Concept of energy restoration of residential buildings in Slovenia

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Summary

Since 1992 there have been more studies done concerning improvement of energy efficiency in Slovenian residential sector. In the framework of these studies energy saving potential in residential buildings in Slovenia has been assessed. Further more energy efficiency measures and possible ways of implementation were suggested following the results of public opinion analysis detecting appartement owners attitude and plans. In 1996 incentives for additional loft insulation, drought proofing and oil burner adjustment were implemented. The goal of the paper is to present the expectations in improvement of energy efficiency in building and accomplished results of grant subsidy scheme for energy saving measures in households.

1. Technical and economically viable energy saving potential in residential buildings in Slovenia

The analyses showed that expected energy savings in Slovene residential building sector are in range from 45% to 76% with average technical energy saving potential of 64%.

According to previous studies energy saving measures with payback period lower than 10 years that are socially acceptable can reduce energy consumption up to 30%. Further more most of the buildings need to be refurbished anyway that means that only a smaller part of the whole investment in refurbishment is on behalf of the energy restoration. Considering that payback period for the most extensive and therefore expensive but the most efficient energy saving measures (outer wall insulation, new windows) is much shorter.

To investigate public opinion on implementation of energy saving measures in buildings or households a public opinion analysis was completed 1996.

As it was predicted buildings in Slovenia built before 1980 are poorly thermal insulated. More than 60% of residential buildings have bad loft insulation ($k > 1.0$ W/m^{2}K) (Fig. 1), more than 64% have draughty windows and more than 42% of them have heating system older than 15 years. Majority of the questioned households are interested in implementation of energy saving measures, especially those with short payback period (up to 10 years). The main barrier proved to be lack of money.

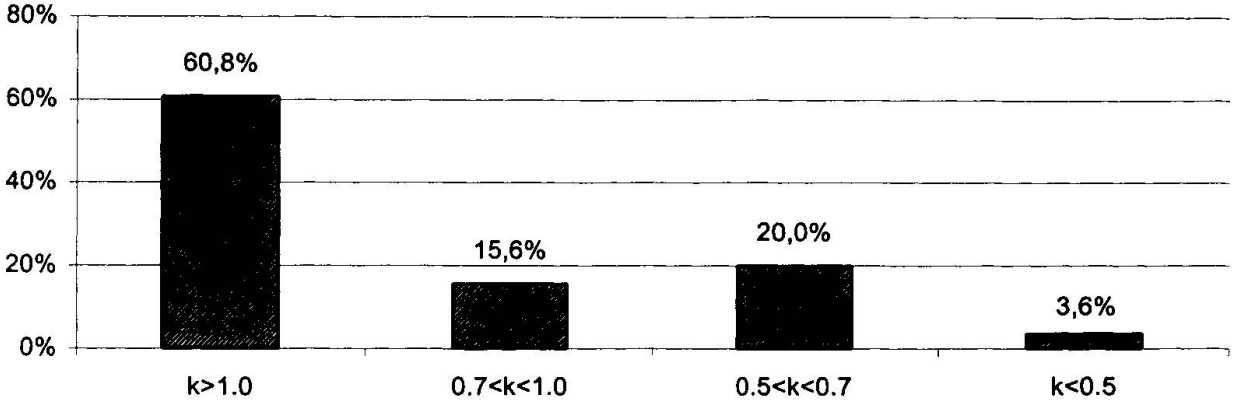

Figure 1. Present situation in outer walls k value (W/m^2K) in Slovenian residential buildings

2. Incentives

A pilot project of grant subsidy scheme was formed in 1996 where the Ministry of Economic Affairs allocated the founds for the incentives for implementation of energy saving measures in 2800 households in Slovenia. The following energy saving measures were subsidised:

- ***loft insulation*** (in 355 households) - 350 SIT/m^2 with max. 28.000 SIT/household, i.e. aprox. cost of insulation material for unused attics in average building,
- ***window tightening*** (in 944 households) - 400 SIT/m' of window frame with max. 10.000 SIT/household, aprox. cost of window tightening in smaller apartment,
- ***oil burner adjustment*** (in 1229 households).- 5.500 SIT, i.e. cost of the service.

In frame of the "Loft insulation" project average k value for the 355 lofts and attics before implementation was 1,75 W/m^2K (varying from 0,7 to 4,5 W/m^2K). After the implementation average k value is 0,29 W/m^2K (Fig.2). Such enormous difference in heat loss through loft/attic signify reduction of energy demand in household from 7% (single family house built after 1980) to 24% (single family house built before 1970) or in average 800 oil per household depending, of course, on condition before implementation. Payback period of the state investment in energy efficiency is less than one year, but for the whole investment considering different ways of realisation of additional loft/attic insulation pay back period varies from 1 to 5 years.

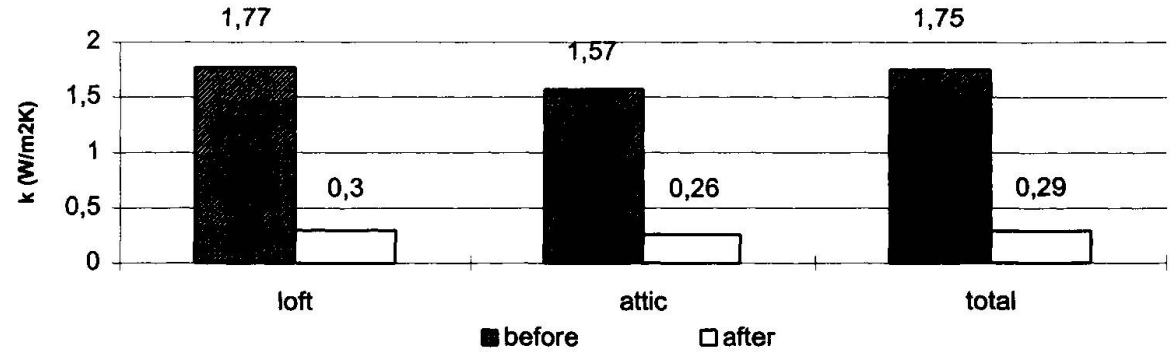

Figure 2. Average k values(W/m^2K) before and after implementation of additional loft/attic insulation