

Solar energy for Kyrgyzstan

Project report

2005-2007



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1 Introduction

Using the sun as an energy source means using energy that is free and clean, i.e. available to everyone and with a zero emission effect. Due to the important sunlight characteristic – containing the thermal energy (the heat), sun represents the greatest energy source on our planet today.

The project ‘Solar energy for Kyrgyzstan!’ on solar energy use in Republic of Kyrgyzstan was implemented by the environmental organisation BIOM from Kyrgyzstan and Norwegian Society for the Conservation of Nature/Friends of the Earth - Norway (Norges Naturvernforbund), with an aim to make this technology of using sunlight for water heating accessible to everyone. It was supported by Small Grants Program of GEF- Kyrgyzstan and Norwegian Ministry of Foreign Affairs. The period of the project implementation was 2005-2007, however BIOM continues with monitoring and recording the results, as well as further dissemination of low cost technology and information on solar water heating.

The main purposes and tasks of this initiative were developing and adjusting solar installations and devices technology to an affordable price, training local population to construct those themselves and organizing regional solar-energy-use demonstrative stands as well as establishing permanent exhibitions of solar installations.

Kyrgyzstan has a great potential in renewable energy sources, such as sun, wind and hydro energy, as well as in biomass and geothermal energy. Solar

energy is, for instance insufficiently in use and local populations are poorly educated on possibilities for its exploitation.

The average annual sun insolation in Kyrgyzstan lasts for 2600-2900 hours, and most of the country is of a mountainous landscape (up to 80% of the territory). This geographical characteristic of the country asks for developing and implementing solar technology usable in higher altitude regions.

Some of the biggest obstacles to using alternative energy sources in Kyrgyzstan are lack of information, lack of experience in working with these and similar issues as well as the financial aspect.

Since the greenhouse gases emissions are expected to increase here, due to growth of development in Kyrgyzstan, the long-term aim of BIOM and Norges Naturvernforbund is to slow down the emission rate. Other important outcomes of solar energy reliance are a decline of forest cutting and devastation of land, as well as its positive effect on a family budget. Therefore there are quite a few advantages of switching from traditional energy use to alternatives, such as power of sunlight.



2 Project implementation

Goals and activities

The main goal of the project is decline of the greenhouse gases emission and preserving natural ecosystems in Kyrgyzstan, by promoting use of the sun as a source of energy. Solar energy use for heating water, instead of coal and wood will result in a significant decline of negative human impact on the nature.

Within this project, BIOM has conducted the following activities:

- explored potentials for solar energy use in regions of Kyrgyzstan
- conducted a research on hot water demands and needs and chosen and developed technology accordingly
- provided training for educating future trainers
- spread knowledge on solar energy using for water heating, throughout all regions of Kyrgyzstan, by distributing informational material
- established cooperation between schools and NGOs in purposes of education on the project in seven counties
- developed and adjusted existing technology for solar collectors, using easily accessible low cost materials and according to the climate and the region
- trained three hundred locals in twenty villages, to become skilled in constructing solar installations themselves

- set seven stands for demonstrating solar energy exploitation, one in each Kyrgyzstan county
- developed monitoring program on effectiveness of the implemented project

Small technology choice and development

Household technologies for solar energy application, common in western countries, would unfortunately be extremely expensive method for people in Kyrgyzstan.

Therefore, it has been important to develop a technology, which could provide everyone with an opportunity to use sunlight as a source of energy. The Kyrgyz-Norwegian team of NGOs have been working on creating various types of solar collectors, which would be easily constructible, from locally available materials, have ability to work throughout the year and in higher regions, and with acceptable price as well. NGOs' work in developing solar technology is based on existing solar technology, but adjusted to this region's climate and economy, in order to make it both non expensive and efficient.

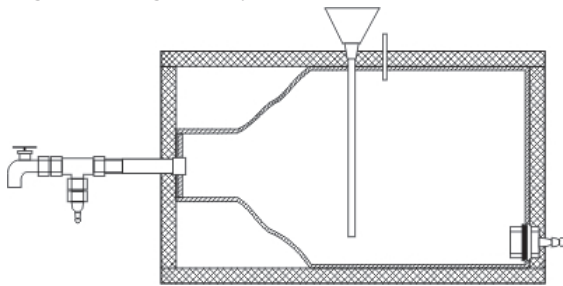
Research on necessary characteristics for a collector showed the priorities regarding design:

- quantity of sunlight capture
- heat retain
- volume
- resistance to freezing

- prevention of alien substances getting into the water
- ability of heating sufficient amounts of water up to a needed temperature
- comfortable and easy to use

Batch heater

The simplest option is a batch heater, painted in black colour and left to rest in the sun, which many people are already using. During building the water batch for accumulating heated water, it is important to keep in mind that black colour entirely absorbs sunlight (unlike other colours), which enhances efficiency of heating pace. Furthermore, the efficiency is increased by placing the batch in an insulated container and under a glass shield, resulting in a greenhouse effect, which increases the temperature inside the batch. The batch heater can be made in many sizes, but can for example have capacity to heat 50 litres of water to a temperature above 60 degrees during one day.



The batch heater

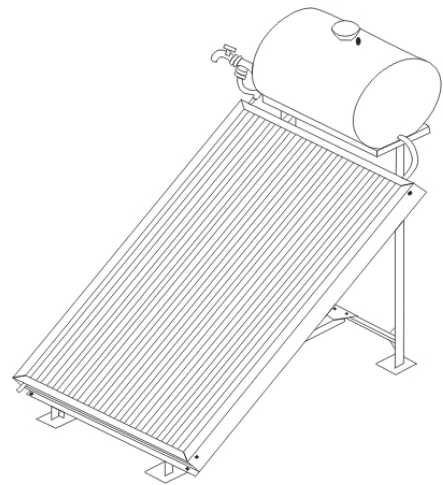
Flat collector

The other main option is a flat collector in which water, during the process of heating, runs through narrow pipes. Isolating the collector and installing a water-accumulating tank helps retaining the heat.

The volume of this tank would be between 40 and 50 litres. Position of the water tank in the upper part of a collector is necessary in order to maintain convective flow of hot and cold water masses.

For manufacturing collectors, materials most commonly used are plastic and metal. Metal can be combined with other metals, which also increases the efficiency of the device. Plastic, on the other hand, is less expensive and easier to handle, but not resistant to temperature fluctuations.

Using a reflector for concentrating sunlight emission significantly increases efficiency of the heating, but it also increases the costs of the installations.



The flat collector

There are also two different types of solar cookers, parabolic and concave, and they are placed in Bishkek. Other locations contain parabolic solar cookers. At the moment, the team in Kyrgyzstan is developing design for do-it-yourself solar cookers.



Trainings of future trainers

Conducting trainings in twenty local villages on self-constructing a solar collector, it was important to teach and fully educate several persons who would later on supervise and conduct trainings themselves. Within the project, a training team of eight people was formed.

Two seminars were organized in order to educate future trainers and increase their level of competence for conducting solar energy use projects.

During the seminar work, future trainers gained knowledge in technology of building solar collectors, ecological theories and concepts and learnt about result of examining capacities for using solar energy.

Leading country's experts held presentations and

seminars' participants had an opportunity to visit solar collectors' sites and learn about their functioning.

Trainings in villages

During the project implementing, twenty villages were been chosen as locations for training of local people.

Participants at these seminars came from many different social groups – there were whole families, pupils, pensioners, workers in different professions, and trainings included both male and female participants.

There were both theoretical and practical lectures during the seminars, and all participants as well as local libraries received publications, on both Kyrgyz and Russian language. Choices of villages turned



out to be very fortunate, since not only people from the village where seminar took place came, but also people from nearby places as well. The seminars were considered as very successful and BIOM has come to an agreement with locals on most suitable methods of applying knowledge and technology for solar installations constructing.

In the village Semenovka, the seminar took place at the Children's home. BIOM project team carried out the seminar, during which one solar heater was given to the Children's home, and it is indeed used in its whole capacity.

The reactions were very positive, as solar heater and using hot water in Children's home improved general conditions for children and their health.

The choice of another village – Korumdu, for seminar conducting, was based on the significance of its location, in bio reserve Issik Kuly. Local people of all age have been present, which gave a social dimension to the project, as young and old people learnt and practice constructing collectors together. Many local journalists were present at the seminar as well. In Korumdu, after the seminar's completion, eight solar heaters and two collectors have been constructed. However, this region suffers water supply difficulties, and therefore only one heater and one collector have been tested.

All of the participants were instructed on using the installations, but those rouse an interest among other residents as well.

At the end of seminar, literature on solar use possibilities was distributed.

After the project was finished, during the monitoring process, BIOM team received the note:

'We did not have hot water in our home, and it was therefore difficult to do dish washing, since warming up the water took the entire day. After we got solar collector, everything became so much easier and simpler, hot water is always here and washing became a joy.'

Valentina Mihajlovna

Exhibitions of the solar installations

Within the project, there have been established ten permanent solar energy exhibitions. Seven have been installed in regional centres, and among the presented items both fabricated collectors of different kinds as parabolic solar heaters/cookers, solar vacuum collectors, batch heaters and flat solar collectors made by the project team, as well as solar photo voltage installations.

At the Bishkek exhibition, there have also been installed a metal solar collector, device for solar



pasteurization and vacuum solar collector for winter household heating.

During the project implementation period, over 3000 people have visited the exhibitions – citizens, farmers, participants of BIOM seminars, students and teachers as well as local authority representatives.

Exhibitions in towns of Osh and Dzhalalabat

On the 14th of December 2006, in Osh, the second largest city in Kyrgyzstan, a demonstration exhibition on solar energy was opened.

Information about the project and installations were posted at the exhibition panel where visitors could also learn about schemes for setting the solar installations. Informational meeting was organised on the next day, and was visited by more than 120 people, with some of them even coming from the other villages.

The exhibition continued on the December of 16th, in town of Dzhalalabat, with local ecology teacher as an exhibition guide. Same exhibits were set at this site as well. Among people present at the exhibition were leaders of some local organizations, teachers from several faculties, parents of pupils, everyone asking many questions, noting that installations would improve life conditions, particularly in schools where children will have warm water for use. Several TV crews were attending the meeting as well as few journalists from the local newspapers.

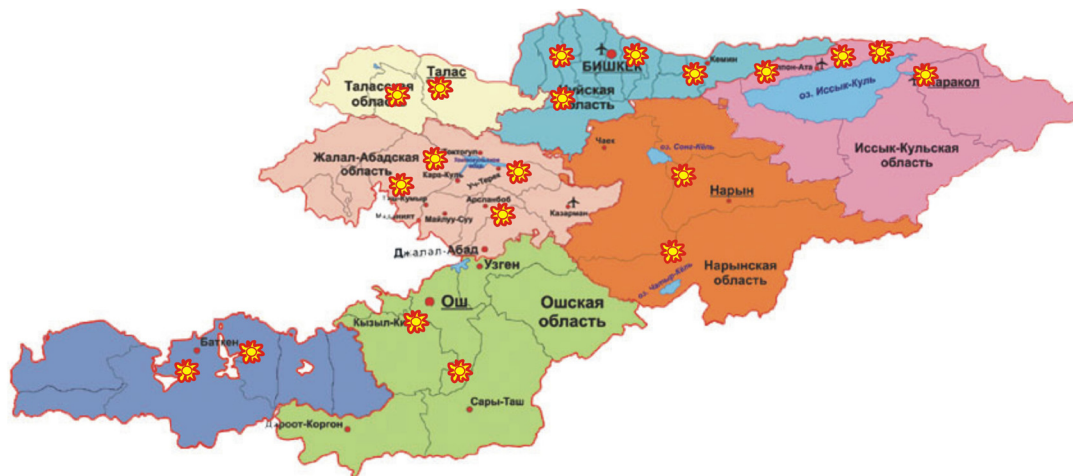
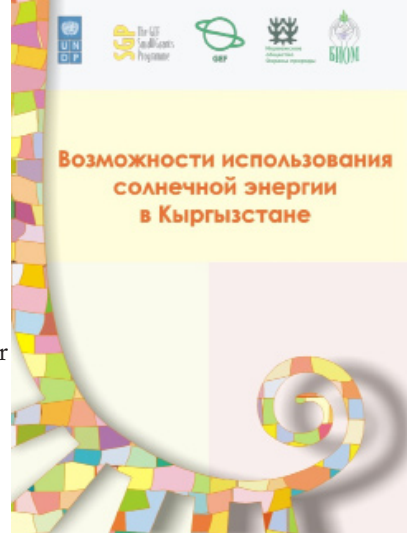
Results and future work

Twenty villages from the entire country participated in ‘Solar energy for Kyrgyzstan’ project, while more than sixty applied for participation. According to the results published in local newspapers there has been over four hundred consulting requests to BIOM, from local people, on solar energy use issues.

Promotional material such as publications, bags and footballs was distributed during the projects implementation. The brochure ‘Possibilities of using solar energy in Kyrgyzstan’ that BIOM has published has been translated to Kyrgyz language and it enjoys a great popularity. The brochure contains not only descriptions of methods of warming up water with sun power, but also of different designs of dryers, small greenhouses and various options for passive and active solar heating.

In addition, manual for construction of solar heaters and cookers were made and distributed.

Due to the active involvement and interest of the villagers in the solar development in general, and in order to share experience between the villages, the “Network of Sunny Villages of Kyrgyzstan” was



established during the project. The network includes participating villages and also people from other parts of the country interested in solar energy using.

One of the interesting remarks the BIOM team has received after the project was this one:

'I have constructed my solar barrel in 2 days at the seminar. At first, I was suspicious like many others, but now we have no problems with hot water. My neighbours stop by to see the solar installation, and they want to build it themselves, too.' Akilbek

A publication on solar installations integrated in new and existing buildings, has also been developed, for those who want to build these installations themselves, in their own home. All the materials for building installations can be found at Kyrgyz markets. There have also been several offers to BIOM, from different companies for production and sale of solar installations throughout Kyrgyzstan.

After the project was conducted, there were some solar collectors constructed for sale, yet not very often. Building for sale took place only in Zhalalabatksa region. It is perhaps, still early, since experience with solar collectors is still not widespread yet, but it is indeed popular.

The interest in solar energy using in Kyrgyzstan has increased during the implementation of the project.

Many newspapers, journals and magazines have been covering the solar energy project. Particularly high interest in the project was noted from mountain villages, where electricity and heating is often lacking.

After this project, Norwegian and Kyrgyz partners are moving further, working on developing and improving solar technologies for even more efficient solar power use.

The project 'Solar energy for Kyrgyzstan' is developed and conducted as a part of the SPARE project.



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SPARE

SPARE is an international school project that has been run by the Norwegian Society for the Conservation of Nature since 1996. Through SPARE pupils learn how to use energy and resources efficiently. Active SPARE schools conduct education on sustainable use of energy and resources, implement practical measures on energy efficiency or renewable energy, and finally inform the neighbourhood about their achievements. The educational activities in each country are coordinated by national NGOs, who also promote education on energy and environment into the national educational plans as well as simple technologies for energy efficiency and use of renewable energy sources. Several thousand schools in so far 16 countries work with the SPARE educational programme.

SPARE educational material is aimed at pupils aged 10-14, and is developed by environmental NGOs and teachers through more than 10 years of active use in schools. The main implementation strategy is adaptation of teacher guides and methodologies for each country, as well as training of teachers. Teacher training is often made in cooperation with institutions for retraining of teachers.

School activities have proven to be an efficient channel for energy information and promoting energy efficiency in households. On the basis of SPARE, national NGO coordinators, schools and other partners cooperate for development and implementation of simple low cost energy efficiency and renewable energy measures at schools and in private homes. SPARE has many partners in different countries, from ministries of education and environment, institutes for retraining of teachers, local administrations, UNDP and other local donors and organisations.

You are welcome to join in as partners in promoting sustainable energy!

Visit our website: www.spareworld.org

