



USAID
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ARMENIA

RESIDENTIAL HEATING PROJECT

Final Report

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RESIDENTIAL HEATING PROJECT

Final Report

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INTRODUCTION AND CONTEXT

Over the last decade, the Government of Armenia has been struggling to maintain its municipal infrastructure under severe resource constraints. It has made great strides in certain areas, including the provision of reliable water and electricity to its citizens. Retaining a viable residential heating sector, however, has proven more difficult. The former Soviet-era centralized district heating systems have suffered under the burden of aging infrastructure, inadequate operation and maintenance budgets, and rising fuel prices. Across the country, unsustainable ad hoc solutions have crept in. Rural populations have turned to burning wood, deforesting large areas, and eroding the landscape. Most urban apartment residents survive without centralized heating and rely on unsafe electric or gas heaters or wood stoves in poorly ventilated apartments, leading to fires, carbon monoxide poisoning, and dozens of fatalities.

CHALLENGES TO SUCCESS

Analyses conducted over the past few years, including those made by the Residential Heating Project (RHP), have demonstrated a wide variety of policy, institutional, economic, technical, and social issues that limited progress toward sustainable heating solutions. Inadequate or ambiguous ownership documentation make operating or rehabilitating existing assets difficult. Planning and management capacity at the municipal level is limited, as is the history of private sector involvement. This sector will require an estimated \$500 million or more to rehabilitate, but it has drawn

only a small fraction of that amount. Banks and other investors see uncertain fuel prices, inadequate tariff structures, low cost recovery, and other risk factors as substantial disincentives to further investment. On the technology front, as old infrastructure crumbles, new and affordable options must be readily available. Low demand and competition from neighboring Iran have frustrated attempts to manufacture domestic heating equipment in Armenia. Finally, ineffective and poorly regarded systems for managing communal services complicate provision of heat to apartment buildings, where residents have only recently taken on ownership responsibilities.

THE RESPONSE

In 2002, with the support of the World Bank, the Government of Armenia (GoAM) took a significant step forward by adopting an Urban Heating Strategy. The strategy defines a framework for this developing country's heating sector over three phases ("survival," "recovery," and "growth") over the next 25 years. The strategy provides broad direction and next steps on a range of issues: regulation and market stimulation; institutional, social, technical, promotional/awareness; and financial considerations. Related dialogue defines government roles and responsibilities for implementing the strategy.

From 2000 to 2005, a variety of related heat energy projects were financed or co-financed by entities including the Government of Armenia, the national gas supplier ArmRusGasprom (ARG), a French-Armenian coalition, the European Union's TACIS program, the World Bank, the United Nations Development Programme/Global Environment Facility (UNDP/GEF), and USAID. These projects supported overall sector reform activities but also engaged in significant demonstration heating projects. In so doing, these projects informed future efforts.

USAID'S RESIDENTIAL HEATING PROJECT

The Residential Heating Project was conceived with the primary goal of helping the Republic of Armenia implement its Urban Heating Strategy. The project was intended to demonstrate a range of heat supply alternatives, including centralized heating based on heat-only boiler houses, cogeneration systems to serve municipal districts, heat-only boilers for single or multiple apartment blocks, and heating of single apartments by natural gas-fired heaters.

The project focused on practical alternatives to enhance the ability of the developing heat market to realize least-cost solutions that promote effective management, reduce costs, and minimize impact on the environment. The project was designed to stimulate more

“ During the last 10 years, the heating system has deteriorated in Armenia, creating not only serious social problems, but also obstacles for the country's economic development. I am sure that the proposed strategy will help to solve the problem.”

**- MR. ROBIN PHILLIPS,
MISSION DIRECTOR,
USAID/ARMENIA**

transparent commercial operations in the heating sector, which would ultimately improve the quality of service delivered to customers; and was motivated by the contribution that a more efficient heating system would make toward increasing Armenia's energy security. Improving economic efficiency and ensuring sustainable heat supply would improve the quality of life for all Armenians.

To realize the goal of fostering sustainable and affordable development of the heating sector, RHP supported broad sector-enhancement activities along with specific heating projects for residents of apartment blocks. These activities supported RHP's two overall objectives:

- To improve the effectiveness and commercial operation of key private sector and GoAM institutions that will promote more transparent and efficient heat sector management to support a sustainable commercial energy market.
- To support broad-based private sector and civil society contributions to implementing the GoAM heat strategy by:
 - Implementing heat supply pilot projects to introduce cost-effective and efficient heating infrastructure options
 - Helping condominium associations improve their capacity to organize and manage heat infrastructure rehabilitation and renovation
 - Helping private sector and municipal organizations strengthen their capacity to implement effective heat system operation and to further develop their commercial operations, in order to improve the quality of service and support sustainable system operation

Collaboration and linkages with other donor-funded activities were critical for RHP. The World Bank's \$15.5 million Heat Improvement Program created the Renewable Resources and Energy Efficiency (R2E2) Fund within the Government of Armenia to support development of the heat sector and finance associated projects. The Residential Heating Project was intended to help the fund's manager to develop staff, practices, and procedures and provide support and collaboration as heat projects financed through the fund were developed, analyzed, and implemented.

UNDP/GEF also funded a program on energy efficiency in the heat sector. This program supported a wide range of activities with significant potential for synergy with RHP, including providing advisory services to residents and private businesses, supporting development of urban heating strategies, monitoring and mitigating the environmental consequences of heating projects, and mobilizing funding for specific energy efficiency initiatives.

SUCCESS STORY

RHP Central Heating Solutions: Improving Quality of Life While Saving Money



Through a pilot initiative of the Residential Heating Project, Navella Nazaryan now has quality, affordable heating. Her building in Yerevan is warm throughout the winter, and her electric bill has been reduced by 75 percent.

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After the collapse of Armenia's Soviet-era district heating systems, Armenians, including more than 65 percent of the urban population living in apartment buildings, survived the winter using either expensive electric heaters or ineffective wood stoves. Homes were only partially heated, with room temperatures rarely exceeding 50 degrees Fahrenheit.

Like the other residents of her building at 23 Sundukyan Street in Yerevan, Navella Nazaryan thought that affordable centralized heating was a thing of the past. Yet it became a reality because of a RHP pilot initiative implemented with the local company Jerm-MAS, Ltd.

"Honestly, I couldn't believe my eyes and ears the first time a project representative told me about the program. I thought American assistance had no real impact on lives of usual citizens. Now I insist on the opposite," said Mrs. Nazaryan. "With USAID assistance, I have improved the quality of my life and saved money at the same time."

Mrs. Nazaryan, a mother of three children, appreciates the improved heating and more importantly, its low cost. Since the heating system was installed in her apartment, her electricity bill has gone down by 75 percent, yet her apartment is much warmer than before. Her family no longer needs to spend all day in one heated room in their three-bedroom apartment, and they don't need to heat the bathroom with an electric heater before taking a shower or bath. "There are new radiators throughout my apartment, and it is so warm it seems the summer sun is still shining outside," said Mrs. Nazaryan.

Now, the residents of her building can stay warm during the cold winter months. Mrs. Nazaryan's neighbors told RHP representatives, "Our life has now been significantly improved, and we're saving energy and money and protecting our health."

The residential heating sector in Armenia is very much a work in progress. RHP was initially intended to last three years, but USAID elected to end the project after 17 months. Although RHP did not fulfill all of the objectives envisioned at its inception, the project achieved substantial accomplishments, discussed in detail below. At the same time, the project helped identify the key challenges facing the residential heating sector, and the lessons learned on this project will inform future efforts.

SUPPORT FOR IMPROVED DELIVERY OF HEAT

The primary thrust of RHP was to bring heat safely, affordably, and sustainably to the people of Armenia. The project accomplished its objective through identifying, assessing, designing, investing in, and implementing pilot projects. During initial planning for the project, some were optimistic that significant existing systems and infrastructure could be brought to bear on the problem. Analyses supporting the development of the Urban Heating Strategy suggested that district heating systems would continue to make a significant contribution to residents' needs. This approach proved to be impractical. It was also thought that mobilization and better organization of the consumer base, through new or enhanced condominium associations, could contribute significantly in the near term to heat system sustainability. While this is true, achieving success with condominiums proved to be complex and forced project staff to rethink how to achieve more immediate success.

RHP made technical assistance and modest funds available to partially offset up-front heating project investment costs. Both of these steps catalyzed sector-wide activities. To demonstrate a range of heating options through individual projects, several sectoral challenges needed to be addressed. RHP identified and prioritized pivotal issues and tackled them either as required for an individual pilot project or under a broader sector development initiative (see next chapter).

DEFINING THE PRESSURE POINTS FOR SUCCESS

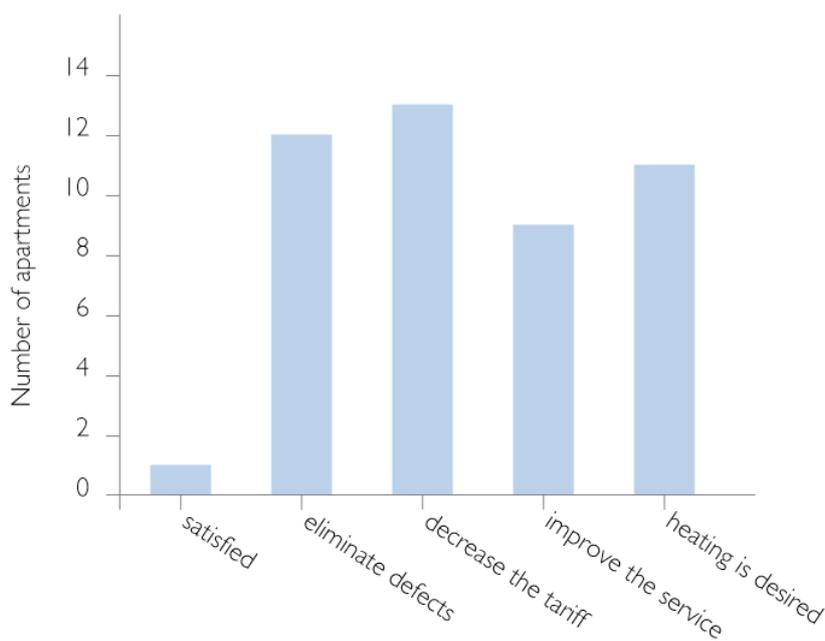
Because several donors had already engaged in heating projects, and the government maintained a modest program to rehabilitate existing infrastructure, RHP's pilot projects needed to recognize the factors that undermined these other efforts. A survey of 12 successful and unsuccessful heating infrastructure projects defined the issues as follows:

- Design and quality of heating equipment
- Condominium and communal services management
- Metering and monitoring usage
- Tariffs
- Billing/collection systems and customer relations
- Heat quality tied to existing building design

Legal issues, identified as an issue for broad sector enhancement, were not found to be as significant. Any legal impediments were addressed on a project-by-project basis.

Many of these factors are technical. The RHP survey found that in the less successful pilots, nearly 80 percent of customers cited technical issues as reasons why the pilot project had not met their heating needs. Technical factors, however, are relatively easy to address. Customer satisfaction is a more complicated problem, especially because future sustainability will depend on customer payments.

CUSTOMER ISSUES WITH EXISTING HEATING OPTIONS



Non-payment is rarely, if ever, related to the ability to pay. RHP examined the situation in Aparan, one of the poorest cities in Armenia. This city has four fully functioning boiler houses owned by four different condominiums. The collection rate for these four condominiums is nearly 100 percent, with only a few residents paying late.

MULTIDISCIPLINARY PROJECT SCREENING

RHP initiated a process to screen and qualify potential projects based on lessons learned from prior efforts and additional factors defined by the team and stakeholders. The first heating season would include those projects considered most viable (restarts, expansions) because of lower capital investment requirements, viable operators identified, a solid customer base, and other factors. Restarts were given special scrutiny to determine the challenges of turning a previously failed project into one with longer-term sustainability. Customer satisfaction and payment issues were most common with restart projects.

Each potential project was assessed through multiple meetings with municipal officials. In all, RHP worked with in 30 municipalities across Armenia during the screening process. Engineering assessments were followed by legal analysis (focusing on asset ownership and contractual issues), door-to-door surveys with residents, and discussions with operators. Six pilot projects were identified for the first heating season. Ultimately two were carried to completion, in part because of the early closure of the project. Details on these two projects are to follow.

IMPORTANCE OF PRIVATE SECTOR OPERATORS

Two factors dominated discussions during project screening: viability of the customer base and resulting income stream, and identification of a suitable operator. Municipalities themselves were typically reluctant or ill equipped to participate, yet they often controlled existing assets such as boiler houses.

By all accounts, finding a private sector operator was most desirable. Of the six projects short-listed by the RHP team for feasibility studies and implementation during the 2006-2007 heating season, two involved private sector operators who controlled the heating assets. Another project involved apartment-level solutions, with residents procuring heaters directly from the private-sector supplier. An additional two projects were operated by ArmRusGasprom, which had a vested interest in projects that would be potential customers of the company's gas. The final project was to be operated by the city of Spitak, one of the more proactive municipalities supported by RHP's integrated municipal heat planning process discussed in the next chapter.

CONVINCING THE CUSTOMER

Building trust is crucial to providing heating services, and RHP invested heavily in this goal, in part by understanding and addressing customer needs for each pilot project undertaken.

Owners and operators can build trust in various ways, including:

- Open and frequent communication with residents/consumers
- Transparent cost accounting
- Regular provision of information such as expected price changes
- Understanding the financial capabilities of poor consumers
- Examination of proposed energy savings programs

Community relations activities began with project screening and continued through the construction phase for selected projects. For projects past the screening stage, RHP worked to support the operator's effort to foster long-term customer satisfaction. The

TABLE I.
SUNDUKYAN PILOT PROJECT: THE NUMBERS

Total apartments in all four buildings	215
Number of apartments participating	119
Estimated number of residents participating	464
Jerm-MAS company direct investment	\$63,000
USAID direct investment	\$176,000
Estimated average reduction in heating costs per apartment (based on price from new gas system versus price if using electricity for comparable heating level)	48% (assumes electrical heat cost is AMD 172,350, and new gas system heat cost is AMD 89,260 per season)

SUCCESS STORY

Promoting Small Businesses in the Heating Sector



Armen Martoyan implemented a heating project in Yerevan's Arabkir neighborhood after attending RHP's first Exhibition of Heating Technologies.

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After the first Exhibition of Heating Technologies organized by RHP with local government officials, businessman Armen Martoyan, one of the visitors to the exhibition, became confident that his idea of doing business in the residential heating sector was realistic. Mr. Martoyan is the founder of Jerm-MAS Ltd., a small local business selling construction materials. In partnership with RHP, he implemented a successful heating project in Yerevan's Arabkir neighborhood, bringing heat to more than 100 families.

Mr. Martoyan has a deep understanding of business in Armenia. In a recent interview with a Yerevan newspaper, he expressed his strong belief that with effective management, business in the heating sector is not only possible, but potentially very profitable. He also predicted that it will soon become a popular business in Armenia because very little centralized heating currently exists. "There is a need only for start-up assistance to such kind of business, and this is being provided by USAID," Mr. Martoyan told the newspaper.

Mr. Martoyan was one of first businessmen to prepare a detailed business plan for a heating project to submit to the Yerevan city government. It was approved quite quickly, in part due to its quality and professionalism.

He has not just financed the construction of the boiler house. He was very attentive to the quality of equipment, and with RHP's assistance, he has trained his staff not only to manage the heating systems effectively, improve billing mechanisms, and enhance the quality of services provided to consumers, but also to improve customer service to achieve the best results possible. Seeing larger benefits, Mr. Martoyan has renovated the buildings' entrances and constructed a playground for children.

Mr. Martoyan has already received advance payments from his new customers equivalent to 60 percent of the total estimated charges for the month of December. Residents of two additional buildings nearby — one of which Mr. Martoyan has already agreed to support — have also expressed willingness to draw heat from the new boiler house.

plan was as follows:

- Phase I. Project analysis and planning
 - Surveys and focus group meetings with residents
 - Preparation of informational materials
 - Town hall meetings
 - Targeted community-based trainings
- Phase 2. Launch of heating system
 - Event and publicity
- Phase 3. Operations
 - Monitoring and evaluation to assess residents' satisfaction and make enhancements as necessary

Through door-to-door interviews, project staff obtained information on resident's concerns, knowledge gaps, and misperceptions that would affect the chances of success of an anticipated heating project. These interviews also identified the preliminary level of interest in the project, affecting anything from technology considerations to tariff and finance options. As projects progressed through implementation, activities included additional and more detailed questionnaires to understand further technical details (e.g., apartment layout and size). In all, RHP and its partners conducted more than 900 interviews with residents.

Public outreach continued during construction, as staff worked with the operator to address resident concerns and expand participation in the pilots.

EXECUTION OF PRIVATE SECTOR-LED HEATING PROJECTS

RHP supported two successful heating projects, bringing quality and affordable heat to an estimated 510 residents of Yerevan for the 2006-2007 winter heating season. These pilots demonstrated the private sector's commitment under two different supply options — centralized boilers and individual apartment-level boilers. In addition to USAID's direct investment in the projects of \$185,300, the private operators/suppliers and residents invested a total of \$74,000.

For the first pilot project, RHP identified a small private company, Jerm-MAS, Ltd., interested in bringing back on line the heating system at 23 Sundukyan Street in Yerevan. Upon further review with RHP specialists, the project was expanded to include two neighboring buildings as well, for a total of 175 apartments. Discussions with residents indicated that 85 apartment owners

were interested in participating and were able to pay for the new heat supply.

RHP's memorandum of understanding with Jerm-MAS called for:

- RHP to provide technical assistance and funds through a subcontract to a local energy service company (ESCO), supply and installation of the external water piping to the buildings, heat meters for the buildings, and the internal heating systems supplying building common areas and individual apartments
- Jerm-MAS to complete construction of the boiler house, furnish the boilers and related equipment, provide all utility connections, and serve as the overall operator of the system

As an incentive to increase participation, residents were offered free connections within their apartments during the first year.

As detailed design and construction proceeded, Jerm-MAS received an expression of interest from residents of a fourth and adjacent building, bringing the total participating apartments to 119. Through close planning between RHP and Jerm-MAS, systems for the first three buildings were completed in November, and the fourth was completed in December.

The potential for this pilot to serve as a catalyst was realized with the expansion to the fourth building noted above. Further expansion is on the horizon. Armen Martoyan, the founder and manager of Jerm-MAS, indicated he would install a third boiler soon in preparation for supplying a fifth building of 125 apartments next year. Mr. Martoyan has leased eight other boiler houses within Yerevan and intends to refurbish them as well.

The second pilot, at 15a Amiryan Street in Yerevan, was more modest in numbers but successful nonetheless. Euroterm, LLC, a local producer of apartment-level boilers, identified an opportunity. Its technology allows customers to have full control over the heating system, making it easier for them to regulate fuel consumption as well as fulfill their hot water needs. The project was made possible by the recent gasification of the building by ArmRusGasprom.

RHP helped Euroterm assess the economic, financial, and technical feasibility of this project, particularly the technical aspects related to safe provision of input air for the boilers and the technology used to vent combustion by-products to the atmosphere in a safe and environmentally sound manner.

The project was made possible through small, three-year loans (70 percent financing at 13.5 percent interest with no advance payment) to apartment owners through a local bank. The loans helped residents cover the cost of the equipment, which ranged

from \$1,300 to \$1,600 depending on the size of the apartment. RHP estimated that residents together contributed approximately \$11,000, and approximately one-third of the residents obtained loans. USAID support amounted to \$9,300. Twelve individual apartments were equipped with boilers through this project. Other residents are interested, because of the success in the initial apartments.

In addition to these two pilots, RHP has helped leverage other donor efforts involved in heat provision. The UNDP/GEF project plans to support a multibuilding heating project in Spitak to serve 23 buildings with 276 apartments. RHP was responsible for finalizing ownership issues, defining technical requirements, and calculating financing needs, all within the context of the Spitak municipal heat planning process.

FOSTERING IMPROVED SECTOR PERFORMANCE

Armenia's Urban Heating Strategy acknowledged the full range of challenges faced by the residential heating sector. While the strategy provided a management framework, implementation planning by the government was lacking. Tremendous resource pressures meant that clear decision-making criteria and priority setting were essential. National and local initiatives and roles and responsibilities needed to be reconciled and coordinated. Given that implementation takes place at the local level, better municipal planning was clearly needed.

Other elements of the sector need to be enhanced as well, starting with ensuring the success of pilot projects and moving toward a sustainable and expanding market for heating equipment and services. In conjunction with enhanced performance of government institutions, the private sector and civil society performance required substantial improvement.

RHP's approach treated the impediments and constraints identified in pilot project planning as opportunities. The pilots provided real-life examples of some of the constraints that served as real impediments to providing heat to residents efficiently and affordably. Legal, technical, and community involvement specialists developed solutions that could, in turn, provide a starting point for broader sector reforms. Other reforms initiated by RHP were less specific to pilots but enhanced the enabling environment.

MUNICIPAL HEAT PLANNING SETS THE STAGE FOR RATIONAL INVESTMENT

The years immediately following the development of the Urban Heating Strategy saw few government initiatives related to the heat sector. Government support to centralized systems was withdrawn even though management of the heating enterprises was inadequately prepared for the challenge. Centralized systems collapsed, and people who could afford it installed their own heating systems to replace them. Uncontrolled development of the heat market failed to meet the objectives of the urban heating strategy while producing new problems, such as risks to health and safety.

At the start of RHP, some believed that the Urban Heating Strategy needed to be updated to reflect the evolution in the sector since 2002. RHP, on the contrary, believed that the priority was to move rapidly toward local planning in municipalities and the associated implementation plans.

The objectives of municipal heat planning included: 1) developing sustainable least-cost heating for the urban population, 2) promoting the rational use of energy, and 3) reducing environmental stresses. With severe constraints on municipal resources, officials also needed to have the tools to make rational decisions when options are presented by private sector proponents, the national government, and other sources such as donors.

The design then called for implementation plans describing the complete course of action contemplated for the municipalities, including the role of ongoing municipal planning, organization structure, stakeholder communication, schedule, quality and safety provisions, critical success indicators, and a financing plan. The implementation plans would ensure the proper enabling environment by addressing such key issues as development of consumption-based billing systems, harmonization of pricing methodologies for heat and gas, support for low-income households, and enhancement of the regulatory and standards framework. Each plan would reflect local conditions, including weather, heat demand density, and the resources available in specific residential areas.

With the shortened duration of RHP, the major step of municipal heat planning was begun. RHP selected two cities, Sevan and Spitak, for the first municipal heating planning initiative in Armenia. Both of them are fully gasified, have relatively good socioeconomic conditions, and have officials keenly interested in planning.

Sevan is a city of 23,818 people, with a variety of geographic zones and building types that require the assessment of multiple conditions and heating options. It has a relatively long and cold heating season.

Spitak is a somewhat smaller city of 19,600 people, with newer construction and relatively uniform building types and heating needs. It is more typical of newer cities elsewhere in Armenia and has a milder heating season than Sevan.

The success was RHP's ability to draw municipal leaders and other stakeholders into a process they saw as realistic. The plans offered stakeholders:

- Thorough analysis of heat demand for the municipality and specific zones
- Definition of heat supply options, including prioritization, based on a series of general and local factors
- Cost and affordability determination
- Institutional requirements (e.g., ownership, licensing, metering, tariffs, cost accounting)
- Financing options
- Action plan for moving forward with specific initiatives

RHP supported not simply a static document, but a process with tools to facilitate planning in the future. Some of the models created allow both the municipality and investors to assess feasibility of different heating systems, based on elements such as the technology and specific heat demand of the location, feasibility of hot water supply systems in addition to heating, level of required capital investment, and heat tariff and monthly payment options.

“ Now that we have been provided this very good integrated heating plan, we feel an obligation to try to make use of it.”

**- GEVORG NAZARIAN,
CHIEF CITY ARCHITECT, SPITAK**

“ It took our specialist 20 days to develop a small heating plan for Vedi. With this new model and spreadsheet, the development time will be much faster.”

**- TAMARA BABAYAN,
R2E2 FUND DIRECTOR**

PRIVATE SECTOR SUPPORT AND FINANCING

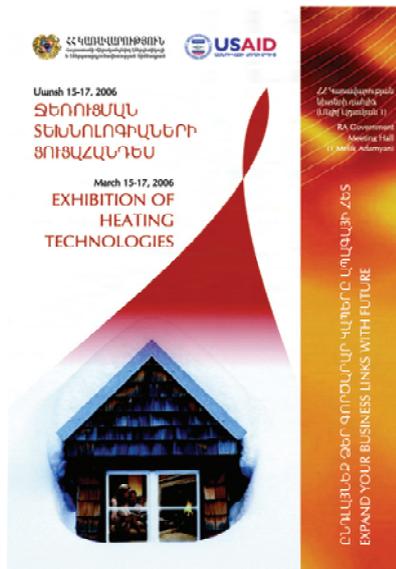
For the private sector market in the residential heating sector to succeed, a variety of factors must be addressed. RHP, while showing some success, was only a first step. Its support was to be multi-faceted, addressing business development services, access to financing, feasibility analysis and risk mitigation, demand issues, legal requirements (from technical standards to customs regulations), customer relations, and other issues. Specific interventions were intended to focus on:

- Analyzing the condition of current heating systems to provide optimal heating and heat measurement options
- Calculating heat system renovation, operating, and maintenance costs
- Conducting public opinion surveys and education campaigns on heat sector renovation
- Understanding legal and contractual regulations
- Initiating business plans for bank financing and loans
- Providing specialized training, as required, on these and other topics

Through the pilot projects, RHP highlighted two successful models for private sector involvement. One model is a centralized, multi-building option with the operator serving residential customers; and the other is an individual apartment-level technology provided by a local equipment supplier.

Broader support began with a diagnostic phase, engaging heating technology suppliers and financing institutions to determine impediments and opportunities. RHP's main support was linked to the project identification and planning process. Technical, financial, and legal specialists prepared analytical tools to define viable heating options and the operational, economic, and financial parameters; model contracts; and model business plans to support financing. All of these tools are now available to the market through the project's heat sector supply database (see below).

One of RHP's successes was the first Exhibition of Heating Technologies in March 2006. Organized with the R2E2 Fund, the exhibition's goal was to bring together suppliers, financing institutions, and potential customers in one place to facilitate awareness and information sharing on efficient heating technologies, and resources for putting them into practice.



One of RHP’s successes was the first Exhibition of Heating Technologies, which connected suppliers, financial institutions, and customers. Nearly 30 exhibitors and 2000 visitors attended.

The exhibition hosted nearly 30 exhibitors and welcomed more than 2,000 visitors. Participants included major suppliers and manufacturers of heating technologies in Armenia, energy service companies, condominium associations, and commercial banks and credit organizations interested in heating sector financing. Participants found the exhibition to be an ideal forum for presenting their products and services to the public and other stakeholders in the heating sector, appropriately conveying the importance and feasibility of improving heat in Armenia, and meeting with potential customers.

Visitors said that the exhibition increased their knowledge of heating technologies and related services and financing available in Armenia. One visitor told staff, “There is no doubt that the exhibition is both useful and interesting. I’d like that it not be the last one!” The exhibition enjoyed extensive media coverage from numerous print, broadcast, and electronic media outlets.

LEGAL AND REGULATORY REFORM

RHP and its partners were aware that legal and regulatory difficulties had contributed to the growth of inappropriate heating options, led some projects to fail, and prevented other projects from starting up at all. In the initial months of the project, RHP completed an assessment of the laws and regulations covering the provision of heat to residents. The report assessed the following:

1. The functions of apartment building management bodies
2. Contracting relationships among consumers, condominium associations, and energy service companies
3. Heat sector standards and technical regulations
4. The need for a law on heat supply
5. Enabling the consumer to regulate the amount of heat consumed based on own choice
6. Bankruptcy claims on property used by the public
7. Discounting opportunities for collective groups, such as condominium associations
8. Certification of boiler operators
9. Grandfathering of old gas connections
10. Rights-of-way required for gas networks and boiler houses
11. Environmental sustainability requirements

Although much had to be done, RHP decided to concentrate on its primary objective — providing sustainable and affordable heat to residents. Further discussions with system operators, investors, customers, and municipalities created clear consensus on the immediate need.

Stakeholders agreed that many projects failed and others were never started due to the uncertainty or problems in the relationships between the heat supplier and the consumer. RHP's legal team completed three model contracts for various scenarios of heat supply projects, which were reviewed by the Armenian Public Service Regulatory Commission (PSRC). One contract seeks to define relations among the private operator (often an ESCO), condominium residents, and the condominium association, where the condominium association has the role of collecting fees from residents and paying to the operator for the volume of supplied heat energy. Two sample contracts define relations between the operator and residents. In one of these model contracts, monthly fees are fixed and depend on the size of the apartment or number of radiator sections in the apartment. In the other, monthly fees are calculated based on the amount of consumed energy.

STANDARDS AND TECHNICAL REGULATIONS

Technical regulations and standards, if they are properly enforced, greatly facilitate a sustainable heating market. The inadequate framework to date has contributed to unsafe technology and installations in residences, distortions in supply options allowing inexpensive but unreliable (and unsafe) options, and more costly yet inefficient and outdated systems due to outdated design standards.

RHP led a highly consultative process for modifying crucial standards, engaging relevant ministries and standard-setting bodies, including the Ministry of Energy, ArmRusGasprom, the National Safety Centre, the R2E2 Fund, and the Public Services Regulatory Commission. In spite of RHP's abbreviated term, the team addressed some of the most critical standards and supporting regulations: two regulations, each supported by four technical standards.

One regulation related to installation and operation of hot water and pressurized steam boilers, and the other to safety requirements for the installation of gas appliances in apartment buildings. The regulations were developed based on international norms, taking into consideration local economic opportunities and consequences. Final documents in Armenian were transferred to the Ministry of Energy for officials to begin the process leading to parliamentary approval.

COMMUNICATIONS AND RAISING AWARENESS

In addition to specific community initiatives on heating projects, communications were a component of RHP's agenda. The project developed a comprehensive communications strategy and action plan to include stakeholders and beneficiaries — government ministries, ArmRusGasprom, the R2E2 Fund and other donor efforts, finance institutions, private sector operators and suppliers, condominium associations, and the general public.

Communications activities were guided by initial assessments on various elements of the sector and lessons learned from previous heating projects, discussions with key stakeholders, and survey results.

While insufficient time passed to allow measurement of impact, RHP's accomplishments included the following:

- Creation of public service announcements on gas safety, project funding sources, condominiums and heating systems, and local heating equipment manufacturers
- Preparation of a gas safety brochure, now being distributed by ArmRusGasprom and others to the general public, the news media, and others
- Other activities described elsewhere in this report, such as the extensive communications work performed for pilot projects and the exhibition of heating technologies

ENHANCING KEY INSTITUTIONS

The project had a specific mandate to support the development of the R2E2 Fund. In the initial months of the project, RHP specialists supported development of the R2E2 Operations Manual, focusing particularly on compliance of institutional arrangements with local legislation, the operation of the grant scheme for the poor, and overall cohesion. In addition, RHP supported the fund's manager in her efforts to identify specific accounting software and equipment for fund offices. As the fund became established, RHP and R2E2 pursued joint activities, such as the heating exhibition and the identification of viable heating projects.

RHP also worked closely with ArmRusGasprom to develop a joint work plan that included support to the company's public relations strategy on gas safety, the improvement of collections at company-owned boiler houses, development of an improved contractual process for sale of natural gas to new heat energy systems, and assistance with gas equipment-related technical regulations.

As it moves from a "supply-side/central planning" management mentality to a more customer-centered approach,

ArmRusGasprom must place greater emphasis on public relations and customer relationship management, which are essential to sustaining customer participation and satisfaction. One of the very important aspects of these services is providing quality safety information to consumers and holding applicable parties to safety regulations, particularly within residences.

In recognition of the importance of customer-related issues, RHP supported an observation study tour (funded under USAID's Human and Institutional Capacity Development Project) to allow representatives from ArmRusGasprom and the Ministry of Energy to observe best practices in gas safety and customer relations in the Czech Republic, which has experienced similar transitions from Soviet-style heat supply systems. Participants observed public relations and customer relationship management (PR/CRM) techniques and new approaches to developing a PR/CRM program. They saw how public awareness campaigns on critical consumer topics, such as gas safety and rate hikes, are developed and rolled out. They also witnessed how consumer groups and NGOs interact effectively with utility regulators on topics including gas safety, consumer rights protection, quality gas provision services, and billing and payment issues.

HEAT SECTOR KNOWLEDGE MANAGEMENT

Rehabilitating Armenia's heat supply systems requires considerable capital investment. The government cannot afford to rehabilitate systems in each municipality on its own, so responsibility will rest mainly with the private sector, working with the consumers themselves. For heating projects to be attractive for private investment, investors must have all the facts at their disposal.

Analysis carried out by the RHP team showed that historically, investors refused to make investments in the heating sector because they are unable to determine the risk factors involved and the return on investment. Issues related to planning, operation, maintenance, and management of heat supply systems were formerly addressed by various state bodies. Most of those bodies do not exist now, and to obtain information about heat supply systems of Armenia, one must turn to other sources of information, many of which are unreliable. Further, obtaining information from different sources is expensive, discouraging all but the most tenacious entrepreneurs.

To counter this impediment, RHP developed a national heat sector supply database. The intent was to provide a transparent, widely available knowledge management framework for potential investors that would capture information on the status of

residential heating in various municipalities, legal and regulatory issues, and sources of equipment and financing. It would also provide tools for potential investors to evaluate technical solutions, obtain financing, and engage in contracts with customers.

Before developing the database, the RHP team studied more than 30 similar databases worldwide, evaluated experience of foreign countries on database development, and organized a discussion on database structure and objectives with counterparts. The resulting system, which has now been transferred to the Ministry of Energy, is composed of two major sections.

Information section

- General data related to heat supply systems rehabilitation for 54 municipalities in Armenia, including:
 - Brief information about each city
 - A map of the city
 - Regional administration bodies
 - Banks
 - Population
 - Economy
 - Geographical and climatic parameters
 - Residential and public buildings
 - Technical characteristics of former heat supply systems
 - Current situation of heat supply systems
 - Any municipal heating plans previously developed
- Legal and regulatory framework (copies of 47 laws and decrees of the GoAM are included)
- Information about the current finance sources and lending terms and conditions for heat project beneficiaries
- Information about heat equipment supply companies, manufacturers, and ESCOs, to help investors and consumers make good choices among the many options based on different technical, performance, and financial indices

Support section

- Initial steps to developing a heating business
- Anticipated barriers and lessons learned in the heating business
- Model business plan and financial model
- Model customer survey, incorporating RHP's survey experience for pilot projects, to help potential operators and

investors assess the level of participation in a heat supply project

- Heat supply model contracts (three model contracts and a user guide)
- Software model for evaluating the heat load, capital investment, and various technical and economic parameters of heating system alternative designs
- Sample municipal heating plans from Sevan and Spitak

LESSONS LEARNED TO INFORM FUTURE INITIATIVES

Analyses performed by the RHP team document lessons learned from Armenia's recent residential heating projects and some of the hurdles yet to be surmounted. These analyses are available on the CD accompanying this report. Activities of RHP yielded several additional insights, detailed below.

The consumer is key. RHP spent extensive resources understanding residents' concerns, questions, and misperceptions; developing and implementing a customer relations and support program; and working closely with the operator to build trust from the outset. This trust was enhanced by the quality and timeliness of the construction team's work and the operator's physical presence and active participation in the community. This in turn led to advance payment by residents and oversubscription of the project as neighbors' apprehensions dissipated.

Residents want control. Centralized provision of heat that cannot be controlled by the resident is no longer acceptable to most people. Metering, and in some cases allocators, together with frank discussions on tariff structures and billing, strip away skepticism regarding unfair charges. Collective action through condominium associations to manage infrastructure in common areas and protect consumer interests depends more on the personalities involved and cultural biases than on policies or legal issues. At the same time, rehabilitation and reconstruction projects implemented with consumers' contributions and participation can be more sustainable, because the project's success will ensure the effectiveness of the consumers' contributions.

Socially vulnerable populations need serious consideration. The RHP pilot on Amiryan Street in Yerevan showed that this was true even in the relatively prosperous capital. Poorer residents, including pensioners, could not afford the up-front costs of the heat solution and could not demonstrate enough assets or cash flow to qualify for bank financing. Outside Yerevan, this situation is more critical and needs significant attention.

The private sector is interested, but risks (both actual and perceived) need to be mitigated. The relative lack of successful heating projects in Armenia limits the information available for investors to properly assess new opportunities and mitigate risks. Technical assistance to support the planning and design effort should continue. Although grant money for project start-up slightly distorts the market in the near term, the demonstration effect of these early projects and the risk reduction that comes with support provide the catalyst that the market needs to work properly in the long term. This was demonstrated clearly in the pilot project on 23 Sundukyan Street in Yerevan, where RHP partner Jerm-MAS is now looking for opportunities on its own to refurbish an additional eight boiler houses.

PROJECT PARTNERS

The Residential Heating Project was implemented from late July 2005 through December 2006 under a stand-alone contract issued by USAID to Chemonics International Inc. Chemonics' U.S.-based partners for the project were Advanced Engineering Associates International, Inc (AEAI), the Alliance to Save Energy (ASE), and Hill International, Inc. In Armenia, the project was supported by the Association of Condominium Chairmen (ACC), AVAG Solutions Ltd., Euroterm, the National Association of Condominium Owners (NACO), and Termoservice.

RHP interacted with a broad range of stakeholders and beneficiaries, including the R2E2 Fund, the Ministry of Energy, the Ministry of Nature Protection, the Ministry for Coordination of Territorial Administration and Infrastructure Activities, the Ministry of Urban Development, the Ministry of Finance and Economy, the Public Services Regulatory Commission, ArmRusGasprom, various municipalities, private sector companies, and other donor projects.

PROJECT REPORTS AND RESOURCES

The accompanying CD contains the following items that can be distributed widely to foster knowledge sharing in the residential heating sector:

- Selected project reports and deliverables
- Public service announcements on gas safety
- Electronic copy of this final report

CD ROM INDEX

TECHNICAL REPORTS

**ASSESSMENT OF LEGAL/REGULATORY
FRAMEWORK**

**ASSESSMENT OF LEGAL/REGULATORY
FRAMEWORK: COMMON LAND AND FACILITIES**

COMMUNICATIONS STRATEGY

**CURRENT HURDLES FOR AFFORDABLE HEAT
SYSTEMS**

**DEVELOPMENT OF HEAT SECTOR STANDARDS
AND TECHNICAL REGULATIONS**

HEAT ENERGY MARKET ASSESSMENT REPORT

HOW TO WRITE A BUSINESS PLAN

**LENDING PRACTICES AND RECOMMENDATIONS
FOR THE HEATING SECTOR**

**LESSONS LEARNED FROM RECENT HEATING
PROJECTS**

MUNICIPAL HEAT PLAN: SEVAN

MUNICIPAL HEAT PLAN: SPITAK

PILOT HEATING PROJECT REPORT: SUNDUKYAN

PILOT HEATING PROJECT REPORT: AMIRYAN

TRAINING NEEDS ASSESSMENT

TRAINING NEEDS ASSESSMENT: CONDOMINIUMS

PUBLIC SERVICE ANNOUNCEMENTS

SAFE GAS USE

DEALING WITH GAS LEAKS

FINAL REPORT

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