

Abstract

Energy Efficiency in Kyrgyzstan: High-Tech and a Mix of Hay and Clay A Joint Project of Kyrgyzstan and Switzerland

Key words:

Energy efficiency / local insulation material / better housing / better living conditions > on the village level in the transition context

Swiss support for the Kyrgyz energy sector has a history of over ten years. Measures to save energy were initiated together with a Kyrgyz partner organisation at the level of the Kyrgyz distribution companies and at the level of rural consumers. Technical measures for the maintenance of the infrastructure (substations / overhead lines) have largely been implemented jointly with other international donors.

User-oriented home insulation and heating improvement projects at the village level have gone through the pilot phase, proved technically viable, and are ready for upscaling. The most important idea behind these projects is that they are designed to use local material, as emphasised in the title.

Demand-side and supply-side options

The Swiss State Secretariat for Economic Affairs SECO supported the Kyrgyz distribution companies within the privatisation process (**supply-side options**), the Swiss Agency for Development and Cooperation SDC did the same with partnership pilot projects on the village level (**demand side options**).

If electricity as high quality energy in the entire Kyrgyz Republic is excessively used for pure heating purposes such as water heating, space heating etc., demand-side management comes up as an attractive alternative. Building insulation and stove efficiency as demand-side measures in rural regions is appropriate to reduce heat energy demand by up to 50%, depending on the actual state of the buildings. The higher the inefficiencies, the better the prospects for sufficient financial returns. However, financial viability can only be achieved if bill collection rates are raised to reasonable levels.

In order to evaluate possible cooperation among these two demand- and supply-side projects, SECO and SDC jointly contracted the Centre for Development and Environment (CDE) for a pre-feasibility study:

“Energy efficiency in the Kyrgyz Republic – integrating demand and supply-side options”.

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This study had three main purposes: 1) To support decision-making concerned with alternatives for future energy strategies; 2) To address both demand-side and supply-side alternatives; and 3) To propose further projects and activities on energy efficiency for one of the poorer mountain districts of the Kyrgyz Republic where both Swiss agencies – SECO and SDC – are active.

Experience within the Central Asian Mountain Partnership programme (CAMP, initiated by SDC in 1999) illustrated the importance of reducing energy demand in order to meet the specific needs of poorer households. At the same time, ecological costs in terms of natural resources are reduced.

Poorer households rely very heavily on natural resources (wood / alpine bushes / dung) due to the lack of other resources for heating and cooking. Even in the short term (2 to 5 years) ecological costs through the destruction of specific mountain ecosystems will be immense. (results based on specific CDE studies for poor mountain oblasts in Tajikistan (Droux, R. and Hoeck, T.- 2007*))

Knowing these facts Swiss **SECO** defined **comparison** of efficiency measures based on **cost-benefit and sustainability criteria** as a specific objective of this study. **The geographical focus** of both energy efficiency projects is the mountainous and poor **Narynskaja Oblast of the Kyrgyz Republic**. Possible synergetic impacts (insulation of houses and public buildings, complemented by raising energy awareness, capacity development, and financial incentives) are identified as a result of this

study. Concrete village based projects and participatory / awareness raising activities are recommended.

The methodological approach chosen for this comparison combines Utility Value Assessment (UVA) and Cost Benefit Analysis (CBA). The following 6 interventions were assessed:

From the demand side: 1) partial retrofitting of typical private houses; 2) full retrofitting; 3) new straw bale construction.

From the supply side: 4) seco's Naryn III programme on rehabilitation of the electricity distribution infrastructure; 5) and 6) two examples of decentralized use of hydro energy (one planned by a local NGO and one realized by USAID).

The **results of the cost-benefit analysis (CBA)** indicate that insulation of houses and reconstructions in Naryn III are economically feasible, assuming that energy prices remain stable. The pay-back period for partly retrofitting is 15 years. For Naryn III (>SECO's infrastructure rehabilitation) , taking account of commercial losses, it is 10 years. These magnitudes are similar with other standard CBA parameters as well (see graph "pay-back period" attached below).

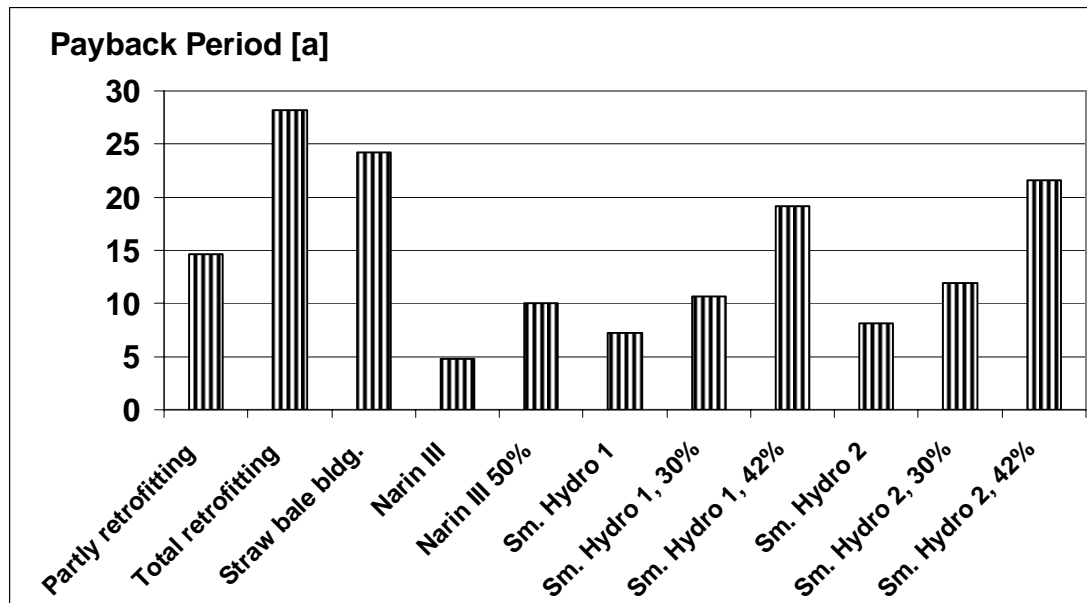
Based on an expert assessment, the UVA calculates a total utility value (TUV), applying sustainability criteria relating to society, economy, technical function, feasibility and environment. The UVA method was applied with the participation of VOSTOK ELEKTRO, other Kyrgyz and Swiss experts in Narynskaja Oblast. The results showed that experts attributed greater value to insulation projects than to reconstructions in Naryn III (see spider diagram "Summary results UVA attached below).

The study made it possible to identify a typical win-win solution. The gains for individual households consist not only of lower costs for energy, but also greater comfort and warmth in each room. At the same time, ecological costs in terms of natural resources are reduced. The distribution company gains when commercial losses are reduced because people are willing and able to pay lower electricity bills.

In terms of overall results, this study makes it clear that a strategy combining selected interventions related to energy supply and demand will improve the energy situation in the Kyrgyz Republic.

The photos attached to this abstract illustrate the two SDC demand side projects, one on house insulation with locally available material, one on stove efficiency

** Droux, R. and Hoeck, T. (2004): Energy for Gorno Badakhshan – Hydropower and firewood Cultivation. Analysis of the Energy Situation in the Tajik Pamirs. CDE, University of Berne.*

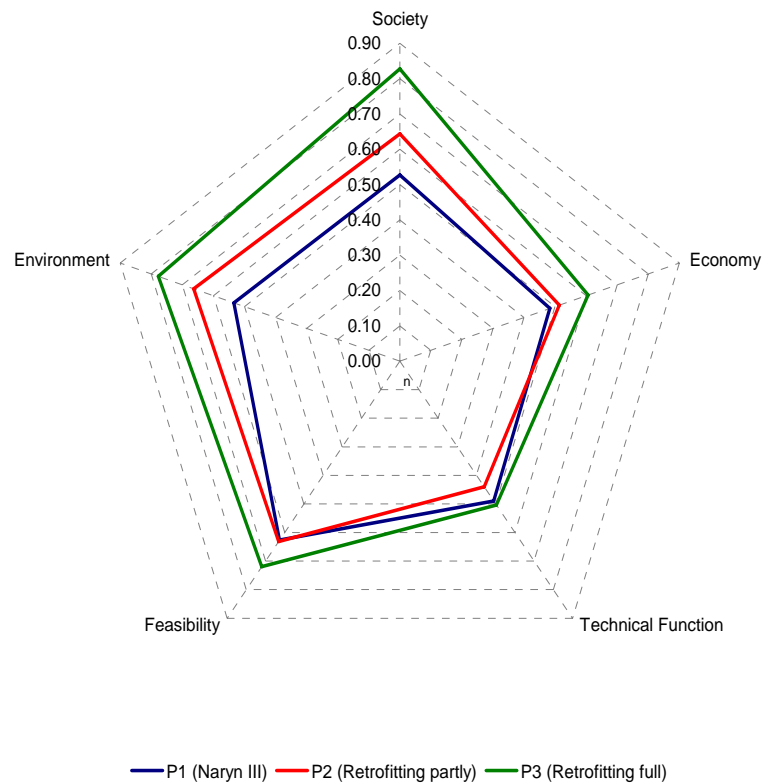


Summary results

Cost Benefit Analysis (CBA) – Payback Period

Projects described in the graph above (left to right):

- 1-3 : SDC's pilot projects on retrofitting of private and public buildings (e.g. schools) in the framework of the CAMP (Central Asian Mountain Partnership) programme
- 4-5 : Naryn III is the acronym for SECO's long term support to electricity infrastructure reconstruction programme in cooperation with the Kyrgyz distribution company VOSTOK ELEKTRO
- 6-11: Sm. Hydro (e.g. Small hydropower projects) which are not tackled in this abstract > interesting for comparison



Summary result of the **Utility Value Assessment (UVA)**

Comparison of partial utility values per dimension for the three project alternatives assessed

- Naryn III (=infrastructure programme implemented by SECO) >blue
- Partly Retrofitting of private dwellings on the village level >red
- Full Retrofitting of private dwellings on the village level >green



Locally available material: in the case of the high mountain village of Jergetal, this consists of a hay and clay mixture

By Silvio Meessen / Jergetal, Narynskaja Oblast - July 2007



Preparation of clay panels (“glinnye panely”). The material is taken from a local clay quarry.

Foto Doc by CAMP Alotoo (Ermek B.), taken in Tölok (Narynskaja Oblast of the KR ,) July 2003



The first two levels of the insulation layer, reaching from the ground to a height of 2 m, have been mounted.

By Silvio Meessen / Jergetal, Naryskaja Oblast - July 2007



A newly built stove with small, multi-purpose fire chambers and a high storage capacity.

Foto Doc by CAMP Alattoo (Ermek B.), Jardy Suu (KR), February 2004



A conventional iron stove typical for rural areas in the Kyrgyz Republic.

By Silvio Meessen / Jergetal, Naryskaja Oblast - July 2007



Poster about the typical energy situation in rural Kyrgyzstan

by Heino. Meessen (CDE)- presented at the SECO workshop in Berne, Sept. 2006



Map of the electricity distribution network of the Kyrgyz Republic, specifically for Narynskaja Oblast.

Photo taken by Heino Meessen at the Ak-Suu substation operated by VOSTOKELEKTRO which was reconstructed with financial support of SECO