

## Chapter - VII

# Solar Photovoltaic Systems

### 1. Introduction

Since 2005-06 MNRE had been providing Central Financial Assistance (CFA) to the implementing organisations<sup>1</sup> for deployment of off-grid<sup>2</sup> Solar Photovoltaic (SPV) systems such as Solar Home Lighting Systems (SHLSs), Solar Street Lighting Systems (SSLs), standalone Solar Power Plants (SPPs), Solar Lanterns (SLs), Solar Water Heating Systems (SWHSs) and Solar Water Pumps (SWPs) etc. Various off-grid SPV systems up to a maximum capacity of 100 kW per site and off-grid and decentralized solar thermal applications, were also eligible for CFA. Mini-grids for rural electrification up to a maximum capacity of 250 kW per site were also supported. The main objectives were to promote the use of SPV systems, reduce the consumption of kerosene for lighting purposes, improve the quality of life in rural areas and provide an alternate for meeting rural lighting/energy requirements. In January 2010, the Government of India (GoI) launched the Jawaharlal Nehru National Solar Mission (JNNSM) which aimed at 2,000 MW by 2022 and merged all the previous schemes into the mission.

The solar off-grid policy of MNRE was demand driven and open to each implementing organization. The locations<sup>3</sup> were to be identified by the State/ Accredited Channel Partners/Beneficiary. The selection of locations was the prerogative of the State Nodal Agency (SNA)/ Channel Partners. The projects were to be approved by MNRE.

### 2. Targets and achievements

#### 2.1. Mismatch between MNRE targets and targets set under JNNSM

The targets of MNRE and those set under JNNSM are given in Table 29.

**Table 29: MNRE and JNNSM targets**

(in MW)

Year	MNRE Target	Target under JNNSM	Achievement
2007-08	0	Not Applicable	4
2008-09	0	Not Applicable	3
2009-10	5	Not Applicable	9
2010-11	32	Phase I	11
2011-12	20	200	16

<sup>1</sup> The programme was implemented through SNAs/ State Nodal Departments (SNDs)/Corporations, PSU Banks, IREDA, and Akshaya Urja Shops. The Scheme was also being implemented through various Channel Partners like Renewable Energy Service Providing Companies; Financial Institutions including microfinance institutions acting as Aggregators; Financial Integrators, System Integrators and Programme Administrators. Akshaya Urja Shops are shops for sale of solar energy products and to provide easy after sales repair services.

<sup>2</sup> Distributed/decentralized renewable power (solar) system for isolated communities and areas which are not likely to be electrified in near future from grid connectivity

<sup>3</sup> Site/Village/Community/Institution.

Year	MNRE Target	Target under JNNSM	Achievement
2012-13	30		34
2013-14	40	Phase II (2013-17) 800	50
<b>Total</b>	<b>127</b>	<b>1,000</b>	<b>127</b>

Source: MNRE.

JNNSM envisaged incremental targets - Phase I (2010-13): 200 MW, Phase II (2013-17): 800 MW and Phase III (2017-22): 1,000 MW. However, the year wise targets of MNRE were not aligned with JNNSM targets. For Phase I, MNRE target of 82 MW was 59 *per cent* below JNNSM target, and achievement was only 61 MW i.e. 31 *per cent* of JNNSM target.

For the Phase II, JNNSM target was 800 MW (from 2013-17) but achievement in the first year (2013-14) was only 50 MW. MNRE was unable to elaborate its plan to achieve the target of 800 MW in Phase II, within the next three years, with 750 MW capacity yet to be installed.

MNRE stated (July 2015) that the sanctioned projects take 24 to 36 months to complete. Hence, installation targets are different from the sanctioned targets. Further, for Phase-II the sanctioned target had been revised to 500 MW.

The reply is not tenable because in JNNSM the target was installation of 2,000 MW by 2022. Also, the Phase I target (200 MW) of JNNSM was not achieved by MNRE over the three year period 2011-14 (100 MW).

## 2.2. Achievement of physical targets by the States

In order to determine the extent to which targets were achieved, Audit collected the data in each category of the SPV systems (in numbers) from the State Nodal Agencies (SNAs) of the 24 States sampled.

The State wise details of targets and achievements are given in **Annexure XI**. Analysis of achievement of physical targets in *percentage* terms in 24 States selected in Audit is summarized in Table 30 below.

**Table 30: Achievement of States for various off-grid programmes**

(in numbers)

SPV system	Number of States without targets	Number of States with					Nil achievement
		100 to 90 <i>per cent</i> achievement	90 to 75 <i>per cent</i> achievement	75 to 50 <i>per cent</i> achievement	50 to 25 <i>per cent</i> achievement	Less than 25 <i>per cent</i> achievement	
SL	12	8	2	-	-	1	1
SHLS	6	8	3	2	3	1	1
SSLS	5	10	4	1	3	-	1
SWP	16	3	1	1	1	1	1
SPP	6	8	-	5	3	2	-
SWHS	5	3	1	4	7	4	-

Source: SNAs.

Note: Solar Home Lighting System (SHLS), Solar Street Lighting System (SSLS), Solar Power Plant (SPP), Solar Lantern (SL) and Solar Water Pump (SWP).

Audit observed that:

- i. Chhattisgarh, Karnataka, Mizoram, Nagaland, Odisha and Punjab did not fix any targets for some of the off-grid programmes. In Chhattisgarh, Mizoram and Nagaland though no targets had been set, various off-grid programmes were running.
- ii. Arunachal Pradesh, Bihar, Himachal Pradesh, Maharashtra, Meghalaya, Rajasthan and Uttarakhand were able to achieve more than 90 *per cent* of the targets fixed by them for various off-grid programmes.
- iii. In Assam and Tamil Nadu, the achievement was less than 25 *per cent* for some of the off-grid programmes.

MNRE stated (July 2015) that solar mission was demand driven and project based and Ministry cannot enforce any targets for the States. The reply needs to be viewed in the context that JNNSM does set a target, which can be achieved only through State agencies.

### 2.3. Approval Mechanism

As per JNNSM guidelines, MNRE had to constitute a Project Appraisal Committee (PAC) to approve projects within 45 days of receiving the project proposal. This committee was to provide approval as also review progress. Deficiency, if any, had to be communicated in writing to the Proposer/Channel Partner within 30 days. The Committee would then, on receipt of clear proposal approve it. The entire approval process was to be Information Technology (IT) enabled.

Audit observed that the projects were not approved by MNRE within 45 days of date of the submission of the application. MNRE approved the projects based on the availability of the funds. No application was accepted by MNRE in the year 2013-14 as it had applications pending from previous years. PAC also did not review the progress of the projects. The approval process was not IT enabled.

MNRE stated (July 2015) that PAC could not approve the projects as Phase II of JNNSM was approved on 26 May 2015 and now approval process is IT enabled.

## 3. Financial Management of SPV off-grid programme

During the years 2007-14, MNRE released CFA of ₹ 864 crore to the 24 sampled States for SPV projects, States contributed ₹ 707 crore and ₹ 114 crore was received from other sources. State wise details of the 24 sampled States are at **Annexure XII**. Audit noticed instances of non submission of Utilization Certificates, excess claim of Central Financial Assistance and diversion of Central Financial Assistance. The detailed audit findings are given below:

### 3.1. Non submission of Utilisation Certificates (UCs)

As per Rule 212 of General Financial Rules (GFR), UCs should be submitted by the organization receiving funds within 12 months of the closure of the financial year. MNRE

should monitor the submission of UCs and if the UC was not received within the specified time, the grantee organization should be black listed. As per Principal Pay and Accounts Officer of MNRE, UCs worth ₹ 198 crore were pending (August 2014). MNRE did not review these cases of pending UCs to see whether the works had been done as per sanction and the reasons for non submission of UCs. The State wise audit findings are given below:

#### Assam

- i. Assam Energy Development Agency (AEDA) carried out awareness activities through Akshay Urja Diwas, seminars, exhibitions, conferences, debates, competitions, media campaigns etc. during 2007-12, and ₹ 0.36 crore were released by MNRE for these activities. An expenditure of ₹ 0.33 crore was incurred, UCs for ₹ 0.14 crore were available with AEDA, of which UC for ₹ 0.04 crore had not been sent to MNRE, and UCs for ₹ 0.19 crore were not available, rendering expenditure of ₹ 0.19 crore doubtful.
- ii. MNRE sanctioned (September 2008) ₹ 0.53 crore for installation of solar systems to be completed by September 2009. The work was completed in September 2010. AEDA sent UCs to MNRE in September 2009, one year before actual completion of the work.

#### Jammu & Kashmir

UCs, in respect of SWHSs sanctioned during 2009-12, were submitted to MNRE after a delay ranging from nine to 28 months. UCs submitted (January 2013) in respect of installation of 46 SWHSs sanctioned by MNRE during February 2011 confirmed that all the 46 SWHSs had been installed and commissioned. Records, however, showed that six SWHSs were not installed/ commissioned at the time of submission of UCs, of which three SWHSs had not been installed even as of August 2014.

#### Punjab

For implementation of Integrated Rural Energy Programme (IREP) during 2006-07, MNRE released (January 2007) ₹ 0.73 crore to the State Government, which in turn released ₹ 1.46 crore, including its share of ₹ 0.73 crore, to Punjab Energy Development Agency (PEDA) in November 2008 (after a delay of 23 months). Audit noticed that the scheme was not implemented and PEDA while refunding ₹ 0.01 crore submitted (December 2009) UCs of ₹ 0.72 crore to MNRE showing the amount as spent on salaries and development of Information Technology infrastructure etc. during 2006-07, which was irregular.

### 3.2. Excess claim of CFA

Audit observed that in Tamil Nadu a project for installation of a 100 kW solar system was approved by MNRE to be completed by February 2012. The project was commissioned on 24 February 2012 at an actual cost of ₹ 1.80 crore. Audit observed that the project cost was certified by Tamil Nadu Energy Development Agency (TEDA) as ₹ 2.35 crore while claiming the balance CFA from MNRE, though the beneficiary had submitted details of expenditure for the project as ₹ 1.80 crore only. On 18 April 2013, it was seen that solar systems of 40 kW was installed. There was no mention about the installation of the balance 60 kW. The

status of the project whether ongoing or abandoned/stopped, was also not clear as of June 2014.

MNRE stated (July 2015) that the settlement of claim was based on the audited Statement of Expenditure and completion certificate given by the agency after inspection. Reply is not acceptable as the status of project was not submitted to MNRE and excess claim of CFA was not checked by MNRE.

### 3.3. Diversion of CFA

Audit observed that in Chhattisgarh MNRE sanctioned capital subsidy of ₹ 2.22 crore in 2012-13 for installation of domestic SWHSs with collector area of 7,000 sqm and released ₹ 1.55 crore as first installment. Audit observed that an amount of ₹ 0.53 crore (1,706 sqm collector area) was diverted for installation of SWHSs in commercial/ Industrial/ institutions etc. Chhattisgarh Renewable Energy Development Agency (CREDA) stated (December 2014) that the systems were installed in various sectors like industries, hospitals and educational institutions etc., within the overall targets. The reply was not tenable as the sanction was only for domestic purposes and the changes in purpose were not approved by MNRE.

## 4. Implementation of off-grid programme

Implementation of the off-grid programme was examined in audit at two stages i.e. execution and monitoring. There were cases of irregularities in distribution of solar devices, delay in distribution, irregular purchases of solar devices, deficiencies in award of works for Solar Power Plants, irregular payments and delays in completion of projects. Cases of excess recovery of beneficiary share were also noticed. Findings of each stage are given below.

### 4.1. Execution

MNRE released CFA to the State Governments for procurement of solar appliances and their distribution to beneficiaries with certain terms and conditions. However, Audit observed that in some States, SNAs did not follow the terms and conditions stipulated in the Ministry's sanction for distribution of solar appliances/devices to beneficiaries.

#### 4.1.1. Irregularities in distribution of solar devices

Based on test audit, some instances of irregularities in distribution of solar devices were noticed. The State wise audit findings are given below:

#### Bihar

In Bettiah district, 90 SLs were shown as distributed during 2006-07 but details of total number of SLs received from Bihar Renewable Energy Development Agency (BREDA) were not on record of Deputy Development Commissioner (DDC) and the recipients signature were also not on record. It was also observed that six SLs were irregularly distributed among the DDC (two), BREDA (one), technician (one) and signatures of recipients of remaining two SLs were not on record.

**Meghalaya**

- i. MNRE sanctioned (February 2006) 20,000 SLs for un-electrified villages. Meghalaya Non-Conventional and Rural Energy development Agency (MNREDA) purchased (April 2008) 12,000 SLs and could distribute (October 2011) only 3,318 with under recovery of beneficiary share of ₹ 0.15 crore (actual beneficiary share ₹ 0.56 crore). MNREDA decided (November 2012) to distribute the remaining 8,682 SLs free of cost in schools but by that time the batteries had expired, which had to be replaced for ₹ 0.53 crore. The school children to whom these lanterns were given were not from un-electrified villages. UCs sent to MNRE indicated that 20,000 SLs had been distributed to the beneficiaries instead of 12,000 SLs actually distributed.
- ii. MNRE sanctioned (October 2006) 8,000 SLs to be distributed, free of cost, to girl child studying in Class IX and X. Audit observed that only 5,600 lanterns were purchased and these were given to beneficiaries for ₹ 1,465 per lantern instead of free of cost.

**Uttarakhand**

Scrutiny of records (July 2014) revealed that Uttarakhand Renewable Energy Development Agency (UREDA) collected ₹ 0.69 crore more from 80,859 beneficiaries for distributing SLs to them, claiming the collection as service charges. This was irregular since service charges were to be released by MNRE at the rate of three *per cent* of CFA and not to be borne by beneficiaries. The State Government accepted the facts.

**West Bengal**

Out of 1,000 lanterns procured, WBREDA could produce a list of six institutions to whom 258 lanterns were handed over, no record of the balance 742 lanterns was furnished to Audit.

**4.1.2. Non distribution/delay in distribution of solar appliances**

Audit observed that in certain States there were instances of solar appliances either not being distributed to beneficiaries or delay in distribution of solar appliances. The State wise audit findings are given below:

**Arunachal Pradesh**

MNRE released (January 2014) ₹ 0.25 crore to APEDA for procurement and distribution of solar energy education kits to Government school students. APEDA procured 500 solar energy education kits in April 2014 at a cost of ₹ 0.25 crore but these were yet (September 2014) to be distributed. APEDA accepted the facts.

**Bihar**

- i. Under the Tharu community development programme, a total of 4,000 SLs were to be provided to 3,846 members (November 2013). Audit scrutiny revealed that only 3,556 SLs were distributed and 444 SLs worth ₹ 0.06 crore remained undistributed. Delay in distribution might result in discharge of batteries kept in unused conditions.

- ii. BREDA (2009-10) delayed distribution of 2,000 SLs in 38 districts. There was delay of five to eleven months in the distribution of the material supplied by the supplier to districts. Further, the lanterns were distributed with a delay of two to 11 months by the Deputy Development Commissioner (DDC) after receipt from the supplier because of which not only the capacity of batteries decreased, the beneficiaries also remained deprived of the benefit of the scheme.
- iii. Audit scrutiny of records revealed that 59 SLs and six SHLSs supplied (May 2007) to the DDC Saran got destroyed (December 2007) in a fire in the godown. As per BREDA directives, these should have been immediately distributed to the beneficiaries.

#### Jammu & Kashmir

- i. MNRE sanctioned (February 2013) 10,000 SHLSs for ₹ 11 crore for various villages in Kishtwar, Dodha District. Audit observed that the SHLSs had not even been procured by Jammu and Kashmir Energy Development Agency (JAKEDA) as of August 2014. MNRE stated (May/July 2015) that orders had been placed and the project had been extended upto September 2015 for completion.
- ii. MNRE sanctioned (March 2010) assistance of ₹ 1.81 crore for distribution of 15,150 SLs in the Gujjar and Bakerwal basties of the State. Test check of records of Anantnag District, revealed that of the 4,384 SLs received in 2011, 803 had not been distributed and the batteries were exhausted. MNRE stated (May 2015) that SNA completed distribution of SLs and submitted audited SoE. However, MNRE did not furnish documents evidencing distribution of SLs.

#### Punjab

MNRE sanctioned (March 2011) 2,680 SHLSs in 147 villages of Gurdaspur, Ferozepur, Tarn Taran and Amritsar districts for ₹ 5.36 crore. PEDDA placed (May 2011) order for supply of 1,000 SHLSs. The contractor<sup>4</sup> could supply only 500 SHLSs for which a payment of ₹ 0.90 crore was made, and these were also below MNRE specifications.

In Abohar 30 SHLSs worth ₹ 0.05 crore were destroyed in a fire. Audit observed that these had been kept in an ordinary rented house and had not been distributed even after 13 months of procurement.

#### 4.1.3. Delay in completion of projects

Projects were sanctioned by MNRE based on the proposal received from SNAs/ other agencies. Audit observed that there were delays in completion of projects. The State wise audit findings are given below:

#### Assam

- i. MNRE sanctioned 11 SPV projects during October 2006 - March 2013 to AEDA for ₹ 23.29 crore. Out of 11 projects, five were completed with delay of seven months to two years, while six had not been completed (July 2014) even after delays of eight to 25 months. Delay in completion of works was due to considerable time taken in initial processing and issuing the notice inviting tenders, with delays ranging from four to 21

<sup>4</sup> M/s R.R Solar System, Ahmedabad.

months from date of receipt of sanction orders from MNRE. An amount of ₹ 16.14 crore remained blocked out of ₹ 23.29 crore sanctioned between October 2006 to March 2013. MNRE accepted the facts (May 2015).

- ii. MNRE sanctioned (August 2012) installation of SPV power plants (28kW) at various locations in the State for ₹ 0.69 crore to be completed by April 2013. The work was awarded (February 2014) to M/s National Small Industries Corporation (NSIC) which further sub contracted the work to M/s Mac Power system against the general terms and conditions of contract. The work to be completed by April 2013 was still under progress (November 2014).

MNRE stated (July 2015) that progress of work was slow because of local problems and there was no financial burden on either MNRE or the State Government. The reply is not acceptable as the projects were delayed.

- iii. MNRE sanctioned two projects (September 2010) for development of solar cities in Guwahati and Jorhat for ₹ 0.45 crore and ₹ 0.49 crore respectively. The Master Plan was to be prepared by September 2011 and the other three activities<sup>5</sup> were to be carried out during the following five years. It was observed that while the Master Plan prepared by Jorhat Municipal Board (JMB) was sent to MNRE during September 2011, the Master Plan prepared by Guwahati Municipal Corporation (GMC) was sent in March 2013, after a delay of 18 months. The Master Plan of Guwahati was approved by MNRE in January 2014.

RE proposals for Jorhat valuing ₹ 1.96 crore were sent to MNRE in December 2012, which were yet to be approved. As for Guwahati, the same had not been sent (June 2014). Further, the MNRE released ₹ 0.15 crore (March 2012) and ₹ 0.05 crore (March 2013) for setting up of Solar Cell and promotional activities for Jorhat and Guwahati, respectively. No further progress in the matter was on record.

- iv. The work of installation of RE systems in Raj Bhawan was sanctioned in November 2011, to be completed by November 2013. However, tender was invited (September 2013) after a delay of 23 months, and the work was awarded in February 2014. MNRE had censured the concerned agency for the abnormal delay in work, stressing that the financial support would be completely withdrawn for delay beyond 36 months from date of original sanction. The work was under progress (November 2014).
- v. The work of installation of Solar Plants of 240 kW at 11 locations (Assam State Secretariat – 100 kW; Guwahati High Court – 50 kW; and Dibrugarh Public Health Engineering Department (PHED) – 90 kW) was sanctioned in March 2013 to be completed by November 2013. AEDA invited an expression of interest on behalf of Dibrugarh PHED in December 2013, the tender was invited in January 2014 and the work was awarded in February 2014 to National Small Industrial Corporation (NSIC). NSIC in turn sublet the work to M/s Mac Power Systems.

In relation to other two locations (viz. State Secretariat and High Court) the work was yet to be awarded (July 2014). The tender for Assam Secretariat was invited in June 2014 and was at the tender evaluation stage. Delay in inviting tenders was attributed to changing of the nodal agency multiple times by the State Government.

<sup>5</sup> Implementation, Setting up of Solar Cell and Promotional activities



**Bihar**

- i. BREDA received a sum of ₹ 27.91 crore for implementing the Saur Kranti Solar Pump Scheme in five districts, to be completed within four months of execution of agreement. Audit observed that the scheme was not completed even after a lapse of nine months of the execution of agreements despite availability of funds.
- ii. BREDA was to install 100<sup>6</sup> SSLs for which an amount of ₹ 0.19 crore was received from the three<sup>7</sup> beneficiaries. However, these SSLs had not been commissioned so far (November 2014).
- iii. Audit scrutiny of records of DDC, Muzaffarpur revealed that out of 18 SSLs received (June 2011) only nine were installed (November 2014). BREDA failed to monitor the complete installation of the same.
- iv. The State Government released (2007-08) ₹ 0.50 crore to BREDA and MNRE had to provide CFA of ₹ one crore for establishing State Level Energy Park. The park was not established and funds were surrendered (July 2012) after three years. The SNA stated that State Government did not allot the required 2.5 to 3 acres of land resulting in non-construction of the energy park and the grant was refunded.
- v. Ten Solar Roof Top power plant of 50 kW and four Solar Roof Top power plant of 200 kW totaling 1.3 MW were to be installed under Mukhyamantri New and Renewable energy scheme for which BREDA received ₹ 24.67<sup>8</sup> crore during 2008-14, but the scheme was yet to be implemented.

**Jammu & Kashmir**

- i. MNRE sanctioned (December 2010) ₹ 32.70 crore for installation of SPPs of 1,090 kW at 69 district hospitals/ health centres. Audit observed that 22 plants had not been installed even after a lapse of 32 months. Also the contract was placed on a firm<sup>9</sup> whose turnover was not certified by a Chartered Accountant as required under the eligibility conditions.  
MNRE stated (May 2015) that the project was still incomplete and the SNA was to follow tender conditions in which it would not interfere.
- ii. MNRE sanctioned (February 2012) installation of SPPs of 905 kW at 107 Community Information Centers for ₹ 24.44 crore. Audit observed that 22 plants had not been installed (August 2014) even after a lapse of 20 months.  
MNRE stated (May 2015) that some of the companies to whom the contract was awarded had gone to Court and the project was stalled.
- iii. MNRE sanctioned (September 2012 - February 2013) installation of 22 SPPs of 752 kW at 22 locations and nine SPPs of 900 kW in nine institutions. Audit observed that the plants had not been installed (August 2014) due to non-finalization of tenders.  
MNRE stated (May 2015) that the project was under court litigation.

<sup>6</sup> Three at Betiya, 27 at Gaya, and 70 at the units of Bihar State Tourism Development Corporation.

<sup>7</sup> ₹ 0.05 crore from Gaya Engineering College, ₹ 0.14 crore from Bihar State Tourism Development Corporation and ₹ 0.58 lakh from District Magistrate (DM), West Champaran, Bettiah.

<sup>8</sup> MNRE- ₹ 0.49 crore, State- ₹ 24.18 crore.

<sup>9</sup> M/s Sova Power Ltd.

- iv. MNRE sanctioned (September 2009) establishment of State Level Energy Park for ₹ one crore and seven Akshya Urja shops for ₹ 0.04 crore, but the same had not been established (August 2014) and the funds remained unutilised.

MNRE stated (July 2015) that project had been cancelled.

### Madhya Pradesh

- i. The installation of 2,12,800 Litres per day (LPD) capacity SWHSs at 41 places was to be completed by M/s Waree Energy Pvt. Ltd, Mumbai by December 2013. Audit observed that only six *per cent* work was completed upto March 2014.
- ii. A work order was placed on M/s Steam Power Entertech Pvt. Ltd, Rajkot for installation of 40,000 LPD capacity SWHS at MP State Cooperative Dairy Federation, Gwalior at ₹0.59 crore to be completed by November 2013. There was no progress in the work (March 2014).

### Mizoram

- i. MNRE sanctioned (January 2006) an Education Park for ₹ 1.50 crore to create awareness about solar energy. ZEDA failed to arrange suitable land in Aizwal city, and after four years (October 2010) arranged a plot in Mizoram University campus, 14 km away from the city. ZEDA unilaterally dropped a number of systems to be installed and terms of AMC were also relaxed for the contractor<sup>10</sup>. At present the park was not being used. MNRE also failed to monitor successful implementation of the project.

MNRE stated (July 2015) that park has been completed but due to funds constraint, AMC could not be signed. The fact remains that there was delay of more than seven years in completion of the project.

- ii. MNRE sanctioned (February 2008) solar dryer for drying turmeric for import and export. Work order for seven 35 kg solar dryers were placed (July 2008) and the order for the rest was to be placed after setting the dryer in the most optimum condition suiting the climate of Mizoram. Audit observed that the contractor<sup>11</sup> supplied (November 2012) 42 solar dryers without identification of the site and required infrastructure by the user<sup>12</sup> agency. These solar dryers had not been installed leading to unfruitful expenditure of ₹ 1.11 crore.

### Nagaland

- i. MNRE approved (November 2011) ₹ 22.31 crore for installation of SPPs of 670 kW at 45 locations in Kohima, to be completed by May 2012. Although installation work was completed, commissioning and handing over of 17 SPPs (260 kW) had not been done (May 2014) and commissioning of 16 plants was also delayed by seven to 18 months. The delay was attributed to delay in release of payments to contractors. The State Government stated that it had released the balance civil deposit amount of ₹ 1.71 crore in September 2014 and the contractor had been asked to commission the balance 17 SPPs at the earliest.

<sup>10</sup> M/s Swastik Enterprise, Kolkata.

<sup>11</sup> National Research Development Corporation, a PSU.

<sup>12</sup> Mizorganic Producers Company Limited, a private company.

- ii. MNRE accorded (2003) sanction of ₹ 0.83 crore for installation and commissioning of solar devices to be completed within 24 months. MNRE released ₹ 0.42 crore in 2003 but the State share<sup>13</sup> was released after a delay of five years. The work was awarded to M/s V K Keguruse without inviting open bid. Due to delay in completion of work, the contract was subsequently cancelled (August 2013) after incurring an expenditure of ₹ 1.30 crore. MNRE accepted the facts (May 2015).

### Uttar Pradesh

- i. UPNEDA was to install 292 SWHSs (January 2011) at KG Residential Balika Vidhyalayas in 48 districts. Audit observed that installation of 190 SWHSs was still pending as the firms could not supply the equipment. The work was retendered but even then the work could not be completed. Despite lapse of more than two and half years the work was still incomplete. The main reason for non-completion was lack of coordination between UPNEDA and Education Department.
- ii. MNRE approved (July 2010) CFA of ₹ 2.77 crore for providing SPPs of 4.8 kW and six SSLs to each of the 57 Rajkiya Ashram Padhati Vidhyalayas located in 42 districts. Though 342 SSLs (six SSLs for each of 57 SPPs) were installed, the firm<sup>14</sup> could install only 22 SPPs (April 2011) and none of them were functional. Payment of ₹ 1.32 crore had been made to the firm. The work could not be completed by UPNEDA even after a lapse of over four years<sup>15</sup>. UPNEDA stated that the firm had been blacklisted and performance guarantee forfeited and 22 SPPs would be operationalised soon and remaining 35 SPPs would also be installed.

### West Bengal

- i. MNRE released CFA of ₹ 8.67 crore to WBREDA during September 2011 - March 2013 for installation of standalone SPV system of capacity 5 kW each at 100 Government aided schools in South and North 24 Parganas and Murshidabad districts along with one 24 kW SPV system at Jalpaiguri Engineering College. WBREDA installed solar rooftop PV plant in 70 out of 100 schools and 25 kW SPV plant at Jalpaiguri college at a cost of ₹ 6.61 crore as of September 2014. WBREDA had not identified the remaining 30 schools on which rooftop SPV plant was to be installed under the programme.  
MNRE stated (May 2015) that the project was still incomplete and the Ministry would consider cancelling the projects for the remaining 30 schools based on audit observations.
- ii. MNRE sanctioned a project for installation of 500 SWHSs in different institutions/domestic areas at a cost ₹ 0.32 crore, to be completed within twelve months and released ₹ 0.22 crore in September 2011. MNRE's sanction stipulated that remaining funds (₹ 0.10 crore) would be released to WBREDA on demonstration of SWHS with the report of monitoring of the systems by third party. However, Audit observed that WBREDA could spend only ₹ 0.14 crore on installation of 137 SWHSs against the target of 500 SWHSs, as of September 2014. WBREDA did not conduct any third party monitoring as required under MNRE's sanction.

<sup>13</sup> Civil works ₹ 0.56 crore (State share); and Supply, installation and commissioning of solar devices ₹ 0.83 crore (CFA).

<sup>14</sup> M/s Gangotri Enterprise, Lucknow.

<sup>15</sup> October 2010 to September 2014.

#### 4.1.4. Deficiencies in award of work for Solar Power Plants

Applicable guidelines are to be followed by the SNAs/ implementing agencies while executing the projects with regard to tendering and award of the work. The State wise audit findings are given below:

##### Assam

MNRE sanctioned (December 2011) 354<sup>16</sup> kW SPV power plants for ₹ 8.73 crore to be completed by December 2012. AEDA awarded the work (February 2013) to an ineligible contractor<sup>17</sup>. The work, that was to be completed by August 2013, was started by the contractor in October 2013 with an undertaking to complete it by February 2014. Thereafter, the contractor sub-contracted the work to M/s Geetanjali Solar Enterprises. The work was not completed till date (June 2014). Audit also observed that another order was placed on M/s Umgreen Lighting for installation of two SPV power plants of five kW of similar nature, specifications and location at a lower rate which led to an excess expenditure of ₹ 0.22 crore.

##### Jammu & Kashmir

Inspection report of the Director General Quality Assurance (DGQA) indicated that 5,000 SHLSs supplied by a firm<sup>18</sup> for ₹ 5.44 crore were not as per Indian Standard specification as envisaged in the Notice Inviting Tender (NIT) and Chinese solar cells were used which were not allowed as per NIT. JAKEDA did not take any action against the defaulting firm and justified the deviation to Audit on the grounds that the firm was to maintain the system for five years free of cost.

MNRE stated (July 2015) that all procured items were test certified as per MNRE requirements and there was no restriction on Chinese cells. The reply is not tenable as it violates the standard given in NIT and modules were not indigenous as envisaged in programme guidelines.

##### Jharkhand

Scrutiny of records revealed that two mini-grid (off-grid) power plants of 120 kW (Jhargaan and Jari villages in Gumla District) were allotted to developers<sup>19</sup> without inviting tender.

MNRE stated (July 2015) that with no party coming forward to work in Gumla District, work was awarded on nomination basis by the State Government.

#### 4.1.5. Irregular payments

Audit observed that in two States, SNAs had released payment to firms without following MNRE guidelines and obtaining requisite installation/commissioning reports. The State wise audit findings are given below:

<sup>16</sup> Five kW capacity each at 27 DC offices and one kW SPV power plant at 219 Aryabhata science centers.

<sup>17</sup> M/s Eversun Energy Pvt. Ltd, who had the experience of manufacturing, supply, installation and maintenance of off-grid SPV systems of 250 kW instead of required 350 kW in the previous three years.

<sup>18</sup> M/s Jain Irrigation Systems Limited.

<sup>19</sup> M/s DD Solar India Pvt Ltd and M/s Bergen Solar Power & Energy Ltd.

**Jammu & Kashmir**

The SNA awarded contracts for installation of 422 SWHSs to two firms<sup>20</sup>. It was observed that without following the guidelines and obtaining requisite installation/ commissioning reports, photographs of systems installed and full details of solar collector type and area installed, the SNA released payment of ₹ 0.41 crore to the firms.

**Tamil Nadu**

MNRE approved (May 2011) installation of six SPPs in Coimbatore at a cost of ₹ 12.60 crore. CFA of ₹ 3.42 crore was sanctioned of which ₹ 1.70 crore released to TEDA. TEDA in turn released (June 2011) the entire amount of ₹ 1.70 crore received from MNRE to the supplier. Audit observed that TEDA released the CFA to the supplier directly, instead of releasing it to the beneficiary, which was not as per MNRE guidelines. Despite the entire CFA being released to the supplier none of the six SPPs had been commissioned as of June 2014.

Accepting the facts, MNRE stated (July 2015) that TEDA had released ₹ 1.70 crore without bank guarantee and now TEDA has filed police case against the supplier.

**Uttar Pradesh**

i. Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA) purchased 7,517 Compact Fluorescent Lamp (CFL) based SSLs (ordered at the rate of ₹ 22,301) and installed them (January/March 2011), under Project Mode even when cheaper Light Emitting Diode (LED) based SSL (at the rate of ₹ 16,830) were installed under Dr. Ambedkar Gram Yojna (2010-11) in September 2010, leading to an extra expenditure of ₹ 4.11<sup>21</sup> crore.

The SNA stated that CFL based SSLs was ordered as per sanction of MNRE. The reply was not tenable as the UPNEDA could have sent revised proposal based on LED for the project.

ii. In another case UPNEDA purchased (December 2011) 16,507 CFL based SSLs at a higher price of ₹ 22,301 per unit, thereby paying an excess amount of ₹ 10.40<sup>22</sup> crore, even though there was a valid rate contract<sup>23</sup> for supply of cheaper and technically better Light Emitting Diode (LED) based SSL<sup>24</sup>.

iii. Further, despite having above rate contract for LED based SSLs (at the rate of ₹ 16,000), UPNEDA ordered (September, November 2011) for 13,262 and installed 13,185 LED based SSLs at higher cost (at the rate of ₹ 18,500) under Dr. Ambedkar Gram Yojna (2011-12) at an extra expenditure of ₹ 3.30<sup>25</sup> crore.

<sup>20</sup> M/s Electrotherm and M/s Tata BP.

<sup>21</sup> ₹ (22,301-16,830) X 7,517= ₹ 4.11 crore.

<sup>22</sup> (₹ 22,301 - ₹ 16,000) X 16,507 = ₹ 10.40 crore.

<sup>23</sup> M/s Linker Associates Lucknow. Executed in July 2011 and valid till January 2012 to supply LED based SSLs at the rate of ₹ 16,000 per unit.

<sup>24</sup> A comparison between CFL and LED based SSLs showed that luminosity of an 11 watt CFL-SSLs provides a lumen of 900 while a 10 watt LED-SSLs provided the same lumen (at the rate of 90 lumen per watt decided by MNRE). CFL based SSLs of 11 watt used solar panel of 75 watt and 75 AH tubular plate battery whereas solar panel of 45 watt and 40 AH tubular plate battery was used in LED based 10 watt SSLs. The working life of a LED and CFL was 50,000 hours and 8,000 hours respectively. Thus, it could be seen that a 10 watt LED based SSL is far better than an 11 watt CFL based SSL both in terms of luminosity and price.

SNA stated that LED based SSLs were not purchased (rate contract at the rate of ₹ 16,000 per system) because these systems were not as per standard and specification of MNRE. The reply was not tenable because in such circumstances the supplier<sup>26</sup> should have been disqualified instead of signing of rate contract. Further UPNEDA could have installed 16,507 LED instead of CFL based SSLs.

MNRE stated (July 2015) that procurement was as per demand of public in rural areas and during 2011-12 CFL based light was proven system. The reply is not tenable as during the same year LED based SSLs were installed at a cheaper rate.

#### 4.1.6. Non-adherence to contractual obligations

Audit observed that in two States, SNAs were not able to ensure that the contractors adhere to the contractual obligations. The State wise audit findings are given below:

##### Nagaland

M/s Electrotherm was allowed (May 2012) to install and commission the incomplete portion of the SWHS work, initially allotted to it, after cancellation of work order and release of EMD amounting to ₹ 0.10 crore, instead of forfeiting the same. Penalty of ₹ 0.21 crore<sup>27</sup> on undelivered portion as stipulated in contract agreement was not levied. Similarly, the Department of New and Renewable Energy (DNRE) had also failed to impose penalty of ₹ 0.06 crore<sup>28</sup> on M/s Swastik for the delay in supply of SWHS materials and paid the Earnest Money Deposit (EMD) amount of ₹ 0.10 crore in full instead of forfeiting the same.

##### Punjab

- i. MNRE sanctioned ₹ 2.48 crore for installation (November 2007) of 4,000 SHLSs and 500 SSLs. Audit observed that though 3,600 SHLSs were not supplied by the contractor<sup>29</sup>, PEDDA did not levy penalty of ₹ 0.44 crore as per contracted terms. Also the project was completed with extra payment of ₹ 0.13 crore, which was not recovered from the defaulting contractor due to not including an enabling clause in the contract. The subsequent contractor<sup>30</sup> was also contractually liable to a penalty of ₹ 0.12 crore for delaying supply beyond December 2008 without approval of extension of time.

MNRE stated (May 2015) that this decision was taken by PEDDA and the Ministry could not interfere in the matter.

<sup>25</sup> ₹ (18,500-16,000) X 13,185=₹ 3.30 crore.

<sup>26</sup> M/s Linker Associates.

<sup>27</sup> The amount of penalty calculated for a period of 28 weeks (November 2011 to May 2012) was (0.5 per cent x ₹ 1.48 crore x 28 weeks).

<sup>28</sup> Delay for the period of four months or 16 weeks amounting to ₹ 0.06 crore (0.5 per cent x ₹ 0.80 crore x 16 weeks).

<sup>29</sup> M/s Divayam Solar Energy Development Agency, Jalandhar.

<sup>30</sup> M/s Suntime Energy Delhi

- ii. MNRE sanctioned (July 2011) installation of 600 solar pumps for ₹ 22.20 crore to be completed by March 2012 and released ₹ one crore as the first installment. The supply order for 100 pumps was placed (May and November 2013) by PEDDA, and the pumps were installed with a delay of 25 to 151 days for which a penalty of ₹ 0.09 crore was not imposed. Also incorrect UC for ₹ one crore against the due subsidy claim of ₹ 0.81 crore was sent by PEDDA to MNRE in June 2013.
- iii. The State Government agreed to pay 40 *per cent* subsidy of ₹ 1.12 crore to PEDDA for 100 pumps valuing ₹ 2.80 crore. However, it did not release the agreed amount of subsidy.

MNRE stated (May 2015) that penalty figure was imaginary. Further PEDDA had also informed that the entire amount was spent and documents for release of balance CFA were under process. The reply was not tenable as work order provides the imposition of Liquidated damage at the rate of 0.5 *per cent* per week and maximum of 10 *per cent* of the contract value.

### Tamil Nadu

MNRE sanctioned for installation of 60,000 SHLSs for houses constructed for BPL families under the Chief Minister's solar powered green houses scheme. TEDA decided to implement the scheme with CFL bulbs in 49,650 houses and with LED bulbs in the remaining 10,350 houses. Tenders were invited (October 2012) for commissioning and maintenance for five years for the 49,650 CFL based system and Letters of Acceptance (LoA) after evaluation of the bids was issued to the successful bidders by TEDA on 21 June 2013 by which time, the validity of the bids had already expired on 1 June 2013. As one of the parties to whom LoA was issued expressed its inability to extend the validity, the LoA for 28,596 units was cancelled (July 2013). In the subsequent tender for 2013-14, the backlog quantum was awarded at a higher rate of ₹ 22,276 per system as against the originally decided price of ₹ 19,860 in 2012-13. The delay in finalizing the tender led to additional expenditure of ₹ 6.91 crore besides loss of opportunity to generate solar energy in 28,596 houses.

MNRE stated (May 2015) that delay was due to retendering as bidder expressed inability to fulfill order. The reply was not tenable as there was delay in the process of award of work.

#### 4.1.7. Excess recovery of beneficiary share

Audit observed that in some States excess beneficiary share was collected by SNAs. MNRE had no mechanism to monitor such cases. The State wise audit findings are given below:

### Madhya Pradesh

Excess amount of ₹ 1.26 crore received from MNRE and Madhya Pradesh Jail Department towards installation of 126 SPPs, was not returned by Urja Vikas Nigam Ltd, Bhopal. Further, excess amount of ₹ 0.07 crore received as beneficiary share from Commissioner Nagar Nigam, Gwalior and Tribal Research Institute, Bhopal had also not been returned since the last four years (August 2010 to August 2014) by Urja Vikas Nigam Ltd, Bhopal.

### Meghalaya

MNRE sanctioned (September 2008) CFA of ₹ 1.77 crore for installation of 1,000 SSLs in the State, for which the contract was awarded in March 2010 by MNREDA and work was completed in June 2010. It was observed that beneficiary share was very high at ₹ 9,450, as compared to State share of ₹ 2,000. Also MNREDA was only able to provide a list of only 170 beneficiaries to Audit, instead of 1,000, indicating that the project was not completed.

## 4.2. Monitoring and evaluation

Cases of irregular installation, non installation of solar devices and poor quality of work were noticed which indicated deficiencies in monitoring and evaluation. The detailed audit findings are given below:

### 4.2.1. Deficient monitoring system

As per JNNSM guidelines, Information and Communication Technology was to form the backbone of monitoring system. At primary level the monitoring was to be done by the Channel Partners and additional monitoring could be done by reputed civil society groups, eminent persons, corporate houses, SNAs and MNRE officials, on random sample basis. Also, certified energy auditors were to be empanelled for certifying whether the outputs of the system correspond to the parameters laid down in the in-principle approval for non-credit linked projects.

Audit observed that third party monitoring was not carried out by MNRE/ SNAs and information technology was not made use of for monitoring. Energy auditors were also not empanelled by MNRE/ SNAs to certify the output of the systems.

MNRE stated (July 2015) that primary monitoring was done by SNAs and MNRE officials also visit the systems on random basis. MNRE accepted that Information Technology enabled monitoring was an issue.

### 4.2.2. Deficiencies in installation of solar devices

Projects were sanctioned by MNRE based on the proposal received from SNAs/ other agencies. Test audit revealed instances of irregularities in installation of solar devices which indicated deficiencies in monitoring. The State wise audit findings are given below.

### Assam

MNRE sanctioned (July 2006 to March 2008) setting up of 10 district level energy parks for ₹ 0.65 crore. Inspection of one<sup>31</sup> park (October 2010) by AEDA revealed that poor quality work was done and there were deficiencies in 10 of the 16 allotted works. No action in this regard was taken by AEDA. AEDA furnished the UCs to MNRE in November 2013 and claimed the balance of ₹ 0.30 crore.

<sup>31</sup> Don Bosco High School.



### Chhattisgarh

MNRE sanctioned (October 2010) installation of one kW SPP in nine Janpad sites<sup>32</sup> of Surguja district. Out of nine, only four plants<sup>33</sup> were installed and two<sup>34</sup> of these plants were installed at unapproved locations. Five plants were not installed because of technical reasons. MNRE accepted the facts (May 2015).

### Himachal Pradesh

- i. Himurja installed 560 SSLs under MNRE programme in villages Kandaghat and Batal during the years 2012-14 at an expenditure of ₹ 1.07 crore. Audit observed (August 2014) that Himurja again installed 95 SSLs at the cost of ₹ 0.19 crore out of funds sanctioned by the Department of Tourism for installation of SSLs in the above villages. It was further noticed that SSLs were mostly installed adjacent to the electrical SSLs.
- ii. MNRE sanctioned CFA of ₹ 0.20 crore in November 2008 for installation of 12 kW capacity wind-solar hybrid systems at Pooh in Kinnaur District. The first installment of ₹ 0.15 crore was released by MNRE to Himurja in March 2009 and it released ₹ 0.13 crore to M/s Machnocraft, Pune in the same month. The systems were installed in July 2009 but it could generate only 1,300 kW upto November 2009 and were not working satisfactorily thereafter. The balance grant of ₹ 0.02 crore had not been released by Himurja so far (March 2014.) Himurja accepted the facts (February 2015).

### Jammu & Kashmir

Audit observed that 236 SPPs (capacity: 4,473 kW) sanctioned during 2008-14 were installed in Government buildings in areas which were connected with electricity grids. MNRE accepted the facts (May 2015).

### Mizoram

Almost all SPPs were installed in areas where grid connected power was available and more than 50 *per cent* of the projects were commissioned in Aizwal city only. This indicated that preference was not given to isolated un-electrified rural areas. The State Government stated (January 2015) that ZEDA was not involved in the implementation of systems as these were implemented by Channel Partners of MNRE. It also stated the beneficiaries who are willing to contribute their share were selected. Due to shortage of fund it failed to extend its activities to far flung areas. The reply was not justified since solar systems were more required in rural areas than urban areas. MNRE accepted the facts (May 2015).

<sup>32</sup> Ambikapur, Kusmi, Shankargarh, Manpat, Balrampur, Udaipur, Ramchandrapur, Odgi and Premnagar.

<sup>33</sup> Balrampur, Udaipur, Odgi and Premnagar.

<sup>34</sup> Balrampur and Premnagar.

**Nagaland**

- i. Contract for installation of 4,200 SSLs in 139 villages was awarded to three contractors<sup>35</sup>. According to progress report submitted (October 2013) to MNRE, 3,786 SSLs had been installed, in 196 villages. However, Audit observed that only 3,046 SSLs were installed, leading to inflated reporting of installation of 740 SSLs of ₹ 2.22 crore<sup>36</sup>. MNRE stated (May 2015) that it would seek clarification in this regard from the SNA.
- ii. Audit scrutiny of completion reports submitted by the firms, revealed that out of 1,579 certificates submitted, 199 had identical serial numbers of major components of the devices reported to have been installed, leading to doubt on the installation of SSLs amounting to ₹ 0.60 crore.

**Uttar Pradesh**

With the aim of providing electricity in the remote unelectrified villages, UPNEDA decided (October 2010) to install 1.2 kW mini grid SPPs at 47 villages of 16 districts. Contracts were assigned (December 2011) to five firms for the work of design, supply, installation and commissioning of the plants. While three firms failed to execute the contract, two firms could install 23 plants in 23 villages of 11 districts (December 2012). Audit observed that most of the installed plants were lying non-functional since July 2013. As per the project report each plant was to have a maximum of 200 connections but these ranged from 46 (Hajipur, Sitapur) to 176 (Kathelakothi, Sidharth Nagar). SNA stated that the design of the project was not as per the electricity requirement of the villagers. It was also stated that some of the villagers drew electricity irregularly by tempering with the wires due to which the plants frequently became non-functional.

**4.2.3. Non preparation of beneficiaries list**

As per MNRE guidelines, all programme implementing organizations were required to prepare a record containing details of beneficiary and SPV systems. The data was to be made available on a computer floppy/ Compact Disc (CD) for verification/ audit purpose. The implementing agency was to prepare the beneficiary lists as per guidelines before sending the proposal to MNRE. The State wise audit findings are given below:

**Assam**

MNRE sanctioned two SWHS projects (October 2012 and October 2013) for ₹ 3.33 crore and ₹ 3.50 crore. In the first project, out of 5,925 square metre (sqm) of collector area at various locations, only 58 sqm area had been installed and AEDA was still to prepare a list of beneficiaries. No progress was made in the second project at Guwahati Municipal Corporation.

<sup>35</sup> M/s Sunshine Power Products Pvt Ltd., M/s Microsun Solar Tech. Pvt. Ltd. and M/s Sanmati Traders.

<sup>36</sup> 740 X ₹ 30,000 per set.

**Odisha**

SPV systems were centrally procured by Head Office (HO) of Odisha Renewable Energy Development Agency (OREDA) and issued to different RE cells of the districts based on their requisitions. Test check of beneficiaries' list of districts by Audit revealed that they were incomplete as these did not contain detailed address of beneficiaries.

SPV systems were issued in the name of the concerned technicians, but details of beneficiaries to whom technicians supplied the systems were not on record. In one case of Khurda District, SPV systems were issued directly from HO to beneficiaries, details of beneficiaries could not be made available to Audit.

OREDA stated that targets were fixed depending upon the willingness of the user organization assessed by the districts as well as HO. The reply is not tenable as there were no records of assessment of SPV systems by the district offices and at OREDA headquarters.

**Punjab**

Out of 2,500 beneficiaries to whom SLs were distributed, PEDDA did not provide list of beneficiaries in respect of 678 lanterns valued at ₹ 0.18 crore.

**4.3. Deficiencies in Annual Maintenance Contract (AMC) of systems**

As per MNRE guidelines upto January 2010 (before JNNSM), the SNA/ implementing agency had to enter into an AMC for the maintenance and proper running of the equipment after warranty period and quarterly report regarding maintenance of systems/equipment was to be sent to MNRE by SNA. However, Audit observed that in some States there were deficiencies in maintenance of systems by SNAs. MNRE had no mechanism to monitor such cases in the States. State wise audit findings on the maintenance of systems are given below:

**Assam**

During beneficiary survey, it was seen that out of 48 SHLS systems installed under different off-grid SPV schemes during 2009 – 2013, as many as 30 were defective or not working within one year of installation.

**Chhattisgarh**

As per suggestion of the System Integrator, for better generation, solar panels should be cleaned twice a week. During the test check of the records of SPV power plant of 100 kW installed in October 2012 at MGM Welfare Society, Raipur, Audit observed that power generation from the plant was only 78,700 kWh per year (about 50 per cent) due to non-cleaning of panels.

**Haryana**

Village Energy Committees were to be constituted to ensure maintenance and upkeep of the off-grid systems. The concerned Panchayat were required to deposit an amount of ₹ 2,500 per SSL system in the account of Village Energy Committee, as one time grant to meet the future maintenance expenditure. Audit observed that Village Energy Committees had not been formed.

**Himachal Pradesh**

Himurja executed AMC with the suppliers for off-grid systems installed in various villages. Audit observed (June 2014) that the representatives of these suppliers were not visiting the sites regularly. During physical verification of Chango village, the Pradhan Gram Panchayat stated that local skilled person attended to the complaints and rectified the defects in the solar systems installed. Himurja accepted (February 2015) the facts.

**Jharkhand**

- i. Audit observed (July 2014) that AMC/CMC were done only for 2,827 out of 3,467 SSLs. No AMC/CMC was done for 7,000 SLs.
- ii. The suppliers were required to submit quarterly reports duly certified by the concerned local panchayats or bodies designated by JREDA on functioning of the systems, but suppliers neither submitted any report nor claimed (March 2014) AMC charges (August 2014). JREDA also did not ensure submission of regular quarterly progress report. SNA accepted the audit observation.
- iii. Audit observed that Bharat Coking Coal Limited (BCCL) Dhanbad reported (between November 2011 and February 2013) 70 *per cent* non-functional systems out of 299 SSLs installed during 2010-12 due to non maintenance of the systems. Further, on the ground of non maintenance of installed systems, BCCL withdrew (April 2013) its subsequent installation of SSLs. SNA accepted the audit observation.

**Madhya Pradesh**

100 kW SPP commissioned (November 1999) at Jaitpura costing ₹ 3.59 crore was lying idle since October 2011 due to lack of maintenance.

**Maharashtra**

Under Special Area Demonstration Programme (SADP) systems were installed at important Government buildings at a cost of ₹ one crore per site, inclusive of procurement and installation of systems and devices along with AMC. Audit observed that the system installed under SADP at Raj Bhavan, Mumbai at a cost of ₹0.63 crore was not working satisfactorily. No action was taken to rectify the deficiencies in the working of the system. An amount of ₹ 0.23 crore under the programme remained unutilized with the SNA.

**Punjab**

- i. PEDA allotted the work of maintenance to private contractors including warranty period of two to 10 years, but it was found during joint physical verification by Audit and PEDA, that contractors were not providing services properly, as three out of nine off-grid SPV systems inspected were found to be non-functional due to lack of maintenance.
- ii. MNRE sanctioned (October 2010) ₹ 5.40 crore for commissioning of SPPs in 17 villages of Gurdaspur district to be completed by 30 June 2012, and to be operated and maintained for 10 years by the contractor under warranty clause. Plants were installed (October 2012) by the contractor at a cost of ₹ 2.63 crore but these were not working (September 2013) as the contractor was not maintaining the plants,

despite these being covered in the warranty period. Joint physical verification of three out of nine power plants conducted by Audit and PEDDA, disclosed that all the three plants were not working. PEDDA also did not levy penalty of ₹ 0.21 crore for delay in installation of the plants. One plant of 10 kW capacity valuing ₹ 0.29 crore in village Lodhi Naggal was installed in a private house against the project proposal to install the same on Government Land/Panchayat buildings.

MNRE stated (July 2015) that defects were rectified but did not comment on the issue of levy of penalty and installation of plant on a private house.

### Uttar Pradesh

MNRE approved (February 2010) setting up SPPs at 340 police stations for ₹ 14.96 crore. Audit observed that the work was completed (June 2011) after a delay of six months but 90 systems were not functioning (August 2012). The supplier<sup>37</sup> did not repair the systems even though these were within the two years warranty and three years AMC. In Gonda eight out of 15 plants installed were lying non-functional for almost one year. Payment of ₹ 8.52 crore had been made to the supplier. SNA stated that the systems became non-functional due to excess use and overloading. The reply was not acceptable as the full amount of ₹ 8.82 crore was released (November 2011) to the firm and systems were covered under warranty and AMC.

### Uttarakhand

- i. UREDA made an agreement with Central Electronic Limited (November 2008) for the supply and maintenance of SSLs in the State with two years warranty. In case the contractor could not rectify the defects within 15 days of receipt of complaint, UREDA would restore the devices in working condition at the contractor's expenses. Audit observed that 54 street lights were given to Zilla Panchayat (ZP), Tehri Garhwal for installation in 29 villages and remaining were distributed to the Gram Pradhans. Audit also observed that 45 out of 54 street lights installed were inoperative since June, 2011 i.e. within the warranty period. UREDA did not restore the systems at the contractor's expenses. It was also noticed that in respect of 10 inoperative streets lights, the plates, batteries and CFL were stolen. The State Government accepted the facts (December 2014).
- ii. Under Special Area Demonstration Programme of MNRE, CFA of ₹ 0.41 crore was sanctioned (July 2010) for installation of ten solar devices at Raj Bhavan, Dehradun. Scrutiny of the records revealed that three<sup>38</sup> out of the seven solar devices<sup>39</sup> actually installed were inoperative since their installation (May 2011). UREDA did not make any effort to rectify the inoperative solar devices at the contractor's expenses (August 2014). Accepting the facts, MNRE stated that action for rectification of solar devices had now been taken (May 2015).

<sup>37</sup> M/s Kotak Urja Pvt Ltd, Bangalore.

<sup>38</sup> Solar road stud, solar pump and solar water purifier

<sup>39</sup> Out of ten, Raj Bhavan authorities did not permit for installation of two devices and for one device fund was not allocated.

#### 4.4. Physical verification of off-grid systems by Audit

In order to check the functionality of the installed off-grid systems, Audit conducted physical verification on a sample basis, the results of which are summarized in Table 31. The audit findings indicate that large numbers of systems were not functioning properly in a number of States. Details may be seen in **Annexure XIII**.

**Table 31: Summary of physical verification of off-grid systems**

System	No. of systems inspected	No. of systems not working	No. of systems missing	Observations
SHLS	1,191	372	29	Issues ranged from lack of maintenance and after sales service facility to irregular issuance of systems to already electrified villages.
SSLS	1,233	857	19	A large number of systems were not working due to lack of maintenance facilities.
SL	1,413	580	2	Almost half the systems were not in working condition. Diversions of usage to factories/temples were also observed.
SPP	24	9	Nil	In addition to large number of idle systems, very low Cumulative Utilisation Factor was observed in working systems.
SWP	91	47	Nil	Issues like theft of modules, misuse towards commercial activities and very low discharge of water were observed.
SWHS	7	3	Nil	Nil
<b>Total</b>	<b>3,959</b>	<b>1,868</b>	<b>50</b>	

Note: Solar Home Lighting System (SHLS), Solar Street Lighting System (SSLS), Solar Power Plant (SPP), Solar Lantern (SL) and Solar Water Pump (SWP).

Physical verification of sampled systems by Audit revealed that 47 *per cent* of the off-grid systems were not working and one *per cent* of the systems were found missing and five *per cent* of the systems were issued to villages already electrified.

#### 4.5. Non implementation of awareness programme

As per the JNNISM guidelines, awareness and demonstration of effective and innovative use of solar systems for individual/ community/ institutional/ industrial applications were to be promoted. Audit observed that in some States awareness and demonstration programmes were not implemented as per JNNISM guidelines. The State wise audit findings are given below:

**Assam**

MNRE sanctioned (September and November 2005) an amount of ₹ 0.34 crore to District Level Renewable Energy Advisory Committee (DLREACs) under Information & Public Awareness Programme in 23 districts. Audit observed that only three<sup>40</sup> districts had set up these committees. MNRE had expressed its dissatisfaction over the working of the DLREACs from time to time and had stressed on improving their functioning.

**Gujarat**

GEDA received ₹ 0.38 crore during the period 2007-10 out of which it utilised only ₹ 0.05 crore and refunded ₹ 0.33 crore to MNRE as unutilised amount. Out of the above amount, ₹ 0.26 crore was given to GEDA for conducting functions/activities to generate mass awareness about the need, benefits and use of new and renewable energy on 20 August of each year on the occasion of Rajiv Gandhi Akshay Urja Diwas. But 80 per cent of the fund was refunded to MNRE thereby defeating the very purpose and objective of the programme. Further, an amount of ₹ 0.12 crore was given to GEDA for setting up of renewable energy clubs in engineering colleges/institutions and creating awareness and publicity of renewable energy in the year 2007-08. However, the entire amount of ₹ 0.12 crore was refunded.

**Himachal Pradesh**

Himurja made efforts to create awareness through exhibition, Doordarshan/All India Radio, newspapers, National and State level trade fairs, events, publicity campaigns and mobile exhibitions in rural / remote areas during 2007-13. Against allocated financial target of ₹ 0.84 crore (2007-14), MNRE released ₹ 0.60 crore. Of that, Himurja spent ₹ 0.59 crore. However, the SNA could not organize the awareness programme during the year 2013-14 due to non-release of funds by MNRE.

**Uttar Pradesh**

MNRE released (August 2006) ₹ 0.11 crore for setting up Renewable Energy Clubs in engineering colleges/institutions approved by AICTE in order to create awareness about RE, its various systems and devices among students. Audit observed that out of the 64 colleges selected by UPNEDA, 16 colleges were non-engineering colleges and only three colleges utilized ₹ 0.45 crore.

**Uttarakhand**

Against available fund of ₹ 1.80 crore during 2007-14, UREDA incurred expenditure of only ₹ 1.35 crore on awareness programme through seminars, exhibitions, training and capacity building. Further, a Mobile Exhibition Van (MEV) costing ₹ 0.10 crore was procured (2004) by UREDA for organizing exhibitions/publicity on RE in schools, colleges, public places including remote and far flung areas. Audit observed (August 2014) that the MEV was under utilized<sup>41</sup> since January 2012. Rural areas including non-electrified villages were rarely covered. Further the publicity systems/devices (solar TV/ Biogas tank) installed in the MEV for demonstration purpose were not functioning. The State Government accepted the facts (December 2014).

<sup>40</sup> Karimganj (May 2005), Kamrup (June 2005) and Dibrugarh (July 2008)

<sup>41</sup> Was used in one rural area and six urban areas of Dehradun and Nainital.

#### 4.6. Failure of training centers in achievement of objectives

As per MNRE guidelines, SNAs were required to setup training centres for demonstration of solar appliances to be installed under RE off-grid programmes and for that, SNAs were to fix targets for organizing training programme. Audit observed that in Uttar Pradesh, Training centre at Chinhat had received ₹ 0.27 crore in 2009-10 and 2012-13 for conducting training programmes but for remaining years 2007 to 2014 (except 2009-10, 2012-13), neither any training proposal was submitted by UPNEDA nor were any funds released by MNRE for the purpose. Further, a demonstration-cum-training centre 'Non Conventional Energy Research Institute' (NERI) was set up at Ghosi, district Mau in 1993-94 for ₹ 1.76 crore. Audit observed that only one training programme for 40 persons (Industrial Training Institute passed unemployed youths) was organized (March 2014) and no research work was done at the Institute. The building was lying vacant. Thus, the training centre failed in achieving its objectives.

#### 4.7. Mandatory requirement of SWHS

Audit examined whether the State Governments/SNAs/Municipal Corporations had come up with policies that encourage hotels/institutions/society/ individual home etc, to install SWHSs and that new building in certain categories were not constructed unless solar assisted water heating systems were installed in the building.

Audit examination revealed that the State Government in Andhra Pradesh issued (December 2004) orders making SWHSs mandatory for all hospitals, nursing homes, hotels, guest houses, lodges and multi storied buildings in colonies. No Objection Certificate (NOC) for building plan was to be issued only after deposition of 25 *per cent* of estimated cost of SWHSs as refundable performance guarantee, to be refunded on successful installation of the SWHSs. Audit observed that as of March 2013, an amount of ₹ 9.69 crore was pending refund by the Non conventional Energy Development Corporation (NREDCAP) to residential apartments/commercial complexes/ hospitals after installing the SWHSs. These advances were outstanding since 2005 onwards.

## 5. Conclusion

MNRE did not align its solar photovoltaic off-grid targets with the Jawaharlal Nehru National Solar Mission targets and only 31 *per cent* of the Phase I, Jawaharlal Nehru National Solar Mission targets were achieved. Most of the States did not set any solar photovoltaic off-grid targets and in cases where the targets were set, the same were not achieved. The Project Appraisal Committee did not review the progress of the projects and the processing of applications was not Information Technology enabled as envisaged under the Jawaharlal Nehru National Solar Mission guidelines.

Audit noticed instances of non submission of utilization certificates. Cases of excess recovery of beneficiary share were also observed. There were instances of irregularities in distribution of solar devices, delay in distribution, irregular purchase of solar devices, deficiencies in award of works for solar power plants, irregular payments and delay in completion of projects by the States.



Maintenance of the off-grid systems was also not done as per the guidelines and the provisions of Annual Maintenance Contract. Physical verification of sampled systems by Audit revealed that 47 per cent of the off-grid systems were not working, one per cent of the systems were found missing and five per cent of the systems were issued to electrified villages.

## 6. Recommendations

- *MNRE must ensure that targets set under the programme are in alignment with Jawaharlal Nehru National Solar Mission.*
- *MNRE may review all delayed off-grid projects, set clear timelines for completion of these projects by the State Nodal Agencies/State Governments and ensure adherence with the same.*
- *MNRE may set up an effective mechanism, in coordination with the State agencies, to ensure that the off-grid systems are properly maintained and remain functional through their useful life.*