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Residential Energy Use in Lithuania: The Prospects for Energy Efficiency

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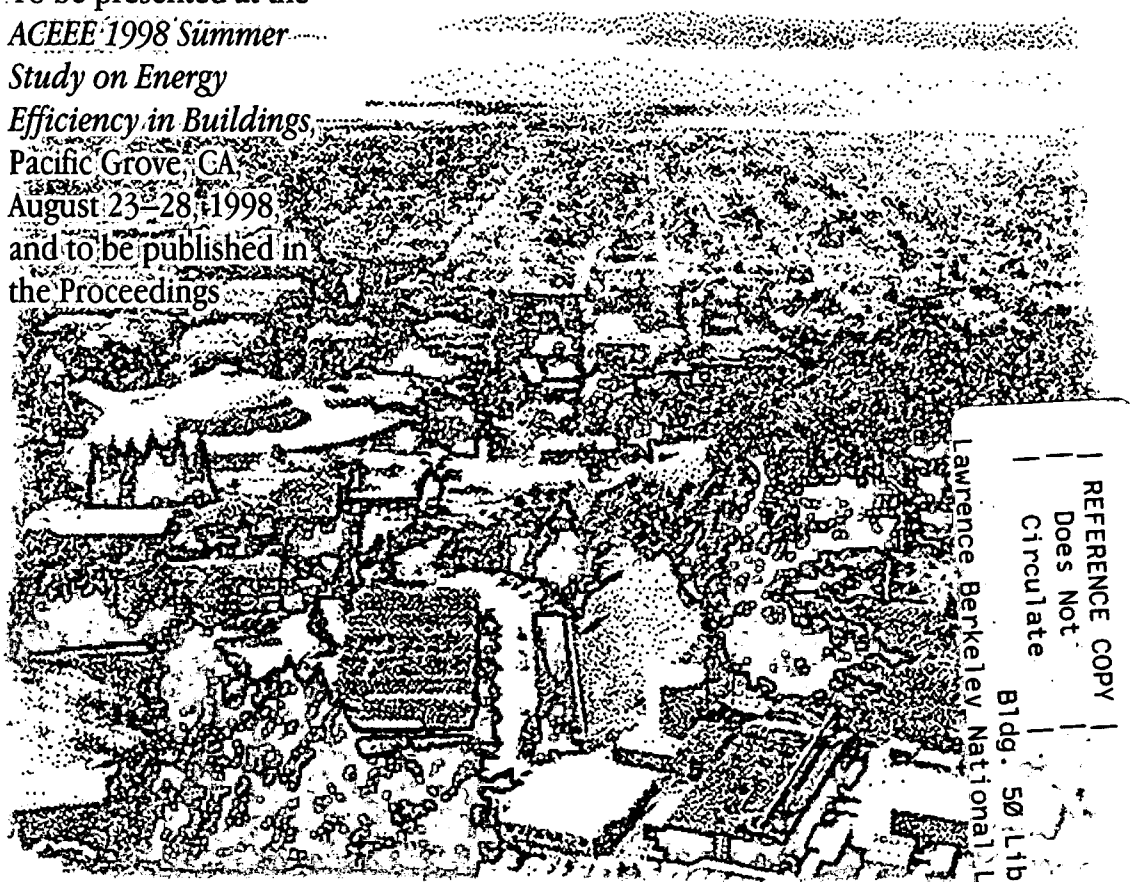

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Residential Energy Use in Lithuania:

The Prospects for Energy Efficiency

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Abstract

While the potential for saving energy in Lithuania's residential sector (especially, space heating in apartment buildings) is large, significant barriers (financial, administrative, etc.) to energy efficiency remain. Removing or ameliorating these barriers will be difficult since these are systemic barriers that require societal change. Furthermore, solutions to these problems will require the cooperation and, in some cases, active participation of households and homeowner associations. Therefore, prior to proposing and implementing energy-efficiency solutions, one must understand the energy situation from a household perspective.

Introduction

Since 1991, Lithuania has been involved in a massive effort to transform its centrally planned economy into a market-oriented economy. Substantial progress in the transition to a market economy has been made, most notably in the areas of price reform, privatization, and trade reform. In contrast to these reforms, improvements in the energy efficiency in the residential sector have been slow.

Lithuania is a small Eastern European country with a population of 3.7 million people. During the period of economic recession in early 1990s, Lithuanians were hit by more than a 50% loss in real income due to inflation. Although the country's gross domestic product (GDP) is growing again (more than 6% annually in 1997), an average annual salary was only around $2,760 and GDP per capita was around $4,300 in 1997 (Business Central Europe 1998). High inflation (although decreasing during recent years) and discount rates and housing and energy subsidies present formidable obstacles to the promotion of energy efficiency. Thus, what is surprising is not the relative lack of energy-efficiency investments, but the fact that some households are even able to improve the energy efficiency of their dwellings given such economic conditions.

Because the Lithuanian government is very sensitive to the needs of its people with regard to their ability to pay for energy, district heat and hot water to households are still subsidized. Despite the constant increase in district heating tariffs (households paid $ 0.02/kWh in 1996), they are still bellow the actual costs of heat production, which varied from $ 0.01 to 0.03 per kWh with an average value about $ 0.03/kWh in 1996 (Juska & Bartkus 1997). Heat tariffs increased by approximately 20% during the 1997/98 heating season, nevertheless, they still do not cover heat production costs.[1] In addition, if the household's heating bill exceeded 15% of household income, households had to pay only 15% of their income for heat; if the hot water bill exceeded 5% of household income, households paid only 5% of their income for hot water. This subsidy is significant in some areas: e.g., 40% of the families in Vilnius applied for a "15 plus 5 per cent" subsidy in 1995 (Vine et al. 1997). The subsidy is beneficial for low-income families, but prevents the promotion of energy efficiency as it hides the real cost of energy to households. Over three years

[1] In the future, the deregulation of the district heating companies will allow each company to set their own tariffs that may reflect their own marginal costs.

(1994-1996) more than $70 million were spent subsidizing the Lithuanian Power Company, and most of it went to subsidize district heat.

Approximately 61% of all Lithuanian households receive heat from district heating (DH), and in the case of urban households, this percentage reaches 81% (Lithuanian Department of Statistics 1997a). Although energy consumption in the residential sector of Lithuania decreased from 81 PJ in 1990 to 56 PJ in 1996, district heat consumption remained almost at the same level (29 PJ in 1996 compared with 31 PJ in 1990). Only 37% of district heat is supplied by co-generation plants, and households consume about 50% of the district heat produced in the country (Juska & Bartkus 1997). There are extensive inefficiencies in the production and distribution of this heat, so that significant opportunities exist for improving supply-side efficiencies. Also consumers in buildings connected to the DH system cannot control temperature nor flow into their building's sub-stations, and the DH and block systems lack the capacity to meter consumption per dwelling unit.

In 1996, Lithuania's housing stock was made up of approximately 1.27 million dwellings: 0.85 million were located in urban areas while the rest were located in rural areas. Around 80% of urban households in Lithuania live in massive, most commonly 4- to 9-floor multi-dwelling buildings. Rural households live mainly in single-family detached houses. More than two-thirds of Lithuanian urban dwellings are 2- to 3-room apartments with an average area of 54 square meters (Lithuanian Department of Statistics 1997b). The quality and thermal properties of the precasted concrete panel and clay brick buildings were generally neglected during the Soviet times due to lack of incentives and resources in the construction industry. Therefore U-values (W/degree/square meter) for walls, roofs and windows are much higher compared to Danish standards for similar buildings or to new Lithuanian standards (the higher the U-value, the less efficient the building component) (Kazakevicius et al. 1996; Lithuanian Ministry of Urban Development and Housing 1996). The roofs and windows in a very high percentage of older buildings are in poor condition (for example, 39% of roofs and 50% of windows of brick buildings built in 1958-1984 were considered to be in bad condition, Arpaillange 1995), so they are in an urgent need for renovation. Small repairs have been undertaken by households in the last five years to address these problems, but investment has not been extensive or comprehensive: e.g., insulating doors; repairing outside doors, window frames, and balcony glazing; and renovating the heating system. In 1994, households spent an

average of US$ 53 for one or more of the energy-efficiency actions listed above, while one-half of the households did not spend any money.

More than 90% of Lithuanian dwellings are now private (Lithuanian Department of Statistics 1997b). The privatization of housing started earlier and was more widespread in Lithuania than in other countries of the former Soviet Union (most of the dwellings in the former Soviet Union were either state, or municipality owned), but privatization has not resolved all problems. A total privatization program launched by the Lithuanian government in 1991 allowed individuals to open special investment accounts that were supplemented by investment funds from the Lithuanian government according to the depositor's age and the amount of funds deposited. Investment funds could then be used for privatizing dwellings or state-owned businesses, shops, restaurants, services, etc. A system of indexes that took into account the state of repairs, amenities, and neighborhood was used to determine the price of the flat. The rapid pace of housing privatization in Lithuania was a normal reaction for people who had spent the past 50 years living under socialism. Flat privatization came first, and only then were spare funds invested in private businesses. The privatization of individual flats did not equate to private responsibility for buildings. Privatization of existing housing simply granted title to a specific apartment, and the right to sell or rent. The responsibility for the building as whole is still an unresolved matter, causing serious barriers related to the retrofit of the building stock. For former municipal and state property (around 70% of all dwellings), municipal district maintenance offices are responsible for building maintenance (Vine et al. 1997). Nevertheless, privatization is an important step toward more efficient household energy use, since the new property owners have a direct interest in reducing the costs of building maintenance and operation. In addition, for energy-efficiency improvements, private property can be used as collateral for capital investment loans.

Lithuania inherited a legal and institutional framework characterized by a highly centralized energy sector managed by state-owned enterprises, making it difficult to initiate energy-efficiency projects. Until July 1, 1997 the generation and distribution of electricity and heat was the responsibility of the 91% state-owned Lithuania Power Corporation (LPC) (Vine et al. 1997). In an attempt to break up the LPC monopoly, the Lithuanian government separated six regional District Heating Companies (DH Companies) from the LPC and transferred them to municipalities.

There are some plans to privatize the DH Companies. This type of decentralization provides more autonomy to the municipalities in determining their energy future and may lead to greater energy efficiency. Unfortunately remaining energy subsidies and large outstanding debts of end-users limit abilities of the DH Companies to invest in energy efficiency.

Methodology

We analyzed the energy and housing data collected for the World Bank in the two largest cities in Lithuania (Vilnius, the capital city, and Kaunas) in January-May 1995 (Vine et al. 1997). We believe the households in these two cities are representative of households in other urban areas in Lithuania. Three sets of World Bank data were examined: (1) a *household energy survey*, where over 2,000 households living in 607 representative buildings were interviewed using a questionnaire that collected information on fuels (central heating, piped gas, electricity, etc.), socioeconomics, energy-related attitudes and behavior, and Homeowner Association (HOA) issues; (2) a *building assessment survey*, where 120 buildings from the larger survey were audited using a questionnaire that collected information on building materials, windows, balconies and doors, and inside and outside temperatures; and (3) a *homeowner association profile study*, where interviews were conducted in 94 (out of 135) HOAs in Vilnius using a questionnaire that collected mainly qualitative information. Random sampling was applied to both the sample frame of the household energy survey and the building survey to ensure the representativeness of the main socioeconomic characteristics of Lithuanian households (Arpaillange 1995). Our analysis also relies partially on the work previously conducted by authors of this report (Kazakevicius et al. 1996), as well as recently published papers on Lithuania (Adamantiades et al. 1994; Juska and Bartkus 1997; Lithuanian Department of Statistics 1997a; Martinot 1997; Schipper 1995; The World Bank 1996). In addition, one of the authors (Kazakevicius) participated in the World Bank Appraisal Mission for an Energy Efficiency/Housing Project in Lithuania in January 1996.

Five caveats need to be briefly mentioned which limit the scope and conclusions of the paper:

1. The survey data are primarily self-reported (e.g., billing data and other measured data on these households were not available) and, therefore, are susceptible to measurement problems commonly associated with self-reported data.

2. The focus of this paper is on energy use within an individual dwelling unit. District heating, the principal form of energy supply, is not the focus of this study, but is an important opportunity for improvement. More importantly, actions are needed for improving the efficiency of the district heating system in order to realize the full potential of energy savings in Lithuania (i.e., supply-side inefficiencies in production and distribution need to be addressed, as well as demand-side inefficiencies). In some cases further utilization of expensive district heat coming from old heat-only boilers is not feasible (especially in small towns), so it should be replaced by local building-level boilers.

3. The situation in Lithuania is very dynamic as new regulations are implemented and new relationships are formed during the country's transition to a modern society based on private markets.

4. It is important to note that energy efficiency is one small part of a multitude of problems confronting Lithuania. Basic social, political and economic changes are needed, some of which will affect how energy is controlled and used in Lithuania.

5. While the data reported in this paper is mainly for the 1994 - 1995 period, we believe that conditions in Lithuania remain the same, so that our findings are still valid.

Barriers to Energy Efficiency in Lithuania

Many households are interested in energy efficiency for reducing space heating energy use, but face significant barriers to investing in energy efficiency, such as: (1) the lack of information on energy efficiency, including the absence of energy metering, (2) lack of heating controls, and (3) the lack of access to financing and credit.

Lack of Information and the Absence of Energy Metering

A well-informed populace is necessary for making decisions on energy-efficiency investments. Unfortunately, Lithuania can be characterized as a country that is poorly informed with respect to consumption information at the household level and to retrofit opportunities. Energy metering is important for providing critical information on energy consumption of individual dwelling units.[2] Metering of energy use at the building level is the most common type of energy metering available and not all buildings are metered. Metering of individual apartments is almost nonexistent. As a result, households lacking information on the amount of energy consumed in their apartment have no reference to make economic decisions.

Furthermore, there is little experience in Lithuania (or other countries in Eastern Europe) with heating-related retrofits showing savings and costs. While the retrofit experience in other countries is useful, one must be very careful in transferring the project experience from countries with expertise, building materials, and project experience to countries like Lithuania that lack these resources.

[2] The Vilnius DH Company reported that heat consumption in the residential sector decreased by 20% in the Fall of 1995, compared with the previous year, and the reduction is believed to be a direct result of heat metering at the building level for 50% of the buildings in Vilnius (Vine et al. 1997).

Lack of Heating Controls

Most households (96%) believe it is important for them to be able to regulate heat in order to reduce their bills (assuming they can control the amount of heat entering their building). However, most households (80%) cannot regulate the heat supplied by radiators in their home, because radiators in most buildings (including the newer buildings) do not have heat valves.

Lack of Access to Financing and Credit

More than 70% of Lithuanian households find it difficult to pay their monthly energy bills. About 50% of apartment households in Vilnius were in arrears in payment for district heating, as of January 1996 (Vine et al. 1997). Thus, it is not surprising that almost half of the households that are very dissatisfied with their heating system did not buy insulation, and about 50% of the households who want to insulate their homes did not buy insulation. Finally, for those people who want to insulate their homes, 85% believe that reducing consumption will be very hard to do without financial assistance. Banks are unwilling to lend to households and homeowner associations (see below) because of collateral problems and uncertainty over viability of investments. In conclusion, while households are interested in energy efficiency, most households believe that making their dwelling more energy efficient will cost them too much money and, therefore, do not invest.

The Plight of Low-Income Households. The average urban household spent approximately $207 per year on energy used in the home in 1995. This number is expected to increase due to increased energy tariffs. Almost half (42%) of the energy expenditures went to district heating; the next two largest energy sources contributing to this monthly cost were electricity (23%) and non-metered pipe gas (22%) (Vine et al. 1997). The Lithuanian official sources (Lithuanian Department of Statistics 1997c) state that the average consumption for energy represented about 12 - 13% of total monthly household expenditures during the recent years, second to expenditures for food.

Low-income households in Lithuania face a particularly difficult and challenging situation. Although the lowest income groups have the lowest energy expenditures of all income groups, they have the highest "energy burden" among all income groups, where "energy burden" is defined as the percentage of total household expenditures (food, public transport, gasoline for car, energy, and other) spent on energy use in the home. While the average household spent approximately 16% of total household expenditures on energy use in the home, the lowest income group experienced the greatest energy burden, spending approximately 30% of total household expenditures on energy use, almost four times as great as for the highest income group. Not surprisingly, almost 90% of the lowest income group have financial problems paying their bills, compared to 50% of the highest income group. Similarly, 93% of the lowest income group report that with higher prices, it will be more difficult for them to pay their utility bill, in contrast to 77% of the highest income group. The lowest income households also state that they do not know how to save energy, in contrast to the higher income households. Finally, reducing energy consumption will be more of a hardship for the lowest income groups compared to the highest income groups, 90% versus 72%, respectively (Vine et al. 1997).

The Role of Homeowner Associations

Because of the diverse barriers affecting individual households, an aggregation of households might be a more effective vehicle in promoting energy efficiency. Homeowner Associations (HOAs) represent potential target groups for organizing households in promoting energy efficiency at the building and/or community level, but face significant barriers (e.g., perceptual, lack of experience, diversity, and financial) to investing in energy efficiency.

In February 1995, the Parliament adopted the Homeowners Association Law that makes the HOA the single organization responsible for housing maintenance and issues related to common areas in multifamily buildings. The HOA is given the right to make transactions, undertake ownership obligations, open a bank account in Lithuania or abroad, obtain credits, and levy charges on all homeowners, be they members or not, for the purpose of financing maintenance and repair work agreed to by a majority of its members.

As of June 1995, only 10% of all apartment buildings in Lithuania's two largest cities were maintained by HOAs, reflecting the significant barriers to the formation of HOAs. For example, membership in the HOA is neither mandatory nor automatic. In order to establish an association, 50% of the owners within a building have to be present and come to a majority decision. Moreover, many households believe that HOAs are complicated to organize and manage (80%), cost too much money for the owners (48%), and may result in the loss of individual decision making (43%). Nevertheless, around 80% of households believe that it would be useful to create a HOA in their building and be a member of an HOA.

The HOAs are very heterogeneous in terms of their capacity to implement the thermal rehabilitation of buildings and are inexperienced in obtaining financial assistance: e.g., most (over 92%) HOA members have never applied for a loan or grant for repair work. This reluctance reflects the fact that tenants are wary of using their home as collateral for fear of losing them, and they are not confident of the banking system. Similarly, banks are unwilling to accept multifamily homes as collateral because of ambiguous laws and lack of enforcement. Households with HOAs are excellent candidates for implementing energy efficiency: households with HOAs in their building are somewhat more informed about energy efficiency and insulation compared to their counterparts. Moreover, HOA households do appear to be more "active" with respect to investing in energy efficiency: HOA households spent an average of $ 65 in 1994 on insulation, compared to $ 48 by non-HOA households (Vine et al. 1997).

Potential Energy Savings

Technical studies conducted on Lithuanian buildings indicate that technical potential savings are large, offering the potential for more investment by Lithuanian households. Studies by the Lithuanian Energy Institute (Stankevicius et al. 1994) and other specialists suggest the potential for a 50% reduction in heat losses in Lithuanian homes, although the cost-effectiveness of achieving this reduction is uncertain. BCEOM French Consultants (BCEOM 1995; Bellanger 1995) examined six buildings representing three material types (brick, cast-on-site concrete and pre-fabricated concrete panels), three building periods (1945-1970, 1970-1985, post-1985), and two heights (3-6 and 7-12 stories). The payback periods were calculated using

billing rates for the 1995/96 heating season. The evaluation of the cost-effectiveness of the proposed options was based on the widespread use of Lithuanian-made materials for the rehabilitation of the building. The authors proposed two options. The full rehabilitation package included roof insulation, window retrofits, wall insulation, temperature controls, staircase improvements, basement insulation, pipe insulation, and heat system balancing. Partial rehabilitation included the same measures except that windows were refurbished rather than replaced. The payback period for the full rehabilitation varied from 14 to 27 years, whereas for the partial rehabilitation the payback varied from 5 to 16 years. A general conclusion of the study was that window change and wall insulation had very long payback periods (20 to 40 years) and would be feasible only if considered as part of a building improvement.

Similar results were reported in a study of panel buildings performed by the Swedish company SWECO (1995). Energy savings and payback periods were calculated assuming different comfort levels (13 and 18 C°) andwere based on metered heat consumption. A basic package contained the following measures: refurbishment of windows, new doors, automatic control of heating system, circulating pump, heat exchanger for heating system, thermostatic radiator valves, balancing valves, two-pipe system, and roof renovation. Payback periods for the basic rehabilitation of typical panel buildings varied from 12 to 20 years. The most cost-effective measures were refurbishment of windows (8-year payback), automatic control of heating system (3 years), and heat exchanger (around 8 years).

These studies indicate a large variation in payback levels, some of which are quite long. Some of the long paybacks may be due to the fact that, after the retrofit, tenants improved their comfort levels by raising their thermostat levels, thus reducing the amount of expected savings (i.e., takeback). Heat tariffs in Lithuania are expected to continue to rise (approx. 20% per year) in an attempt to cover increasing production costs. Thus, the actual value of the energy savings to households will be greater than suggested by these calculations, thereby, improving the cost-effectiveness of retrofit projects. As a result, paybacks should be smaller, and the range of paybacks is expected to narrow. In addition, incentives offered by DH companies will also help to reduce payback levels.

Unfortunately, there is little experience with actual retrofit and rehabilitation projects to form a firm basis for drawing judgments regarding the cost-effectiveness

of different levels of investment for various types of buildings. A detailed study involving the retrofit of a standard 30-apartment panel building was carried out in Alytus in 1993, where all the materials were supplied from Denmark (Hartmann Consult Blukon 1994). A neighboring building of the same construction was used as a reference building. Energy savings of 33% (15 GJ/year/average apartment) were achieved compared with the reference house. Assuming average Danish heat prices ($20/GJ), a payback time of 11 years was calculated. Lithuanian heat tariffs are much lower, so that the real payback period should be longer. On the other hand, the use of less expensive Lithuanian-made materials, where possible, would reduce the payback period. However, the use of Lithuanian products to improve the cost-effectiveness of energy retrofits carries certain risks (e.g., poor quality and low durability) that may prevent energy investments.

Although the payback from heat cost savings is important to consider, since it represents a source of revenue from which payments on a loan can be made, many of the measures are ones that should be considered as part of general building rehabilitation, which will increase the livability and value of the building. For such investments, a simple calculation of payback period based on energy savings alone is not appropriate. If some costs are considered as part of building upgrading, the packages of energy-efficiency measures could then be made more viable for many buildings.

Recommendations for Promoting Energy Efficiency in Lithuania

At least, nine opportunities are available for promoting energy efficiency in the residential sector:

1. Accurate and credible information on energy use
2. Energy controls
3. Energy retrofit and rehabilitation demonstration projects
4. Marketing of energy-efficiency opportunities to targeted groups
5. Promotion of an energy services industry
6. Encouragement of new HOAs and provision of technical and financial assistance to existing HOAs
7. Energy-efficiency actions by municipalities
8. Alternative financing mechanisms
9. Special assistance to low-income households

Accurate and Credible Information on Energy Use

Accurate and credible information on energy use is needed for pricing and for the education of households so that they can make informed decisions. In the short term, to allocate costs on the basis of usage, heat meters should be gradually installed on every building. Once a building is metered, households have an incentive to reduce heating energy use by reducing the flow of hot water into the building, but this should be done through a collective decision. Cheap evaporation meters could be installed on apartment radiators and at least a portion of the "consumption" indicated by these meters could be used to calculate a family's heating bill.

A program to encourage the installation of heating meters in multi-dwelling houses was launched in 1995. The households received a special heat supply discount rate after heat meters had been installed. In some cases, the expenses for heat meter purchase were reimbursed. A number of households implemented

simple measures to save energy after they realized that they consumed (and had to pay) significant amounts of energy.

Energy Controls

Reducing the overall flow of heat to a building as internal demands fall (sensed from occupant controls) or warming of outdoors (sensed with external sensors) is an attractive economic development strategy. Heating controls for individual apartments are not common in Lithuania but are desired by households. Approaches for controlling apartment building energy use include thermostatic controls (thermostats include thermostatic radiator valves as well as wall-mounted thermostats) and energy management systems. Satisfactory thermostatic control requires the right equipment, properly installed and maintained, as well as residents who understand how thermostats should be used (DeCicco et al. 1996; Kempton 1986). Where controls can be installed, occupants will be able to adjust temperatures and, therefore, take more control on how much energy is consumed in their dwelling. Energy management systems are relatively costly, but can be quite cost-effective when properly installed and operated. District Heating Companies in some cities offer various discounts on the HOA's heating bill for upgrading their heat substation and installation of energy controls.

Energy Retrofit and Rehabilitation Demonstration Projects

The lack of experience in energy retrofits and rehabilitation projects clearly indicates the need for small-scale demonstration projects in selected parts of Lithuania. These projects will provide a better understanding of how much energy can be saved in the residential sector, as well as a better understanding of the complexities and uncertainties in retrofitting. At the same time, these projects will help develop the expertise and materials needed for promoting energy efficiency on a larger scale. An important feature of the demonstration projects will be project monitoring and feedback, project evaluation, and commissioning of the facility to ensure the persistence of energy savings. The experience in designing, implementing, and evaluating these projects could also be used for training energy professionals (e.g., architects, engineers, and contractors) and students. Finally, the

results from the projects should be disseminated widely (e.g., through printed material, electronic media, and "open houses" to the public), and the results should emphasize both energy and non-energy benefits (e.g., improved comfort, lower life-cycle costs, and less maintenance).

Marketing of Energy-Efficiency Opportunities to Targeted Groups

The results from energy retrofits and rehabilitation projects, as well as other energy information, need to be targeted to select audiences, so that the information will be used effectively. Considering the survey data, the demand for energy information is high. However, indiscriminate dissemination of information will not be fruitful. Key audiences need to be identified and targeted, so that they can be educated about energy efficiency and about non-energy benefits. Targeted groups could include managers and HOAs of buildings needing roof and wall repairs and low-income households: e.g., HOAs may have special information needs that may be fulfilled by some printed material, while low-income households may need to have more direct assistance (e.g., onsite visits).

Promotion of an Energy Services Industry

One of the reasons for the scarcity of energy information, energy professionals, and high quality materials for retrofits is the absence of an energy services industry. The absence of the industry is not surprising since the demand for energy expertise and resources has been relatively small. If the demand were to increase, then the supply would, hopefully, increase. Government could intervene in the market to develop more quickly the energy services industry by encouraging more metering, energy controls, energy demonstration projects (e.g., in government buildings), marketing and information dissemination, and the training of energy professionals (Vine and Murakoshi 1997). With a more competitive energy services industry, energy efficiency can be promoted more cost-effectively.

Encouragement of New HOAs and Provision of Technical and Financial assistance to Existing HOAs

Homeowner associations have the potential to become an important vehicle for implementing energy-efficiency policy, because the association is a legal entity interested in reducing building maintenance costs and improving energy efficiency. Once in possession of financial resources, HOAs can provide financial and technical assistance as well as provide general information and education services to individual households. However, HOAs have limited experience in promoting energy efficiency and are in need of financial assistance and building maintenance information and services. The government should target existing HOAs for financial and technical assistance and should encourage the formation of more HOAs (only 10% of the residential building sector have them). Because of their heterogeneity, targeted marketing and assistance is needed. Finally, the government should try to clarify the institutional and legal uncertainties regarding property issues (e.g., the rehabilitation of the building), maintenance responsibilities, funding, and management.

Energy-Efficiency Actions by Municipalities

The centralization of the Lithuanian economy has inhibited local organizations from promoting energy efficiency. As decentralization occurs, it is possible that municipalities will become more responsible and proactive (rather than reactive) in implementing energy-efficiency policies, projects, and programs. This change in attitude will likely be slow, however, the opportunities could become significant. The central government should encourage the private initiatives of municipalities to promote energy efficiency and try to eliminate any barriers that prevent these opportunities. New legislation has been adopted in decentralizing and privatizing the Lithuanian energy industry and giving more responsibilities to municipalities. It remains to be seen whether municipalities will take advantage of this opportunity to promote energy efficiency.

Alternative Financing Mechanisms

Access to financing is one of the most significant barriers to energy efficiency in the residential sector. Households, HOAs, and government need funds for investing in energy efficiency, since existing resources are limited. As noted above, tenants are wary of using their home as collateral for fear of losing them, and they are not confident of the banking system. Similarly, banks are unwilling to accept multifamily homes as collateral. A variety of financing mechanisms needs to be explored and utilized: e.g., grants, bonds, (low-interest) loans, energy-efficient mortgages, leases, tax credits, and energy performance contracting. It is unlikely that individual households will borrow money for extensive refurbishment of existing buildings. Most borrowing will be done by HOAs.

International financial lenders could also act as a channel for donor organizations to provide loans and possibly grants to building occupants for housing rehabilitation. A program to improve the thermal properties of the housing stock should be part of a much larger program to encourage more general rehabilitation of the housing stock. If thermal improvements are taken together with general upgrading, the costs of doing this are far less than if each step is taken on its own.

In an attempt to address the housing energy efficiency problems the Government of Lithuania, with co-financing from the World Bank and Scandinavian countries, established a quasi-government body - Housing Credit Fund (HCF) "Bustas" - that provides both technical and financial assistance for building renovation to HOAs and individual owners, facilitates development of energy service companies, finances demonstration projects (like school and public building retrofits), and provides the necessary feedback to ministries and parliament commissions for the creation of new legislation.

Special Assistance to Low-Income Households

Low-income households have the highest energy burden of all income groups and have the greatest need for energy-efficiency improvements. Accordingly, energy-efficiency policies and programs need to be responsive to the needs of low-income households. Thus, when considering a redirection of subsidies or changes in

metering, policy makers must account for impacts on equity and energy efficiency. The government should consider establishing an Affordable Energy Trust Fund to assist low-income households in improving the energy efficiency of their apartments. These trust funds could be accessed for energy improvements with fewer credit and debt restrictions than may be applicable for traditional lenders.

Short and Medium-Term Strategies

The barriers mentioned earlier create difficult conditions for providing economic incentives to individual households for efficiency improvements. Until these barriers are reduced or removed, households can only install measures that are low cost and improve the comfort conditions inside the dwellings (e.g., window and roof insulation and weather-stripping).

Some creative short-term (1-2 years) strategies are already being tried in Lithuania. Tenants in cold buildings have added plastic or glass panes to existing windows, caulked cracks, and installed some insulation around hot water piping. The most striking measures are the construction of covered balconies to reduce heat losses through large windows, or the addition of a new top floor and a well-insulated attic above it, both to make rental space available and to save heat. These strategies are motivated by households who want better indoor conditions, since none receive monetary rewards for heat saved.

In the medium term (2-5 years), the following measures could be collectively carried out: (1) renovate heat and hot-water circulation pipes; (2) structural retrofits to improve both the condition and appearance of inner and outer walls as well as to add thermal insulation; (3) replace windows whose panes are broken, frames are leaky and rotten, or sashes moldy and decayed; (4) replace heating pipes within dwellings with systems permitting individual radiator controls and shunts or bypasses, so individual radiators can be turned off (if this is done, individual meters, at least the inexpensive evaporation type, must be installed to create the incentive to use these shunts); (5) meter each apartment's domestic hot water with the installation of a system that provides hot water outside of heating months; (6) insulate attics and spaces hidden from view that cause air leaks or other thermal problems in apartment buildings; and (7) install outdoor and indoor temperature

sensors to regulate overall provision of heat to the building. These measures are costly; however, if these were performed during building rehabilitation, incremental costs would be less than what is expected if the only purpose of the actions is to save heat. Because of limited resources, collaboration among the following parties will be needed for implementing these actions: households, HOAs, heat generating companies, government, banks, Home Credit Fund and energy service professionals.

In conclusion, the problem of affordable comfort in Lithuania (as well as the rest of Eastern Europe) must be considered a human problem, emphasizing that people comprise the links between the challenges outlined in this paper. Although governments in these countries have recognized the political threat of cold families, they have only recently begun to understand how people are responding to these difficult situations. It is very important to couple politically difficult-but-necessary decisions (such as, increasing residential energy prices) with bold strategies to reduce energy needs. Doing either without the other can lead to difficult social problems on the one hand, or a misallocation of scarce resources (and skills) on the other.

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