Chapter - X

Ladakh Renewable Energy Initiative

1. Introduction

MNRE sanctioned (June 2010) Ladakh Renewable Energy Initiative (LREI) for promotion of RE in Ladakh region. The duration of the project was three and a half years i.e. up to 31 December 2013.

The project was being implemented by two agencies: Leh Renewable Energy Development Agency (LREDA) and Kargil Renewable Energy Development Agency (KREDA). Both these agencies are registered as Societies under the Jammu & Kashmir Societies Registration Act 1941.

2. Grid Connected Power

2.1. Planning

The State Government formulated (December 2011) policy for development of Micro/ Mini Hydro Power (MHP) projects[1] up to two MW with the objective to attract investors for the development of the State's water resources and to provide a solution to the energy problems in remote and hilly areas where extension of grid system was un-economical or un-viable. In the State, power projects up to two MW were implemented by Jammu & Kashmir Energy Development Agency (JAKEDA)/ LREDA/ KREDA.

LREDA along with the Alternate Hydro Energy Centre (AHEC) of the Indian Institute of Technology, Roorkee had conducted (2010-11) comprehensive feasibility studies to assess the total hydro power potential in Leh District and identified 63 potential sites for hydro projects of aggregate capacity of 45 MW. Audit observed that the inventories of all the identified sites had not been put in public domain. LREDA had not prepared long term plans to exploit hydro resources in the Leh District separately.

KREDA had neither conducted assessment of hydro power potential in Kargil District, nor prepared comprehensive plans to exploit the hydro power. MNRE stated (May 2015) that KREDA had got the pre-feasibility report of the executed projects from Civil Investigation Department (CID), Kargil and the same had been approved by the Governing Board of Ladakh Autonomous Hill Development Council (LAHDC). However, the fact remains that the agencies did not prepare long term and comprehensive plans to exploit the hydro power of the region and none of the SHP/MHP projects had been completed (March 2014) as discussed below.

2.2. Target and achievement (2010-14)

The target and achievements of LREDA and KREDA during 2010-14 is given in Table 37.

[1] The power projects upto 100 kW are defined as micro and power projects from 101 kW to 2,000 kW are defined as mini hydel as per the policy.

Table 37: Target and achievements of LREI

LREDA						KREDA					
Targets		Revised target		Achievement		Target		Revised target		Achievement	
Nos	Capacity	Nos.	Capacity	Nos.	Capacity	Nos.	Capacity	Nos	Capacity	Nos	Capacity
19	11.2 MW	10	6.1 MW	Nil	Nil	11	12.5 MW	7	11 MW	Nil	Nil

Source: LREDA and KREDA

As can be seen from Table 37, even after four years of implementation of the Programme, none of the 17 Small and Micro Hydro Power projects sanctioned had been commissioned as of July 2015.

2.3. Budgetary provisions

The details of budget and expenditure for the period 2010-14 are given in Table 38.

Table 38 : Budget and expenditure of LREI

(₹ in crore)

Activities	MNRE Grant as per Sanction	Funds received from MNRE as of 31 March 2014		Interest earned as on 31 March 2014		Total Expenditure		Un-utilised fund (including interest)	
	LREDA+ KREDA	LREDA	KREDA	LREDA	KREDA	LREDA	KREDA	LREDA	KREDA
SHP/ MHP projects	266.80	24.02	20.23	0.34	NA	24.26	17.72	0.10	2.51

Source: LREDA and KREDA

MNRE sanctioned ₹ 266.80 crore for MHPs for LREI, but it released only ₹ 44.25 crore and the expenditure was only ₹ 41.98 crore.

Audit also observed that MNRE had released funds of ₹ one crore for trees and land compensation during November 2011. KREDA had not identified (August 2014) the status of land[2] and as a result, ₹ 0.99 crore had remained unutilized as of August 2014. KREDA however, had shown these funds as utilized in the utilization certificates for the year 2012-13. This indicated that the KREDA had reflected incorrect position in the utilization certificates.

MNRE stated (May 2015) that the status of land had been taken up with the Assistant Commissioner (Revenue), Kargil and remaining amount of tree and land funds had been utilized for other SHP purposes, being the scheme under SHP head.

3. Implementation

The projects were sanctioned without allotment of land, statutory clearances such as environmental, forest, irrigation clearances and technical approvals. This was compounded by slow progress in execution of projects. The detailed audit findings are given below:

[2] Whether it was forest or private land. Also refer to para 3.2.

3.1. MHP projects sanctioned by MNRE without proper feasibility studies/ statutory clearances

MNRE sanctioned (June 2010) 30 MHP projects of 23.68[3] MW for ₹ 266.80 crore on the basis of preliminary reports, to be completed by December 2013. Subsequently, well after sanction of projects by MNRE, LREDA and KREDA allotted (August 2010 to August 2012) the work of survey, investigations and preparation of Detailed Project Reports (DPRs) in respect of 31 MHP projects[4]. On the basis of DPRs the projects were revised downwards to 17[5] (17.10 MW) for an estimated cost ₹ 219.58 crore.

None of the MHP projects had been completed (July 2014).

3.2. MHP projects allotted without obtaining necessary clearances

Audit observed that LREDA and KREDA allotted 17 mini hydro power projects to contractors for development without ascertaining the status of land of identified sites of these projects, taking statutory clearances viz environmental clearances, forest clearances, irrigation and land clearances etc. and technical approvals as given at Table 39.

Table 39: Status of statutory clearances and technical approvals for MHP projects

Agency	Projects (MW)	Allotted cost (₹ in crore)	Status of land	Allotment of contracts	Issue of land acquisition taken up	Clearances of MoWR[6]	Other clearances
LREDA	10 (6.10)	87.67	Not ascertained	September 2011 to June 2013	June to December 2013	December 2012	Technical approval of IIT Roorkee was not obtained
KREDA	07 (11.00)	134.00	Not ascertained	August 2012 to November 2013	March to May 2014	Not obtained	

Records showed that LREDA and KREDA had incurred (March 2014) an expenditure of ₹ 41.98[7] crore on these projects without land acquisition and obtaining technical approval. MNRE released (November 2011) ₹ one crore for land compensation but the funds were diverted (August 2014), as in absence of surveys it was not ascertainable whether land was Government, forest or private land.

MNRE stated (May 2015) that the matter for land acquisition had already been taken up with the Revenue Department of the State Government for transferring the land for hydro projects.

[3] 11.18 MW in Leh covering 61 villages and 12.50 MW in Kargil covering 63 villages.
[4] Which included only 23 sanctioned projects.
[5] Four of which were not in the original list approved by MNRE.
[6] Ministry of Water Resources.
[7] Leh: ₹ 24.26 crore; Kargil: ₹ 17.72 crore.

3.3. Contract awarded without establishing reasonability of rates

As per CVC guidelines estimated rate is a vital element in establishing the reasonability of prices. Audit scrutiny revealed that the Project Director, KREDA had prepared cost estimates and invited (June 2010) tenders for "surveys, investigation and preparation of DPR and supervision till successful commissioning" for 10 MHP projects. However, the orders were placed (August 2010) for surveys, investigation, detailed engineering design and preparation of DPR at a cost of ₹ 2.11 crore omitting 'the supervision till successful commissioning' without corresponding reduction in the cost. Thus, alteration in the scope of work in the contract without corresponding reduction in price indicated that undue benefit was given to the contractor with an extra expenditure of ₹ 1.35 crore incurred on preparation of DPRs of 10 projects by KREDA.

MNRE stated (May 2015) that the terrain of the project sites are very difficult to traverse for contouring and detailed survey and investigation as compared to project sites of LREDA and JAKEDA, thus attracting higher rates. The reply is not acceptable as the average expenditure per DPR was more than double the expenditure incurred by LREDA or JKEDA and KREDA did not see the reasonability of the price.

3.4. Poor physical progress of construction of MHP projects

KREDA had invited (December 2011) tenders in respect of seven MHP projects which were finalized (August 2012 and November 2013) after a period of eight to 23 months, to be completed within 24 months. Audit observed that physical progress in respect of these projects was poor even though an expenditure of ₹ 21.94 crore had been incurred (June 2014). The construction work in respect of four projects - Khandi, Sangrah, Bairas and Chilong was in the initial stage[8] and construction work in respect of remaining three projects Raru, Matayeen and Zunkul had not been started (June 2014).

LREDA allotted (September 2011 to December 2011) projects to be completed by October 2013, but progress of civil works and pen stock[9] works of six out of 10 MHP projects was slow as given in Table 40.

Table 40: Progress of civil and pen stock works

Details of work	Head works	Feeder channel	By pass channel	De-silting Tails	Foreway	Power house	Tail Race	Penstock
Progress (in *per cent*)	Nil to 50	Nil to 100	Nil to 100	Nil to 100	Nil to 95	30 to 90	Nil to 70	Nil to 60

Similarly, the construction work in respect of remaining four projects allotted during December 2012 to June 2013 was in the initial stage[10].

MNRE stated (May 2015) that lack of bidders, inaccessible terrain and locations, short working seasons and delay in release of funds resulted in poor progress.

[8] Earthwork, trench excavation, Plinth/Floor level of store rooms and staff quarters.
[9] A penstock is a sluice or gate or intake structure that controls water flow.
[10] Part earthwork in respect of civil structures, non-completion of approach roads, RCC works taken up in only one project as of May 2014.

4. Off-Grid/Decentralised systems

4.1. Target and achievement (2010-14)

The target and achievement for the Off-Grid/Decentralised systems for LREI is given in Table 41.

Table 41: Target and achievement for the Off Grid/Decentralised systems for LREI

Programme	LREDA				KREDA			
	Targets		Achievement		Target		Achievement	
	Nos.	Capacity (in kW)	Nos.	Capacity (in kW)	Nos.	Capacity (in kW)	Nos.	Capacity (in kW)
SPPs of 5 to 100 kWs with battery support for villages	51	1,502	34	1,033	23	1,100	19	840
SPPs of 5 to 10 kWs for Institutions	60	447	58	422	65	367	64	357
SPPs of 100 kWs in Defence establishments	15	810	14	790	2	157	1	100
SWHS (in sq m)	-	20,384	2,002	5,378	-	-	68	131
Dish Cookers	4,500	-	1,200	-	5,500	-	186	-
Steam Cooking Systems	15	-	1	-	10	-	Nil	-
Domestic Green houses for BPL families	2,500	-	2,500	-	3,000	-	3,000	-
Commercial Green houses	250	-	250		250	-	240	-
Solar Dryers	500	-	Nil	-	500	-	Nil	-
Experimental System – Ground supported heat pumps etc	5	-	Nil	-	5	-	Nil	-
SHLS	2,000	74	Nil	-	2,000	74	Nil	-

Source: LREDA and KREDA.

Note: Below Poverty Line (BPL), Solar Home Lighting System (SHLS), Solar Power Plant (SPP) and Solar Water Heating Systems (SWHS).

4.2. Budgetary provisions

The details of budget and expenditure for the period 2010-14 are given in Table 42.

Table 42: Budget and expenditure for the Off-Grid/Decentralised systems of LREI

(₹ in crore)

Activities	MNRE grant as per sanction	Funds received from MNRE as of 31 March 2014		Interest earned as on 31 March 2014		Total Expenditure		Un-utilised fund (including interest)	
	LREDA+ KREDA	LREDA	KREDA	LREDA	KREDA	LREDA	KREDA	LREDA	KREDA
SPPs and lighting systems	132.00	57.83	46.93	0.25	NA	58.06	39.72	0.02	7.21
Solar water heating/ cooking/ solar passive heating/ green houses/ solar dyers	64.20	7.65	3.54	0.06	NA	6.64	4.32	1.07	(-) 0.78
Capacity building, training, consultancy etc.	10.00	4.00	4.00	0.07	NA	3.51	3.46	0.56	0.54
Total	**206.20**	**69.48**	**54.47**	**0.38**	**0**	**68.21**	**47.50**	**1.65**	**6.97**

Source: LREDA and KREDA.

4.3. Implementation

4.3.1. Solar Power Plants (SPPs) sanctioned without feasibility studies

MNRE sanctioned (June 2010) 200 SPPs for installation in villages, institutions and Defence establishments in Leh and Kargil districts without preparation of DPRs and identification of sites. Sites of 19 villages in Kargil District were changed after placement (September 2010) of supply order, as most of these villages were electrified with the commissioning of Chutuk hydro power project during November 2012 and January 2013. Similarly, sites of 12 institutions were also changed due to non-availability of space for installation of SPPs.

MNRE stated (May 2015) that new sites were identified by LAHDC and prefeasibility report was prepared. The reply was not tenable as the KREDA had to change the sites due to electrification of villages and due to non-availability of space for installation of SPPs which indicate the lack of reliable feasibility studies.

4.3.2. Inappropriate selection of sites

i. It was observed that the village Saliskote in Kargil district was covered under Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) for Chutak hydro project (2010-11). As a result of this one SPV power plant of 65 kW approved (September 2010) for Saliskote village was shifted to another village Prachik Yogma, but another SPV power plant of 40 kW installed (December 2011) in the same village was not shifted. Further, another SPV power plant of 75 kW to be installed at Hardass village was shifted to Saliskote village (December 2011), despite the village being already covered under RGGVY. Thus the expenditure of ₹ 2.01 crore (cost of 75 kW) incurred by KREDA was avoidable.

MNRE stated (May 2015) that the change of sites was suggested by the Governing Board. The facts remains that change of sites led to wasteful expenditure.

ii. SPPs at villages Chikten Zgang (37.5 kW) and Techna (42.5 kW) were shifted due to their connectivity with Chutak hydro power project. They were installed at Sheep breeding farm Kakakul (37.5 kW) and at co-operative marketing society Kharul (42.5 kW) without ascertaining the power load requirement of these institutions by the respective representation of LAHDC and without approval of MNRE. KREDA records showed that the power load requirement of sheep breeding farm was five kW leading to under utilization and consequent injudicious utilisation of funds of ₹ 2.42 crore.

MNRE stated (July 2015) that the excess power was utilized in the nearby school. The reply is not tenable as the MNRE had not explained whether the full capacity of 80 kW was being utlilized. Further, the KREDA had not done the feasibility study leading to change of site.

4.3.3. Physical progress of installation not monitored

LREDA placed (2010-11) orders for installation of 126 SPPs in Leh District. Audit observed that 13 SPPs (totaling to a capacity of 465 kW) had not been commissioned (June 2014) despite lapse of 39 to 44 months. Similarly, records of KREDA showed that six SPPs (totaling to a capacity of 327.50 kW) out of total of 88 had not been commissioned (June 2014) despite a lapse of 45 months. Non-commissioning of systems had rendered the expenditure of ₹ 10.30 crore incurred on the 19 SPPs unfruitful.

The Project Director KREDA stated (September 2014) that SPPs could not be installed due to some disputes at sites even though the plants had been supplied by the firms. LREDA stated (May 2015) that the SPPs shall be installed within a period of four to five months or during the coming season.

4.3.4. Solar power plant installed without establishing reasonability of rates

As per CVC guidelines estimated rate was a vital element in establishing the reasonability of prices. Audit observed that, there was no coordination between LREDA and KREDA, and the cost of installation solar power plants by KREDA was higher than that by LREDA, leading to excess expenditure of ₹ 0.95 crore as given in Table 43.

Table 43: Cost of installation of SPV power plants

Capacity of SPV power plants (in kW)	Cost of SPV power plant		Cost difference per plant (in ₹)	No. of systems	Total extra cost(in ₹)
	LREDA	KREDA			
5	12,54,041	13,23,690	69,649	18	12,53,682
10	20,55,000	21,92,342	1,37,342	16	21,97,472
37.50	78,38,000	82,21,620	3,83,620	5	19,18,100
42.50	91,51,000	94,47,025	2,96,025	4	11,84,100
57.50	1,20,66,000	1,23,39,000	2,73,000	3	8,19,000
65	1,37,48,000	1,40,59,268	3,11,268	6	18,67,608
100	1,73,00,000	1,76,25,361	3,25,361	1	3,25,361
Total				**53**	**95,65,323**

Similarly, in case of Evacuated Tube Based Collector SWHS the rates difference given by the same contractor in Leh and Kargil was ₹ 7,997 for 300 Litres per day SWHS and ₹ 25,549 for 500 Litres per day SWHS leading to excess expenditure of ₹ 0.09 crore[11] by KREDA.

MNRE stated (May 2015) that the public tender procedure was followed. The rates were a little higher than LREDA. The reply is not acceptable as the cost difference was very high and KREDA could have negotiated with the firm who had supplied the same systems to LREDA.

4.3.5. Solar Home Lighting Systems distributed to ineligible beneficiaries

MNRE sanctioned (June 2010) 2,000 SHLSs for Kargil district under LREI. Audit observed that KREDA had not conducted any survey to identify the beneficiaries and 451 SHLSs for ₹ 53.22 lakh were distributed in villages falling within the electric connectivity of hydro power projects and 251 SHLSs for ₹ 29.61 lakh in the villages where the SPV power plants had been established during 2010-12. Audit also noticed that 246 SHLSs were issued against 192 households in four villages where as in nine villages 205 SHLSs were distributed against 350 households in these villages, which was anomalous.

MNRE stated (May 2015) that the distribution was as per the decision of Governing Board of LAHDC. However, the fact remains that KREDA had not conducted any survey to identify the beneficiaries, leading to ineligible beneficiaries being given SHLSs.

4.3.6. Excess expenditure incurred by not invoking the 'risk and cost' clause

The terms and conditions of the bidding document envisaged that if the supplier failed to make supply within the stipulated period, risk purchase at the cost of the supplier will be made within two months of the expiry of stipulated delivery period by inviting short term quotations. Based on the bidding process, LREDA placed order on four agencies[12]for design, manufacture, supply, installation and commissioning of SWHSs covering 7,500 sqm. It was observed in audit that the suppliers covered only 3,432 sqm during 2011-12 leaving a balance of 4,068 sqm. LREDA instead of taking penal action against the suppliers, invited (March 2013) fresh Notice Inviting Tender (NIT) and placed supply order for purchase of systems of 15,000 sqm collector area including 4,068 sqm at a rate higher than the rate approved in earlier tendering process. LREDA had not recovered excess cost of ₹ 22.65 lakh from the pending bills of the suppliers who had earlier partly supplied the systems.

MNRE stated (May 2015) that the 7,500 sqm was an envisaged target and not necessarily equal to the supply orders. Demand upto 2013 was only for 3,432 sqm hence supply orders for this number of systems were issued. The reply is not acceptable as the work order was placed for 7,500 sqm.

4.3.7. Irregularities in establishment of polygreen houses

MNRE sanctioned (June 2010) CFA for establishment of 5,500 domestic green house for Below Poverty Line (BPL) families and 500 for commercial purpose. Audit observed that,

[11] 300 LPD- 6 Nos = ₹ 7,997 X 6 = ₹ 47,982, 500 LPD – 70 Nos = ₹ 25,549 X 70 = ₹ 17,88,430.
Total extra expenditure = ₹ 47,982 + ₹ 17,88,430 = ₹ 18,36,412, On 50 *per cent* payment = ₹ 9,18,206.

[12] M/s Electrotherm Renewables, M/s Solarium Solar Power Systems, M/s Neutech Solar Systems Pvt Ltd and M/s Solar Energizers Pvt Ltd.

during 2011-14, only 600 poly green houses were established for BPL families and 1,900 were given to other interested non-BPL beneficiaries.

As per guidelines, ₹ 11,500 per house or 50 *per cent* of the cost whichever was less, was to be recovered from the beneficiary but LREDA under recovered ₹ 1.42 crore and KREDA did not recover any amount.

MNRE stated (May 2015) that there was no further BPL family taker for the 1900 poly greenhouses, hence decision was taken by LAHDC that left over domestic green houses be distributed to every block of the district on population basis, to the interested beneficiaries. Reply cannot be accepted as the agencies had not taken the permission of MNRE for distribution to other than BPL family and recoveries should be as per MNRE's guideline. Further, the cost of poly greenhouses was ₹ 23,000, much higher than benchmark rate of MNRE.

4.4. Monitoring

Audit observed that periodic monitoring to ensure proper functionality of systems had not been carried out. Third party evaluation was not done. Further the functional status of plants installed under LREI was not ascertained and the Agency had no relevant data in this regard.

MNRE stated (May 2015) that the required third party inspection for the project on LREI shall be done soon.

4.5. Physical Verification

Audit conducted physical verification of the systems installed under LREI on a test check basis to see the condition of the systems installed and the problems faced by the users. Audit findings are given in Table 44.

Table 44: Physical verification of LREI systems

Type of system	Location	Reasons
Solar Power Plant	Saliskote Village	Two plants were installed. One plant of 40 kW installed in December 2011 was not working properly. The battery backup was very poor and had not been rectified despite the firm (M/s TATA BP) being approached. The village was also covered by RGGVY.
	Village Umba	Connection was provided only to 65 households out of 150 because of non-laying of distribution network.

MNRE stated (May 2015) that due to the scattered nature of the village and low capacity of the SPV power plant the lighting system was connected to only 65 households. Hence LAHDC has decided to approach MNRE for another SPP for the remaining hamlets of the same capacity, so that entire village could be covered. However, the fact remains that 85 households were still to get electricity from SPP.

5. Conclusion

Ladakh Renewable Energy Initiative was taken up with the objective of promotion of renewable energy in Ladakh region. The duration of the project was three and a half years (June 2010 to December 2013).

Audit observed that Ladakh Renewable Energy Development Agency and Kargil Renewable Energy Development Agency did not undertake comprehensive feasibility studies to assess the total hydro power potential. Though the two implementing agencies viz. Ladakh Renewable Energy Development Agency and Kargil Renewable Energy Development Agency set targets of 11.2 MW (revised to 6.10 MW) and 12.50 MW (revised to 11 MW) respectively during 2010-14, neither of the two agencies were able to put in place any capacity during the period. Even after four years not a single Small Hydro Power/ Mini Hydro Power project was installed.

Audit further observed poor due diligence in implementation of sanctioned projects, such as allotment of land without taking statutory environmental, forest, irrigation and land clearances and technical approvals, excess payments to contractors, diversion of funds besides non-completion of projects. Monitoring mechanism was also found to be deficient.

Audit observed that off-grid solar power projects were sanctioned by MNRE without conducting feasibility studies. As a result, two solar plants were installed in a village that was already covered under Rajiv Gandhi Grameen Vidyutikaran Yojana and 702 Solar Home Lighting Systems were distributed to ineligible beneficiaries. There were deficiencies in implementation of the projects.

It was further observed that contracts were awarded without adhering to bidding document requirements. Instances of excess payment to contractors and awarding of contract without establishing reasonability of rates were also noticed.

6. Recommendations

- *MNRE must ensure that comprehensive and reliable feasibility studies of the sites are conducted before sanctioning projects.*
- *Prior to sanctioning of the projects all statutory clearances, particularly land clearances, must be taken.*
- *Evaluation of progress of work during implementation and post implementation must be carried out by MNRE or State Agencies or reliable third parties.*