



ALLIANCE TO
SAVE ENERGY
Creating an Energy-Efficient World

Study of Potential for Energy Efficiency Retrofits of Residential Buildings City of Uzhgorod Ukraine



PROJECT BACKGROUND¹

The building sector in Ukraine annually consumes a third of the total energy used in Ukraine. The residential sector consumes up to 90 percent of the total energy consumed by buildings, and is in a dilapidated state due to lack of systematic and adequate maintenance. The quality of utility services supplied to the end-user is not always satisfactory. Paying for utilities has become difficult for the average consumer as utility tariffs are increased as a result of the economic restructuring process in Ukraine. Vulnerable households are taking the biggest toll despite the subsidies provided for housing and communal services by the state. In fact, these subsidies reduce the badly needed stimulus for retrofits of energy inefficient residential buildings.

Current Ukrainian legislation does not define legal and administrative roles of housing management companies and the responsibilities for basic services and maintenance in housing are unclear. In addition, the market for energy efficiency services, building insulation technologies, metering, and control equipment is small. Most energy efficiency equipment is imported at world market prices, which are too high to be affordable for an average Ukrainian consumer.

In order to aide local governments in Ukraine to increase efficient energy use in housing, a joint research project was launched by the Housing and Environment Institute of Darmstadt (IWU),

¹ The study on Potential for Energy Efficiency Retrofits in Residential Buildings of Uzhgorod, Ukraine was carried out by the Housing and Environment Institute (IWU) of Darmstadt, Germany. A report and handbook detailing this study and other such studies can be obtained by contacting the IWU directly. The Alliance to Save Energy selected this case study in order to draw wider attention to the study and its results.

Germany; the City of Uzhgorod, Ukraine; and the City of Michalovce, Slovak Republic. The project was partly funded by the TACIS Cross-Border Co-operation Small Project Facility.

PROJECT APPROACH

The City of Uzhgorod established a special working group to collect statistical information for 1,450 residential buildings, representing 68 percent of the total housing stock in the city.

The IWU conducted all of the statistical and economical analysis for this study using four potential thermal engineering refurbishment models for each type of building:

1. Thermal refurbishment of building envelope
2. Installation of new boilers in buildings and in district heating boiler stations
3. Insulation of heating pipes in buildings and outside networks
4. Installation of heat meters and thermostatic valves in buildings and improvements in operation of boiler stations

The research assessed energy consumption and the cost of retrofit works for each building type, with a focus on the following measures:

- thermal insulation of walls;
- installation of new windows;
- insulation of upper floor ceilings;
- thermal insulation of basement ceilings;
- insulation of heat distributing pipes in the buildings;
- installation of new boilers in gas supplied buildings;
- installation of new boilers in heat plants;
- installation of new pipes network;
- disconnection of all buildings from district heating network;
- installation of improved temperature control systems in boiler stations;

- installation of heat meters in buildings, thermostatic valves and heat cost allocation devices in apartments.

Using a German software called IWUbill-2, the team calculated the energy balance in buildings, estimated energy efficiency investment costs, and selected the best methods for energy saving retrofits. The economic results were evaluated based on four indicators:

- total investment cost;
- surplus cost of energy efficiency retrofits;
- pay-back time;
- annuity profit or difference between saved energy cost and annual investment costs.

The Uzhgorod city administration and the IWU also studied the building ownership models, project financing mechanisms, family income levels, tariffs and subsidies in the city. A variety of financing options were investigated: mortgage secured loans issued by universal banks, mortgage banks and saving banks, financing with loan guarantees, leasing of energy efficiency equipment for buildings, and performance contracting.

RESULTS

The study showed that the potential for energy savings through heating refurbishments in Uzhgorod buildings is more than 50 percent, and that savings from natural gas used for production of heat and hot water can amount up to 60 percent. The calculations of the study show that pay back period for all examined scenarios is well above 10 years and that local, state or international grants are necessary for most of the energy efficiency refurbishments considered in the study.

Given the 2003 data on energy costs and tariffs, and prices for construction materials and equipment, the study pointed out that most of energy efficient measures in residential buildings are not cost effective because:

1. energy prices in Ukraine are low and do not correspond to world market price for energy.
2. prices for imported building insulation materials and equipment are relatively high compared to energy costs. Only 10% of Ukrainian households with monthly incomes greater than US \$1,000 can afford such materials.

Therefore, financial savings from reduced heat energy consumption in residential buildings were not able to cover the costs of energy retrofits in Uzhgorod in 2003.

Analysis of available instruments for financing energy saving measures determined that a mortgage-secured loan is the best form of borrowing under the conditions prevalent in Ukraine in 2003. The research uncovered that commercial banks in Ukraine are able to provide medium and long-term collateralized loans to building and apartment owners.

The ability to finance energy saving measures with bank loans largely depends on the financing costs, the financial capability of households, and the incentive of each household to invest in energy efficiency. The analysis of the loan financing potentials showed that while 23 percent of all Ukrainian households with the above average monthly income of 800 UAH are able to borrow using short-term loans at 20 percent interest rates, 30 percent of all households are able to only borrow if loan maturity is longer than 10 years at an interest rate not higher than 15 percent. The other 47 percent of all households in Ukraine are not at all able to finance any projects through borrowing.

Research also showed that the role of condominiums as managers of privatized multifamily buildings is weak, and that local authorities and individual apartment owners in Ukraine are strongly dependent on state intervention into local matters such as residential building renovation, management and maintenance.

LESSONS LEARNED


The study highlighted the tremendous energy savings, which can be garnered in the residential buildings of Uzhgorod. Despite 2003 conclusions of the study, which indicate that energy efficiency retrofits were not cost effective, the ongoing development and liberalization of the energy, construction materials and equipment markets in Ukraine should contribute to increasing profitability of energy efficiency projects. Policies that strengthen the role of homeowner associations can play a significant role in ensuring that the benefits of energy efficiency measures are widely known, understood and adopted through practical implementation.

For More Information:

Nicholas Diefenbach
Housing and Environment Institute (IWU)
Darmstadt, Germany
Email: n.diefenbach@IWU.de
www.iwu.de

&
Angela Morin Allen
Alliance to Save Energy
USA
Email: amorin@ase.org
www.munee.org

Last Update: February 2006



The information presented here was prepared by the Housing and Environment Institute (IWU), summarized by MUNEE, and funded by the Renewable Energy & Energy Efficiency Partnership.