

Submission

ENERGY GLOBE AWARD 2000
Housing Category

**Russian Enterprise Housing Divestiture
Project
(EHDP)**

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Using Energy Efficiency Retrofits to Transform Multifamily Property Markets in Russia The \$400 Million Enterprise Housing Divestiture Project

Summary

The Russian Enterprise Housing Divestiture Project (EHDP) is a large, multi-year project involving the retrofit of over 3000 multifamily buildings in 6 Russian cities. The EHDP has several unique features, which merits it being considered for an Energy Globe Award 2000:

- Building energy efficiency retrofits are the driving force in transforming ownership of multifamily properties from industrial enterprises to the private sector.
- By matching energy efficiency retrofits to building type and size, climate, and local energy prices, a model approach is being developed that can be replicated across all of Russia and much of the former Soviet Union.
- The EHDP is believed to be the largest, most comprehensive, and most complex multifamily building energy efficiency retrofit project ever undertaken.

The goal of the Russian Enterprise Housing Divestiture Project (EHDP) is to spur the transfer of thousands of multifamily buildings from previously state-owned industrial enterprises to city administrations and, ultimately, to the private sector. To induce cities to accept multifamily buildings from enterprises, the EHDP team determined that building energy costs needed to be significantly reduced. If energy cost reductions were accomplished by reducing building energy use, this would make the properties more valuable and more attractive to private sector ownership—the ultimate objective.

The EHDP team decided to achieve this objective by designing and implementing a \$400 million program to retrofit over 3,000 buildings in 6 cities. The size and expanse of the EHDP project, and that it is being undertaken in Russia, is sufficient testimony to the challenges faced by the EHDP team and is, by itself, sufficient reason why this effort is worthy of consideration for the Energy Globe Award 2000 in the housing category.

Background

Industrial enterprises in Russia owned and operated entire cities during the Soviet era. The enterprises provided housing, schools, health care, and recreational facilities for the residents. During the Russian government's restructuring initiatives in the 1990s, enterprises began privatizing their facilities. As part of this process, the government directed the enterprises to transfer ownership of their housing stock to city governments. The majority of the floor space is in buildings

ranging from 4 to 14 stories in height. The intent was that the cities would, ultimately, privatize the housing.

However, the cities were in poor financial shape, and had little incentive to accept the housing stock because of the high costs of maintaining the buildings. The major cost was heat, which was already approaching 50% of the annual operating budgets of some cities. Heat and other utilities had been essentially “free” under the Soviet system. Although residents now were being asked to pay a greater portion of the energy bill, the cities would still need to carry the majority of the cost.

Faced with an impasse, the Russian government asked the World Bank to assist in designing a program that would have the appropriate incentives for city governments to accept the enterprise housing stock. In response to this request, the Russian government and the World Bank assembled a team of energy efficiency experts to evaluate the potential for energy and monetary savings and to recommend a retrofit program design that, when implemented, would capture the projected savings. Initial analyses considered variations in building size and type, climate, and local energy costs. The results indicated that energy efficiency investments ranging from approximately \$25,000 to over \$100,000 per building would payback in less than 3 years.

The EHDP team determined that for the model approach to be easily replicated across all of Russia, it needed to be 1) applicable and cost-effective from the extreme climates in the north to the milder climates in the south, and 2) championed by city administrators. To accomplish these objectives, the EHDP team decided to advertise and promote the program, and to conduct a competition among cities from small to large and from north to south.

Coincident with the city competition, the EHDP team conducted several additional activities. Two of the most important were a retrofit demonstration project and a social survey to gauge resident acceptance of the project. The demonstration project entailed continuously monitoring all energy and water flows into, and out of, 6 typical multifamily buildings over 2 heating seasons in the city of Ryazan. These data were complemented by continuous and comprehensive data from 1) a weather station installed on the roof one of the buildings, and 2) apartment and ventilation stack temperature data loggers. This is believed to be the most comprehensive set of energy and water data ever collected on Russian multifamily buildings.

Four of the demonstration buildings were retrofit with a variety of measures after the first heating season (see attached photos and candidate retrofit list). Post retrofit data were used for two purposes. The first was to verify the energy and water savings due to the retrofits. The second purpose was to develop guidebooks to be used for selecting retrofits for the initial sets of buildings in the 6 cities. In the model approach developed by the EHDP team, the energy efficiency measures

selected vary as a function of building size and type, climatic factors, and energy cost. The plan is to continuously update the guidebooks as more energy and water data are collected over the life of the project.

The social survey was conducted with residents in 3 cities (including the Ryazan demonstration buildings) to determine their attitudes regarding energy and water consumption and efficiency, and to predict their likely acceptance of the potentially invasive nature of the retrofit process. Residents were enthusiastic regarding the proposed EHDP project retrofits. A post retrofit survey was conducted at the Ryazan demonstration buildings to evaluate resident perception of equipment performance and quality of workmanship.

The above activities were conducted to provide candidate city administrators first hand information on the retrofit measures and potential benefits from implementing the EHDP. The results of both the demonstration project and the survey were very positive, indicating that implementation of the EHDP could be effectively managed and that residents and city administrators would be happy with the results.

Given the above results, city administrators were eager to participate. The city administrators knew that they would eventually have to accept the enterprise multifamily housing stock. If the operating costs of the buildings could be significantly reduced, the cities could save money, and it would be easier to transfer the housing to the private sector. In addition, the city administrators would benefit politically because the residents would be happier. Finally, the local work force would benefit from the creation of local companies that would provide energy efficiency retrofit services to the EHDP and to other city buildings on a sustainable basis. The money saved from the EHDP efficiency retrofits could be used to retrofit other city-owned buildings. Thus, a sustainable retrofit services industry could, potentially, grow from the EHDP investments in each city. Six cities were eventually chosen for the program through the competition process (see map). These are: Cherepovets, Orenberg, Petrozavodsk, Ryazan, Vladimir, and Volkhov.

Results to Date

World Bank Board approval for the EHDP was given in May 1996 for \$300 million. Contributions from Russian federal and local governments, and from bilateral parties have increased the EHDP to \$421 million. The Russian government created the Foundation for Enterprise Restructuring (FER) to manage the EHDP from Moscow. Cities chosen for the EHDP created local implementation groups (LIGs) to interface with the EHDP team in Moscow and to manage the local retrofit activity.

To date \$29.5 million in contracts have been let with several additional bid packages currently open for competition and others being evaluated pending awards. Retrofits and equipment installed to date include:

- Complete metering systems in 40 “base” buildings across the 6 cities to collect similar data as was collected in the Ryazan demonstration. The data will be used to verify savings from future retrofits and to update the guidebooks.
- Over 500 building heat meters and over 500 water meters
- 5.5 km of heat pipelines rehabilitated
- 76 buildings retrofitted

The majority of the investment is budgeted for efficiency measures in the multifamily buildings. Typical retrofit measures include, but are not limited to, heat exchangers and/or building level controllers, balancing valves, pipe insulation, pipe replacement, attic and archway insulation, window weather stripping, window caulking, and entry door replacement. A limited amount of investment is reserved for “upstream” retrofits including the district heating and service water systems. A complete list is attached.

Results of the activities can be seen in the enclosed photos showing workers caulking exterior joints, results of caulking, archway insulation, new exterior doors, heat meters and controllers.

More details on the EHDP can be found at <http://www.fer.ru> including references to technical reports.



Enterprise Housing Divestiture Project Cities

- Cherepovets
- Petrozavodsk
- Orenberg
- Ryazan
- Vladimir
- Volkhov

**List of Building and Upstream Retrofits
Implemented under
Enterprise Housing Divestiture Project**

Building Retrofit

Heating and Domestic Hot Water System

- 1 Space heating heat exchanger and controls installation
- 2 Domestic hot water heat exchanger and controls installation
- 3 Building-level boiler and controls installation
- 4 Space heating controls installation
- 5 Pipe and riser flushing
- 6 Pipe and riser replacement
- 7 Pipe and riser insulation
- 8 Line balancing valve installation
- 9 Basic balancing
- 10 Thermostatic radiator valve installation
- 11 Radiator allocator installation
- 12 Building-level heat meter installation

Service Water System

- 13 Booster pump installation
- 14 Low flow showerhead installation
- 15 Low flow faucet installation
- 16 Shower and fauset restrictor installation
- 17 Toilet fixes
- 18 Apartment water meter installation
- 19 Building-level water meter installation

Envelope Insulation

- 20 External wall insulation
- 21 Archway insulation
- 22 Roof insulation
- 23 Attic insulation
- 24 Basement ceiling insulation
- 25 Pipeline and riser insulation
- 26 Apartment window film installation
- 27 Radiator reflector installation

Caulking and Weather-stripping

- 28 Panel and extention joint caulking
- 29 Apartment window and balcony door caulking
- 30 Apartment window pane caulking
- 31 Stairwell window caulking
- 32 Entrance door caulking
- 33 Apartment window and balcony door weatherstripping
- 34 Stairwell window weatherstripping
- 35 Entrance door weatherstripping
- 36 External wall hydrophobization

Construction Works

- 37 Roof and attic door installation
- 38 Basement opening hatch installation
- 39 Entrance door replacement
- 40 Stairwell window replacement
- 41 Apartment window and balcony door replacement

Ventilation System

- 42 Attic fan and air speed controls installation
- 43 Apartment damper installation

Electric System

- 44 Stairway lighting replacement
- 45 Apartment lighting replacement

Upstream Retrofit

District Heating

- 1 Heat meter installation in purchase points
- 2 Area-heat-only-boiler and controls installation
- 3 SH heat exchanger and controls installation in Central Heat Points (CHP)
- 4 DHW heat exchanger and controls installation in CHP
- 5 Variable speed pump and controls installation in CHP and Pump Stations (PS)
- 6 Pipe replacement
- 7 Pipe insulation

Service Water System

- 8 Water treatment facility installation
- 9 Variable speed pump and controls installation in PS
- 10 Pipe replacement

Remark: Upstream Retrofits # 2-5, 7-10 will be implemented in 2000-2002



Caulking Exterior Joints



Caulked Joints



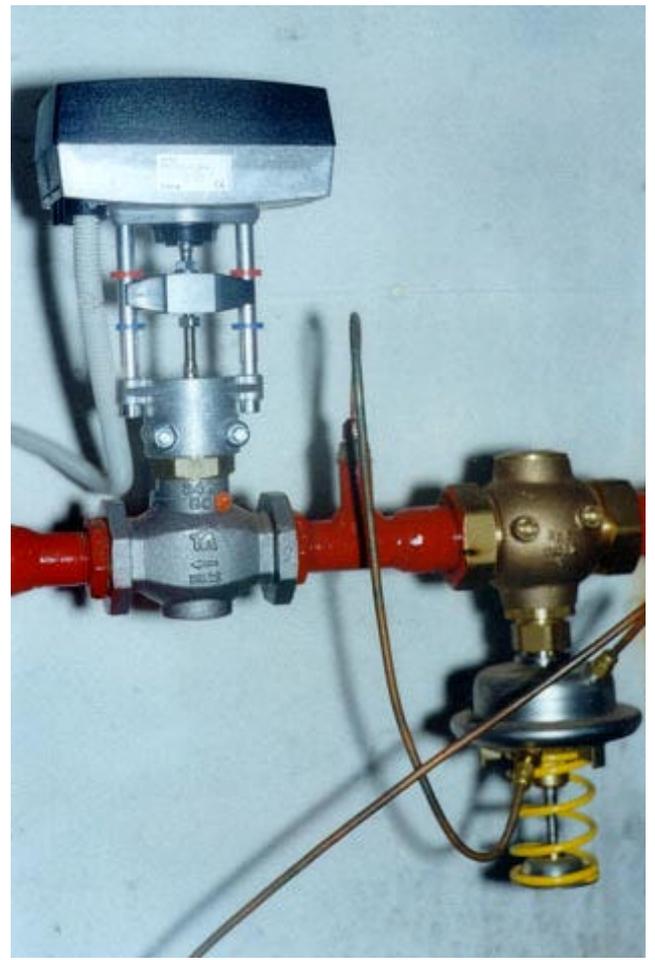
Archway Exterior Insulation



Archway exterior Insulation



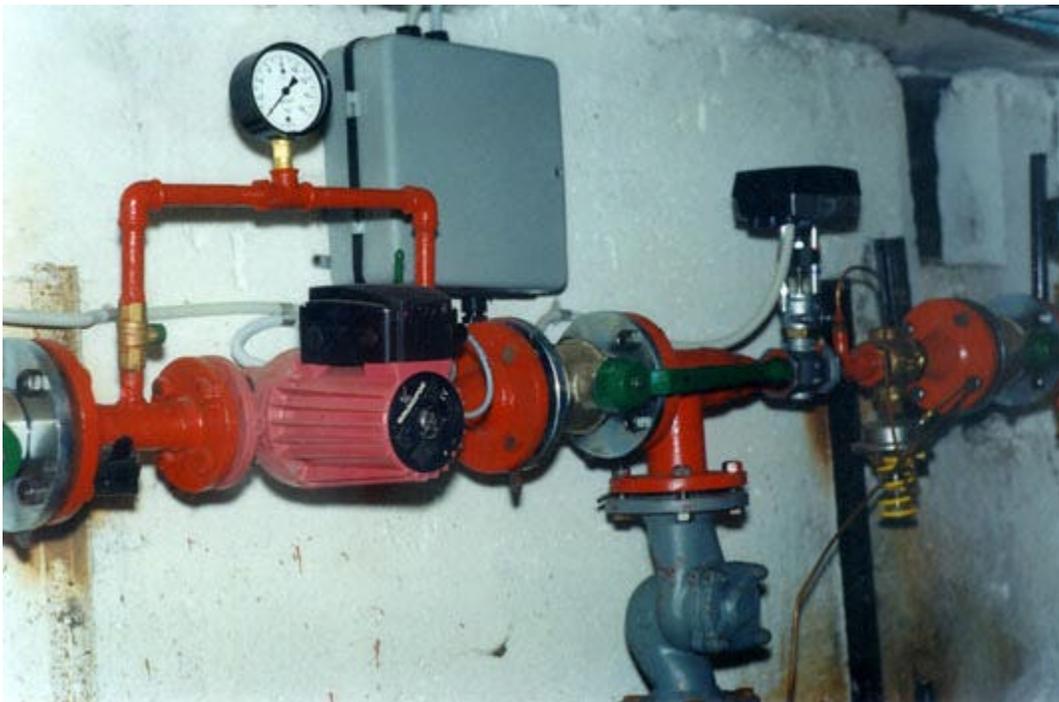
Exterior Door



Building Heat Controller



Building Heating System Balancing



Building Controller and Heat Meter