

Heat exchangers: an inexpensive option to increase the efficiency of simple iron stove-based room heating systems in winter cold regions

In many winter-cold areas of Asia up to the present the rural population relies on simple, inefficient iron stoves for winter heating. The consumption of large quantities of firewood and/or dried animal dung as main fuel sources during the winter period represent in many regions a key driving force for advancing natural resource degradation.



Heat exchangers offer an inexpensive option to substantially increase the efficiency of locally used simple iron stoves.

Basic functioning and fuel reduction potential of heat exchangers

Build out of metal sheets, heat exchangers are inserted into the existing exhaust pipe system at about 40 cm distance from the top of the iron stove. By reducing the speed of hot air flowing through the exhaust pipe and increasing the surface area for heat transmission into the room, *heat exchangers* have the capacity to reduce families' energy requirements for winter heating and cooking in the range between 25-50%.



A short film clip, which can be accessed through the following link:

<https://www.down-to-earth-consult.com/fields-of-intervention/energy-efficiency/heat-exchanger/>

briefly illustrates the functioning of *heat exchangers*.

A reduction of the winter fuel requirements by 25% translates for many rural families in winter cold areas into savings of several tonnes of wood and/ or dried animal dung as fuel material per year.

Heat exchangers can also be used to increase the efficiency of iron stoves that are supplied with gas or coal.

Different *heat exchanger* designs

In order to suit individual requirements to the best possible extent, a number of different types of *heat exchangers* have been developed.



The “6 in 1 *heat exchanger*” (see above photo on the right site) allows rural families to engage in room heating, cooking, tea preparation, warming up of water for washing and bathing- all at once.

Apart from enhancing the efficiency of family-based winter heating systems, *heat exchangers* can improve energy efficiency of stove based winter heating systems in schools or public offices as well of small to medium size greenhouses.

In addition, *heat exchangers* offer great potential to substantially reduce the energy requirements of families who are living during part of the year- or all year round in movable shelters such as yurts.



Favourable cost-benefit ratio

Heat exchangers can be produced by skilled local metal craftsmen at a price between Euro 20 to Euro 30,- per unit. Taking into consideration their average fuel saving potential, heat exchanger normally pay-off in less than one winter period.

With the possibility to re-use the same structures for several years, in many winter cold areas of Asia currently *heat exchangers* represent the by far most cost-efficient readily available option to substantially increase domestic energy efficiency by simple means.

Potentials for up- and cross scaling

Up to the present *heat exchangers* are mainly applied in Tajikistan/ Central Asia, where its use has enabled thousands of rural families to sharply drop their fuel requirements for winter heating and cooking.

Other winter cold countries in Asia, where the use of *heat exchangers* could support rural families to substantially cut their annual consumption of different fuel materials include Afghanistan, Armenia, Bhutan, China, Georgia, Kyrgyzstan, Mongolia, Nepal, Pakistan and Uzbekistan.

Time to act!

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