

## **“Cane reed: 19<sup>th</sup> century idea, 21<sup>st</sup> century solution”**

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Searching for solutions to provide needy families with an affordable housing, HFH Kyrgyzstan started an absolutely innovative in Habitat world project - Cane Reed Houses, in September 2004. These houses are built using local materials - cane reed mats that are environmentally friendly, energy-efficient, seismically stable, affordable and fast in construction. Habitat Kyrgyzstan's innovative Cane Reed project won US\$116,389 World Bank Award at the prestigious World Bank Development Marketplace competition that took place in Washington DC in May 7-10, 2006. The winning project “Cane Reed: 19th Century Idea, 21st Century Solution” is among 30 winners chosen from 2,500 applicants from 55 countries. In May 10, 2007 the build was started and the families were building 2 row houses (each of 5 apartments) with the help of local and GV volunteers. To date 48 cane reed houses are built.

We will present this type of technology, which was recently improved by the implementation of a solar collector system for warm water and heating – in collaboration with Women of Europe for Common Future.

### **History of the project:**

Kyrgyzstan's population amounts to 5.4 million. 70% of them live under substandard housing conditions or are homeless, live in dormitories, with relatives and friends. Due to social and economic problems poor families move to the overcrowded capital, searching job and shelter. The population of the capital city Bishkek has grown from 800,000 to 1,500,000 people during the last five years. The capital is overcrowded and in extreme need of decent houses. It is not unusual for 3 generations of a family to be crowded in one single room with no heating or running water. About 700,000 people (45% of the population) live in new housing estates around Bishkek with no central infrastructure, many of them having electric or solid fuel house heating. Solid fuel heating often means dangerous makeshift furnaces. Besides the new builds, there are 13 housing estates in Bishkek, including 40,000 unfinished, to 30-70% completed houses. Our innovative heating system can also be applied while renovating/finishing these houses.

House building is extremely expensive, as is heating a home. Families must spend up to 50% of their earnings on heating. Electric heating is clean but dangerous because often makeshift furnaces are used, and almost unaffordable. The traditional solid fuel heating, used by 80% of the population is cheaper but pollutes, does not properly heat all the rooms, even kills through CO poisoning and causes excessive misuse of forests and coal resources. As solid fuel heating is the cheaper, people are forced to be unconscious of pollution and new technologies. Their main concern is to heat the house and still having enough to eat.

One of the greatest problems on national level is the disparity between energy production and consumption. Kyrgyzstan consumes more coal, oil and natural gas than it produces what causes dependency on import. At the same time, local electric energy production is almost 50% higher than the current consumption. Further, the loss of energy by consumption is exorbitant. The country's energy development program aims

at reducing energy loss, introducing energy saving technologies and taking measures against pollution and climate changing caused by the use of gas, coal, biomass etc.

In the long run, our innovative method can tackle poverty housing, misuse of energy resources, dependency on imported energy and last but not least by saving a considerable percentage of their income, help the poor to live a decent life.

The government of the overdebted new republic is currently unable to tackle the problem of social housing. Habitat for Humanity has already proven to be able to mobilize the communities by building simple, decent and affordable houses at no profit or interest, involving volunteers. The energy-saving programs of the country are relatively new.



The purpose of the project to provide an affordable and environmentally clean house heating to poor and low income families, by building houses using a traditional cane reed and clay construction technology, combined with a coiled circuit under floor heating system.

As a solution to the building costs and to the energy problem our innovation of combining the traditional reed and clay construction technology with the relatively new coiled circuit floor heating system, has allowed us to achieve both low construction and heating costs. We have achieved a capital construction cost saving of circa 40% and the innovative, clean and cheap floor heating system saves 75% of the energy costs. The reed and clay technology is in used in the floor, walls and ceiling of seismically stable timber carcass home. The heating system is ‘sandwiched’ between the slabs of reed and clay, and the concrete floor slab. The water in the system is 30ltrs with a 10ltrs boiler tank and the circulating pump 3.4 kwatt.

### **Idea and Innovation**

The ‘rule of thumb’ in construction technology is: ‘a low construction cost delivers a high running and maintenance cost’ or ‘a high construction cost delivers a low maintenance and running cost.’ By combining the traditional cane, reed and clay construction technology, and the relatively new coiled circuit under floor heating system, we have achieved both low capital construction costs and low maintenance and heating costs – without compromising the structural integrity of the home.

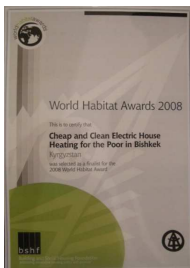
Our project addresses the problems identified in the previous points by building simple, decent, warm and affordable houses for the poor:

- Using cane reeds for heat isolation in the walls, ceiling and floor construction (cane reed is a seismically stable and meets local building codes, is an ecologically pure and cheap natural building material produced locally),
- Using an innovative floor heating system, through a local company, which is cheap and easy to install, involves low electric energy consumption, is safe, environmentally friendly, and warm,
- And disseminating this project (old technology with a new technology) to people, raising awareness, to expand the project;

The innovation in this project is the combination of an old technology - use of cane reed for building houses that we developed further – with a new technology: the innovative coiled circuit under floor heating system. Opposing to the traditional XIX century cane reed houses, we build the house with a timber frame that is filled with cane, reeds and clay. This construction has improved insulating properties, is seismically stable and meets local building codes, is low cost and minimizes the impact on the environment. The floor heating system is unique in terms of using extra thin pipes, thus minimizing the volume of water circulated in the system. A further innovation is the laying of the floor and the heating system in one step.

The building of the first 3 individual pilot houses in 2004 took us 6 months. The greatest barriers were the rainy weather during construction, the search for a reliable cane reed supplier and the search for appropriate construction materials, such as plastic pipes, heaters, boilers etc. During this process we found our partner organization Chelebi which provides us the materials cheaper and is willing to take part in the further development of the innovation to duplexes and multi-home houses.

### Project awards and international recognitions:



“Cheap and Clean Electric House Heating for the Poor in Bishkek” project was selected as a finalist for the 2008 World Habitat Award



“Providing Affordable Housing to the Poor by combination of traditional building method with an innovative heating system” project was selected as a Best Practice by an International Independent Jury for Best Practices in the year 2006 for its outstanding contribution toward improving the living environment



“Cane reed: 19th century Idea, 21st century Solution” project was selected as a finalist in Development Marketplace Global Competition 2006 and won award 116, 000 USD for building 10 new houses.



## Project Beneficiaries and Results

Kyrgyzstan is one of the poorest of the countries of the former Soviet Union. The country provides poor protection from harsh winters, yet families continue living under these inhumane conditions because they cannot afford something decent. Habitat for Humanity Kyrgyzstan is the only organization in the country, providing simple decent and affordable houses to the poor. Our houses built with the new technology are highly appreciated by the Construction and Architecture Commission under the President of the Republic. The city’s architecture and construction commission will support us in designing the house and getting authorizations and construction permits for project implementation. The municipality will provide access to water and electricity.

Project success is measured by following:

- Energy services are improved, safe electrical heating is provided to at least 60 poor people then to whole communities.
- One family will save up to USD 60 per month. For this money you can buy 490 loafs of bread, or 20 kg of meat, or 160 l of milk. It means practically, that a family can feed all its members on the money that it saves through energy savings.
- Through building the houses together with the homeowners, we not only build houses but also communities. The savings can also be used to improve the living conditions of the families and secure the mortgage payments of USD 15-25 per month.
- The use of solid fuel is reduced, resulting in less pollution and improving health.
- The community saves up to 3000 kilowatt/family and per month that is the equivalent of USD 60.
- Reed houses are seismically stable: what is important particularly in the mountain regions.

## **Financial Viability**

One of our financial resources is our revolving fund funded by donors and by the monthly mortgage repayments of homeowner families that will be used for the up-front investment. The loan bears low interest and has a life time of 15 years. Due to the savings of 60\$/month through this project, the families will be able to pay the monthly installments, and the revolving fund will help us to help more poor families. Average cost per cane reed house is 12000 USD for 45 m2.

As Habitat Kyrgyzstan working on eliminating poverty housing in Kyrgyzstan by developing communities through building and renovating simple, decent and affordable houses in partnership with families in need the role will be to house poor people in Bishkek and demonstrate the efficiency and the better way to improve their life. Habitat Kyrgyzstan is the affiliate of *Habitat for Humanity International* and was established as non-profit, non-governmental organization in 1999. Has 2 affiliates in Kyrgyzstan: HFH Bishkek and HFH Barskoon. The organization is funded by donations from individuals, organizations, churches and companies.

One of the organization strength is a revolving fund principle of donations from organizations and individuals are combined with mortgage payments from homeowner families to build more houses. This makes more people have houses, take responsibility to repay and support value.

Organization has well worked out and sustainable planning, implementation, monitoring and reporting system. It has a monthly activity tracking on construction, partnership developing, volunteer recruiting, training, fundraising and program managing. Have served 130 families, have sustainable partnership with the government, signed a MOU between Habitat and the Government, have partner organizations both local and international, recruited over then 200 volunteers, have contacts with every provinces of the country working on incorporating Habitat programs such like new building, renovation, partnership work, half build completion and so on.

On November, 2008 by financial support of WECF was installed new pilot solar heating system in one of existing cane reed house. To date is conducting monitoring process in different season and to be planned to issue report on this innovative idea in the next year. We will be happy to share with all of you.