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REPIC
Renewable Energy &
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Promotion in
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Cooperation

Final Report

House insulation and efficient stoves for reduction of CO₂ emissions and improvement of livelihood in Kyrgyzstan



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The author(s) of this report are alone responsible for its content and conclusions



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1. Summary

The project aims at promoting house insulation of energy efficient stoves in rural and mountainous areas of Kyrgyzstan through a number of measures ranging from local certification of technologies, training of craftsmen, cooperation with microcredit organisations, monitoring of pilot houses and political dialogue.

The project successfully implemented the following activities:

1. National Certification of insulation technologies and stove construction.
2. Preparing of training materials,
3. Practical trainings on house thermal insulation and energy efficient stove construction for local masters (84 participants)
4. Agreements with two microcredit organizations on allocation of funds for energy efficient measures; in cooperation with them conducted a wide-spread informational campaign;
5. Political dialogue with relevant state entities responsible for project correspondent issues;
6. Monitoring of implemented activities showing
 - 50-70% reduced energy consumption despite enlarged living space for the family
 - House owners used 1 t coal instead of 4-5 t in winter 2011/12 (savings of 115-135 SFR)
 - This corresponds to lower GHG emissions of about 7tCO₂eq/year and house
 - Lower health costs (50 SFR/family)

The project is challenged by a number of issues, the two most important being the complexity of methodological issues to comply with the carbon market and the long payback period of the investments despite substantial savings in energy and costs for house owners.

Methodological challenges:

The project implementer was challenged by very complex issues in relation to the elaboration of CDM methodology. It is very important to mention that this project was innovative as it was the first conducted in Kyrgyzstan and in the CIS area. Unlike as expected, none of the existing methodologies of the CDM were appropriate for the intended set-up of the project (combination of insulations and fuel-efficient stove; use of fuel mix consisting of fossil fuels and biomass).

The project, together with MyClimate developed a new methodology which was submitted to CDM Executive Board, but its approval has not been achieved during the life-time of the project. Consequently, the initiation of a large-scale CDM project is at this time not immediately feasible.

Before starting the second stage of the project further work on the methodology and the monitoring system would be needed. It is recommended to conduct these activities with direct consultation of specialists from MyClimate and other specialists.

The certification of CO₂ reduction methodology can drag on for an indefinite term and we are not optimistic in this regard. Given the current very low prices for the CO₂ certificates, we are of the opinion that for further replication of the project other options must be sought and the CDM market no longer represents a realistic option for this project.

Long pay- back period for investments in house insulations:

Investment costs for complete house insulations and new heating equipment amount to about 1200-3200 SFR per household. Energy savings and savings on health costs have been assessed by the monitoring of 15 houses to be about 165-185 SFR a year. The payback period is therefore rather long given the local socio-economic conditions.

However, if we include the benefits in terms of social well-being (the family can use more rooms for living and sleeping) as well as environmental benefits (less use of biomass if used instead of coal) the total benefits are much higher.

Options for the future

As an alternative option the project partners are looking at various options:

- Access to the voluntary market and the Gold Standard. However this also will require time and efforts to fulfil these standards.
- Use the experience gained in training craftsmen and development of technologies further and incorporate them into training curricula (vocational or/and university level).
- Develop and implement training on business skills targeting craftsmen trained in the project who have a potential of developing successful small-scale businesses in this field
- Finally, the achievement of overall goal of the project (large-scaled implementation of proposed energy efficient measures) can be reached by working with micro-crediting organizations and combined promotion of small-scale business (without certification of CO2 reduction methodology).

2. Objectives

The project aims at promoting house insulation of energy efficient stoves in rural and mountainous areas of Kyrgyzstan through a number of measures ranging from local certification of technologies, training of craftsmen, cooperation with microcredit organisations, monitoring of pilot houses and political dialogue.

Through this project economic, social and environmental goals can be achieved:

- Income generation (trained craftsmen can build insulations and efficient stove)
- Increased savings (less fuel costs, less health costs)
- Better living conditions for the families (more living space, less in-door air pollution, better in-house conditions)
- Less CO² emissions, less toxic fumes
- Less biomass burned (fuelwood, dung) contributes to lower deforestation, degradation of vegetation and improved soil fertilization)
- Less working time for collecting fuel wood and dung

The main objectives of the present project were:

- the certification of the house insulation technologies and the energy efficiency stoves by Kyrgyzstani authorities;
- Conduction of trainings for craftsmen about house insulation and construction of energy efficient stoves;
- The signing of agreements with local microfinance institutions;
- The implementation of informational campaigns;
- Establishment of a monitoring system

The long term goal of the project was to build the basis for large CDM project for 4000 houses in Kyrgyzstan which should be implemented in 2011 to 2024. During the implementation of the first phase, in a parallel effort, the funding and set-up of the main project should be organized.

CDE, CAMP Alatoo and MyClimate were working on defining an appropriate Clean Development Mechanism (CDM) methodology, which was submitted to the CDM Board of UNFCCC for approval.

This is a parallel effort, since the approval of an appropriate CDM methodology is a precondition for launching the second component of the project, i.e. the planned CDM project. To start the second component of the project additional efforts and activities of project partners are needed.

3. Technical Solution / Applied Method

The project used a number of techniques for house insulations adapted to local conditions (using locally available materials such as straw, reed, sawdust and wool) for insulations and for building improved stoves. The technical designs used are documented in the certification of technologies as submitted by CAMP to the relevant state institutions in Kyrgyzstan. (See next section).

4. Results

The following section summaries the result of the project.

4.1 Certification of technologies

The certification was aimed to build a consensus among responsible state institutes about energy efficiency technologies suitable for rural areas of Kyrgyzstan.

For certification of the technologies “CAMP Alatoo” established **partnership between following organizations:**

- the Scientific Research Institute for Seismic Resistant Construction of Kyrgyzstan;
- the Centre for Energy Efficient Building Central Asia (CEEBA);
- CAMP Alatoo;
- UNDP project ‘Energy efficiency in the buildings’.

The first step of the certification process was the elaboration and signing of the memorandum of understanding. In this document the Kompanion (micro financing institution), the Kyrgyz Scientific-Research and Design Institute of Seismic Construction (KNIIPSS) and CEEBA / CAMP Alatoo agree about the expected structure and content of catalogues on technical solutions.

The next step was the elaboration and approval of catalogues of technical solutions for the thermo-insulation of buildings and the elaboration and approval of catalogues on technical solutions for the construction of energy efficient stoves.

The **following results** were achieved during the certification process:

- The elaboration and approval of catalogues on technical solutions for thermo-insulation of buildings and energy efficient stoves;
- The conformity of catalogues to the Kyrgyzstani standards of energy efficiency, seismic resistance, fire safety and ecology;
- The elaboration of recommendations on the use of insulation technologies made from accessible and affordable natural materials; energy efficient stoves acknowledged by the competent state organizations;
- The elaboration of recommendations for different regions of Kyrgyzstan and acknowledged by the competent state organizations;

800 printed copies in Russian language and 1000 in Kyrgyz (each catalogue) were published and are available for awareness raising and distribution to the interested public. The catalogues were provided to Kompanion which allowed them to start activities on creation of credit lines for thermal insulation and energy efficient stove construction in pilot territories. Through the UNDP project ‘Energy efficiency in the buildings’ the catalogues were provided to all local administrations at rayon level in Kyrgyzstan. Also these catalogues are used in the frame of seminars for craftsmen.

Memorandum of understanding and cooperation
between
the UNDP project Energy Efficiency in buildings
Kompanion Financial Group Microfinance Closed Joint Stock Company,
Public Foundation CAMP Alatoo,
the Kyrgyz Scientific-Research and Design Institute of Seismic Construction,
Public Foundation Center for Energy Efficient Building Central Asia

UNDP Project Energy Efficiency in buildings (hereinafter referred to as UNDP Project) represented by its Manager Rodina E.M., **Kompanion Financial Group Microfinance Closed Joint Stock Company** (hereinafter referred to as Kompanion), represented by its Chief Executive Officer Tereshchikov U. A., **Public Foundation CAMP Alatoo** (hereinafter referred to as CAMP Alatoo) represented by its Director Kasymov U.A., **Kyrgyz Scientific-Research and Design Institute of Seismic Construction** (hereinafter referred to as KNIIPSS) represented by its Director Inambekov S.T., **Public Foundation Center for Energy Efficient Building Central Asia** (hereinafter referred to as CEEBA) represented by its Director Kojonov R.M. – together referred to as Parties herewith testifies about mutual understanding related to the below provisions and declare the following agreement:

I. Overall goal of the Memorandum

The Parties confirm that the overall goal of the Memorandum is to establish cooperation between UNDP Project, Kompanion, CAMP Alatoo, KNIIPSS, CEEBA in development of energy efficiency technologies aiming at poverty overcoming, capacity development for application of the above mentioned technologies: by supporting initiatives and efforts of local communities, local self-governance, state and educational structures of the Kyrgyz Republic.

The Parties confirm their intention to cooperate, complement and coordinate activities to ensure effectiveness of their programs and projects.

The Parties will provide implementation of the present Memorandum according to the Kyrgyz legislation, documents regulating activities of the Parties, as well as on the basis of mutual respect and equality in decision making.

II. Cooperation activities:

- Joint informational campaign to attract local people in the project participation (CAMP Alatoo, Kompanion, UNDP Project)
- Development of catalogues of technical solutions of energy efficient walling and energy efficient stoves (UNDP Project, CAMP Alatoo, KNIIPSS, CEEBA)
- Training of masters to ensure technical support of activities within the CAMP Alatoo project Energy Efficiency Program for rural regions and reduction of CO2 emission (CAMP Alatoo, CEEBA)
- Targeted crediting of local people within Kompanion's loan policies and procedures.

III. Duration of the Memorandum:

1. The Present Memorandum is valid for one year from the date of its signing and may be revised and/or amended by the Parties in a written form.
2. The Memorandum may be revised by mutual agreement of the Parties in a written form.

Memorandum of Understanding



Catalogue for technical solutions on thermal insulation of outside frame filling of individual dwellings

- Developing of technical solutions (implemented by KNIIPSS with the contribution of CEEBA & CAMP Alatoo);
- Submitting to and checking by State Agency For Architecture and Construction of Kyrgyz Republic (implemented by Institute);
- Publishing of catalogues & dissemination (by CAMP Alatoo).

The target groups of the certification process are composed of all the stakeholders of construction and energy efficiency. They include: local engineers, architects, craftsmen, relevant institutions and organizations; teachers in vocational education schools and the clients of Micro credit agencies applying for micro credit products in the field of energy efficiency.

Certification activities allowed to develop a range of **documents**, among them:

- Recommendations for using of straw, reed, sawdust and wool for heat insulation of individual dwellings (Russian, **Annex 1**);
- Report of the Scientific Research Institute for Seismic Resistant Construction of Kyrgyzstan according to the Agreement on "Development and approval of the Catalogue for technical solutions on thermal insulation of outside frame filling of individual dwellings" (Russian, **Annex 2**);
- Recommendations for construction and maintenance of energy efficient stoves (Russian, **Annex 3**);
- Report of the Scientific Research Institute for Seismic Resistant Construction of Kyrgyzstan according the Agreement on "Development and approval of the Catalogue for technical solutions on construction of energy efficient stoves" (Russian, **Annex 4**);
- Catalogue for technical solutions on thermal insulation of outside frame filling of individual dwellings (Russian);
- Catalogue for technical solutions on construction of energy efficient stoves (Russian);

All above-mentioned documents are approved by State Agency for Architecture and Construction (SAAC) under the government of the Kyrgyz Republic by the Cover Letter (**Annexes 5, 6**) which officially informs that submitted reporting materials and technical solution catalogues on house exterior walling insulation and energy efficient stoves construction in rural areas have been reviewed by specialists of the SAAC under the government of the Kyrgyz Republic and are recommended for further practical use.

4.2 Development of training materials, preparation and conduction of practical trainings

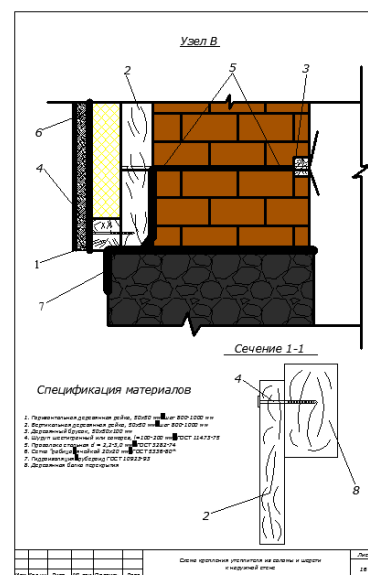
This part of the report describes the activities dedicated to the preparation and conduction of the training seminars for constructional craftsmen about:

- thermal insulation technologies for heat insulation of houses in rural localities;
- energy efficient stoves construction.

The aim of the seminars was to train craftsmen for them to carry out the orders of the inhabitants. .

The **main activities** of the certification process included:

- Preparing and signing a Memorandum of understanding with partners;
- Forming a work team, clarifying of tasks, of objectives (moderation of process, development of TOR's & contracts and agreements were made by CAMP Alatoo);
- Collecting and analyzing information (provided and implemented by KNIIPSS, CEEBA & CAMP Alatoo);
- Collecting of information in the field (measurement, interviews, observations implemented by KNIIPSS, CEEBA & CAMP Alatoo);
- Analyzing the information (KNIIPSS);



Scheme of wall insulation with organic material

The main components of this part of the project were:

- to develop the programs of the conduction and materials for local constructional craftsmen training;
- to train 50 craftsmen on house heat insulation and 20 on construction energy efficient stoves;
- to conduct the estimation and certification of constructional craftsmen and specialists, trained during seminars;
- to secure the groups of craftsmen with indispensable tool-kit.

The activities on preparing and conducting the training seminars for constructional craftsmen on thermal insulation technologies are implemented by CAMP Alatoo in cooperation with the CEEBA. This was assigned within the agreement concluded between CAMP Alatoo and CEEBA, the agreement is valid from 28.04.2010 till 31.12.2011.

The agreement stipulates the conduction of 4 training seminars during 2010 – 2011.

Development of didactical manual for the basic theoretical seminar on thermal insulation of existing houses in rural localities

The main goal of didactical manual development was to prepare conditions for systematic training conduction for local craftsmen to give them skills in the field of:

- estimation of peculiar conditions of house regarding thermal insulation;
- selection of the best thermal insulation technologies, using local available thermal insulation materials
- calculation of quantity of construction materials, of effective planning and proper implementation of thermal insulation works.



Methods of energy efficient construction (didactical manual)

The developed didactical module contained 6 training modules:

1. Reasons for energy efficiency;
2. Estimation of houses for measures on thermal insulation;
3. Theoretical basis on thermal insulation;
4. Criteria of selection of suitable materials and methods for thermal insulation;
5. Planning of thermal insulation measures;
6. Safety engineering in construction work.

The module stipulated such approaches as brainstorming, lectures, moments dedicated to questions, discussions, exercises and experiments.

Conduction of training seminars for constructional craftsmen on thermal insulation technologies were conducted in;

- Chon-Kyzyl-Suu village, Jety-Oguz rayon, Issyk-Kul oblast (19.08.2010 – 03.09.2010)
- Ak-Orgo residential community, Bishkek (20.11.2010 - 03.12.2010)
- Djety-Oguz village, Jety-Oguz rayon, Issyk-Kul oblast (02.06.2011 – 16.06.2011)
- Chyrak village, Jety-Oguz rayon, Issyk-Kul oblast (09.08.2011 – 24.08.2011)



Working process during seminar on house insulation, Jety-Oguz village

During the seminars craftsmen were trained on:

- Theoretical skills (see Annex 7);
- Selection of the houses for thermal insulation works;
- Thermal insulation of walls, floor, roof
- Replacement of north-side bearing wall of house;
- Heat insulation of entrance door;
- Composition of drain system;
- Development of recommendations on house thermal insulation.

All craftsmen trained were awarded according to the results of final testing with certificates conform to their ability to conduct the thermal insulation works.

In the framework of 4 seminars 52 craftsmen were trained (Russian, **Annex 12**).

The activities to prepare and conduct the training seminars for constructional craftsmen on energy efficient stoves construction were implemented by CAMP Alatau.

In the frame of the project, 3 trainings of craftsmen were planned. At the moment, all three seminars have been successfully implemented. The trainings aimed at increasing of craftsmen qualification about planarization, design and construction of energy efficient stoves. Moreover, it gave them a practical training to enhance their skills in building of three different kinds of stoves and then guarantee to the craftsmen further work.



Participants of energy efficient stoves construction seminar in Saruu

The preparation works for seminars conducting consisted in:

- The determination of the locations of trainings conduction and responsible persons from local communities regarding organizational issues;
- The arrangements on selecting constructional craftsmen for participation in seminars;
- The development of the training program and training materials for energy efficient stoves construction seminars;



Working process during seminar on energy efficient stoves construction

The first training was done in May 2010 in Balaaylchy village of Chui Oblast (Russian, **Annex 13**), the second in June 2010 in Saruu village of Issyk-Kul oblast (Russian, **Annex 14**), the third in October 2010 in Emgekchil village of Naryn oblast (Russian, **Annex 15**). During the 3 seminars 36 craftsmen were trained (Russian, **Annex 16**). The majority of the participants were young (less than 35), what is an opportunity for the dissemination of the practices. The participants were selected regarding to their skills in construction and those working in the domain of stove building.

The trainings were implemented with the support of local Territorial Public self-governances (TPSes). The representatives of the TPSes also played a big role in the mobilization of the participants and of the communities.

The question of the mobilization of the participants is of course one of the main issues. It is important to have very interested persons who can dedicate time for the training and who will be involved in the process. Because of that, it was difficult to bring together the planned number of participants. For the craftsmen the most appropriate period to assist to do trainings is early spring.

The trainings were divided in two parts: the first was more oriented on theory and the second was more practical. The first part of the seminar included a general introduction about the issues of energy efficient stoves and then the main phases of the building of these stoves. The importance of security rules was also underlined. Information about other projects in the same domain at national and international level was provided. The practical part of the training implied the construction of stoves. These stoves were built in private houses and in public building. Each group was divided into 4 teams during the trainings. Each team was responsible of the construction of a specific kind of stove. Every morning, the all group visited the different building sites. The choice of the household for the practical training was made considering specific criteria of the house (the house should not be old, should be inhabited, the heating system should have high needs in combustible).

Each craftsman was secured with indispensable tool-kit. At the end of the training a certificate was given to the participants who acquired the skills and knowledge essential for the energy efficient stoves building and a contract was entered with them for further cooperation.

4.3 Preparation of contracts with microcredit organizations

Allocation of funds from Habitat for Humanity Kyrgyzstan.

In September 2010 CAMP Alatoo signed the Memorandum of Understanding with Habitat for Humanity Kyrgyzstan. The main subject of the Memorandum is the allocation of funds for crediting the energy efficient measures. The sides agreed on thermal insulation of buildings as complex of arrangements intended for reduction of energy consumption and carbon-dioxide gas emissions for heating of internal space of buildings during service life. The Memorandum stipulates thermal insulation of 8 one-family houses in Chui and Issyk-Kul oblasts.

The maximum cost for thermal insulation accounts for:

- Houses in Bishkek - 154 648,88 KG soms;
- Houses in Issyk-Kul – 121 920,74 KG soms.

The maximum term of repayment of special-purpose loan makes out 4 years. According to the interest conditions a borrower should make the monthly paybacks with the following formula:

$((\text{loan value} * 1,1 \text{coefficient of inflation}) / 4 \text{ years}) / 12 \text{ months} = \text{amount of monthly repayment.}$

The main criteria for selecting households are:

- Technical state of house corresponds to constructional norms and rules;
- To be solvent – monthly income of family accounts for not less than 7-8 thousands KG soms;
- Availability of all necessary documents;

According to the Memorandum Habitat for Humanity Kyrgyzstan and CAMP Alatoo conducted following works:

- Informational campaign for local population;
- Collection of applications and correspondent documents;
- Preparation of expenses of repairing-constructional works, working out of schedule of repairing-construction works;
- Providing of households with constructional materials;
- Control and monitoring of repairing-constructional works implementation.

On the base of the successful implementation of planned joint activities CAMP Alatoo and Habitat for Humanity Kyrgyzstan signed the next Memorandum of Understanding in December 2011. The Memorandum stipulates the allocation of low-interest credits already for 17 one-family houses in Chui, Issyk-Kul and Naryn oblasts.

The maximum cost for thermal insulation accounts for:

- Houses in Bishkek – 161 307 KG soms;
- Houses in Issyk-Kul – 156 630 KG soms;
- Houses in Naryn – 166 914 KG soms.

Note: this figures indicate the upper limit of the loans given. Depending on the owners contribution in labour, the cost of material and transport at the given location, full or partial retrofitting, the actual cost can be reduced by more than 50%, giving a range of about 1200 to 3200 SFR/house.

The maximum term of repayment of special-purpose loan makes out 5 years. According to the interest conditions a borrower monthly should make the paybacks with the following formula:

$((\text{loan value} * 1,1 \text{coefficient of inflation}) / 5 \text{ years}) / 12 \text{ months} = \text{amount of monthly repayment.}$

Allocation of funds from Kompanion Financial Group.

After conclusion and approval of the catalogues of technical solutions, the appropriate documents were submitted to Kompanion. This allowed Kompanion to prepare conditions for allocation of credits to rural population. The list of already trained craftsmen was provided to Kompanion for selection of focus villages

The Agreement between CAMP Alatoo and Financial Group Kompanion was signed on July the 6th 2011 (Russian, **Annex 17**). The Agreement stipulates the thermal heating of buildings and construction of energy efficient stoves through allocation of micro credits to local population. In the framework of the Agreement, a loan can be given for ::

- thermal insulation of walls, ceilings, floors of buildings with local organic and industrial heat-insulating materials;
- hydro insulation of walls, fundamentals and all;
- renovation or replacement of windows;
- replacement or renewal of entrance doors;
- corrective action in heating systems consisting in installation in energy efficient stoves;
- and other arrangements directed at reduction of energy consumption and emissions of carbon dioxide.

For the reporting period the following results were achieved:

- **Allocation of more than 50 credits for stove construction in Issyk-Kul and Naryn oblasts;**
- Big interest of the population and potential of clients attraction just through the network of "Kompanion";
- Jointly developed plan of common activities, which includes the main following points:
 - signing of agreement;
 - solving of problems with constructional and insulation material on a local level
 - improvement of skills of already trained craftsmen;
 - mobilization of funds and fundraising for increasing the amount of demonstrational objects;
 - development and update of the database of the clients;
 - periodic monitoring of quality and amount of constructed stoves and insulated houses;
 - conduction of joint information campaigns;
 - development and dissemination of target-oriented informational materials;
 - monitoring of CO2 emissions reduction;
 - trainings of credit specialists of "Kompanion" including specific issues of energy efficient technologies.

4.4 The awareness building

The awareness building about the issues of the energy efficiency aimed at the increasing of awareness of the public and population concerning possibilities and potential of CO2 emissions reduction.

Awareness building campaign was implemented in cooperation with Kompanion and Habitat in the villages chosen for crediting. The population in the focus area was informed about advantages of house insulation and energy efficient stove building as well as possibilities to get credits for insulation and stove building.

To cover the rest of the territory of the three oblasts (Chui, Issyk-Kul and Naryn) the work was conducted together with local filials of Kompanion. For the moment a wide audience in the three oblasts was informed about energy efficient measures as house insulation and energy efficient stove building.

In the frame of this part of the project CAMP Alatau team produced a manual on construction of energy efficient stoves, posters and booklets (Russian, Kyrgyz, **Annex 18**) describing the energy efficient technologies and dissemination supporting mechanism of micro crediting.

In August 2011, CAMP Alatau and Kompanion Financial Group signed an Additional Agreement to the Memorandum on construction of 3 energy efficient stoves in the framework of joint information campaign. Funds at the rate of 150,450 th. KG soms for construction of energy efficient stoves were allocated by Kompanion. Constructions were conducted in child-care facilities in three rayons of Naryn oblast:

- kindergarten "Aitkul", Jumgal rayon, Baizak village;
- kindergarten "Sezim", Atbashy rayon, Ak-Jar village;
- kindergarten "Bychan", Ak-Talaa rayon, Kosh-Dobe village.



Advertising booklet about availability of micro-credits for energy efficient stoves construction

4.5 Development of monitoring system

Results achieved.

One of the main goals of the project was the establishment of a CO₂ emissions reduction monitoring system. During 2010-2011 the Project achieved following results.

- Together with colleagues from MyClimate and CDE a methodology was developed for calculating the reduction of CO₂ emissions by retrofitting existing residential houses and construction of new residential houses including energy efficiency measures in Central Asia;
- The **methodology was submitted to CDM Executive Board of UNFCCC**;
- For processing of data collected by the monitoring, 2 kinds of software were presented to MyClimate (German, **Annex 19**; Russian, **Annex 20**);
- On the basis of methodology, the **manual for monitoring conduction and calculation of CO₂ emissions reduction were developed**;
- The procedure and necessary documents for approval of the project at the State Agency for Environment and Forestry (State responsible body for CDM projects) of Kyrgyz Republic were determined;

Post-project prospects for realizing a CDM project

Revision of the Methodology by SSC WG concluded that because of the complexity of the proposed project, the consultancy of an expert is needed to evaluate the last modifications made to the methodology.

After discussion with colleagues from MyClimate, it was agreed that another option for proceeding can be used. The second option consists in narrowing the methodology by defining one cluster and only eligible houses with coal as fuel (no fuel mix, no consumption of wood, dung, etc.). In this case we can use the existing methodology and submit the project to the Gold Standard.

We also recommend to include Naryn Oblast into the project, due to high number of heating days and cold climate. The motivation of residents might be high due to these reasons. Naryn is one of the coldest areas in the Kyrgyzstan. The heating season lasts here up to 8-9 months; therefore, they consume more fuel than other regions of Kyrgyzstan. The thermo insulation measures can significantly reduce energy consumption, and then lead to significant CO₂ reduction. Hence, it would be relevant to include Naryn Oblast in the project area. However, one problem might be significant. The population of Naryn Oblast is one of the most deprived in the country, therefore, the high interest rates of credit can hinder the project implementation.

4.6 The political dialogue

This part of the project was aimed at improving the cooperation with political and administrative decision-makers and energy companies. To achieve this aim the project team regularly met with different partners and companies worked in the sphere of energy efficiency legislation and regulation, distribution and promotion. In cooperation with the Scientific Research Institute for Seismic Resistant Construction under the State Agency for Architecture and Construction of Kyrgyz Republic the project organized a round table with the state actors to discuss the problems related to energy efficiency in constructional sector and the potential solutions. The activities implemented in the framework of policy dialogue allowed informing decision-makers about advantages of house insulation and energy efficient stove building for rural population, making easier and supporting spreading of appropriate technologies, as well as increasing of policy dialogue in respect of measures on energy efficiency and reduction of CO₂ emissions.

Round table conduction.

The round table was conducted on 30th of March 2012. The aim of the round table was to discuss the issues of energy saving and energy efficiency in constructional sector of Kyrgyzstan. The participants of the round table represented diverse organizations dealing with energy efficiency and climate issues such as governmental entities (ministries and state agencies), scientific-research institutes, construction and architect unions, construction and projection companies, international organizations and projects, local education institutes and NGOs, representatives of local communities, mass media.

In total more than 40 specialists and decision-making people participated at the round table. Speakers made presentations to describe the state-of-the-art at different level and scope:

- State entity regarding legislation changes - Draft of the State Program of Energy Efficiency and Energy Saving in Constructional Sector of Kyrgyz Republic;
- Activities of NGOs in the related sphere - Experience of energy efficiency and CDM project realization in Kyrgyzstan;
- International project - Results and prospects of UNDP project "Improving of Energy Efficiency in Buildings";
- CAMP Alatau experience at the local level – Results of the Project "House insulation and efficient stoves for reduction of CO2 emissions and improvement of livelihood in Kyrgyzstan" and Results of baseline study on state of rural residential buildings from the energy efficiency and seismic stability points of view.



Welcoming speech of secretary of state of the State Agency for Architecture and Construction of Kyrgyz Republic

The participants of the round table discussed and noted the progress made during last years. At the same time there is still necessary to work further. The main priorities of such work should be:

- large information campaign among population, according to official data average energy consumption in residential buildings come up to 650-1000 kW·h per m2 yearly;
- the existing legislation related with on energy efficiency and energy saving, Kyoto Protocol require corresponding improvements; responsible governmental entities exercising regulation in these fields need the increasing of competence and technical assistant;
- the implementation of energy efficient measures needs the organization of production of locally-based thermal insulation materials, the development of technical solutions and of projects applicable in rural areas, the combination of energy efficient solutions with technologies using environmentally friendly renewable energy sources;
- the determination of governmental and international community funding for implementation these and other related activities.

4.7 Monitoring of implemented activities

The conducted monitoring gave the opportunity to assess the results of the project achieved during activities implementation, to expose shortcomings committed in the course of project realization and to determine the further steps needed for achievement of main project goals.

Data of the surveys made in retrofitted households.

The survey of the houses with implemented retrofitting measures was conducted on the basis of 15 representative objects. The objects chosen for survey were situated in different pilot areas of the project. Main attention during survey conduction was paid to such factors as:

- **The increase of real living space during winter time;**
- **to what extend families decreased the fuel consumption and expenses for these purposes;**
- **the improvements of living condition comfort (temperature, humidity etc.);**
- **the improvement of families health and decreasing of expenses for medicine.**

All objects retrofitted in the framework of the project showed very positive results according the points mentioned above. Families noted that winter period for them were different from the one for their neighbors as the ambient



Monitoring of retrofitted houses

in their houses was comfortable and warm. If before parents tried to dress children as warm as possible this winter children were dressed lightly and nearly haven't suffered from illness. In terms of money savings depending on decreasing of medicine buying consist in average 2250 KG soms (ca 45 SFR) per heating period.

The real living space during winter increased. Before families heated only one room and all members huddled together in this room as to heat all the house was very difficult. Now houses with thermal insulation keep the warmth and it's much easier to heat them. Consequently people live in bigger living areas.

In accordance with performed measurements, all the houses have stable temperatures in all rooms. Moreover inside temperatures do not depend on outside ambient temperatures and temperatures on the surface of outside part of house walls. On average, inside temperatures equals to 18-19 °C, which meets to the requirements of comfortable conditions of living. Also such factor as lack of dampness can be attributed to better living conditions. All families participating in survey noted the considerable decreasing of fuel consumption. In spite of different proportions of fuel consumption in different houses overall fuel consumption decreasing can be observed. On average it decreased by 50-70% and savings during heating period can be estimated for 6000-7000 KG soms (115-135 SFR) per each household.

Thermal imaging examination of insulated houses.

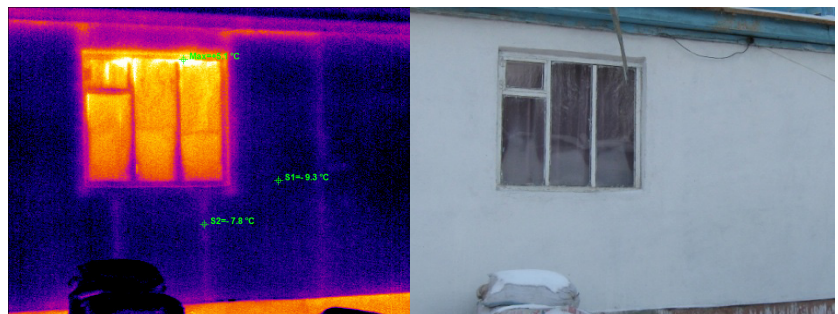
Project team conducted thermal imaging examination of insulated houses in Chyrak and Jety-Oguz villages (Russian, **Annex 21**). The aim of such examination was the inspection of enclosure of insulated building and checkup of quality of conducted thermal insulation works.

The conducted survey hasn't revealed any defects and destructions in outside finishing on thermal insulation layer. Microclimate in house was optimal; temperature of inside air was 20 C; humidity – 40-60%. The temperature is the same in all rooms, which is an evident indicator of comfort. This winter house owners used 1 ton of coal instead of usual 4-5 tons, which is a good economy for house owners.

The carried out thermal imaging survey and visual observations showed that there are some heat losses, **but they are not critical**.

Heat losses are mainly due to:

- sufficiently high infiltration through leakages of window and door openings;
- windows with single glazing;
- interfaces and heterogeneities of heat-insulation materials;
- foundations of houses, because of heat transmission from walls to fundament;
- quoins, lath frames attaching points.



Thermal imaging examination of insulated houses

The method of checkup of conducted thermal insulation works by means of infrared imager was effective to analyze the quality of implemented works, as well as to sight even small heat losses in thermal insulation layers.

In conclusion it should be observed that overall thermal insulation works were conducted with relatively good quality. However, conducted survey showed that there is necessary to change some constructive decisions for preclusion of "bridges of cold".

Results and further work on dissemination of energy efficient technologies.

In the framework of the signed Memorandums with Habitat for Humanity Kyrgyzstan and Financial Group Kompanion, more than 50 credits were allocated. To increase the number of clients, the following directions should be explored:

- to work with microcredit organization on simplifying of process of households selection and allocation of credits;
- to develop unified estimation of constructional materials for calculation of credit sums to be allocated to clients;

- fine-tuning of cheap schemes of delivery of construction materials to remote rural areas with the aim of reducing the sums of credits;
- to develop combined (organic and industrial) technical house insulation solutions.

5. Impacts

The project has made important contributions towards furthering energy-efficient technologies in the rural housing sector in mountainous regions of Kyrgyzstan. The technologies used and trained can be multiplied by the trained craftsmen, in combination with micro-credit loans and with and without carbon finance.

The positive benefits of the energy efficiency measures proposed have been shown by the monitoring activities of the project (see above). As far as energy saving and reduction of CO₂ emissions these benefits are quite substantial. With regard to the environmental objectives of saving biomass (dung and vegetation) from being burned, the monitoring system has not yet been able to measure the extent of this positive effect. Nevertheless substantial benefits are expected in this respect.

CAMP Alatoo is committed to continue working on energy-efficiency developing further this line of action. CAMP Alatoo has shown that it has a capacity to raise funds for conducting further activities in this area of expertise.

However the full potential of the work done so far will probably not be exploited unless more is done to spread the technologies to more households and other areas of the country.

Also the potential of these technologies could be applicable also to other countries in the regions, if there are enough funds available.

6. Future Prospects

As an alternative option the project partners are looking at various options:

- Access to the voluntary market and the Gold Standard. However this also will require time and efforts to fulfil these standards.
- Use the experience gained in training craftsmen and development of technologies further and incorporate them into training curricula (vocational or/and university level). Contacts with Helvetas have been established in this respect (as it has a vocational training programme in Kyrgistan).
- Develop and implement training on business skills targeting craftsmen trained in the project who have a potential of developing successful small-scale businesses in this field.
- Finally, the achievement of overall goal of the project (large-scaled implementation of proposed energy efficient measures) can be reached by working with micro-crediting organizations and combined promotion of small-scale business (without certification of CO₂ reduction methodology).

CAMP Alatoo is presently looking into possibilities to raise funds within Kyrgistan. CDE would be interested to continue to support these efforts through methodological backstopping, support in fund raising and impact monitoring. If REPIC or other funders are interested, CDE would be ready to develop a follow-up project.

7. Conclusions

CAMP Alatoo team successfully implemented the project and achieved its planned outputs.

However, the overall goal of preparing a massive CDM follow-up project was not achieved. A developed methodology of CO₂ reduction was submitted to CDM Executive Board, but its approval needs additional time and activities to achieve the condition for starting the 2nd stage of the project.

The certification of CO2 reduction methodology can drag on for an indefinite term and we are not optimistic in this regard. As an alternative option the project partners are looking at the options of voluntary market and the Gold Standard.

Before starting the second stage of the project the practical adaptation of CO2 monitoring system is needed. For approbation it is necessary to conduct the preliminary monitoring with getting data, their calculation and approbation of methodology, it is recommended to conduct these activities with direct consultation of specialists from MyClimate.

The CAMP Alatoo team was challenged by very complex issues due to lack of previous experience in CDM projects. It is very important to mention that this project was innovative as it was the first conducted in Kyrgyzstan and in the CIS area. During the implementation of the project we met unexpected situations which made the process more complicated and challenging than what we planned.

It has to be added that the difficulties arising from adapting CDM methodologies in this particular case were clearly underestimated by all partners involved. Nobody foresaw the difficulty created by the situation that the existing methodologies were suitable only for houses that use only fossil fuel heating systems and also not for a combination of house insulations with improved stoves. It has to be noted that in the same time similar projects by other agencies (World Bank in China, Caritas in Balkan) also encountered similar problems which could not yet be overcome.

For the meantime we strongly recommend to use the experiences gained in this project and support CAMP Alatoo to undertake more activities in this field. For the time being, training of craftsmen, development of small-scale business based on this skills, inclusion of the technical contents in curricula of training and education institutions and support to house owners with micro-credits indicate a wide range of possibilities.

Annexes available:

- Annex 1 Recommendations for using of straw, reed, sawdust and wool for heat insulation of individual dwellings rus;
- Annex 2 Report of the SRIfSRCoK rus;
- Annex 3 Recommendations for construction and maintenance of energy efficient stoves rus;
- Annex 4 Report of the SRIfSRCoK rus;
- Annex 5 Cover Letter rus;
- Annex 6 Cover Letter english translation;
- Annex 7 Didactical manual for the basic theoretical seminar on thermal insulation of existing houses in rural locality rus;
- Annex 8 Report on training seminars for constructional craftsmen on thermal insulation technologies Chon-Kyzyl-Suu rus;
- Annex 9 Report on training seminars for constructional craftsmen on thermal insulation technologies Ak-Orgo rus;
- Annex 10 Report on training seminars for constructional craftsmen on thermal insulation technologies Djety-Oguz rus;
- Annex 11 Report on training seminars for constructional craftsmen on thermal insulation technologies Chyrak rus;
- Annex 12 List of trained craftsmen on house thermal insulation rus;
- Annex 13 Report on training seminars for constructional craftsmen on construction of energy efficient stoves Bala-Aiylchy rus;
- Annex 14 Report on training seminars for constructional craftsmen on construction of energy efficient stoves Saruu rus;
- Annex 15 Report on training seminars for constructional craftsmen on construction of energy efficient stoves Emgekchil rus;
- Annex 16 List of trained craftsmen on construction of energy efficient stoves rus;
- Annex 17 Agreement between CAMP Alatoo and Financial Group Kompanion rus;

Annex 18 Energy efficient stoves booklet kyr;

Annex 18 Energy efficient stoves booklet rus;

Annex 19 Tables for estimation of CO₂ emission ger;

Annex 20 CO₂ calculator rus;

Annex 21 Report on thermal imaging examination of insulated house in Chyrak rus;