



LADAKH RENEWABLE ENERGY INITIATIVE

- A Report

*the only renewable energy agency of the district,
fostering the development of sustainable and resilient
energy systems*

KREDA
9/14/2017



The Ladakh Renewable Energy Initiative

(Highlights)

Kargil Renewable Energy Development Agency (KREDA) has been working to familiarize the mass with varied aspects of Renewable Energy at the same time promoting commercial exploitation of know how. The most prominent aims and objectives of KREDA is to promote sustainable development of the area by harnessing the immense potential of renewable energy from Solar, Solar

Thermal, Wind and Hydro sources in a sustainable manner contributing towards reducing scarcity of energy generation and the cost. Ministry of New and Renewable Energy, Government of India, sanctioned the **Ladakh Renewable Energy Initiative (LREI)** for the development of various Renewable Energy based schemes like Solar Photovoltaic (SPV) Plant, Micro/ Mini/ Small Hydro Power Projects, Wind Energy and Solar Thermal systems.

The agency's one of important objectives is to develop and strengthen the facilities and capabilities and undertake human resource development programmes to build a sustainable economy in the region.

KREDA has been sanctioned with Small Hydro Projects of capacity ranging from 500 kW to 2500 kW at 07 sites. Work is under progress at all sites.

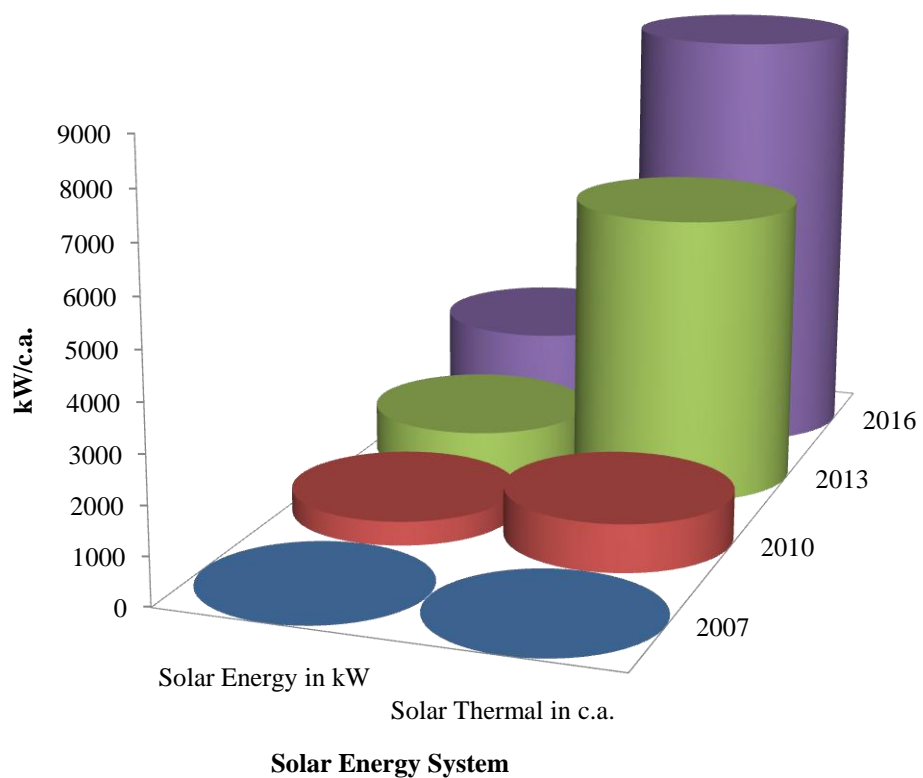
Ladakh Renewable Energy Initiative (LREI)

S.No.	Project	Total Capacity/No
1.	Micro Hydel projects 07 Nos.	10.55 MW
2.	SPV Power Plant with battery support (above 2.5-100 KWp)	1.60 MW
3.	SPV Home Lighting System	2000 Nos.
4.	Solar Thermal Systems: Water Heating Devices	10000 sqm. c.a.
5.	Solar Green House	3250
6.	Solar Cooker	600
7.	Solar Drier cum heating system etc.	200
8.	Other Systems (Specialized applications)	



Renewable energy has begun making visible impact in the District energy scenario of Kargil. The solar power plants have benefited thousands of rural folk by meeting their lighting and other energy requirements in an environmentally benign manner.

District Renewable Energy Scenerio



Small Hydro Projects under KREDA:

The foremost requirement for micro/small hydroelectric is a good perennial source of water at a height which can be used to run a turbine and generate electricity. This criterion is of course met by most of the sites in almost all

the three regions of Jammu and Kashmir. In Ladakh several villages witnessed the installation of micro/mini hydro plants by some NGOs and Government agencies, promoting renewable source of energy. In evaluating a potential

micro/mini hydro site we need a sufficient quantity of falling water and some other considerations such as its Power Output, Economics (Costs), Permits and Water Rights etc.

The scope for the development of Hydro Energy is immense in Kargil by using available natural resources. Hydro energy is generated on perennial streams available in abundance. KREDA has selected more than 40 Nos. of feasible sites for the development of Mini Hydro Power Projects on tributaries of River Suru, River Drass, River Zaskar, River Shingo and Wakha Nallah with a an approx. capacity of

more than 70 MW. KREDA has taken only 07 projects in three clusters as its Ist Phase projects. Cumulative capacity of the projects shall be 10.55 MW

Suru Cluster:

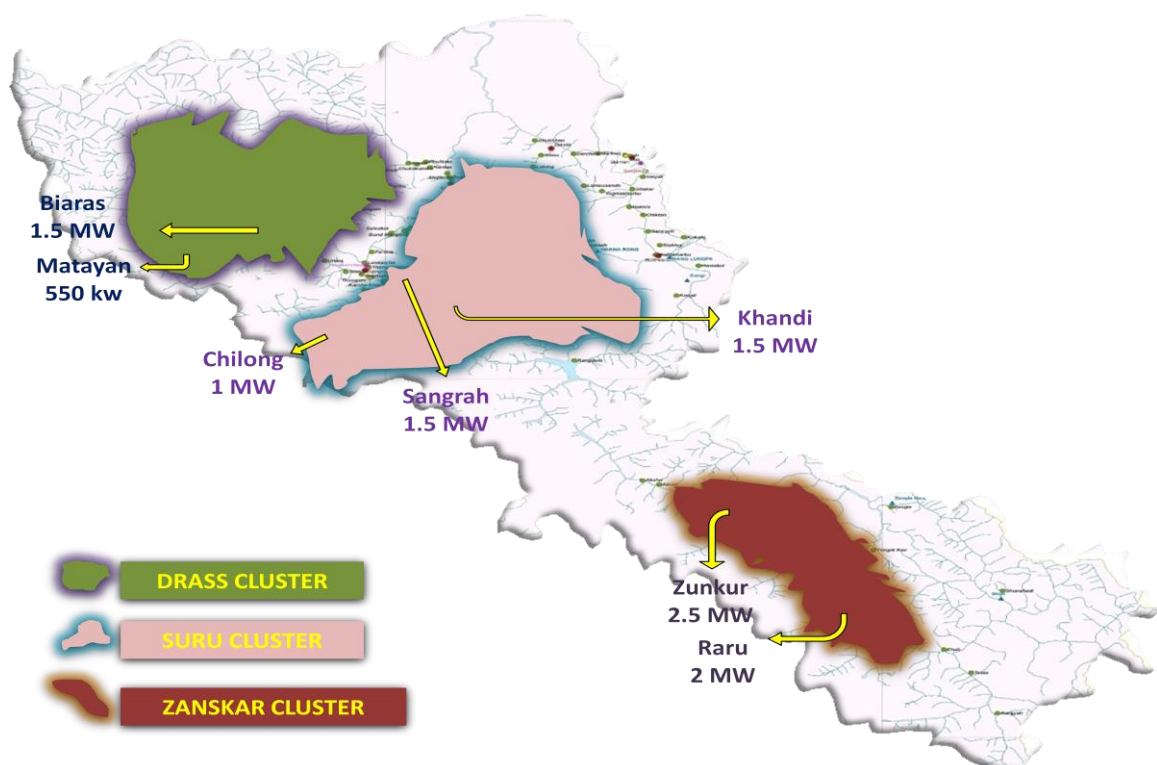
1. SHP Sangrah
2. MHP Chilong
3. SHP Khandi

Drass Cluster:

1. MHP Matayeen
2. SHP Bairas

Zaskar Cluster:

1. SHP Ating. (Later on renamed as Zunkhul)
2. SHP Raru





SHP Biaras



SHP Matayeen



SHP Chilong



SHP Zunkul





SHP Sangrah



SHP Khandi



SHP Raru

Solar Thermal Project in Kargil:

KREDA has been trying its best to achieve a remarkable growth in the contribution of solar thermal renewable energy in the District.

With the objective of promoting development and commercializing agriculture (through greenhouses) KREDA has been constructing green houses all over the district since its inception. KREDA has successfully installed hundreds of nos. of Domestic Green Houses in Kargil, and is constructing numbers of Commercial Green Houses. The MNRE has always been helping in strengthening the agency to supply the locals with new and latest technologies involved in the field of Solar Thermal Energy.

KREDA's aim is to develop and strengthen the facilities and capabilities; evolve strategies; and undertake human resource development programmes to build a sustainable economy. The agency has introduced the Solar Dish Cooker

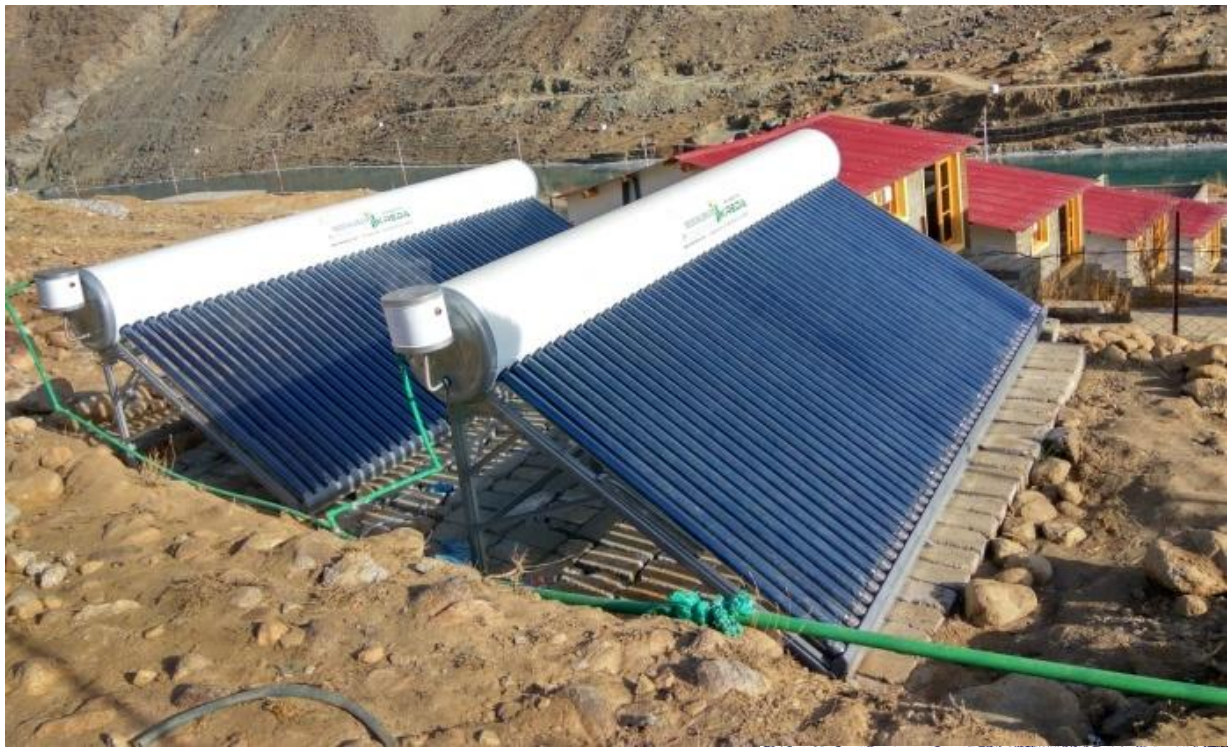
Scheme to the public during early 2013. Since then KREDA has left no stone unturned in developing and propagating this scheme. KREDA has completed the installation of around 600 nos. of SDC in Kargil.

One more important device that has been launched in Kargil by this agency is Water Heating System (WHS), a solar energy device. Water heating device is available in any capacity ranging from 100-500 LPD and could be used for households, institutions and commercial buildings. The agency has a target of 10,000 sqm collector area to be covered by ending 2017. So far the agency has completed nearly 9000 c.a.

The systems shall save several tons of firewood and thousands of kilo liters of diesel annually if properly used by the beneficiary. The system is eco-friendly and would reduce deforestation, desertification process and pollution as well.

Physical Status Solar Thermal System

Scheme	Physical Status
Solar Thermal Scheme under Ladakh Renewable Energy Initiative	The green house and solar dish cooker scheme has been completed and Water Heating System is yet to be completed



Solar Photo Voltaic Power Plants in Kargil:

The northern part of the subcontinent, especially the Ladakh region, is blessed with an abundance of sunlight and high solar radiation. Harnessing solar energy into consumable electricity is highly effective and useful.

Under **Ladakh Renewable Energy Initiative**, a scheme sanctioned by MNRE GOI to minimize dependence on diesel in the Ladakh region and meet power requirement through local renewable sources, KREDA has been establishing number of SPV Power Plants capacity ranging from **25 kWp to 100 kWp** in various villages and Army establishments, small Photo Voltaic Power Plants in various institutions capacity ranging from **2.5 kWp to 10 kWp**. SPPs have been installed in nearly **Twenty two** villages, most of which are remotely located, and some **Army establishments** and nearly **62 institutions**.

The agency has been sanctioned with SPV Pump also. But the project has not yet been started. KREDA has received several applications for the systems from government institutions as well as local beneficiaries. The project shall be started soon and progressive farmers shall be supplied with the system. Solar Photo Voltaic system supported pump is in great demand here in Kargil.

Physical Status Solar Photovoltaic & Solar Home Lighting System:

Scheme	Physical Status
SPV for Institutions and Villages under Ladakh Renewable Energy Initiative	Completed
Solar Home lighting System	Completed



SPV

in

VILLAGES



Wind Energy Development in Kargil

Wind Energy Development in Kargil has been initiated by the demonstration projects established by **Kargil Renewable Energy Development Agency (KREDA)** under the guidance of the C-WET, an R & D organisation established under the MNRE, in five most windy places of the district.

Five candidate sites in Kargil with **50m wind masts** installed for wind resource assessment:

S.No.	SITE NAME	BLOCK	EXECUTING AGENCY/COMPANY
01	Khumbathang	TSG	NIWE in collaboration with Ramakrishna
02	Photang	Zanskar	NIWE in collaboration with Ramakrishna
03	Rangdum	Tai-Suru	NIWE in collaboration with Ramakrishna
04	Hambutingla	Kargil	NIWE in collaboration with Ramakrishna
05	Lakhthang	Drass	NIWE in collaboration with Ramakrishna

The monitoring heights of the basic/optional parameters at all the five sites in District Kargil:

S.No.	Parameters	Unit	Monitoring Heights
01	Wind Speed	m/s	10m, 30m, 50m
02	Wind Direction	Degree	30m, 50m
03	Temperature	(°C)	03m
04	Pressure	Mb	03m
05	Solar Radiation	w/m ²	03m

Note: Each site has same parameters at same heights.

Status of Wind Resource Assessment in Kargil:

As per the directions and guidance of the team from C-WET our agency has been looking after the masts/stations. Since the installation of the masts in October 2010 the officials have been replacing the Multi Media Cards (MMC) and batteries each month, and along with the Chip Collection Report send to C-WET for assessment.

Detailed Physical achievement/status reports of Wind Energy at various sites in Kargil:

S. No	Project Sites	Coordinates	Status
01	Hambutingla Kargil	Latitude: 34°35'02.4"N Longitude: 76°16'30.5"E	Mast installation work was completed on 21/10/2011. So far two year data has been collected. The data logger is collected from the station as the target period for 2 years data collection has been completed.
02	Khumbathang TSG	Latitude: 34°23'51.4" Longitude: 75°59'47.8"	The wind mast installation work has been completed on 16/10/2011. So far two year data has been collected. The data logger is collected from the station as the target period for 2 years data collection has been completed.
03	Photang Zanskar	Latitude: 33°29'19.9" Longitude: 76°53'4.8"	The mast erection work has been completed on 17/10/2011. So far two year data has been collected. The data logger is collected from the station as the target period for 2 years data collection has been completed.
04	Rangdum Tai-Suru	Latitude: 34°02'8.4" Longitude: 76°22'25.2"	Mast installation work has been completed on 21/10/2011. So far two year data has been collected. The data logger is collected from the station as the target period for 2 years data collection has been completed.
05	Lakhthang Drass	Latitude: 34°25'30.7"N Longitude:	The wind mast installation work has been completed on 22/10/2011 So far two year data has been collected.

Wind Characteristics: The Average Wind Speed and Wind Density at various heights (Based on Oct 2011 to Aug 2012) for the five sites is given below.

Station	50 m		30 m		10 m	
	WS (m/s)	WPD (W/m ²)	WS (m/s)	WPD (W/m ²)	WS (m/s)	WPD (W/m ²)
Hambutingla	4.07	90.09	4.05	96.19	4.41	115.92
Lakhthang	3.17	60.10	2.87	48.97	3.03	48.17
Khumbathang	3.03	67.65	2.79	60.35	2.77	46.12
Rangdum	3.08	48.16	3.09	44.21	2.91	35.81
Photang	4.80	161.15	4.58	144.69	3.90	86.86



Under other MNRE Sanctioned Schemes the agency has started installing **Water Mills & Unnat Chulhas**

Water Mill Project of MNRE, GOI

The installation of Improved water Mill is to renovate the existing old Gaharatas (Chakki) used to grind flour and also to generate electricity by using motors that will use for individual households as well as cluster of villages for Electrification as well as to use end machines like butter churner, spinning Machines, small carpentry Machines and the most is the electrification of the Households as most of the remote villages are still not connected with grid and without electricity and it will give a significant impact on the general standard of living of the village communities. The main benefit of electrification is lighting, which results in a longer working day as well as a better quality of life. In addition to lighting, electrification enables the use of machines for saving time and effort in domestic activities as well as generating income.

Installation of Improved Water Mill: There is lot of demand from the public for installation of new and improvement of the existing old water Mills with Mechanical or Electrical. KREDA had proposed to install 100 Nos of improved water Mills in different villages of Kargil with maximum contribution from the beneficiary. The ministry i.e. MNRE, GOI has sanctioned 30 nos. of Mills 20 Mechanical and 10 Electrical.

So far four Water Mills have been installed & commissioned out of **30 Water Mills**. 26 more shall be installed (Both Electrical & Mechanical).

Unnat Chulha Scheme:

The Unnat Chulha, introduced by this agency, has already been tested by the MNRE certified agency. The technical specifications of the chulha and its design have become a public favorite. The target to be achieved under **U-Chulha** was **1000 nos.** and KREDA has issued nearly 900 U-Chulhas and shall be issuing more **100 Chulhas** to complete the target.

The ‘Unnat Chulha’ (Locally called HLCHAQS-THAB):

- The Unnat Chulha, introduced by KERDA, is designed in such a way that it could be a reliable option in reducing the indoor air pollution. This Chulha is especially premeditated keeping in view the harsh winter of the region.
- It is a technically reinforced stove.
- The Chulha has been technically checked for its efficiency in cooking and heating.

The Unnat Chulha has further additionalities like:

- Contribution to sustainable development by improving the standard of households.
- Environmental additionality by improving health and environment.
- Financial additionality by enabling using appropriate firewood saving technology.

The Chulha can play a vital role in avoiding the emission of greenhouse gases and smoke from traditional cooking and open fires.

Concentrated Solar Thermal Technology

- ❑ Kargil is by nature, gifted with annual average 300 days of sun shine and average solar radiation of 5-7 KWH/m², where power potential @ 22-25 MW/sq Km is incident during the average clear days, which discerns the scope of tapping solar energy in the District.
- ❑ Concentrated Solar Thermal (CST) Technology is very new to Kargil District, though the district has an immense potential to make use of it in various applications with DNI levels.
- ❑ An effort of beginning the CST technology has been made by KREDA this year only.
- ❑ It is hoped that by 2020 KREDA shall install more than 10 nos. of Steam Cooking System in Kargil at Ba-Ashram, Al-zahara ,yateem khana, Mutharay hostel, Lankerchey orphanage, etc.
- ❑ KREDA has installed the first Steam Cooking System at Jawahar Navodaya Vidyalaya Campus, Khumbathang. After this successful demonstration, efforts to create awareness about CST and promote the technology shall be taken up.

JNV

KHUMBATHANG



5kWp Solar Photovoltaic (Newly Sanctioned Scheme):

Through this scheme KREDA shall be installing 405 nos. of Photovoltaic Rooftop plants in Kargil. So far nearly 50 systems have been installed in various Govt. & residential buildings.

2nd Phase: The proposed project consists of the following schemes: -

Name of the Scheme	Tentative Cost (Rs in Crore)
(A) Installation of Mini/Small Hydel Projects In Kargil 12500 kWp (7 Nos.)	112.50
(B) Installation of Micro Hydro Projects of 1456 kWp (22 Nos.)	13.10
(C) Replacement of incandescent bulbs into LED (120000 Nos)	1.38
(D) Solar Home lighting Systems (5700 Nos)	7.12
(E) SPV Power plants for institutions 2.5 kWp, 5kWp, 10 kWp (100 Nos)	25.06
(F) Space Heating Through Panels in different Govt. Institutions (435 Rooms)	14.23
(G) Improved Water Mill (65 Nos.)	2.26
(H) Wind Solar Energy Project (17 Nos.)	5.10
(I) Thermal Project (DGH, CGH and WHS)	16.63
(J) Solar Street Light LED Based Lamps (Nos. 115)	0.35
1 Office expenses (Travel, Misc, equipments, salary, training etc.) Lump sum	10.00
2 Office Vehicle (3 Nos.)	0.40
T O T A L	208.53

PMDP

Reconstruction of J&K

1. **07 MW** capacity, grid-connected, may come under KREDA's supervision and control which includes:
 - four Projects of **01 MW** each
 - at four places: Khangral, Drass, Sankoo and Zanskar.
 - and one project of proposed capacity **03MW**
 - at Yubaltak.

Sites have been identified and feasibility has also been checked. Site Photographs and coordinates including other [details](#) have already been sent to SECI.
2. EOI for DPR Preparation of Hydro Projects 500 kW to 10 MW capacity has been sanctioned to KREDA.
3. DPR Preparation in KW capacity range is also assigned.
4. Solar Off-Grid Home Lighting/Street Lights:
 - 16000 HLs and Street Lighting at 09 locations upto 2.5km.

Solar Pump: The agency has been sanctioned with SPV Pump Scheme. But the project has not yet been started. KREDA has received several applications for the systems from govt institutions as well as local beneficiaries. The project shall be started soon and progressive farmers shall be supplied with the system. Solar Photo Voltaic system supported pump is in great demand here in Kargil.

Other than MNRE, GOI

Projects

The Ladakh Renewable Energy Initiative Project has been, no doubt, a very big and successful project. The programme was initiated by the Ministry of New & Renewable Energy (MNRE), Govt. of India (GOI), to electrify the far-flung areas/villages falling under one of the difficult terrains of the subcontinent, Ladakh (Kargil & Leh). Many villages have been covered either under Solar Power or Hydro. But still, as per a survey done by KREDA, there are several villages in Kargil district which are totally unelectrified. The numbers of villages are so large that small projects could not cover these villages. In this connection KREDA has submitted a project proposal, “LREI-2nd Phase”, to MNRE, GOI.

Apart from the activities sponsored by *MNRE, GOI, KREDA* has also

implemented **CSR Project** of worth Rs. 2.96 crore by installing and commissioning of 02 Nos SPV power plants of 42.5 KWp each with five years operation and maintenance in two un-electrified villages of Zanskar sub-Division in Kargil District funded fully by **Engineers India Limited (EIL)** under their *Corporate Social Responsibility (CSR)* scheme. The scheme will electrify 120 HHs in two villages of Zanskar by December 2011 as these villages were not covered under Ladakh Renewable Energy Development initiative of MNRE. Under Nano-Grid System KREDA has electrified various unelectrified villages. Lanterns have been distributed among hundreds of poor shepherd families. Under the **CSR Scheme of Power Finance Corporation of India** the agency has distributed Solar Lanterns among the shepherds of district Kargil.

Nano Grid (DC Grid):

Under the Scheme “Nano-Grid”, KREDA, in collaboration with a team from Himalayan Expedition, has installed photovoltaic systems (DC-Grid) in various villages/hamlets of Kargil. KREDA have started this mission for providing electricity to those villages which doesn't have any source of electricity for lighting purpose neither from DG Set nor from any Hydro project.

The system is of low-cost and has ability to generate, store and use direct current (DC) electrical energy locally, DC solar micro-grids can act as an ideal solution that can transform energy infrastructure for rural communities to power household use as well as local businesses. The implementation is affordable, safe, simple, flexible and also energy efficient.



The topography of the region, Kargil, is mountainous with little or no vegetation. The mountains are of sedimentary rocks and are in process of disintegration due to weathering. The terrain being hilly, available land for agriculture is meagre. The summer being short, only one crop of local gram or wheat is grown.

So far the power availability is concerned; it is completely not enough to meet the requirement of the community. Presently there are around 157 villages in Kargil, out of which only 97 villages are electrified (of which 95% through DG Sets). There are mainly two power stations one small hydro (Iqpal Project) with an installed capacity of 3.75MW and one DG station with 4MW capacity that supplies electricity to the main town of Kargil and villages nearby. There are also two numbers of mini hydroelectric power units and some DG sets (with capacity ranging from 50-750 KW) mostly installed in the progressive villages.

