



Case study of improvement schemes of public housing in the Slovak Republic

Public housing
in the Slovak
Republic

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Abstract

Purpose – Since 1989, the efficiency of heat production has increased remarkably, and heat and water consumption have decreased significantly. This is largely due to the liberalization of prices (within 15 years heating prices have increased 25 times, water charges 50 times), legislative changes and the improved quality of administration of residential buildings. The purpose of this case study is to describe actual interventions and experiences from Slovakia's older residential houses. Some associations' efforts in relation to building management of housing estates have achieved such improvements, which are also instructive to advanced countries.

Design/methodology/approach – The paper utilises a case study approach.

Findings – On the basis of detailed analyses of housing estates it can be concluded that their physical condition, due to various structural defects and technical shortcomings, poor workmanship and neglected maintenance, is worse than that corresponding to their age, particularly in panel housing estates. A reduction in energy consumption in existing housing estates can be achieved mainly by taking the measures outlined. A reduction in energy consumption in residential buildings can be achieved effectively only in terms of real economic parameters. Artificially maintained low energy prices did not motivate residents to reduce heat or water consumption. Now that prices have been brought closer to those in other EU countries, the economic effectiveness of rationalization measures for reducing costs in heating residential buildings can be evaluated more objectively. Rationalization measures aimed at reducing energy consumption have proved successful. Building administration associations have transformed to a great extent.

Practical implications – The paper is a very useful source of information and impartial advice for associations wishing to achieve a necessary level of production and supervision.

Originality/value – This paper fulfils an identified information/resource need and offers practical help for the effective management of housing estates.

Keywords Housing, Residential property, Energy consumption, Cost reduction, Slovakia

Paper type Case study

Introduction

Currently, there are 1.7 million apartments registered in the Slovak Republic, and approximately 50 percent of these are situated in residential buildings (blocks of flats). The majority of the buildings were built between 1945 and 1993. In an endeavour to satisfy accommodation needs as fast as possible, building companies sought construction methods that were fast, cost-effective and affordable to a wide spectrum of residents. As a result, large-scale housing estates came into existence, all built on the basis of panel structure elements. The method of panel housing construction was used



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to build approximately 650,000 apartments under various construction systems. Apart from many other shortcomings, the most serious problem of this type of building is their high energy consumption, caused mainly by the less strict thermo-technical criteria stated at the time for cladding and roofing structures, windows, entrance doors, etc.

The adverse effect of the Government's policy at that time should be looked at in this context. Until 1989 the Government made every effort to maintain the costs of energy and water artificially at a very low level, which resulted in excessive energy and water consumption and waste. There were minimal efforts by building operation/administration managers to solve problems related to the rationalization of energy and water consumption.

Since 1989, the efficiency of heat production has increased remarkably, and heat and water consumption have decreased significantly. This is largely due to the liberalization of prices (within 15 years heating prices have increased 25 times, and water charges have increased 50 times), legislative changes and the improved quality of administration of residential buildings.

Developments in heating and water charges after 1989

Up until 1992 the price of heating supplied to residential buildings from centralized heating and hot water production sources was constant at SKK 21.00/GJ. Since 1993 it has been rising gradually, and now it is SKK 560.00/GJ (SKK – Slovak crowns; €1 ≈ 38 SKK). The trend in heating prices from 1992 to 2005 is shown graphically in Figure 1. The graph shows both the development of prices controlled by the state, set on the basis of economic costs, and the development of maximum prices that were paid by residents in residential buildings. This means that until 1999 the state subsidized heating supplies for its citizens.

From 1992 to 2005 there was a sharp increase in drinking water charges. The development of prices in this period is shown in Figure 2.

It is worth mentioning that there were some important legislative measures taken by the state in the aforementioned period (acts, decrees and directives) that were aimed at cutting the energy consumption of buildings, residential buildings included. Moreover, the Government, within its financial possibilities, in order to mitigate adverse economic effects on residents, has been supporting and subsidizing solutions for the reduction of energy consumption in residential buildings.

Reduction of heat and water consumption in residential buildings

On the basis of detailed analyses of housing estates it can be concluded that their physical condition, due to various structural defects and technical shortcomings, poor

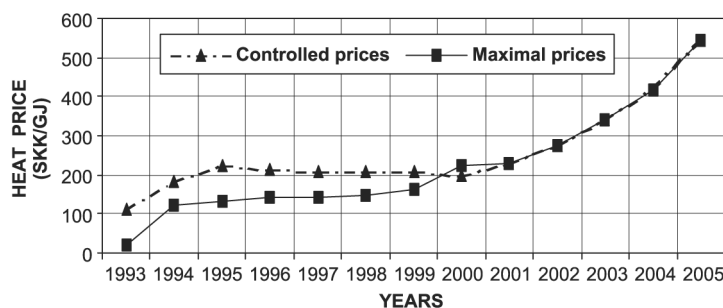


Figure 1.
Development of heating
prices from 1992 to 2005 in
the Slovak Republic

workmanship and neglected maintenance, is worse than that corresponding to their age, particularly in panel housing estates. Structural, hygienic and operational defects are found (Sternová, 1999). However, there is a high potential for a reduction in energy consumption. The reduction in energy consumption in existing housing estates can be achieved mainly by taking the following measures.

Measures for a reduction in energy consumption in existing housing estates

- (1) A marked improvement in the thermal properties of enveloping structures of housing estates.
- (2) An improvement in the existing condition of building equipment, including:
 - heating and drinking water consumption measurements made at the entrance/input to the buildings and at the end-user households;
 - hydraulic control by special valves of the heating systems and hot water distribution systems from the source to the end pieces of the equipment elements; and
 - application of progressive regulation technology.
- (3) An increase in the level of energy-saving consciousness in managers administering housing estates and in their residents.
- (4) A quality improvement in the operation, maintenance and use of heat sources, residential buildings and their services.

However, implementation of all these necessary measures is really expensive, and it is a long and slow task that may last ten to 15 years. The effectiveness of single measures can clearly be seen from the change in specific amounts of heat consumed to supply heat to the houses constructed in the systems T 06 B, T 08 B and T 03 B in Figure 3 (T 06 B, T 08 B and T 03 B are structural systems designations according to former Slovak standards). Specific amounts of heat consumed in the years from 1994 to 1997 correspond to the original state. In 1998 there was an evident decrease in heat consumption after the overall hydraulic regulation of heating systems in residential buildings.

Additionally, in 1999 residential houses Type No.1 BD 1 (BD, dwelling building) constructed in systems T 06 B or T 08 B were insulated. This was followed in 2003 by house Type No.4 (T 06 B). The energetic effectiveness of the additional warming is observable mainly in houses of system T 06 B, which are typical of the insufficient properties of cladding structures.

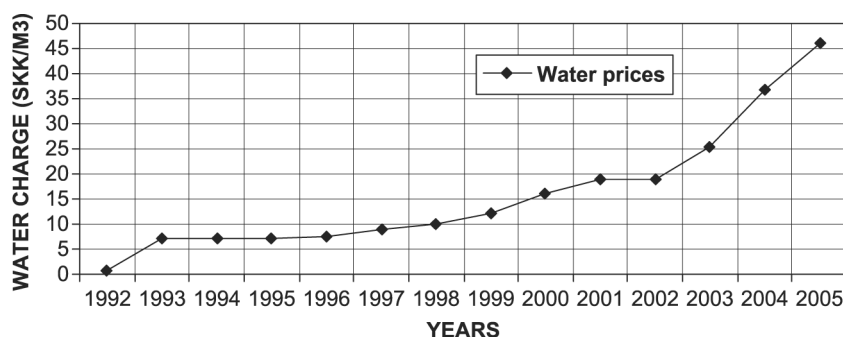


Figure 2.
Development of drinking
water charges from 1992
to 2005 in the Slovak
Republic

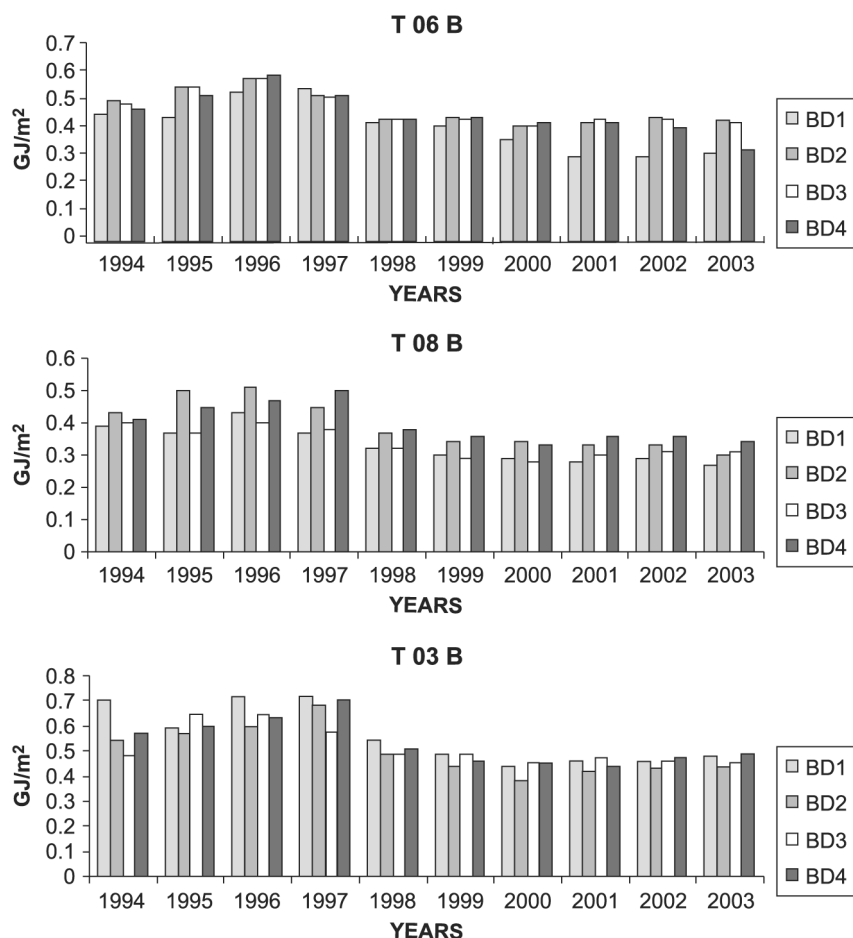


Figure 3.
Specific amounts of heat
consumed to supply heat
to houses constructed in
systems T 06 B, T 08 B and
T 03 B

Figures 4 and 5 demonstrate a decrease in the consumption of hot and drinking water due to a rise in water charges and water metering in end-user households.

Economic effectiveness of reduction measures for energy consumption in residential buildings

The reduction in energy consumption in residential buildings can be achieved effectively only in terms of real economic parameters. Artificially maintained low energy prices did not motivate residents to reduce heat or water consumption.

Now that prices have been brought closer to those in other EU countries, the economic effectiveness of rationalization measures for reducing heat costs in heating residential buildings can be evaluated more objectively.

As an example, the effectiveness of the hydraulic regulation of heating systems in house construction system T 06 B can be given (Dahlsveen and Petráš, 1999). Table I shows the amounts of heat consumed for heating of selected residential buildings (RB) from 1994 to 2003.

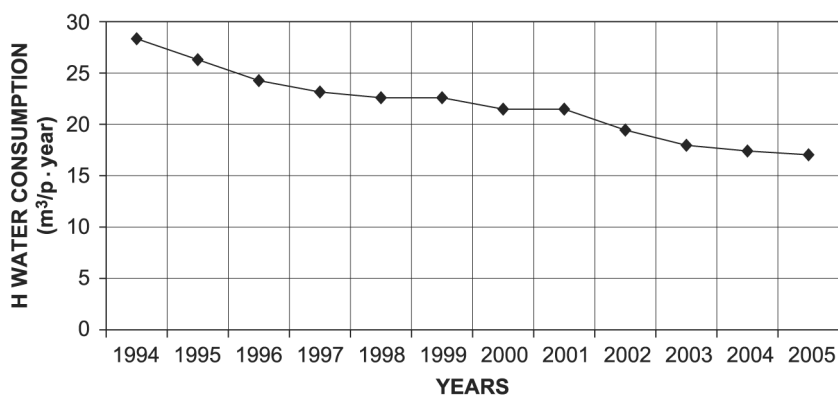


Figure 4.
The consumption of hot
water from 1992 to 2005 in
the Slovak Republic

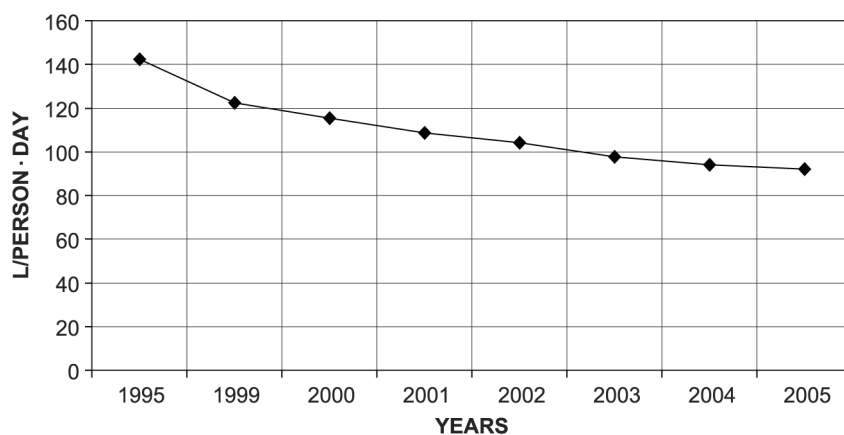


Figure 5.
The consumption of
drinking water from 1992
to 2005 in the Slovak
Republic

Building number	Heat consumption per year (GJ)									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	2,128	2,078	2,519	2,543	2,006	1,948	1,690	1,455	1,434	1,504
2	2,368	2,626	2,747	2,455	2,044	2,096	1,917	2,017	2,096	2,006
3	2,344	2,612	2,736	2,412	2,024	2,068	1,950	2,025	2,038	2,005
4	2,246	2,444	2,770	2,462	2,036	2,081	1,981	2,004	1,912	1,602

Table I.
Amounts of heat
consumed for heating of
selected buildings from
1994 to 2003 (GJ)

Calculations of economic effectiveness

- Average heat consumption 1994-1997 (original state): 2,468.00 GJ.
- Average investment costs for hydraulic regulation in 1997: 342,907.00 SKK.
- Average heat saving after the hydraulic regulation (RB Nos. 2, 3 and 4 from 1998 to 2002): 450.00 GJ.

- Heat price in 1997: 208.00 SKK/GJ.
- Gross return on investment (ROI): 3.7 years.

The economic effectiveness of additional insulation of residential house Type No. 1 T 06 B also takes into account the unavoidable remedy of the defect in the cladding structure, i.e. a leakage through the panel joints resulting from the shrinkage of caulking material in the panel joints.

- Investment costs of the additional warming up of the cladding structure in 1999: 2,912,000.00 SKK.
- Overall repairs of caulking the panel joints in the cladding structure in 1999: 314,000.00 SKK.
- Annual heat saving (RB No. 1 compared to RB Nos. 2, 3 and 4 from 2000 to 2002): 570.00 GJ.
- Heat price in 2000: 374.00 SKK/GJ.
- Economic lifespan of the additional warming up: 30 years.
- Nominal interest rate in 2000: 13 per cent.
- Inflation in 2000: 7 per cent.
- Real interest rate: 5.6 per cent.
- Gross return on investment (ROI): 12.2 years.
- Net return on investment: 17 years.

Conclusions

Rationalization measures aimed at reducing energy consumption have proved successful. Building administration associations have transformed to a great extent. Some associations' effective management of housing estates has achieved such a level of production and supervision that they can also be an inspiration for advanced countries.

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Further reading

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