USAID
FROM THE AMERICAN PEOPLE

ALLIANCE TO SAVE ENERGY

Municipal Network for Energy Efficiency

Regional Synthesis Paper

Addressing Affordability of Utility Services in Urban Housing: Energy Efficiency Solutions

October 2007

Table of Contents

Acknowledgements

The authors are grateful to the remarkable group of experts who contributed their time and expertise in helping to make this paper a true and rigorous analysis of the impact of residential energy efficiency on the ability of consumers in Central and Eastern Europe and the Commonwealth of Independent States to afford adequate heating and water resources.

Angela Morin Allen of the Alliance to Save Energy (Alliance) was the primary author and coordinator of this group research initiative, with support from the other members of the Alliance International Team. The study built upon the rich resource bank generated over the years by the Municipal Network for Energy Efficiency—a program funded by the United States Agency for International Development (USAID)—and the substantive mentorship and input from the Europe and Eurasia Bureau of USAID, especially Ira Birnbaum.

The Alliance greatly appreciates the peer review and comments from several experts and long-standing partners based in the region studied, including: Pavel Manchev of EnEffect, Igor Bashmakov of CENEf, Dagnija Blumberga of the Riga Technical University, Andrzej Rajkiewicz of the Polish National Agency for Energy Conservation Inc. (NAPE), Witold Cherubin, Lena Bratic and Nebojsa Arsenijevic of the Center for Energy Efficiency of Bosnia & Herzegovina, Astghine Pasoyan and Tigran Parvanyan of the Alliance to Save Energy Armenia, Tanya Lujanskaya of the Alliance to Save Energy Moldova, and Honoriu Pitaru. Editorial support was provided by Judith Barry, Director of International Programs at the Alliance to Save Energy, and Olga Chistyakova. The authors also thank the World Bank for providing access to data needed for this analysis. Finally, we thank USAID for the financial as well as intellectual support that made this study possible. Support for some of the research and a regional workshop held in Kyiv in February 2006 was also provided by the Renewable Energy and Energy Efficiency Partnership (REEEP).

Alliance to Save Energy

1850 M Street, NW • Suite 600 • Washington, D.C. 20036
amorin@ase.org • www.ase.org

Abbreviations and Acronyms

BGK	Bank Gospodarstwa Krajowego (National Economic Bank of Poland)
CEE	Central and Eastern Europe
CENEf	Russian Center for Energy Efficiency
CHP	combined heat and power
CIS	Commonwealth of Independent States
CZK	Czech crown (Czech currency)
DH	district heating
DSM	demand side management
EBRD	European Bank for Reconstruction and Development
EnEffect	Bulgarian Center for Energy Efficiency
ESCO	energy service company
EU	European Union
EU-10	Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia, Slovakia
EU-12	EU-10 plus Bulgaria and Romania
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, Netherlands, United Kingdom
EU-25	EU-15 plus Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia (now EU-27 with Bulgaria and Romania)
GDP	gross domestic product
HCA	heat cost allocator
HOB	heat only boiler
IFI	international financial institution
KWh	kilowatt hour
LTL	Lithuanian lita (Lithuanian currency)
NAPE	National Agency for Energy Conservation, Inc. (NAPE), Poland
NG	natural gas
NGO	non-governmental organization
O&M	operations and maintenance
PLN	Polish zloty (Polish currency)
REP3	Romanian Energy Policy Phase III (project of USAID)
SEE	Southeastern Europe

SKK	Slovak crown (Slovak currency)
TRV	thermostatic radiator valve
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
USD	United States dollar
USAID	United States Agency for International Development
VAT	value added tax

List of Figures

List of Tables

List of Boxes

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.

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 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 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.

- ***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.

PART I: OVERVIEW

Chapter 1

Chapter 1: What Energy Efficiency Can Achieve

The economic transition in the post-Soviet era has included gradually ending the heavily subsidized utility prices from the Soviet era. However, many policymakers have been reluctant to raise heating and water tariffs to cost-recovery levels due to concerns that consumers will not be able to pay increased prices (see **Table 3** in **Chapter 2** indicating that most countries in the region still subsidize heat tariffs). The continuation of untargeted resource subsidies perpetuates unsustainable consumption patterns and hinders any real potential for providing more effective aid to households truly in need.

This assessment examines the potential for energy efficiency to improve the affordability of utility services and improve the quality of life in households and communities. The assessment also examines barriers – structural, institutional, political, and socioeconomic - to tapping the energy efficiency resource. Lack of awareness, inexperience with energy efficiency, and incomplete documentation of efficiency project results leave many bill-payers and policymakers without motivation, means and know-how to benefit from energy efficiency. Consumers are only motivated to improve the efficiency of their consumption if the price they pay for that resource is clearly related to the amount they consume.

In examining the specific situations of countries in Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS) during the transition from planned to market-based economies, there is great need for policy reforms that balance social needs with the economic realities of constrained public budgets. This vast region includes both some of the coldest and hottest climates in Europe as well as its poorest people. The energy and water systems serving these countries are in most cases old, oversized, and in severe disrepair or completely deteriorated. The residential buildings that still house the majority of urban populations could be described as "energy sieves" because they are poorly insulated and poorly maintained. This set of circumstances suggests that there is tremendous potential to improve energy efficiency and to recoup the cost of such improvements through energy cost savings.

Evidence of Savings for Residential Consumers

This study examines the experience in CEE and the CIS that demonstrates this potential, specifically with regard to benefiting households by making utilities more affordable through end-use energy efficiency. The quantity of such real-life, documented and monitored examples is still relatively small, and most of the projects referenced in this study are among the pioneers of residential energy efficiency in their respective countries. This assessment reviewed documented results from 25 projects implemented and monitored throughout the region since

the late 1990s, and found that households saved anywhere from about ***10 to 77 percent*** on their utility bills (savings for the specific projects are presented in **Table 1**). Specific projects have higher or lower energy savings, depending on the scale of the project and the measures implemented.

Most of the experts contributing to this study feel that cost savings to households of around 20 to 30 percent are realistic for an "average" residential retrofit involving low cost improvements such as heat cost allocators (HCAs), thermostatic control valves (TRVs), weatherization, reflective radiator shields, and compact fluorescent bulbs. Savings of 40 to 60 percent are achievable for more comprehensive improvements that also include building envelope upgrades such as insulating roofs, walls, and basements, and replacing windows and doors. Though it is not an energy-saving technology by itself, metering has been shown to influence households to save energy and water when they are billed according to metered consumption.[2] These savings of energy and water have influenced the utility bills in cases where: the bills are based on metered consumption, prices motivate consumers to rationalize their use, and consumers have the awareness and tools (such as valves on radiators) to control their consumption levels.

Social Aid for Energy and Energy Efficiency

Directly or indirectly, some governments in this region (e.g. Bulgaria) are already spending over one percent of the state budget in subsidies for energy, water and fuel with no financial or resource savings, and they could ease the transition to more market-based price reforms by allocating a portion of the budget to residential energy-efficiency improvements. As shown above, the potential for energy-efficiency improvements to make residential utility services more affordable and housing more comfortable is substantial. If an average household can save about 30 percent on its utility bills by improving its energy efficiency, then price reforms could be more feasible for typical consumers when paired with energy-efficiency programs.

[2] In **Appendix A**, the case studies from Armenia, Romania and Ukraine have detailed the effects of metering on consumption.

Table 1. Typical Annual Savings from Energy-Efficiency Improvements in Multi-Family Residential Buildings of CEE and the CIS

	Armenia (Yerevan)	Arm. (Yerevan & Gyumri)	Bulgaria (Gabrovo)	Bulgaria (Pleven)	Bulgaria (Sofia)	Czech. (Brno)	Czech. (Rumburk)	Latvia (Kuldiga)	Latvia (Valmiera)	Lithuania (Vilnius)	Poland	Poland (Warsaw)	Romania (Bucharest)	Serbia (Pancevo)	Slovakia (Kosice #1)	Slovakia (Kosice #2)	Slovakia (Pezinok)	Slovakia (Žiar #1)	Slovakia (Žiar #2)	Ukraine (Kiev)	Ukraine (Lviv #1)	Ukraine (Lviv #2)
HEATING and LIGHTING																						
New roof					●		●												●			
Insulation: Walls					●	●	●	●	●	●		●			●	●	●		●			
Insulation: Basement					●	●	●	●	●	●						●			●			
Insulation: Roof/Attic					●	●		●	●	●		●			●	●	●					
Windows					●	●	●	●		●					●					●		
Doors (exterior)			●		●	●		●							●	●			●			
Weatherization		●	●	●	●	●	●			●	●					●			●	●	●	●
Waste heat recovery						●									●			●				
TRVs/HCAs		●	●	●								●		●	●							
Radiator shields			●	●																●		
Meters - heating		●																●				●
Heating pipes upgraded/insulated					●	●			●							●			●	●		
Hydraulic regulation		●														●	●	●	●			
New boiler for building												●										
Substation retrofit			●								●			●						●		
CFLs/automation			●													●						
Energy Savings			**30%**	**26%**	**60%**	**51%**	**47%**	**28%**	**39%**			**52%**		**10%**	**55%**	**2%**	**46%**	**61%**	**57%**	**21%**		
Annual Cost Savings*		**$21**	**$52**	**23%**	**$350**	**$172**	**$468**	**$190**	**$246**	**50%**	**35%**	**45%**		**$60**						**$19**	**$25**	**$35**

Table 1, continued. Typical Annual Savings from Energy-Efficiency Improvements in Multi-Family Residential Buildings of CEE and the CIS

	Armenia (Yerevan)	Armenia (Yerevan & Gyumri)	Bulgaria (Gabrovo)	Bulgaria (Pleven)	Bulgaria (Sofia)	Czech. (Brno)	Czech. (Rumburk)	Latvia (Kuldiga)	Latvia (Valmiera)		Poland	Poland (Warsaw)	Romania (Bucharest)	Serbia (Pancevo)	Slovakia (Kosice #1)	Slovakia (Kosice #2)	Slovakia (Pezinok)	Slovakia (Žiar #1)	Slovakia (Žiar #2)	Ukraine (Kiev)	Ukraine (Lviv #1)	Ukraine (Lviv #2)
HOT WATER																						
Meters - hot water		●											●		●	●				●		●
Low-flow showerheads			●	●																		
Temperature regulators																●						
Hydraulic regulation																			●			
Hot water pipes upgraded/insulated				●	●										●					●		
Hot Water Savings			**n/a**		**n/a**			**35%**					**26%**		**29%**	**23%**			**38%**	**29%**		
Annual Cost Savings*		**		**48%**									**13%**							**$36**		
COLD WATER																						
Meters - cold water	●												●		●	●				●		
Pipes rehabilitated					●										●							
Cold Water Savings					**n/a**			**35%**					**35%**		**50%**	**19%**			**30%**	**7%**		
Annual Cost Savings*	**77%**												**35%**							**$10**		

*Average annual cost savings per household, as a percentage or in USD

**Savings figure is for heating and hot water combined

Some form of financial and technical assistance to encourage investments in energy efficiency is essential in most countries in CEE and the CIS, especially for vulnerable households. Many such households consume either less than what they need, or more than necessary because they do not have the awareness or means to pay for new windows and insulation, or meters or thermostatic valves, or more efficient appliances, light and water fixtures, and heating systems. The traditional welfare aid that is allocated to these households aims to meet basic needs at estimated levels of consumption that might not reflect actual need, but it does not affect the bills unless measures are taken to improve the efficiency of keeping apartments comfortable and lit. Even if households do not pay the bills in full, the subsidies that make up the difference usually only compensate fuel or service suppliers without contributing to better efficiency and long-term affordability.

The household bill savings and payback periods for improvements in vulnerable households might be different from the averages reported from available data. In some cases the savings possible for an average household can be extrapolated to vulnerable households, particularly in buildings where most apartments and households are of a similar size and have similar energy and water use patterns. Because energy costs are disproportionately higher for low income households, the benefits of residential energy-efficiency programs are likely to benefit such households disproportionately.

In other cases, efficiency improvements to vulnerable households might not yield the same bill reductions, and payback periods might be longer, because their baseline consumption was below the norm, i.e., the vulnerable households do not heat their homes to standard comfort levels. Closer analysis of what energy efficiency can achieve financially and technically in average households and vulnerable households is necessary at the project level so that the most appropriate set of improvements can be selected for any given building. Even if the financial paybacks are lower for vulnerable households, social aid to improve energy efficiency can help these households raise indoor comfort from substandard levels as affordably as possible, thereby still achieving a valuable social goal.

ANALYTICAL APPROACH TO MAKING A POLICY CASE FOR RESIDENTIAL ENERGY EFFICIENCY AS A WAY TO IMPROVE AFFORDABILITY OF ENERGY AND WATER

The focus of this study is on end-use energy efficiency in urban residential buildings, and how it can ease the financial burden of tariff reforms as they are implemented in CEE and the CIS. This study does not analyze the complex set of tariff reforms and social subsidies that aim to help vulnerable households, nor does it examine how efficiency improvements in utility supply networks can affect affordability. These issues are very important components of a comprehensive approach to addressing affordability, and they are more widely discussed in other work (in particular, see the companion study by the Alliance to Save Energy also funded by USAID – the *Regional Urban Heating Policy Assessment*, July 2007), while energy efficiency is regrettably absent from most policy discussions and programs addressing affordability problems.

The study analyzes the affordability concerns and energy-efficiency potential for the region's urban households in multi-family buildings. This particular demographic is vulnerable to price reforms because urban populations are growing and most buildings are old with antiquated energy and water systems and poor energy performance. They are also more reliant on municipal service infrastructure (i.e. water supply and sanitation, and district heating systems) and have few if any cheap and safe alternatives to their network fuels if they were to lose those services. While affordability and access to basic services are also increasingly problematic for non-urban residents, a thorough examination of their needs and specific solutions to address them was beyond the scope of this study.

Previous Research

The major international development agencies and IFIs working in CEE and the CIS have all acknowledged the growing problem of utility affordability, and this study builds upon previous and current research supported by these institutions and others. At the time of writing this study, with perhaps one exception,[3] no major research has been published about the effects of end-use energy-efficiency improvements on affordability of energy and water for households in CEE and the CIS.

Recent affordability studies published by the European Bank for Reconstruction and Development (EBRD) and World Bank[4] briefly mention energy efficiency as a way to ease the burden of rising electricity and other utility prices on households, but they state that more research is needed. UNDP/GEF has initiated several comprehensive, long-term programs to improve energy efficiency in the region, although most of these programs are still under development. UNEP, the Energy Charter Secretariat, and the Renewable Energy and Energy Efficiency Partnership have also noted that there is a connection between utility affordability and energy efficiency, examining the broader policy issues and barriers. USAID has supported several regional and country-specific activities to bring energy efficiency into the policy discussions about tariff reform and social safety nets, and to determine whether there is sufficient institutional capacity in selected countries to deliver energy-efficiency improvement services to vulnerable residential groups.

Research Questions

The main questions the study examines concern the role that energy efficiency has in making household energy and water bills more affordable – particularly end-use measures like building weatherization, renovation of heat and water distribution systems in buildings, and metering and thermal regulation controls. The following questions were developed by the authors of this study with USAID and a group of regional experts on energy efficiency.

---

[3] See *A Regional Review of Social Safety Net Approaches In Support of Energy Reform*, a multi-country report prepared by Aguirre International and the International Science and Technology Institute, Inc. for USAID in October 2003.

[4] Tepic, Sladjana and S. Fankhauser. 2005. *Can poor consumers pay for energy and water? An affordability analysis for transition countries*. London: EBRD. Lampietti, Julian A., S. Banerjee, A. Branczik. 2007. *People and Power, Electricity Sector Reforms and the Poor in Europe and Central Asia*. Washington, DC: International Bank for Reconstruction and Development / World Bank.

- What are the actual cost savings achieved through energy-efficiency promotional programs?

Comparing bills before and after implementation of a program or project is the simplest method of determining if there are cost savings, i.e. reduced utility bills due to more efficient and typically lower consumption of a resource. 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. As shown above in **Table 1**, the projects examined for this study report a range of savings using the tariffs at the time of project completion: 40-45 percent on heat bills in Polish households (where tariffs are at or near cost-recovery levels, though higher savings are often possible), 15 percent on hot water in Romanian households (even after a substantial tariff increase), 15-30 percent on heat bills and 30-60 percent on hot water bills in Bulgaria (with low tariff, but savings nearly equaled new costs when tariff increased), 30-40 percent or even up to 80 percent on heat bills in Ukraine (with low tariffs). In absolute terms, the cost savings will be higher when utility tariffs reach economic levels. While the above-mentioned cost savings are calculated based on the tariffs at and around the time that efficiency improvements were made, over time the savings will be greater.

- What is the net financial gain or loss to households that adopt energy-efficiency measures to help deal with rising utility costs?

The overall financial result of energy-efficiency measures weighs the cost savings against the cost of implementing a project. Most of the projects documented for this study show a net financial gain with cost savings that recoup the investment costs over time. The payback periods of the documented case studies (**Appendix A**) have ranged widely – anywhere from a few months (e.g. water metering in Armenia) to two decades (e.g., comprehensive building retrofits in Latvia and the Slovak Republic that can include many building improvements in addition to energy-efficiency measures). As utility tariffs rise the paybacks become shorter. See also Table 1 for energy cost savings of selected projects.

Although the actual amount of a project's net financial gain is specific to that project, the findings from this research show that energy efficiency generally results in a net financial gain when appropriately designed and implemented. Given the narrow range of standard building types and the proven effectiveness of the energy-efficiency measures, predictable ranges of savings can be estimated for different combinations of energy-efficiency improvements and energy prices. Taking rising utility costs as a given, if consumers choose to reduce their use through energy efficiency, they will pay less than they would if they had made no change.

For example a project in Pleven, Bulgaria convinced hundreds of households to reconnect to the local district heating network because they could save between 15 and 30 percent on their heat bills and between 30 and 57 percent on hot water costs thanks to the project's energy-efficiency retrofits. Meanwhile, the tariff for heat and hot water still had to increase to a cost-recovery level, and once it did the residents' cost savings were needed to pay for the increased heat prices. But the project made the necessary price reform possible and improved indoor comfort without increasing the burden of utility costs on household budgets. This project also helped sustain district heating for Pleven's residents, which at the time is the most affordable and environmentally-responsible heating option available.

Some of the projects identified for this study did not result in net financial gains and consequently were abandoned or postponed. For example, one of the two buildings in a residential project in Kiev yielded heat and water savings between 17 and 30 percent for each service, while a nearby building with a different design had no savings. Similar experiences have occurred throughout the region and underscore the importance of energy auditing and tailoring energy-efficiency solutions appropriately to the problems they aim to solve.

- What are the supporting policies introduced by governments in CEE and the CIS that are associated with success in residential energy-efficiency promotional programs?

Several countries in the region studied have introduced framework energy laws and national programs promoting energy efficiency and renewable energy, and a few countries have implemented targeted policies and programs for residential consumers. Policies requiring metering of energy and water, basic control technologies for district-heated customers, and standards for building energy audits are vital to the replication and success of energy-efficiency programs.

The implementation of policies is enabled by programs that demonstrate how efficient technologies and energy management principles lead to cost savings. The most successful programs have been those backed with financial resources for residential buildings, those that have minimized the bureaucracy associated with accessing those resources, and those with capable institutions (i.e. any combination of municipalities, housing associations, utility companies, NGOs, product and service vendors, financial institutions, media) that have coordinated implementation of energy-efficiency measures and technologies in the residential sector.

Successful programs are those that have high participation and show tangible progress toward the goal of improving energy efficiency. The policies and institutions implementing them have evolved over time and have improved their "success" through trial and error, such as Poland's Thermal Modernization Program that provides loans and grants to housing associations and public institutions for thermal renovation projects. In the first phase of the program, the application process was particularly cumbersome and participation was lower than hoped, but some revisions to the program criteria and application procedure resulted in an increase in quality as well as quantity of applications for the funds.

Lithuania's programs to improve residential energy efficiency have also made adjustments. Its housing pilot project was successful in motivating residents in some towns to form housing associations and apply for loans to make energy-efficiency retrofits, but beyond the project's scope, the vast majority of multifamily housing is still not organized into associations. The state program that was launched in 2004 to continue and expand the energy-efficiency progress of the pilot project included – after much debate – a provision for buildings without associations to apply for funds through a different legal mechanism. At the time of writing this study, there were few results to report from the state program.

Policies mandating metering along with the means to control energy consumption were integral to promoting energy efficiency in some cases. For example, as part of its energy policy reforms, the Bulgarian government has required that all district-heated apartments be equipped with

meters or HCAs, and households are encouraged to buy TRVs. As explained in a report by Aguirre International, this policy followed a successful mandate for universal water metering that encouraged compliance by charging non-compliant households six times the amount of a typical water bill. Ninety percent of households were already metered for district heat before a noncompliance strategy was even developed. A couple of factors contributed to this high compliance rate: the availability of financing to households through simple and affordable installment loans, and a variety of vendors (16 private companies sold and installed "bundles" of HCAs and TRVs). Households paid for the technologies and in some cases the equipment vendors or other parties provided the technologies for free to low income households. However, the TRVs were sometimes never installed, so in practice the giveaways worked best when the vendors installed the technologies upon delivery.[5]

Policies and policy statements promoting energy efficiency are more compelling when backed with financial assistance. A policy allowing utility companies to disconnect non-paying customers is only an incentive for conservation if the household has the means to influence its utility bills, and if there is no cheaper alternative. Policies that mandate or encourage metering, consumption-based billing, and control technologies are more effectively implemented when financing is available for households and housing associations.

Some form of public financing usually precedes or complements private financing, and policies can lower the barriers to residential energy-efficiency projects when they help insure or subsidize loans and address other financial risks. In Latvia, some municipalities (e.g. Valmiera, Ventspils, Olaine) have offered loans to housing associations for energy-efficiency improvements, and in some cities these municipal programs have become very popular. Meanwhile, a housing association in Kuldiga took the initiative and financed its own improvements without a municipal initiative. Poland and Lithuania have two of the region's state-sponsored residential energy-efficiency programs that offer some form of financing to housing associations, and municipalities usually play an integral part in motivating the housing sector to take advantage of these opportunities. One of the region's newer programs is the Residential Energy Efficiency Credit Line in Bulgaria, which the EBRD and Bulgarian government established in 2005. Through participating local banks REECL offers residential consumers loans for specific categories of energy-efficiency improvements. There are grants, loans and small revolving funds in some cities in Ukraine and Armenia that have generated residential investments in energy-efficiency improvements. The case studies in the appendices to this paper provide some examples of financing schemes tailored to different local needs.

- What are some examples of how changes in tariff policy and structure have been introduced with energy-efficiency promotional programs?

In almost every country in the region, energy prices have risen in recent years and continue to rise. However, residential heat and water tariffs in many cases are still below levels that reflect the actual cost of supply, and cross subsidies still exist in most countries (see **Table 3** in **Chapter 2**). Not surprisingly, residential energy-efficiency projects and programs have better

[5] Philips, Michael. October 2003. "Energy Reform and Social Protection in Bulgaria," published as *Appendix 3* to the study *A Regional Review of Social Safety Net Approaches in Support of Energy Sector Reform*, pp. 26-27. The report was prepared for USAID by Aguirre International and the International Science and Technology Institute, Inc.

documentation (perhaps because they are the projects with results) in countries where tariffs have risen to levels high enough to motivate action and to generate paybacks in less than five years.

A couple of examples where energy-efficiency programs accompanied tariff increases with effective results were in Serbia and Hungary. In Serbia, USAID supported an intensive public awareness campaign and residential weatherization program that helped households cope with the dramatic increase in electricity tariffs from 2001-2. Within the first heating season after the tariffs increased, there was a 22 percent decrease in total electricity use, residential use of electricity for heat decreased by 10 percent and wintertime peak demand for electricity fell by 7 percent. See the case study for this project in **Appendix A**.

A few years earlier, Hungary implemented a short-term energy assistance program that is cited as one of the most innovative for helping the poor survive the planned price shock of 1997-98. However the program did not have an energy-efficiency component. It set up a private non-commercial fund financed by the government and private companies to ensure that poor households were heated. Assistance was delivered in cash for gas heat, direct payments for district heat or in-kind for households using wood or coal.[6] The following year Hungary introduced a major residential weatherization program that aimed to weatherize, insulate and improve efficiency in multifamily buildings constructed in the 1960s and 70s. While the financing for improvements was envisioned to be shared by the state (30 percent) and local governments (70 percent), in practice households had to pay for the lion's share of the investments, which meant that most of the beneficiaries were middle- and upper-income groups.[7]

- What are the supporting actions of utility companies that are associated with success in energy-efficiency promotional programs?

Utility companies are important actors in the implementation of policies and programs to improve energy efficiency, and their enthusiasm or disdain for a policy can influence the policy's effectiveness. For example, utilities introduce metering when it is mandated by law and/or when there is a financial gain for the utility. The policies for meter use need to be clear and enforceable. In Moldova there has been confusion about who was responsible for buying, installing and maintaining meters (the heat company or residents), resulting in delayed use of consumption-based billing. In Russia there have been problems with metering also, reportedly because utilities do not want to lose revenues when meters show that their clients have been paying for more than they actually consume.

Some utilities support energy efficiency through better customer service, which improves payment discipline and customers' willingness to pay. Occasionally utilities even offer energy-efficiency services as a form of customer service, especially if it improves their competitiveness and market share. One example of this is found in Poland, where several district heating companies offer existing or prospective new customers services to improve efficiency and

[6] Velody, Mark, Michael J.G. Cain, and Michael Philips. October 2003. *A Regional Review of Social Safety Net Approaches in Support of Energy Sector Reform*, a synthesis report prepared for USAID by Aguirre International and the International Science and Technology Institute, pp. 13-14.
[7] *Ibid*, p. 23.

indoor comfort through maintenance and repair of building-level distribution systems and upgrading substations (see **Box 5** in **Chapter 4**).

Improved transparency of utilities' billing methods and bill collections improves customer relations and also improves consumers' efficiency when they have the means to control their consumption. A project in Pančevo, Serbia introduced heat customers to consumption-based billing concepts before actually implementing it. The local heat company presented its customers with a side-by-side comparison of costs and methods right on the heat bill, explaining how tariffs are calculated and when meters are read and by whom, and how much they would spend if charged according to metered consumption versus according to the traditional bill based on heated area (m^2).

Disconnecting non-payers from network utilities (e.g. district heat, gas, water, electricity) may encourage energy efficiency in cases where there is no cheaper alternative fuel source. However, quality and reliability of service must also be acceptable to customers. A project in Pleven, Bulgaria shows how customers that had disconnected from district heating decided to re-connect when end-use efficiency improved the comfort and affordability. A real threat of disconnection can motivate better payment discipline if customers can afford to pay their bills, but vulnerable households usually don't have the means to pay unless they are adequately protected by social safety nets. Utilities are sometimes not allowed to disconnect non-payers when they are truly unable to pay, or sometimes they choose not to disconnect because they would lose their (potentially) paying customers to competitors. In either case, utilities have an interest in promoting better customer energy efficiency as part of customer services, which is shown to improve payment discipline as evidenced in projects in Poland, Bulgaria, and elsewhere.

Methodology

The authors and research team contributing to this study analyzed existing material–reports, studies, presentations, statistics, and case studies—covering the topics of affordability, residential energy efficiency, and related policy issues such as housing and poverty strategies. The World Bank kindly provided the research team with data from its extensive income database, which the research team has graphed and analyzed for purposes of this study.

The research team has also identified and documented the most relevant residential energy-efficiency projects as case studies, particularly those focusing on demand-side management and building weatherization. The team found that there are very few projects that have been completed and measured for energy and cost savings. There is very limited information about household incomes and expenditures for energy before and after these projects, and about the effects of these projects on public (municipal and state) budgets used to subsidize utility costs for the poor. Wherever feasible the research team examined the effects that energy-efficiency improvements had on households' affordability and on public budgets, as well as the improvements in indoor comfort, reduced incidence of illness, environmental benefits, etc. Highlights from the case studies are presented in the following section and in the detailed case studies compiled in **Appendix A**.

For most of the affordability analysis, this study uses household *expenditure* as a proxy for income in measuring affordability. Due to the large shadow economy where income is not reported and taxed, income statistics do not accurately represent what households in CEE/CIS have to spend. Expenditure is often viewed by researchers as a more accurate metric for inferring how much households have to spend and what they can afford.[8]

There is an underlying assumption in this approach that households in the poorest income brackets spend all or most of their income – and thus all or most of their expenditures – on maintaining the household, especially if the incomes of poor households come primarily from social welfare benefits specifically designated for basic needs like housing, utilities, food and clothing. However, because several of the contributors to this study also examined affordability in relation to reported income, this study also shows affordability as a measure of the portion of a household's *reported income* spent on utilities. All figures are labeled according to the metric used. Income and expenditure are not used interchangeably in this study, although they both serve a similar function in the analysis of affordability, and expenditures for utilities are grouped according to income brackets.

CASE STUDY HIGHLIGHTS

The residential energy efficiency projects examined for this study (found in **Appendix A**) concern one or a combination of the following:

- metering of heat and water and introduction of consumption-based billing;
- improvements to residential buildings that give residents better means to control their energy use, e.g., Thermostatic Radiator Valves (TRVs) and Heat Cost Allocators (HCAs), and that increase efficiency of energy end-use through better thermal insulation and related "weatherization" retrofits;
- switching from an expensive and inefficient heat service to a relatively more efficient and less expensive option.

In the residential sector, most of the cost-effective energy-efficiency gains in CEE/CIS are in heating, so it is not surprising that most of the projects have featured improvements for heating and hot water.

As the projects identified and documented by the research team were funded by different donors and government agencies using different methodologies and emphasizing different priorities, there are few "apples to apples" comparisons. Nonetheless, there are common themes and trends that emerge from analysis of these projects:

- Energy efficiency helps vulnerable households, but the precise affect is difficult to quantify because data are scarce. In some cases where apartments are heated to substandard levels and when residents pay very little if anything for heat, a large part of the benefits relate to improved comfort at a relatively affordable cost – relative to what comfort would cost in the absence of energy efficiency. In such cases when residents were paying high amounts for substandard heat, they would also feel the financial benefits of improved energy efficiency

[8] Tepic and Fankhauser 2005, pp. 4-5. Also, David Kennedy personal communication, August 2005.

as well as better comfort. 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 reinvest their "subsidy savings" when citizens do not need heat or other energy assistance thanks to metering and energy efficiency. Since these subsidy savings are allocated for vulnerable populations anyway, they could be used to help finance energy-efficiency improvements in buildings with low-income households. There are no documented examples of this practice in CEE/CIS, although there are ways to enable households receiving social welfare benefits to use some of their benefits for energy efficiency. For example, in Latvia households on welfare may help pay for residential energy efficiency if these expenses are itemized as operation and maintenance" costs instead of as a loan for renovations (see case studies for Olaine and Valmiera, Latvia in **Appendix A**). 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. Although metering is not an energy-saving technology by itself, metering improves payment discipline and motivates consumers to improve energy efficiency when they have the means to control consumption and their bills. Metering enables consumption-based billing and gives consumers a clearer picture of how their use of water and energy is related to the utility bill. 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/CIS, this type of cooperation supports institutional strengthening and capacity building. Every project documented for this study shows some aspect of institutional strengthening and cooperation between public and private entities – among housing associations, municipalities, utilities, energy-efficiency companies, state ministries and NGOs. Sometimes contentious and inefficient, the collaboration among different groups can result in better awareness of the problems with residential utility use and more consensus on and commitment to the solutions. 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 improving energy-efficiency in public

housing can also inspire private homeowners to improve energy efficiency. Projects illustrating the role of municipalities include: Magadan (Russia),[9] 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. After the residents in a 60-apartment building in Kuldiga improved energy efficiency and indoor comfort from 15°C to 20°C, while achieving a small margin of energy cost savings, six neighboring buildings were inspired to invest in energy efficiency and borrowed from a commercial bank at commercial interest rates to pay for the investments. Heat costs had risen dramatically in the season when the six additional buildings decided to invest in efficiency measures. In Horodok, the availability of Ukrainian-manufactured equipment was critical to making the investment in household-level gas-fired heating cost-effective. The boilers purchased were 3 to 4 times less expensive than similar models in Europe or the United States. Still, the lack of an institutional framework in Ukraine for residents to borrow money remains a considerable obstacle.

- 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. A few of the projects examined for this study introduced energy-efficient fuel substitution on the end-user side, e.g. switching to local gas-fired heat or to high-efficiency wood stoves when district heating was expensive and the service bad. Fuel switching may be a short-run or long-run response to affordability constraints. It might curtail consumption and costs in the short-run, or it may involve switching to relatively cheaper energy in the long-run. Some examples of these projects and trends are found in: Armenia, Banja Luka (Bosnia), Horodok (Ukraine), and Vladimir (Russia). For example in Banja Luka, by switching from district heating to high-efficiency wood-fired boilers at the building level, an average sized apartment of 50 m^2 can save about €144 a year, which is the equivalent to one month's earnings.

  The longer-term impacts of this type of fuel-switching and the supply of wood and other fuels are necessary before recommending this measure, but in reality residential consumers will switch to cheaper alternatives when available and relatively reliable.[10]

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

[10] This trend is observed throughout the region. In response to price increases Czech, Bulgarian, and Macedonian households are switching from natural gas to coal; households in Bosnia & Herzegovina, Serbia and Moldova are switching from district heating to wood, coal or gas when available.

PART II: ANALYSIS OF ISSUES, TRENDS, AND FINDINGS

Chapter 2: Analysis of Utility Affordability in Urban Multifamily Housing

Chapter 2

After decades of relative isolation from fluctuations in world resource markets, fuel prices are no longer predictably low, and jobs and housing are no longer guaranteed. The following chapters focus on the issues at the local level that affect utility affordability, and specifically they discuss the issues that influence household energy use and energy efficiency. The trends in affordability and in responses to affordability constraints are presented, followed by the research team's analysis of findings.

The major utility services to households are heat, electricity, water and wastewater. Heat and electricity typically consume the greatest share of household utility costs in CEE/CIS. Electricity is used for heat in much of Southeastern Europe while either district heat or decentralized gas heaters are used to heat households in major cities of Southeastern Europe and most of Central Europe and the CIS. Wood and liquid fuels are also used for heating, especially in poor households that cannot afford the other options. However, in most of the countries studied, these options are predominantly in non-urban areas that are not the focus of this study.

Water continues to be heavily subsidized in most countries, leaving little incentive for households to save water. Wastewater services are gradually improving, especially in the new EU Member States that must raise the quality of services and environmental protection to EU standards. The costs of upgrading water supply and treatment are going to make water a much more expensive utility service if tariffs increase to cover costs.

Many vulnerable households cannot afford to pay basic utilities so they typically consume less than average households – for example by not heating the entire apartment or by keeping low indoor temperature levels – and they consume the cheapest fuels locally available. If energy efficiency improves, these households might finally be able to consume enough to meet the most basic needs by increasing comfort from substandard levels, and switch to a more efficient fuel, but this does not mean that they save money on utility bills.

Furthermore, vulnerable households are not necessarily confined to the lowest income groups in CEE/CIS. Lower-middle income groups that do not qualify for welfare assistance in general still pay well over ten, fifteen or even twenty percent of their overall expenditures on utilities. As subsidized tariffs are being eliminated in many countries, these groups that do not qualify

for social assistance might experience the greatest direct benefits of affordable services and indoor comfort made possible through improved energy efficiency.

MULTIFAMILY HOUSING CONDITIONS

Most of the urban populations in CEE/CIS live in multifamily buildings that were constructed during the Soviet era. These buildings were constructed with relatively inexpensive materials and there was little or no attention to energy efficiency. By the time renovation was necessary, there was no money for maintenance much less major refurbishment of these homes, so they continued to deteriorate. Today an estimated 60 percent of multifamily housing stock in the EU-10[11] is in need of refurbishment and would cost an estimated €86 billion, while 60 to 80 percent of multifamily buildings in the CIS need to be refurbished. By comparison, about 15 percent of multifamily housing stock in the EU-15 needs to be refurbished, though not quite as urgently as in CEE/CIS because longer-term programs in the EU-15 have been in place to maintain basic standards in housing conditions.[12]

A visitor to the region's major urban areas would notice a dramatic change in the physical appearance of residential neighborhoods compared to the late 1980s and early 1990s, and a startling contrast among housing for the newly rich, the emerging middle class, and the increasingly vulnerable segments of the population. As cities have become more economically diverse, emerging "upscale" districts boast newly constructed, rebuilt and renovated housing while residents who struggle just to pay the rising costs of basic living remain in the poor conditions of Soviet-era housing. In most CEE/CIS countries more than half of the urban housing stock is still in need of repair and renovation to improve comfort, durability and energy efficiency.[13] Homeowners do not always have the financial means and established processes for making physical and managerial improvements to their buildings. Meanwhile, energy bills for these buildings are skyrocketing in many cities where utility tariffs are billed at cost-recovery levels.

Based on the reports from the European-based contributors to this study, the physical condition of multifamily buildings in urban areas remains poor in much of Southeastern Europe and the CIS, while it is more noticeably improving in Central Europe where the economies are relatively stronger and policies to improve housing are relatively more developed. Although newer and refurbished housing is more likely to include heat meters, insulation, and better windows, their

---

[11] The newest EU Member States Bulgaria and Romania were not included in this figure but the estimates are similar, e.g. 58 percent of Romania's housing built between 1950-1985 need energy-efficiency improvements (Tsenkova, Sasha. October 2005. *Trends and Progress in Housing Reforms in South Eastern Europe*, with support from the Council of Europe, UNECE, Norwegian Ministry of Foreign Affairs, Paris: Council of Europe Development Bank, p. 51.)

[12] UNECE. 2006. *Social and Economic Challenges in Distressed Urban Areas of the UNECE Region*, Note by the Secretariat in collaboration with the Bureau, Committee on Housing and Land Management, Sixty-seventh session, 18-20 September, 2006. Geneva: U.N. Economic Commission for Europe, p. 9. Available at: http://www.unece.org/hlm/documents/2006/ece/hbp/ECE.HBP.2006.3.e.pdf.

[13] *Ibid.* The estimate is 60 percent in the EU-10 and 60 to 80 percent in the rest of the UNECE countries although the need in the EU-15 is not so urgent because those countries have long-term programs in place to improve this housing.

effects may be offset in wealthier households by more energy-consuming appliances and equipment.

Ownership and Management

Privatization of multifamily housing has increased since 1990, transferring responsibility for residential building management, maintenance and repair from municipalities to private home owners. The property lines of individual apartment units within a building are relatively straightforward, but the common areas are not. Common areas like roofs, attics, basements, hallways, stairwells, elevators, external walls, and energy and plumbing systems are usually jointly owned by all the apartment owners, who generally have limited experience and interest in managing common property.

The apartment owners either have to create associations to handle this management, or hire building administrators that are usually municipal employees with limited training, skills and interest in improving building quality above the bare minimum. Even in cases where associations exist, municipal building administrators are still hired to do the basic work. The cost of these services is generally low, but often so is the quality.

The extent to which housing sector privatization has been completed varies from country to country, and a closer look reveals some trends in the relationship between ownership and affordability. The trend has been for housing to privatize quickly in cities where incomes are higher, and slowly where incomes are lower.[14] Some of the poorest urban households do not necessarily own their homes, which complicates the issue of who will have the incentive and resources to improve the condition of such housing.

As of 2006 an estimated 5 to 8 percent of individual housing units region-wide had still not been privatized.[15] Typically these units are reserved either for municipal employees as a perk, or for vulnerable households that cannot afford to purchase their own homes. In some cases, e.g. in Poland, the municipal owners of older apartment units have tried to sell them to the current residents at only 5 to 10 percent of their market value, but the residents only buy these units when they have the means to maintain them. The high cost of heating and maintaining such housing deters many would-be buyers.[16] Privatization efforts might be more successful if paired with programs to improve residential energy efficiency and affordability of maintaining these households.

Owner-occupied residential buildings are the ones that are more likely to be refurbished and retrofitted. Municipal landlords do not often have the resources and the awareness to invest in energy-efficient measures that could improve comfort and lower energy bills for their "social" tenants.

---

[14] This is observed in the Czech Republic in: "Country Survey InoFin – Czech Republic," draft prepared by Enviros, 2006, pp. 10-11, where municipalities still owned about 57 percent of urban housing as of 2004. The report did not specify if this housing is for low or middle income residents. There is also anecdotal evidence of this trend in Poland and Latvia.

[15] UNECE 2006, p. 10.

[16] Narodowa Agencja Poszanowania Energii (NAPE), 2006 Report on Piaseczno. The report also says that 70 percent of the municipally owned housing (using 1994 as a base year) had been privatized.

AFFORDABILITY ANALYSIS

Based on the case studies and anecdotal information from the experts contributing to this study, many of the inhabitants of multifamily buildings in need of maintenance and refurbishment have low to average incomes. Households with the lowest incomes may already qualify for social welfare assistance, although not all households that are vulnerable receive such assistance and even those that do still cannot cover all of their basic expenses with that assistance. Because many people who would qualify for social aid loathe the application process that involves a rigorous investigation of a household's qualifications—including interviews with neighbors and visits to the applicants' homes—many people in vulnerable households prefer to work in the shadow economy.[17] Thus the lines between income groups are blurred and a household's ability to afford energy and water may vary from season to season.

A recent EBRD study examining the affordability of energy and water in transition countries concludes that the poorest 10 percent of the region's population struggles to pay for energy and water; the study also carefully acknowledges that the problem of affordability is very specific to each country and even city.[18] The "affordability ratio" is the percentage of total household income or expenditure spent on utility bills. A new World Bank study finds that affordability ratios in the lowest and highest income quintiles – the bottom and top 20 percent – are not necessarily different from one another,[19] and affordability ratios for energy (power, gas, heat, oil and wood) averaged over all income groups are 10 percent or greater for seven of the 17 countries studied.[20] The thresholds used for determining when affordability becomes a problem vary among the institutions analyzing affordability. The range is usually 15 to 20 percent.

Many households with middle incomes may also experience affordability constraints with rising energy prices. Although the severity of their constraints is presumed to be less, middle income groups often share buildings with the most vulnerable households and thus the burden of heating, ventilating, weatherizing, plumbing, and maintaining the common areas. The graphs on the following pages illustrate how utility expenditures of the middle income groups can sometimes be as high as the proportional expenditures of the lowest income groups (see **Figures 1 through 6** on following pages, where "1" shown in red is the poorest quintile). All data are for 2002, except for Bulgaria and Tajikistan where the data are for 2003.[21]

---

[17] According to anecdotal reports from experts contributing to this study, this is the case in Romania, Latvia and other countries.

[18] Tepic and Fankhauser 2005.

[19] For example, the 20 percent of urban households with the lowest incomes in Moldova spend 14 percent of their incomes on energy while the households in the top income bracket still spend the same percentage of their incomes on energy. Ratios in other countries are similar: in Poland the difference is 15 to 13 percent, Turkey 14 to 13 percent, Ukraine 9 to 7 percent. In Bulgaria the difference is 18 to 14 percent, Hungary 20 to 13 percent, Serbia 14 to 7 percent to name a few examples.

[20] Lampietti et al 2007, Annex 2.

[21] Note: some of these numbers are slightly different than the World Bank data published in (Table A2.11 in Lampietti et al 2007), also based on 2002 data for urban households. Lampietti's book shows Serbia's poorest 20% income group with an affordability ratio of 14%, while the numbers for Hungary and Bulgaria are slightly higher in Lampietti's book than the numbers shown here.

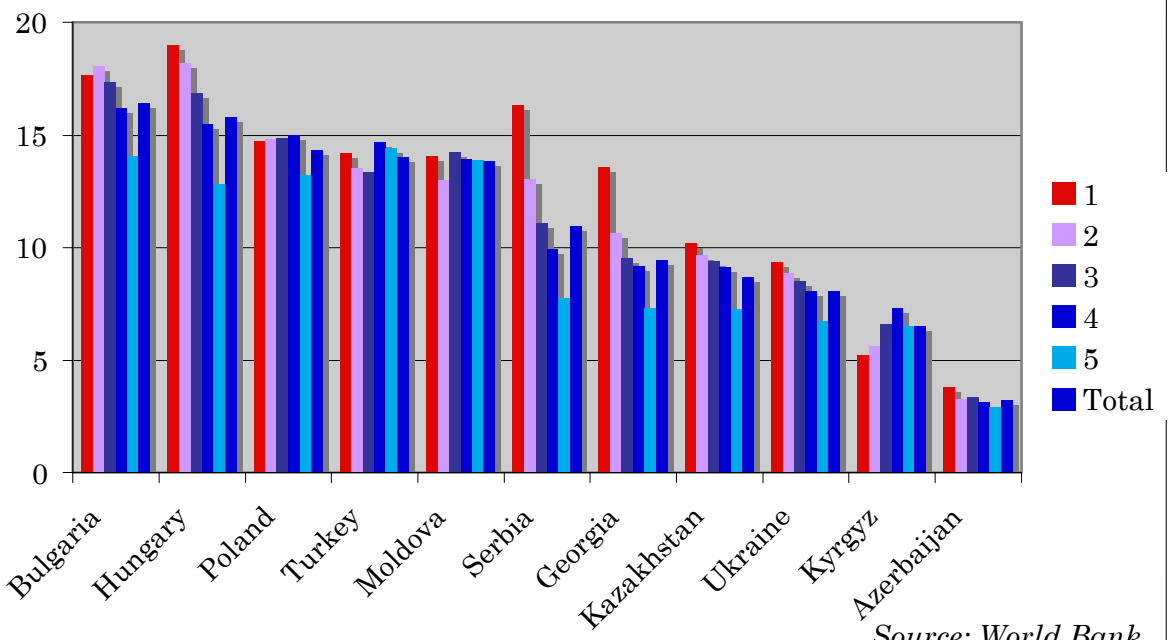
Not surprisingly, in the countries where residential energy prices are no longer heavily subsidized, affordability ratios are considerably higher (two to four times higher) than in countries where tariffs are still subsidized (see **Figure 1**). The breakdown of household expenditures by fuel or utility service **(Figures 2 through 6**) shows that the lowest income quintile generally pays the highest percentage of its overall expenditure on utilities. However, the middle income groups are not far behind – usually by less than two percentage points. The affordability ratios for gas are particularly high in countries where central heating is nonfunctional or only accessible for wealthier households (see **Figure 2**).

As mentioned above, affordability in this study is measured relative to overall household expenditure instead of relative to income in most cases. An overview of housing costs as a percentage of total household expenditure in the EU is provided in **Table 2**. The largest portion of expenditures is for so-called "housing costs," including rent, energy and water bills, which altogether average 21.4 percent in the EU-25 and the subset of eight Central European and Baltic countries that joined the EU in 2004. Slovaks spend the highest percentage (27.5) on housing expenses and the Lithuanians spend the lowest percentage (15.8). Similar data collected using different methods and comparing household expenditures to income show that this percentage – for the utility costs alone – can be much higher (over 50 percent) in the CIS and Southeastern Europe.[22] A closer analysis of these expenditures reveals that the residential energy tariffs in the EU-10 are still lower than in the EU-15, while energy consumption in residential buildings in the EU-10 is two to three times higher than in the EU-15.[23]

[22] Parvanyan, Tigran and Astghine Pasoyan. March 2007. "Armenia Affordability Study," a report by the Alliance to Save Energy prepared for USAID, p. 8. Caution should be used in these high figures because income is often underreported in many CEE/CIS countries.

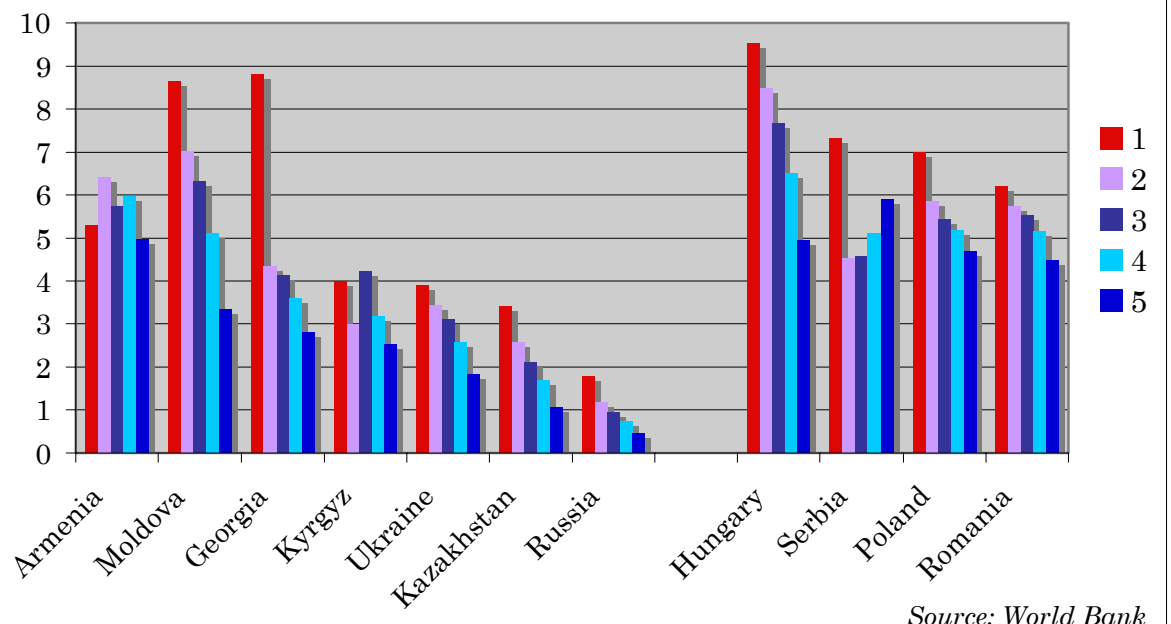
[23] Figures cited by National Agency for Energy Conservation (NAPE) in Poland in the attached case study on Poland's state-supported thermo-modernization program. See **Appendix A**.

Figure 1. Ratio of Household Energy Expenditures as Percentage of Total Household Expenditures, by Income Quintile



Source: World Bank

Figure 2. Ratio of Household Expenditures for Natural Gas as Percentage of Total Household Expenditures, by Income Quintile



Source: World Bank

Table 2. Household Expenditure 2004* (% of total household expenditure)

Country	Housing, water, electricity, gas and other fuels	Transport	Food and non-alcoholic beverages	Recreation and culture	Clothing and footwear
EU-25	**21.4**	**13.4**	**12.7**	**9.6**	**6.0**
Belgium	22.9	14.6	13.6	9.2	5.3
Czech Republic	21.8	10.7	17.2	11.8	5.0
Denmark	27.3	12.5	11.4	10.6	5.0
Germany	23.8	13.8	11.7	9.4	5.4
Estonia	21.9	11.6	20.5	6.6	5.9
Greece	15.4	8.5	15.0	6.0	10.1
Spain	16.0	12.0	14.2	9.3	5.5
France	24.1	14.7	14.4	9.0	4.5
Ireland	20.7	10.6	9.3	7.3	4.8
Italy	20.5	12.1	14.5	7.4	8.9
Cyprus	12.2	14.5	16.4	8.2	6.4
Latvia	21.3	10.7	21.1	8.4	5.8
Lithuania	15.8	16.6	31.8	7.8	7.4
Luxembourg	21.0	18.5	9.7	8.1	3.9
Hungary	19.4	15.6	17.7	7.9	4.0
Malta	8.6	13.5	17.3	11.1	6.2
Netherlands	21.6	11.4	11.0	10.3	5.4
Austria	18.9	12.7	10.6	11.7	6.7
Poland [24]	24.8	10.5	19.4	7.2	4.4
Portugal	13.5	13.7	17.0	6.6	7.9
Slovenia	19.3	15.0	15.8	9.9	6.2
Slovakia	27.5	9.2	19.7	8.4	3.4
Finland	25.4	12.7	12.5	11.2	4.8
Sweden	28.6	12.9	12.3	11.9	5.2
United Kingdom	18.7	15.0	8.9	12.7	6.1

**2003: France, Poland and Portugal*

[24] Over the five years from 2000-2005, annual statistics collected by the Central Statistical Office in Warsaw according to the uniform data collection method used by EU Member States and accession countries reveal the following figures for Polish housing and utilities: 19.5% in 2000; 19.6% in 2002; 20.25% in 2003; 18.8% in 2004; 19.6% in 2005. The percentage for 2004 is lower than indicated in the EUROSTAT news release. A research report for Poland by Witold Cherubin cites the Polish statistics.

Source: national accounts data, based upon current prices. Published by Eurostat.[25]

Compared to electricity (see **Figure 3**), natural gas is still relatively less expensive although gas prices have climbed steadily over the years and more sharply at the time of writing this study. The longer-term effects of the recent surge in natural gas prices are yet to be known, but the increase in gas prices is likely to continue, prompting households with alternative options for energy to switch to cheaper and often more polluting fuels, especially for heating. The lowest income groups in Hungary, Georgia and Moldova spend 8 to 9 percent of overall costs on natural gas, whereas the averaged affordability ratio across all income groups is around 4 to 5 percent. Natural gas is still preferable to electricity and most other fossil fuels in terms of its efficiency and affordability, although the trend toward increasing gas prices should be carefully considered in policies and measures aiming to improve affordability as well as energy efficiency.

Electricity costs take up a significant portion of household budgets in the region, especially when electricity is used for heat, which is more common in Southeastern Europe, the Central Asian Republics and the Caucuses than elsewhere in the region. At current tariffs, the lowest income quintiles in these countries spend about 7 to 12 percent of their overall expenditures on electricity, and the highest income quintiles spend 4 to 8 percent. As with other fuels, the affordability ratio for electricity in urban areas decreases as incomes increase.

In addition to the countries shown in the figures here, the EBRD study points out that in Croatia, Slovenia and the Slovak Republic – countries where price reforms have been more aggressive in spite of the fact that income levels have remained very low – the lowest income deciles spend between 9.5 and 11.5 percent of their overall costs on electricity.[26] These ratios provide some insight into the likely increase of affordability problems as tariffs increase toward cost recovery levels.

The World Bank has used household budget data in 12 countries to simulate the impact of sudden tariff increases from 2002 levels to cost recovery levels, using a price elasticity of -0.15 (meaning that a 10 percent increase in price results in a 1.5 percent decrease in demand for the service). The simulation showed that affordability ratios for electricity will increase most drastically (i.e. by 3 to 8 percent) in Serbia, Albania and Bulgaria, where electricity is widely used for space heating, hot water and cooking. In the other countries included in the simulation, affordability ratios of poor households would remain the same or decrease slightly because their tariffs were already at or above the cost recovery tariff level.[27]

Although the differential is not as pronounced as for gas, in all countries with functioning central heating except Bulgaria, the lowest income quintile pays the highest percentage of household expenditure on central (district) heat (see **Figure 4**). In some countries (Albania, Armenia, Georgia, Tajikistan) district heating has only been available to the highest income

---

[25] EUROSTAT News Release, 59/2006, May 12, 2006. http://epp.eurostat.cec.eu.int/pls/portal/docs/PAGE/PGP_PRD_CAT_PREREL/PGE_CAT_PREREL_YEAR_2006/PGE_CAT_PREREL_YEAR_2006_MONTH_05/3-12052006-EN-AP.PDF.

[26] Tepic and Fankhauser 2005, pp. 11-12.

[27] World Bank. June 2006. *Infrastructure in Europe and Central Asia Region, Approaches to Sustainable Services*, World Bank departmental report, p. 55. The other countries studied were: Armenia, Belarus, Georgia, Hungary, Kazakhstan, Moldova, Poland, Turkey and Ukraine.

groups who paid at least 10 percent and as much as 22 percent of total household costs on district heating bills, a situation that proved to be unsustainable.[28] Since 2002-3, district heating has collapsed in these countries due to its high cost, low efficiency and quality, and the availability of relatively less expensive heating options. With the exception of Tajikistan, Russia and Azerbaijan, just about all income groups in the other countries pay between 5 and 15 percent on central heat, and as much as 20 percent in Moldova.[29] In the CEE countries shown, almost all income groups spend at least 10 percent on central heating. The EBRD has calculated especially high affordability ratios for the poorest ten percent of the populations in Serbia and Montenegro (10%), Estonia (15.4%) and the Slovak Republic (18.6%).[30]

The affordability ratios for water are still substantially lower than for energy because water is still heavily subsidized in many countries, and governments still retain a tight hold on the power to set tariffs and keep them low. Nonetheless, water bills of the lowest income groups still account for between 3 and 6 percent of their expenditures for hot water and about 1.5 to 4.5 percent for cold water. These are not insignificant amounts. The EBRD estimates that water affordability is currently most severe in Hungary and the Slovak Republic (not shown in the graphs due to different data sets) where water tariff reform has been more aggressive, and in Russia due to widespread poverty exacerbated by inefficient consumption.[31]

Water tariffs will rise in the not-too-distant future, especially in CEE countries that have joined the EU, and in countries where private sector participation in the water sector is accelerating the reform of water tariffs, metering and enforced payment collections. The current averages per region are per m^3 USD 0.90 in CEE, USD 0.30 in SEE and USD 0.07 in CIS.[32] Metering is important because if customers are billed according to the number of persons in a household – the traditional practice – instead of according to metered consumption, the level of consumption varies widely and so do the bills. Several projects, e.g. in Armenia, Ukraine, and Romania, demonstrate how water metering alone influenced residential consumer behavior when households saw that they could save money by consuming less water.[33]

---

[28] The high affordability ratios for Georgia, Armenia and Albania are misleading when we consider future affordability given that those countries' central heating systems are not in operation now.

[29] Taking the entire region averaged across all countries, 2003 affordability ratios for heat are reported in the World Bank paper *Approaches to Sustainable Services* (by the Infrastructure Department for the ECA Region – see previous footnote 27) to be 2% for all households and 3% for the bottom income decile.

[30] Tepic and Fankhauser 2005, p. 13. The EBRD and World Bank numbers vary significantly.

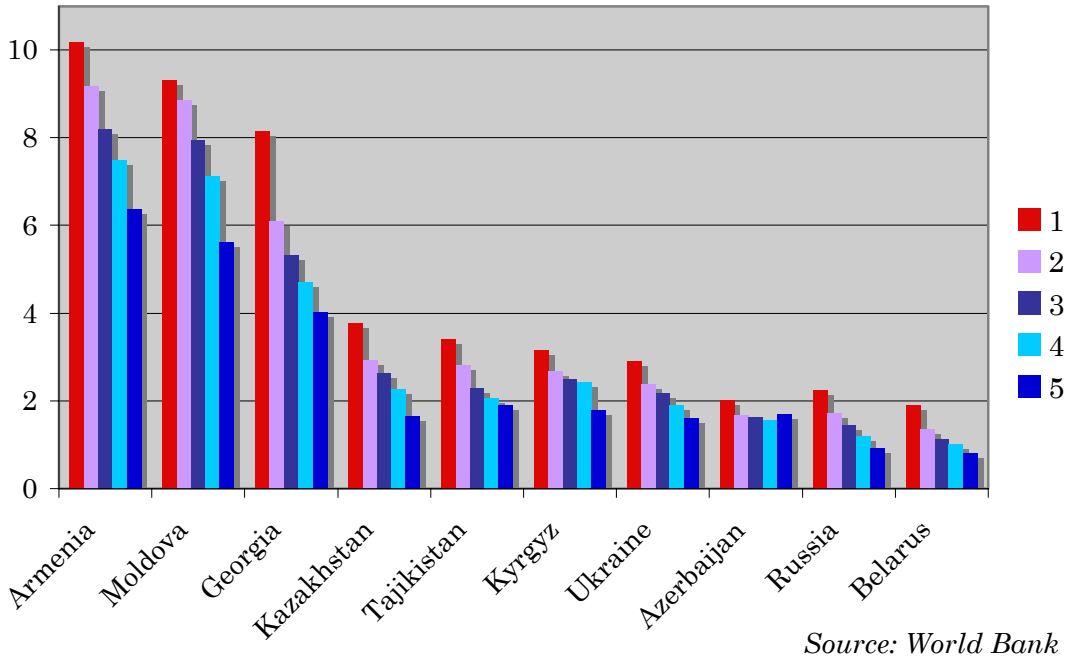
[31] Tepic and Fankhauser 2005, pp. 11-12. Note: the EBRD's numbers for affordability in the bottom decile are for 2003 and are a bit different than the World Bank numbers presented here by quintile. E.g. the EBRD reports that the lowest income decile in Moldova has affordability ratios of 5% for electricity, 0.4% for water and 0.3% for water; it is not clear if "water" includes hot water.

[32] World Bank departmental report June 2006, p. 38.

[33] The Ukrainian, Armenian and Romanian examples are documented as case studies in **Appendix A**. They generally show that metering had a direct affect on consumption because people became aware of the relationship between how much they consumed and how much they were billed; they noticed that their bills decreased if they consumed less and increased if they consumed more.

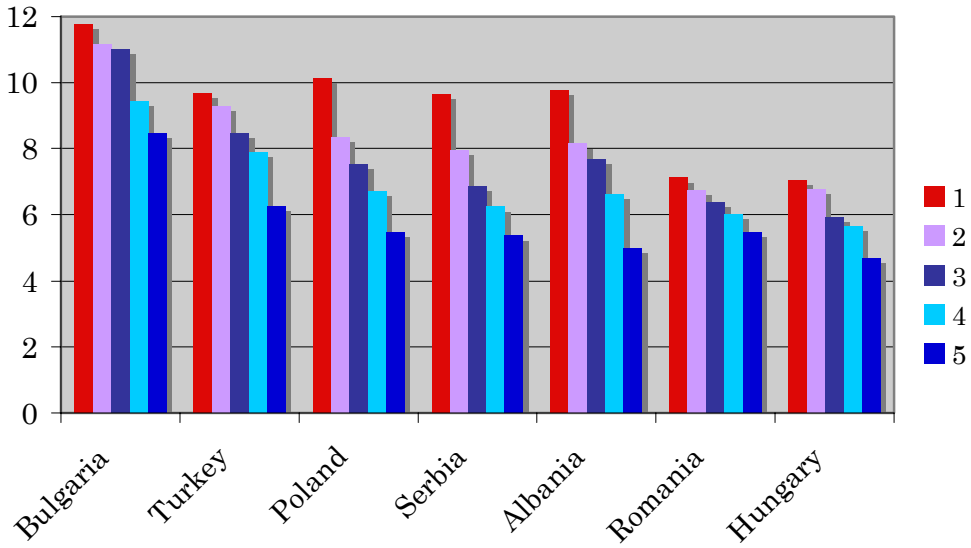
Figure 3. Ratio of Household Expenditures for Electricity as Percentage of Total Household Expenditures, by Income Quintile, for:

Figure 3A. CIS



Source: World Bank

Figure 3B. Central and Southeastern Europe



Source: World Bank

Figure 4. Ratio of Household Expenditures for Central Heating as a Percentage of Total Household Expenditures, by Income Quintile

Figure 4A. CIS

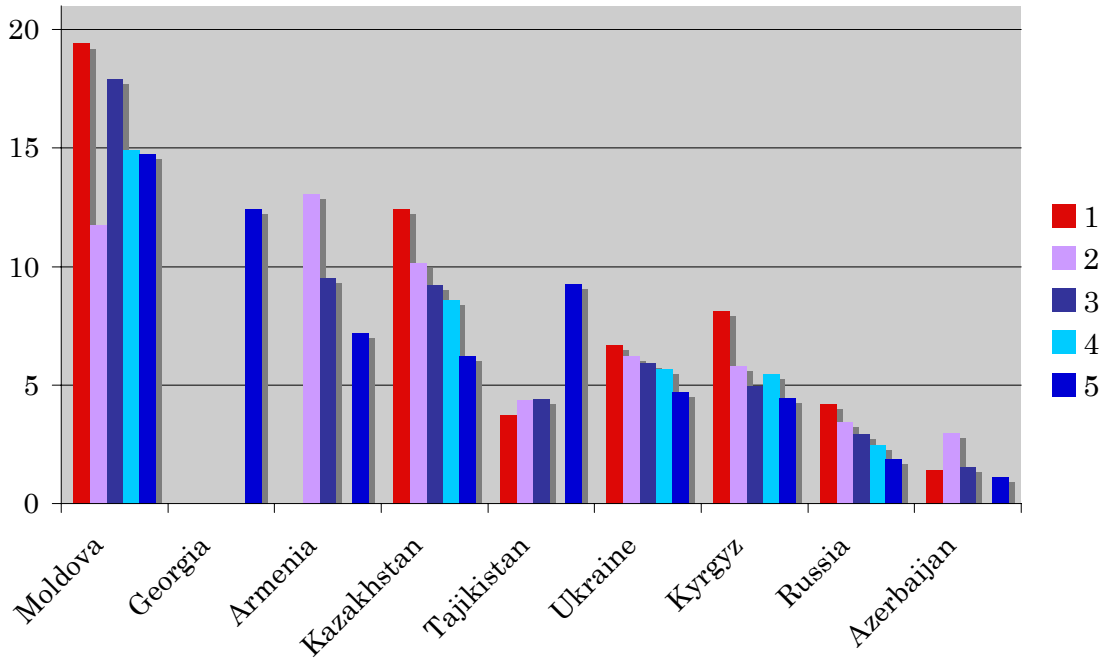
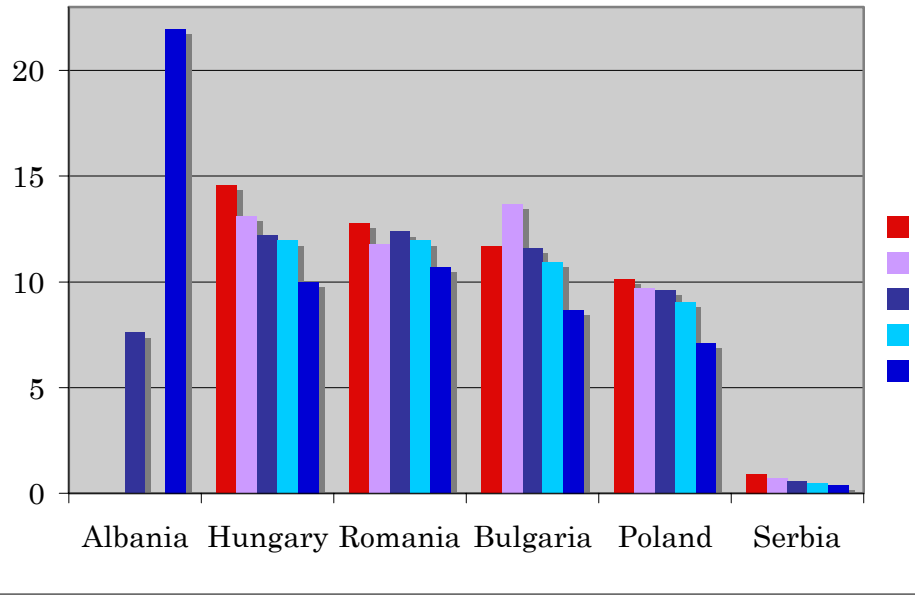
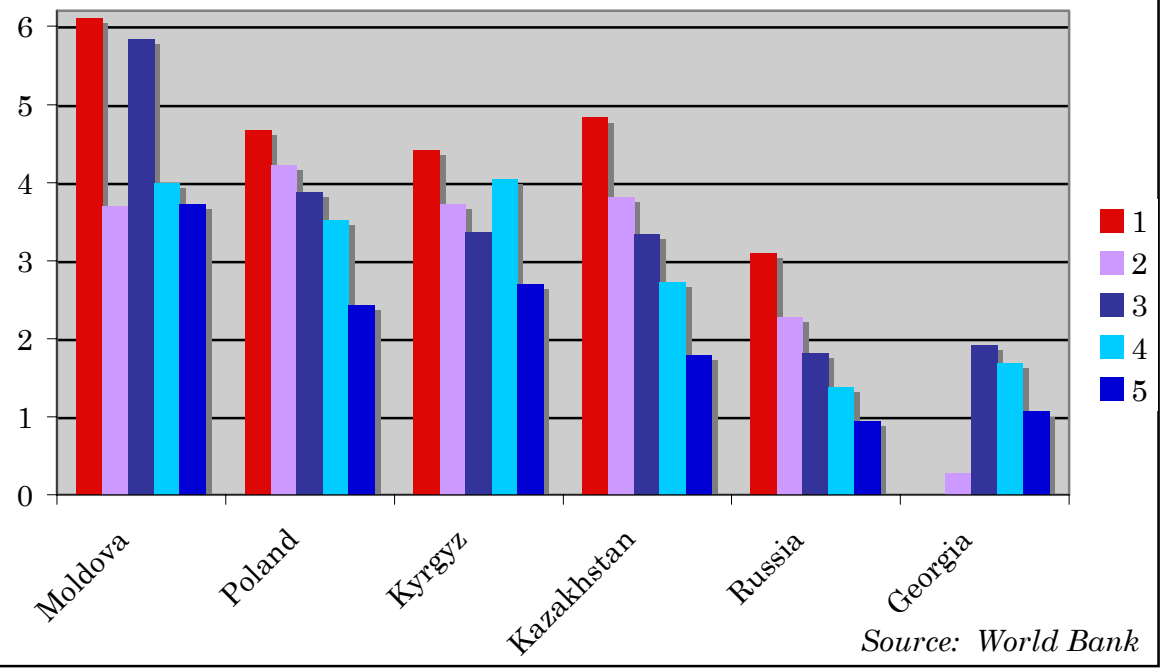


Figure 4B. Central & Southeast Europe



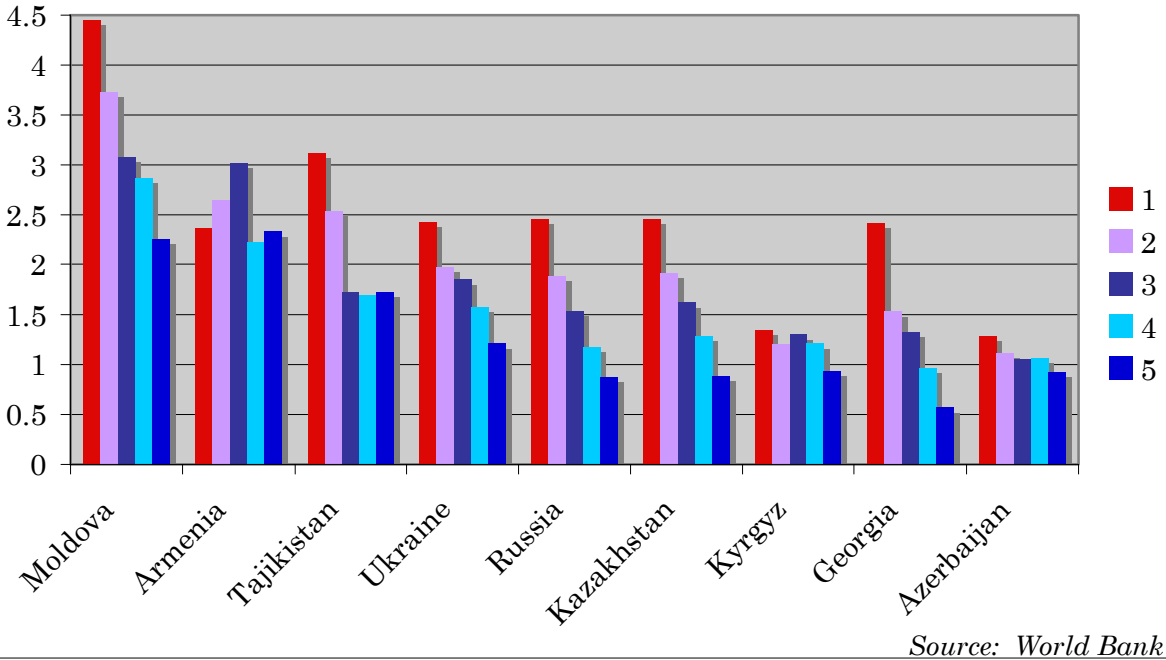
Source: World Bank

Figure 5. Ratio of Household Expenditures for Hot Water as Percentage of Total Household Expenditures, by Income



Source: World Bank

Figure 6. Ratio of Household Expenditures for Cold Water as Percentage of Total Household Expenditures, by Income



Source: World Bank

In the entire region, reform of water tariffs is becoming a priority, especially considering that all water tariffs are below cost-recovery levels, amounting to an implicit subsidy that the World Bank estimates could be as high as one percent of GDP. The average per capita consumption of water in CEE/CIS countries is 285 liters/day, whereas the average per capita consumption in Western Europe does not exceed 150 liters/day. Consumption is particularly high in Georgia, Kazakhstan, Russia and Ukraine.[34]

Trends in Affordability

As energy price reforms are gradually being implemented, residential consumers are spending more on household utility services. In some cases households are consuming more by choice, but in other cases the increased utility bills are unintentional and a result of the tremendous inefficiencies in the buildings and the networks supplying them. Households with rising incomes consume more energy with the purchase of additional home appliances and larger homes, thus high affordability ratios in the top two income groups is understood to be the consequence of a lifestyle choice and one can assume that these households could adjust their energy consumption if affordability were a problem for them.

> The poor spend nearly twice as much of their household budgets on heat as the non-poor. In countries with a particularly high incidence of poverty, the burden of heating is severe: in Armenia, for example, about half of the average household income is spent on heat.

Relative to the rising energy consumption of middle and upper income groups, the lowest income groups, whose incomes remain the same or decrease as energy costs rise, do not necessarily consume more than they did before tariff reforms. In general they consume very little and often less than is needed to reach even the most basic standard of indoor comfort and health. In a reformed environment where bills are based on consumption, people typically consume less energy if they have the means to control consumption levels and – more importantly – the costs. Still, the tremendous inefficiencies of residential buildings as well as supply networks mean that much of the energy and water is lost or wasted, and that households have to turn off the heat and power in order to save money, which is often not an option for technical and health reasons.

Heating costs make up the largest portion of household utility expenses in this region, despite the fact that tariffs for central heating and gas are still subsidized for many residential consumers. The poor also spend a greater share (nearly twice as much) of their household budgets on heat as the non-poor.[35] In countries with a particularly high incidence of poverty such as Armenia where in 2002 half of the population was considered relatively poor, 13 percent of which was extremely poor,[36] the official percentage of average household income spent on heat was about 50 percent. By contrast, Poland's poverty rate in 2002 was 17 percent

[34] World Bank departmental report June 2006, p. 38.

[35] Lampietti, Julian and Anke Meyer. 2003. *Coping with the Cold*, World Bank, Washington, DC.

[36] Parvanyan and Pasoyan 2007, p. 11. By February 2007, the International Development Agency reported a significant improvement in Armenia's incidence of poverty for 2005: 29.8 percent relatively poor and 4.6 percent extremely poor. See "Armenia: Reaping the Benefits of Steady Reforms," at www.worldbank.org/ida.

(<2 percent of which lived in extreme poverty),[37] and an average household spent about 8 – 10 percent of its reported income on heat.[38]

Table 3. Status of Residential Central Heating Subsidies in the CIS and CEE

	Type of Subsidies for Heating				
	1 General	2 Only targeted subsidies for low-income	3 Cross Subsidies	4 Fuel Subsidies to DH Companies	5 Transition in progress from 1 to 2
Bosnia & Herzegovina	•				
Bulgaria		•			
Croatia			•		
Czech Republic			•		
Hungary		•			
Latvia		•			
Moldova	•				
Poland		•	•		
Romania				•	•
Russia				•	
Serbia	•		•		
Ukraine					•

Most CEE/CIS countries still heavily subsidize residential heat tariffs, or allow cross-subsidies (**Table 3**), so future affordability of heat and other utilities will be even more problematic once these subsidies are dismantled. The share of heat and other utility costs in the budgets of vulnerable households is likely to grow, particularly when social aid to the poor is inadequate to cover rising living costs. The "threshold" above which heat and other utility costs are considered to be a burden can vary from 10 percent to 25 percent, depending on the method

[37] World Health Organization (WHO) at http://www.euro.who.int/eprise/main/who/progs/chhpol/demographic/20050131_1 accessed online on January 16, 2007. "People are considered to be in absolute poverty if their incomes are not sufficient to purchase very minimal goods and services. The World Bank currently uses an absolute poverty line of US$ 2.15 and US$ 4.30 income per capita per day to measure poverty in low- and middle-income countries of the WHO European Region (using 1993 international prices adjusted for purchasing power parity). While there is no certainty that the poverty lines measure the same degree of need across countries, the World Bank uses them as a constant to permit comparison. Many countries in the Region calculate their national poverty lines on the basis of a minimum consumption basket selected and priced according to the specific circumstances of the country."

[38] National Agency for Energy Conservation (NAPE) for Poland, and World Bank data.

used.[39] Just looking at the affordability ratios for heat mentioned above, and the ratios presented in the preceding tables, most income groups in CEE/CIS spend over 12 percent of total household expenditures on energy, and the lowest income quintiles spend anywhere from 14 to 20 percent (see **Figure 1** showing ratios for all energy expenditures in selected countries).

The percentage of households that struggle to pay their utility bills is generally equated as the same percentage of households that qualify for social welfare assistance, plus pensioners. EBRD estimated affordability ratios by minimum social entitlements for these two vulnerable groups, by country, for 2003 (**Table 4**). According to analysis of 2004 data from the Polish Central Statistical Office, average-income households spent about 11 percent of income on energy (district heat and hot water, electricity, gas, oil, coal and other fuels used in households) and water, while poor households spent as much as 40 percent of income. The basis for this calculation is the average energy and cold water costs were 82.01 PLN per capita, and the average available income was 735.40 PLN per capita. The share of energy and cold water costs in an average-income household amount to 11.15%. However, there are poor households with much lower income per capita (average income for families with unemployed persons, pensioners and retirees was about 200 PLN per capita) – thus the share of energy and cold water costs in poor household budgets reach or even exceed 40 percent.[40]

Several countries (see *italicized* in **Table 4**) have affordability ratios for total electricity, district heat and water expenditures exceeding 25 percent, which is the threshold set by the EBRD. According to the authors of the EBRD study, if tariffs were to rise to cost-recovery levels, that threshold would be surpassed in most of the CIS. Another study by the Russian Center for Energy Efficiency (CENEf) shows two tiers of affordability: above the first threshold of 7 percent, payment discipline declines and consequently service degrades; and above the second threshold of 15 percent, households are simply unable to pay their utility bills in full and will not respond to even the most severe methods of payment collection and must resort to the minimum level of service possible.[41]

Households that cannot pay their heat and other utility expenses in full, on time, or at all, have a few limited options. If they qualify for social welfare assistance they receive financial support from the state, which in most countries is funneled through municipalities. Otherwise, they pay what they can and either the utility or their neighbors shoulder the costs for their portion of utility use. In cases where a household or a building could be disconnected from a utility service for nonpayment, the incidence of nonpayment – even by low-income households – decreases considerably.

[39] Tepic and Fankhauser 2005, p. 5; World Bank reports cited above; research report by Bashmakov, Igor for the Alliance to Save Energy 2005; USAID/Romania and IRG reports.
[40] Witold Cherubin, personal communication.
[41] Bashmakov, Igor. 2006. Presentation for regional workshop on residential energy efficiency, Kyiv, Ukraine. Center for Energy Efficiency in Russia (CENEf).

Table 4. Affordability in 2003 of All Utility Services, by Minimum Consumption Entitlements, in Percent of Total Household Expenditure

Country	Pensioners	Social Beneficiaries
Czech Republic	5.6	45.6
Estonia	6.3	10.8
Hungary	4.9	10.3
Latvia	7.3	12.8
Lithuania	10.2	14.7
Poland	4.0	N/A
Slovak Republic	9.7	N/A
Slovenia	5.8	13.2
Central Europe and Baltic Countries	**6.7**	**17.9**
Albania	3.8	10.9
Bosnia and Herzegovina	6.0	6.6
Bulgaria	6.6	13.1
Croatia	3.9	12.4
FYR Macedonia	6.9	13.3
Romania	8.7	25.7
Serbia and Montenegro	4.4	7.2
Southeastern Europe	**5.7**	**12.7**
Armenia	19.1	40.6
Azerbaijan	6.6	26.8
Belarus	4.9	N/A
Georgia	30.3	30.3
Kazakhstan	5.3	22.8
Kyrgyz Republic	12.8	22.9
Moldova	37.7	40.4
Russia	3.4	12.5
Tajikistan	9.9	22.7
Turkmenistan	0.3	0.9
Ukraine	7.1	9.3
Uzbekistan	17.5	61.4
Commonwealth of Independent States (CIS)	**12.9**	**26.4**

Source: EBRD.[42]

[42] Tepic and Fankhauser 2005, pp. 23-24.

Nonpayment

Another way that affordability problems are identified is through analysis of nonpayment rates compared with income statistics, and information about household expenditure. Nonpayment persists as a problem in much of the region, but it can be a misleading indicator of affordability. There are many reasons for its persistence – lack of enforcement, the Soviet legacy of a "nonpayment culture," waivers and privileges for certain groups (not only vulnerable households), poor quality of services when customers refuse to pay, and high cost of services that for some are not affordable.

Some countries have opted to tolerate nonpayment as a way to deal with the rise in poverty. This is the case in FYR Macedonia where it is common practice for residents to continue using district heat and electricity even if they have not paid their bills for months. The country's lack of a residential energy-efficiency program perpetuates the culture of nonpayment and waste of natural resources, and has the effect of prolonging "energy poverty" even in higher income groups.[43] Even in countries where energy-efficiency programs have been introduced, an improvement in payment discipline is not always felt immediately.[44]

Energy Poverty and Affordability

The phenomenon of energy poverty – also called "domestic energy deprivation" – whereby homes are inadequately heated because residents cannot afford minimum comfort standards – is not limited to the poorest income groups.[45] This is particularly true in countries like FYR Macedonia, Moldova, and the Caucuses where income levels for "average" consumers are very low when compared with the rest of the region, where the housing infrastructure is very energy inefficient and energy tariffs are already rising. In countries with much higher average incomes, energy poverty is concentrated in the poorest segments of the population, and these vulnerable groups typically decrease their energy expenditures when prices increase – signaling energy poverty.

For example, Stefan Buzar's "compensating variation analysis" of energy poverty in FYR Macedonia and the Czech Republic estimates how much additional income households needed in 2004 in order to retain 1995 energy expenditures when energy prices were relatively lower. The study finds that 60 percent of the poorest Macedonian households would require additional income (anywhere from 1 to 27 percent of total equivalent income), or they would have to cut back on their energy purchases in order to maintain their 1995 levels of household energy expenditure in the year 2004. In the Czech Republic, the poorest 10 percent of households needed to cut back on energy expenditures by about 6 percent in the same period if they were to retain 1995 levels.[46]

---

[43] Buzar, Stefan. April-May 2006. "Energy Poverty in Macedonia and the Czech Republic," in *Beyond Transition, The Newsletter About Reforming Economies*, Volume 17, No. 2, pp. 15-16.

[44] For example the introduction of the Residential Energy Efficiency Credit Line in Bulgaria did not dramatically affect the level of non-payment for heat energy according to the Bulgarian Energy Efficiency Center "EnEffect."

[45] "Fuel poverty" is also a term widely used to describe households that need to spend more than 10 percent of their incomes on fuel to maintain basic energy and heating services.

[46] Buzar 2006, pp. 15-16.

Although the leading research by the World Bank and EBRD finds that affordability is really only a problem for the lowest income decile in most CEE/CIS countries, the energy poverty dimension of the affordability problem and the analysis of expenditure data show that middle-income households are negatively affected by the price increases, too. Because the multifamily buildings in need of repair house a combination of income groups, there is a need and opportunity to provide a comprehensive solution to affordability and energy poverty problems – and that energy-efficiency support can play an important role in the solution.

What Energy Efficiency Does for Households

Energy efficiency's potential to reduce utility bills and improve comfort levels provides an important option for meeting the needs of lower income households. In the context of affordability, as utility costs rise, residents of all income levels will save money on utility bills if they use energy and water more efficiently. In some cases, low-income households may not actually see a reduction in their utility bills but they do experience an increase in comfort for the same costs. The reason for this is that low-income households frequently consume energy at a "survival" level and not at the level of normal comfort. When they can pay for energy-efficiency improvements they are usually limited to a few measures that pay back very quickly (in less than two years). Even if they are charged special "social" tariffs that adjust affordability of utilities, they do not have enough money to invest in retrofits that usually require a bank loan.

Households with average and higher incomes will see changes in their utility bills if they conserve energy (e.g. if they shut off heat in rooms not in use, set thermostats on slightly lower temperatures, lose less heat to the outside environment through weatherization, use more efficient appliances, etc.). If they choose not to conserve intentionally, most often these households spend about the same percentage of their incomes on energy but with greater comfort. More specifics about energy-efficiency measures and their impacts on affordability are described below in Chapter 5.

ECONOMIC DIVERSITY IN MULTIFAMILY HOUSING – CHALLENGES AND OPPORTUNITIES FOR ENERGY EFFICIENCY

The socioeconomic makeup of urban housing is changing, especially in the capital cities and larger urban areas that attract villagers and migrants looking for work. The income distribution among residents of multifamily buildings has become more diverse, resulting in a mix of middle and low income households sharing common building space and common building-related problems to solve with unequal incomes. As long as there continues to be a mix of incomes in multifamily buildings, there is both a challenge and an opportunity to improve energy efficiency and affordability.

The *challenge* is primarily institutional and financial. Multifamily buildings in this region need to be organized into functioning legal entities that are capable of managing group decision-making, representing residents' needs and concerns to utilities, and maintaining common property. Most countries in the region have at least one form of housing association, but the

effectiveness of these associations varies widely. In most countries of this region, households and housing associations also do not have experience with borrowing money and do not have common assets to use as collateral to secure loans. Consequently, lending institutions view the residential sector as "high risk" unless loans are guaranteed by creditworthy municipalities or other guarantors.

The *opportunity* at this particular time of socioeconomic transition is to engage all income levels living in multifamily blocks to participate in energy-efficiency improvements. Some of the most effective improvements result from programs initiated by public and private partners (often state and local governments with banks) that provide financial incentives for all income levels to invest in energy efficiency. Poland, Lithuania, and recently Bulgaria have residential energy-efficiency programs on a nation-wide scale, while other countries (e.g. Latvia, Armenia, the Czech Republic) have local projects that have potential for wider replication.

The opportunity is, unfortunately, still a theoretical one. The diversity of incomes in multifamily buildings is also a problem in reality. Existing residential energy-efficiency programs target housing associations that can take on loans, and buildings with higher percentages of vulnerable households are either not organized into associations, or if they are, the vulnerable households are still reluctant or unable to borrow money, which makes projects in such mixed-income buildings slower and more complicated to implement. A few residential energy-efficiency programs have begun to make provisions for targeting financial aid to cover vulnerable households' portions of multifamily building retrofits, but as of yet there is little experience to document. It is still a very important step toward a much-needed, *targeted* "social" energy-efficiency policy. As noted by the experts contributing to this study, most countries need to coordinate social policy with energy-efficiency programs to ensure that vulnerable households get to participate and benefit from residential energy-efficiency investments.

As incomes rise, homeowners invest more in their individual apartments, making them more comfortable and energy-efficient. Improving common areas of multifamily buildings has been slower, and lower-income households come to view energy efficiency as something only for their "richer" neighbors. In cases where individual households in a building disconnect from district heating, a practice that is legal and technically possible in many countries, the neighbors that remain on the network either end up paying more for heat, or the municipality and the heat company lose revenue and risk bankruptcy unless there is the will and the way to rescale heat load to meet lower demand.

By improving energy efficiency and comfort of apartment units and common areas of buildings, bills at cost-recovery energy prices become more affordable for residents than they would be without improvements. Depending on the competition among heat suppliers in a given city and the cost, financing and timing of the demand-side renovations, households that disconnected from district heating have sometimes elected to reconnect. A project in Pleven, Bulgaria illustrates one example of this phenomenon, and other examples of this effect are found in Poland and Romania.[47]

[47] A case study on the Pleven project was prepared as part of this research (see **Appendix A**).

A separate study on reforms affecting urban heating in this region goes into more detail about policy reforms affecting urban heating in CEE and the CIS.[48] But the implications for affordability are important to note here: where end-use energy-efficiency improvements are made and where the density and reliability of district heating are sufficient to attract and retain residential customers, heat is more affordable.

The greatest need and potential for energy efficiency is in the older housing stock built before 1990, although residents in newer buildings are at risk of facing affordability problems in countries without energy-efficiency building codes. While newly constructed buildings in the EU are built to meet European building standards, this is not always the case in Southeastern Europe and the CIS. Electric appliances are also less efficient in non-EU countries and as electricity prices are rising, so will household utility bills.

[48] Alliance to Save Energy, July 2007. *Regional Urban Heating Policy Assessment, Part I*,. This report is the partner study for this regional report on residential energy efficiency and affordability funded by USAID.

Box 1. Summary of Findings Relating to the Affordability of Utilities in Urban Multifamily Housing in the CEE/CIS Regions

- Leading researchers of affordability use a benchmark of about 20 percent as the acceptable affordability ratio for housing and utilities. Considering that at the beginning of the region's transition households in CEE/CIS paid less than 3 percent of total expenditure on housing and utilities, there are numerous political, social and cultural barriers to be overcome before the 20 percent threshold is widely accepted.
- Countries with a high rate of poverty in general also experience affordability problems in middle income groups as well as lower income groups.
- Current affordability of total household energy is most problematic in the countries that have reformed their tariffs. Hungary, Bulgaria and the Slovak Republic have some of the highest affordability ratios in the region, while Poland, Turkey, Serbia and Moldova are not far behind. 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
- Future affordability of energy in the CIS will be problematic unless steps are taken now to improve energy efficiency as tariff reforms are gradually introduced.
- Water affordability is comparatively less problematic but on the rise. Poor households in Romania, Bulgaria, Poland, Hungary, Turkey and Moldova spend 4 to 6 percent of household expenditures on cold water.
- With relatively high affordability ratios for non-network fuels such as wood, urban households have few cheap alternatives to central heating and gas. Fuel switching in response to affordability constraints may not address affordability in the long term. Energy efficiency improvements are essential now.
- Energy-efficiency improvements might not necessarily reduce the energy bills of vulnerable households that are currently living with minimum "survival level" service, but they will improve indoor comfort without increasing the current costs of utilities.
- For the foreseeable future in most CIS countries, low and middle income households will continue to live in multifamily housing so investments in renovation and energy efficiency are very timely as tariffs are rising and pensioners do not receive enough aid to cover energy and water bills.
- Vulnerable households are still mingled in buildings with other income groups. Residential energy-efficiency and renovation projects must include special provisions for financing the vulnerable households' portion of investment costs, while providing financial incentives for middle and upper income neighbors to share in the investment costs. There is little actual experience with this approach, though some examples are found in Poland and Latvia.
- In some countries, e.g. Georgia and Moldova, social welfare beneficiaries and pensioners do not receive enough aid to cover energy and water bills.

Chapter 3: Policies and Programs Influencing Affordability and Energy Efficiency

Chapter 3

The main policy areas affecting affordability are energy tariffs and subsidies. Social safety net policies aim to address affordability generally for all basic needs, while a few countries (often with international cooperation) provide utility-specific aid. In most of CEE/CIS, as indicated in **Table 3**, heat and water tariffs need to increase in order for utilities to recover costs, and general subsidies will have to be eliminated and targeted subsidies reformed so that they effectively reach those who truly need assistance without draining public budgets. Policies for metered billing, housing reform, social welfare, energy planning, and energy efficiency influence affordability as well.

As a complement to critically important policies like elimination of blanket subsidies in favor of targeted social subsidies, government programs can be particularly effective mechanisms for reaching the vulnerable households because programs focus on improving existing buildings, whereas policies typically set standards and requirements for new and future housing. Except for a few cases where new housing is designated for vulnerable households, the poor are going to benefit most from programs that improve the older housing stock.

TARIFFS AND SUBSIDIES

Although governments are likely to experience social and political difficulties in attempts to raise energy prices, price increases are becoming a reality as a result of rising fuel prices on the world market and policies phasing out traditional subsidies for all residential consumers in favor of subsidies targeted only to the poorest income groups. There are many different types of tariffs and subsidies that governments use to protect households from economic hardship and energy deprivation – perceived and real – due to rising utility costs. A wealth of research and analysis is available about the different options: lifeline tariffs, cash transfers (earmarked and non-earmarked), burden limits, cross subsidies, tolerated nonpayment (discussed in **Chapter 2**), and tariff discounts to selected groups (i.e. pensioners, handicapped, veterans, etc.).

From a regional point of view, there is no cost-recovery tariff amount that applies for all countries. Analysts at the EBRD provide some estimates of full cost-recovery tariffs for the three major sub-regions of CEE/CIS (**Table 5**), however they emphasize that these estimates are only averages and should not be used liberally because actual cost-recovery levels are very specific to each country and even municipality.[49]

Most IFI analysts of affordability concur that delaying needed price reforms is more detrimental than the potentially negative impacts of the reforms themselves. There is also consensus that in most countries tariff reforms could be achieved without exceeding the 20 to 25 percent

[49] Tepic and Fankhauser 2005.

benchmark that is used as the higher end of an acceptable measure of how much households can afford to pay for utility services.[50] However, all countries will need to strengthen their social protection mechanisms in order to weather this reform. There is a need to proceed cautiously in several countries (e.g. Albania, Bulgaria, Serbia, Tajikistan) by introducing reforms more gradually in order to avoid exceeding the 20 to 25 percent affordability ratio limit, while others (Caucasus and Central Asia) will immediately exceed the affordability threshold and thus will need international support to manage affordability problems and social welfare burdens.[51]

Table 5. Averaged Full Cost-Recovery Tariffs by Sub-Region, in USD

Sub-Region	Electricity ($/kWh)	Heat ($/kWh)	Water ($/m³)
Central Europe & Baltics	0.08	0.04	1.40
Southeastern Europe	0.08	0.04	1.40
Commonwealth of Independent States	0.06	0.03	1.00

Source: EBRD

As is the case with defining what cost-recovery tariffs are and will be in CEE/CIS, there is no one-size-fits-all approach to subsidies that provides the best coverage and most efficient targeting of the poor. Many countries choose to use several different types of subsidies to ensure coverage, trading off the administrative cost of carefully identifying and targeting the poor with the cost of providing subsidies to many who do not really need them.

The pace and progress of tariff and subsidy reforms vary as these are multi-year endeavors involving all levels of government as well as the cooperation of consumers and the utilities. Accession to the EU has proven to be an effective impetus for countries to enact reforms and invest in institutional development, although the latter has been a much slower process. Some of the most recent reforms and their implications for affordability are shown in **Table 6**.

In most of these countries, municipalities are responsible for setting heat and water tariffs, but there are often political difficulties in efforts to set them closer to cost-recovery levels. Policies for penalizing non-payers are also becoming stricter, especially in the gas sector and to a growing extent in district heating. Customers who fail to pay their bills on time will be cut off until payments are made. As noted in **Chapter 2** in the case of FYR Macedonia, sometimes nonpayment is tolerated as its own form of social subsidy.

[50] Tepic and Fankhauser 2005. World Bank departmental report June 2006.
[51] World Bank departmental report June 2006, p. 3. This list is not exhaustive.

Table 6. Some Recent Tariff and Subsidy Reforms in Selected Countries

Country	Tariff Change	Subsidy Change	Affordability Implication
Bulgaria	*Electricity*: most recent hike in July 2007 has prompted 9 water utilities to increase tariffs for their customers. The new tariff means water companies spend up to 40 percent of operating costs on electricity.	*Electricity*: No more lifeline tariffs for general population. Targeted subsidy for qualifying households. *Heat Fuels*: Targeted subsidy for qualifying house-holds (for DH, gas, other heating fuels).	Electricity use for heat will be more expensive for general population; if properly targeted most vulnerable households will have more affordable electricity. Water tariff increases will affect households' water affordability.
Czech Republic	*Heat*: Reduced VAT of 5% will end in 2007 and go up to 19%. *Gas*: market liberalization of prices for residential customers as of 2007. *Electricity*: market liberalization – affected residential customers' choice and prices as of 2006	*Heat*: 20€/MWh is subsidized DH tariff for residential customers; full-cost price is 45-55€/MWh; NG heat costs 35-45/55€/MWh[52]	Increasing NG prices on world market can affect affordability of heat (NG heat and DH).
Latvia	*Heat*: tariffs increase from 10%/yr (Riga) up to 50-55% from 2004-2007 in other towns e.g. Rezekne, Valmiera. *Gas*: 25% annual increase since 2005; increasing 1.7% less for large consumers. *Electricity*: 10% increase *Hot Water*: increases depend on local MWh cost *Cold Water*: 5-10% increase (b/c of electricity) 2006	No blanket subsidies. Only households that prove their vulnerable status qualify for social tariffs.	As many as 15-20% of households have utility affordability ratios reaching 35-40%. This high cost of living is prompting emigration abroad.
Russia	*Gas*: prices to reach European levels by 2015		Users of DH (~ 70% of Russia's population) may experience a greater burden. More research needed.

[52] Czech Center for Energy Efficiency "SEVEn." Presentation "Municipal Energy Planning Demonstration in Serbia," Belgrade, December 14, 2005, slide 86.

Customer responses to these threats of disconnection vary. Many customers in this situation readily switch to cheaper fuels when options are available. For example, households in Balkan cities switch to wood-fired burners or lignite for heating and can save a month's worth of wages in one heating season.[53] In CIS countries the shift is the same, sometimes also to gas if that is the cheapest, locally available fuel. However if there is no alternative source of heat, water, or electricity, and households are unable to pay their bills, they resort to using the minimum amount of service possible – e.g. heating only one room in winter, using ovens and stoves in the kitchen as heaters, or doing without the service whenever possible.

Social Safety Net Policies and Energy

The members of the research team contributing to this study had differing perspectives about the needs of vulnerable households regarding energy and water use, and their attitudes about energy efficiency. On the one hand, some (mostly in CEE) said that households receiving subsidies did not care about utility costs and energy efficiency because their social benefits covered their needs. Meanwhile others (CIS and Southeastern Europe) said that vulnerable households did not receive adequate levels of service and that social benefits were insufficient to cover bills for all basic utility services.

Based on current reforms and trends, the countries where residential consumers in general will face the greatest affordability constraints related to heat and electricity include Croatia, Estonia, Serbia, Slovenia and the Slovak Republic.[54] Tariffs for water[55] are much slower to increase, but countries where affordability of water supply and sanitation could become problematic for residential consumers include Hungary, Russia and the Slovak Republic. The recent hike in electricity tariffs for large customers including water utilities in Bulgaria will also affect affordability for consumers as water utilities have to increase their customer service tariffs to cover rising electricity bills that consume as much as 40 percent of the water companies' operation costs.[56] Countries where recipients of social safety net benefits (e.g. unemployment payments, pensions, other aid to cover basic living costs for food, shelter, etc.) have relatively more difficulty with affording basic household energy and water services are indicated in **Table 7.**

[53] Based on available information about a project in the Bosnian town of Banja Luka, by switching from district heating to high-efficiency wood-fired boilers, residential customers can reduce household bills by 34 percent and save about €144/year – the equivalent of an average month's salary (see **Appendix A**).
[54] Tepic and Fankhauser 2005.
[55] Payment discipline related to water is lower than other utilities because most water companies are municipally owned and operated, less business-oriented and more lax about nonpayment. Some typical examples of this behavior is observed in Albania and Armenia, where non-payment or incomplete payment of water bills is well above 50 percent and often higher.
[56] "E.ON, 9 Water Utilities in Dispute over Electricity Tariffs," July 26, 2007 in *SeeNews* at http://www.seenews.com/news/latestnews/e_on_9waterutilitiesindisputeoverelectricitytariffs-215629/. The nine water companies are in Silistra, Razgrad, Varna, Veliko Tarnovo, Dobrich, Ruse, Gabrovo, Isperih and Targovishte.

Table 7. Countries Where Social Welfare Beneficiaries Experience Particularly High Affordability Constraints

Countries	Affordability Constraints
Georgia, Moldova, Tajikistan, Uzbekistan	Pensions in these countries are particularly low, while in Moldova and Georgia low pensions are further exacerbated by relatively high tariffs.
Czech Republic, Romania, Armenia, Azerbaijan, Georgia, Moldova, Uzbekistan	Affordability ratios for social safety net beneficiaries in these countries are above the threshold of 25% (i.e. more than a quarter of household expenditure is used for energy and water services).
Croatia, FYR Macedonia, Georgia, Slovak Republic	The poorest income deciles in these countries spend more than 10% of their overall expenditures on electricity alone.

Source: EBRD

A closer look at the vulnerable groups in some of these countries shows how the effects of uncoordinated policies can affect affordability. A tariff increase affects the poor disproportionately when no measures are taken to mitigate the existing (pre-reform) affordability ratios. Housing was and continues to be privatized in its ill-maintained condition, and with no means to invest in refurbishment and weatherization, the lowest income groups are further exposed to substandard living conditions and higher expenses that they as homeowners cannot manage without more social aid. In countries like Moldova, the Caucasus and Central Asia, tariff and subsidy reforms are particularly problematic because they need to factor in the high incidence of poverty in general. A sudden shift to cost-recovery principles would not be politically feasible or economically practical because large segments of the population would plunge further into poverty and need additional poverty assistance if the increased tariffs were to be enforced.

When there is a high incidence of poverty as in Moldova, the Caucasus and Central Asia, a sudden shift to cost-recovery principles would not be politically feasible or economically practical because large segments of the population would plunge further into poverty and need additional poverty assistance if the increased tariffs were to be enforced.

While most social safety net benefits are supposed to cover utility expenses among other household needs, the severely cold winters in the region have necessitated additional help for vulnerable households. Many governments offer special "heat assistance" to all households when their bills exceed a certain threshold, although in recent years the trend is toward assistance that targets only the poorest income groups who are already eligible for social assistance. Heat assistance typically is in the form of earmarked cash transfers that are paid to the district heating company or directly to households not on the central network. Sometimes the heat assistance has been offered by donor programs when governments do not have the resources for it.

Among the countries offering heat assistance in the form of cash transfers are Bulgaria and Romania. In Bulgaria, the Winter Supplement Program is available to everyone who is already eligible for social assistance, although the number of people receiving the supplement is

actually larger than the number of social beneficiaries in general. Despite spending two percent of the total social benefits expenditures for 2001, the program has not been adequately funded and does not cover all of the heating costs for all low-income households.[57] In subsequent years, the Bulgarian government has become more selective about recipients for this benefit.

In Romania, the social safety net system for energy has included untargeted subsidies for customers using natural gas and district heating, and targeted "heat assistance payments" for the same two energy services, plus wood and coal. Based on findings of the USAID-funded Romanian Energy Policy (REP3) program implemented by the International Resources Group, the untargeted subsidies have been at least four times larger than all targeted assistance to the poor. Targeted assistance has benefited a larger proportion of customers connected to gas (33 percent) or district heat (25 percent), than the 9 percent of households using wood and coal.

Most urban residents use district heat or natural gas, and the REP3 team found that urban residents received proportionately more social aid for energy even though the incidence of poverty is significantly higher in rural areas. An estimated 3.2 percent of district heating customers and 5.8 percent of natural gas customers live below the poverty line, while the poverty rate for households using wood or coal stoves is almost 21 percent.[58] However, relative to other household utility costs, the bills for district heating and natural gas place the greatest financial burden on households regardless of income. The policy recommendations from the REP3 program envision continued and better-targeted subsidies to cover the fixed costs of supplying energy to vulnerable households paired with creation of a social energy-efficiency benefit program that would help pay the capital costs of energy-efficiency investments in low-income households.[59]

A common problem with social safety net policies and programs is that they do not always reach the intended groups, while those who reap the benefits do not necessarily need assistance. This problem can be attributed to shortcomings of the policy or program, to the implementing institutions, and to other factors. Generally, the elimination of blanket subsidies in favor of more targeted "social" (subsidized) tariffs is considered a best practice.

At the same time, the problem of affordability is not limited to the most impoverished groups. As noted in the previous chapter and in some of the case studies (e.g. Pleven, Bulgaria) and country profiles (e.g. Armenia), affordability constraints may affect segments of the population that do not already qualify for special assistance – particularly the lower-middle income groups that appear as quintiles "2" and "3" in Figures 1 - 6. Many average consumers in Romania, Hungary, the Czech Republic, Poland, Portugal, and the Slovak Republic that do not qualify for "social tariffs" (where they exist) pay some of the highest electricity tariffs in Europe from a purchasing power parity perspective.[60] Keeping tariffs artificially low for consumers will not

[57] Energy Charter Secretariat, March 2006. *Cogeneration and District Heating, Best Practices for Municipalities*, Brussels, pp. 26-27.

[58] International Resources Group (IRG), June 2007. "Romanian Energy Program, Phase III (REP 3), Lessening the Social Impacts of Higher Energy Prices: End Universal Subsidies and Introduce an Expanded and Fully Targeted Market-Based Social Safety Net," report for USAID for Contract EPP-1-00-03-00006-00, Task Order No. 3, p. 4.

[59] *Ibid*.

[60] PEEREA Review for Romania 2006, p. 15. Statistics from EUROSTAT.

address the longer-term need for sustainable communal services. Meanwhile, there is a high potential for cost-effective energy savings that can reduce household utility bills by 20 to 50 percent *on average* through residential end-use measures.

While identifying and targeting the poor for energy assistance is a costly and difficult task, energy-efficiency assistance can be more inclusive as well as cost-effective. Multi-apartment buildings often house residents of mixed incomes. Some of these residents are able and willing to pay for energy-efficiency improvements, while others do not have the means to do so. Improvements to such residential buildings benefit all residents by making buildings more comfortable and enabling residents to have more control over how much energy and water they consume and are subsequently billed.

There is still a need to identify and target vulnerable households; although they have benefited from general residential programs in some countries, vulnerable households are often unable to participate in residential programs because most programs require contributions from households. There is a limited amount of financial resources to allocate to affordability problems, but those resources can be stretched further to reach more people by using a combination of different financing mechanisms based on ability and need. Some state residential improvement programs are using this approach of providing grants to finance the low-income households' portions of those investments (in e.g. Lithuania, Armenia, Bulgaria and Poland to name a few) while the "average" income residents obtain loans. A longer-term outcome of such broader-based residential programs is that they can develop the market for residential energy efficiency so that over time it becomes more affordable to invest in efficient buildings and technologies.

Comparing Costs and Benefits of Traditional Subsidies with Energy Efficiency – Analysis for Bulgaria

Most governments in CEE/CIS spend a significant amount of their budgets on subsidies for household heat, electricity and water use. Take the Bulgarian government, for example, which has spent 1.25 percent of its 2002 budget and 0.79 percent of its 2004 budget on subsidies and heat assistance to poor households. While subsidies to the general population were phased out completely in November 2005, heat assistance to qualifying poor households increased slightly although its percentage of the total state budget decreased because the state budget increased as a whole. **Table 8** shows this trend for the years 2002 – 2004, while **Table 9** shows the average financial equivalents of heat assistance to the poor, per household, per month of each heating season over the course of four heating seasons.

By applying even a fraction of the funds spent on subsidies to certain energy-efficiency improvements, there is evidence suggesting that governments and other financiers (donors, development banks) can address affordability problems more cost-effectively while improving indoor comfort conditions for households. In Bulgaria's case, some evidence comes from documented resource and cost savings from energy-efficiency projects in Sofia, Pleven and Gabrovo, where resource savings in typical urban households ranged from 30 to 60 percent.

Cost savings in the form of reduced energy bills and returns on investment varied from city to city and also are estimated to have been about 30 percent on average.[61]

Table 8. State Subsidies and Heat Assistance in Bulgaria from 2002 to 2004 in BGN (Bulgarian lev)

	2002	2003	2004
Total State Budget	12.5 bln	14.1 bln	15.6 bln
Heat Subsidies	37 mln	44.8 mln	24.3 mln
% of state budget	0.30%	0.32%	0.15%
Heat Assistance	119.6 mln	100.3 mln	102.2 mln
% of state budget	0.95%	0.71%	0.64%

Source: EnEffect

Table 9. Heat Assistance to Bulgarian Households in BGN Equivalents

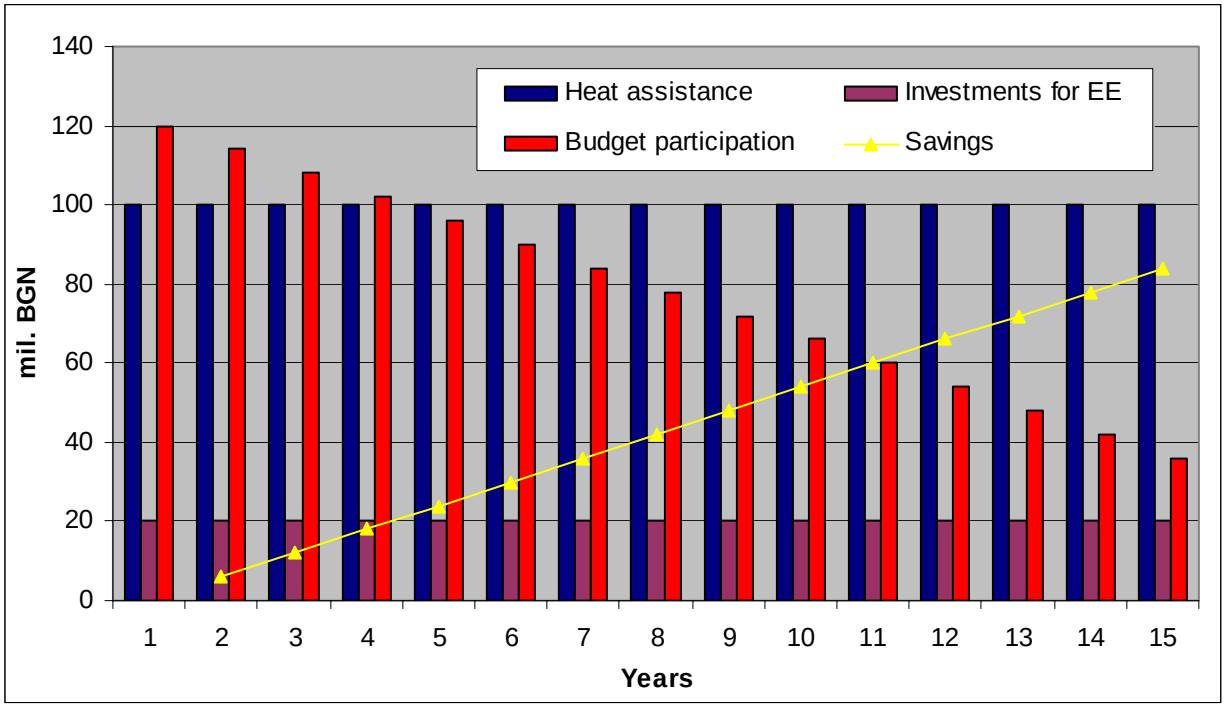
Heat Season	BGN Equivalent of Monthly Heat Assistance*	Number of Households Receiving Assistance
2002-2003	45.38	700 000
2003-2004	52.63	550 000
2004-2005	58.45	500 000
2005-2006	60.45	450 000

Source: EnEffect
** Paid only in the months of the heat season.*

If the state were to spend 20 percent of what it already pays in heat assistance for investments in residential energy-efficiency measures in typical households, theoretically those investments in energy efficiency would pay for themselves within four years and thereafter continue to generate savings (**Figure 7**).[62] In contrast, although they are necessary to ensure that basic service is provided and paid for, heat assistance transfers would not generate cost savings nor would they necessarily contribute to sustainable and lasting indoor comfort improvements.

[61] See **Appendix A** case studies for Sofia, Pleven and Gabrovo at the end of this paper. All data gathered by EnEffect.
[62] The assumptions for this Bulgarian analysis are based on average savings of energy-efficiency projects in municipal buildings as well as the few residential examples. However, the authors of this analysis at EnEffect feel that there are still many institutional, technical and other barriers to residential projects that often prevent or delay project implementation and can mean a much longer payback period in reality, so it is paramount that these barriers be addressed (more in **Chapter 4**).

Figure 7: Impact of Energy Efficiency Cost Savings on the State Budget's Participation in Measures to Address Affordability of Heat in Bulgaria



Source: EnEffect

In Bulgaria's case, only 3.2 percent of households qualifying for heat assistance are connected to district heat, while about 20 percent of vulnerable households use electric heat and over 75 percent use wood or coal.[63] In this case, vulnerable households can benefit most from energy-efficient technologies that are not specific to the heat source. For an average household in Bulgarian cities, weatherization of windows and doors can save as much as 30 percent on heat bills.

However, at least in Bulgaria, anecdotal evidence gathered by EnEffect suggests that vulnerable households use very little energy to begin with and would only save half of that amount at best (a maximum of 15 percent), and from an economic standpoint these investments would not pay back for at least 8 years. A payback period of that length is considered too long to be cost-effective for cash-strapped households or public budgets. Nonetheless householders in several countries are increasingly willing to contribute to the investment costs once they see the benefits and when affordable financing is readily available (see examples in the following section about residential programs).[64]

[63] According to the Bulgarian Statistical Yearbook for 2006-7, 70.65 percent of Bulgaria's population lives in urban areas. Although it is often presumed that most households using wood and coal live in non-urban areas, in this case most of the recipients receiving heat assistance – including for wood and coal – are in urban areas. Source: EnEffect.

[64] See **Appendix A** case studies for Slovakia, Latvia, and Poland for some examples of longer payback periods. Note that average and upper-income households still see the value in energy efficiency even if payback periods are longer than 5 years.

EXAMPLES OF RESIDENTIAL PROGRAMS AND POLICIES

In addition to the more traditional cash transfer mechanisms, several governments and donors have recognized that improving energy and water efficiency can improve the affordability of utilities. There are a few examples of social safety net programs with an energy focus, or an energy-efficiency program with a social safety net focus. It is also instructive to review experience of more general residential energy efficiency programs as they provide indications of available savings and methods to implement energy efficiency improvements, while recognizing that special provisions are likely needed to ensure participation by vulnerable households. Below is an overview of some of these programs. For more extensive discussion, please see the case studies appearing in **Appendix A**.

Poland

In Poland, the Act on Supporting Energy-Efficiency Retrofitting Projects (also called the Thermal Renovation Act) has generated a country-wide program to finance and implement residential energy-efficiency projects. The studies upon which the Act was based projected that residents would benefit from energy-efficiency improvements without an additional financial burden on household budgets, the state's budget revenues would increase because energy audits would more precisely evaluate the cost-effectiveness of the proposed energy-efficiency retrofits and thus streamline and target state financing (replacing an earlier system that did not require the rigor of a standardized energy audit), and jobs would be created.

In the first eight years since the Act was implemented, over 5,000 multifamily buildings have been retrofitted with average energy savings of 35 percent and a 9-year payback. By the end of 2007, an estimated 10 000 multifamily buildings are estimated to have been refurbished and made more energy-efficient through this program. Households benefiting from this program save about USD 25 million annually because they spend less on energy. Many public institutions, private engineering companies, housing associations and NGOs have participated in the implementation of the program. The program has engaged public and private financial institutions, which have been instrumental in the program's ongoing success. Housing associations generally have to obtain a loan from a commercial bank, and then the state-owned Bank Gospodarstwa Krajowego (BGK) co-finances up to 25 percent of the loaned amount, or 20 percent of total project costs. The BGK "bonus" is only given after the measures recommended by the certified energy audit are implemented. (See also **Box 9** in **Chapter 5**.)

An analysis of selected projects from Poland's thermal renovation program indicates that energy savings of heat and hot water ranged from 16 to 74 percent in multifamily buildings.[65] The comparison of projected and actual savings shows that actual savings were typically slightly lower—and sometimes significantly lower—than projected because residents decided to keep indoor temperatures higher than energy auditors recommended. Presumably,

[65] Panek, Aleksander and M. Robakiewicz, A. Wiszniewski. November 2005. „Analiza Efektów Termomodernizacji na Przykładzie wybranych zrealizowanych przedsięwzięc termomodernizacyjnych w budynkach różnego typu i źródłach ciepła." Warsaw. A study prepared by the National Agency for Energy Conservation (NAPE) at the request of the Polish Ministry of Infrastructure.

affordability was not a concern for these households, but comfort was. This consumer behavior explains the similar discrepancies between actual and projected energy savings in many of the residential projects examined region-wide for this study. It also points out a discrepancy between the assumptions underlying energy audits and the actual consumer response to improved information about energy consumption and ways to control it.

Armenia

There are a number of energy-related projects and programs for the residential sector supported by USAID, UNDP, the World Bank and other donors. The UNDP and USAID have supported residential programs with the intention of reaching low-income households. For example, the Alliance to Save Energy (Alliance) has initiated Building Energy Efficiency Revolving Fund Assistance programs in the cities of Gyumri, Hrazdan and Vanadzor. Starting with a small amount of seed money from USAID, the funds are used to support modest residential end-use energy-efficiency projects such as renovation and maintenance of common spaces in multi-apartment buildings including entrance doors and windows, basement doors and windows, water and sewage system valves and pipes, and roof repair. With guidance from the Alliance, the condominium associations agree on what investments will be made and then the energy cost savings are reinvested in further projects. The Funds provide small loans of $500-$600 with a 6-month repayment period. Cost-sharing is provided by the condominiums, with grants from municipalities covering the costs of low income households. A survey of projects indicated a 10 to 25 percent reduction in electricity and gas consumption for heat; average increased indoor temperature of 2-3 degrees Celsius; increased effectiveness of the condominium associations; and improved credit history of borrowers. These programs have become very popular and are being expanded to several municipalities in the Yerevan region.

The World Bank and EBRD support the Renewable Energy and Energy Efficiency ("R2E2") Fund which targets poor households among its beneficiaries. So far the R2E2-funded projects have focused on renewable energy. The UNDP has also established a small housing advisory agency for Armenian condominiums.

Other USAID-funded energy programs have included project development for building weatherization and other measures. Unfortunately there have been only a few such projects and details about the results are unavailable because they were not closely monitored, and/or were small components of larger projects, where it is hard to separate the impacts of weatherization. However, according to informal interviews with residents, the average increase in indoor temperature due to wintertime weatherization is 2-3°C. Based on experience from implemented projects, weatherization of doors and windows may result in energy savings as high as 20 percent during a heating season.[66]

Bulgaria

Based on the National Energy Strategy (2002) Bulgaria's energy reforms integrate a social safety net for vulnerable households through three approaches: (1) a combination of carefully

[66] Parvanyan and Pasoyan 2007, pp. 13-19.

structured subsidies (some budget-related and others specific to type of heat energy used) that phase out gradually, (2) tariffs with a transitional period, and (3) energy efficiency. The Energy Efficiency Agency implements special programs including: i) providing low-income families with high-efficiency light bulbs; ii) low-interest loans to finance weatherization (windows, insulation); iii) grants to help vulnerable households finance mandatory installation of heat cost allocation devices; iv) brochures for households about simple energy-saving measures. Bulgaria's subsidies have been gradually phased out and now are targeted at vulnerable households only.[67] In 2005 the EBRD established the Residential Energy Efficiency Credit Line funneling €50 million through private local banks to finance insulation, efficient heaters and boilers fueled by biomass or gas, windows, and solar water heaters. A national housing renovation program approved in 2005 aims to decrease residential heating bills by 40 percent in some of the most energy-inefficient multifamily buildings constructed during the 1960s-1980s. The state budget will co-finance up to 20 percent of each project's total investment cost.[68]

The UNDP/GEF funded one of Bulgaria's most exemplary, comprehensive residential energy-efficiency projects in Gabrovo. The project did not have a stated focus on vulnerable households but resulted in annual heat energy savings of 21 percent and paid back in less than 3.5 years.

Hungary

From 1996-1998 the *Social Energy Fund* was a nation-wide program to help the poor deal with rapid increases in residential gas and electricity tariffs and ensure that homes were heated. By design it was a relatively short (1.5 years) program to deal with a planned price shock, and thereafter the government implemented this program through the pre-existing housing maintenance program. A particularly innovative feature of the *Fund* was its use of contributions from private companies (power producers and distributors) to pay for assistance to vulnerable households. The benefits came in the forms of cash for gas heat, direct payments to district heating suppliers, or in-kind wood or coal benefits.

Czech Republic

Through the Czech Energy Agency, the Czech government has provided grants for residential and some public sector energy-efficiency and renewable energy projects. On a per apartment basis, the average grant is 15,000-20,000 CZK (€ 500-666). The Agency administers the grant program, enhancing its effectiveness through a network of consulting and information centers that advise residential consumers and school-building administrators about ways to reduce energy use and save on energy bills without compromising necessary comfort and lighting. The consultants are energy auditors, designers and experts in construction, energy management in buildings, and managers active in the energy sector.

The Czech State Housing Development Fund has also offered financing for residential renovation projects through its "PANEL" program. PANEL provides subsidized loans for

[67] EnEffect personal communication; and Todorova, Svetla, Commissioner on State Energy and Water Regulatory Commission of Bulgaria. Presentation on "Low-Income Customers and Role of the Regulator in Energy Affordability" at NARUC conference in Newark, NJ, October 6, 2006.
[68] State Energy Efficiency Agency of Bulgaria, presentation delivered in Thessaloniki, November 2006.

improvements to multifamily apartment-block buildings, including energy efficiency and heating retrofits such thermal insulation of walls, modernizing the buildings' heating systems and sources, and installation of central heating regulation systems. The Fund works in cooperation with a guarantee bank to provide financial assistance in the form of subsidized interest loans where the subsidy can cover up to 40 percent of costs but not to exceed CZK 55,000 (€ 1835) per flat, or CZK 4,800/m^2 (€ 160/ m^2) of the apartment's area. The maximum time to repay the loan is 15 years. In 2005, a total of CZK 500 million (about € 16,670 million) was allocated for the PANEL program.

Serbia

During the winter of 2001-2002, Serbia faced a significant electricity deficit. Residents were shocked by a steep increase in electricity prices, increasing from US $0.005-0.01 to U.S. $0.02 per kilowatt-hour. This increase was still far below production cost.

In order to assist the power production industry in achieving market-level tariffs, the Serbian Ministry of Mining and Energy and the Electric Power Industry of Serbia (EPS) cooperated with USAID and the Alliance to Save Energy to restructure the country's electricity tariff. In order to support the Serbian end-users, particularly those vulnerable to price increases, USAID supported a country-wide energy-efficiency awareness campaign and weatherization program. The Alliance to Save Energy and Nexant implemented this program in Serbia, which helped to ease public acceptance of the increased electricity tariff.

The combined policy and program effort resulted in 22 percent reduction in the use of electricity for space heating, amounting to a 7 percent reduction of electricity demand during peak hours and helping avert a more severe energy crisis. This approach also took vulnerable households into consideration by offering lower tariffs to low-volume consumers (typically poor households) and an off-peak tariff that was four times lower than the peak-hours tariff, and by providing free weather-stripping supplies.

Lithuania

In Lithuania there have been several programs to improve energy efficiency in multi-family buildings: the Government of Lithuania and World Bank Energy Efficiency/Housing Pilot Project (EEHP); the Government of Lithuania Multifamily Housing Building Modernization Program (MHBM); lending programs of the municipalities of Kaunas and Klaipeda for HOAs; and the Municipality of Vilnius "Renew the House, Renew the City" (RHRC) program. These programs have all focused on housing associations as the primary beneficiary of state-subsidized loans for energy-efficiency improvement projects. A housing advisory agency, recently renamed and reorganized to be the governmental institution called the Housing and Urban Development Agency, offers assistance and information to HOAs and municipalities and has been instrumental in coordinating implementation and to some extent documentation of Lithuania's residential energy-efficiency improvements. Municipalities are encouraged to play a larger role in encouraging creation of HOAs and in helping finance loans and grants to HOAs for energy-saving measures.

Slovak Republic

The Slovak Republic's policies and financing programs have enabled and encouraged residents to form housing associations and invest in energy efficiency. The notable policy measures were the increase in energy and water tariffs, and the law to establish housing associations (over 8,000 were registered at the time of writing this study). In practice, housing associations have played an integral role in the implementation of energy-efficiency projects.

The policies have been accompanied by state-sponsored programs to help residents finance renovation of their homes, offering grants, low-interest loans and/or loan guarantees for improvements in energy efficiency. Government assistance to finance the rehabilitation of existing housing comes in three forms. One is the **Construction Savings Scheme**, which offers low-interest loans to upgrade existing dwellings. The Scheme is run by three banks offering 14 different products geared to different situations and income levels, including intermediate loans to clients who cannot make a down payment. Interest rates vary between 3 and 8.9% depending on the tenure of the loan (up to 15 years).

Another is the **Programme of State Support of Housing Stock Rehabilitation**, through which loan guarantees are provided by the state-owned Záručná a rozvojová banka (Guarantees and Development Bank). The programme was launched based on Government Resolution No. 1026/1999 to revitalize rehabilitation of the housing stock, including reduction of energy intensity, and to involve resources of banking institutions in the development of housing. Eligible beneficiaries are those with insufficient collateral, including condominiums and managers who are out-sourced by apartment owners who do not want to do their own building management. Bank guarantees for a maximum of 10 years can be provided for up to 100% of the loan principal, not to exceed SKK 300,000 per unit. Eligible projects include those to reduce the energy intensity of apartment houses by at least 20 percent.

Finally, the **State Fund of Housing Development (ŠFRB)** provides long term loans and—to a smaller extent—grants for rehabilitation that eliminate system faults.

Kazakhstan

The city of Almaty installs water meters for free in low-income households. While metering is almost nonexistent for heating (only sporadically in Almaty and Adana), hot water meters are popular among consumers because they are low-cost ways to reduce the hot water bills.[69]

These examples show some admirable efforts to improve the way households use energy and water, and to make the prices and bills for those services economically sustainable and affordable. Many of these programs have evolved into larger efforts or inspired similar policy initiatives at the local level and in other parts of the region. For example the Armenian revolving funds have grown within the country and are now under consideration in Moldova. The policies and programs in Poland, Lithuania and Bulgaria have informed the development

[69] Energy Charter, 2006. *Regular Review of Energy Efficiency Policies 2006, Part I: Trends in energy and energy efficiency policies, instruments and actors*, p. 18.

of tariff and subsidy reform as well as energy-efficiency policy strategy in neighboring countries.

Barriers to Implementation

Analysis of the available policies and programs reveals that they can be challenging to implement, especially in economies in transition. The barriers to implementing energy-efficiency policies and programs are summarized in **Box 2** and discussed in more detail in the following chapter on institutions.

Box 2. Barriers to Residential Energy Efficiency

Institutional Capacity – Institutions that can play an important role in developing and implementing energy-efficiency policies and programs do not exist or do not have sufficient capacity and experience. Housing associations are not yet established or are weak in many countries. Corruption, lack of transparency in institutional decision-making, lack of legal authority and accountability, and lack of trust in institutions are widespread problems.

Political – Many policymakers do not know about the benefits of energy efficiency and they do not understand its place in meeting a range of policy goals.

Financial – Energy-efficiency programs are not adequately funded. They require contributions from end-users. Residents cannot always afford the capital costs of technologies like efficient home appliances, insulation and windows. Low-income households at best can only afford measures that pay back in 2 years at the most, and even have trouble paying for the lowest-cost measures. Grants and loans are needed to mobilize investments. Private sector lenders perceive the risks to be high unless the borrowers are organized and if there is legal protection of investments. Several IFI and donor programs have introduced loan guarantees as a way to lower risks for private lenders.

Technical – Old construction of buildings and their infrastructure make energy-efficiency investments more complex and costly than they would be in modern buildings. Metering and controls for district heating systems can be particularly difficult in this regard.

Socioeconomic – Household incomes do not keep up with market prices for energy and if homeowners are consuming less than they need, the cost savings from energy efficiency will not be enough of an incentive to make the investment.

METERING, CONTROL AND CONSUMPTION-BASED BILLING

The foundation for any energy reform and any energy-efficiency program is metering. Metering informs suppliers and consumers about how much energy and water is supplied and consumed. If there are discrepancies in those amounts, metering leads to further investigation of where there might be leaks and waste of resources and of what can be done – in both supply and end-use of utilities – to eliminate waste and improve efficiency.

As a basis for billing consumers, metering can have a profound impact on affordability when it generates a bill for a higher or lower amount than the traditional method of billing per square meter of heated space, or per person for water. If metering reveals that consumers are being overcharged for utilities, households can save money initially without weatherizing or using control valves on radiators. If they are being undercharged, then households have a more immediate interest in using controls and weatherization to reduce their consumption if it means that they can save money on household utility bills. See the section on case study highlights in Chapter 1.

However, regardless of the initial savings that can result from consumption-based billing, households need to have the means and incentives to control what they consume. In recent years, many CEE/CIS governments have introduced metering policies, while the end-use controls are usually introduced voluntarily and at the expense of the consumers. Not all households are able and willing to pay for controls and other technologies, so installment financing programs and grants for low-income households can improve the uptake of end-use efficiency measures. Bulgarian experience with this approach has resulted in a 13 to 20 percent reduction in household energy use (see **Box 3**).

Box 3. Heat Metering and Controls in Bulgaria

The Bulgarian government has mandated metering for all district heated buildings, while end-users are encouraged to pay for the installation of heat cost allocators (HCAs) and thermostatic radiator valves (TRVs) that will measure their portion of heat consumed in the building and enable them to regulate consumption. An installment plan helps consumers bear the costs of the HCAs and TRVs although additional assistance is needed for weatherization and complimentary technologies such as foil radiator sheets.* The district heating companies oversee the installation and implementation of HCAs and TRVs performed by private companies that also handle meter reading and billing of customers. To minimize corruption, customers pay bills directly to banks or the heating companies. Based on experience with these measures in Sofia and four other Bulgarian cities, the energy cost savings achieved ranged from 26 to 50 percent, about half from building-level meters and half from HCAs and TRVs.

Sources: Velody, Mark et al. *A Regional Review of Social Safety Net Approaches in Support of Energy Sector Reform, Synthesis Report*, October 2003, pp. 26-27. International Resources Group, *South East Europe Regional Energy Market Support Project, Final Report Task 4*, February 2007. *Author's Note: The Bulgarian Energy Efficiency Strategy described above has a provision to offer low-interest loans and grants to vulnerable households for these technologies, but as of the time of finalizing this study, those provisions have not yet been implemented.

Metering of electricity has been legislated and enforced in most CEE/CIS countries, but metering of gas, district heating and water systems has been harder to implement, particularly

in the CIS but also in parts of the EU-12.[70] Metering of these utilities is typically done at the building level if at all, which is less expensive than metering individual apartments. However, if some households in a building refuse to pay, then the other paying households need to come up with the non-payers' portion of the bill or face disconnection from the service.

Low-income households are not necessarily the non-payers in such cases. Some countries use heat cost allocation (HCA) policies and technologies as a means for measuring each household's portion of the building's overall heat bill, but this method and similar approaches require better organization and management of households that is difficult to achieve – an issue discussed further in **Chapter 4** on institutions.

The subject of this study – the bill savings from end-use energy-efficiency measures – relies on metering. Regardless of whether buildings are weatherized and thermal controls are installed, if buildings have not been metered and billed according to consumption, customers might be billed for more than they actually consume. If this is the case, the introduction of consumption-based billing can amount to significant cost savings for households. Industry professionals working in Europe and Eurasia have found that consumption-based billing can save between 15 and 30 percent of baseline energy use.[71] Experience in Russia indicates that some consumers could save as much as 30 percent on their heat bills by switching from traditional billing to consumption-based billing.[72]

The inverse is also true: based on the traditional billing method, consumers might be billed for less than they actually consume. In such cases the switch to metered billing results in an increase in the energy bill, which may cause affordability to become a problem and/or may provide an incentive for energy efficiency. However, even if there is an economic incentive there may also be a need for financial assistance to pay for residential energy efficiency. Several of the case studies featuring projects in Ukraine, Serbia, Romania, and Armenia discuss metering and its affect on energy efficiency and affordability.

Policies for Heat Cost Allocation

Heat cost allocation (HCA) is a popular, proven, and relatively cost-effective technology for measuring apartment-level heat consumption without having to install a full-scale heat meter in each apartment. However the proper installation of HCA devices and thorough testing of this device in the local market is essential to its success as a means of transparently dividing heat costs among households in a building. The additional cost savings generated from using HCAs

[70] About 60-40% of Czech households are billed for district heating based on consumption (using heat cost allocation devices) while 40-60%are billed based on area (per square meter) of heated space. Source: Czech Center for Energy Efficiency "SEVEn."

[71] Frank Barz of ISTA, 2006. "Energy Saving through Consumption Based Billing," a presentation delivered at an Alliance to Save Energy workshop on Removing Barriers to Residential Energy Efficiency held in Kiev, Ukraine, February 6-7, 2006. Co-sponsors of the workshop were REEEP and USAID.

[72] E.M. Vasina and E.G. Gasho, 2006. "Case studies and problems of adequate use of large-scale resource metering and monitoring data" in *Energosberezheniye*, No. 2, as referenced in Bashmakov, Igor, "Affordability of Utility Services in Urban Housing: Energy and Water Efficiency Solutions," Draft June 2006, pp. 6-7.

is at least 5 percent.[73] The actual control technology – usually a TRV – works in tandem with metering and HCAs by enabling consumers to respond to energy consumption readings by turning the heat up or down. Combined financial savings of HCAs *with* TRVs are estimated to be at least 12 percent (see **Table 1**).[74] HCAs and TRVs, when combined with other low-cost measures, achieve savings up to 30% (see **Table 1**).

Some of the experts contributing to this study[75] feel that CEE/CIS countries need better policy guidelines for protecting consumers against potential problems with HCA devices. They claim that many EU-12 countries have implemented HCAs using the manufacturing (and exporting) countries' procedures and methodologies, without taking into account differences between local conditions and the foreign, exporting countries' requirements and assumptions for building thermal insulation, heating installation, radiators, etc. When this happens, HCA calculations may be inaccurate, leading to public criticism of this technology that could have been avoided with greater awareness and more careful implementation. The competition among different HCA brands has also complicated the ability to reach consensus among all households in a building; the consensus is critical because every radiator in a given building must be fitted with the same model of HCA.[76] The two types of HCAs are analog and digital. The analog version is cheaper but not tamper-proof, and although vendors of analog HCAs have reportedly addressed the problem, consumers are still wary of the risk that their neighbors will cheat the system.

The savings from HCAs or other meters result when heat customers have TRVs or ways to control consumption, when temperatures are high enough that consumers lower them for comfort, or when cost-conscious consumers use them to lower their energy bills. However when poorly insulated, drafty buildings allow heat to escape, indoor temperatures may never become warm enough for HCAs and other meters to influence savings. One of the lessons from these stumbling blocks with HCAs and TRVs is that coordinated awareness campaigns as conducted in e.g. Bulgaria with district heating companies can be particularly effective at resolving or preventing these problems.[77]

IMPACT OF EU INTEGRATION ON POLICIES AND PROGRAMS

European integration has strongly influenced energy policy reforms in CEE/CIS, which will have a bigger impact on future affordability than on current affordability. The policies ranging from framework energy legislation to more specific laws on heat, energy efficiency, energy labeling of appliances and buildings, etc. are new and many of the institutions needed to implement them are under development themselves (see **Chapter 4**). Nonetheless, the policies established as part of EU integration have the potential to benefit vulnerable households as well

[73] See case study (**Appendix A**) about weatherization project in Warsaw on Bukietowa Street. Without the HCAs the savings were 40 percent, and with HCAs 45 percent.
[74] This was an assumption of an EU SAVE II report from 2002 cited in: Philips 2003, p. 34.
[75] Witold Cherubin (Poland), Igor Bashmakov (Russia), Pavel Manchev (Bulgaria).
[76] Velody, Mark et al. October 2003. *Energy Reform and Social Protection in Romania*, Appendix 6 of the *Regional Review of Social Safety Net Approaches in Support of Energy-Sector Reform*, prepared by Aguirre International for USAID, p. 36.
[77] *Ibid*.

as the general population, and policymakers should ensure inclusion of the poor in policy implementation and programs.

There are three broad categories of EU directives and corresponding state-level policies and programs that affect affordability and energy efficiency in the residential sector: energy supply, energy consumption in buildings, and energy-using appliances and equipment. Most CEE and many CIS countries have passed new legislation for energy, and the affordability and security of energy supply is consistently listed as a policy priority for governments throughout the region. A combination of sector restructuring, large investment projects, regulatory reforms, and regional strategies to diversify fuel mix and options for energy supply all contribute to tremendous change in the region's energy markets – and the affordability of energy for end-users.

On the end-user side, policies and programs to improve the energy performance of buildings are crucial to affordability of energy and water. Policies in this category include building codes and standards that apply to new construction. The experts contributing to this study report that energy-efficient building standards are being enforced in CEE for new buildings, although this is not consistently the case in many Southeastern European or CIS countries. Nonetheless, the adoption and implementation of building codes in Russia is encouraging. After the regional energy code was adopted and implemented in Moscow, specific energy consumption for heat has decreased by 35-40 percent compared with buildings constructed in the 1960s and 1970s. However, it can take a couple of decades to develop these policies and see their effects.[78]

Programs to refurbish or retrofit existing buildings usually target the prefabricated residential buildings built of concrete panels during the 1960s, 70s and 80s. These buildings use two to three times more energy than newer buildings and are the homes of most low and middle income consumers. Space heating alone accounts for 66 percent of energy consumed in EU households, and projected savings from optimization of heating systems are 10-30 percent for district-heated households and 80 percent for electric-heated households.[79] These estimates are plausible when considering that in Lithuania, residents in buildings that have not been retrofitted pay two to three times more for heat than residents pay in new buildings. Data collected in typical buildings showed that households in 60 m^2 apartments paid 154 LTL/month but apartments of the same size in new buildings received bills for 54 LTL/month.[80]

The EU Directive on energy labeling has prompted the EU-12 countries and others in the region to introduce the EU energy label for major home appliances and to use media campaigns to raise consumer awareness about the energy costs associated with appliance use. Labeling will help to phase out the inefficient appliances on the market and as such have a positive impact on affordability of future electricity bills.

---

[78] Bashmakov, Igor 2006, p. 5.

[79] UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production. December 2005. Background Paper prepared for the European Conference on Sustainable Consumption and Production, Berlin.

[80] Lithuanian Association of Local Authorities and Lithuanian District Heating Association, presentation at Alliance to Save Energy Financing Forum in Moscow, November 2006, supported by the Renewable Energy and Energy Efficiency Partnership (REEEP).

Though not necessarily related to the EU Accession process, several countries in CEE/CIS implemented programs to encourage all consumers (including residential) to switch from incandescent to compact fluorescent lamps (CFLs). In some cases, donors helped to initiate and fund these programs, e.g. the "Efficient Lighting Initiative" with the International Finance Corporation in Poland, Czech Republic, Hungary, Latvia. In other cases, the governments paid for these programs without foreign assistance. This was the case when Bulgaria's Ministry of Labor and Social Protection distributed two million CFLs in 1998-1999 to vulnerable households and social institutions.[81]

The effects of energy labeling on affordability and vulnerable households have not been studied in this region. Vulnerable households do not always use home appliances, and when they do they usually have access to the older and least efficient models. An International Energy Agency (IEA) information paper argues that efficiency standards for buildings and household appliances can be particularly important for low-income consumers that rent their housing. When home appliances, including space heating and hot water equipment, are included in the rent these households benefit from the savings on energy bills without having paid for the initial investment.[82] However, in the absence of a program targeted to this vulnerable group, lower income households might be stuck with inefficient appliances if they even have any at all.

Energy Planning

As part of the EU integration process, many countries have decentralized responsibility and authority for managing communal services from the state to the local level. In the EU-12 many governments have required municipalities to develop local energy plans, and in some cases (e.g. Lithuania) the plans have been specific to heat. The purpose of these plans is to analyze the scope of local energy (and water) needs and set priorities for investments and policy change. The emphasis is most often on securing affordable energy supply, although there are some instances where energy demand has been evaluated, especially when international assistance teams have introduced methods for forecasting and managing demand and improving energy efficiency in end-use and in supply.

Energy plans typically include residential neighborhoods and can help municipalities identify which buildings or building types use the largest amounts of local energy resources, and evaluate options for managing that demand and improving energy efficiency. For example, the energy planning process in Czech towns used energy audits of residential buildings and public buildings to analyze energy demand scenarios and the potential for cost-effective energy-efficiency improvements. The Czech planners found that residential buildings constructed in the 1970s had the most potential for energy efficiency. Energy-saving measures recommended in the energy plans included heat metering, individual room controls (TRVs on radiators), heat cost allocation, hydraulic regulation, and work on substations (reconstruction, automated controls).[83]

[81] Philips 2003, p. 37. Results of this program were not included in the reference.
[82] Geller, Howard and Attali, Sophie. August 2005. "The Experience with Energy Efficiency Policies and Programmes in IEA Countries, Learning from the Critics." IEA Information Paper, p. 17.
[83] SEVEn (Czech Energy Efficiency Center) presentation for Serbian delegation, December 2005.

The actual results of energy planning in terms of energy cost savings and effects on affordability of communal services are not readily available, although the experts contributing to the research for this study underscore the importance of energy planning as a way to identify local affordability issues and address them locally. In the Czech Republic and some other EU-12 countries, municipal energy plans are compulsory but there are neither deadlines nor penalties for inaction. While energy planning may be implemented more systematically in public facilities and buildings, for privately owned buildings and apartments, energy plans function as so-called "soft tools" that aim to motivate building owners to improve energy efficiency.

Tax Incentives

Another way to encourage energy efficiency – and to improve affordability of energy through the use of more efficient technologies – is through tax incentives. In an effort to encourage residents to invest in their homes, some governments have offered tax breaks on the cost of labor associated with residential building renovation, and often energy-efficiency improvements are part of such renovations. For a limited time, Czech households could benefit from a reduced VAT rate of 5 percent (instead of the standard 19 percent) on the cost of housing refurbishment. In Poland the VAT on the total cost of residential building retrofits is 7 percent, however the VAT charged on construction materials used for retrofits is 22 percent.[84] Many other countries in CEE/CIS have similar VAT exemptions for housing-related improvements.

The Polish National Agency for Energy Conservation, Ltd. (NAPE) estimates that about 20 percent of the total building retrofits done since the tax incentive was introduced in 1997 were related to energy efficiency – e.g. replacement of windows and radiators, and insulation of walls, resulting in average energy cost savings of 35 percent.. While the Polish home renovation tax incentive is not specific to energy efficiency, it has been very effective in motivating homeowners to invest in home improvements. Out of the estimated 12 million dwellings in Poland, about half of them were refurbished to some extent with application of the tax incentive. This means that about 10 percent of all apartment buildings (an estimated 1.2 million buildings) have been renovated with energy-efficiency improvements.

There are also tax benefits offered as a reward to building owners that improve energy efficiency. In the new EU Member States there is a relatively new system for certifying buildings for energy-efficiency performance. The buildings which cover the requirements for an "A" certificate (denoting the most efficient) are exempted from property tax for 10 years, respectively for 5 years in the case of buildings earning a "B" certificate.

[84] According to NAPE, the 7 percent VAT could be used from 1997-2006 and about 10 million taxpayers utilized this deduction. In the tax year 2005 the average tax deduction was 133 EUR per taxpayer, and the total tax deduction for that year was 0.9 billion EUR. From 1999-2005 the cumulative tax deductions amounted to 5.8 billion EUR. There are no statistics available concerning the breakdown of expenditures claimed for this tax deduction.

Box 4. Summary of Findings Regarding the Policies and Programs Influencing Affordability and Energy Efficiency

- Elimination of blanket subsidies in favor of more targeted subsidies and social tariffs is necessary because blanket subsidies tend to benefit the non-poor and not the poor.
- Investments in residential energy efficiency generate financial savings over time. As shown in the Bulgarian analysis, average energy cost savings of 30 percent means that investments in end-use efficiency will pay for themselves in four years. This analysis indicates that energy-efficiency policies and programs are, compared with subsidizing energy tariffs, relatively cost-effective approaches to improve consumers' indoor comfort and their ability to control their bills and comfort.
- The most successful residential policies and programs include ways to finance investments through lending to households and housing associations. Some examples of these best practices are found in Poland, Armenia and Latvia. See also case studies in Appendix A for Lithuania and Latvia. Grants and soft loans also need to be available to housing associations and landlords as well as owners of apartments where vulnerable households live.
- General social safety net policies do not always cover basic utility needs. With basic energy-efficiency improvements vulnerable households can usually only go from "survival" to "normal" indoor comfort levels, but in many cases they may not see their utility bills decrease. If social benefits are sufficient to cover utility costs, vulnerable households are most interested in improving indoor comfort than in saving money on bills.
- Metering and consumption-based billing are necessary to eliminate systems where households are charged for more than they actually consume. Longer-term (over 4 or more years) analysis of household consumption after the introduction of metered billing reveals that the initial reduction in consumption is significant but subsequent consumption declines are usually a function of energy- and water-efficiency improvements rather than consumers' motivation to reduce their bills.
- Policies for metering need to be transparent and provide the appropriate level of guidance regarding who pays for meters, and what is metered (buildings and/or apartments). For some utility services supplying all apartments in a building, meters should be installed at the building level first. Apartment-level metering is generally more costly and the payback periods are very long, so it is only recommended for vulnerable households that are at risk of being billed for system-level leaks. HCAs are a good option for buildings with district heat, provided that methods for allocating the costs are tailored to the local conditions and residents are well-informed about HCAs and TRVs.
- Energy-efficiency performance standards for buildings and labeling of home appliances are important for low-income households that usually rent their living space. They might not benefit households that own their homes because poor consumers usually do not buy appliances, nor do they live in new buildings subject to performance standards.

Chapter 4: Institutions That Can Improve Affordability and Energy Efficiency

Chapter 4

The effectiveness of any policy depends on the institutions charged with implementing them, and the commitment of policymakers to fund and support implementation programs. Institutional coordination and cooperation around issues and policies affecting affordability is essential, but such coordination is often not a priority – even in countries with more developed institutions.[85] Affordability is generally treated as a social issue for governmental institutions to resolve, particularly with regard to the poorest households. And as mentioned in previous chapters, governments have typically dealt with affordability problems by keeping utility tariffs low and they have little experience with alternative approaches. Utilities, regulatory agencies, and quasi-governmental policy agencies get involved when they are legally mandated to do so, and when financial resources are available for this purpose.

Even when there is a mandate and some funding to address affordability problems, very few institutions are aware of the benefits of energy efficiency with respect to affordability. In CEE/CIS there is limited local experience with energy-efficiency projects, and limited institutional and market infrastructure to deliver energy-efficiency services to households that can afford them, much less for those that can't. Nonetheless, some households and housing associations are already using energy efficiency to improve housing conditions when they have the information and access to financial and technical resources, even on a modest scale.

For example, a small grant of USD 1,000 has leveraged creation of a residential renovation fund in Armenia, whereby a local and an international NGO work with condominiums and municipalities to oversee how funds are used and reinvested in further energy- and cost-saving projects. In Latvia, a USD 7,000 grant paid for technical audits and partner coordination services in a city where the town council agreed to lend money at no interest to homeowner associations that followed the energy audit's recommendations to invest in energy-saving measures. In both cases, the success of these initiatives is evident in the growing popularity of these approaches and uptake of energy-efficiency improvements.

The coordination and effective management of institutions – the housing associations, municipalities, NGOs, financiers and donors – were critical to the success in these cases. The participating institutions were made aware of a problem, took responsibility for addressing the problem, and seized the opportunity to solve it by working together and contributing their own resources – thus increasing their "stake" in a successful outcome. The contributions from the

[85] For more discussion of institutional coordination in U.S. low-income assistance programs, see MacGregor, Theo and Jerrold Oppenheim, "Coordination between Utility and DOE Low-Income Weatherization: What do Public Utility Commissioners Need to Know?" Report prepared for Oakridge National Laboratory Energy Division and UT-Battelle, LLC. Gloucester, MA: 2002. Available online at http://www.democracyandregulation.com/attachments/19/ORNL_FINAL_REPORT_06-09-02.doc.

donors motivated cooperation and action, even if the sums were relatively small considering the large scale of the problem.

Some larger-scale projects such as those in Lithuania, Poland, Bulgaria, and Ukraine have illustrated that substantial energy cost savings of about 20 to 50 percent are possible for households of all income levels participating in the projects.[86] However, the absence of institutional frameworks that can enable the replication of appropriate energy-efficiency solutions in multifamily buildings, especially those with vulnerable households, is a persistent barrier to replication of successful pilot projects.

In many of these cases, policies or programs provided a framework and goals, and it was the leadership and cooperation of publicly accountable institutions that led to results. Local and international NGOs, municipalities, quasi-governmental agencies, and private companies play an important part in raising awareness about affordability and energy efficiency, and building political support for the longer-term effort to reduce energy poverty. Governmental support on all levels is extremely important. Without it, residential energy-efficiency will probably never reach households that cannot afford to pay for retrofits. Non-governmental partners can provide additional innovation, talent, financing and flexibility that can motivate residents to make changes and improvements.

In countries that have established policies and programs to improve residential energy efficiency (mostly in western countries), a range of public and private institutions participate in the implementation process. Many of the donors and international organizations active in CEE/CIS have recognized the need for capable and accountable institutions to introduce and build support for reforms, enforce policies and manage programs. Since the beginning of the transition they have worked intensively with local partners to strengthen institutions, many of which affect affordability and energy efficiency and can link these two policy areas. While institutional support continues through local government partnerships and a multitude of democracy and governance programs in many Southeastern European and CIS countries, more targeted international and local support is needed to cultivate institutional frameworks for improving residential energy efficiency, particularly for vulnerable households.

INSTITUTIONAL FRAMEWORKS

The institutions that will be most effective in enabling and implementing residential energy-efficiency programs vary from country to country. An overview of the types of public and private institutions (**Table 10**) that affect affordability and/or energy efficiency shows just how cross-cutting and multi-dimensional these issues are. In CEE/CIS many of these institutions are already involved in tariff and related reforms, housing, social welfare programs or energy efficiency, although the specific allocation of responsibilities for social safety nets and energy vary from country to country.

All of these institutions must be part of a framework that supports transition to a cost-recovery tariff system and sustainable utility infrastructure as well as effective social protection of vulnerable households in urban areas. The columns labeled "affordability" and "energy"

[86] See case studies in **Appendix A**, and a summary of savings shown in **Table 1** of **Chapter 1**.

indicate whether the institution is directly and primarily responsible for addressing these issues from a legal point of view. However institutions that are not necessarily legally responsible (i.e. market vendors, ESCOs, NGOs, housing associations) may still have a critically important role in enabling and delivering better, more affordable comfort to vulnerable households.

There are different ways that these institutions address the most persistent barriers to residential energy efficiency (see previous chapter **Box 2** for categorization of barriers). For example, NGOs, utilities and public agencies might overcome the lack-of-information barrier by organizing seminars, preparing and disseminating weatherization brochures (done in Russia, Armenia, Moldova and other countries) and working on a regular basis with vulnerable households to earn their trust and willingness to try energy-efficiency improvements (done in Serbia, Armenia and elsewhere).

A way to overcome the lack-of-incentives barrier, and to ease the implementation of consumption-based billing (which will provide incentives), is for the heat or water utility to present two versions of the utility bill to consumers: one based on metered consumption and the other based on traditional billing methods, so that consumers see how much they would save (or spend) through consumption-based methods.[87] Then NGOs and private-sector experts can work with households and housing associations to demonstrate technologies and methods of saving energy costs, and municipalities can endorse energy-saving behavior through public speeches and incentive programs with financing if such resources are available.[88]

Coordination is Key

Coordination among institutions on issues as complex as utility affordability and energy efficiency is difficult in developed countries, and more so in a transition environment. It takes many years to build institutional capacity for targeting and delivering residential energy-efficiency programs, and to establish a steady stream of financing to support them. Institutions are sometimes reluctant to share information and resources; doing so requires greater transparency and accountability for actions – whether it is reading a meter and billing, or selecting which households qualify for social safety net aid. Nonetheless there are a few examples in CEE/CIS of effective institutional cooperation to improve residential energy efficiency that could be a foundation for further and possibly more targeted programs that bring energy-efficiency assistance to the poor.

The Armenian example mentioned above demonstrates how four different levels of institutions work together to establish and operate revolving funds for residential building retrofits in the towns of Gyumri and Vanadzor. Local and international NGOs (Third Nature, Alliance to Save Energy) worked with funds provided by international donors (USAID, UNDP) to convince municipalities and/or housing associations to contribute a modest amount of their own budgets to pay for repairs and energy-efficiency improvements in residential buildings. All parties established a transparent process for selecting which measures would be taken first, and how energy-cost savings would be reinvested in further cost-effective projects.

---

[87] See case study (**Appendix A**) about introducing consumption-based billing in Pancevo, Serbia.

[88] See case studies (**Appendix A**) from Latvia, Poland, Bulgaria and Lithuania for some examples of such institutional cooperation.

Table 10. Institutional Landscape for Dealing with Affordability and Energy Efficiency

Institution Type	Afford-ability	Energy	Roles	Issues
Ministries (e.g. Energy, Natural Resources, Environment, Labor & Social Protection, Housing, Urban Development)	X	X	Allocate portions of state budget for social safety nets or energy efficiency, oversee policy implementation	Coordination among ministries difficult; rarely is one ministry responsible for both affordability and energy issues.
Quasi-governmental Agencies (e.g. State EE Agencies)	X	X	Implement policies and programs.	Similar issues as ministries. Limited funding.
Energy Regulators		X	Can incorporate social concerns into tariff and subsidy policies. Regulate energy prices. Approve tariffs.	Not all are indepen-dent. Could require utilities to offer energy efficiency services to poor. Should have a more direct role in improving affordability through tariff policy.
Municipalities and Local Administra-tions	X	X	Identify and provide vulnerable households with social assistance (from state budget). Provide "social housing." Set and/or approve district heat and water tariffs. Initiate residential energy saving programs. Manage or own heat, water and housing maintenance companies.	Mayors very influential. Elected officials and political priorities usually change with each election cycle.
Legislators	X	X	Draft laws, approve/reject laws and budgets.	
Top Level Executive Govern-mental Offices/Gov-erning Parties	X	X	Set policy agenda and communicate with public about policy goals and priorities.	Competing policy priorities. Typically use energy efficiency as response to an energy crisis. Awareness of energy efficiency varies.
Housing associations			Collect money from households to pay utilities. Procure utility services. Organize residents. In some cases help identify vulnerable households and apply for special assistance for them (Romania).	Relatively few exist. Have very limited ability to borrow money.

Institution Type	Afford-ability	Energy	Roles	Issues
Housing maintenance companies			Maintain common areas of multifamily buildings. Can identify and implement energy-saving measures, but in reality rarely do so.	Most are municipally owned and there is little competition to provide services.
NGOs			Raise awareness. Deliver non-technical and technical services, training. Build consumer confidence in energy efficiency. Monitor results of EE projects.	Funding levels vary. Skills and services vary. Can be very effective in disseminating information.
Energy-efficiency companies (ESCOs, consultants, vendors, etc.)		X	Sell energy-efficiency products and services. Analyze client needs and markets for services.	Need customers who can pay for services. Prices for goods and services can be high if no competition. Single-technology solutions (e.g. windows) are often popular but have long paybacks.
Utilities		X	Generate and supply energy or water service, collect payment. Cut off non-payers if legally allowed. Might offer demand-management advice to customers if current demand exceeds supply, and if mandated by law to do so.	More interested in selling and using energy than saving it. Quality of service varies. If no competition, typically less interested in customer service.
Financial Institutions			Offer financing. Work with grant-givers to include vulnerable households in lending programs.	Face risks in lending to housing sector in some countries.
Media			Publicize and disseminate information to consumers.	Journalists have limited understanding of energy efficiency in most cases. Funding for public service advertising is limited in CEE/CIS, and there are many competing public issues.

The amounts of money involved are small (up to USD 1000), but once they have seen that the mechanism and institutional cooperation functions, the willingness of all parties to increase financial contributions and the scale of improvements increases. The results of projects are immediate, improving indoor comfort by 2-3°C and reducing the amounts spent on energy bills for heating (average payback periods are 6-12 months). As an indication of improved affordability and of households' support for the project and further efforts of the condominium,

the rate of collection for condominium fees improved after this project was successfully implemented.

In Latvia, the USAID supported a municipal energy efficiency network that spawned demand-side management projects in Latvian towns. The local energy consulting company Ekodoma and the Alliance to Save Energy offered training to communal service advisors and municipal energy managers in how to identify and implement energy-saving measures. The municipalities of Valmiera and Ventspils expressed particular interest in using energy efficiency as a resource management tool in the residential sector.

Ekodoma worked with the municipalities to select typical multifamily buildings that had strong potential for cost-effective energy savings and that would serve as a good model for other buildings in these towns. The municipalities offered the housing associations a no-interest loan to finance the measures recommended by a professional energy audit, while the donor funds paid for the auditing services and project coordination including meeting facilitation among the housing association, municipality and project engineers. A project in Valmiera – viewed by Latvians as a typical city with average incomes – was particularly successful in that it led to further projects in Valmiera as well as other cities.

The implemented projects benefited households with average incomes and low incomes. Initially the participation of low income households posed a problem because they did not have the means to help finance capital costs of the retrofits. There are tight restrictions on how the monthly social benefits may be used. They could not be used to finance loans but could be used for operation and maintenance costs. Thanks to coordination with all the project partners (municipality, consultants, vendors, housing association, banks) the low-income households were able to use their monthly social benefits to cover their portions of the loans through the housing association's monthly "operations and maintenance" bills.

Romania's heat assistance program now involves several different institutions in order to deliver heat "coupons" to the households that have trouble paying for district heat, natural gas or non-network fuels during the five-month heating season. In the first winter of its implementation (2000/2001), households applied directly to the municipality but now the housing owners associations collect applications from the vulnerable households in their buildings, and the associations submit a single application for the building. Municipalities evaluate the applications and determine who qualifies and then make payments directly to the utilities for the balance owed from beneficiary households for heat or gas. The Ministry of Labor and Social Protection defined the heat assistance policy, but it is carried out entirely at the municipal level with housing associations.[89] This institutional coordination might also be appropriate for delivery of energy-efficiency improvements to households.

Repeated examples of this multi-party coordination are seen in just about all of the residential projects examined as case studies in **Appendix A** (see e.g. heating projects in Yerevan and Gyumri, Armenia; weatherization of Zaharna Fabrika HOA in Sofia, Bulgaria; Lithuanian residential pilot project and multifamily building modernization program). Any approach to addressing affordability problems – with energy efficiency and/or with targeted policies and

[89] Energy Charter Secretariat, 2006 , pp. 26-27.

reforms – requires a strong and well-coordinated network of public and private institutions. Political support within state and local institutions to implement reforms and protect consumers in a sustainable way is extremely important. By raising awareness about the problem and practical ways to address it, the international community can inspire such political support, but local leadership is crucial.

Although the framework may be different within each country, there are about five general categories of institutions that must be involved in the enabling of an energy-efficiency approach to improving affordability. These are: (i) agencies initiating and supporting the policy or program, (ii) funding institutions, (iii) service providers or "deliverers" of energy efficiency, (iv) residential communities (e.g. housing associations, homeowners, tenants, building administrators and maintenance companies), and (v) outreach networks (e.g. media, NGOs, public spokespeople). Despite limited resources, many of these institutions exist in CEE/CIS.

MUNICIPALITIES

Municipalities fall into many of the above-mentioned categories, which presents some difficulties but also some opportunities with regard to addressing affordability and energy efficiency. The extent to which municipalities have autonomy and budget authority varies within the region, and the trend is toward more local "self-government." On the issues relevant to this study, municipalities 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. Residential buildings often top the list of energy-intensive areas needing efficiency improvements, which pressures municipalities to come up with ways to address residential energy use even when housing has been privatized.

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. After receiving designated welfare benefits from the state they distribute those benefits to households that adequately demonstrate that they can not afford standard living costs. 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.

Recent reforms in policies for housing, new construction and renovation (building performance standards), and operation and maintenance (including meter installation and reading), have charged municipalities in most of CEE/CIS with tasks once left to the state. Where housing is privatized, municipalities are no longer responsible for residential buildings, although the common areas of multifamily buildings are still managed by municipally-owned housing administration companies that are a vestige of Soviet times. The emergence of a market for private housing maintenance companies is evident in some cities and towns, and many of the experts contributing to this study affirm that the privatized companies are better service providers and more likely than municipal companies to improve building energy management. However, most low-income households are still served by the municipal companies.

In many CEE/CIS countries municipalities are obligated to develop and implement their own housing policies and finance implementation of those policies. Housing for "vulnerable" groups is flagged as a priority. At the same time, municipalities have to manage their budgets efficiently and cover their costs. While they are not always explicitly responsible for assisting vulnerable segments of society, the fact that they oversee housing and urban development plans implies that they will assume greater responsibility for meeting social needs of vulnerable groups.

Any renovation and energy-efficiency retrofits made to municipally owned apartments and buildings are paid by the municipality. In such cases the cost of renovation cannot be passed along to existing tenants through increased rent although some countries allow for investment cost-recovery rents for *new* tenants of municipally owned housing. Vulnerable households residing in such renovated apartments would probably need assistance in paying for retrofits.

Some municipalities have facilitated the investment in residential energy efficiency – and thus contributed to improved affordability of energy – through residential lending programs. There are a number of good examples of such programs, small and large, and this approach is not limited to capital cities and larger towns that have bigger budgets and relatively higher employment rates. The smaller programs (e.g. in Latvia, Armenia) tend to be simpler, less comprehensive, but more quickly implemented and still effective at improving comfort by 2-3°C and generating savings if the energy costs are at a cost-recovery level. Larger projects (e.g. in Lithuania, Poland, Bulgaria) involve more money, more comprehensive options and greater overall comfort improvements (e.g. 5-7°C), and more layers of decision-making.[90] Consequently the results are often different than predicted due to delayed implementation and other factors.

An innovative example of how municipalities – even small ones – inspire and help finance improvements to residential buildings is in the Polish town of Bytów (population of 17 000). With the revenue from privatization of municipally-owned apartment units, the city council established a fund with USD 370 000 that offered loan guarantees and financing for the interest payments on loans from selected banks to HOAs using the loaned money for building refurbishment (including but not limited to energy-efficiency retrofits). Loans cover up to 90 percent of the investment costs and must be repaid in five years. Residents must agree to pay a fee (USD 0.35 per m^2) into their respective HOA refurbishment funds until the loan is repaid, and vulnerable households may use their dwelling allowances to cover their contributions to the investment. In the fund's first 7 years it financed over 115 residential loans, 30 of which

[90] For example, in June of 2004 the municipality of Vilnius adopted a program "Renew the House – Renew the City" that is administered by the city's district heating company and aims to implement 300 housing renovation projects over the course of the program. The municipality agreed on a favorable fixed interest rate with Hansabankas, which will lend up to 90 percent of the total renovation costs to residential borrowers participating in the program. Leveraging up to 30 percent of the total investment costs from the nation-wide program, the municipality offers grants covering up to 15 percent of total investment costs. The grants may be used to pay for audits and project development documentation. As of the time of writing, 90 audits had been performed but the implementation of the audits' recommendations is unclear. One "model project" under the Vilnius program was one building in the Zirmunai region although replication of this project has yet to materialize.

involved energy-efficiency retrofits. The case study for Bytów in **Appendix A** shows results for nine of the projects.

Both types of projects are needed to strengthen institutional capacity and reveal where capacity is still needed. There is no single approach for involving municipalities, but their involvement is important in efforts to make residential communities more affordable and energy-efficient. Some of the best ways to do this are through programs and projects that encourage municipalities to 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.

HOUSING ASSOCIATIONS

Housing associations fall into the category of residential communities and sometimes also outreach networks. In some limited cases they also help to deliver energy-efficiency services. The specific relationship between housing associations and affordability is not well documented. Nonetheless there are a number of ways that housing associations affect affordability: they can make the investments in building improvements that can lower energy and water bills; they can subsidize the vulnerable households in a given association if they choose; they can apply for special grants (when available) to pay for the vulnerable households' portions of energy-efficiency investment costs; they can disseminate information about energy efficiency directly to member households and help monitor results of energy-efficiency projects; they can support policies and programs to help improve residential energy efficiency for all households.

In reality, few housing associations in CEE/CIS actually do all of these things they could potentially do to improve affordability. The main problem is that many associations are weak in leadership, and households often are not interested in cooperating. There are often problems with agreeing on joint investments when some households have significantly less to spend than others. Some programs try to address this concern by providing special assistance to vulnerable households, so that buildings with mixed incomes can still qualify for loans, while grants finance the contributions that vulnerable households cannot afford.[91] In Romania, housing associations collect applications from vulnerable households for heat assistance subsidies, and thus help facilitate their inclusion in the heat assistance program (see Chapter 2).[92]

[91] Case studies for Serbia's weatherization program, Polish projects in Warsaw offer a couple of project-level examples of this targeted approach. The state (national level) programs in Lithuania and Armenia have stated provisions for vulnerable households but no specific examples were available at the time this study was finalized. Nonetheless, some local level programs are filling the need. The revolving funds established for residential building renovation in the Armenian towns of Gyumri, Vanadzor and Maralik are able to include vulnerable households thanks to targeted grants from the municipalities.

[92] Anecdotal evidence indicates that the process of applying for this heat aid in Romania is socially very invasive, suggesting that some households would rather operate in the "gray" market and use unofficial income to pay for heat even if they legitimately need the assistance. One could argue that such households might not need the assistance after all.

In some cases the social welfare aid vulnerable households receive may be used indirectly to help pay for energy-efficiency improvements. In practice, this happens only when vulnerable households are part of a housing association in which non-poor households can help finance building improvements. This approach described above is now commonly used in Latvia and housing associations play a role. Residents in a housing association that borrowed money for an energy-efficiency project in Kuldiga, Latvia repaid the loan by paying more for monthly operation and maintenance (O&M) of the building's heat system. This approach was particularly important for low-income households because pensioners and households receiving other social benefits were only allowed to use their benefits to pay for utility-related O&M and not for a loan. While they saw their energy bills go down, their O&M costs rose until the loan was repaid, and thereafter they enjoyed better comfort for a lower cost.

The extent to which housing associations help meet the specific needs of low-income households has not been well documented, but in terms of improving energy efficiency and the quality of housing overall, housing associations are instrumental. While the legal form of a housing association may vary from country to country, city to city,[93] the important features of housing associations are that they: organize residents to make joint decisions about the building; manage and collect money for the services, maintenance and repairs of a building; have bank accounts and in some countries can take out loans to pay for building improvements – and potentially energy-efficiency projects.

The effectiveness of housing associations in executing these responsibilities varies widely and depends on a given country's laws as well as the association's leadership, management and decision-making policy. The financial status of households and the income distribution within an association also influence the association's ability to function. Incurring debt to pay for building improvements is especially difficult in CIS and still in many parts of CEE because it requires both explicit legal authority to borrow and practical ability to reach consensus among residents. This means allowing such decisions to be made on the basis of a majority vote of homeowners attending a meeting rather than requiring unanimous or near-unanimous votes or a high percentage of all owners, many of whom may be absentee and unlikely to attend meetings.

The most effective associations tend to have trusted leaders and economically homogeneous residents and are responsible for only one or a small number of buildings. In countries such as Poland, where the creation of housing associations has been widespread and relatively successful, there is anecdotal evidence that vulnerable households in an association benefit from building renovations and that their affordability concerns are recognized and protected by their neighbors as well as the local authorities distributing social welfare funds. In other countries such as Russia or Ukraine, where housing associations have been much slower to form – and privatization of housing has been slower, vulnerable households are not widely included in

[93] Nowadays most countries have at least one form of "housing association" or "housing management body," although the effectiveness of these residential associations varies widely. The building "cooperatives" have the longest tradition in the region because they existed in Soviet times, and they consist of multifamily buildings owned collectively by residents who also financed construction of the buildings, often with small grants from the state. As the housing sector has privatized in most countries, newer forms of housing associations have formed, such as "condominiums," "building trustees," and "home owner associations."

such associations and thus do not benefit from them at the present time.[94]

Based on information collected for this study, housing associations help improve affordability for vulnerable households when there are mixed incomes within an association (so that some residents can help finance improvements with their own resources) and when there are special programs to help associations with low-income households finance retrofits of common areas and apartment units. Most energy efficiency projects take place in buildings that have housing associations and owner-occupied apartments, and not in those without associations. Most energy-efficiency campaigns and programs targeting the residential sector encourage or even require the creation of housing associations, with varying degrees of effectiveness.

In Lithuania, a large pilot project and the follow-on state-initiated project to stimulate investments in energy efficiency in multifamily housing and municipal buildings motivated creation of housing associations in roughly 20 percent of the country's multifamily housing stock. These programs have developed the institutional capacity to support housing associations and energy efficiency, but the remaining 80 percent of Lithuania's multifamily housing still has shown little interest in forming housing associations. Many households in the most energy-*in*efficient buildings are struggling financially and afraid to borrow money, which is understandable with high interest rates and limited experience with financing.

In many countries, a significant portion of multifamily housing is still communally owned.[95] In any given building, it is common for several apartments to be owned by the municipality while the rest are privately owned. Low-income households usually occupy the municipally-owned flats but they have limited if any financial resources to contribute to the association and the municipal owners of their flats typically do not have the means or the will to contribute either.

When there is mixed (public and private) ownership, it is more difficult to create and manage housing associations effectively. The responsibilities and motivations of tenants vs. owner-occupiers to improve housing management are different – even if both want more affordable indoor comfort. Although well over 90 percent of housing is privatized in the region as a whole, citizens are not always interested in forming associations and have little institutional experience and support to make them work. Even when international donors have built capacity for housing associations, the success of a housing association often depends on the will of its members and ability of its leaders. If initial experience with associations is good, the idea is likely to replicate; but if it is negative, or effectively limited to a small (often more financially stable) segment of the population, it could take many years before the concept takes hold and works well.

---

[94] Less than 5 percent of Russia's multifamily housing stock is organized into home owner associations and this estimate has remain unchanged for several years ("Community Driven Development Approaches in Housing Sector Projects in Transition Economies," World Bank Social Development Notes, n.71/August 2004 citing P. Ellis 2002, and "Housing and Communal Services in Russia: Completing the Transition to a Market Economy," Final Report, April 2003 by Peter Ellis et al.). See also Bashmakov, Igor 2006.

[95] In the Czech Republic about 17-20% of housing is owned by municipalities, and much of that housing is for vulnerable households. (Source: Enviros) In Latvia, nearly 25% of housing is municipally owned, and in Russia about 40% is owned by government institutions. (Source: World Bank)

FINANCIAL INSTITUTIONS AND PUBLIC-PRIVATE CO-FINANCING SCHEMES

Despite the prospects for favorable returns on energy-efficiency improvements, many households lack available financial resources to pay for the improvements. Residents need to be able and willing to assume some of the risk. However for vulnerable households, the funding will usually need to come from public or charitable funds that can help absorb the risk and share risk with other financiers and residents.

In a transition environment like CEE/CIS, public funds are scarce. However, governments and taxpayers are already spending money on energy subsidies (including toleration of non-payment in some countries), social tariff schemes and emergency assistance. While such aid is deemed to be socially and politically necessary, rarely is the improvement of energy efficiency incorporated into such aid. This is a missed opportunity to make social safety net programs related to energy and water use more cost-effective – and as a preventative medicine for energy emergencies, more effective in the long-term.

As illustrated in **Chapter 3** with an analysis of Bulgaria's subsidies and energy-efficiency costs and paybacks, some of the money being spent now on various energy subsidies could be more cost-effectively used to help pay for energy efficiency. However, the policies and institutional capacity in much of Southeastern Europe and the CIS – including financial institutional capacity and legal protection of financiers – need to be strengthened. Most of the residential energy-efficiency projects studied for this analysis used a mix of public and private financial sources and institutions.

For residential energy efficiency in general some level of donor support and/or public finances are needed to generate and maintain investments, and to absorb some risk. Private funds (from residents, vendors and commercial lenders) are more likely to be introduced once the financial benefits of energy efficiency have been repeatedly demonstrated and consumers have incentives to save energy. For vulnerable households in particular, grants (usually public finances or charitable donations) are essential, and they can be combined very effectively with private resources including resources of homeowners who can afford to pay for efficiency improvements.[96]

There are a number of financial mechanisms and institutions (e.g. funds, state and commercial banks) that are currently used to pay for residential building improvements and energy efficiency, although most of the specific energy-efficiency finance is not targeted to vulnerable households and most of the beneficiaries tend to be average-income households. The institutions financing these improvements report that their clients save money on energy bills. Based on the case studies examined for this research (see **Appendix A**), cost savings range on average from 20 to 60 percent. The 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. For vulnerable households this level of savings is likely to be in the lower end of that range given that many households do

[96] See case studies (**Appendix A**) for Armenia and Poland for some examples.

not currently use as much energy and water as they actually need, and an increase in efficiency enables them to use what they need without necessarily exceeding an affordability threshold.

One of the most common barriers to financing residential projects in the region studied is that households often do not qualify for loans or other debt-financing. Individual households might not have adequate financial holdings to obtain loans at affordable interest rates, and it is more complex to determine at the housing association level what will be used as acceptable collateral for common property. People are reluctant to take on debt even if there are demonstrated financial paybacks resulting from investments in energy efficiency. Many people do not trust financial and other legal institutions, so donors and public institutions need to share the risk and then clearly show the results of their investments.[97] Better energy efficiency and affordable utility services are of interest to the greater public good, so public institutions must be involved in financing residential energy efficiency and in the development of policies and institutions supporting private-sector financing.

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Over the past two decades, a wide range of international NGOs along with donors have helped establish civil society and local capacity to identify and address a range of social needs in CEE/CIS. In the context of programs to improve housing and energy efficiency, NGOs fill a variety of roles; they are advocates for policies and programs, deliverers of efficiency services, and outreach networks. In the current CEE/CIS environment, the existing NGOs most relevant to residential affordability and energy efficiency include energy-efficiency centers with technical expertise and financing knowledge; community groups with a focus on housing; local branches of international NGOs protecting the environment and fighting poverty.

Several energy-efficiency centers have been in operation for the past 15 years and offer a range of services to energy consumers in all sectors, although they generally have much more experience in the public sector than in the residential sector. Several of the centers contributed to the research for this study and expressed interest in working more with residential buildings. The main barriers to working in this sector have been institutional (lack of organized housing associations) and financial (limited options to pay for investments in private housing).

Housing advisory centers are another form of NGO that have been established in a few countries, e.g. Moldova, the Slovak Republic, Armenia, and Lithuania. The extent to which they assist vulnerable households is unknown, although such agencies have become important resources to multifamily buildings about ways to save energy costs.

Given their relative independence from commercial competition and governmental mandates, NGOs are particularly adept at networking – disseminating and exchanging information, and facilitating partnerships. They can liaise with public institutions that have the mandate (but not the resources) to help vulnerable households, with residential consumers, and with utilities and

[97] Related conclusions are made by Dina Aager Zimling in "Barriers and Recommendations for Development of Joint Implementation (JI) in End-use Energy Efficiency Projects in the Residential Sector, Main Report on Ukraine and Romania," Copenhagen: Danish Ecological Council, October 2006, p.18.

private companies to identify needs and can help meet them by facilitating partnerships. So far in CEE/CIS there are limited examples of such partnerships with the residential sector, but interest appears to be growing as evidenced by the new residential programs, most of which involve NGOs in some capacity (e.g. in Bulgaria with UNDP/GEF; Lithuanian state-initiated program and some related programs introduced by municipalities; a program in Lutsk, Ukraine funded by a state grant; locally-initiated projects in Latvia – leveraged with USAID funds – that have begun to replicate; the Armenian revolving funds with donor and local resources.)

Informational Media Campaigns

All of the institutions discussed here play a role in disseminating information about energy efficiency, and public awareness campaigns using mass media are particularly effective when backed by the most influential institutions with the credibility of an "independent" organization like an NGO. One example of a larger scale awareness campaign was in Serbia around the turn of the millennium. During its first post-transition winter, Serbia faced a significant electricity deficit, and citizens for the first time faced steep increases in electricity prices (from about 0.5-1 US cent per kilowatt-hour to 2 cents, although still well below production cost). The Alliance to Save Energy with support from USAID and Nexant launched a large awareness campaign to encourage energy efficiency. The campaign included among other strategies the production and a large amount of prime-time airing of public service announcements by a well-known Serbian comedian. Some results of the campaign were:

- Electricity consumption for heating decreased by 1700 GWh or 22 percent from the previous winter (using weather-adjusted data).
- About 10 percent of households switched from electric heat to another source of heat.
- Total winter electricity consumption (for all uses, not just heat) decreased by 5.5 percent and peak demand by 7 percent (500 MW).
- According to surveys, about 400,000 households improved window insulation.

Large-scale awareness campaigns were an important component of many of the more successful residential energy-efficiency programs. See also the case studies from Poland's thermal renovation program.

DELIVERING ENERGY-EFFICIENCY SERVICES TO HOUSEHOLDS

Putting all of the pieces together, what is needed is an institutional framework with capable and respected organizations that can deliver energy-efficiency services to the targeted "vulnerable" population. The "targeting" aspect can be quite difficult and costly. Even when vulnerable households are accurately identified, delivering the services to them does not always work.

A USAID-funded weatherization project in Serbia offered weather-stripping materials for a low, tax-free price to households and for free to low-income households. However, due to a lengthy import procedure and a price vs. quality conflict during the procurement process, the weatherization materials arrived in the middle of the heating season and as a result were offered to everyone for free. A follow-up survey of the households designated to receive the

materials revealed that only 36 percent of the low-income residents picked up the materials – despite the fact they were for free; and of all the households that received the window weather-stripping tape, less than half had installed it even though they said the instructions of how to do so were clear. The partners working on this project concluded that the beneficiary households lost trust and confidence in the project due to the issues with delivering the materials.

Table 11. Survey on Likelihood of Providing Energy-Efficient Technologies to Low-Income Residents

Deliverer	Bulgaria	Romania	FYR Macedonia	Albania	Moldova
Consumer Organization	2	0	1	1	1
Electric Utility	1	0	1	4	2
District Heating Company	1	0	4	NA	3
Housing Maintenance Companies	1	2	NA	NA	NA
Local Government**	4	1	2	3 Housing department	1
National Government***	5	1	1	3 Ministry of Energy	1
Welfare Centers	5	0	2	NA	0
Religious or Charity Groups	1	5	1	5	1
Other NGOs (please specify type of NGO)	2	4	1	5 NGOs dealing with energy issues	0
Consulting companies or local contractors	4	4	5	5	5
Home Owner Associations	1	2	NA	NA	4
Other	2				

**The question asked was: What is the likelihood that the following entities would be interested in participating in a program that provides energy-saving technologies to low-income residents? Scale: Potential Deliverers of Low-Income Weatherization Services – Potential for Participation (on a scale from 1-5; 1 = no chance; 5 = strong chance).*

***What city agency – housing department, welfare department, other?*

****What government ministry – ministry of social welfare, energy, etc.?*

In 2003 the Alliance to Save Energy conducted an informal survey of local partners in Southeastern Europe to collect opinions about the range and capacity of organizations that could actually deliver energy-efficiency services to vulnerable households (see **Table 11** for a summary of results). While there is no consistency among the answers, there are existing institutions that could bring energy-efficiency aid to households. However, first a program would need to be funded and most likely these institutions would need some form of training.

INITIATIVES OF UTILITIES TO ENCOURAGE ENERGY EFFICIENCY

In the above-mentioned survey of partners in Southeastern Europe, electric or district heating utilities were listed as possible deliverers of energy-efficiency to low-income consumers in Albania, FYR Macedonia and possibly Moldova. This potential should be explored further through some sort of incentive program using grants or tax incentives. In the United States, energy regulators require utilities to assist low-income consumers and federal funding is allocated for low-income weatherization and assistance programs. Although fiscal resources are much more limited in CEE/CIS, the progress with private sector participation in utilities and the growing competitiveness among different utilities (esp. for heat) means that utilities are more interested in retaining customers and attracting new ones. To the extent that lower-income consumers can become reliable paying customers, utilities have an interest in keeping them.

Utilities generally are most interested in turning a profit, and if consumers save energy and save on their energy costs as a result, utilities see a decline in their revenues unless they are able to sell the unused energy to other consumers. Utilities are most interested in promoting consumer energy-efficiency if it means that they will improve their profits and market competitiveness. For example, **Box 5** shows some Polish district heating companies who introduced energy-saving programs for their customers when they realized that they had to compete with other heat suppliers and it was financially advantageous to them to support demand-side management. Although low-income consumers are not explicitly targeted, they are included among the beneficiaries and the impacts of these programs on affordability of energy would be worth closer study.

The institutional framework for addressing affordability through energy-efficiency projects and programs is not well developed in CEE/CIS but the foundation for such a framework already exists in many countries – particularly in the EU-12. The institutions administering and delivering heat assistance subsidies (ministries and municipalities, and in some cases housing associations and NGOs) could also help bring energy-efficiency services to vulnerable households. Some projects at the local level have begun to make this institutional linkage between energy efficiency and social safety nets, as described in some of the case study highlights in the following chapter. Policymakers and donors working in CEE/CIS have a timely opportunity, now while energy reforms and social safety net strategies are under development in many countries, to make this linkage more deliberate and effective at the state and local levels.

Box 5. Examples of Polish District Heating (DH) Companies that Found End-use Energy Efficiency Financially Advantageous

Warsaw DH Company (owned by municipality) offers financial and technical support in liquidation of group substations supplying several multifamily blocks and construction of individual substations for specific buildings. The goals of this program are more efficient heat end-use, reduction of heat and water losses as well as improvement of heat supply comfort (e.g. stabilization of hot water temperature, heat supply regulation according to customer needs).

Warsaw CHP (privatized) is interested in expanding its market to buildings using inefficient heat only boilers (HOBs) to the district heating network. The company is offering support to those buildings in liquidation of inefficient coal-fired HOBs and very costly oil- or gas-fired HOBs, and free-of-charge connection to the DH network.

Pulawy DH Company (owned by municipality) is offering maintenance and operation of internal heating and domestic hot water installations as well as heat costs allocation in multifamily blocks.

Wroclaw DH Company (privatized) is offering similar services as the Pulawy DH Company.

Pila DH Company (owned by municipality) is implementing DSM and end-use energy-efficiency improvements for residential consumers. Results will be published in 2007.

Ostrow Wielkopolski DH Company (owned by municipality with private sector participation) offers two programs. One offers comprehensive services "from the heat source to radiators and taps" involving maintenance and operation of internal heating and domestic hot water installations in customers' buildings. Another one aims to expand its customer base by connecting buildings without existing internal heating and domestic hot water installations by removing their coal fired stoves and constructing the internal heating installations at favorable costs.

Box 6 summarizes the findings about institutions in CEE/CIS that are and can become involved with residential energy-efficiency solutions for vulnerable households.

Box 6. Summary of Findings Regarding the Institutions Influencing Affordability and Energy Efficiency

- A combination of institutions is usually necessary to identify and prioritize utility needs of vulnerable households, and then to develop, fund, deliver and sustain a residential energy-efficiency program that includes the poor. It can take many years to develop the institutional framework and supporting infrastructure of experts. Fortunately, many CEE/CIS countries already have some of the pieces in place, although the framework needs development. Now is an opportune time for countries that have accepted price reforms and have a basic institutional foundation to introduce residential energy-efficiency programs and establish this framework. Generally what is needed are the following: political support, an implementing organization with local staff, transparent monitoring and evaluation system, and long-term commitment of public institutions to help fund energy efficiency for vulnerable households. Some projects have established housing advisory agencies (see case studies for Lithuania, Czech Republic).
- Housing associations can help improve energy efficiency for vulnerable households, but grants or other charitable funds are needed. The importance cannot be underestimated of an organized, legally recognized entity that can make decisions about investments in the multifamily building, collect fees from residents to pay for utility bills and joint investments, and apply for bank loans. Such housing entities also need to develop the ability to manage social and socioeconomic differences among residents in a building. Case studies from Bulgaria, Latvia, Armenia and Poland provide some examples.
- In some countries, vulnerable households are excluded from housing associations (usually comprised of home owners) if they rent instead of own their apartments. Consequently, they do not benefit from energy-efficiency programs that typically target buildings that are organized into homeowner associations. Nonetheless, over time they can still benefit from policies that increase building energy performance and energy labeling of home appliances and equipment.
- Municipalities with lower employment rates and older populations are slower to develop institutional capacity to improve energy efficiency and attract financing. NGOs and international institutions need to work more with middle- and low-income cities to demonstrate energy-efficiency benefits, develop financing tools that can work for residents in these towns, and raise awareness of local councils and mayors about the role of energy efficiency in improving comfort and affordability. See case studies from Gyumri, Armenia and Pleven, Bulgaria.
- When ownership of apartment units in a housing association is mixed (private and municipal), the municipality votes on behalf of the vulnerable households that often reside in the units it owns. Sometimes municipalities are reluctant to pay increased condo fees to help finance the cost of energy-efficiency retrofits in such buildings. (See case studies from Poland, Latvia.) The municipalities' lack of interest suggests that they are not aware of what they could be saving on the costs of services for these households and how they could contribute to more affordable comfort for their citizens by participating in energy-efficient building improvements.
- Networks of local and international partners can be very effective at disseminating information, raising awareness, and generating interest in energy efficiency. Mass media also play an important role in making awareness of these problems and solutions mainstream, and in stimulating public discussion about these issues. Awareness campaigns and their results are documented in case studies for Serbia and Poland.

Chapter 5: Integrating Energy Efficiency and Social Safety Nets

Chapter 5

The main policy program areas responding to tariff and subsidy reforms that this study seeks to integrate are social safety nets and energy efficiency. The way to do this is to design and implement appropriate, cost-effective energy-efficiency projects in multifamily buildings, using delivery mechanisms and institutions that reach all households including vulnerable households. While many of the projects in CEE/CIS have benefited vulnerable households amidst other households, the frequent inability of the poor to contribute to renovation costs prevents many buildings from being renovated, and households from having basic standards of comfort and lower utility bills. Therefore, residential refurbishment programs should provide special assistance to vulnerable households so that their buildings and apartments will be improved, and so their bills can be better controlled.

In CEE/CIS there is relatively more experience with social tariffs and subsidies than with residential energy-efficiency programs, and empirical evidence about the benefits of energy efficiency is very limited. The case studies provide some insight into real potential for improved energy efficiency to save money on energy bills while improving comfort and living conditions for households. Otherwise, experience from other countries is used to show the relative benefits of energy-efficiency programs and more traditional social assistance programs that pay to provide basic service to poor households but do not improve energy and water efficiency. This chapter analyzes and discusses the lessons and findings from projects and programs that have aimed to improve residential energy efficiency and affordability of utility services in CEE/CIS, and other countries where relevant to this region.

There is a widely-held opinion in the least affluent communities of post-Soviet bloc countries that energy efficiency – along with other home improvements – is mainly something for people who have money. The funds to pay for the up-front costs of weatherizing buildings, retrofitting heat substations, installing thermal controls on radiators and other energy-and-cost-saving measures have to come from somewhere, and households with scarce financial resources are often not able to pay for these investments. When energy tariffs are held at below-market levels, the payback for energy-efficient investments is too long (usually well over 10 years) to make economic sense, especially for a cash-strapped household. Even in the United States, European Union and some of the other most developed economies where prices are already at cost-recovery levels, efficiency measures with simple payback periods of three years or less are the ones that policymakers use as a basis for setting energy-efficiency standards.

Many of the residential energy-efficiency projects that were piloted over the past decade show that more rational consumption of energy through building retrofits improves comfort, but not necessarily bills, in part because consumer tariffs are also inevitably increasing. The resulting energy bills become relatively more affordable with energy-efficiency improvements than they are without them. This means that households in some cases might end up paying more for

utility services than they used to pay before metered billing and price reforms, but they are still paying less than they would if there were no energy-efficiency improvements.

There are three general approaches to helping vulnerable households deal with rising energy bills – and to help governments manage the costs of social assistance specific to energy (such as "heat assistance" in Bulgaria and Lithuania). All approaches have pros and cons, but the longer-term benefits of energy efficiency are significant (**Table 12**). Social tariffs and other types of subsidies that cover some or all the energy costs that consumers cannot pay, or that exceed a designated threshold (affordability ratio), are the more traditional policy responses to affordability, and they are paid year after year. They are essential in the absence of alternatives to meeting the energy needs of the poor. However, energy-efficiency improvements improve comfort and can reduce subsidy outlays.

Table 12. Comparison of Three Approaches to Affordability Constraints

Strategy	Lifeline Tariffs	Subsidies	Energy Efficiency
Advantages	Relatively easy to implement – just involves utility.	Good targeting and direct cash payments can provide immediate relief.	One-time investments reduce costs, improve comfort, reduce subsidy outlays.
Disadvantages	Cannot be done without meters, as is often the case with heat in the region.	Subsidies have to be paid year after year. Targeting those who really need aid can be difficult and costly. Encourages consumption. Requires substantial public funding.	Require an infrastructure to implement, such as contractors, materials, institutions that select recipients and manage implementation.

Source: Alliance to Save Energy

As discussed in the previous chapter, the infrastructure and institutional capacity to implement energy-efficiency programs in CEE/CIS is still underdeveloped. There has been little if any evaluation of the few existing residential energy-efficiency programs, and a comparative analysis of the energy-efficiency approach with subsidies is not available. In spite of the differences between the U.S. and CEE/CIS countries, the U.S. experience is illustrative in showing the comparative benefits of energy-efficiency programs, especially when institutions are well-coordinated and adequately funded.

A study commissioned by the Oak Ridge National Laboratory compared America's two major nation-wide programs for low-income assistance and concluded that the Weatherization Assistance Program (WAP) that actually weatherizes homes was very effective in reducing the amount of cash subsidies (provided by the Low Income Home Energy Assistance Program "LIHEAP") needed to protect vulnerable households. Specifically, the number of households that had needed the highest level of cash assistance from the LIHEAP reduced by 50 percent thanks to energy-efficiency improvements made possibly by the WAP. A related study

comparing the two programs within the state of Massachusetts revealed that the low-income energy-efficiency programs coordinated with the WAP and implemented by local community groups are some of the most cost-effective anywhere, yielding $1.80 to $2.80 in benefits to ratepayers for each dollar spent on the program.[98]

While there are differences in the approaches used, the potential applicability of the U.S. experience to CEE/CIS countries is reinforced by similar findings from Lithuania and Ukraine. Analysis of the benefits of residential energy-efficiency improvements in these two countries showed that energy efficiency can reduce the amount of heat subsidies required (see discussion later in this chapter.)

CHALLENGES WITH DOCUMENTING BENEFITS AND COSTS OF ENERGY EFFICIENCY

As mentioned in the introduction to this study, residential energy-efficiency projects are rarely well-documented in the region studied. In many cases residential projects never really got off the ground, were incomplete, or not systematically monitored. Those projects that were documented have been captured in case studies, which are referenced throughout this study and available in greater depth in **Appendix A** to this study.

An extensive independent evaluation of the benefits and costs, as well as of the effectiveness of energy-efficiency programs in this region has yet to be undertaken and completed. If one does exist, it is not readily available to the international community. Such program evaluations can be costly but are important tools for assessing the results of energy efficiency and informing policymakers, utility service providers, and consumers about actions they can take to control energy costs and improve progress toward social and environmental goals.

The authors and research team of this study have relied primarily on available project reports and a small collection of country briefs prepared by experts in the region.[99] In its quest for actual project results (going beyond engineering calculations of energy and cost savings), the research team identified the main residential end-use energy-efficiency improvement projects that were implemented since the early 1990s and examined the reported results of these projects. Specifically, the team studied the effects that energy-efficiency and metering projects had on the affordability of household energy bills.

As discussed in the previous chapters, not all countries in the region have reformed residential energy tariffs to reflect market-based fuel and supply costs. Therefore, the affordability of residential energy was often a hypothetical as opposed to a real issue at the time when many

[98] MacGregor, Theo and Jerrold Oppenheim, 2002. "Coordination between Utility and DOE Low-Income Weatherization: What do Public Utility Commissioners Need to Know?" Report prepared for Oakridge National Laboratory Energy Division and UT-Battelle, LLC. Gloucester, MA. See "Massachusetts: A Case Study" at the end of the Oakridge/UT-Battelle report. Available online at http://www.democracyandregulation.com/attachments/19/ORNL_FINAL_REPORT_06-09-02.doc.
[99] See **Appendix A** for case studies. Selected country profiles will be available at www.munee.org.

residential energy-efficiency projects were implemented. In such cases the significant energy cost savings for households were realized once tariffs increased.

Nonetheless the general finding is that household energy bills decreased after energy-efficiency improvements were made, and they remained more or less the same in cases where household consumption was already extremely low and where the improvements made it more affordable to increase indoor comfort from "survival" to "normal" levels. In most countries, energy prices have risen since the projects were implemented, in some cases proportionally to the energy costs savings so as to have a neutral overall effect on household energy bills but a significant savings considering what bills would be with market-based tariffs in the absence of efficiency savings.

The amounts by which energy bills can decrease thanks to end-use efficiency improvements can vary widely and depend on many factors: the tariff, metering, combination of energy-efficiency measures implemented, and the building's pre-existing energy efficiency and household consumption patterns before the project. The actual payback periods and returns on investment are also project-specific depending on the residents' preferences for indoor temperatures, seasonal variations in weather from year to year, the local energy-efficiency market (affecting the costs of products and services), and other factors. Households that are concerned about affordability will adjust their consumption – when given the technical means to do so – to meet their budgets, while households that are not concerned about affordability will often consume more energy, albeit more efficiently. Some examples from Latvia and Bulgaria illustrate these points (see **Box 7**).

Box 7. Energy Cost Savings Might be Lower for the Poor than for Average Households

Olaine, Latvia – residents selected the least cost-effective EE measures and wanted warmer indoor temperatures than the energy audits recommended. The lower income residents of these buildings agreed to the least cost-effective options because their energy consumption costs and portion of the EE project investment costs were reportedly covered by the social benefits they received.

Zaharna Fabrika in Sofia, Bulgaria – expected energy savings and cost savings were lower than the audits predicted because residents chose to keep indoor temperatures higher than the audits recommended.

Pleven, Bulgaria – the lower income households living in renovated buildings saw decreases in their energy bills, but the percentage by which their bills decreased was least for the second and third lowest income groups – i.e. the population just above the poorest 10% receiving social benefits. These households did not use much energy to begin with so there was little to save and affordability remained a concern for them. In that case, further energy-efficiency potential should be explored and these households should qualify for targeted heat (or related energy) assistance combined with energy-efficiency improvements.

The difference between household energy cost savings in homes with low incomes vs. those with middle and high incomes indicates that lower income groups use less energy to begin with and thus have less to save when efficiency improvements are made. Just because they may use

less energy does not mean that the amounts they are using are sufficient to meet their needs. Energy-efficiency improvements can make it affordable for lower income households to consume what they need, to reduce their energy deprivation. There might not be a decrease in the energy bill but at least there will be better comfort for nearly the same outlays. Unfortunately, this better comfort is not traditionally measured from the financial point of view, strictly calculating the investment costs and the bills before and after investments are made. However this traditional approach overlooks the cost already being paid by states and society in the form of price subsidies and artificially low tariffs. That cost could be reduced over time if efficiency of use improves for average households and vulnerable households, and if subsidies are better targeted.

ENERGY-EFFICIENCY MEASURES THAT AFFECT AFFORDABILITY

Metering

In Lviv, Ukraine a project introducing heat meters and controls demonstrated that household heat bills can drop significantly – between 28 and 38 percent – and reduce the level of state budget funds needed to pay for heat in vulnerable households. In one building, the state could reduce its subsidies paid to the heat utility to cover low income households' bills by more than 50 percent.

In Pančevo, Serbia, a project funded by the European Agency for Reconstruction aiming to improve viability of district heating through energy efficiency in supply and demand introduced consumption based billing along with the modernization measures. During the transition to metered billing customers could choose whether they would pay by the meter (0.03/kWh) or by heated area (0.5/m2/month) – whichever was less. Households that had been retrofitted for energy efficiency chose to pay by the meter, while those where inefficiencies persisted paid on the traditional basis but when they saw what their bills would be like when retrofitted and metered, they were motivated to invest in efficiency.

Installing meters is not enough, though; institutions providing metering technologies and methodologies for consumption-based billing must have public support and a legal framework to enforce metering in order to function well. From 2003-2004 a large-scale metering program in Moscow resulted in the installation of building-level water meters in over 24,000 multifamily buildings, but by the end of 2005 only half of them were used for billing purposes. Residents were still paying for water losses in the supply network outside their buildings. If metering were used for heat billing, consumers could save up to 30 percent.[100]

Fuel-Switching to More Energy-Efficient Fuels

In CEE/CIS, vulnerable households switch to cheaper fuels when they cannot afford network utilities. Often these fuels are of the lowest quality and have the worst environmental impacts. There are examples of locally-available alternatives to network utilities in some cities, but these would need to be identified at the project level and the feasibility of their longer-term use,

[100] Bashmakov, Igor, 2006, p. 7.

economic and environmental sustainability as well as affordability must be considered. In countries where district heating is beyond repair and where more energy-efficient options exist, alternatives might be the best if not the only options. Some of the projects in Bosnia and Armenia present examples of when non-network fuels might be the better as well as the more affordable utility option.

Repair or Renovation of Heat and Water Networks in Buildings

Investments to improve efficiency of heat and hot water systems within buildings can be very cost-effective and improve affordability, as shown in the case studies for projects in Sibiu, Romania, Pleven, Bulgaria and Kiev, Ukraine, to name some examples. Whether the residents remain connected to district heat or use local boilers to supply heat through these systems, they must be in good repair to ensure efficient end-use and minimize leaks and thermal losses that can unnecessarily increase heat bills. Renovating the building networks from vertical to horizontal distribution systems is a very "involved" renovation process that may increase the overall project cost but decrease the individual households' investments in meters and TRVs. Horizontal systems can both simplify and clarify the billing methodology, resulting in more accurate consumption-based billing and fewer disputes about bills. The problem is that these types of improvements require larger investments than some of the low-cost methods, plus they concern common property and thus rely on agreement among residents to pay for the renovation. Low-income households might not be able to pay for these projects unless grant funding is available.

Weatherization

Measures that improved the building envelope's ability to preserve indoor comfort and withstand forces of changing weather are at the heart of low-income energy-efficiency programs in developed countries. They include the "low-cost" measures of installing radiator foils and caulking and sealing windows and doors, as well as more costly improvements in insulation and new windows. Such measures can improve comfort and may also save money if building residents have the ability to control indoor temperatures using TRVs. Sometimes weatherization measures are offered to vulnerable households at no or low cost. However, in order to become the norm, these materials (as with any other energy technologies) need to be available and affordable on the local market and they need to be installed properly in order to work.

Comprehensive End-Use Measures

Building energy audits typically recommend several different levels of energy-efficiency measures, starting first with the ones that are most urgently needed and that will result in relatively quick cost savings, followed by more expensive measures that might have longer payback periods and can be financed in part with the initial cost savings. The case studies for Latvia show some examples of how the recommendations are categorized. Not all households can implement all of the needed improvements at once, and sometimes they end up introducing one new technology at a time due to financial constraints.

In Gabrovo, Bulgaria a comprehensive residential energy-efficiency project demonstrated that the introduction and combined effect of three categories of energy saving measures resulted in reduced heat energy consumption, lower heat bills for the residents and reduced greenhouse

gas emissions. The categories were: (1) building envelope e.g. insulation, windows, etc.; (2) in-house engineering systems related to heat e.g. TRVs, automated controls on substations; and (3) in-house engineering systems related to electricity consumption e.g. low-flow shower heads, CFLs. The overall annual energy savings were 21 percent (compared to forecasted savings of 30 percent), with a payback period of less than four years. The investment costs (paid almost entirely by the UNDP/GEF) amounted to roughly half of the total amount that the block's residents pay in annual energy bills.[101]

This project is one of the better-documented examples of residential end-use efficiency in the region outside of Central Europe, and it shows that energy-efficiency retrofits can be cost effective for multi-apartment buildings and that the comprehensive recommendations of the energy audit were appropriate. The methodology used for this project appears to be transferable to other residential EE projects, but it has not been widely replicated yet – perhaps due to lack of financing and to institutional barriers mentioned above (housing associations, clear and enforceable energy-efficiency building standards, etc.) The project reportedly improved affordability of household heat and electricity bills, particularly for households that were able to reconnect to district heating and stop using electric heat.[102]

The quality and affordability of the cost of energy-efficiency products and services was improved through (1) a competitive bidding process to select a single contractor who was obligated to "good workmanship" standards for a competitive service price, and (2) negotiating a package of all efficiency materials instead of individually, resulting in cost savings of about 20 percent below retail prices.[103]

Another set of projects showing how a comprehensive selection of end-use measures can result in higher energy savings and a shorter payback period is in the Polish town of Bytów mentioned in **Chapter 4** and documented in the case studies. An analysis of nine residential energy-efficiency projects involving insulation, TRVs, windows, heat substation upgrades showed that savings increased and payback periods decreased as the projects became more comprehensive.

Supply-Side Improvements

The modernization of district heating and water networks can have a tremendous impact on the affordability of energy and water. Substation renovation can be particularly cost-effective although a large investment is usually needed, sometimes two to three times as much as any other single demand-side measure. Only a few of the projects examined for this study involved substation retrofits and they were usually the bigger, more comprehensive projects – e.g. in Warsaw and Gabrovo. Substation retrofits combined with more efficient building-level heat and water distribution systems can improve energy efficiency substantially, and also utilize financing available to residents as well as to district heat suppliers.

---

[101] EnEffect, 2004. "*Retrofit of a Large-panel Residential Building to Reduce Energy Use*," draft report, p. 5.

[102] *Ibid,* p. 20.

[103] *Ibid,* p. 26

Private sector participation in district heating – specifically in the ownership, management and investments into these supply networks has in some cases resulted in lower costs for consumers thanks to improved energy efficiency and overall management. As one example of this trend, the following comparison of heat prices and energy efficiency of heat generation in Poland shows that state-owned or communally-owned heat companies are less efficient and less competitive than other, privately owned or operated licensed district heating companies, as illustrated in **Table 13**.

Table 13. A Comparison of State- and Communally-Owned District Heat Companies in Poland as Compared to Privately-Owned

Specification	Unit	Year	Communally owned DH companies	State owned DH companies	Privately owned DH companies
Energy efficiency of heat production	%	2004	75.6	75.6	**85.3**
		2005	76.4	73.9	**85.3**
Heat price	PLN/GJ	2004	35.16	36.02	**29.06**
		2005	35.79	36.78	**29.22**

Source: Polish Energy Regulatory Office publication (Heating Industry in Numbers - 2005, Warsaw, 2006)

It is extremely important that energy-efficiency measures on the supply side be coordinated with measures on the demand side, particularly for heating projects. Lack of coordination can lead to an increase in heat losses in that consumers will end up paying for. As demonstrated in the early implementation phase of the thermo-modernization and district heating modernization program in Poland—when a few "pilot project" buildings were weatherized and retrofitted with automated heat controls—the residents of those buildings saved money on heat bills. However, neighboring buildings without these retrofits were overheated because the heat supply network was not equipped with technologies to decrease the flow of heat being diverted from buildings that no longer needed the original amount. Buildings that could not pay for thermal improvements and automate heat flow coming into the buildings would end up with higher heating bills as soon as metering were introduced, and unless the efficiency improvements involved both suppliers and consumers of heat. Since this lesson was learned, the coordination improved among the Warsaw heat supply and distribution companies (owned respectively by a private operator Vattenfall and the municipality) and the building administrators. The heat companies' primary interest is in attracting new heat customers, while the residents' interest is in affordable comfort and reliable service, and both suppliers and consumers invest in energy-efficient improvements to their respective end of the heat networks.

In other countries, the need to coordinate supply and demand efficiency is evident though harder to replicate without financing and institutional capacity. Still, the potential for cost-effective efficiency improvements has been demonstrated. A public-private partnership in Sibiu, Romania involving Dutch financing showed that energy-efficiency improvements in the entire network (including generation, transmission, distribution and end-use in the internal building networks) resulted in at least a 15 percent reduction in household energy bills, enabling low income families to save as much as 50 percent of their net income. The supply-

side improvements were necessary to improve the quality of supply and service and enable the district heat company to compete with decentralized heating. The demand-side improvements – i.e. retrofit of building-level pipes from horizontal to vertical distribution and introduction of water flow meters and HCAs – enabled residents to monitor and control their consumption. A large rate of disconnected district heating customers in Romania made it difficult for the heat company to recover its costs and for consumers still on the network to afford rising tariffs. Most of those customers still on the network were in the lower income brackets and had been receiving subsidies from the municipality; after the supply-side energy-efficiency improvements were made, the city was able to reduce its heat subsidies to residents by over 15 percent.[104]

Further discussion of such supply-side efficiencies is beyond scope of this study but still factors into affordability of energy bills. More information is available in the Alliance to Save Energy's Regional Urban Heating Policy Assessment, July, 2007.

SPECIAL CONSIDERATIONS FOR DISTRICT HEATING

With respect to households that use district heating and hot water, there are economies of scale affecting affordability. When some households in a building disconnect from district heating, those that remain on the network are often burdened with higher bills because there are fewer households to share the costs of supplying the service as well as the cost of using it. This is especially true if households are billed according to area of heated space or by heat cost allocation that divides the heat bill for the entire building among the apartments using the central heat network.

District heating and hot water is the more affordable option if the population density is high, everyone in a building (or neighborhood) uses it, if there are building-level meters and controls enabling each apartment to regulate its use and influence its bills, if the heat network is technically and managerially efficient, and if the building is weatherized. In such cases, energy-efficiency improvements can help lure households that disconnected back to district heating and reduce the overall system charges per household as well as improve the affordability and level of comfort. This was the case in Pleven and Gabrovo, Bulgaria, two of the projects documented for this study.

Heat energy cost savings resulting from a residential project in Pleven were relatively lowest for consumers in the income groups that had low incomes but did not qualify for social welfare benefits and thus had to pay their bills without additional help from the state. As energy prices rise, these households will probably experience the greatest affordability constraints. According to a feasibility study conducted by the Technical University of Sofia the poorest income decile saved 10-13 percent of energy costs while the next two low-income deciles garnered savings of only 7-8 percent. The lowest income groups receive heat assistance and other welfare benefits that helped pay for heating in all rooms, while the next two income groups do not receive such benefits and effectively experience a bigger affordability constraint. Consequently, they heat fewer rooms and thus use less energy but tend to under-heat their homes. **Table 14** shows the comparison between average heat energy cost savings in each of four retrofitted residential

[104] See case study for this project in **Appendix A**.

buildings relative to the reference building (same architectural design and size) where no efficiency improvements were made. These savings were measured based on one heating season (November 2000 – March 2001).

Table 14. Energy Cost Savings per Building in Pleven, Bulgaria Residential Energy Efficiency Project, Compared to the Reference Block with No Change

Building Name	% Decrease in District Heating Bills	% Decrease in Domestic Hot Water Bills	% Decrease in Heat Energy Use (MWh) Based on Heat Meter
Buria	26.5	56.7	33.7
G. Kochev	15.8	47.7	26.5
Uragan	28.5	55.5	27.6
Spartak	19.7	32.5	19.0

Source: EnEffect

FROM PROJECTS TO POLICIES AND RESIDENTIAL EFFICIENCY PROGRAMS

As discussed in the analysis for Bulgaria in **Chapter 3**, compared to the cost of subsidizing energy and water through low tariffs, blanket subsidies and/or targeted subsidies, the benefits of energy-efficiency measures exceed their investment costs and result in a financial payback through bill reductions and continued accruals of savings. There are only a few documented, empirical examples of how improved energy efficiency actually relieves the subsidy burden on public budgets (see **Box 8** and case studies for Lithuania and for Horodok and Lviv in Ukraine in **Appendix A**). But considering that metering and energy efficiency can result in cost savings for average-income households, money spent on subsidies to the general population would be more cost-effectively spent on energy efficiency. Compared with policies that subsidize energy costs for a large percentage of consumers without improving energy efficiency that can reduce consumption costs to society (taxpayers), energy-efficiency investments are a good value and should be a cornerstone of programs to aid vulnerable households.

Box 8. Examples Where Energy-Efficiency Improvements Have Reduced the Need for Subsidies for the Poor

After the municipality of Horodok switched 20 residential buildings from a failing district heating network to natural gas, and introduced metering for the gas, the number of applicants for heat assistance subsidies decreased by 5 times within the multifamily building population. Single-family homes also switched to the new, more efficient and cost-effective gas-fired boilers and saved substantially on their heating bills as evidenced by fewer applicants for heat assistance. As a result, fewer low-income families applied for the heat assistance subsidies and the municipality saved 71 percent on such subsidies. Furthermore, the municipality of Horodok no longer operated its district heating network and thus saved on operation and maintenance costs associated with the central heat service.

In Lviv, a project introduced metering and automated building-level controls for district heating customers in two buildings where 20 percent of the residents received social welfare benefits. These measures helped households save 28 to 38 percent on their heat and hot water bills. In the building where the control was installed, the state subsidies for vulnerable households could be reduced by 57 percent and in the other by 12 percent.

Several countries in the region now have programs for renovating, refurbishing, and revitalizing multifamily housing (see **Chapters 1** and **3**). Some have dedicated energy-efficiency objectives (**Box 9**) as part of a strategy to reduce costs of residential utility services, especially in countries that have begun the process of reforming consumer energy prices. Most of these programs are quite new and their long-term effectiveness – and impact on affordability for vulnerable households – remains to be seen. The short- and medium-term results in terms of energy savings are encouraging, but more institutional capacity is needed. Furthermore, implementation of price reforms – particularly the elimination of cross-subsidies whereby large industrial and commercial customers pay much more than residential customers – has been slow in many countries, limiting the current cost-effectiveness of residential energy-efficiency programs.

Box 9. Examples of Residential Building Improvement Programs and Credit Lines with Strong Emphasis on Energy Efficiency

State Program for Thermal Modernization in Poland (since 1997): this program has resulted in the renovation of over 4,000 multifamily buildings, resulting in average energy savings of 35 percent – only 3.5 percent lower than the overall estimated savings. Typical measures financed by residents and the state bank BGK include modernization of internal heat networks with automated control valves, wall insulation, replacement of windows and doors in common areas. The average payback period is nine years. Consumers save a total of USD 25 million annually, and the program is ongoing.

Lithuanian Energy Efficiency Housing Pilot Project (1996-2004): LTL 70 million invested in 700 buildings (residential and schools), reducing energy consumption by 24 percent on average, and by up to 50 percent in larger projects. Primary support came from the World Bank, governments of Denmark, the Netherlands and Lithuania. The follow-on initiative is the **Lithuanian Multi-apartment Residential Building Modernization Program** (since 2005). The goal is to retrofit 70 percent of Lithuania's multifamily buildings, reducing heat demand by 30 percent, and decreasing state heat subsidies to households by 35 percent. Currently heat subsidies are still available to any household whose heat bills exceed 25 percent of income, although a longer term goal is to phase out these subsidies. Local governments are expected to play a major role in implementing the program. At the time of writing, there were no notable results to report from this program.

Residential Energy Efficiency Credit Line (REECL) (since 2004): This EUR 50 million Bulgarian financing facility offers loans and incentive grants to households – defined as occupiers of homes and flats – for selected energy-efficiency home improvement projects. The funding is on-lent from the EBRD to six participating local banks, which then finance qualifying projects. The grants can cover 20 percent of the total project cost, up to a maximum of EUR 850 per household. The REECL will finance projects through June of 2007. At the time of writing this study, over 50 percent of the projects financed efficient windows (double-glazing), resulting in aggregate electricity savings of over 7,000 MWh annually. The biggest electricity savings on a per project basis have been for efficient gas boilers. Roughly 12 percent of the REECL loans have financed this measure resulting in nearly 15,000 MWh savings annually. Other qualifying energy-efficiency measures are insulation (walls, floors, roofs), efficient biomass stoves and boilers, solar water heaters, and heat pump systems.

Residential Energy-Efficiency Credit in Hungary (since 2002): The IFC and Raiffeisen Bank Hungary have offered specialized packages to finance upgrades to windows, insulation and heating networks of large apartment buildings. Since February of 2006 the program has financed 300 buildings housing over 50,000 people in 18,000 apartments. This credit structure took several years to develop and according to the IFC "is anchored in the realization that repayment would come mostly from energy savings, and that renovation would raise the buildings' value. […] Banks in Hungary have found a new way to expand their business, inhabitants of the housing blocks have better heat for less money, and the environment benefits by reducing carbon dioxide and particulate emissions."(www.ifc.org)

It is worth noting that many "housing refurbishment" programs are designed to address a number of housing priorities – privatization of housing, capital repairs, maintenance and management, emergency assistance when heat supply is in question, etc. Many of these important measures are not necessarily cost-effective but essential investments in housing stock. When energy efficiency measures are made in such projects, it is difficult to obtain the results apart from the overall project; energy consumption before and after the projects is not always monitored.

Project and Program Evaluation Should Examine Results for Vulnerable Households

In evaluating the effects of these programs now and in the coming years, the correlation between residential energy-efficiency programs and affordability ratios deserves closer study. In the region studied, poor households reside in buildings shared with middle-income groups, and it is important that the incentives for improving efficiency and the awareness of how to save on utility bills be relevant for a combination of income groups, especially if they all live under the same roof. Households that cannot afford to pay for the refurbishments they need to live in standard energy-efficient comfort zones should be identified and helped through special assistance to finance their portions of the investments. Then the effects of the projects for these households should be more closely monitored and reported so that the benefits and costs for helping vulnerable houses through tariff reforms and other hurdles are better understood and can be improved.

Non-energy benefits should be stated and quantified to the extent possible. Investments in energy efficiency are also investments in more healthy living conditions, and in civil society. The small revolving funds established in Armenian towns improved cooperation among households in the participating condominiums. Energy efficiency projects in Bulgaria and Latvia resulted in less pollution and fostered a better sense of community and cooperation that extended beyond the project sites. Jobs are created as a result of residential energy efficiency projects. Directly and indirectly, all of these factors benefit society and improve the conditions for vulnerable households.

In calculating costs and benefits of residential efficiency programs, the overall benefits generally outweigh the costs, but monitoring of project outcomes and periodic evaluation is necessary to see whether this remains true. Comprehensive evaluations of the CEE/CIS experience with energy efficiency are not yet available, but evidence from other countries shows that net gains to households and society are still far greater than the costs. For example, the evaluation of the United Kingdom's home energy retrofit programs revealed that a loft insulation grant program saved households over £2.5 billion over an 18-year period, while it cost the government £1.23 billion. This finding accounts for free riders, changes in energy prices and consumers who utilize efficiency gains to improve comfort through increased heating or cooling and use of electric appliances.[105]

[105] Shorrock (1999) in Geller and Attali 2005, p. 29.

In CEE/CIS, governments have smaller budgets and less experienced institutions than in the West, but the situation is improving and evolving. Utility price reforms and institutional reforms are ongoing or imminent, and the need for creative and sustainable ways to protect households and help them manage resource use is all the more timely and urgent. Governments and donors need reliable information to make policy decisions, so programs related to housing, energy efficiency and poverty alleviation must strengthen in-country capacity to measure results, independently verify them and share them among institutions and with the public. Cost savings comparable to those in Western countries' low-income energy-efficiency programs are possible for CEE/CIS, but the institutional framework must be strengthened and documentation must be consistent, published, and for the long-term. A summary of findings about how energy efficiency improvements affect affordability is in **Box 10**.

Box 10. Summary of Findings on the Impact of Energy Efficiency on Affordability

- Consumption-based billing is fundamental to improving energy efficiency and the affordability of energy and water bills. In countries where metered billing is not the norm – in most CIS and several Southeastern European countries – it is not uncommon for consumers to be billed for more than they actually consume.
- Improving the affordability of residential services through energy efficiency is best achieved in projects that use consumption-based billing, harmonize efficiency of consumption as well as of supply, and involve residents in project implementation and evaluation.
- Demand-side energy-efficiency improvements such as weatherization, substation upgrades, internal heat and water network retrofits, and thermostatic controls save money on bills if households have been billed for more than they actually consume, and if billing is based on metered consumption. If households have been using less energy and water than they need – which is common for vulnerable households – or if they have been billed for less than they consume, then energy efficiency can help them regulate utility consumption and influence their utility bills once bills are based on metered use.
- The precise amount of energy and money saved from such measures depends on the combination of measures used, the energy tariffs, the baseline condition of a building, and consumer behavior. All households usually benefit from energy efficiency by achieving greater indoor comfort and better control over household utility expenditure.
- In multifamily buildings in the region constructed prior to 1990 that house people with low and middle incomes, there is still relatively little experience with residential end-use energy efficiency. There is also little experience with monitoring and evaluating the effectiveness of efficiency projects and programs that have been implemented.
- Comprehensive energy-efficiency retrofits have a greater affect on affordability than projects focusing on one technology (e.g. just windows or just insulation). Comprehensive projects also tend to be more complex to finance, and may be prone to delayed implementation.
- Payback periods for comprehensive projects might be longer than what vulnerable households can afford, or what municipalities are willing and able to pay for on behalf of vulnerable households. Unless they may keep or reinvest energy cost savings (or subsidy savings from energy efficiency), municipalities have little incentive to use energy efficiency instead of or in addition to traditional heat assistance. Project-level cash flow analysis of what municipalities pay for in energy/water bill assistance vs. what they would pay for in energy-efficiency assistance to vulnerable households is needed.
- Energy-efficiency improvements are often part of larger-scale residential building improvements, so the payback periods reported are much longer than pure energy-efficiency projects would be. Nonetheless, residents still experience the benefits of lower energy bills – or at least a better value on their energy bills and the ability to control their consumption costs through improvements such as thermal controls, more efficient windows, insulation, efficient lighting and appliances.

PART III: CONCLUSIONS AND RECOMMENDATIONS

There is documented evidence that energy efficiency improvements will help vulnerable households in CEE/CIS, and that energy efficiency is the quickest, cleanest and cheapest way to bring comfort to these households. **The experience with residential end-use energy-efficiency projects is still very limited, and documentation of that experience scarce, so there is a need to share the available experience to apply the lessons more widely to implement energy-efficiency improvements among residential consumers in general with special provisions to ensure the inclusion of vulnerable households.** Most importantly, local institutions at all levels need to be strengthened and coordinated so that policies and programs aiming to protect vulnerable households will take advantage of the plentiful but untapped resource of energy efficiency. Donors, governments, financial institutions, utilities and municipalities could save money and natural resources through residential energy-efficiency programs that ensure the inclusion of vulnerable households.

Several insights emerge from the case studies and country-specific research about residential energy efficiency in CEE/CIS:

- ***Makes Comfort Affordable*** – in some cases energy-efficiency improvements might not result in lower energy bills, especially in households that are only using "survival" levels of energy, but it will help make heating and other services more comfortable and sustainable for households, including low-income households.
- ***Grant Financing Should Be Targeted*** – residential energy-efficiency programs for multifamily buildings should target all households but have special provisions for vulnerable households so that they may participate in the project from the beginning and are not deterred by the costs that households are expected to contribute. Some of the state-sponsored residential energy-efficiency programs have such provisions (e.g. as in Lithuania) and the experience and challenges with implementing them deserve closer study so that barriers can be lowered.
- ***Existing Social Welfare Benefits Can Help Pay for Efficiency*** – The rules for using housing allowances and social benefit money to finance loans are understandably restrictive. The funds can be used most typically for basic housing and utility costs, food, etc. As a way to enable Latvian pensioners and other lower-income households to help pay for energy-efficiency investments, the loan repayment structure in housing associations was set up so that households make their contributions through the monthly sum paid to the HOA manager for operations and maintenance (O&M) related to energy, which is an allowable expense for social benefits. All households repay their "energy-efficiency loans" by paying a higher amount in monthly fixed O&M costs until the loan is repaid.
- ***Affordable Housing Programs Could Benefit from 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 bills for heat, electricity, water and wastewater are manageable for those who will be paying them, and so

that the occupants of this housing are ensured a satisfactory level of comfort and basic energy and water services. While the energy-efficiency aspect of affordable housing programs may be implicit, it must be explicit and closely monitored to protect the residents and bill-payers of these homes, but also to track the real effects of energy-saving measures and technologies in such buildings.

- ***Institutional Strengthening is Essential*** – many residential energy-efficiency programs require that applicants be housing associations, which may exclude many vulnerable households living in rented flats or buildings that have not associated. Energy efficiency programs must reach these households and work more closely with community organizations, housing agencies and municipalities to do so. One of the ways 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*** – they benefit from helping the general population save energy because constraints on energy and water resources are a concern throughout the region and in towns where bills are high, consumers are less able to spend their money in the local economy. If bills exceed affordability thresholds beyond what consumers can pay, nonpayment can cause financial problems for the utilities, some of which are municipally owned, and subsidies are frequently paid by municipalities. Municipalities need more incentives to improve residential energy efficiency in flats where vulnerable households reside (with social assistance from the municipality), and in the general multifamily population. Cost accounting of the status quo compared with net savings (i.e. the difference between costs of residential utility bills before and after a project) from energy-efficiency measures can illustrate how energy efficiency can make utility services more affordable and thus ease the transition to more market-based tariffs. It is also important for municipalities to see the difference between the investment costs for energy efficiency and the sum of net savings over a project's lifetime. The investment costs are one-time costs that yield savings over time, while traditional subsidies are paid continuously and do not yield savings.

- ***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. As Lampietti et al explain in the recent book *People and Power*, when reforms do not produce expected results, the gaps in data are often reasons for discrepancies between expectations and realities.[106] And as the UNDP and Bulgarian Energy Efficiency Center concluded based on their experience with the Gabrovo project – one of the more comprehensive and thoroughly documented residential energy-efficiency projects in CEE/CIS, long-term monitoring is crucial to understanding the benefits and costs of energy efficiency, and monitoring has to start from the beginning of a project. To make well-informed policy decisions, greater rigor is needed in evaluating energy efficiency projects and programs, and harmonization of evaluation techniques within each country and across the region could facilitate more investment in energy efficiency and reduce the cost and administrative burden of evaluation. A well-developed range of evaluation methods and tools exists in western countries and they should be utilized more broadly.

[106] Lampietti et al, 2007, pp. 171-2.

- ***Integrate End-Use and Supply-Side Efficiency Options*** – Improvements in energy efficiency need to take place in supply as well as end-use. Better quality services must accompany price reforms. Efficiently supplied energy and water can be offered to consumers at a lower price. Consumers should be billed based on consumption to encourage them to use and pay for only what they need.

- ***Consumption Based Billing and Thermal Regulation are Fundamental*** – Metering of energy and water use at the building level needs to be universal. The quality of the meters, and the ability of institutions to enforce metering is very important for affordability. 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.

- ***Building Energy Performance Standards and Appliance Labeling Are Essential*** – Although they might not affect today's vulnerable households, policies that lead to better building energy performance and efficiency of home appliances and lighting and related equipment (boilers, heat and water distribution systems) will improve affordability of all households for years to come. However, the institutional capacity to enforce these policies is needed. Energy-efficiency procurement programs could help increase the uptake of efficient technologies in housing that is still publicly owned, and set an example for residents in privatized housing. Some of the experts contributing to this study feel that energy-efficient appliances could be a very important aspect of social assistance programs targeted at vulnerable households.

- ***Methods for Evaluation Need To Be Quantitative and Qualitative*** – There is no commonly used standard method of evaluating energy-efficiency work in CEE/CIS, and this lack of a standard evaluation makes it very difficult to compare and contrast the results from projects and programs across the region. While documenting and evaluating energy-efficiency projects, project implementers should take advantage of existing methods for evaluating social and economic impacts to enable better and more accurate comparative analysis, and to assign appropriate weight to benefits that are particularly hard to quantify. Testing such tools was beyond the intent and scope of this study, but future study of affordability and energy efficiency might consider using something like the social impact analyses (PSIA) used by the World Bank as a form of "social cost-benefit analysis."[107] This type of analysis can help policymakers, donors and IFIs, and local stakeholders evaluate the impacts of reforms and energy-efficiency programs both quantitatively and qualitatively. For example, the cost of energy-efficiency projects and programs that target vulnerable households may be considerably higher because these households do not contribute with their own scarce resources, and the benefits might be improved comfort at the same cost instead of improved comfort at a reduced expenditure. However, the net benefit is still positive when considering the improvements to quality of life and to society when fewer households suffer from lack of basic needs.

- ***Public Awareness Campaigns Should Make the Link Between Affordability and Efficient Energy Use*** – As energy prices continue to make headlines, 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. Product and

[107] See more about this tool in Lampietti et al, 2007.

service suppliers as well as governmental agencies and NGOs can contribute to the documentation and publicizing of what energy-efficiency measures are available and effective in their respective cities and countries.

MUNICIPAL NETWORK FOR ENERGY EFFICIENCY

A Program of USAID

Alliance to Save Energy
1850 M Street, NW • Suite 600
Washington, D.C. 20036
info@ase.org • www.ase.org

This paper was funded by the U.S. Agency for International Development

The Alliance to Save Energy is a non-profit organization founded in 1977 to promote the efficient and clean use of energy worldwide.