for new sanctions. Under this Scheme, based on the allocation requests received from different States, MNRE has sanctioned net capacity of 50 MW canal-bank and 44 MW canal-top solar PV power projects to 7 different States. As on 30.11.2019, full net sanctioned capacity of 50 MW canal-bank solar PV projects and 44 MW canal-top solar PV projects have been commissioned.

3.6.5 SCHEME FOR SETTING UP OF 1000 MW OF GRID CONNECTED SOLAR PV POWER PROJECTS BY CPSUS AND GOVT. ORGANIZATIONS UNDER VARIOUS CENTRAL/ STATE SCHEMES/SELF USE/3RD PARTY SALE/MERCHANT SALE WITH VIABILITY GAP FUNDING (VGF) UNDER PHASE-II OF JNNSM.

(i) The Ministry launched the above scheme in January 2015 , the Scheme is closed for new sanctions. Under this Scheme, MNRE has sanctioned around 882 MW grid-connected solar PV power plant capacity to 9 CPSUs/Govt. Organizations. As of 31.12.2019, all the sanctioned 882 MW capacity solar PV projects have been commissioned.

(iii) As on 31.12.2019, VGF of around Rs. 795 crores (including SECI's charges) has already been released to SECI for onward disbursal to CPSUs/Govt. Organisations who have set up solar PV power projects under the Scheme.

3.6.6 CPSU SCHEME PHASE-II FOR SETTING UP 12,000 MW GRID-CONNECTED SOLAR PHOTOVOLTAIC (PV) POWER PROJECTS BY CPSUS/ STATE PSUS/ GOVERNMENT ORGANISATIONS, WITH VIABILITY GAP FUNDING (VGF) SUPPORT FOR SELF-USE OR USE BY GOVERNMENT/ GOVERNMENT ENTITIES, EITHER DIRECTLY OR THROUGH DISTRIBUTION COMPANIES (DISCOMS)

(i) Government of India, through Ministry of New & Renewable Energy (MNRE), on 05.04.2019, has approved Implementation of CPSU Scheme Phase-II for setting up 12,000 MW grid-connected Solar Photovoltaic (PV) Power Projects by CPSUs/ State PSUs/ Government Organisations, with Viability Gap Funding (VGF) support over 4 years 2019-20 to 2022-23 for self-use or use by Government/ Government entities, either directly or through Distribution Companies (DISCOMS).

(ii) The VGF fund requirement over the four years 2019-20 to 2022-23 will be Rs.8580 crore, subject to a maximum of Rs.0.7 crore/MW, to be decided through bidding amongst Government organizations. The VGF content will be reviewed by MNRE, for downward revision if required. The savings thereby achieved is to be used for additional capacity.

(iii) **Usage Charge:** To be mutually agreed between Government organizations producing and consuming, subject to limit of Rs.3.50/unit.

(iv) **Domestic Content Requirement (DCR):** both Solar cells & modules to be domestically manufactured and MNRE can prescribe DCR for upstream components also such as domestically manufactured wafers/ ingots/ polysilicon or for higher efficiency cells.

(v) **Total Investment envisaged:** Cost of the project: Rs.48,000 crore for 12,000 MW capacity, @ Rs.4 crore/MW.

(vi) **Implementation Agency:** Solar Energy Corporation of India Limited (SECI).

(vii) **Role of SECI:** SECI will handle the Scheme, on behalf of MNRE, by way of Bidding on VGF among prospective Government Producers; Scrutiny of project proposals for WTO compliance; Project progress monitoring including site inspection; Ensuring compliance of Domestic Content Requirement (DCR) by way of site inspection/ field visits; and handling of funds under the Scheme. For these activities, SECI will be given a fee of 1% of VGF disbursed.

(viii) The Scheme empowers MNRE to

- increase the scope of DCR to include wafers, ingots & polysilicon or higher efficiency cells/ modules;
- empowers MNRE to reduce VGF if cost difference comes down
- to make amendments or relaxation in provisions of the Scheme with no increase in fund requirement and VGF limit.

3.6.7 STATUS OF IMPLEMENTATION

(i) As of 31.12.2019 SECI has issued two tenders under the Scheme, the status / details of which are as under:

Tranche-I:

(ii) Against the 2000 MW capacity offered, the final capacity awarded was 922 MW as given in **Table 3.6**.

Tranche-II: Tender issued for 1500 MW solar PV projects

(iii) Against the 1500 MW capacity offered, the final capacity awarded was 1104 MW as given in **Table 3.7**.

Table 3.6 Capacity awarded under Tranche I of CPSU Scheme Phase II					
Sl. No.	**Bidder's Name**	**VGF per MW, quoted by the bidder/ Govt. Producer (INR)**	**Allotted Capacity (MW)**	**Total VGF eligible for the project (INR)**	**VGF amount released till 31.12.2019**
1	NHDC Ltd.	55,00,000	25	13,75,00,000	6,87,50,000
2	The Singareni Collieries Company Limited	60,00,000	90	54,00,00,000	27,00,00,000
3	Assam Power Distribution Company Limited	68,00,000	30	20,40,00,000	10,20,00,000
4	Delhi Metro Rail Corporation Limited	69,75,000	3	2,09,25,000	1,04,62,500
5	Nalanda University	69,95,555	5	3,49,77,775	1,74,88,888
6	NTPC Limited	70,00,000	769	538,30,00,000	269,15,00,000
	Total		**922**	**632,04,02,775**	**316,02,01,388**

Table 3.7 Capacity awarded under Tranche II of CPSU Scheme Phase II					
Sl. No.	**Bidder's Name**	**VGF per MW, quoted by the bidder/ Govt. Producer (INR)**	**Allotted Capacity (MW)**	**Total VGF eligible for the project (INR)**	**VGF amount released till 31.12.2019**
1	The Singareni Collieries Company Limited	68,00,000	81	55,08,00,000	0
2	Indore Municipal Corporation	68,80,000	100	68,80,00,000	0
3	NTPC Limited	70,00,000	923	646,10,00,000	0
	Total		**1104**	**769,98,00,000**	**0**

3.6.8 VIABILITY GAP FUNDING (VGF) SCHEME

(i) Under VGF Schemes, 750 MW, 2000 MW and 5000 MW of Grid connected Solar Power Projects have been taken up. Solar Energy Corporation of India Limited (SECI) has been designated as an implementing agency for these schemes. A fund of Rs. 500 crore for creating Payment Security Mechanism (PSM) at SECI for 750 MW, 2000 MW and 5000 MW VGF Schemes has been provided. Details of each of three VGF scheme are given below:

3.6.9 750 MW VGF SCHEME UNDER NSM PHASE-II, BATCH-I

(i) The scheme provides for the setting up of large scale ground-mounted solar PV projects on pan-India basis for 750 MW capacity. After a transparent selection and award process, projects of capacity 680 MW could successfully achieve financial closure and were commissioned. All these projects are under commercial operation.

- Total VGF Disbursement by SECI to SPDs, for the period from 01.01.2019 to 31.12.2019 is Rs. 131.88 Cr.
- No further capacity likely to be added under the scheme.

3.6.10 2000 MW VGF SCHEME OF NSM PHASE II, BATCH III

(i) Scheme for Setting up of over 2000 MW Grid connected solar PV Projects with VGF under NSM Phase-II, Batch-III.

- Guidelines issued on dated 04th August 2015. Power purchased by SECI @ Rs.4.43/kWh (PPA) and sold to buying utilities @ Rs.4.50/kWh (PSA).
- Bidding has been carried out amounting to Rs.1515 crore out of the total approved scheme allocation of Rs.2100 crore.
- 2 categories: DCR (250 MW) & Open (1750 MW). Minimum Project Size 10 MW.
- State-specific tenders based on the demand from State. Projects could be set up either in the Solar Parks and or outside the solar park.
- VGF up-to Rs.1.31 crore per MW (DCR) and Rs.1 crore per MW (Open).
- Average bid for VGF under the open category was Rs.63.27 lakh/MW and DCR category was Rs.1.11 crore/MW.
- Total capacity awarded 2155 MW (as on 31.12.2019).
- Total 2295 MW Capacity reported as commissioned in the states of **Andhra Pradesh, Chhattisgarh, Karnataka, Maharashtra**, and **Uttar Pradesh** at both solar park and non-solar park locations (as on 31.12.2019).
- Total VGF Disbursement by SECI to SPDs, for the period from 01.01.2019 to 31.12.2019 is Rs. 356.62 Cr.

3.6.11 5000 MW VGF SCHEME BATCH IV PHASE II

(i) Scheme for Setting up of over 5000 MW Grid Connected Solar PV Projects with VGF under NSM Phase–II, batch-IV

- The Scheme was launched in 2015-16, to be implemented in 4 years (at least 1250 MW in each year).
- Initial provision was that power will be purchased by SECI @ Rs.4.43/kWh and sold @ Rs.4.50/ kWh. Now onwards the bidding under the scheme will be carried out at discounted tariff below from bench mark tariff Rs.4.43/kWh with zero VGF option.
- Project Size is Minimum 10 MW upto 50 MW (in multiples of 10 MW).
- VGF support of Rs.1.25 crore per MW (DCR) & Rs.1.00 crore per MW (Open)
- Projects could be set up either in the Solar Parks or out-side locations. The tenders will be state-specific based on the demand from particular state. Inter-state solar power transmission is permissible under the scheme.
- Total capacity awarded 3420 MW (as on 31.12.2019).
- Total 2470 MW Capacity has been commissioned in the State of Gujarat, Odisha, Maharashtra, Rajasthan, U.P, Andhra Pradesh (Kadapa Solar Park), and Karnataka (Pavagada Solar Park) (as on 31.12.2019).
- Total VGF Disbursement by SECI to SPDs, for the period from 01.01.2019 to 31.12.2019 is Rs. 155.48 Cr.

3.6.12 GENERATION BASED INCENTIVES PROGRAMME FOR SMALL SOLAR POWER GENERATION

3.6.13 DEMO SOLAR GBI

MNRE had announced the Demonstration Programme on Grid Interactive Solar PV Power Generation (Demo Solar GBI) in the FY 2008-09 before the starting of JNNSM.

Salient features are as under:

a) Scheme was formulated for 25 MW for Demonstration of MW capacity of solar PV plants in the country. Projects of capacity from 1 MW to 5 MW were commissioned.

b) MNRE provides Generation Based Incentive (GBI) to these projects. The GBI is being released directly to the project developer through IREDA.

c) Seven projects were commissioned from FY 2009-10 to 2011-12.

d) Against the target capacity of 25 MW, a total of 19 MW from seven project developers could be commissioned in six states (Andhra Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, and, West Bengal) with a capacity ranging from 1 MW to 5 MW each.

e) Ministry releases GBI to Developers through IREDA maximum upto Rs.12/kWh for maximum period of 10 years.

f) Tentative Annual budget requirement by MNRE under Demo Solar GBI scheme is approx. Rs.33.00 crores (including IREDA service charges @ 1% or maximum limit of Rs. 5.0 lacs/annum/project).

3.6.14 ROOFTOP PV AND SMALL SOLAR POWER GENERATION PROGRAMME (RPSSGP)

a) After successful demonstration of MW projects in Demo Scheme, Ministry launched a Generation Based Incentives (GBI) programme on 16th June 2010 to give a thrust to rooftop PV and other small solar power plants connected to grid under Phase I JNNSM. Implementing Agency is IREDA.

b) 100 MW Solar capacity was allocated and 91.8 MW from 72 projects in 13 States were commissioned. GBI is applicable for 25 years from the commissioning date and payable to the distribution utility.

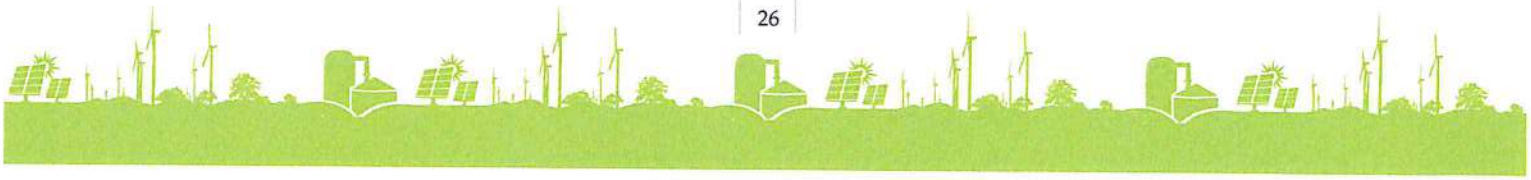
c) Ministry provides fixed GBI from Rs.8.69 to 12.24 /kWh to the State utilities at a rate equal to the difference of the CERC tariff for 2010-11 (Rs.17.91 per kWh) and a base rate of Rs.5.50 per kWh. However, base rate for the projects commissioned during each subsequent year shall also be modified at escalation factor of 3% p.a. and such escalated base rate shall remain constant over duration of 25 years.

d) Annual budget requirement by Ministry under RPSSGP scheme is approx. Rs. 180.00 crore for 91.8 MW (inclusive of IREDA's Service Charges @ 2%).

e) IREDA has disbursed GBI of Rs. 125.93 Crore to State utilities (from 01.01.2019 to 31.12.2019), under the scheme based on the claims received from respective State utilities.

3.6.15 GRID CONNECTED ROOFTOP SOLAR PROGRAMME: PHASE-II

(i) Phase II of the Grid connected rooftop solar programme was approved for with a target for achieving a cumulative capacity of **40,000 MW** from Rooftop Solar (RTS) Projects by the year **2022 in**



February 2019. The programme will be implemented with the total central financial support of Rs 11,814 crore through DISCOMs.

(ii) 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/RWA), CFA will be limited to **20%** for RTS plants for supply of power to common facilities. However, the capacity eligible for CFA for GHS/RWA 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 categories i.e. institutional, educational, social, government, commercial, industrial, etc.

(iii) Rooftop Phase-II Programme is being implemented through DISCOMs.

(iv) Performance based incentives will be 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.

(v) Model operating procedure along with suggested timelines developed for implementation of rooftop solar projects.

(vi) Aggregate capacity of **410.96 MW** in residential sector has been allocated for **49** DISCOMS/Electricity Departments as on **31/12/2019**.

(vii) An amount of Rs.6.67 crore has also been released under this phase-II of the rooftop solar programme as on 31/12/2019.

3.6.16 GRID-CONNECTED ROOFTOP AND SMALL SOLAR POWER PLANTS PROGRAMME: PHASE-I

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

(ii) About 2098 MW solar rooftop systems have been sanctioned/approved under the scheme. Aggregate 1889.30 MW have been reported as installed in the country as shown in **Table 3.8**. Projected capacity to be commissioned - 3000 MW by 31st March 2020.

(iii) Model Power Purchase Agreement (PPA), Memorandum of Understanding and CAPEX Agreement for government sector projects have been developed which were duly vetted by Department of Expenditure, Ministry of Finance and Department of Legal Affairs, Ministry of Law & Justice.

(iv) Solar Rooftop Calculator has also been developed for financial calculations of grid connected solar rooftop projects on PAN India basis. SPIN (http://solarrooftop.gov.in) is an e-governance initiative of the Ministry. It is an online system designed to monitor almost all activities involved in Solar Rooftop programme. Online portal of 24 States has been developed by various state agencies out of which 10 nos. of portals have been integrated with spin portal.

(v) The State Rooftop Solar Attractiveness Index (SARAL) has been developed. It is an index to assess and evaluate various States for their preparedness to support rooftop solar deployment. It also ranks States based on parameters that are critical for establishing strong solar rooftop markets.

(vi) MNRE developed a panel of expert PSUs to facilitate Ministries/State Governments in bidding process. Ministry/ State Government may also choose to implement RTS projects through their own PSUs/ other notified designated agencies in the scheme such as State Nodal Agencies, DISCOM, Government departments and their own PSUs. These PSUs are expected to survey potential, submit brief feasibility report, collate RTS projects of various Departments, undertake bidding in model chosen by Department and facilitate signing of agreement between selected developer and the Department. The 3% service/ Project Management Consultancy (PMC) charges for such PSUs/designated agencies are being provided by MNRE. Rs.1832.94 crore has been released as Central Financial Assistance to different implementing agencies for installation of grid connected rooftop projects of which Rs.254.95 crore has been released in FY 2019-20 up to 31/12/2019.

3.6.17 INITIATIVES FOR LOANS AND INTERNATIONAL FUNDING

i. Reserve Bank of India has included renewable energy projects under priority sector lending for which bank loans up to a limit of Rs.15 crore to borrowers will be available for renewable energy projects including grid connected solar rooftop systems. For individual households, the loan limit is Rs. 10 lakh per borrower.

30 kWp Rooftop Solar PV Power Plant at Nagar Nigam, Ajmer, Rajasthan

Table 3.8: State-wise Solar Rooftop Systems Capacity Commissioned as on 31.12.2019				
S.No.	State /UTs	Subsidized (MW)	Non Subsidized (MW)	Total (MW)
1	ANDAMAN and NICOBAR ISLANDS	4.59	0.00	4.59
2	ANDHRA PRADESH	71.02	17.01	88.03
3	ARUNACHAL PRADESH	0.22	4.12	4.34
4	ASSAM	16.17	14.39	30.56
5	BIHAR	5.59	1.36	6.94
6	CHANDIGARH	24.76	5.22	29.98
7	CHHATTISGARH	8.84	1.55	10.39
8	DADRA and NAGAR HAVELI	0.00	0.48	0.48
9	DAMAN and DIU	0.00	0.39	0.39
10	GOA	3.23	0.61	3.83
11	GUJARAT	220.83	80.88	301.71
12	HARYANA	57.76	60.70	118.47
13	HIMACHAL PRADESH	13.24	2.22	15.46
14	JAMMU and KASHMIR	10.22	0.59	10.81
15	JHARKHAND	11.95	1.62	13.57
16	KARNATAKA	23.70	108.12	131.83
17	KERALA	23.46	18.29	41.75
18	LAKSHADWEEP	0.00	0.00	0.00
19	MADHYA PRADESH	35.95	13.45	49.40
20	MAHARASHTRA	95.69	120.42	216.11
21	MANIPUR	3.09	1.46	4.55
22	MEGHALAYA	0.04	0.08	0.12
23	MIZORAM	1.32	0.10	1.43
24	NAGALAND	0.08	0.00	0.08
25	NCT OF DELHI	95.33	14.47	109.80
26	ORISSA	12.48	1.79	14.27
27	PUDUCHERRY	0.92	1.00	1.92
28	PUNJAB	28.89	38.95	67.85
29	RAJASTHAN	59.54	59.96	119.50
30	SIKKIM	0.06	0.01	0.07
31	TAMIL NADU	60.53	95.25	155.78
32	TELANGANA	48.83	23.81	72.64
33	TRIPURA	2.94	0.02	2.96
34	UTTAR PRADESH	89.69	51.18	140.87
35	UTTARAKHAND	30.48	45.23	75.71
36	WEST BENGAL	29.21	13.91	43.12
Total		**1090.67**	**798.64**	**1889.30**

494 kWp Rooftop Solar PV Power Plant at University of Lucknow, Uttar Pradesh

ii. Department of Financial Services has advised all Public Sector Banks to provide loans for grid connected rooftop solar systems as home loan/ home improvement loans.

iii. Concessional loans of around US $ 1125 million from World Bank (WB) and Asian Development Bank (ADB) have been made available to State Bank of India (SBI) and Punjab National Bank (PNB) for solar rooftop projects.

iv. Multilateral grant of USD 5 million by ADB, USD 1.8 million from USAID, € 15 million from GIZ, € 2 million from EU and USD 28.8 million from World Bank has been approved for solar rooftop programme.

v. Indian Renewable Energy Development Agency has formulated a scheme of low-cost financing with an interest rate of 9.9% to 10.75 % per annum.

vi. The Central Electricity Authority (CEA) has also notified the Installation and Operation of Meters guidelines vide its amendment regulation on 3rd December 2014.

vii. Demand aggregation exercise for government buildings of various States has been initiated for installation of rooftop solar projects under technical assistance programme.

3.6.18 OFF GRID AND DECENTRALISED SOLAR PV APPLICATIONS PROGRAMME

(i) Under Off-Grid and Decentralized Solar PV Applications Programme, Ministry has been providing Central Financial Assistance (CFA) for deployment of Solar Street lights, Solar Study Lamps, Standalone Solar Pumps, Solar Power Packs and other off-grid solar applications to meet out the electricity, water pumping

5 HP solar pump installed in Sambhar, Jaipur District, Rajasthan

and lighting needs of the local communities/institutions/individuals in the rural areas. Programme is being implemented mainly through State Nodal Agencies (SNAs).

(ii) Over 2.46 lakh solar pumps have been installed under the programme till 31.12.2019.

(iii) A total of 212 MW capacity solar PV off-grid power packs / power plants have been installed till 31.12.2019.

(iv) Some major Off Grid Solar PV projects under implementation during 2019-20 are as follows:

- Around 61.60 lakh solar study lamps have been distributed to school going children, in the states of Assam, Bihar, Jharkhand and Uttar Pradesh, where household electrification was less than 50%.
- Out of 96,376 pumps sanctioned during 2017-18, state-wise details of the pumps installed are shown in **Table 3.9**.
- Under Atal Jyoti Yojana: Phase-I, cumulatively 1.34 lakh Solar Street Lights have been installed till 31.12.2019.
- Under Atal Jyoti Yojana: Phase-II, cumulatively 16,389 Solar Street Lights have been installed till 31.12.2019.

(v) Cumulative numbers/capacity of the off-grid solar applications installed in various States as on 31.12.2019 is as given in **Table 3.10**.

(vi) Capacity installed in various States during 2019-20 (as on 31.12.2019) is as given in **Table 3.11.**

Table 3.9: State-Wise Details of Solar PV Pumps		
S.No.	**State**	**Pumps Installed (Nos.)**
1	Andhra Pradesh	15000
2	Bihar	931
3	Chhattisgarh	15000
4	Gujarat	3537
5	Jharkhand	1180
6	Karnataka	1077
7	Madhya Pradesh	14000
8	Maharashtra	6022
9	Orissa	754
10	Punjab	2556
11	Rajasthan	7134
12	Tamilnadu	1000
13	Uttar Pradesh	9669
Total		**77860**

3.6.19 PRADHAN MANTRI KISAN URJA SURAKSHA EVAM UTTHAAN MAHABHIYAAN (PM-KUSUM) SCHEME

(i) Administrative approval of the PM-KUSUM Scheme was issued on 08.03.2019 and Implementation Guidelines for the Scheme were issued on 22.07.2019, up to the year 2022. The scheme consists of 3 components:

Solar Street Light at a village in District Nalanda, Bihar under Atal Jyoti Yojana

Table 3.10: State-wise Cumulative Capacity installed under Off-grid SPV Programme						
S.No.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)	Solar Power Plant (kW)
1	Andhra Pradesh	22972	77803	8992	34045	3815.595
2	Arunachal Pradesh	35065	18551	5008	22	963.200
3	Assam	46879	642996	9554	45	1605.000
4	Bihar	12303	1725478	34468	2813	6770.000
5	Chhattisgarh	42232	3311	2042	61970	31249.900
6	Delhi	0	4807	301	90	1269.000
7	Goa	393	1093	707	15	32.720
8	Gujarat	9253	31603	3267	11522	13576.600
9	Haryana	56727	93853	34625	1293	2321.250
10	Himachal Pradesh	22592	33909	78000	6	1905.500
11	Jammu & Kashmir	144316	51224	14156	39	8129.850
12	Jharkhand	9450	790515	12286	4670	3769.900
13	Karnataka	52638	7781	2694	7420	7754.010
14	Kerala	41912	54367	1735	818	15825.390
15	Madhya Pradesh	7920	529101	11496	17813	3654.000
16	Maharashtra	3497	239297	10420	9337	3857.700
17	Manipur	24583	9058	11205	40	1580.500
18	Meghalaya	14874	40750	5800	19	2004.000
19	Mizoram	12060	10512	5325	37	2955.600
20	Nagaland	1045	6766	6235	3	1506.000
21	Odisha	5274	99843	17111	9551	567.515
22	Punjab	8626	17495	42758	4413	2066.000
23	Rajasthan	187968	225851	7114	48175	30349.000
24	Sikkim	15059	23300	504	0	850.000
25	Tamil Nadu	296505	16818	39419	5459	12752.600
26	Telangana	0	0	1958	424	7450.000
27	Tripura	32723	64282	1199	151	867.000
28	Uttar Pradesh	235909	2284425	264179	20546	10638.310
29	Uttarakhand	91595	163386	25168	26	3145.030
30	West Bengal	145332	17662	8726	653	1730.000
31	Andaman & Nicobar	468	6296	390	5	167.000
32	Chandigarh	275	1675	898	12	730.000
33	Lakshadweep	600	5289	2465	0	2190.000
34	Puducherry	25	1637	417	21	121.000
35	Others	24047	125797	9150	609	23885.000
36	NABARD (2015 onwards)	116226	0	0	4012	0.000
Total		**1721343**	**7426531**	**679772**	**246074**	**212054.170**

Table 3.11: Capacity installed under Off-grid SPV Programme during 2019-20					
S.no.	Agencies	Solar Home Light (Nos)	Solar lamp (Nos)	Solar Street Light (Nos)	Solar Pump (Nos)
1	Assam	0	144725	7	0
2	Bihar	0	467184	4610	706
3	Gujarat	0	0	1263	0
4	Jharkhand	0	43220	1985	813
5	Karnataka	0	0	0	1077
6	Madhya Pradesh	0	0	663	0
7	Maharashtra	0	0	0	5022
8	Odisha	0	0	2544	224
9	Punjab	0	0	0	556
10	Rajasthan	0	0	262	0
11	Tamil Nadu	6129	0	0	475
12	Telangana	0	0	855	0
13	Uttar Pradesh	0	947692	5316	81
14	Uttarakhand	0	0	3049	0
Total		**6129**	**1602821**	**20554**	**8954**

Figure 3.2: Cumulative Solar Street Lights installed YoY for last 7 Years

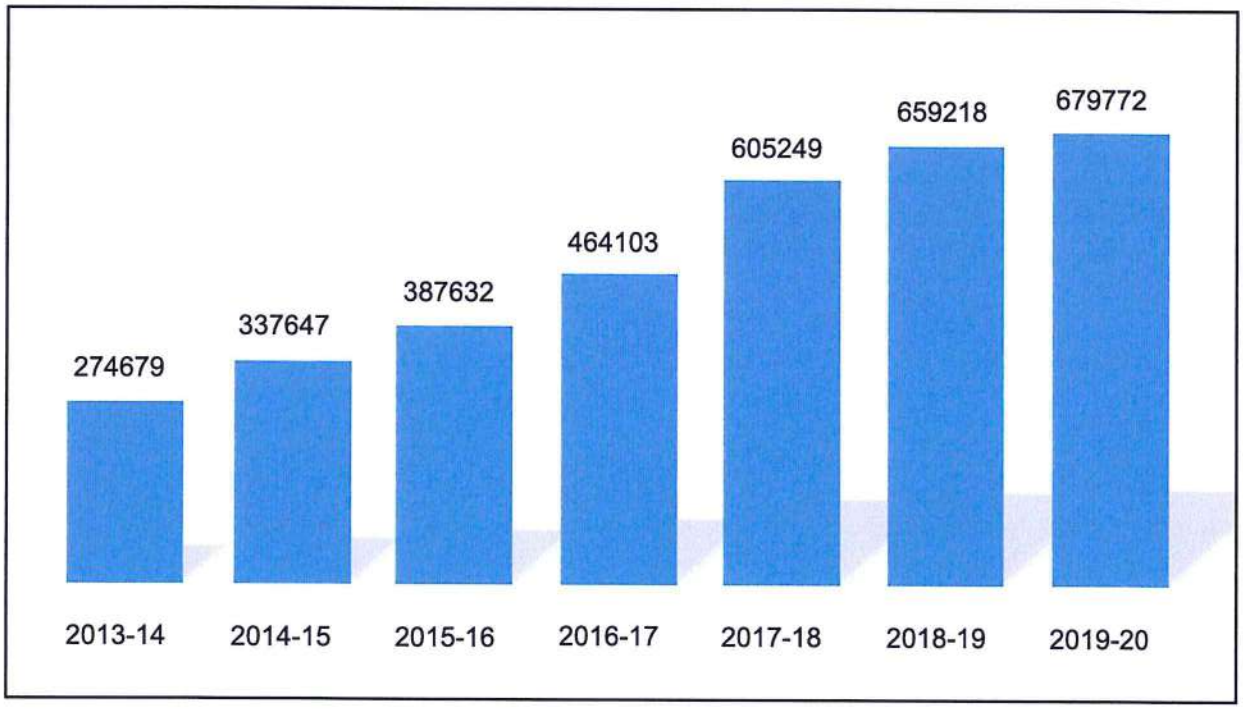


Figure 3.3: Cumulative Solar Pumps installed YoY for last 7 Years

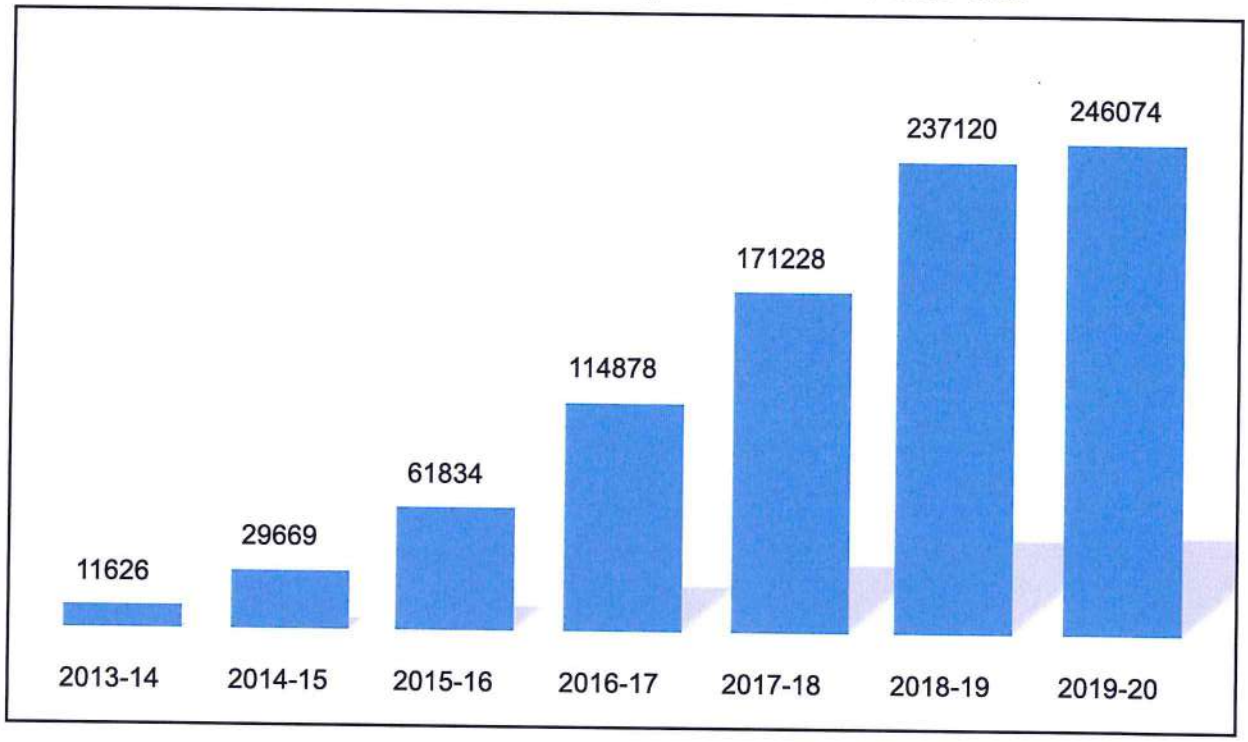
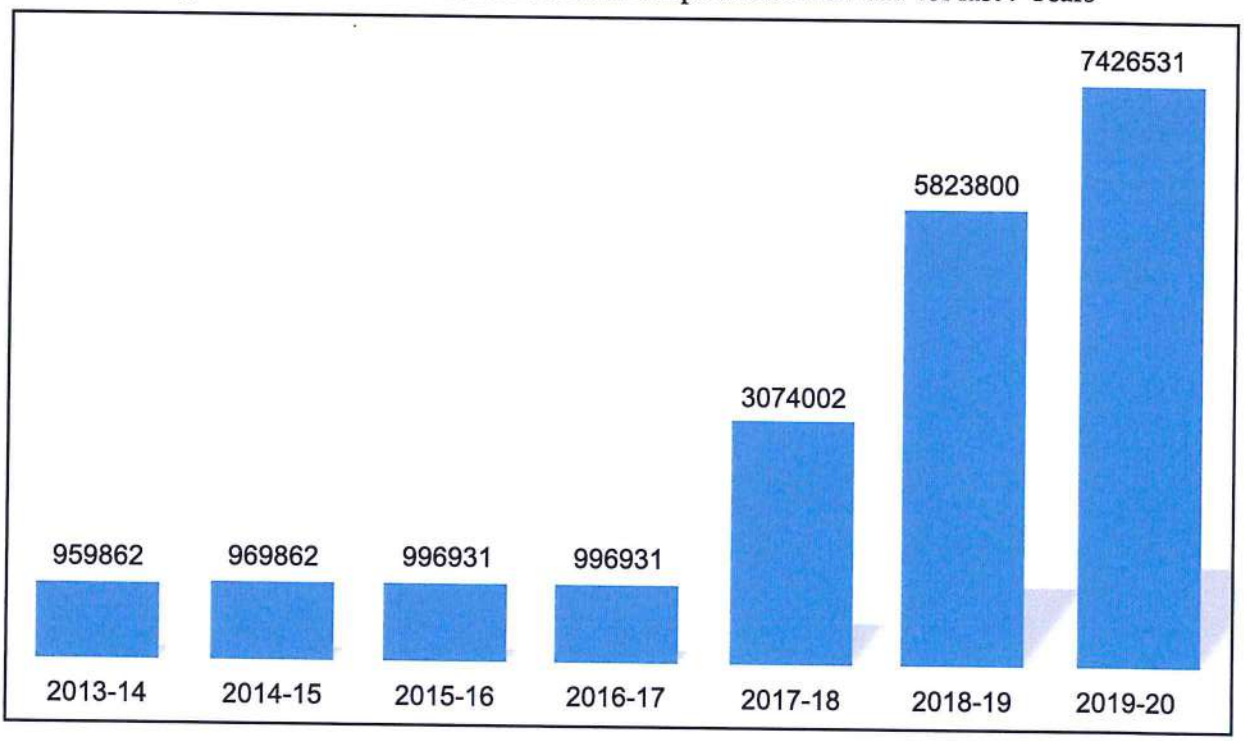


Figure 3.4: Cumulative Solar Lanterns/Lamps distributed YoY for last 7 Years



Cumulative systems installed up to 31.12.2019	
SPV Systems System	**Cumulative up to 31.03.2019**
Lanterns and Study lamps (No.)	74,26,531
Home Lights (No.)	17,21,343
Street Lights (No.)	6,79,772
Solar Pumps (No.)	2,46,074
SPV Plants (MWp)	212.05

- **Component-A:** Setting up of 10,000 MW of Decentralized Grid Connected Solar or other Renewable Energy Power Plants on barren/fallow land;
- **Component-B:** Installation of 17.50 Lakh stand-alone solar agriculture pumps; and
- **Component-C:** Solarisation of 10 Lakh Grid Connected Agriculture Pumps.

(ii) 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 to state implementing agencies. Part of central financial support i.e. Rs.10,000 Cr. will be provided through GBS and balance Rs. 24,422 Cr will be raised through EBRs by IREDA as Government Guarantee Bonds.

(iii) The Component-A and Component-C will be implemented on pilot mode for 1000 MW capacity and one lakh grid connected agriculture pumps respectively and thereafter, will be scale-up on success of pilot run. Component-B will be implemented in full-fledged manner.

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

(v) Under Component B, individual farmers will be supported to install standalone solar pumps of capacity up to 7.5 HP. Installation of solar pump of capacity higher than 7.5 HP is also allowed, however, the central support in such cases will be limited to that applicable for 7.5 HP capacity pumps.

(vi) Under Component C of the scheme, individual farmers will be supported to solarise pumps of capacity up to 7.5 HP. Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme. The farmer will be able to use the generated energy to meet the irrigation needs and the excess available energy will be sold to DISCOM. This will help to create an avenue for extra income to the farmers, and for the States to meet their RPO targets.

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

(viii) For FY 2019-20, a target of 1000 MW has been kept under Component-A, 1.75 lakh standalone solar pump under Component-B and solarisation of 1 lakh grid-connected agricultural pumps under Component-C. Based on the demand received from various States, the allocations made under the three Components of PM-KUSUM Scheme are given in **Table 3.12**.

3.6.20 OFF-GRID & DECENTRALISED SOLAR PV APPLICATIONS SCHEME: PHASE-III

(i) Phase-III of Off-grid and Decentralised Solar PV Applications Progrmme was launched in August, 2018 with target of 3,00,000 solar street lights, 25,00,000 solar study lamps and 100 MW capacity of off-grid solar power plants. Scheme is available till 31.03.2020.

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

Table 3.12 Allocations made to States under the Components of PM-KUSUM Scheme

S. No.	State	Component-A Sanctioned Capacity (MW)	Component-B Sanctioned Quantity (Nos)	Component-C Sanctioned Quantity (Nos)
1	Chhattisgarh	-	20000	-
2	Delhi	10	-	-
3	Haryana	25	15000	468
4	Himachal Pradesh	-	550	-
5	Jharkhand	10	10000	500
6	Gujarat	-	4000	-
7	Karnataka	50	6000	-
8	Kerala	10	-	5200
9	Madhya Pradesh	100	25000	15000
10	Maharashtra	300	30000	9000
11	Meghalaya	10	1700	60
12	Odisha	-	2500	-
13	Punjab	30	4500	3900
14	Gujarat	40	-	-
15	Himachal Pradesh	10	-	-
16	Rajasthan	325	25000	12500
17	Tamil Nadu	-	17500	20000
18	Tripura	5	1300	1300
19	Uttar Pradesh	75	8000	1000
Total		**1000**	**171050**	**68928**

(iii) Projects are being implemented by State Nodal Agencies. Centralised tendering has been done for procurement of solar streetlights and solar study lamps.

(iv) Sanctions issued for various States under the scheme is given in **Table 3.13**..

3.6.21 ATAL JYOTI YOJANA (AJAY): PHASE-II

(i) Under Atal Jyoti Yojana (AJAY) Phase-I Scheme for installation of Solar Street Lights (SSLs) which was available in the States of Assam, Bihar, Jharkhand, Odisha and Uttar Pradesh over 1.34 lakh solar street lights have been installed.

(ii) Considering the success of the AJAY Phase-I scheme, coverage of the scheme in Phase-II launched in December, 2018 has been expanded for implementation in North Eastern States including Sikkim and hilly States/UTs of Jammu & Kashmir, Ladakh, Himachal Pradesh and Uttarakhand and Island UTs and

Table 3.13: Sanctions issued to States under Off-grid & Decentralised Solar PV Applications Programme: Phase-III

S. No.	State/UT	Capacity/ Numbers Sanctioned		
		Solar Street Lights (Nos)	Solar Study Lamps (Nos)	Off-Grid SPV Power Plants (kWp)
1	Andhra Pradesh	12,000	2,59,754	-
2	Andaman & Nicobar	1,100	-	-
3	Arunachal Pradesh	20,000	2,00,000	-
4	Assam	20,000	2,32,342	-
5	Bihar	-	-	240
6	Himachal Pradesh	20,000	-	-
7	Jammu & Kashmir	20,000	-	-
8	Kerala	-	-	2,000
9	Manipur	20,000	75,000	25
10	Meghalaya	-	1,02,000	-
11	Mizoram	20,000	1,50,000	939
12	Nagaland	9,810	24,000	415
13	Odisha		1,00,000	9,558
14	Punjab	19,000	-	-
15	Sikkim	-	43,034	-
16	Telangana	-	2,00,000	-
17	Tripura	12,000	3,00,000	-
18	Uttarakhand	19,665	-	-
19	Uttar Pradesh	-	21122	-
Total		**1,93,575**	**17,07,252**	**13,177**

also in the aspirational districts of other States. A total of 3,04,500 Solar Street Lights (SSLs) are proposed to be installed.

(iii) Under Phase-II, 2000 numbers of SSLs will be provided in each of the Parliamentary Constituencies of NE States, Hilly States/UTs and Island UTs as mentioned above. In the five States covered under AJAY Phase-I, 1000 numbers of SSLs will be provided in each of the Parliamentary Constituencies, which will be irrespective of number of SSLs already installed in Phase-I of AJAY scheme. Further, out of total 115 aspirational districts, 67 districts are lying in the states/UTs mentioned above and hence are automatically covered. Parliamentary constituencies lying in uncovered balance 48 aspirational districts, will also be provided with up to 2000 numbers of SSLs based on the extent the Parliamentary Constituency lies in the aspirational district.

(iv) Under Phase-II, SSLs with improved LED capacity of 12 W are being provided. 75% of the cost of the system is provided through MNRE budget and the remaining 25% to be provided from MPLADS fund.

(v) Under Phase II, consent for allocation of funds from MPLADS fund has been received for 140 parliamentary constituencies for installation of 1.58 lakh SSLs, against which DM's sanction has been received for 85,532 nos. of SSLs. Out of this, 16,389 nos. of SSLs have been reported installed as on 31.12.2019.

3.6.22 SCHEME FOR DISTRIBUTION OF 70 LAKH SOLAR STUDY LAMPS

(i) A scheme to provide Solar Study Lamps to 70 lakh school-going children was available in the five states of Assam, Bihar, Jharkhand, Odisha and Uttar Pradesh, where less than 50% of the households are electrified. About 60.61 lakh solar study lamps have been distributed under the Scheme.

(ii) The scheme is jointly implemented by IIT Bombay and Energy Efficiency Services Limited (EESL) with separate responsibilities on deliverables wherein IIT Bombay is the central coordinating agency and EESL is the chief procurement agency. At the grassroots, the State Rural Livelihood Mission (SRLM) are involved in implementing the scheme.

(iii) Local women are involved in assembly & distribution, and repair & maintenance of the solar study lamps. Under the Scheme, over 7436 nos. of women were trained as solar lighting technicians, 1769 nos. of repair and maintenance centers were established, around 1896 people were trained in entrepreneurship development and 832 nos. of solar shops have been opened.

3.6.23 'OFF-GRID AND DECENTRALIZED CONCENTRATED SOLAR THERMAL (CST) TECHNOLOGIES FOR COMMUNITY COOKING, PROCESS HEAT AND SPACE HEATING & COOLING APPLICATIONS IN INDUSTRIAL, INSTITUTIONAL AND COMMERCIAL ESTABLISHMENTS' SCHEME

(i) Ministry has been implementing the 'Off-Grid and Decentralized Concentrated Solar Thermal (CST) Technologies for Community Cooking, Process Heat and Space Heating & Cooling Applications in Industrial, Institutional and Commercial Establishments' scheme for the promotion of renewable energy for thermal applications.

(ii) The benchmark cost of the different CST technologies is given in table below:

Type of Solar Collector	Benchmark Cost (Rs./m²)
Concentrator with manual tracking (dish solar cookers)	7000
Solar collector systems for direct heating and drying and non-imagine/ Compound Parabolic Concentrators (NIC/CPC)	12000
CSTs with single axis tracking (including Scheffler dish)	15000
CSTs with single axis tracking, solar grade mirror, reflector and evacuated tube collectors	18000
CST based on double axis tracking	20000

(iii) Subsidy rate:

a. @ 30% of the bench mark cost or actual cost whichever is less to all beneficiaries in all states

b. @ 60% of the bench mark cost or actual cost whichever is less to Non-profit making bodies and institutions in special category states, viz., NE states, Sikkim, J&K, Himachal Pradesh, Uttarakhand and islands.

c. The subsidy rates were revised to 20% & 40% for the Financial Year 2019-20

(iv) In 2019, Ministry has sanctioned eight projects with a cumulative collector/reflector area of about 1630 m² for various applications in different parts of the country. It is expected that projects having a cumulative collector/reflector area of about 5000 m² will be completed by 31.03.2020.

3.6.24 SUCCESS STORIES

(i) M/s. Asian Paints Ltd., Khandala, Maharashtra

A CPC based pressurized solar hot water system having a collector area of 369.6 m² was successfully installed and commissioned at M/s. Asian Paints Ltd., Khandala, Maharashtra for process heat

CPC based pressurized hot water system installed at Asian Paints Ltd., Khandala, Maharashtra

CST Installation at Youth and Sports Hostel, Una, Himachal Pradesh

application. The CPC system, installed with a total cost of Rs.77.89 lakh, delivers pressurized hot water at rate of about 6 lakh kcal/day and saving of about 70 Litres of HSD/day benefiting a saving of about Rs.5,000/ day.

(ii) Youth and Sports Hostel, Una and Bilaspur, Himachal Pradesh

HIMURJA implemented a CST based cooking project having an individual reflector area of 48 m^2 in the Youth and Sports Hostel in Una and Bilaspur districts of Himachal Pradesh. The scheffler dishes with reflector area of 16 m^2 are used and the project was completed with a total cost of Rs.18.72 lakh. The system was used to cook food for the inmates saving about 9kg/day of LPG, benefitting a savings of about Rs.750/day.

CST Installation at Natco Pharma Ltd., Telangana

CST Installation at NIF, Kanpur, U. P.

(iii) Natco Pharma, Telangana

A Parabolic Dish based CST system was installed at Natco Pharma Limited, Nagarjunsagar, Telangana for process heating application. The system with a total reflector area of 380 m^2 comprising of 4 Nos. of dual-axis tracking paraboloid dishes each of 95 m^2 concentrator area. The CST system, installed with a total cost of Rs.82.19 lakh, generates about 8 lakh kcal/day, saving 120 kg of Furnace Oil per day and benefitting a saving of about Rs.1 Lakh per Month.

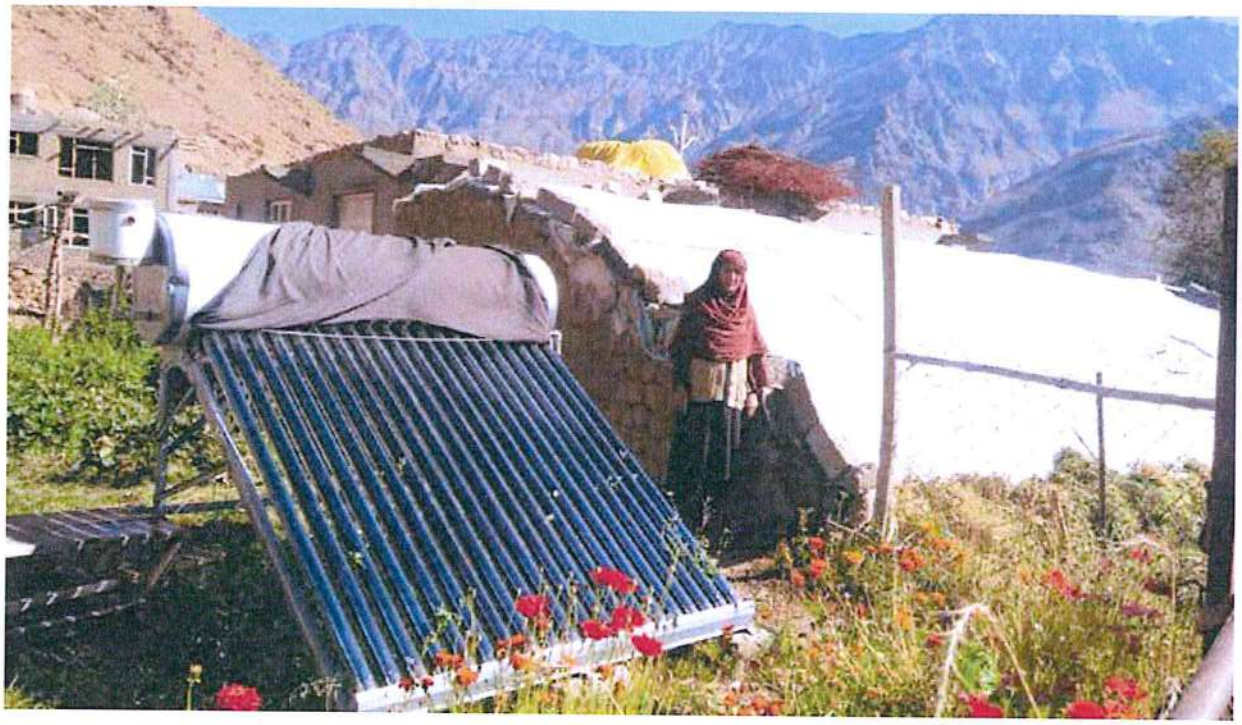
(iv) Namaste India Foods Pvt. Ltd., Kanpur, U. P.

NIF Pvt. Ltd., which is one of the largest milk processing companies in India, was using wood for steam generation for milk processing and storage equipment. Two dual-axis tracking Paraboloid dish concentrator system of 95 m^2 each were installed at two Milk Chilling centres of NIF located near Kanpur, U.P. The CST system was installed with a total cost of Rs.40.10 lakh producing thermal output of about 4.5 lakh kcal/day, saving about 150 kg of wood per day on both sites with a saving of about Rs.3500/day.

(v) Vidya Dairy, Anand, Gujarat

NDDB implemented a Concentrating Solar Thermal based pressurized hot water system at Vidya Dairy, Anand University campus, Gujarat with a total cost of Rs.72,22,438/-. The CST system having 19 Nos. of modules of Paraboloid Dish with dual axis tracking a total reflector area of 380 m^2 delivers pressurized hot water at the rate of 1.85 lakh Kcal/day. Through these 66 liters of Furnace Oil is being saved per day which equivalent to a savings of about Rs.950/day.

CST Installation at Vidya Dairy, Anand



A beneficiary with her 200 LPD SWH and CGH.

3.6.25 IMPLEMENTATION OF LADAKH RENEWABLE ENERGY INITIATIVE (LREI) IN LADAKH REGION.

(i) MNRE implemented the Ladakh Renewable Energy Initiative (LERI) in the Ladakh region with the objective of minimizing use of fossil fuels and to meet energy requirement of the region through renewable energy. Under this, Ladakh Renewable Energy Development Agency (LREDA) completed the implementation of the 500 Nos. of Commercial Green Houses (CGHs) in the Leh region with a total cost of Rs. 10.34 crores. Also Kargil Renewable Energy Development Agency (KREDA) has implemented the following projects/installations in Kargil region:

Sl. No.	Component	Units
1	Solar Water Heating Systems	10005 Sq. m.
2	Dish Cookers	600 Nos.
3	Solar Steam Cooking Systems	1 No.
4	Domestic Green House	3000 Nos.
5	Commercial Green House	375 Nos.

Different fruits & vegetables are grown inside the CGHs.

(ii) CGHs implemented under LREI have a very positive impact on the community in the far flung areas of the Ladakh region. It has also been noticed that hundreds of families have been benefited and have become self-sufficient in terms of availability of green vegetables during long winter (From November to April) thereby improving the health condition of the people. Annual income from the CGHs range between Rs. 40,000 to Rs. 50,000.

CST installation at Jawahar Navodaya Vidyalaya Campus, Khumbathang, Kargil

(iii) Under LREI, KREDA implemented the first Steam Cooking System with a cumulative reflector area of 64 m^2 (4 Dish of 16 m^2 each) at Jawahar Navodaya Vidyalaya Campus, Khumbathang. The CST installation helps the school for saving 70 kg of LPG per day. The project has been proved to be a beneficial in saving the environment and helping the school administration in saving money by minimizing the consumption of nos. of cylinders per year. The system has also become a model project of renewable energy for the students at the JNV.

3.6.26 MNRE-GEF-UNIDO PROJECT

The GEF-UNIDO project on Promoting Business Model for increasing penetration and scaling up of solar energy was designed to complement the Ministry's CST support programme by helping to remove barriers associated with Concentrating Solar Thermal (CST) technologies, its awareness, capacity building, market and financial barriers.

The project has undertaken following activities:

- The project has promoted two new CST technologies during 2018-19– (i) A single largest paraboloid dish of 576 m^2 collector area is being installed in Thane, Maharashtra for cooling and other applications in the CMC Hospital. The project has been supported by UNIDO under its MNRE-IREDA-UNIDO financing scheme; (ii) A highly efficient and low weight Compound Parabolic Concentrator (CPC) to generate steam for various applications is being considered for support by UNIDO.
- The project has in past organized 20 workshop/conference /business meets to create awareness across the 14 identified industrial sectors in cooperation with SNAs, Industrial associations and cluster associations. In addition, 18 visits to CST project sites were also organized in different parts of the country.
- UNIDO has partnered with National Institute of Solar Energy to develop and implement a CST skill development program for training for trainers and training for technician.

Launch of CST Road Map, Sun Focus Magazine and CST e-Newsletter in the National CST Workshop

- A quarterly CST e-magazine 'Sun Focus' and CST e-Newsletter were launched on 23 August 2019 during the National CST Workshop in New Delhi. The publications cover information on latest updates on solar concentrator technologies, current events, case studies - local & global and innovations.
- A project website on CST www.steia.in has been developed to provide relevant information related to CSTs and also the activities of MNRE-GEF-UNIDO Project.
- UNIDO presented the advantages of using solar energy for thermal applications in industries at Indian Pulp & Paper Technical Association (IPPTA) Workshop in Rajahmundry, Andhra Pradesh (08 & 09 November 2019) and at the LK Memorial Workshop in New Delhi (15 & 16 November 2019).

3.7 GREEN ENERGY CORRIDOR

(i) In order to facilitate integration of large scale renewable generation capacity addition, the Cabinet Committee of Economic Affairs (CCEA) in FY 2015-16, approved the creation of Intra-state Transmission System in the states of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu, rich in renewable resource potential and where large capacity renewable power projects are planned, at an estimated cost of Rs.10,141.68 crore with Government of India contribution of Rs.4056.67 crore. The activities envisaged under the project includes establishment of Grid sub-stations of different voltage levels with aggregate transformation capacity of approx. 22600 Mega Volt Ampere (MVA) and installation of approx. 9700 circuit kilometres (ckm) of transmission lines in these eight states. The creation of the Intra-State Transmission System will facilitate the evacuation of over 20 GW of power from renewable energy generation stations to load centres.

(ii) The project is anticipated to be completed by 2021 with funding mechanism consisting of 40% Central Grant, 40% KfW loan (Euro 500 million) and the remaining 20 percent as State contribution. As on 31.12.2019, a total of approx. Rs. 2000 crore has been disbursed to the States from the Government of India contribution, and works related to installation of transmission towers and their stringing for an aggregate 6258 ckm and 6812 MVA have been completed. The following works, mentioned in the States below, have been completed in 2019-20:

a) **Gujarat:** (i) 160 MVA transformer commissioned in 220 KV Moti Gop substation in Jamnagar district, (ii) 400 KV Hadala – Shapar line, (iii) 220 KV D/C Chorania – Salejada line.

b) **Karnataka:** (i) 400/220 kV S/s in Jagalur (Hiremallanahole), Davanagere district, (ii) 400 kV DC line from Rampura limits (400 kV MC line from BPS) upto Anchor point 39/0 near proposed 400/220 kV S/s at Jagalur (Hiremallanahole), (iii) 220/66 kV and 66/11kV substation at Shivanasamudra, Malavalli taluk, Mandya district, (iv) 220 kV Double DC line on MC towers tapping from existing 220 kV DC T.K.Halli-Madhuvanahally line to the sub-station at Shivanasamudra.

c) **Madhya Pradesh:** (i) 220kV Double Circuit Double Strung line from Betul 220kV S/s to Gudgaon 220kV S/s, (ii) 132kV Interconnector between Gudgaon 220kV S/s and Gudgaon 132kV S/s.

d) **Tamil Nadu:** (i) 400 kV SS at Thennampatti, (ii) 400 KV Thenampatti - Kayathar line.

e) **Maharashta:** (i) 2nd ckt. stringing of 132 kV Shevgaon - Bhenda D/C line with bays, (ii) 2nd ckt. stringing of 132 kV Manmad - Yeola SCDC line with bays, (iii) 132 kV Kavthemahankal - Savlaj SCDC line with bays.

f) **Himachal Pradesh:** (i) Providing additional 400/220 kV, 1x315 MVA transformer in the 400/220 kV substation at Gumma in Shimla district, (ii) 220 kV Snail-Hatkoti line.