

## Dissemination of energy efficient buildings in the cold deserts of Western Indian Himalayas



The project provides access to sustainable and affordable energy and improves the living conditions of rural population in Ladakh and Himachal Pradesh.

### Context



The valleys of Lahaul and Spiti in Himachal Pradesh state and Ladakh in Jammu & Kashmir state, lie at altitudes higher than 3,000 metres above sea level. During the harsh and long winter, temperatures generally fall below  $-20^{\circ}\text{C}$ . The villages remain isolated for more than six months a year since the access passes are blocked by snow. However, the region benefits from strong sunlight during more than 300 days per year.

In the last fifty years this region has been the subject of rapid and deep evolution. New economic opportunities have been created but they are mostly available in the main cities. In rural areas inhabitants rely on livestock breeding and self subsistence agriculture, as there are hardly any employment opportunities outside the cities. Shortage of local fuel and the high price of imported fossil fuels result in a situation of energy vulnerability. Women and children have to spend around two months per summer to gather dung in pasture land. Traditional houses are thermally poorly efficient and room temperatures fall below  $-10^{\circ}\text{C}$  in winter, resulting in adverse living conditions. Very few activities are possible during winter, even inside houses, due to cold temperature.



The project is implemented in both Leh & Kargil districts in Jammu & Kashmir as well as in Lahaul, Spiti & Kinnaur districts, in Himachal Pradesh, which all together represent an approximate population of 300,000 inhabitants.

### Objectives of the project

The project aims at setting up all necessary conditions for sustainable scaling-up of energy efficient buildings and, therefore, improving the winter livelihoods of rural population in the cold desert areas of Indian Himalayas.

More specifically, the major objectives consist in:

- Integrating energy efficiency in 1,000 private and community buildings
- Organising sustainable networks for dissemination of energy efficiency measures
- Enabling income generation activities in the newly warm rooms
- Reducing the pressure on local and global environment.
- Building capacity of local NGOs and artisans on energy efficiency

The target population are the poor villagers, women Self Help Groups and individuals living with less than 0.5€/day (around 30 INR/day).



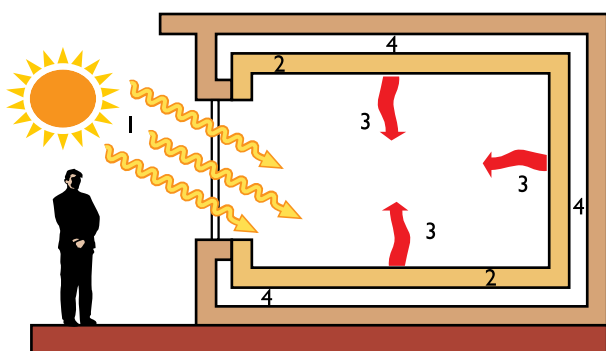
## Integrating energy efficiency in domestic and community buildings

### What is a passive solar house?

Passive solar architecture takes advantage of solar radiation during the cold season to heat the inner space of a building and keep rooms warm both during day and night.

This is how it works:

1. Collection of solar radiation
2. Storage of the heat collected during the day
3. Release of the heat inside the building at night
4. Insulation of the whole building to retain the heat



The project enables to integrate energy efficiency in buildings. The passive solar housing (PSH) technologies combine solar gain, thermal mass and systematic insulation (window, infiltration, wall, ground and roof). Three main options are promoted for solar gain: Direct gain, Solar Wall (alike Trombe Wall) and Attached Greenhouse. They can be integrated in new construction as well as in existing buildings through retrofitting.

The project assists 970 individual households and 30 community groups to build or retrofit energy efficient buildings in 125 villages.

For an investment cash cost lying between 150 and 500€, depending on the investor capacity, heating needs decrease by 60% and indoor temperatures remain continuously above 5°C, even at night time when outside temperatures fall below -20°C.

Social and health impacts are also significant: the number of winter diseases for children (indoor smoke and cold related illness) is decreased by one third and maternal health is significantly improved.

### Awareness raising campaign

Since energy efficient techniques are not well-known in targeted remote areas, the first essential step is to initiate communication activities within the communities, firstly for raising awareness, secondly for favouring the appropriation of the action and thirdly for encouraging replication. A series of radio and TV broadcasts in local languages are done for mass awareness.



## Organising sustainable networks for energy efficiency measures

A main objective of the project is to set up all required conditions to ensure large and sustainable dissemination of energy efficient housing techniques after the project period.

In this view the project aims at organising and strengthening three types of sustainable networks at different levels to allow a large diffusion:

### Small & medium enterprises of building sector

200 masons and carpenters are trained and certified as service providers for renovation and construction using energy efficient techniques.

### 15 grassroots level networks

These networks, set up at the level of village clusters, play a very important role in ensuring grassroots participation in the project as well as acting as a pressure group to advocate policy with the district authorities.

### Policy-level networks

Establishing policy-level networks at district and state levels help promote energy efficiency practices, allocate subsidy to grassroots networks for energy efficiency incentives, support very poor villagers, and recommend policy on energy efficiency.



## Enabling income generation activities in a warm environment



Wool is one of the main natural resources of Western Himalayas, especially in the proposed remote villages where livestock is important. Wool transformation is a usual activity focused on household products. Besides, lots of traditional handicrafts still constitute a major source of income (metal work, goldsmith, thanka painting, silver jewellery, pottery...).

Offering a warmer and brighter environment provided by a passive solar room, the project supports income generation activities and enables artisans to increase their winter income from handicrafts by 50%.

A total of 500 semi-skilled artisans (a large majority of women organised in self help groups) are assisted to develop handicraft income generation activities and to build technical, administrative and marketing skills.

## Reducing the pressure on local and global environment

Mountain areas are not only an ecologically extremely sensitive environment, they are also among the first to experience the impacts of climate change. The local consequences of climate change in Ladakh are particularly felt in terms of water availability. An impact assessment done in 2008 shows that in many villages changing precipitation patterns have led to the drying up of natural springs and that winter precipitation has decreased by nearly 50% over the past 35 years. In combination with an increase in summer maximum temperature (by 0.6 °C over the past 10 years) this has caused many small glaciers in the region to retreat.



To enable communities to cope with the impacts of climate change the project proposes, tests and implements strategies to adapt to already observed changes. This includes changes in house designing, cropping patterns or water management.

The project also raises awareness on climate change related issues among communities and institutions. This includes school and village campaigns as well as radio and TV broadcastings.

By introducing passive solar architecture the project reduces fuel consumption, therefore reducing the pressure on natural sources for heating purposes and avoids current and future CO<sub>2</sub> emissions.

Besides, adaptation solutions to climate change are explored and developed with the involvement of the communities. Artificial glaciers constitute one of the major solutions under the project.



## Developing a comprehensive offer

In order to provide the population and the public sector with a comprehensive offer of energy efficient buildings, research & development are conducted on improved stoves for Ladakh. It also participates to the effort to mitigate the pressure on natural sources thanks to the reduction of biomass used for heating and cooking purposes.



## Transfer of Knowledge & Technology

The project is implemented by a network formed by five local NGOs. A significant activity of the project focuses on building the knowledge and capacities of the civil society as well as the public sector stakeholders (especially engineers). Training sessions, workshops, practice with technical guidance on designs, training on site, etc. compose this activity.

To enable the NGOs consortium to be recognised and to be a reference in the Hindu Kush Himalayas, the project reinforces their technical, organisational and advocacy capacities.

## Implementation methodology

A network of five Ladakhi NGOs and one European NGO implements the project. The role of the local NGOs is defined in two dimensions: resource NGO and proximity NGO. Being a resource NGO means being a technical advisor to the proximity NGOs in its specific fields of knowledge. Working as a proximity NGO implies being responsible for the implementation in one's own area. A resource NGO can also be proximity NGO in its traditional area.

GERES, a European NGO, coordinates the network and elaborates with the resource NGOs the implementation methodology.

## A dynamic NGO network

### GERES (*Groupe Énergies Renouvelables, Environnement et Solidarités*)



GERES is a French NGO working in India, Cambodia, Afghanistan, Central Asia, West and North Africa and South of France. It has been working in Ladakh since 1986,

aiming at supporting local NGOs and institutions to promote income generation activities and ecofriendly technologies by using energetic services and renewable energies. GERES is the leader and coordinator of the project.

### ECOSPHERE



Since 1992, ECOSPHERE, consortium of MUSE and STAG NGOs, has been working in Spiti on community mobilisation, preservation of the culture and passive solar technologies. It has considerable experience in seabuckthorn processing and marketing. It implements the project in Lahaul and Spiti districts, as a proximity NGO.

### LEDEG (*Ladakh Ecological Development Group*)



Created in 1983 LEDEG is one of the oldest Ladakhi NGOs, recognised for its work on renewable energies, environment, organic agriculture, education, food processing and handicrafts. LEDEG has implemented an integrated livelihood project in Durbug block with 100 kW PV solar plant. The organisation is based in Leh, with two sub-offices in Kargil and Padum. In the project it is the resource NGO for the climate change component and trombe wall technology. LEDEG implements the project in Changthang, Nubra, Zangskar, Drass and Suru valley.

### LEHO

#### (*Ladakh Environment and Health Organisation*)



LEHO has been working since 1991 on ecological agriculture, passive solar housing, handicraft, health and environment. It has expertise in greenhouse technology and pashmina fiber processing. In the current project it is resource NGO for social aspects, target group identification, investment capacity assessment and owner mobilisation process. LEHO implements the project in Sham and central Ladakh.

### LNP (*Leh Nutrition Project*)



Working in Ladakh since 1978, LNP focuses on children and development, education, health, passive solar architecture and rural development. LNP has developed the concept of artificial glaciers to cope with climate change. It is the resource NGO for handicraft component, direct gain and attached greenhouse technologies. LNP carries out the project in Rong area, Changthang and Markha valley.

### SECMOL (*Students' Educational and Cultural Movement of Ladakh*)



SECMOL has been working since 1988 in education, media, environment and rural energy. With a long experience on energy efficient building construction, SECMOL is the resource NGO for awareness campaign, media and publication.

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