

EXECUTIVE SUMMARY

Purpose

The focus of this study is on end-use energy efficiency in urban residential buildings, and its potential to ease the financial burden of tariff reforms as they are implemented in Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS). This study does not analyze tariff subsidies or reforms, or efficiency improvements in utility supply networks. These important issues are more widely discussed in other work, while energy efficiency is regrettably absent from most policy discussions and programs addressing affordability problems.

Accordingly, this study documents and analyzes available evidence of resource and cost savings from residential energy-efficiency measures in CEE and the CIS and discusses whether and how residential energy efficiency should accompany energy price reforms to address consumer affordability. Empirical examples of 25 well-monitored residential projects were examined for this study and presented as case studies. These are found in Appendix A to this study.

Findings: What Energy Efficiency Can Achieve

Empirical evidence from the case studies shows that through various improvements in end-use energy efficiency households can save energy and water resources by at least 30 percent on average, with corresponding savings in energy bills. The bill savings are possible if prices are market-based, if the appropriate efficiency improvements are selected, and if institutions are in place to implement efficient technologies correctly and on a wide scale. The savings were achieved through metering, use of thermal controls, retrofits of a building's heat distribution system and building envelope improvements (insulation, weatherization, windows).

Cost savings for residential consumers depend on the baseline condition of a building, consumer behavior, the energy and water prices, and the measure or combination of measures implemented. The projects reviewed indicate that relatively low cost improvements generally result in savings of 20 to 30 percent, while more comprehensive improvements that also include building envelope upgrades generally result in savings of 40 to 60 percent. In addition to bill savings, the project results indicate that households enjoy improved comfort levels.

Utility Affordability in Urban Multifamily Housing

Average expenditure on housing and utilities has increased significantly from 3 percent of total household expenditures at the start of the region's transition. Affordability is most problematic in countries with reformed tariff practices. Low income groups invariably pay a higher percentage of household expenditures for utilities than other groups.

Utility affordability ratios – i.e., the percentage of household expenditures required for paying utility bills – are most pronounced in Hungary, Bulgaria and Slovakia, followed by Poland, Serbia, and Moldova. In these countries, average income households spend at least 12 percent, and the lowest income groups spend 14 to 20 percent of total expenditures on energy and water. Affordability is expected to become increasingly problematic in CIS countries when tariff reforms will be introduced. With relatively high affordability ratios for non-network fuels such as wood, urban households have few cheap alternatives to central heating and gas.

The case studies indicated that vulnerable households typically live in buildings with other income groups. Therefore, to have an impact, effective methods must be found that deliver energy efficiency to apartment buildings in general, with special provisions for funding the participation of vulnerable households. Poland and Latvia have some experience with such an approach. In some cases, energy efficiency improvements might not necessarily reduce vulnerable households' energy bills if they are already living with minimum "survival level" service – in such instances energy efficiency helps them attain normal comfort levels without increasing the cost of utilities.

Policies and Programs Influencing Affordability and Energy Efficiency

Currently most countries in the region respond to consumer affordability concerns by continuing to subsidize energy prices, either through price subsidies for the general population or more targeted subsidies only for households that apply for and meet criteria for social welfare aid. A few countries have offered some form of general (e.g. Romania, Lithuania) or targeted (e.g. Bulgaria) energy-specific aid to pay for residential heating costs, while most countries bundle all typical household expenses for energy, rent or mortgage, food, medicine, etc. into one targeted social assistance benefit. The energy-specific portion of such "dwelling allowances" or "family poverty benefits" can vary widely among countries depending on the tariffs and fuels used. From a regional point of view this makes it difficult to determine the cost of subsidizing energy for the poor that could be compared with the cost of improving energy efficiency in households.

Institutions Affecting Energy Efficiency and Affordability

The biggest barriers to delivering energy efficiency to protect vulnerable households from dangerously cold temperatures and skyrocketing energy bills as tariffs increase are institutional and financial. A combination of institutions is necessary to effectively promote energy efficiency among residential consumers and to include special provisions for vulnerable households.

The network of community support groups, housing associations, municipal social welfare departments, NGOs, governmental agencies and energy-efficiency product and service providers that can make low income homes more energy-efficient is not well developed in CEE and the CIS.

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Municipalities' involvement is important in efforts to make residential communities more affordable and energy-efficient. They typically set or approve the tariffs for heat and water. They often own the heat companies and water supply companies. In a growing number of countries, they are required to prepare local energy plans for managing the supply and end-use of resources, with residential buildings often topping the list of energy-intensive areas needing efficiency improvements. Municipalities also provide housing management and maintenance services. They own "low income housing" units and are the landlords of tenants in those units, many of whom are vulnerable households. They frequently are responsible for providing subsidies to vulnerable households.

In countries where nation-wide residential energy improvement programs exist (e.g. Lithuania, Bulgaria, Poland to name a few), municipalities are the institutions charged with implementation of projects and programs at the local level. Municipalities can be a good source of support for including vulnerable households in projects implemented through a housing association. Good examples are provided by case studies in Gyumri, Armenia and Pleven, Bulgaria.

Municipal involvement can be particularly effective when they work with other local partners – NGOs, residents, energy consultancies and the financial community. This is true in all of the projects examined and documented for this study. The residential improvement projects that have the political support of the mayor and local councils while utilizing local NGOs and companies for implementation are usually the most successful and the ones likely to be replicated. To provide solid understanding of energy-efficiency issues among municipalities, it is important that the municipalities have staff experts and/or expertise provided through country-wide or even international municipal associations or networks.

Housing associations can help deliver energy-efficiency improvements, but grants or other charitable funds are needed to ensure vulnerable households are included. There is a clear need for a legal framework allowing housing associations to form; to serve as utility customers and collect customer payments and fees; and to borrow to make improvements to the building. Housing advisory agencies are helpful to build the necessary skills within the housing associations. Good examples are provided from case studies in Bulgaria, Latvia, Armenia, and Poland.

Mass media can play an important role in raising awareness about how energy efficiency can improve utility affordability. The Serbia case study about a nation-wide weatherization and consumer awareness media campaign provides a good example that produced measurable results.

Conclusions: Integrating Energy Efficiency and Social Safety Nets

The funding for a residential efficiency program targeted at the most vulnerable households would need to come largely from scarce public sources based on revisions to existing policy. Governments need to realize that through energy-efficiency measures

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they could more effectively protect their vulnerable citizens from the cold and also save money on subsidies that pay for heating poorly weatherized buildings. For example, an analysis of the effects of heat metering and building level controls in Lviv, Ukraine revealed that the state could save anywhere from 12 to 57 percent in subsidy costs by these most basic measures. Similarly, the analysis of residential efficiency projects in Lithuania's Housing Strategy (see case study for Lithuania in **Volume II**) indicates that energy-efficiency improvements reduced the amount of energy subsidies required for low income households in the affected buildings by 40 percent.

In addition, the funding institutions for residential efficiency improvements should be aware that failure to restrict targeting to only the most vulnerable households does not necessarily mean that the poor will not benefit, and that some “spillage” to non-vulnerable households may be needed to secure the participation of the vulnerable households. Because many vulnerable households in urban areas live in buildings together with non-poor households, programs that provide technical assistance and financing of energy-efficiency improvements for the entire building are highly desirable because everyone benefits from improved comfort and lower utility bills. The inability of low income households to pay for building improvements is a serious obstacle to undertaking building renovations among other households. In such cases, funding institutions can use their resources to cover investment costs that poor households cannot afford and provide incentives for non-poor households to contribute what they can. For example a campaign in the Bulgarian city of Gabrovo offered one free thermostatic radiator valve (TRV) to any household that purchased at least one TRV, and offered an additional TRV to households qualifying for the heating subsidy program. A relatively new residential building modernization program in Lithuania includes a provision that low income families should receive additional financial support to pay for energy-efficiency improvements. Unlike providing untargeted subsidy payments, which would represent a waste of public funds for ineligible households, improving energy efficiency is desirable for all households.

In most of the projects examined for this study, energy-efficiency improvements helped households manage price hikes without severe effects on household welfare. Households repaid their loans for improvement projects using their energy-cost savings, payment discipline improved, and comfort levels increased. The authors conclude that introducing energy-efficiency programs, particularly with special provisions for low income households, can help maintain utility affordability and thereby facilitate otherwise difficult decisions to increase energy tariffs to cost-recovery levels.

The following conclusions were drawn from the case studies:

- Energy efficiency helps vulnerable households, but the precise affect is difficult to quantify because data are scarce. Projects showing the effects of end use energy efficiency on vulnerable households are those documented from: Pleven (Bulgaria), Horodok and Lviv (Ukraine), and Warsaw (Poland).
- Energy efficiency can reduce the strain on public budgets that subsidize residential energy and water costs. Unfortunately, municipalities usually may not retain or

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reinvest their “subsidy savings” when citizens do not need heat or other energy assistance thanks to metering and energy efficiency. Projects that saved money in municipal and state budgets because the need for subsidized energy bills decreased as a result of metering and some energy-efficiency improvements are: Horodok and Lviv (Ukraine), Sibiu (Romania), and Lithuania.

- Metering can help households that are overpaying for services reduce their expenditures to reflect actual consumption. Projects that introduced metering and resulted in savings by switching to consumption-based billing include: Pančevo (Serbia – district heating), Bucharest (Romania – water), Yerevan (Armenia – water), Lviv (Ukraine – district heating), and Kiev (Ukraine – hot and cold water). Payment discipline for hot and cold water bills in Kiev increased by 30 to 50 percent.
- Cooperation and coordination between public and private institutions is necessary to leverage sufficient resources and have a longer lasting impact on better energy efficiency. In CEE and the CIS, this type of cooperation supports institutional strengthening and capacity building. Some of the projects that illustrate the process and benefits of multi-party cooperation and capacity building include: Sofia (Bulgaria), Rumburk (Czech Republic), Yerevan, Vanadzor and Gyumri (Armenia), and Valmiera (Latvia). There is anecdotal evidence that the success of these projects and their capacity building aspects has already motivated replication of residential energy efficiency.
- The leadership and support of municipalities in residential energy efficiency is extremely important, especially for ensuring that vulnerable households can participate in residential energy-efficiency improvement projects. Projects illustrating the role of municipalities include: Magadan (Russia),¹ Jaworzno (Poland), Warsaw (Poland), and Rumburk (Czech Rep.)
- When there is an institutional framework for residential consumers to improve their homes, combined with energy price increases, they will make the investments. The availability of affordable energy-efficiency products and services is essential for replication, especially for households with average and modest incomes. Examples of projects that stimulated the market for residential energy efficiency include: Kuldiga and Valmiera (Latvia), Horodok (Ukraine), and Poland’s Thermal Renovation Program.
- The most common responses to affordability constraints are switching to relatively cheaper alternative fuels when available, reducing consumption when technically possible, or not paying bills. Fuel switching may be a short-run or long-run response to affordability constraints. Some examples of these projects and trends are found in: Armenia, Banja Luka (Bosnia), and Horodok (Ukraine).

¹ This municipal energy-efficiency project in Magadan is not found in the case studies chapter but is described in more detail in [Appendix B](#).

Recommendations

There are no examples in CEE or the CIS where energy efficiency is used outright as a social safety net tool, but its potential for use as a cost-effective way to improve indoor comfort and affordability of energy is high. Unlike subsidies that need to be paid every year, energy efficiency improvements only have to be paid one time for the life of the equipment installed, while continuing to generate savings over time. For example, the Bulgarian case studies for Sofia, Gabrovo, and Pleven showed measured energy savings of around 26 to 60 percent, resulting in investments that paid for themselves in about four to six and a half years. Compared to subsidizing tariffs, the relatively low cost energy-efficiency improvements provide a means for consumers to balance their comfort and energy bills.

Experts contributing to this study contend that investments in residential energy efficiency will save money in current and future consumer energy costs and will curtail the burden that energy price reforms place on households and on public budgets that have protected households through “affordable” but uneconomic tariffs. Compared to annual expenditures on traditional price subsidies and social aid, investments in energy efficiency incur a one-time expense in exchange for better indoor comfort and relatively more affordable utility bills.

The economic benefits of energy efficiency are best achieved where utilities are priced according to market principles, including metering and consumption-based billing with cost-based tariffs. If prices are still heavily subsidized, energy-efficiency improvements can save energy and improve comfort but will not necessarily save much money unless consumers are motivated (usually by price increases) and technically able to reduce how much they consume. Metering policies should clarify responsibility for paying for the meters, and whether the metering will take place at the building- or apartment-level (using heat cost allocators for the latter in buildings with district heat). Thermostatic control valves should be used in tandem with heat cost allocators to provide a method for consumers to reduce bills and/or improve comfort.

The most successful policies and programs for promoting residential energy efficiency include methods to finance investments through lending to households and housing associations, as exemplified by case studies from Poland, Latvia, and Armenia. To include vulnerable households in the improvements, special provisions (e.g., targeted grants or soft loans) should be provided.

The reasons for improving energy efficiency are economic, environmental and social. When done appropriately, increasing energy efficiency saves money and improves indoor comfort. It also raises residential property values, reduces illness, improves air quality, reduces the need for additional energy resources, and leads to creation of new jobs.

The findings suggest the following recommendations:

- ***Grant Financing Should Be Targeted*** – Residential energy-efficiency programs for multifamily buildings should be structured to reach all households but have special provisions for vulnerable households so that they can afford to participate.
- ***Existing Social Welfare Benefits Should Help Pay for Efficiency*** – The rules for using housing allowances and social benefit money should be made compatible with financing energy efficiency improvements. Under the Latvian example, payments to housing associations' monthly operations and maintenance (O&M) funds are considered allowable expenses for social benefits. This feature allows pensioners and other lower-income households to pay for energy-efficiency investments by paying a higher amount in monthly fixed O&M costs until the loan is repaid.
- ***Affordable Housing Programs Should Include Energy Efficiency*** – Several countries have introduced programs to make housing more accessible and affordable to vulnerable populations. Affordable housing needs to be energy-efficient so that utility bills are manageable and to ensure satisfactory comfort and basic energy and water services.
- ***Institutional Strengthening is Essential*** – Many residential energy-efficiency programs work through housing associations, which may exclude many vulnerable households living in rented flats or buildings that have not associated. To reach these households requires working with community organizations, housing agencies and municipalities. One strategy to strengthen housing institutions is to offer an affordable consulting and information through housing advisory agencies (as in Lithuania, Armenia).
- ***Municipalities Need To Be Engaged*** – Municipalities struggle with energy issues, need greater incentives to act and need to understand the longer term savings from short term residential energy efficiency investments.
- ***Monitoring and Evaluation of Projects Should Include Affordability Impacts*** – Better empirical data are needed about residential energy and water demand, and price elasticity for all income levels so that there is a greater understanding of which households are vulnerable to utility price reforms. Monitoring has to start from the beginning of a project.
- ***Integrate End-Use and Supply-Side Efficiency*** – Improvements in energy efficiency need to take place in both supply and end-use, as efficiently supplied utilities can be provided to consumers at a lower price. Better quality services must accompany price reforms.
- ***Consumption Based Billing and Thermal Regulation are Fundamental*** – Metering of energy and water use at the building level needs to be universal. Once they have the knowledge of what they are consuming and a bill based on that consumption, households must have the means to regulate how much they consume.

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- ***Building Energy Performance Standards and Appliance Labeling Are Essential*** – To avoid future utility affordability problems, policies for new building construction and appliance standards should be enacted and enforced. Energy-efficiency procurement programs could help increase the uptake of efficient technologies in existing housing that is still publicly owned, and set an example for residents in privatized housing.
- ***Public Awareness Campaigns Should Make the Link Between Affordability and Efficient Energy Use*** – As energy prices increase, the heat providers, government, private sector vendors of efficiency equipment, media and all institutions trying to address affordability concerns should publicize the results of local energy-efficiency projects and international experience when local examples are not available.