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Report No: 31552-AM

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT
IN THE AMOUNT OF SDR 10 MILLION
(US$ 15 MILLION EQUIVALENT)

TO THE

REPUBLIC OF ARMENIA

FOR AN

URBAN HEATING PROJECT

June 3, 2005

Energy and Infrastructure Sector Unit
South Caucasus Country Unit
Europe and Central Asia Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective January 27, 2005)

Currency Unit	=	Armenian Dram (AMD)
AMD495	=	US$1
US$0.00202	=	AMD1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

BOT	Board of Trustees
CAS	Country Assistance Strategy
CDD	Community-Driven Development
CDM	Clean Development Mechanism
CBA	Central Bank of Armenia
CFAA	Country Financial Accountability Assessment
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DH	District Heating
EEHPP	Energy Efficiency and Housing Pilot Project
EMP	Environmental Management Plan
ERR	Economic Rate of Return
FI	Financial Intermediary
FM	Financial Management
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GOA	Government of Armenia
GPOBA	The Global Partnership on Output-Based Aid
HOA	Home Owner Association
IDA	International Development Agency
IDP	Institutional Development Plan
IFRS	International Financial Reporting Standards
kWh	Kilowatt Hour
MOFE	Ministry of Finance and Economy
NBFI	Non-Bank Financial Institution
NGO	Non-Governmental Organization
OBA	Output-Based Aid
OM	Operations Manual
PFBP	Poverty Family Benefit Program
PFI	Participating Financial Institution
PIU	Project Implementation Unit
PPF	Project Preparation Facility
PRSP	Poverty Reduction Strategy Paper
R2E2 Fund	Renewable Resources and Energy Efficiency Fund
UHP	Urban Heating Project
UHS	Urban Heating Strategy
UNDP	United Nations Development Program
USAID	United States Agency for International Development

Vice President:	Shigeo Katsu
Country Manager/Director:	Donna Dowsett-Coirolo
Sector Manager:	Peter Thomson
Task Team Leader:	Gevorg Sargsyan

ARMENIA
URBAN HEATING PROJECT

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ARMENIA
URBAN HEATING PROJECT
PROJECT APPRAISAL DOCUMENT
EUROPE AND CENTRAL ASIA

Infrastructure and Energy Sector Unit

Date: June 3, 2005	Team Leader: Gevorg Sargsyan
Country Director: D-M Dowsett-Coirolo	Sectors: District heating and energy efficiency services (70%); Oil and gas (30%)
Sector Manager: Peter D. Thomson	Themes: Other urban development (P); Infrastructure services for private sector development (S); Pollution management and environmental health (S)
Project ID: P057880	Environmental screening category: Financial Intermediary Assessment
Lending Instrument: Specific Investment Loan	Safeguard screening category: Requires framework

Project Financing Data

[ ] Loan [X] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 15.00
Proposed terms: 10 year grace period, final maturity of 40 years, a service charge of 0.75% and commitment fee of 0.50%

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER	1.55	0.50	2.05
BENEFICIARIES	0.60	1.40	2.00
INTERNATIONAL DEVELOPMENT ASSOCIATION	4.71	10.29	15.00
UN DEVELOPMENT PROGRAM -GEF	1.20	1.70	2.90
Total:	8.06	13.89	21.95

Borrower: REPUBLIC OF ARMENIA

Responsible Agency: MINISTRY OF FINANCE AND ECONOMY

Estimated disbursements (Bank FY/US$m)

FY	2006	2007	2008	2009	2010
Annual	1.50	3.70	3.60	4.40	1.80
Cumulative	1.50	5.20	8.80	13.20	15.00

Project implementation period: Start: October 7, 2005 End: December 31, 2009
Expected effectiveness date: October 7, 2005
Expected closing date: June 30, 2010

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD A.3***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD D.7*** Have these been approved by Bank management? Is approval for any policy exception sought from the Board?	[ ]Yes [X] No [ ]Yes [ ] No [ ]Yes [X] No

Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD C.5***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD D.7***	[X]Yes [ ] No

Project development objective ***Ref. PAD B.2, Technical Annex 3***
The project development objective is to increase the use of clean, efficient, safe and affordable heating technologies in urban schools and multi-apartment buildings.

Project description ***Ref. PAD B.3.a, Technical Annex 4***
The project will support implementation of the Urban Heating Strategy for multi-apartment buildings and improve heating in schools through the following five components:

Component A: Community and private sector mobilization and development of an enabling environment for effective and safe provision of heating services.

Component B: Financing of heating and related building infrastructure including: (i) loans to heat service providers, homeowner associations, municipalities, and individual residents, and (ii) grants to the poorest households living in multi-apartment buildings for improving heating services.

Component C: Investments in installation and rehabilitation of gas-based heating systems and basic thermal rehabilitation in urban schools.

Component D: Technical assistance and logistical support to the Renewable Resource and Energy Efficiency (R2E2) Fund for project implementation, monitoring and supervision.

Component E: Refunding of the Project Preparatory Facility.

Which safeguard policies are triggered, if any? ***Ref. PAD D.6, Technical Annex 10***
OP 4.01 Environmental Assessment.

Significant, non-standard conditions, **if any**, for:
Ref. PAD C.7
Loan/credit effectiveness:
-The Subsidiary Agreement has been executed on behalf of the GOA and the R2E2 Fund.
-The Board of Trustees has adopted the Operational Manual (OM), satisfactory to the Bank.

Covenants applicable to project implementation:
-The R2E2 Fund shall, by October 31 of each year, submit a draft annual business plan of R2E2 Fund and its operational budget to the Association for its review; and by December 31 of each year, and adopt the agreed budget for the Project.
-The GOA shall, by December 31, 2005, provide a space available to permanently ensure adequate accommodation for the R2E2 Fund.
-The GOA shall ensure, until the completion of the Project, that the R2E2 Fund is not deprived of the necessary resources, staff, powers or functions in order not to affect materially and adversely the ability of the R2E2 Fund to perform any of its obligations to carry out the Project.
-The GOA shall ensure that the Board of Trustees shall coordinate the operation and activities of the GEF Trust Fund Grant in order to implement the Project effectively.

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

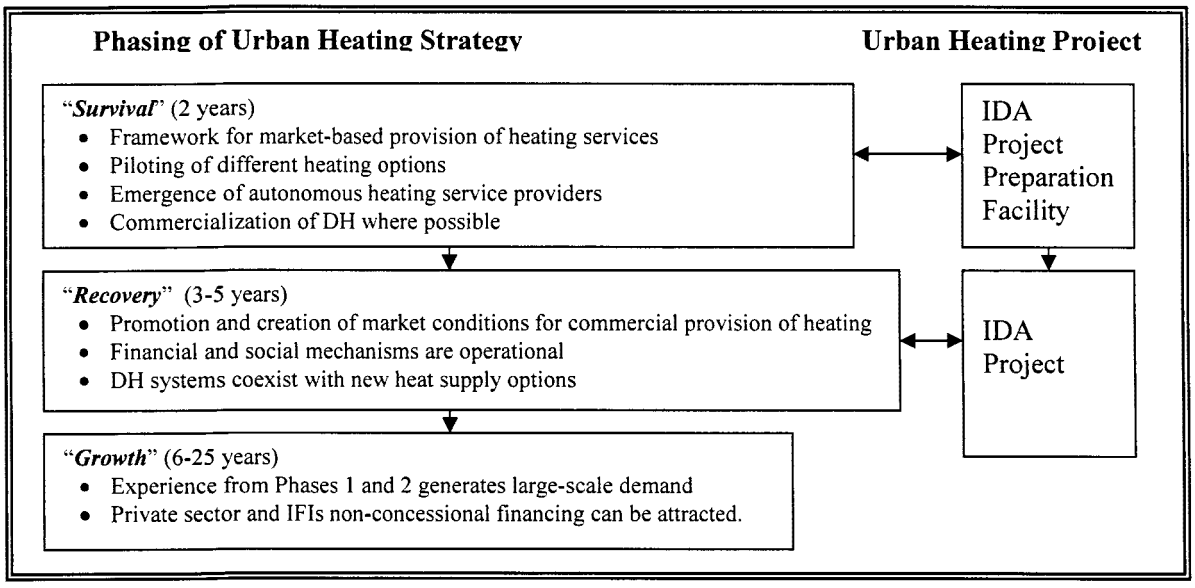
During the past few years, the Armenian energy sector has undergone structural reforms and substantially recovered from the severe deterioration of the early 1990s. Little progress has, however, been achieved in the heating sector. Most district heating (DH) systems, which used to supply the bulk of urban space and water heating in residential and public buildings, stopped service after 1992. The few systems that supplied winter space heating to less than 10 percent of the population over the past few years finally collapsed in 2003 when the Government of Armenia (GOA) withdrew the substantial fuel subsidies. The Armenian population, including more than 65 percent of the urban population living in multi-apartment buildings, now depends solely on individual heating solutions based on costly electricity, polluting solid fuels and increasingly on natural gas. Thus, according to the 2003 household survey, roughly 46 percent of urban households rely on wood for heating purposes, 27 percent on electricity, about 14 percent on coal, oil, and waste, while only 7 percent use gas. Many poor households do not heat at all; for example, in Yerevan, 16.5 percent of households participating in the Poverty Family Benefit Program (PFBP) do not heat their homes.

The widespread use of inefficient, polluting and unsafe heating technologies in multi-apartment buildings and schools comes with considerable drawbacks for users, such as high recurrent costs, visible smoke and associated health and environmental effects inside and outside buildings, and safety hazards:

- Deaths, injuries and damage to buildings caused by gas and CO poisonings, fires and explosions have become a serious problem and they continuously grow with the increasing gasification of the country. For example, from 2003 to 2004 the number of explosions, fires and poisonings almost doubled.
- Heating-related expenditures for the 4-6 month heating period consume a significant portion of household income and contribute to poverty. During the winter months, up to 50% of family expenditures are used for heating purposes.
- The extensive use of wood for heating purposes contributes significantly to deforestation and has detrimental health implications particularly for the young and the old. Based on the 2002 household survey 3,467 annual life years are lost per 100,000 children under five, and 120 life years lost per 100,000 women, due to indoor urban smoke exposure. Moreover this survey found that smoke exposure related health problems, such as upper respiratory diseases, headaches, sore eyes, swelling of extremities and blood circulation problems, are especially pronounced among poor households.
- Due to the lack of appropriate heating, many schools either do not function during the winter months (idle time in urban schools in 2004 was one month) or classes are held in cold or polluted classrooms (even in heated schools the temperature is often below 8°C), thus reducing quality of education and negatively affecting health conditions of students.

The GOA has recognized the negative implications associated with the widespread use of inefficient, polluting and unsafe heating technologies in multi-apartment buildings and schools. As part of its Poverty Reduction Strategy and with World Bank and donor assistance, the GOA undertook to prepare an Urban Heating Strategy (UHS) to facilitate access to efficient, clean,

safe and affordable heating services. Adopted by the GOA in September 2002, the UHS provides the strategic framework for the short-, medium- and long-term development of the Armenian urban heating sector (see graph below). The proposed project, which aims at dismantling various barriers to consumer choice and sustainable provision of improved heating services, is consistent with this strategy.



The UHS identified a number of barriers that prevent the materialization of heating services that are affordable and at the same time environmentally sustainable:

- *Legal and regulatory barriers*: Deficiencies in the legal framework for home owner associations (HOAs) prevent their effective functioning which would regulate rights and responsibilities of residents sharing a common space; lack of clear norms and standards for safety and security, especially for gas supply and use; providers of small-scale heating services face largely the same regulatory framework as providers of centralized heating.
- *Institutional barriers:* A wide disparity in incomes between families living in the same apartment building and lack of technical means enabling families to regulate their consumption of communal services to suit their comfort preferences or affordability levels create difficulties for residents to agree on a common set of rules to govern the provision of these services; schools do not have a budget for capital investment in new heating equipment.
- *Financial barriers:* Considerable gap between the real and perceived risks by local financial institutions (FIs) with respect to heating/energy efficiency projects and lack of technical and commercial skills to properly assess and prepare these projects; immaturity, lack of long-term funds, risk-aversion and lack of management capacity and sector knowledge prevent FIs from providing long-term financing at affordable interest rates, required to stimulate commercial provision of heat services.
- *Informational barriers:* Lack of information on and experiences with flexible and energy-efficient heating technologies and with contractual mechanisms for the provision of affordable heating services in multi-apartment buildings; lack of information for residents

on legal, institutional and energy issues, including the right methods of gas use and its potential hazards.

The UHS does not propose a large-scale publicly funded heating infrastructure investment program, but intends to facilitate a community and private sector-led approach. Especially in the first two phases the proposed actions are "soft", concentrating on providing information to consumers and (potential) suppliers, eliminating the mentioned barriers to the provision of commercial and competitive heating options, enabling low-cost investment and setting the stage for more substantial investment in the third phase. The UHS also recommends limited investment in existing centralized heating systems to maintain supply from a cogeneration plant as an option for the future.

2. Rationale for Bank involvement

The rationale for World Bank support to promote commercial provision of heating services is the "public good" aspects and related positive externalities associated with the provision of clean, safe and affordable heat to residential buildings and schools. In addition, the Bank's contribution to transforming the heating sector is considered vital both by the GOA and other donors since the Bank has comprehensive knowledge of the sector, the country environment, and has maintained a high-level dialogue with the GOA. The Bank has been a catalyst for mobilizing other donor support to the sector, resulting in several donor-funded initiatives targeted at supporting community-based activities to manage communal services, particularly heating, and reducing barriers to implementation of energy-efficiency investments. Further, the Bank, in close cooperation with the GOA, has a central role in coordinating UNDP/GEF, USAID and other major donor-funded activities in the areas of heating, energy efficiency and HOA assistance (see C.1).

Success of the project will require close coordination between several sectors - housing, finance, social development (especially community-driven development (CDD) activities), water, and energy - and will permit synergies across Bank-supported activities in each of these sectors. The Bank is well-positioned to provide inter-sectoral coordination to maximize the development impact of the project. In addition the Bank brings a wealth of global knowledge of heating and energy efficiency issues, and its solid local presence will allow it to provide ongoing advice and constant monitoring during project implementation.

3. Higher level objectives to which the project contributes

The Poverty Reduction Strategy Paper (PRSP) adopted by the GOA in October 2003 emphasizes the need for policy reforms in five key areas, including promotion of private sector development, improvement of public infrastructure, and enhancement of human development. More specifically, the PRSP prioritizes increased access to heating services primarily through the development of local heating systems and the improved quality of education by improving heating and building conditions of schools. By increasing the access to environmentally clean and safe heating services by households and schools and promoting the establishment and growth of private sector energy service companies, the proposed project will support some of the key policy areas of the PRSP and is consistent with the objectives of the CAS.

B. PROJECT DESCRIPTION

1. Lending instrument

The proposed credit in the amount of US$15 million is designed as a specific investment loan, combining investment, line of credit and TA financing. This combination is considered crucial to enable the successful implementation of demand-based demonstration projects, thus providing a basis for later scale-up.

2. Project development objective and key indicators

The project development objective is to increase the use of clean, efficient, safe and affordable heating technologies in urban schools and multi-apartment buildings.

The project will achieve this objective by (i) removing barriers and creating market conditions for the commercial provision of heating services; (ii) providing long-term financing to service providers and consumers for their investments in heat supply systems and energy efficiency measures; (iii) building the capacity of local financial institutions in financing heat supply and energy efficient systems to ensure sustainability after project closing; (iv) promoting efficient and safe boilers, heaters, and equipment to meter and control fuel and heat consumption; and (v) stimulating creation and effective functioning of self-regulating community organizations.

Key performance indicators include: (i) Share of households in multi-apartment buildings with safe gas- or hot-water-based heating; (ii) Cumulative number of targeted schools with class temperature above 15°C and no idle classroom-days, resulting from inadequate heating; (iii) Reduced incidence of CO poisonings, fires and explosions (per 10,000 gas subscribers); and (iv) Share of targeted users satisfied with heating conditions (when comparing before and after installation).

3. Project components

The project will support implementation of the UHS for multi-apartment buildings and improve heating in schools through the following five components:

Component A: Community and private sector mobilization and development of an enabling environment for effective and safe provision of heating services (US$ 3.9 million, of which IDA funding US$ 1 million). Technical assistance will be provided in two areas:

A1. (US$ 1.1 million, of which IDA funding US$ 0.5 million) Development of enabling environment for effective and safe provision of heating services including:

- Development of regulations, safety norms and standards, and certification of suppliers and equipment, including for natural gas supply;
- Improvement of legal and regulatory framework to make HOAs more functional and to foster market-based provision of heating services.

A2. (US$ 2.8 million, of which IDA funding US$ 0.5 million) Community and private sector mobilization through:

- Capacity building of heat service providers, local financial institutions, and HOAs;
- Implementation of broad information campaigns and public education programs to inform the public about the available new heating technologies and their benefits, safety norms and standards, the need and benefits of using environmentally clean and safe heating solutions and the new approaches to community-led provision of communal services;
- Establishment of special advisory center(s) to provide private sector and communities with support on legal, technical, and financial matters of modern energy supply;
- Assistance in preparation of sub-projects under B1.

Most of the technical assistance (TA) above will be supplied by UNDP/GEF and USAID TA projects in close collaboration with this project. If these and other donors commit to provide the necessary funding to address the TA needs, the freed-up IDA funds will be reallocated to other project components.

Component B: Financing of heating and related infrastructure (US$ 10.0 million, of which IDA funding US$ 7.2 million). Investment financing for heating of residential buildings will be supported under two subcomponents:

B.1 Lending to project beneficiaries (US$ 6.0 million, of which IDA funding US$ 4.2 million). Heat providers, HOAs, municipalities and individual home-owners will be able to access funding for heating infrastructure investments. It is estimated that about 7,000 households in multi-apartment buildings without access to operational heating services would benefit from these investments. The Renewable Resources and Energy Efficiency Fund (R2E2 Fund or Fund)[1] will on-lend funds to eligible participating financial institutions (PFIs) that would in turn extend loans to beneficiaries. In addition, the Fund may offer risk sharing instruments to beneficiaries and PFIs.

B.2 Capital grants to the poor (US$ 4.0 million, of which IDA funding US$ 3.0 million).
To enable the poorest households living in multi-apartment buildings to participate in the project and thus gain access to improved heating, this component will fund the investments necessary for the connection of gas, heat and hot water supply to the apartments of the poor. Eligible households will be identified based on the existing PFBP. Roughly 10,000 poor households are expected to be provided with a basic level of service from clean heat sources, using an output-based aid (OBA) approach for the disbursement of funds. The Project team has submitted an application to GPOBA, seeking additional US $3 million funding for the connection of poor households to gas and/or heating systems. If approved, these funds will supplement this Project component.

Component C: School heating (US$ 6.25 million, of which IDA funding US$ 5.0 million).
Under this component grant financing will be provided to urban schools for investments in installation and rehabilitation of gas-based local heating systems and basic thermal rehabilitation. All urban schools outside Yerevan will be eligible for financing, provided they have a satisfactory technical state, including availability of gas supply in the area, and have suitable engineering design. Roughly 100 schools that will receive funding under this component will be

[1] The Fund will also serve as the financing mechanism for an IDA/GEF financed renewable energy project. The Fund infrastructure and support of operating costs will be shared between the two projects.

selected based on the cost-effectiveness of the investment per student. If funds are left after investments financed in all eligible urban schools, these additional funds will be provided to schools in Yerevan.

Component D: Support for project implementation (US$ 0.8 million, of which IDA funding US$ 0.8 million). This includes TA, goods, works and logistical support to the R2E2 Fund for project implementation, monitoring and supervision.

Component E: Project preparation (US$ 1.0 million, of which IDA funding US$ 1.0 million). This component is identical with the project preparation facility, which supported various activities that provide the foundation for successful project implementation: awareness building and mobilization of heat providers and consumers; removal of some of the legal and regulatory barriers; and design of the institutions involved in project implementation. Most importantly, 10 pilot projects were completed during the 2003/04 and 2004/05 heating seasons through HOAs, private sector heat service providers, and individuals (see Annex 16 for a description and lessons learned).

The TA, training, investments for school heating and support to the poor and all other activities under Project components A, B2 and C will be provided to beneficiaries free of charge.

4. Lessons learned and reflected in the project design

Key lessons that have been incorporated in the project design include those from

- **Project preparation activities**: 10 pilot projects tested different technical heating options and contractual and commercial arrangements. They confirmed that gas-based heating is more affordable than electricity or wood-based heating, and that consumers are interested in investing in communal heating and private heat service providers can be mobilized. The activities also showed that for an investment implemented through a HOA, its adequate capacity and good management are critical for the success of the project. Sufficient time needs to be allowed for sub-project preparation and implementation (on average nine months) to ensure that both adequate public awareness and education activities are carried out among the apartment residents prior to the implementation and all the necessary equipment is supplied prior to start-up of construction works. In addition, procurement has to be based on existing commercial practices, since centralized procurement introduced major delays in construction works and unwillingness on the part of some of the private companies to participate in the project. Last but not least, the pilot projects confirmed that households, including poor households, are willing to pay for a quality service that can be metered and billed according to individual consumption levels.
- **Bank operations and analytical work in Armenia:** The experience with the Armenian Social Investment Fund I and the Municipal Water Projects demonstrates that poverty targeting, i.e., ensuring that the poor are not excluded from the project, is also essential. In addition, previous studies and operations in Armenia clearly indicate that a demand-driven approach is crucial to ensure sustainability. For example, when the Municipal Development Project shifted emphasis from a supply-driven to a demand-driven approach relying on capacity building, metering and a flexible approach based on beneficiary needs, this significantly enhanced project implementation performance.

- **Energy efficiency and heating projects in other countries:** Improving heating services through investment in DH rehabilitation and modernization has worked well in relatively advanced countries in Central Europe where a large majority of consumers can afford DH. Recent evidence from poorer countries (see "Coping with the Cold", World Bank 2002), however, indicates that due to the large majority of poor consumers, DH could not be made into a viable business, even if provided in a flexible and energy-efficient way. Due to the low affordability, most customers would have to rely on continuing subsidization for which funding is not available. The experiences of the Bank's Energy Efficiency and Housing Pilot Project (EEHPP) in Lithuania provided important guidance by showing how to deal with the need for institutional reform such as the establishment of HOAs and the promotion of private sector participation in the financing and supply of renovation services. Home owners require a support package addressing legal, institutional, technical and financial barriers, as well as significant educational and advisory support to enable them to make investment decisions. Furthermore, the EEHPP confirmed that a support mechanism is required to enable poor inhabitants of a building to join their neighbors in the building improvements. The design of the financing mechanism builds upon the experiences from the implementation of credit lines or funds for energy efficiency worldwide, according to which it is important (i) to maximize transparency of fund access procedures and minimize government interference in financing decisions; (ii) to use existing market players where possible; (iii) that fund financing covers only a portion of the project costs and the borrower has equity in the project; (iv) that interest and principal repayment are fully collected; (v) that small projects with high transaction costs are packaged by partners such as energy service companies; and (vi) not to rely on only one or two financial intermediaries to on-lend funds.
- **Other Bank projects supporting access to infrastructure and related analytical work:** They emphasize the importance of subsidies for allowing low-income households to gain access to basic infrastructure, for example, rural electrification and water supply (for example, Barnes/Halpern 2000 or Gomez-Lobo 2001). Subsidy mechanisms need to be designed carefully to preserve efficiency incentives, maximize benefits and sustainability. Best practice subsidies are for capital costs only, but not for operating costs; they promote performance and output, instead of being linked to inputs; they are based on targeting that minimizes inclusion and exclusion errors as well as administration costs; they prevent collusion; and they are properly funded and/or have an exit strategy.

5. Alternatives considered and reasons for rejection

The following alternatives were considered and rejected:

- Investment in large scale rehabilitation and modernization of DH systems: Ruled out due to high fixed costs of rehabilitation of completely worn-out hardware and associated high risk of project failure if level of demand needed to justify this large investment does not emerge, either because of inability of consumers to pay (as suggested in household surveys) or inability of suppliers to adopt a customer orientation to "win" the market. Furthermore, replicability is questionable since the private sector is unlikely to undertake massive investments needed for DH system rehabilitation.
- Government-owned small boiler houses: Rejected due to lack of customer orientation. Investment may be supported if a private service provider leases, rehabilitates and operates such boiler houses because they are a least-cost means of heat production.

- All investments in heating systems to be provided as loans: Without a grant facility the poorest households would not be able to participate in the project, since the initial investment costs are prohibitive.

C. IMPLEMENTATION

1. Partnership arrangements

Various donor-funded initiatives supporting community-based activities to manage communal services, particularly heating, and reducing barriers to implementation of energy-efficiency investments are currently implemented in Armenia. The major donors in the sector, namely the World Bank, UNDP/GEF and USAID, have structured their projects around the UHS and support different aspects of its implementation.

The UNDP/GEF project "Improving the Energy Efficiency of Urban Heating and Hot Water Supply in Armenia" in the amount of US$ 2.9 million is designed as technical assistance complementing the IDA project. It is targeted at strengthening the role of HOAs in the collective organization and management of provision of heat and hot water supply services, supporting the emerging new service providers in offering their services to HOAs; supporting the establishment of advisory centers to assist heat consumers and providers; supporting the restructuring process and building capacity of DH companies to improve the efficiency of their operations; and promoting development of heat and hot water services in Armenia with a specific emphasis on greenhouse gas reduction aspects. The Board of Trustees (BOT) that will oversee the R2E2 Fund operations and Project implementation will coordinate the operation and activities of the UNDP/GEF project.

As part of USAID's Armenia Strategy for FY2004-2008, the "Program for Improved Heat Sector Management and Delivery of Heat Supply in Armenia" should be approved soon. About US$ 3 million is expected to be allocated as parallel financing to the Bank project, focusing on technical assistance and pilot projects to support emerging heat service providers in realizing least-cost solutions that enhance effective management and reduce environmental costs. In addition, USAID will finance investments in heating systems for roughly 30 schools. Finally, USAID may support the mobilization of local financial institutions through capacity building and introduction of risk-sharing arrangements through its Development Credit Authority.

The GOA cooperates with the Danish Environmental Protection Agency to identify potential heating projects that could be financed within the scope of CDM projects that the Danish government plans to implement.

2. Institutional and implementation arrangements

The Project Implementation Unit (PIU), created to manage the preparation of the UHS and the UHP, will be transformed into the R2E2 Fund. The PIU will transfer its functions and qualified staff to the Fund so as to preserve the technical capacity built during project preparation. The R2E2 Fund will promote the development of renewable energy and energy efficiency markets in Armenia and facilitate investments in renewable energy and energy efficiency. The Fund will

implement the project. The project implementation, as well as the overall R2E2 Fund operations, will be overseen by BOT[2]. The BOT will consist of qualified experts from both the public and the private sector with an appropriate mixture of knowledge and expertise. The organizational structure and the project implementation arrangements are graphically illustrated in Annex 6.

To ensure effective coordination of donor activities a Donor Committee will be established with representatives of all key donors and the GOA. This committee would also provide policy-advice and on-going consultation to the BOT.

The funds available in the investment component of the project will be channeled by the R2E2 Fund to PFIs. Direct lending to project beneficiaries will be allowed as a fall-back option if there is insufficient lending business generated by the PFIs.

3. Monitoring and evaluation of outcomes/results

The BOT and the management of the R2E2 Fund will have the overall responsibility for project implementation and for monitoring of project outcomes. Surveys will be conducted to monitor and evaluate project results and outcome indicators. Initially an independent consulting firm or NGO will be contracted to conduct these surveys. To ensure sustainability of monitoring gradually the responsibility for collecting data regarding the residential sector will be shifted to the National Statistical Service as part of their household surveys. In addition, information will be collected from municipalities and relevant government agencies.

The PFIs will present periodic financial reports to the R2E2 Fund. The Fund will collate these reports and together with its own reports provide them periodically (quarterly and annual) to the BOT and the Bank. In addition, a sample of subprojects will be reviewed annually by the Bank to monitor implementation progress. The financial statements of the R2E2 Fund and the PFIs will be audited annually by an independent firm.

Finally, comprehensive evaluation of the project results so far will be undertaken during the project mid-term review in 2008.

4. Sustainability

The Government's strong commitment to the project is evidenced by the adoption of a well-managed and high quality urban heating strategy. The Government has started the implementation of the UHS by eliminating non-targeted subsidies to the centralized heating sector and preparing a financial rehabilitation plan for the DH companies. A number of legislative changes have been completed, such as the adoption of the Laws on Condominiums and Management of Multi-Apartment Building, and the Energy Efficiency and Renewable Energy Law. The Energy Law was modified to streamline the regulatory framework and eliminate excessive regulation of the sector.

There are two aspects to the sustainability of the project:

[2] The BOT will replace the inter-governmental Steering Committee that oversaw project preparation activities.

(1) **Replicability of the project:** IDA project funds will cover less than 10 percent of the country's investment needs for heating. The replicability of the project is therefore essential for ensuring sustainability. Critical factors determining project replicability are likely to be:

- Emergence of private sector heat service providers;
- Ability to demonstrate the attractiveness of heating investments to the financial sector to allow provision of medium- to long-term maturity and low interest rate resources;
- Sustained targeted subsidies for capital cost of heating equipment for schools and poor residents by municipalities and the central government;
- Ability to mobilize additional funding from banks, other donors and the government;
- Willingness and ability of consumers to pay for the heat they receive;
- Development and reliability of the gas infrastructure.

It is expected that by focusing on the elimination of barriers preventing consumer demand to generate a market-based supply response and by providing capacity building and public outreach activities, the project will facilitate the "Growth" phase of the UHS and maximize sustainability. Successful completion of the first two phases of the UHS ("Survival" and "Recovery") would demonstrate the attractiveness of the heating business. Thus after completion of the project the private sector would be willing, able, and motivated to expand heating services. In addition, it is expected that by addressing capacity constraints and demonstrating feasibility of the heating business, the local financial institutions would increasingly finance heating projects. Successful implementation of the project will also allow leveraging of additional donor financing (including from non-concessional sources). During project implementation measures to ensure the funding of advisory center(s) after project completion will be investigated. Finally, the mid-term review of the project will address the issue of the continued targeted budgetary support to finance capital investments for the poor and schools.

(2) **Sustainability of implemented projects:** The critical factor affecting sustainability of investments financed under this project is the adequate operation and maintenance of the established/rehabilitated heating and gas infrastructure. Since the project promotes commercial provision of heat services based on cost-recovery tariffs and adequate mechanisms (metering, regulation of consumption and ability to disconnect for non-payment) to ensure payment discipline, the payments of residents for heat should generate sufficient funds to cover all expenses, including for operation and maintenance. The gas tariff is also set close to cost-recovery, allowing the gas company to adequately maintain the gas infrastructure. Finally, to ensure the sustainability of school heating investments the government budgetary allocations to schools, which currently cover costs for expensive electric heating, will not be reduced after cheaper, gas-based heating is established. The resulting savings from the difference in tariffs will be used by schools to properly maintain heating systems and improve quality of heating services.

5. Critical risks and possible controversial aspects

Risks	Risk Mitigation Measures	Risk Rating With Mitigation
To project development objective		
Government commitment to	The Heating Strategy has been approved by the	N

sector strategy does not continue throughout the project period	Government and has binding power. Improvement of residential and school heating services is one of the priorities highlighted in PRSP. Ongoing policy dialog with the Government will need to be maintained.	
Significant gas price increases	Gas price increases due to increased use of gas in Armenia would be moderated by a high fixed-cost component in the gas tariff and the small impact of the gas price on total heating costs, only about 25 percent. Prices of competing heating fuels are also expected to increase: Electricity generation is mostly gas-based and wood fuel prices would be impacted by stricter enforcement of ban on illegal logging and control of unsustainable deforestation.	M
To component results		
Private sector is not willing to get involved in commercial provision of heat and other communal services	Technical assistance to improve/streamline the legal and regulatory framework, implementation of public awareness campaigns, and capacity building will facilitate commercial provision of heating services by the private sector. As a fall-back, the project will put more emphasis on supporting individual heating solutions. In addition, contingent grants for project preparation may be offered to project sub-borrowers as an additional instrument to encourage private sector interest.	S
Local financial institutions are not interested in participating in the project	Technical assistance for capacity building, public awareness campaigns and successful implementation of the project, as well as the availability of flexible risk sharing mechanisms should increase the financial sector interest in the project. As a fall-back, the Fund will have the option of lending directly to project beneficiaries.	S
Non-payment for the heating services	The established heating systems will allow individual disconnection to enforce payment discipline. In addition, service providers may enter into arrangements with the gas company to disconnect gas supply in case of non-payment.	M
Apartment residents are reluctant to organize (into home owner or other associations) to contract communal services	Implementation of public awareness campaign, planned technical assistance, and targeted social support mechanism for poor families should facilitate the process. Private suppliers may be able to bear the risks of supplying non-organized individual customers. If consumers fail to organize and consequently neither private supply nor community solutions emerge, more investments in individual heating solutions will be supported.	S
Poor households do not participate in improved heating solutions	Proposed investment subsidy reduces heating costs for poor households participating in the PFBP to variable costs only - expected to be lower than the cost of heating with electricity or wood. In addition, the advisory centers will provide special information to poor households and support their mobilization.	S

Overall risk ti		S
Risk R ti (I :),	(Substantial Risk), M (Modest Risk) 11 (N ligible I w Risk)	

6. Loan/credit conditions and covenants

Conditions for effectiveness:

- The Subsidiary Agreement has been executed on behalf of the GOA and the R2E2 Fund.
- The Board of Trustees has adopted the Operational Manual, satisfactory to the Bank

Legal covenants applicable to the project implementation

- The R2E2 Fund shall, by October 31 of each year, submit a draft annual business plan of R2E2 Fund and its operational budget to the Association for its review; and by December 31 of each year, adopt the agreed budget for the Project.
- The GOA shall, by December 31, 2005, provide a space available to permanently ensure adequate accommodation for the R2E2 Fund.
- The GOA shall ensure, until the completion of the Project, that the R2E2 Fund is not deprived of the necessary resources, staff, powers or functions in order not to affect materially and adversely the ability of the R2E2 Fund to perform any of its obligations to carry out the Project.
- The GOA shall ensure that the BOT shall coordinate the operation and activities of the GEF Trust Fund Grant in order to implement the Project effectively.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

A least cost analysis of heating technologies was carried out during the preparation of the UHS, which revealed that in the medium- to long-term the cost of less centralized and individual gas-heating options is less than half of the cost of the next option, centralized heating.The economic and financial analysis of the project is carried out for each major component of the project due to the different nature of the costs and benefits associated with each of the components.

Lending to project beneficiaries. Funds will be channeled by the R2E2 Fund through the PFIs or to project sub-borrowers for investments in environmentally safe, clean and affordable heating. The pilot projects implemented within the scope of the project preparation activities have demonstrated that on average heating projects generate healthy cash flows with financial rates of return averaging 20 percent. Based on conservative estimates, the amount of financing mobilized through both R2E2 Fund financing and the leveraging impact that the early projects will have by demonstrating the financial viability of heating projects and lowering perceived risks, the total amount of financing mobilized during 10 years would amount to at least US$14 million, yielding a leveraging ratio of 2.8. This should generate net economic benefits, computed as the cost savings arising from the difference between gas-based and electricity-based heating, of US$ 19.2 million, equivalent to an economic rate of return (ERR) of 34 percent. This ERR underestimates the true economic returns to the residents of multi-apartment buildings and society at large, by not incorporating significant non-monetary benefits associated with the access to clean and safe energy, including improved health and comfort, reduced incidences of gas poisonings and explosions, in-door and out-door air pollution and deforestation.

School heating. Urban schools outside of Yerevan are eligible for financing and will be selected according to the cost effectiveness of investment per student. The most important economic benefit that can be quantified is the reduction of heating expenditures (estimated at US$ 1.5 million annually) due to the cost savings of switching from electricity to gas and reduced energy consumption of roughly 30 percent, associated with the installation of more efficient heating systems and insulation of school buildings. The net economic benefit from heating investments in 100 schools that will be rehabilitated under the project is estimated at US $6.8 million with an ERR of 26 percent. Other important benefits that are difficult to quantify are increases in indoor comfort, reduced air pollution, improvement in building stock and related improved health of students, and better quality of education.

Subsidies to the poor. Due to the very depressed level of heat consumption at the expense of comfort, the heat expenses of the poor, while decreasing on a unit basis (e.g. cost per kWh or kJ), are likely to increase on an aggregate basis. However, the non-monetary benefits for the poor of access to clean and safe energy, particularly improved health and enhanced living standards and time savings from not having to gather and handle wood and waste will be significant. Since these other benefits are hard to quantify, the economic analysis for this component is based on cost-effectiveness criteria. For a poor family using one gas stove for 120 days to heat one room to 18°C, the heating bill would amount to about US$ 83 annually. This compares to US$ 121 for heating with wood or US$ 169 for electric heating. The investment cost per poor household under the Project is estimated to be within the US$ 300 range, yielding a basic level of comfort.

2. Technical

The heat supply options to be implemented under the project are expected to be mostly of the decentralized type with autonomous gas-based boilers, mini-cogeneration and individual natural gas boilers and stoves. As confirmed by the studies carried out within the framework of the UHS, these options tend to result in the lowest cost heating, since the level of heating in Armenia is less than in most other regions of Europe due to affordability constraints. The use of highly-efficient equipment will be encouraged, even though investment costs of the predominantly imported components are high. Domestic manufacturing of such equipment is just beginning. The use of consumer-controlled regulation and of metering equipment will be essential to enable consumers to adapt heat consumption to affordability. Low-cost insulation of buildings will be encouraged by systematically eliminating informational, institutional, financing and affordability barriers. Many measures such as (re-)installation of windows and doors in the staircases, tightening of window frames, etc. are low-cost and/or have a short pay-back time and could partially be done by residents themselves.

3. Fiduciary

Procurement and financial management (FM) activities will be carried out by the R2E2 Fund starting from effectiveness of the Credit. By that time, qualified staff will be transferred to the Fund from the PIU, ensuring the continuity of project implementation.

3.1 Procurement for contracts under component B1 (on-lending to project beneficiaries) typically will be conducted using commercial practices acceptable to the Bank. Procurement under other components will follow standard Bank procurement methods. Detailed procurement arrangements, including procurement capacity assessment, are provided in Annex 8.

3.2 As of April 2005 the PIU has an acceptable FM arrangement in place to meet the current Bank requirements in respect of the quality of accounting, reporting and internal controls system and audit arrangements. It was agreed that several actions, which are not critical, will be implemented by project effectiveness and during the initial stage of project implementation. The annual audited project and entity financial statements will be provided to the Bank within six months of the end of each fiscal year and also at the closing of the project. The project will produce a full set of Financial Monitoring Reports (FMRs) every three months throughout the life of the project.

4. Social

Several household surveys and participatory assessments were carried out between 1999 and 2003, combining quantitative, qualitative and focus group work. According to the 2003 household survey about 52 percent of all urban households in Armenia live below the poverty line and about 18 percent receive support from the PFBP. All studies confirm that poor households spend a higher share of their income on energy, particularly heating, than non-poor households, even though they heat less (lower temperature and fewer rooms) and with dirtier fuels (see UHS). Only a minority of households would be able to afford a level of heating that would provide an adequate comfort level common in other parts of Europe. Most households would be willing to pay more for improved heating options, provided they are flexible, allow residents to control their expenditures and be billed throughout the entire year and on an individual rather than communal basis. In November 2003 a participatory assessment was carried out among 400 residents of multi-apartment buildings in four cities, representing 10 HOAs. The survey showed that on average about 20 percent of the multi-apartment building households surveyed can be considered very poor and have neither the possibility to cover the costs of clean and safe heat supply nor the resources to switch to more affordable heating options.

The proposed investment subsidy for poor households participating in the PFBP will reduce heating costs to variable costs only which will be lower than for basic heating with electricity or wood. In addition, the advisory centers will provide special information to poor households and support their mobilization. It is expected that poor households could become a catalyzing force in making HOAs more effective in procuring community-based infrastructure services.

5. Environment

The project is specifically designed to provide access to environmentally sustainable heating technologies, encourage the replacement of electricity and wood with natural gas and reduce fuel consumption through energy efficiency investments in residential buildings and schools. It is therefore not expected to have any significant or irreversible long-term negative environmental impact.

The project is assigned the "Financial Intermediary" (FI) environmental screening category. Specific subprojects will be identified during implementation and the responsibility for environmental due diligence of subprojects will rest with the PFIs, the R2E2 Fund and other local financial institutions for the residential heating component, and the R2E2 Fund for the school heating component. The OM includes a satisfactory Environmental Chapter (to be published), describing the process for assessment of subprojects. Compliance with Armenian environmental law, policies and procedures as well as Bank procedures will be mandatory. The Bank will ensure that the OM is consistently applied in screening project proposals. Since institutional capacity to apply Bank's safeguard policies is limited, staff of the R2E2 Fund and the PFIs will be provided with necessary practical training before effectiveness of the project.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[x]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[x]
Pest Management (OP 4.09)	[ ]	[x]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[x]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[x]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[ ]	[x]
Forests (OP/BP 4.36)	[ ]	[x]
Safety of Dams (OP/BP 4.37)	[ ]	[x]
Projects in Disputed Areas (OP/BP/GP 7.60)*	[ ]	[x]
Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[x]

The project triggers only one safeguard, Operational Policy – OP 4.01 Environmental Assessment. The proposed investments, as a rule, will be small in scale with limited and well known impacts on the environment, which normally can be mitigated or eliminated by adhering to good construction practice. The Environmental Management Plan (EMP) for the project describes the potential threats and the ways of avoiding and/or mitigating them. Also, the EMP contains provisions for habitat protection and for dealing with chance archeological finds. In some cases preparation of more detailed, site-specific Environmental Assessments might be needed. The level of detail will be decided during the screening of subproject proposals.

7. Policy Exceptions and Readiness

This project complies with all applicable Bank policies, requires no policy exceptions and is ready for implementation.

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

Annex 1: Country and Sector or Program Background

ARMENIA: URBAN HEATING PROJECT

Infrastructure services in Armenia severely deteriorated as a result of the 1988 earthquake, collapse of the Soviet Union in 1990, and the 1992 economic blockade of Armenia by Azerbaijan and Turkey over the Nagorno-Karabakh conflict. Energy infrastructure and services were especially hard hit initially due to the disruption of fuel supply routes, followed by rapidly escalating fuel prices and a collapse in industrial activity and national income, leading to a severely reduced ability to pay for basic energy needs. A series of structural reforms have significantly improved the performance of the energy sector entities. The achievements in the power sector are especially remarkable with tariffs at cost-recovery level, successful privatization of the majority of the assets and the resulting elimination of the sector quasi-fiscal subsidies and significant improvement in service quality. There are also tangible achievements in the gas sector with the intensive restoration of gas supply and the related connection of over 100,000 new gas subscribers over the last two years, mostly in urban areas. Here, the number of gas subscribers residing in multi-apartment buildings has increased from around 6,000 at the end of 2002 to 53,000 as of June 30, 2004.

Little progress was achieved, however, in providing heat in a more sustainable way. Most district heating (DH) systems, which used to supply the bulk of urban demand for space and water heating in residential and public buildings, stopped service after 1992. The few systems that supplied winter space heating to less than 10 percent of the population over the past few years finally collapsed in 2003, when the GOA withdrew its direct and indirect subsidies in the order of US$10-12 million annually. For the small part of the population connected to central heating systems until 2003, the provision of heat supply had deteriorated continuously. Lack of maintenance and investment and inflexibility of the service had generated a vicious cycle of deteriorating services, consumer reluctance to pay for poor service quality, and weak authority or ability of service providers to enforce payment from consumers who were too poor on average to afford DH service. Since the demise of DH access to affordable, safe, and reliable heating services is low in Armenia.

People now extensively rely on expensive electricity and dirty fuels to meet urban heating demand, because these energy sources are either financially more affordable (wood, waste) or because they lend themselves to individual consumption preferences and can be matched with affordability (electricity). According to the 2003 Household Survey, 46 percent of the urban population relies on wood and 27 percent on electricity for heating purposes. While the use of gas for heating purposes has been growing with the increasing gasification of the country, the reliance on gas-based heating is still low at less than 8 percent. Unfortunately, a growing incidence of CO-poisoning, explosions and fires can be observed, since many new gas customers use uncertified heating stoves and other potentially unsafe equipment.

Similarly, according to the survey conducted within the scope of project preparation activities, less than 25 percent of the 570 urban schools in Armenia rely on gas-based heating; the rest use electricity, wood, diesel or other types of dirty fuels for heating purposes.

Types of fuel used by urban households for heating purposes in marzes (percent)

Main heating option of apartment	Yerevan	Aragatsotn	Kotuku	Gegharquniq	Tavush	Lori	Shirak	Ararat	Armavir	Sjuniq	Vajots dzor	Total
Central heating	7,1	0,0	8,6	0,0	0,0	0,3	6,3	0,0	0,0	0,0	0,0	5.9
Gas	11,4	2,6	3,8	2,9	1,0	5,2	20,6	17,9	13,6	0,7	10,2	7.2
Electricity	42,4	1,1	9,7	2,6	0,5	6,6	3,3	5,3	7,9	5,2	6,1	27.1
Oil	1,5	0,0	0,6	0,3	0,0	0,7	0,4	1,2	0,2	0,5	0,2	0.4
Coal	0,2	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,3	0,0	0,5	0.1
Wood	29,5	34,3	49,0	47,3	98,0	74,6	40,9	55,8	59,9	80,1	43,2	45.7
Waste	0,1	60,5	21,4	45,6	0,0	9,4	18,6	16,1	11,2	11,2	36,3	7.3
Other	1,8	0,6	3,7	0,6	0,0	0,2	7,2	2,3	5,0	0,3	0,4	
Not heated	6,2	0,8	3,1	0,8	0,6	3,1	2,3	1,5	2,1	2,0	3,2	6.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Human Development National Survey 2003

The widespread use of inefficient, polluting and unsafe heating technologies in multi-apartment buildings and schools has very significant negative implications:

- *Heating related expenditures consume a significant portion of household income.* Severe winters typical for Armenia require heating for 120-180 days, depending on the location. Heating expenditures therefore account for a sizable portion of income for low-income families and contribute to poverty. According to several surveys (reported in ASE/NACO 2004), during the winter months, up to 50% of family expenditures are used for heating purposes. A significant share of poor households (over 6 percent) does not use any space heating. For example in Yerevan, 16.5 percent of households participating in the PFBP do not heat their homes. According to the Human Development National Survey conducted by the UNDP in 2003 the share of households without winter heating among the poor is 55 percent higher than the share of all households with no heating.
- *Heating expenditures impose a substantial financial strain on school budgets.* The state budget allocation for public schools is determined based on the number of students: In 2005 schools receive US$103 per student plus an allocation of US$13,200 for fixed maintenance costs. Electricity-based heating, which is the only clean and safe heating alternative in the absence of adequate gas-based heating, would consume over 16 percent of an average school budget to provide an acceptable comfort level in the classrooms. This is a significant burden for schools forcing them to heat less and maintain the classroom temperature below an acceptable level.

- *Lack of adequate heating in apartments and schools has a detrimental impact on the health of residents and students and on the education quality.* The UNDP survey revealed that the incidence of illnesses is twice as high among households without heating as among those with some form of heating. Many schools do not fully function during winter with school idle time in 2004 reaching one month. Even in heated schools the room temperature is often below 8°C. When classes are held in cold and polluted classrooms, the quality of education is reduced and the health of students is negatively affected. Social costs of not heating - children getting sick and missing school, parents missing work - are very high.
- *The use of dirty fuels (wood and waste) for heating purposes in apartment buildings and schools constructed without adequate ventilation for this kind of fuel results in high indoor pollution levels and related health problems*, particularly for the young and the old. The households, which were surveyed for the heat demand report prepared within the scope of the UHS were exposed to an average level of PM2.5 particles of 210 micrograms/m^3. This is significantly above the international standard for safety of 65 micrograms/m^3. The report also estimated that 3,467 annual life years are lost per 100,000 children under five, and 120 life years lost per 100,000 women, due to indoor urban smoke exposure in Armenia. The resulting economic cost of this ill-health to women and children under 5 is estimated to exceed US$3 million per year. Moreover this survey found that health problems, such as upper respiratory diseases (flu, cough, fever), headaches, sore eyes, swelling of extremities (particularly whilst asleep at night) and blood circulation problems, are especially pronounced among poor households.
- *Use of wood, diesel or uncertified gas stoves has serious safety implications, such as poisonings, explosions and fire.* Due to the affordability constraints as well as lack of awareness, self-constructed or uncertified stoves are frequently used in multi-apartment buildings and schools. The lack of appropriate safety norms and standards, enforcement and control mechanisms (e.g. there is no agency responsible for the enforcement of safety standards inside the apartments) further exacerbate these problems. As a result, the accidents caused by gas and CO poisonings, fires and explosions are a serious problem, and they continuously grow with the increasing gasification of the country. In 2003 the state emergency department registered 7 explosions, 48 poisonings, and 126 fires as a result of misuse of heating equipment. The figures for 2004 almost doubled with 15 explosions, 74 poisonings, and 187 fires. As a result of the accidents 35 persons died and 115 were injured during 2004.
- *Lack of adequate heating results in accelerated deterioration of physical conditions of the multi-apartment buildings and schools* due to the design characteristics of the buildings that anticipated centralized heating.
- *The extensive use of wood for heating purposes contributes significantly to deforestation with major adverse environmental consequences for the country.* Illegal logging occurs mainly in the form of unofficial removal from state-owned forests by local communities for subsistence purposes (estimated through surveys of rural households to be at least 568,000 solid m^3 per annum) and by commercial operators for fuelwood sales in urban centers (estimated at 150,000 solid m^3, through transport and sawmill surveys), while illegal logging for commercial production of wood products is more limited. Given the scarce forest resources of Armenia in general, these massive cuttings disrupt the ecological balance and result in a number of negative ecological impacts, including the loss of biodiversity, accelerated erosion, floods, landslides and weakening of the water protection function of the forests.

Through the unsustainable use of forests at rates exceeding regeneration the burning of wood has become a net carbon-emitting source with associated specific emissions of nearly two times that of natural gas. Due to stricter enforcement of illegal logging the price of wood has started to escalate and is expected to further increase, reflecting environmental factors or the real cost of the resource.

- *The use of electricity for heating is costly for consumers and often not affordable.* It costs about US$ 50/MWh to heat one room during the winter season with electricity vs. US $25/MWh for alternatives, where one MWh is the minimum amount of heat necessary. For comparison, PFBP payments are about $14 per household per month, and the cost of the minimum consumer basket is estimated at about AMD 30,000 (US$52) per month, roughly equivalent to the officially registered average monthly salary (The Economist Intelligence Unit: Armenia Country Report, Nov. 2003.).
- *High reliance on electricity for heating doubles peak power demand during the winter months.* This increases the cost of electricity production and the need for investment in generation and distribution assets. In the long-term this would increase the cost of electric heating even more. It should be noted that the increase in electricity prices is almost inevitable due to the need for massive power sector investments and the closure of Medzamor Nuclear Power Plant.

The GOA has recognized the negative implications associated with the widespread use of inefficient, polluting and unsafe heating technologies in multi-apartment buildings and schools. Therefore, as part of its Poverty Reduction Strategy and with World Bank and donor assistance, the GOA undertook to prepare an Urban Heating Strategy (UHS) to facilitate access to efficient, clean, safe and affordable heating services. Adopted by the GOA in September 2002, the UHS provides the strategic framework for the short-, medium- and long-term development of the Armenian urban heating sector. It consists of three phases:

- "*Survival*" during years 1 and 2: Framework for a market-based provision of heating services is put in place, including testing whether consumers opt for existing centralized heat supply under conditions which permit full commercialization of DH services and whether private providers of autonomous heating services emerge. Creation of market conditions for the commercial provision of heating by addressing informational, regulatory, and "mind-set" barriers is supported.
- "*Recovery*" during years 3-5: Promote implementation of sustainable heating options; surviving DH systems coexist with new heating options. Continue strengthening of institutional capacity. Financial and social mechanisms are operational.
- "*Growth*" during years 6-25: Experience from Phases 1 and 2 generates large-scale demand for affordable heating solutions - decentralized heating systems and possibly investments for DH modernization - with major improvements in service quality and coverage. Private sector and multilateral/bilateral donor non-concessional financing without sovereign guarantee can be attracted for investments.

During the development of the UHS, the technical, financial, fiscal and institutional aspects of three basic heat supply options were investigated:

1. Rehabilitation/modernization of the existing *centralized (district) heating systems*. Heat and domestic hot water is produced in gas-based CHP plants or large or small heat-only boilers and delivered to buildings through a network of hot-water pipes.

2. *Autonomous heating systems* where small-capacity gas-based boiler- or CHP-plants supply heat and hot water to 1-3 multi-apartment buildings.
3. *Individual* heating of apartments (and individual houses), based on natural gas, electricity, wood or other available fuels.

Based on this analysis of heating options in the four targeted cities (Yerevan, Charentsavan, Gyumri, and Jermuk), the UHS draws the following conclusions about the technical options:

- If DH is to be continued at all, modifications will have to be made in the way it is supplied to consumers in order to provide affordable quantities and quality of heat without continuing widespread subsidies; i.e., the provision of heat has to be controlled by the consumer, it has to be flexible and it has to be billed based on metered consumption.
- Decentralized heating with autonomous gas-based boilers and individual natural gas stoves, which were identified as the least-cost options in the long-term should be promoted in all areas and allowed to compete with DH under a sensible institutional framework. The high initial costs associated with these options may, however, render them unaffordable for a part of the population until economic growth improves the general purchasing power.
- Recognizing that many households may be unable in the short/medium term to participate in collective, HOA-based arrangements or afford clean individual heating options, a program should be initiated to reduce the barriers for the development and marketing of efficient wood stoves, which are better designed for use in multi-apartment dwellings than the existing stoves. However, the environmental implications of continued wood burning would need to be carefully assessed.
- Low-cost insulation of buildings should be encouraged by systematically eliminating informational, institutional, financing and affordability barriers. There are many measures such as (re-)installation of windows and doors in the staircases, tightening of window frames, etc. that are very low-cost and/or have a short pay-back time that could partially be done by residents themselves. However, functioning HOAs may need to be in place to capture the full benefits of these measures.

The main purpose of this IDA project and associated donor financing is the implementation of the UHS, focusing on improving the enabling environment for a community and private sector-led approach. This requires the elimination of the following barriers, which prevent the materialization of heating services that are affordable and at the same time environmentally sustainable:

Legal and regulatory barriers

- Deficiencies in the legal framework for home owner associations (HOAs) prevent their effective functioning which would regulate rights and responsibilities of residents sharing a common space. These associations can serve as a forum for taking decisions which affect all residents collectively, including the provision of communal heating services, increase the bargaining power of consumers and reduce the payment risks pervading the provision of some network-based services;
- Regulatory rules used to be the same for all heating service providers and have only recently been relaxed for those providers serving only a small number of customers;

- Incomplete gasification of the country and lack of clear standards and norms for safe use of heating equipment, certification of suppliers and manufacturers of equipment, and deficiency of monitoring, control, and enforcement mechanisms.

Institutional barriers

- Wide disparity of incomes between families living in the same apartment building and lack of technical means for each family to regulate its consumption of communal services create difficulties for residents to agree on a common set of rules to govern the provision of these services;
- The existing central heating systems are essentially supply-driven, un-metered, and provide customers with virtually no means to regulate their consumption to suit their comfort preferences or affordability levels, and be billed accordingly;
- The private sector is immature and has no experience in provision of heating and other communal services;
- Schools do not have a budget for capital investment in new heating equipment.

Financial barriers[3]

- The financial sector is still immature and risk-averse and lacks management capacity, heating sector knowledge and access to adequate financing, particularly long-term funding. As a result banks are unwilling to provide the long-term financing at affordable interest rates, required to stimulate commercial provision of heat services;
- There is a considerable gap between real and perceived risks by local financial institutions with respect to heating/energy efficiency projects. A survey was conducted by the PIU to identify the attractiveness of heating project financing for commercial banks. It revealed that banks regard the financing of individual heating solutions as an attractive business due to its similarities with consumer lending. Several banks already have a sizeable outstanding and quickly growing portfolio of loans for small heating systems in individual homes. Banks consider the financing of larger (building or block level) heating projects riskier and, in some cases, would require risk-sharing arrangements with the R2E2 Fund (see Annex 4). The survey findings further suggest that often the high risk is related to the inability of banks to properly assess, prepare, and monitor these projects due to the lack of necessary technical and commercial skills.

Informational barriers

- Experience with flexible and energy-efficient heating technologies and with contractual mechanisms for the provision of affordable heating services in high population density urban areas does not exist;
- Lack of information on heat supply options and awareness of energy efficiency among residents of multi-apartment buildings;
- Lack of information for residents on energy, legal, institutional issues;
- Lack of awareness about the right methods of use of gas, including for heating purposes, and about the potential dangers.

[3] A more detailed description of the Armenian banking sector is provided below.

Background on the Armenian Financial System

Financial intermediation in Armenia is dominated by the commercial banking system. As of the end of 2004, 19 banks are operating in the country, with total assets of US$ 751 million, or 23 percent of GDP. The rest of the financial system is small, underdeveloped and not widespread.. The banking sector is showing signs of decisive improvement after the turbulent years following the Russian crisis. Improvements are mainly the result of: (i) the positive macroeconomic performance of the country, with average GDP growth in double digits since 2000, decreasing inflation and stable foreign exchange rate; and (ii) the intense efforts of the Central Bank of Armenia (CBA) and the Government in furthering bank consolidation (12 banks were closed since 2000) and in addressing the underlying weaknesses in the framework and infrastructure for financial intermediation.. In the medium term, the country outlook looks positive, with continuing, if slightly less vigorous growth than in the past couple of years and low rates of inflation.

The banking sector is relatively sound, with total capitalization (Tier 1 to risk weighted assets) of around 30 percent, positive returns on equity and assets in real terms, and low levels of non-performing loans (around 7 percent). Banks seem well positioned in terms of liquidity, with liquid assets to demand liabilities well above prudent levels. While it is expected that the system will remain sound in the medium term, financial intermediation and financial deepening remain somewhat disappointing and need to be addressed. Lending rates and interest margins are high, around 10-20 percent in both local and foreign currency. Maturities are extending, but remain generally short due to the short funding base, high risks related to governance and transparency in the enterprise sector, and lack of capacity of banks.

Armenian Banking Sector
Selected Indicators

In US$ million or Percentage	**2000**	**2001**	**2002**	**2003**	**2004[a]**
Regulatory Capital	25%	14%	31%	34%	32%
Tier 1 Capital	23%	12%	29%	32%	30%
Capital to Total Assets	14%	9%	18%	18%	18%
Total Assets	508	566	597	686	751
Total Loans	232	281	295	322	348
Total Deposits	328	332	351	406	440
Total Capital	89	94	104	116	130
Total Loans to Total Assets	46%	50%	49%	47%	46%
Total Deposits to Total Assets	65%	59%	59%	59%	59%
Sector Mix of Loans (% of Total)					
Construction Loans to Total	2%	3%	4%	5%	4%
Energy Loans to Total	17%	11%	17%	11%	5%
Consumer Loans to Total	33%	26%	27%	31%	38%
Deposits of Individuals to Total Dep.	53%	52%	53%	49%	50%
ROE	-12%	-79%	22%	14%	18%
ROA	-2%	-9%	4%	3%	3%
Lending Rate (3 months)		27%	23%	22%	18%
Deposit Rates (Weighted Av. - US$)				5.5%	6.0%
Deposit Rates (Weighted Av. - Drams)				7.2%	7.4%

Data Source: IMF Article IV Consultation Memo (FSIs), the CBA and other

Anecdotal evidence shows that the supervisory capacity and authority of the CBA is more than satisfactory. The CBA conducts a rigorous, ongoing supervisory process that is grounded in legislation, regulatory reporting and prudential norms. The emphasis on compliance-based supervision reflects recent banking sector problems where bank failures undermined confidence in the banking system. However, the CBA has now started to put more emphasis on risk-based approaches to bank supervision with the implementation of a CAMELS system, greater focus on bank management and staff quality, and increasing emphasis on banks' internal policies, controls and business strategies. A few weaknesses and gaps in the legal and regulatory framework supporting CBA's activities remain, hindering supervision and resolution.

Table II
CBA Prudential Standards for Banks

The **minimum total capital** of a bank	**US$ 5.000.000**
Minimum ratio of total capital to risk weighted assets	**12 %**
Minimum ratio of core capital to risk weighted assets	**8 %**
Minimum ratio of high liquid assets to total assets	**20 %**
Minimum ratio of high liquid assets to demand liabilities	**80 %**
Maximum risk on single borrower and related parties	**<20 % of the total capital**
Maximum risk on all related parties	**<50 % of the total capital**
Maximum risk on one related party	**<5 % of the total capital**
Minimum reserve	**6%**
Foreign currency position	**<25 %**

The CBA has adopted a number of important measures in recent years to further strengthen supervision and further consolidation. Minimum capital requirements have been increased to US$ 5 million effective mid-2005. National Accounting Standards for banks have been brought in line with International Financial Reporting Standards (IFRS), with the exception of a few recently revised standards. These standards are for now not applicable to Armenian banks. Auditing standards are also in line with International Auditing Standards, and most of the banks are audited by the subsidiaries of internationally recognized auditing firms.

A deposit insurance system has been introduced, and will commence coverage in July 2005. The system is mandatory and coverage is limited to AMD 2 million for local currency deposits, and AMD 1 million for foreign currency deposits. Successful deposit insurance could help banks to address shortage of funding from depositors, especially long term funding. The CBA also introduced new legislation on Non-Bank Financial Institutions (NBFIs), which became effective in 2004. According to the law, the CBA is responsible for licensing and supervising NBFIs, which are subject to tight prudential norms and regulations (including provisioning).

Lastly, the CBA established a credit registry on January 2003. The registry is quite effective and helps banks in assessing risks and in developing their retail and consumer lending business. Banks are obliged to access the registry for each loan in excess of US$ 3,000. This limit should be lowered. In addition, the CBA is fostering the development of a private credit information bureau, which would effectively transfer the responsibility of the credit registry to the private sector.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

ARMENIA: URBAN HEATING PROJECT

The project design has benefited from the past projects financed by the World Bank and other donors in the country.

Sector issue	Project	Latest Supervision (PSR) Ratings Bank financed projects only	
		Implementation Progress (IP)	Development Objective (DO)
Bank financed:			
Eliminate barriers for sustainable development of renewable energy	Renewable Energy Project (proposed)		
Improvement of water and wastewater services in Yerevan	Municipal Development Project (ongoing)	S	S
Improvement of safety and reliability of the water supply services to participating communities in Yerevan	JSDF Community-Based Urban Water Supply Management Project (ongoing)	S	S
Improve the quality of water and wastewater services in the Armenia Water and Sanitation Company (AWSC) Service Area	Municipal Water and Wastewater Project (effective Sep. 14, 2004)		
Phase out poorly targeted heating subsidies provided through existing DH companies	SAC IV		
Promote adoption of sustainable natural resource management practices and alleviate rural poverty in mountainous areas and preserve the mountain, forest and grassland ecosystems of the Southern Caucasus	Natural Resources Management and Poverty Reduction Project (ongoing)	S	S
Assist in financing productive facilities and resources contributing to the economic and social development, strengthening commercial banks and financial institutions, and the investment and export market development capacity of private enterprises.	Enterprise Development Project (closed July, 2002)	S	S
Non Bank financed:			
Strengthen the role of HOAs in the collective organization and management of provision of heat and hot water supply services and support the restructuring process and capacity building of DH companies	UNDP-GEF: Improving The Energy Efficiency of Urban Heating And Hot Water Supply In Armenia		
Support emerging heat service providers in realizing least cost solutions that enhance effective management and reduce environmental costs	USAID: Program for Improved Heat Sector Management and Delivery of Heat Supply in Armenia		

Annex 3: Results Framework and Monitoring

ARMENIA: URBAN HEATING PROJECT

Results Framework

PDO	Outcome Indicators	Use of Outcome Information
Increased use of clean, efficient, safe, and affordable heating technologies in urban schools and residential areas.	(i) Share (in percent) of households in multi-apartment buildings with safe gas-- or hot-water-based heating;	Slow increase could be due to slow down of gasification. This could be counteracted with more TA, especially awareness building of benefits of new heating options. The indicator will be used for overall monitoring of UHS implementation.
	(ii) Cumulative number of schools with class temperature above 15°C and no idle classroom-days, resulting from inadequate heating ;	Inadequate heating conditions after installation of new heating technologies may signal insufficient resources for operations and maintenance, poor quality of design, installation, or maintenance.
	(iii) Reduced incidence of CO poisonings, fires and explosions per 10,000 gas connections; and	High incidence of accidents may be a result of lack of enforcement of safety norms and standards and insufficient or ineffective awareness building.
	(iv) Share (in percent) of targeted users of new heating technologies satisfied with heating conditions (when comparing before and after installation).	Dissatisfaction could be due to poor quality of construction and installation works, inadequate equipment or poor management. Additional capacity building of heating service providers should be considered.
Intermediate Results One per Component	**Results Indicators for Each Component**	**Use of Results Monitoring**
Component One: Private heat service providers and HOAs are increasingly engaged in providing safe and clean heating services	**Component One:** ▪ Number of private entities engaged in heating business ▪ Number of HOAs and private businesses receiving technical assistance from the advisory center and the R2E2 Fund ▪ Safety norms and standards are developed and enforced.	**Component One:** Lack of private sector involvement in heating business and low demand for TA could be due to lack of interest from beneficiaries or their poor capacity. This may trigger a need of increased focus on individual heating options and additional capacity building and other TA for heat service providers. The effectiveness of advisory center, public outreach campaign and changes in legislation should be considered. Inadequate performance of this component may relate to delays of TA from other donors and/or delay in procurement, thus triggering a need for additional IDA funds.

Component Two: Improved heating services are available to participating households	**Component Two:** ▪ Aggregate dollar amount of projects for residential heating, energy efficiency, and gas supply financed by the R2E2 Fund/PFIs. ▪ Loan repayment rates by the project beneficiaries ▪ Number of poor households receiving capital grants for gas- or hot water based heating services.	**Component Two:** Low level of lending by PFIs signals their weak interest. A revision of the risk-sharing mechanism or direct lending by the Fund might be necessary. Poor repayment rate may indicate weaknesses in eligibility and selection criteria as well as monitoring mechanisms by PFIs. Additional capacity building of PFIs or revision of selection criteria/processes for PFIs might be necessary. Low level of participation by poor households signals that targeting criteria might have to be revised or that affordability is still a problem, requiring further cost reductions. In addition, there might be need for additional public outreach.
Component Three: The quality of heating in participating schools is improved.	**Component Three:** ▪ Number of schools with improved heating services ▪ Investment cost per student	**Component Three:** Slow implementation could signal procurement delays. High unit costs could be due to poor design and lack of competition for equipment and works. More advertising and a review of procedures might improve the situation.

Arrangements for results monitoring

		Target Values					Data Collection and Reporting		
Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
(i) % of households in multi-apartment buildings with safe gas or hot water based heating	11	20	30	35	40	50	Once every two years	Surveys by an NGO or consulting firm in early years and the statistical service thereafter	Initially the R2E2 Fund and the national statistical service thereafter
(ii) Cumulative number of targeted schools with classroom temperature above 15C and no idle classroom-days resulted by inadequate heating;	--	--	10	30	50	95	Once every two years	Surveys by an NGO or consulting firm	R2E2 Fund
(iii) reduced incidence of CO poisoning , fires and explosions per 10,000 gas connection; * and	37	37	33	28	25	20	Annual	Reporting by the gas company and surveys by the state emergency department.	Gas company, the state emergency department and the national statistical service
(iv) % of targeted users satisfied with heating conditions (when comparing before and after installation).	--	50	60	70	75	80	Once every two years	Surveys by an NGO or consulting firm	R2E2 Fund
Results Indicators for Each Component									
Component One :									
▪ Number of private entities (equipment manufacturers, ESCOs and others) engaged in heating business	20	25	30	33	37	40	Annual		The state register, advisory center and the R2E2 Fund
▪ Number of HOAs and private businesses receiving technical	--						Annual		The advisory center and the R2E2 Fund

assistance from the advisory center and the R2E2 Fund		10	30	50	70	100			
▪ Safety norms and standards are developed and enforced.	No adequate standards currently		Standards and norms are developed	Standards and norms are enforced and monitored			Annual	Monitoring by Public Services Regulatory Commission and state emergency department	Public Services Regulatory Commission and R2E2 Fund
Component Two :									
▪ Aggregate dollar amount of projects for residential heating, energy efficiency, and gas supply financed by the R2E2 Fund/PFIs and co-financed by beneficiaries ($ 000).	--	300	1,300	2,500	3,700	4,200	Annual	PFI and R2E2 Fund reports	R2E2 Fund
▪ Loan repayment rates by the project beneficiaries.	--	---	92%	93%	94%	95%	Annual	PFIs and R2E2 Fund reports	R2E2 Fund
▪ Number of poor households who received capital grants for gas or hot water based heating services.	--	--	2,000	4,000	8,000	10,000	Annual	R2E2 Fund reports	R2E2 Fund and Ministry of Labor and Social Issues
Component Three:									
▪ Number of schools with improved heating services	--	10	30	40	20		Annual	R2E2 reports	R2E2 Fund
▪ Investment cost per student (US$)	--	120	120	120	120		Annual	R2E2 reports	R2E2 Fund

* Based on the survey results of 2003/2004 heating season. In these numbers some manufactured but unsafe gas stoves might be included thus inflating baseline figures. During the next survey unsafe equipment will be explicitly identified

Annex 4: Detailed Project Description

ARMENIA: URBAN HEATING PROJECT

The project aims to support implementation of the UHS for multi-apartment buildings and improve heating in urban schools. The project design is consistent with the UHS phases. Specifically, the project preparation stage coincided and supported the objectives of the "survival" phase of UHS, while the actual project implementation stage is expected to coincide with and support the objectives in the "recovery" and early "growth" phases. By addressing the existing institutional and capacity barriers it is expected that by project completion the foundations for the sustainability and the "growth" phase of the UHS will have been laid. The project consists of the following five components:

Component A: Community and private sector mobilization and development of an enabling environment for effective and safe provision of heating services (US$ 3.9 million, of which IDA funding US$ 1 million). Technical assistance will be provided in two areas:

A1. **Development of an enabling environment for effective and safe provision of heating services (US$ 1.1 million, of which IDA funding US$ 0.5 million)**
This sub-component will assist in improving the enabling environment of the project to foster effective and safe functioning of the heating system and promote market-based competitive provision of heating services. This will include:

- Development of policies, norms and standards for natural gas supply and for safe installation of gas and heating infrastructure and supply of services, and certification of heating equipment. This should specify how the relationships between the gas company and the service providers and the gas company and consumers should be regulated, the standards to ensure adequate quality of service and other regulatory aspects of gas supply. In addition, this should include identification of the parties responsible for setting and enforcing standards, certification of heating and metering equipment, and development of standards based on solutions suitable for different types of buildings.
- Improvement of legal and regulatory framework to make HOAs more functional and to foster market-based provision of heating services, such as transfer of common property of buildings from municipalities to HOAs, granting access by HOA representatives to apartments to prevent misuse of the services and disconnect non-payers, more straight-forward and simpler decision making and voting mechanisms with an increased role for apartment owners.

A2. **Community and private sector mobilization (US$ 2.8 million, of which IDA funding US$ 0.5 million).** Support to effective HOAs for managing their buildings and contracting communal services and to private sector entities to create a qualified heat supply industry through:

- Capacity building and technical assistance to heat service providers and local financial institutions through training and information sharing (building on the experiences and best practices of other countries). The training may include on-the-job training, study tours and seminars depending on the specific needs. The TA to the FIs will include training of bank loan officers, particularly on environmental assessment of heating and

energy efficiency projects, provision of methodology for adequate risk analysis (e.g. portfolio management software, scoring systems, etc.).

- Implementation of broad information campaigns and public education programs to explain the benefits of available new heating technologies, the need and benefits of using environmentally clean and safe heating solutions, inform the public about safety norms and standards, benefits of the new approaches to community-led provision of communal services, institutional structure for building management, rights and obligations of members of collective organizations and legal matters. As part of the public awareness program annual exhibitions will be organized where safe and clean heating and energy efficiency equipment and technologies will be demonstrated.
- Establishment of a special advisory center that will support the removal of existing barriers for the provision of affordable, safe and clean heating services by providing comprehensive support on legal, technical, and financial issues to communities, and emerging new service providers. The advisory center will serve as a "one stop shop" offering assistance in wide number of areas, such as preparation of business plans, training and capacity building, introduction and promotion of efficient and cost-effective technical heating solutions in buildings, particularly common areas etc, necessary for developing "bankable" investment proposals, structuring financing for the projects and, as needed, managing the commercially sustainable operation of the heat supply. . Initially, an existing NGO or consulting company will be contracted to carry out the services.
- Support to beneficiaries for project preparation under the Component B1. Technical assistance, training, and other form of support may be offered to project sub-borrowers as an additional instrument to encourage private sector interest and reduce cost.

The TA component is estimated at US$ 3.9 million. Most of the TA will be supplied by UNDP/GEF and USAID in close collaboration with this Project. US $1 million will be allocated under the Project for the most urgent and critical TA. If other donors commit to provide the necessary funding to address the TA needs the freed-up IDA funds will be reallocated to other components of the Project.

Component B: Financing of heating and related building infrastructure (US$ 10.0 million, of which IDA funding US$ 7.2 million). Investment financing for heating of multi-residential apartment buildings will be supported under two subcomponents:

B.1 Lending to project beneficiaries (US$ 6.0 million, of which IDA funding US$ 4.2 million). Heat providers, municipalities, HOAs, and individual apartment owners will be able to access funding for investments in heating infrastructure. It is estimated that about 7,000 households in multi-apartment buildings and without access to operational heating services would benefit from these investments. The funds will be channeled through the R2E2 Fund. The Fund will also serve as the financing mechanism for an IDA/GEF financed renewable energy project. The Fund infrastructure and support of operating costs will be shared between the two projects.

The Fund will provide financing to beneficiaries either (i) through on-lending to eligible PFIs; or (ii) through PFIs under *service contracts*, according to which the Fund would extend loans so as

to retain 100 percent or less of the credit risk (and proceeds), and the PFIs would manage the crediting and other financial/asset management activities, including asset collection, against adequate fees. Direct lending by the R2E2 Fund to project beneficiaries (HOAs, heating service companies, municipalities and individuals) may be offered as a fall-back if there is insufficient interest from local financial institutions.

The Fund will access financing from the GOA in US dollars in form of a loan for its on-lending operations secured against the subsidiary loans made by the Fund to the PFIs. IDA lending terms with eight years of maturity and possibility of extension will apply to the loan made to the R2E2 Fund. The Fund will provision for the foreign exchange risk and the credit risk associated with direct or intermediated lending according to the provisioning requirements set forth by the CBA for financial institutions.

Given the nature of the potential beneficiaries of the project, sub-loans will be divided in two categories: (a) individual beneficiaries borrowing less than US$ 5,000 equivalent; and (b) larger beneficiaries borrowing in excess of US$ 5,000. To ensure maximum outreach among beneficiaries, there will be US$ 2 million and US$ 1.5 million limits (for IDA funds only) for small sub-loans to individuals (below US$ 5,000) and larger sub-loans, respectively. The remaining funds will be used for risk sharing arrangements for certain projects with strictly economic and social purposes (this could be the case for HOAs and other socially important complexes, to be financed under larger projects). In such cases, the Fund may make loans up to 70 percent of the total loan, provided that a PFI is willing to make loans at its own risk of at least 30 percent of the requested loan. The joint lending will be constructed with the Fund providing these services directly to beneficiaries through PFIs on a pari-passu basis up to a predetermined percentage of the sub-projects. The PFIs will be provided a 5 percent service fee for servicing debt repayments and assets collection (terms of the servicing contract). In case of collection services, 5 percent will apply to the collected amounts, and not the principals or book values (success based). The maximum amounts available under the proceeds of the project for these services are US$ 0.7 million.

Sub-borrowers should be fully or majority privately owned legal entities, individuals, or HOAs established as legal entities. Municipalities providing heating services on a commercial basis might also qualify. The eligibility criteria for sub-borrowers and sub-projects will be incorporated in the OM of the Fund, and in the Subsidiary Loan Agreements. In general, these criteria will be based on the financial viability of the sub-projects, and the financial and legal standing of the sub-borrowers.

PFIs would receive funds from the R2E2 Fund and offer the above financial services in both US$ and AMD. The choice of mix between the two currencies would be at the discretion of the PFIs. Interest payments and principal installments will be denominated correspondingly with adequate margins to cover all risks associated with the sub-projects. When the Fund retains the foreign exchange risk for domestic currency denominated sub-loans, PFIs and sub-borrowers will be charged appropriate margins.

The on-lending terms for the PFIs would be set based on the cost of funding for the financial institutions prevailing in the market. Due to lack of long-term funds in Armenia there are no

close benchmark rates for on-lending. For US$ denominated sub-loans, the Fund would charge at least 6 months LIBOR plus 1 percent. On-lending rates in AMD would be equal to the last published weighted average cost of funds for Armenian banks as calculated by the CBA, multiplied by the banking sector leverage ratio (one minus Tier 1 capital ratio), and not lower than US Dollar 6 months LIBOR (as of today, this rate would be equal to 5 percent, approximately). The reference on-lending rates would be set every six months, starting January 15 of each year, or the following business day. The on-lending mechanism, as elaborated in Annex 6, is based on a lump-sum allocation to each PFI for a total of seven years. The Fund will retain the right of recalling portions of allocated-but-not disbursed funds to avoid that PFIs revolve these funds for purposes other than those of the proposed project.

PFIs should be required to meet the following criteria at all times. PFIs could include commercial banks and/or non-bank financial intermediaries licensed by the CBA.

Eligible bank-PFIs should meet the following eligibility criteria:

(i) be in compliance with banking laws and prudential regulations of the Central Bank of Armenia (CBA);
(ii) be interested and committed to servicing the range of clients who are the intended beneficiaries of the Project;
(iii) be at least 75% privately owned;
(iv) undergo an annual audit that is conducted in accordance with International Financial Reporting Standards (IFRS) and International Standards on Auditing and have unqualified audit reports for the last two years;
(v) be rated CAMELS 3.5 or higher by the CBA;
(vi) be generally sound and liquid, and meet the existing prudential regulations related to: (a) minimum and prudential capital requirements; (b) exposure to single, related, connected borrower and insider parties; (c) liquidity; (d) foreign currency position and exposure;
(vii) have a positive net income and positive real return on operating assets and equity, as reflected in the financial statements;
(viii) have acceptable levels of assets quality, with non-performing loans not exceeding 7.5 percent of gross loan portfolio;
(ix) have acceptable quality management policies, procedures and skills, and qualified and capable management team, sound business plan and appropriate budgeting and budget control procedures;
(x) have sound lending policies and procedures, including in respect of the entire credit cycle, problem loan management, write-offs of assets, credit approval authority, etc.;
(xi) have satisfactory internal control and audit procedures, including accounting principles and procedures, internal controls and reporting, and operational controls, as confirmed by external auditors.

Non-compliance with the above eligibility criteria would trigger the suspension or termination of the PFI participation from the project. Termination would trigger the automatic winding down of the outstanding balances with the Fund.

Bank-PFIs should have demonstrated a positive track record of compliance with the above criteria. Continuity and consistency of the policies and other quantitative criteria would be the basis for granting the status of eligibility under the Project. The Fund and the World Bank would retain the right of using different/subjective criteria in case of new bank-PFIs without an attested track record, including requiring the implementation of an agreeable Institutional Development Plan (IDP). The IDP should be designed to strengthen and enhance bank-PFIs technical and operational capacity, with particular attention to management information and internal audits; credit policies, procedures and guidelines; technical capacity and know-how; risk assessment and risk mitigation.

Bank-PFIs management should apply for participation in the Project by submitting relevant documents, including the latest available two annual and audit reports, and other information related to their prudential and regulatory compliance. The bank-PFIs management should also submit a disclaimer letter to the Fund authorizing the CBA to disclose information related to their CAMELS rating and prudential and regulatory compliance. Information provided by the CBA should be made available to the World Bank Project Team. Information disclosure requirements should be limited to those necessary to enable the Fund and the World Bank to assess their eligibility in accordance with the above eligibility criteria.

The Project would consider eligible non-bank financial intermediaries, and especially leasing and investment companies to channel funds to eligible beneficiaries. Especially leasing companies and leasing arms of NBFIs would be considered, given the emphasis on capital investment and equipment purchases. As a result, eligibility criteria for NBFI-PFIs would include:

(i) be licensed and supervised by the CBA;
(ii) be in compliance with the criteria and prudential regulations as established by the CBA related to minimum total and statutory capital, single borrower limits (included related and connected parties and insiders); and gross foreign currency exposure;
(iii) operate in accordance with the applicable laws in effect in the Republic of Armenia for Credit Organizations, including the existing prudential regulations;
(iv) be interested and committed to servicing the range of clients and beneficiaries of the Project;
(v) be at least 75% privately owned;
(vi) undergo annual audits in accordance with international accounting and auditing standards;
(vii) have a sound liquidity position and a prudent liability and leverage structure, including off-balance sheet;
(viii) have acceptable asset quality, both on and off-balance sheet, with non-performing assets not exceeding 7.5 percent of total investment portfolio;
(ix) have sound quality management policies, procedures and skills;
(x) have a positive net income and positive real return on operating assets and equity for the current and two immediately preceding fiscal years, or since the launch of the company;
(xi) have a sound business plan and appropriate budgeting and budget control procedures;
(xii) have satisfactory internal control and audit procedures, including accounting principles and procedures, and financial documents, internal controls and reporting, and operational controls, confirmed by external auditors.

Non-compliance with the above eligibility criteria would trigger the suspension or termination of the PFI participation from the project. Termination would trigger the automatic winding down of the outstanding balances with the Fund.

NBFI-PFIs should have demonstrated a positive track record[4] of compliance with the above criteria. Continuity and consistency of the policies and other quantitative criteria would be the basis for granting the status of eligibility under the Project. The Fund and the World Bank would retain the right of using different/subjective criteria in case of new PFIs without an attested track record, including requiring the implementation of an agreeable IDP. The IDP should be designed to strengthen and enhance the PFIs technical and operational capacity, with particular attention to management information systems and internal audits; credit policies, procedures and guidelines; technical capacity and know-how; risk assessment and risk mitigation.

NBFI-PFIs management should apply for participation in the Project by submitting all relevant documents, including the latest available two annual and audit reports, and other information related to their prudential and regulatory compliance. NBFI-PFIs management should also submit a disclaimer letter to the Fund authorizing the CBA to disclose information related to their prudential and regulatory compliance. Information provided by the CBA should be made available to the World Bank Project Team. Information disclosure requirements should be limited to those necessary to enable the Fund and the World Bank to assess their eligibility in accordance with the above eligibility criteria.

PFIs' Interest and Demand: After preliminary discussions in the field, almost all contacted banks and other financial intermediaries expressed strong interest in participating in the proposed Project. Most of these institutions seem financially, technically and operationally suitable to participate as PFIs in the proposed Project. However, further scrutiny will be needed as the project becomes effective. Some of the banks confirmed that they are already engaged in providing this type of service to their clients, especially under their consumer credit portfolios (home improvement loans). Financial intermediaries and other stakeholders, including heating service providers and distributors consider the overall demand for gas heating and energy efficiency products, and particularly on the consumer lending segment of the proposed project related to small heating systems for individual homes, robust.

B.2 Capital grants to the poor (US$ 4.0 million, of which IDA funding US$ 3.0 million). To allow the poorest households living in multi-apartment buildings to participate in the project, this component will provide capital grants for improving heating/and or natural gas services. Eligible households will be identified based on their participation in the existing PFBP. It is estimated that roughly 10,000 poor households will be funded under this component. The funding limit per household will be US$ 300, sufficient to provide a basic comfort level, and each household will have to provide its own contribution of 5 percent of the value of the investment either in cash or in labor. Those families living in the center of Yerevan, independently of their PFBP status, will not be eligible for grant financing. Co-financing from municipalities will be increasingly sought

[4] The Law on NBFIs was passed in 2004. As a result, given the impossibility of providing a track record within the first two years of the proposed project, the Fund and the Bank will apply subjective criteria and assess eligibility on a case-by-case basis.

for this component. In addition, more prosperous members of HOAs/communities might cross-subsidize poor members if this allows them to reduce the overall cost of heating.
Two types of investments may be financed under this component:

a) Capital grant for the connection of the poor to the heating system in the buildings which will receive financing from the PFIs under this Project for the establishment of local heating systems (building or block level boilers). In this case the enrollment in the PFBP will be the only eligibility criteria for the grant;
b) Capital grant for the connection of the individual apartments of the poor households to the gas and/or heating system. Urban households enrolled in the PFBP and residing outside Yerevan will be eligible for receiving the grant. Priority for receiving the capital grant will be given to the poorest eligible households, determined based on the scoring of the PFBP. The households with the highest scoring in the PFBP predominantly consist of households with orphans, households with multiple children and households with disabled members.

An output-based aid (OBA) approach will be applied for the disbursement of the funds under this component, whereby gas and/or heat service providers will receive payment for each poor household they connect to the gas and/or heating system. Service providers for type (b) investments above will be selected through a competitive bidding process where the least cost will be the selection criteria.

The Project team has submitted an application to GPOBA seeking additional US$ 3 million funding for the connection of poor households to the gas and/or heating systems. If approved, these funds will supplement this component of the Project.

Component C: School heating (US$ 6.25 million, of which IDA funding US$ 5.0 million). This component will finance investments, on a grant basis, in installation and rehabilitation of gas-based local heating systems and insulation (with costs not exceeding 10 percent of total investment costs) for schools. All urban schools outside Yerevan will be eligible for financing, provided they have a satisfactory technical state (including close-by gas supply) and have suitable engineering design. Roughly 100 schools that will receive funding under this component will be selected based on the cost-effectiveness of the investment per student. If funds are left after investments have been financed in all eligible urban schools, these remaining funds will be provided to schools in Yerevan. Around ten urban schools will be selected to receive financing for investment before the coming heating season based on their readiness for implementation

Component D: Support for project implementation (US$ 0.8 million, of which IDA funding US$ 0.8 million). This includes TA, goods, works and logistical support for project implementation and supervision, including the operating costs of the R2E2Fund. This will include staff salary, costs of audits, office equipment and furniture, transportation, communication, staff training, and other reasonable and necessary activities directly related to Project implementation, management and monitoring agreed with the IDA.

Component E: Project preparation (US$ 1.0 million, of which IDA funding US$ 1.0 million). This component is identical with the project preparation facility (PPF). The following activities have been supported during project preparation:

- Implementation of 10 pilot projects during two heating seasons (2003/04 and 2004/05) through HOAs, private sector heat providers and individuals, testing different technical heating options and contractual and commercial arrangements (see Annex 16 for lessons learned);
- Based on the monitoring and evaluation of lessons learnt from the pilot projects and the detailed documentation of costs and benefits of these projects the institutional arrangements were refined, and the development of a market for decentralized heating services was initiated;
- Design of the appropriate financing mechanism to channel the investment funds. This involved determination of whether a new or an existing financial intermediary should be used, specification of the suitable legal status and corporate governance structure of this intermediary;
- Preparation of OM and charter of the R2E2 Fund;
- Development of the documents necessary for the establishment of the advisory center. As part of this work the objectives, legal status, organizational structure and the budget of the advisory center have been prepared;
- Preparation of the financial rehabilitation plan for the DH companies in Yerevan. This plan demonstrated that the DH companies are not financially viable even in the short-term;
- Development and piloting of public outreach program, particularly based on pilot project results; preparation and dissemination of advocacy materials to mobilize communities and other stakeholders; organization of a gas safety workshop and of round tables with legal experts and HOAs to discuss legal improvement needs for better operation of HOAs;
- Removal of some of the legal and regulatory barriers, specifically the exemption of decentralized heating solutions up t 5,8 MW capacity from regulation, particularly of tariffs. a review by the Utility Services Regulation Commission of gas tariffs for different customer segments has not yet been completed. The PIU submitted a proposal for removing barriers regarding access to closed apartments;
- Stakeholder coordination and preparation of the EMP.

Annex 5: Project Costs

ARMENIA: URBAN HEATING PROJECT

Project Cost By Component	Local US$ million	Foreign US$ million	Total US$ million
A: Community and private sector mobilization and development of an enabling environment for effective and safe provision of heating services	1.20	2.70	3.90
B: Financing of heating and related building	3.30	6.70	10.00
C: School heating	2.50	3.75	6.25
D. Support for project implementation	0.50	0.30	0.80
E. Project preparation	0.56	0.44	1.00
Total Baseline Cost	8.06	13.89	21.95
Physical Contingencies	0.00	0.00	0.00
Price Contingencies	0.00	0.00	0.00
Total Project Costs[1]	**8.06**	**13.89**	**21.95**
Total Financing Required	**8.06**	**13.89**	**21.95**

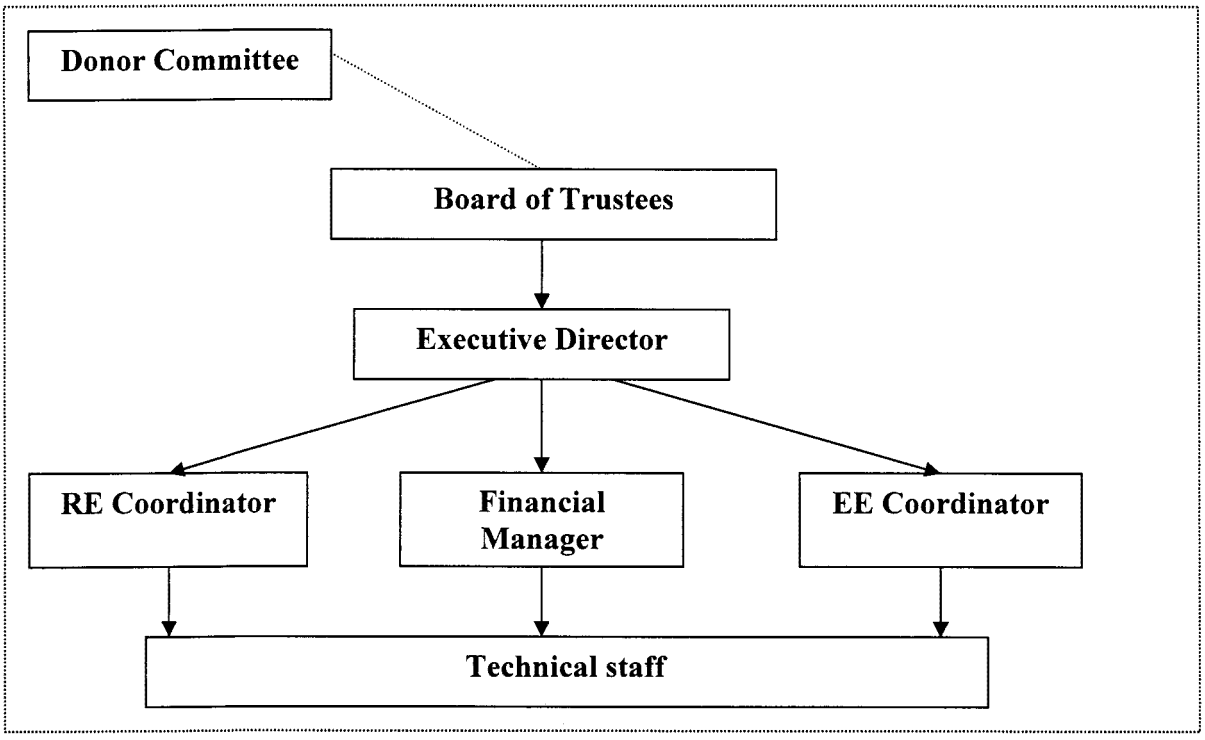
Annex 6: Implementation Arrangements

ARMENIA: URBAN HEATING PROJECT

The project will be implemented by the **Renewable Resources and Energy Efficiency Fund (R2E2 Fund or Fund)**, which will be established with the objective of promoting the development of renewable energy and energy efficiency markets in Armenia and facilitating investments in these sectors. The Fund will be set up as a non-commercial entity governed by the Board of Trustees (BOT) and managed by a qualified management team under an executive director (see graph below). The overall framework for the Fund operation is defined in the Charter, while the details of the principles and implementation rules governing the Fund, including details on its scope of activities, financial instruments, governance structure, procurement and financial management systems will be spelled out in the Operational Manual (OM).

The project implementation as well as overall R2E2 Fund operations will be overseen by the BOT, which will replace the Inter-Governmental Steering Committee that oversaw project preparation activities. The BOT will consist of nine members with seven members representing the public sector and two representing the private sector and NGOs engaged in the areas of energy efficiency and renewable energy. The public sector members will be represented by the Ministry of Finance and Economy (MOFE), Ministry of Energy, Ministry of Territorial Administration, Ministry of Nature Protection, and the Central Bank of Armenia (CBA). The BOT will be chaired by the Prime Minister. The BOT will also coordinate the operation and activities of the UNDP/GEF project to implement the Project effectively.

Renewable Resources and Energy Efficiency Fund Organization Chart



The operating costs of the R2E2 Fund initially will be financed from the WB UHP, the WB/GEF renewable energy project, and the UNDP/GEF project "Improving the Energy Efficiency of Urban Heating and Hot Water Supply in Armenia". Later, income from (on-) lending and contributions from other donors and the government will add to the Fund's income as well. It is expected that by completion of the Project the Fund will continue its operations and obtain financing from its own revenues, from the GOA and from other donors.

To ensure effective coordination of donor activities a **Donor Committee** will be established with representatives of all the key donors and the GOA. Initially the donor committee will include representatives of the WB, UNDP/GEF, and USAID. This committee will also provide policy-advice and on-going consultation to the BOT.

The Project Implementation Unit (PIU) which managed the preparation of the UHS and the preparation phase of this project will transfer its functions and qualified staff to the R2E2 Fund, so as to preserve the technical capacity built during Project preparation.

The Fund will access financing from the GOA in US dollars in the form of a: (i) loan for Project component B1; (ii) agency contract for components A, B2 and C, and (iii) agency fee for component D.

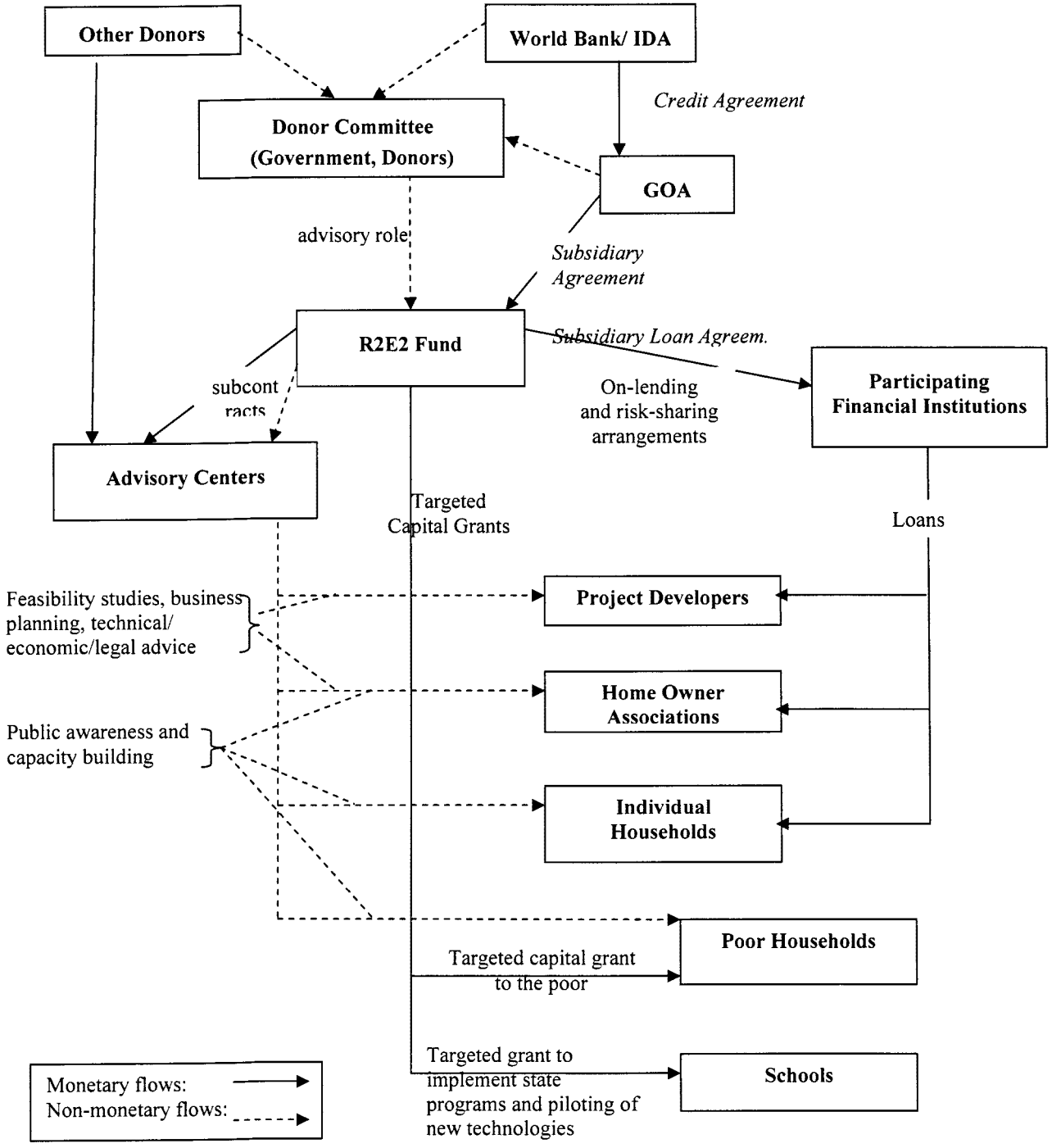
The on-lending scheme has been elaborated after discussions with local commercial banks. The proposed on-lending scheme will be incorporated in the Fund OM and in the Subsidiary Loan Agreements signed between the Fund and the PFIs. According to the proposed on-lending scheme, each PFI would receive a lump-sum allocation not greater than US$ 300,000 equivalent, to be re-lent to project beneficiaries at varying maturities. Whenever a PFI's cumulative outstanding (portfolio) balance exceeds 80 percent of the total allocated funds, PFIs would be entitled to apply for an additional tranche of up to US$ 300,000. Each lump-sum allocation would have seven years maturity with principal repayment at the end of the seventh year. The Fund and the World Bank would reserve the right of lowering the above lump-sum per PFI, depending on the type of PFI and its overall financial and institutional standing. Furthermore, the Fund and the Bank would reserve the right of recalling portions of the allocated-and-undisbursed funds that are in excess of US $100,000 or 20 percent of the total allocated funds for three consecutive months. A commitment fee of 200 basis points per annum will apply to allocated and undisbursed amounts, calculated on three months basis.

Each PFI should be reporting a diagnostic of the respective portfolios on a three months basis starting January 15th or the following business day. The reporting format should be divided between US$ and AMD sub-loans, and should include:

- for sub-loans of less than US$ 5,000 equivalent: cumulative committed, disbursed and outstanding balance vs. on-lent funds; number of sub-loans; weighted average lending rate and maturities; portfolio performance (non-performing loans); a brief summary/breakdown of sub-loans by category;
- for larger sub-loans in excess of US$ 5,000, for each sub-loan: a brief project description; committed, disbursed and outstanding balances; lending rates and maturities; sub-loans performance (repayments, delays, write offs).

The PFI reporting and monitoring details will be specified in the OM.

Project Implementation Arrangements



Advisory center(s) will implement the community and private sector mobilization and development component of the project with funding from the R2E2 Fund under subcontracts and, possibly, from donors. The advisory center will be designed as a one-stop shop and client-friendly entity. Initially one advisory center will be established in Yerevan with the option of opening additional centers or branches in other major cities of the country as the demand for advisory activities grows. The centers will employ qualified legal, economic, technical specialists to provide a comprehensive range of services to the HOAs and the private sector service providers. Initially, an existing NGO or consulting company will be contracted to carry out the services. While initially those services would be offered free of charge, it is expected that with increasing interest and participation of the private sector in the heating sector the advisory centers will start charging fees for their services and will become self-sustainable by the completion of the project.

Annex 7: Financial Management and Disbursement Arrangements

A. Financial Management

Country Issues. The draft CFAA report, which is being finalized currently, concluded that the overall fiduciary risk[5] in Armenia is significant. The key reasons are: (i) inadequate capacity of core control and supervisory agencies performing the audits within the public sector; (ii) although most of the basic laws are in place with respect to various entities' (private sector and public enterprises, including state non-commercial organizations) financial reporting, compliance remains a problem and authorities need to improve the quality of auditing, monitoring and supervision.

However, the fiduciary risk of the stand-alone financial management (FM) arrangements for Bank-financed investment projects in Armenia is considered low. The government counterpart funding remains a major concern but actions have been taken by the Government and the Bank to monitor the status of this problem. Weaknesses in the banking sector mean that there are inadequate commercial banks to manage the special accounts. The project financial staff are considered adequate. The audit arrangements are acceptable and no significant issues have been identified.

A FM assessment was conducted for the project. The assessment found that the PIU has developed satisfactory specific procedures to ensure proper financial accountability of this project.

Risk Analysis

	Risk Rating	Risk Mitigation Measures
1. INHERENT RISK		
1. Country FM Issues	M	The Public Sector Internal and External audit, as well as NCO financial accountability reforms are being undertaken.
2. Project FM Issues	S	An action plan has been developed and agreed with the PIU targeted strengthening the capacity of the fund.
3. Weak Banking Sector Issue	S	Project Special Account (USD) will be opened in a commercial bank (HSBC Armenia Bank). All PFIs will have to go through a detailed and thorough selection process which would consider their corporate governance structure, past performance, reputation, experience in similar projects, etc. All PFIs will have to be audited by highly reputable audit firms. TORs for audit of PFIs will probably include specific clauses related to review of project related lending. PFIs will regularly report to the R2E2 Fund which will monitor their ongoing performance

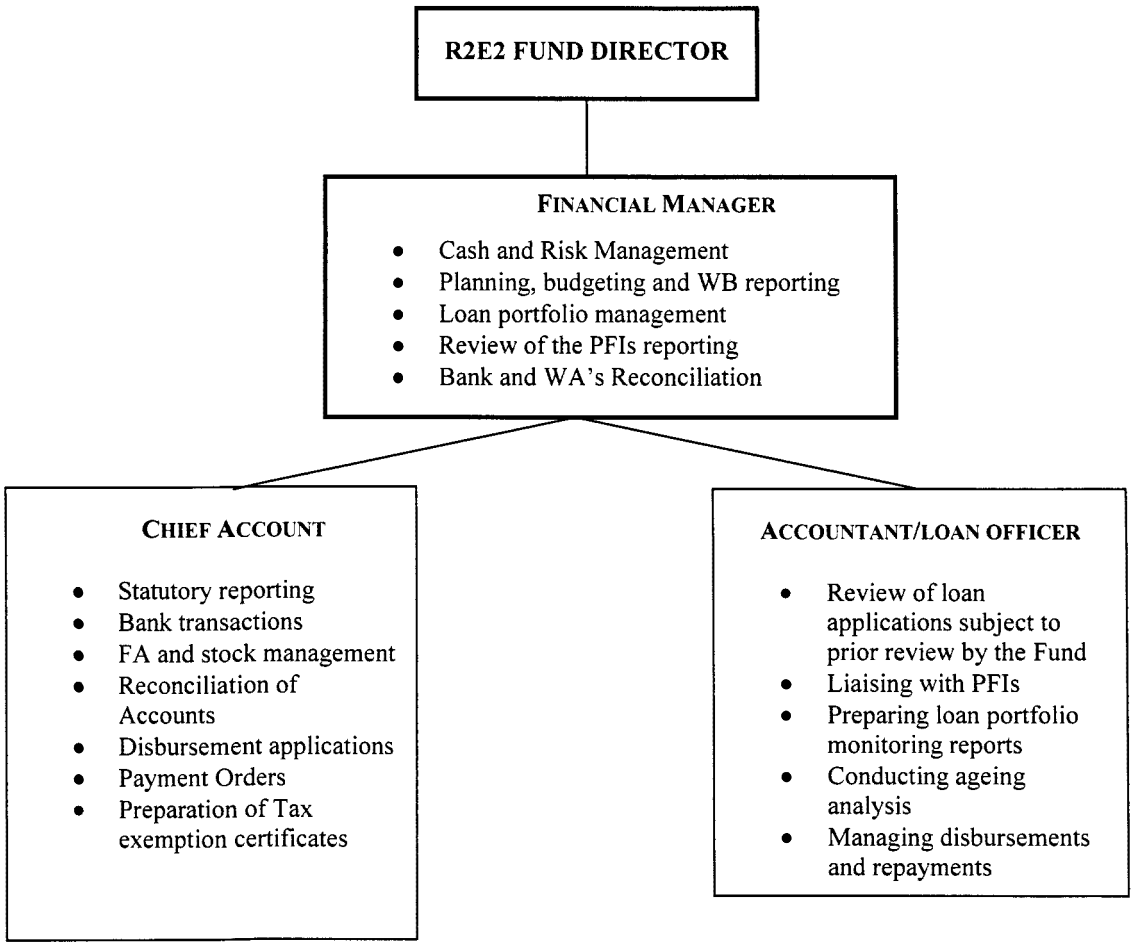
[5] Risk of illegal, irregular or unjustified transactions not being detected, measured on a four point scale according to the CFAA Guidelines (low, moderate, significant or high).

		and loan portfolio management (described in PAD, Annex 4 and 6).
4. Perceived Corruption	S	Ring fencing of projects. Well regulated and controlled financial sector in regard to PFIs.
Overall Inherent Risk	S	Substantial
2. CONTROL RISK		
1. Implementing Entity	M	
2. Funds Flow	M	The Funds Flow including flow to and back from PFIs has been agreed and it going to be finalized in the OM.
3. Staffing	M	The R2E2 Fund should recruit two accounting staff.
4. Accounting Policies and Procedures	M	PIU has developed FM Manual.
5. Internal Audit	N/A	Not applicable
6. External Audit	M	The R2E2 Fund should select audit company from the list of WB qualified auditors
7. Reporting and Monitoring	M	
8. Information Systems	S	The current accounting software will be upgraded or replaced.
OVERALL CONTROL RISK	M	Moderate

Strengths and Weaknesses. The significant strengths that provide a basis of reliance on the project FM system include: (i) significant experience of PIU management (PIU director used to be a Financial Manager of the Transport Project for several years) in implementing Bank-financed projects for past several years; and (ii) highly qualified and skilled financial manager recruited, (iii) adequate FM procedures described in the manual. The weaknesses of the R2E2 Fund (which will be established based on the existing PIU) are the lack of the adequate software for performing business functions and training plan for the staff in WB policies and procedures.

Funds Flow. Project funds will flow from (i) the Bank, either (a) via a Special Account, which will be replenished by withdrawal application, or (b) by direct payment by withdrawal application, and (ii) the Government, via the Treasury at the Ministry of Finance and Economy (MoFE) by request of the R2E2 Fund. Both Bank and Government funds will be managed solely by the Fund. The further flow of funds from the Fund to the PFIs has been agreed with the borrower and is described in Annex 4.

Staffing. The new organizational structure of the R2E2 Fund has been clarified and approved during the assessment and provides for an Executive Director and a finance team comprising a Financial Manager, Chief Accountant (as required by Armenian legislation), and accountant/loan officer. The current PIU's financial manager has considerable experience in accounting of banking and industry sectors and has demonstrated that he is capable of satisfying the management of financial accounting and reporting requirements of the project. The FM department structure of the Fund is presented below.



Accounting Policies and Procedures. The accounting books and records of the R2E2 Fund will be maintained on an accrual basis and project financial statements, including quarterly FMRs, will be presented in US dollars. A FM manual has been developed based on the agreed organizational structure of the FM team to reflect relevant accounting policies and internal control procedures. All PFIs should have sound FM and accounting systems in place which are also regulated and monitored by the CBA. Most of the financial institutions in Armenia produce their financial statements in accordance with IFRS.

Internal Audit. The R2E2 Fund will not have an internal audit function and none is considered necessary given its size. All PFIs will be required to have an internal audit function.

External Audit. The audit of the project will be conducted by independent auditors acceptable to the Bank and under terms of reference (TORs) acceptable to the Bank. A list of audit firms eligible to perform audits of World Bank financed projects in CIS countries is available and updated regularly. A standard audit TOR applicable for ECA, is also available and updated regularly to take account of the developments in the overall Bank audit policy.

The annual audited project and entity financial statements of the R2E2 Fund will be provided to the Bank within six months of the end of each fiscal year and also at the closing of the project. The project financial statements will be based on the quarterly Financial Monitoring Reports (FMRs) and will include: (i) Balance Sheet, (ii) Summary of sources and uses of funds; (iii) Summary of uses of funds by project components; (iv) SOE summary schedule, (v) Statement of the Special Account, and (vi) notes to the financial statements. Single audit opinion is required on all the above listed financial statements. The entity financial statements will include Balance Sheet, Income Statement, Cash Flow Statement, Statement of Changes in Equity, and Notes comprising a summary of significant accounting policies and other explanatory notes.

The contract for the audit awarded during the first year of project implementation may be extended from year-to-year with the same auditor, subject to satisfactory performance. The cost of the audit will be financed from the proceeds of the credit.

The External auditor will be selected to audit the above financial statements by December 2005 based on the TOR cleared by Country FMS, and the audit will be conducted and the audit report on the project issued by 30 June 2006.

All PFIs will be audited by highly reputable audit firms. TORs for audit of PFIs will probably include specific clauses related to review of project related lending.

Reporting and Monitoring. Project management-oriented FMRs will be used for project monitoring and supervision and the indicative formats of these have been discussed and agreed with the Bank.

All PFIs should be reporting to the R2E2 Fund on a quarterly basis with the description of the loan portfolio status and disbursed funding during the past quarter. The reporting format will be divided between two currencies and separate reports will be submitted for small loans with summary information on cumulative committed, disbursed and outstanding balance vs. on-lent funds and other relevant information. For larger loans more detailed information will be required including a brief project description, committed, disbursed and outstanding balances, lending rates and maturities, and sub-loans performance.

Information Systems. The PIU currently uses the 1C accounting package as do several other PIUs. The package has been functioning in the PIU for a while, and no major problems have been noted so far. The major drawback of the package is that it was designed for PIU accounting only with limited accounting and reporting functions. For this project an accounting package with all the relevant accounting and reporting modules applicable to business entities is required. The accounting software should also have lending module to account for the loans granted and repayments received from PFIs. The R2E2 Fund should upgrade the software with one which would include those functionalities or consider acquiring a new software package with all the required functionalities.

The proposed Action Plan for better FM arrangements. The following actions have been agreed with the borrower to enable the implementing agency to improve its FM system, and these actions are not conditions for effectiveness.

Points in Action Plan as of April 2005	Timing
1. Introduce the new accounting software which will incorporate all the functionalities required for business entities in addition to the project accounting requirements.	Before Project Implementation
2. Recruit chief accountant and accountant/loan officer to ensure that internal controls covering segregation of duties and loan portfolio monitoring system are in place.	Before Project Implementation
3. Develop a plan for continued training of key R2E2 Fund FM personnel and procurement officer in WB procedures before and throughout the implementation period of the new project.	Before and during initial stage of project implementation
4. Establish controls and procedures for flow of funds, financial information, accountability, and audits in relation to the on-lending mechanism to PFIs. This will be reflected in the OM.	Before Project Implementation

Supervision Plan. During project implementation, the Bank will supervise the project's financial management arrangements in two main ways: (i) review the project's quarterly FMRs and six-monthly management reports as well as the project's and entity's annual audited financial statements and auditor's management letters; and (ii) during the Bank's supervision missions, review the project's and entity's financial management and disbursement arrangements (including a review of a sample of SOEs and movements on the Special Account) to ensure compliance with the Bank's minimum requirements. As required by the Bank and ECA guidelines, Country Financial Management Specialist for Armenia and Georgia will carry out regular annual FM supervisions of the project.

B. Disbursement

Disbursement Arrangements. The Credit funds would be disbursed over a period of five years. Disbursements would be based on the new Country Financing Parameters for the Republic of Armenia, and disbursed under the Bank's traditional disbursements methods (reimbursements with full documentation, Statements of Expenditure (SOEs), direct payments to third parties and special commitments). The allocation of Credit proceeds are detailed in the table below.

Allocation of IDA Proceeds

Expenditure Category	Amount in US$ million	Financing Percentage
Works and Goods		
for installation and rehabilitation of school heating systems under the Component C	5,000,000	80%
for installation of heating equipment for poor residents under the Component B2	2,000,000	80%

Sub-loans under the Component B1	4,100,000	100%
Grants	1,000,000	100%
Consultants' services and audit	850,000	100%
Training	50,000	100%
Refunding of Project Preparation	1,000,000	100%
Operating Cost and Equipment for the R2E2 Fund	800,000	100%
Unallocated	200,000	
Total	15,000,000	

Initial disbursements to PFIs (Component B1) would be made against an application of advance in the amount of up to US $ 300,000 presented by the PFIs. Following disbursements would be made based on the PFI portfolio reports, indicating that the PFI's cumulative outstanding (portfolio) balance exceeds 80 percent of the total allocated funds. See Annex 6 for detailed reporting arrangements with PFIs.

Conditions for Withdrawal of Funds. Payments made for expenditures prior to the date of the Agreements in an aggregate amount not exceeding the equivalent of US$ 450,000 in respect of categories A, C, and D made before that date but after May 1, 2005 will be eligible through a clause for retroactive financing in Schedule 1.

Special Account. To facilitate timely project implementation, the R2E2 Fund would maintain a Special Account and if necessary one sub-account to the Special Accounts (Transit Account) in a commercial Bank acceptable to the Bank to finance project expenditures from the IDA Credit. In addition, the Borrower would open a Project Account for Government counterpart funds in a commercial bank.

The "Authorized Allocation" of the Special Accounts should generally not exceed 10% of the total Credit amount. The Special Account will have an initial allocation of US$ 750,000. Once cumulative disbursements under the loan have reached US$3,000,000, the allocation will increase to US$1,000,000. Payments in excess of 20 percent of Special Account will be made through direct disbursement from the Credit Account.

Statements of Expenditures (SOEs). SOE procedure would be used for contracts for (i) goods and works costing less than US$ 100,000 equivalent per contract; (ii) services of consulting firms costing less than US$ 100,000 equivalent, and individual consultants costing less than US$ 20,000 equivalent per contract; (iii) incremental operating costs; (iv) training; (v) sub-loans of amounts below US $ 200,000; and (vi) grants. The required supporting documentation would be retained by the R2E2 Fund, until at least one year after the Association has received the audit report for the fiscal year in which the last withdrawal from the Credit Account was made. The documentation would be made available for review by the auditors and by visiting IDA staff upon request. For sub-loans the SOE procedure will be based on reports from the PFIs regarding

disbursed, committed, and outstanding amounts and eligible expenses. These reports will be subject to annual audit by the PFI's external auditors.

Annex 8: Procurement Arrangements

ARMENIA: URBAN HEATING PROJECT

A. General

Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the Credit, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Procurement under component B1 (on-lending to project beneficiaries): Works and equipment under this component would be financed from the sub-loans issued by the PFIs to HOAs, municipalities, home owners, and heat service providers. The procurement will be done using the Commercial Practices method acceptable to the Bank, described in the Fund's OM. In the case of fall-back option, the R2E2 Fund may extend direct sub-loans to beneficiaries. In that case only sub-loans to private companies will be eligible for Commercial Practices method acceptable to the Bank.

Procurement under component B2 (grants to the poor for connection to gas, heat and hot water): Works and equipment under this component would be procured using either Bank's Standard Bidding Documents (ICB, NCB, minor works), or through "rate" contracts, allowing flexibility in providing services to multiple individual beneficiaries.

i. Grant for the connection of individual apartments of the poor households to the gas and/or heating system and installation of the equipment: Service contractor selected based on competitive tender by the Fund to provide connections of heaters to the gas system based on OBA "rate" contract (i.e. payments will be made based on certification of actual connections). The gas heaters will be procured in a centralized manner by the Fund;

ii. Capital grants for the connection of the poor to the local heating system in the buildings which will receive financing from the PFIs under the Project will be based on the actual cost of connection to the heating system and construction/rehabilitation within-the-apartment infrastructure. The contractors for implementing these works will be selected by private companies, HOAs, or municipalities based on the established commercial practices.

Procurement under component C (school heating): Works and equipment under this component will be procured using the Bank's Standard Bidding Documents. For first year schools works will be procured separately for individual schools. Possibility of packaging contracts will be decided based on this experience. Basic design/requirements will be prepared

by the Fund, while the detailed design will be included in the contract for supply and installation of boilers and heating system.

Selection of Consultants: Consulting services under TA component will be procured using the Bank's Standard RFP and contract forms. Services for audit, estimated to cost up to US$100,000 per contract, may be procured under contracts awarded in accordance with the provisions of paragraphs 3.1 and 3.6 of the Consultant Guidelines. Short lists of consultants for services estimated to cost less than $100,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Operating Costs: All operational expenses required for ensuring sufficient operation, such as staff salaries, logistical support, translation, office supplies, office rent, utilities, transportation, communication and maintenance costs, which would be financed by the project will be procured using Fund's administrative procedures described in the OM.

PPF: All works, goods and services financed under the PPF were procured in accordance with the specific procurement requirements in the PPF letter agreement.

B. Assessment of the agency's capacity to implement procurement

Procurement activities starting from effectiveness of the Credit will be carried out by the R2E2 Fund. By that time, qualified staff will be transferred to the Fund from the PIU, thus the continuity of the implementation will be ensured.

An assessment of the capacity of the Implementing Agency to implement procurement actions for the project has been carried out by Mr. Alexander Astvatsatryan, PAS, in April 2005. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff and relevant government bodies.

The key issues and risks concerning procurement for implementation of the project have been identified and include:

a) the evaluation committee of the project includes members not familiar with the Bank's procurement rules and procedures which results in delays in procurement evaluation process;
b) although the Armenian legislation delegates to PIUs a right to make final procurement decisions for contracts below US$ 50,000, the Urban Heating PIU is required to submit all contracts and bidding documents regardless of their estimated price for the project management board approval. This again results in major delays and extra processing cost for the PIU;
c) The PIU procurement staff has mainly dealt with procurement of consulting services and small volume procurement of goods and services. Also the procurement was done under the old guidelines.

The Country Procurement Assessment Report (CPAR) has assessed risks (institutional, political, procedural, etc.) that may negatively affect the ability of the implementing agency to carry out

procurement and has rated Armenia as a high-risk country. Therefore, the prior review thresholds are those applicable to a high-risk country.

The corrective measures should include: (i) additional training of the R2E2 staff on the application of current procurement and selection guidelines and ICB methods; (ii) incorporation of detailed procurement procedures and thresholds in the Fund's OM. Specifically, it is recommended to apply US$ 50,000 threshold for contracts and bidding documents subject to review by the Fund's BOT and to appoint as members of the evaluation committee people who are familiar with the World Bank procurement rules and procedures.

C. Procurement Plan

The Borrower, at appraisal, developed a procurement plan for project implementation which provides the basis for the procurement methods. This plan has been agreed between the Borrower and the Project Team on April 26, 2005 (approved by the Project Management Board on May 12, 2005) and is available at the R2E2 Fund located at 2 Zakian 2/1, Yerevan 375010, Armenia. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended twice a year supervision missions to visit the field to carry out post review of procurement actions.

E. Details of the Procurement Arrangements Involving International Competition

1. Goods, Works, and Non Consulting Services

(a) List of contract packages to be procured following ICB and direct contracting:

1	2	3	4	5	6	7	8	9
Ref. No.	**Contract (Description)**	**Estimated Cost**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**	**Comments**
B2-G-1/2006	Heating equip-ment for the poor	1,000,000	ICB	NA	NA	Prior	01/07/2006 ...	10 contracts

(b) ICB contracts estimated to cost above equivalent of US$ 200,000 and more per contract and all direct contracting will be subject to prior review by the Bank.

2. Consulting Services

(a) List of consulting assignments with short-list of international firms:

1	2	3	4	5	6	7
Ref. No.	**Description of Assignment**	**Estimated Cost**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**	**Comments**
A1-CS-1/2005	Development of norms and regulation for safe provision of gas and heating rules	300,0000	FB	Prior	15/12/05	---

(b) Consultancy services estimated to cost above equivalent of US$100,000 and more per contract and single source selection of consultants (firms) for assignments estimated to cost above equivalent of US$ 15,000 per contract will be subject to prior review by the Bank.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than US$ 100,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Annex 9: Economic and Financial Analysis

ARMENIA: URBAN HEATING PROJECT

A least cost analysis of heating technologies was carried out during the preparation of the UHS, taking into account the affordability constraints of the majority of Armenian households as well as the environmental impact of the heating options. This analysis revealed that in the medium to long-term less centralized gas-heating options (small boiler house supplying a small number of buildings and individual gas stoves) perform the best among the different heating solutions.

The economic and financial analysis of the project is carried out for each major component of the project due to the different nature of the costs and benefits associated with each of the components.

Lending to project beneficiaries

Funds will be channeled by the R2E2 Fund through the PFIs to project sub-borrowers for investments in environmentally safe, clean and affordable heating. The economic and financial performance of the project under this component will primarily depend on the private sector interest and ability to generate bankable heating project proposals, and the financial soundness and effectiveness of the PFIs to identify and support viable heating projects.

The pilot projects implemented within the scope of the project preparation activities have demonstrated that for a 120 day heating season, which is the minimum length of season for Armenia, block or building level heating projects on average generate healthy cash flows with favorable financial, environmental and social characteristics. The key indicators for the pilot projects are summarized below:

Average investment per apartment	US$700
Average simple payback period	5 years
Financial internal rate of return (FRR)	20%
Profitability index (NPV/investment)	73%
Return on equity (ROE)	26%
Average cost-recovery tariff (including fixed investment costs)	3.59 cents/kwh
Average financial savings per apartment during the heating season[6]	US$ 118

The heating projects for individual apartments also are financially viable with FRR in excess of 22 percent, payback period of less than 4 years and financial savings of around US $200 per apartment during the heating season.

Thus, the implemented pilot projects confirm the viability of heating projects. The financial returns will improve if hot water is supplied in addition to heat, if more buildings get connected

[6] Financial savings are computed as savings achieved by replacing electricity based heating with gas based heating.

and if consumers opt for a higher level of comfort (more heating days and/or higher indoor temperature). In addition, with the removal of remaining legal and regulatory, informational, institutional and other barriers for the provision of environmentally clean, safe and affordable heating services the financial returns should improve still further with the concurrent reduction of risks. This should ensure the involvement of the private sector in the heating business, generate adequate deal flow and enable the R2E2 Fund as well as local financial institutions to leverage additional funds for heating investments.

In order to estimate the economic rate of return (ERR) for this component of the project the cost-benefit analysis has been carried out with the following underlying assumptions:

- Loans extended by the R2E2 Fund to the PFIs will operate in a revolving mode;
- Loans will be disbursed over 5 years with annual disbursements of US $ 1 million;
- PFIs will require co-financing for each project from the sub-project borrowers of at least 30 percent of total investment costs.

Based on these assumptions, by the end of year five when the IDA funds will be fully disbursed together with contributions from the sub-project borrowers, the total R2E2 Fund supported investments in the heating business would total US$6.5 million. Based on conservative estimates, the amount of financing mobilized both through R2E2 Fund financing and through the leveraging impact that the early projects will have by demonstrating the financial viability of heating projects and lowering perceived risks, the total amount of financing mobilized over a 10-year horizon would amount to at least US $14 million, yielding a leveraging ratio of 2.8. This should generate net economic benefits, computed as the cost savings arising from the difference between the costs of gas-based and electricity-based heating, of US $4.7 million annually (NPV of US $19.2 million), resulting in an ERR of 34 percent. The existing electricity tariff is used as the cost of electricity-based heating in the ERR calculation. Since the electricity tariff has no provision for the investment costs of heating equipment, the cost savings associated with gas-based heating and thus the ERR are underestimated.

Since the fixed costs of investment account for a sizable share of the gas-based heating tariff, the ERR is not very sensitive to movements in the gas price. Thus, a 50 percent increase in the gas price would bring the ERR to 26 percent, and on average a 10 percent increase in the gas price would lead to 1 to 2 percent reduction in the ERR. In addition, an increase in the gas price is likely to lead to a subsequent electricity tariff increase because thermal electricity generation accounts for 30 to 40 percent of Armenia's total electricity generation and almost 100 percent of generation necessary for meeting heat demand in winter. This should further reduce the negative impact of the gas price increase on the economic and financial viability of heating projects.

The economic returns are also significant if the cost savings are computed based on the[7] savings arising from the difference between the costs of wood and gas-based heating with ERR estimated at 19 percent ignoring the substantial positive non-monetary externalities associated with the replacement of wood with gas.

[7] In reality some of the gas-based heating will replace electricity based heating and some heating by wood.

The economic return assumes useful life of equipment of 20 years, 120 day heating season and indoor temperature of 18°C. Due to the revolving nature of the funds the long-term economic benefits would be significant. In addition, since non-monetary benefits associated with the access to clean and safe energy, including improved health and comfort, preservation of building stock, reduced incidence of poisonings, explosions, and fire, reduced in-door and out-door air pollution and deforestation, are significant, the ERR underestimates the true economic returns to the residents of multi-apartment buildings and society at large.

School heating

Schools eligible for financing will be selected according to the cost effectiveness of investment per student. The most important economic benefits that can be quantified are reduction of heating expenditures (estimated at US$ 1.5 million annually) due to the cost savings from differences in the costs of electricity- and gas-based heating and reduced energy consumption of roughly 30 percent associated with the installation of more efficient heating systems and insulation of school buildings. The net present value of the economic benefits from rehabilitation of about 100 schools under the project is estimated at US$ 6.8 million with an ERR of 26 percent. This estimate assumes 120 day heating season, useful equipment life of 20 years and classroom temperature of 18°C. The ERRs could vary for individual school facility investments since the school administration may decide to take advantage of cost savings achieved from switching fuels and heat the buildings at higher temperatures. Other important benefits that are difficult to quantify are increases in indoor comfort, reduced air pollution, improvement in building stock and related improved health of students, and better quality of education.

Subsidies to the poor

The analysis for this component is based on cost effectiveness criteria. Due to the very depressed level of heat consumption at the expense of comfort by the poor, the heat expenses of the poor while decreasing on a unit basis (e.g. kWh or kJ), are likely to increase on an aggregate basis. However, the non-monetary benefits of access to clean and safe energy, particularly the improved health and enhanced living standards of the poor, will be significant though hard to quantify. The investment cost per poor household under the Project is estimated to be about US$ 300, excluding the VAT. Except for a 5 percent co-payment, poor households will receive an investment grant and thus their heating bills will consist of merely the variable costs of heating. For a poor family using a gas stove to heat one room for 120 days and to 18°C, such a heating bill would amount to about US$ 83 annually. This compares to US$ 121 for heating with wood or US$ 169 for electric heating.

Annex 10: Safeguard Policy Issues

ARMENIA: URBAN HEATING PROJECT

The project triggers one safeguards policy, OP 4.01 – Environmental Assessment, and has been assigned environmental screening category FI, as it will be implemented by financial intermediaries – the R2E2 Fund and PFIs.

The project is expected to reduce out-door and in-door air pollution due to declining use of fuel wood as a consequence of introducing affordable gas-based heating in multi-apartment blocks. Also, the project is expected to slow down deterioration of biodiversity in the vicinity of human settlements, as it will reduce uncontrolled cutting of trees for fuel wood. It is not anticipated that the project will cause any significant long-term negative environmental impacts.

Limited short-term environmental impacts may occur during the construction and/or renovation of boiler houses and replacement of pipelines, as well as elevated noise and dust levels during construction. The project will not affect natural habitats or pose any threat to endangered plant and animal species.

Occupational health issues is another safeguards aspect which will need to be closely monitored, as the probability of encountering asbestos-containing insulation materials while refurbishing the heating systems is quite high.

The project does not trigger OP4.20 Involuntary Resettlement, as no land acquisition is foreseen and the proposed activities will not impair anybody's access to land or other sources of income. If the need arises to lay new pipelines, every attempt will be made that they follow the public right of way, or the land would be purchased/leased on commercial terms between willing buyer and willing seller.

An Environmental Management Plan (EMP) has been prepared by the Borrower and is included in the OM of the R2E2 Fund. The EMP contains a list of potential environmental impacts the project activities may cause, and identifies the preventive and mitigation measures to address them. The EMP will serve as a basis for determining what kind of additional environmental/safeguard studies, if any, would be needed in case of each proposed sub-project. The EMP was discussed with the interested public and NGOs during a meeting on January 25, 2005. The suggestions collected during this meeting were incorporated, to the extent feasible, into the draft EMP. The EMP has been disclosed in the Bank's Infoshop and in Armenia on February 15, 2005.

Institutional capacity in Armenia to deal with safeguard issues is gradually growing. However, neither the newly established R2E2 Fund nor the PFIs have in-house expertise in identifying environmental issues. To address this shortcoming, the Fund's OM contains a checklist for environmental screening of proposed projects and identifying potential environmental threats, if any. Also, it is foreseen that R2E2 fund staff and loan officers of PFIs will undergo environmental training. The Bank's safeguards specialists will be available for advice.

Annex 11: Project Preparation and Supervision

ARMENIA: URBAN HEATING PROJECT

	Planned	Actual
PCN review	01/23/2003	01/23/2003
Initial PID to PIC	06/30/2003	06/30/2003
Initial ISDS to PIC	06/30/2003	06/30/2003
Appraisal	02/22/2005	01/03/2005
Negotiations	04/18/2005	05/16/2005
Board/RVP approval	07/07/2005	
Planned date of effectiveness	07/10/2005	
Planned date of mid-term review	03/16/2008	
Planned closing date	06/30/2010	

Key institutions responsible for preparation of the project:

Ministry of Finance and Economy
Ministry of Energy
Ministry of Urban Development
Ministry of Territorial Administration
Urban Heating PIU

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Gevorg Sargsyan	Operations Officer (Task Team Leader)	ECSIE
Bjorn Hamso	Sr. Energy Economist (PTL)	ECSIE
Rohit Mehta	Sr. Finance Officer	LOAG1
Junko Funahashi	Sr. Counsel	LEGEC
Leonid Vanian	Sr. Procurement Specialist	ECSPS
Inesis Kiskis	Sr. Environmental Specialist	ECSSD
Julian A. Lampietti	Sr. Economist	ECSSD
Arman Vatyan	Financial Management Specialist	ECSPE
Ani Balabanyan	Operations Analyst	ECSIE
Surekha Jaddoo	Operations Analyst	ECSIE
Anke Meyer	Consultant (Energy Economist)	EASEG
Carlo Segni	Consultant (Financial Sector Specialist)	ECSPF
Ramin Shojai	Sr. Private Sector Development Spec.	ECSPF
Ellen Hamilton	Urban Planner (Peer Reviewer)	ECSIE
Robert P. Taylor	Lead Energy Specialist (Peer Reviewer)	EASEG

Bank funds expended to date on project preparation:

1. Bank resources: $ 170, 000
2. Trust funds: $125, 235

Total: 295,235

Estimated Approval and Supervision costs:

1. Remaining costs to approval: $ 5,000
2. Estimated annual supervision cost: US$ 90,000.

Annex 12: Documents in the Project File

ARMENIA: URBAN HEATING PROJECT

- Urban Heating Strategy (also available as ESMAP Report No. 282/04)
- Urban Heating Strategy: Summary Report and Recommendations, The World Bank (October 2002)
- Urban Heating Strategy for Armenia: Demand Analysis, by Environmental Resources Management (2002)
- Minutes of the Project Concept Document Review meeting
- Minutes of the Quality Enhancement Review meeting
- Decentralizing Residential Heating in Armenia: Review of Pilot Projects, Alliance to Safe Energy (2004)
- Review of the social aspects of heat supply rehabilitation, financed by JSDF grant, by NACO and Alliance to Safe Energy (2004)

Annex 13: Statement of Loans and Credits

ARMENIA: URBAN HEATING PROJECT

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P063398	2004	MUN WATER & WW	0.00	23.00	0.00	0.00	0.00	22.36	0.00	0.00
P060786	2004	PUB SECT MOD	0.00	10.15	0.00	0.00	0.00	9.87	0.00	0.00
P074503	2004	EDUC QUAL & RELEVANCE (APL #1)	0.00	19.00	0.00	0.00	0.00	19.41	0.00	0.00
P057847	2002	NAT RES MGMT	0.00	8.30	0.00	0.00	0.00	9.05	0.24	0.00
P055022	2002	IRRIG DEVT	0.00	24.86	0.00	0.00	0.00	21.51	6.23	0.00
P044852	2002	ENT INCUBATOR LIL	0.00	5.00	0.00	0.00	0.00	4.61	3.48	0.00
P069917	2002	NAT RES MGMT (GEF)	0.00	0.00	0.00	5.12	0.00	5.72	0.24	0.00
P076543	2002	FIEF LIL	0.00	1.00	0.00	0.00	0.00	0.80	0.27	0.00
P057838	2001	JUDICIAL REFORM	0.00	11.40	0.00	0.00	0.00	8.33	-3.94	0.00
P057952	2000	SIF 2	0.00	20.00	0.00	0.00	0.00	9.08	-13.62	0.00
P044829	2000	TRANSPORT	0.00	40.00	0.00	0.00	0.00	9.88	-31.27	0.00
P008276	1999	ELEC TRANSM & DISTR	0.00	21.00	0.00	0.00	0.00	11.68	11.25	7.22
P064879	1999	IRRIG DAM SAFETY	0.00	26.60	0.00	0.00	0.00	10.12	6.15	0.00
P057560	1999	TITLE REG	0.00	8.00	0.00	0.00	0.00	0.31	0.31	0.00
P035805	1998	MUN DEVT	0.00	30.00	0.00	0.00	0.00	5.98	5.31	-0.09
P035806	1998	AGR REF SUPPORT	0.00	14.50	0.00	0.00	0.00	1.75	0.10	0.12
		Total:	0.00	262.81	0.00	5.12	0.00	150.46	- 15.25	7.25

ARMENIA
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

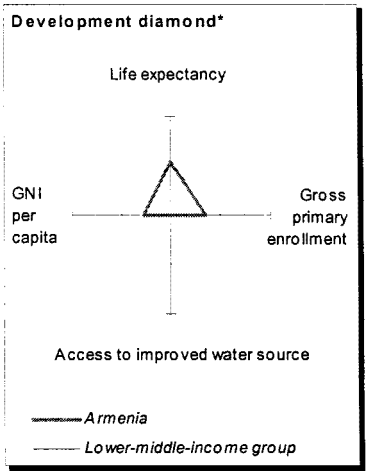
		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2002	ACBA Leasing	2.00	0.27	0.00	0.00	0.00	0.27	0.00	0.00
2000/04	Hotel Armenia	0.00	0.00	1.25	0.00	0.00	0.00	1.25	0.00
	Total portfolio:	2.00	0.27	1.25	0.00	0.00	0.27	1.25	0.00

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2002	Armenia SME Fund	0.00	0.00	0.00	0.00
	Total pending commitment:	0.00	0.00	0.00	0.00

Annex 14: Country at a Glance

ARMENIA: URBAN HEATING PROJECT

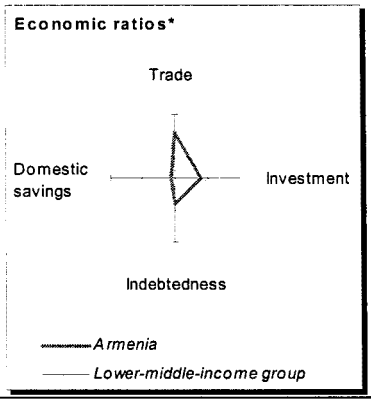
POVERTY and SOCIAL	Armenia	Europe & Central Asia	Lower-middle-income
2002			
Population, mid-year *(millions)*	3.1	476	2,411
GNI per capita *(Atlas method, US$)*	790	2,160	1,390
GNI *(Atlas method, US$ billions)*	2.4	1,030	3,352
Average annual growth, 1996-02			
Population *(%)*	-1.1	0.1	1.0
Labor force *(%)*	1.1	0.4	1.2
Most recent estimate (latest year available, 1996-02)			
Poverty *(% of population below national poverty line)*	48	..	..
Urban population *(% of total population)*	67	63	49
Life expectancy at birth *(years)*	75	69	69
Infant mortality *(per 1,000 live births)*	34	25	30
Child malnutrition *(% of children under 5)*	3	..	11
Access to an improved water source *(% of population)*	..	91	81
Illiteracy *(% of population age 15+)*	1	3	13
Gross primary enrollment *(% of school-age population)*	99	102	111
Male	99	103	111
Female	99	101	110



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

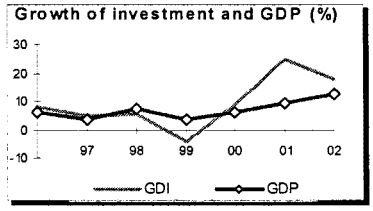
	1982	1992	2001	2002
GDP *(US$ billions)*	..	1.1	2.1	2.4
Gross domestic investment/GDP	..	16	18.6	19.8
Exports of goods and services/GDP	..	39.8	25.6	29.2
Gross domestic savings/GDP	..	-19.8	-1.7	3.2
Gross national savings/GDP	..	..	9.5	14.2
Current account balance/GDP	..	..	-9.5	-6.8
Interest payments/GDP	..	..	0.8	1.0
Total debt/GDP	..	..	46.7	48.5
Total debt service/exports	..	..	7.4	9.0
Present value of debt/GDP	..	..	30.9	..
Present value of debt/exports	..	..	88.8	..

	1982-92	1992-02	2001	2002	2002-06
(average annual growth)					
GDP	..	5.4	9.6	12.9	6.3
GDP per capita	..	6.8	10.4	13.5	-0.7

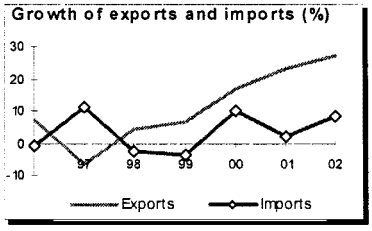


STRUCTURE of the ECONOMY

	1982	1992	2001	2002
(% of GDP)				
Agriculture	..	31.0	27.7	25.9
Industry	..	39.4	34.2	33.2
Manufacturing	..	33.1	22.4	21.6
Services	..	29.6	38.1	40.9
Private consumption	..	101.3	91.0	86.3
General government consumption	..	18.5	10.7	10.5
Imports of goods and services	..	61.3	45.9	45.8

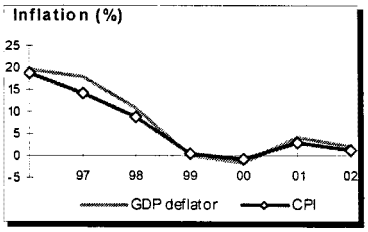


	1982-92	1992-02	2001	2002
(average annual growth)				
Agriculture	..	2.7	11.6	4.4
Industry	..	4.2	6.8	24.2
Manufacturing	..	3.7	3.8	14.2
Services	..	4.4	9.3	9.7
Private consumption	..	3.3	15.2	-7.9
General government consumption	..	-0.3	3.3	8.6
Gross domestic investment	..	7.7	24.8	17.7
Imports of goods and services	..	-2.9	2.1	8.2



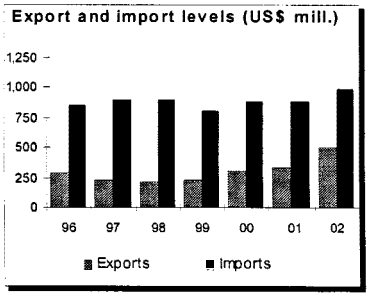
PRICES and GOVERNMENT FINANCE

	1982	1992	2001	2002
Domestic prices				
(% change)				
Consumer prices	..	728.7	3.1	1.1
Implicit GDP deflator	..	568.8	4.0	2.3
Government finance				
(% of GDP, includes current grants)				
Current revenue	..	4.0	16.3	16.7
Current budget balance	..	-7.7	0.3	0.5
Overall surplus/deficit	..	-7.7	-4.3	-2.6



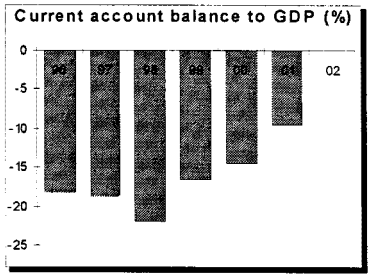
TRADE

	1982	1992	2001	2002
(US$ millions)				
Total exports (fob)	..	220	342	507
Gold, jewelry, and other precious stones	..	..	123	259
Machinery and mechanical equipment	..	..	28	21
Manufactures	..	..	89	..
Total imports (cif)	..	334	877	991
Food	..	..	211	200
Fuel and energy	..	60	187	..
Capital goods	..	..	62	..
Export price index *(1995=100)*	..	..	..	..
Import price index *(1995=100)*	..	..	..	..
Terms of trade *(1995=100)*	..	..	..	..



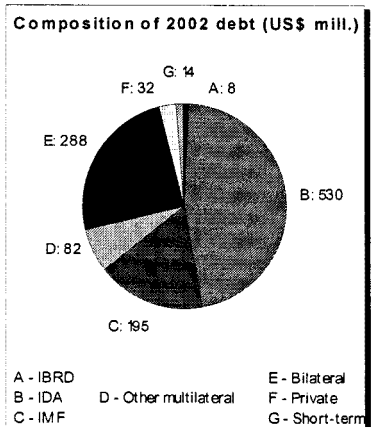
BALANCE of PAYMENTS

	1982	1992	2001	2002
(US$ millions)				
Exports of goods and services	..	230	540	700
Imports of goods and services	..	364	978	1,117
Resource balance	..	-135	-438	-417
Net income	..	-39	64	88
Net current transfers	..	..	174	169
Current account balance	..	..	-201	-160
Financing items (net)	..	..	217	234
Changes in net reserves	..	..	-16	-73
Memo:				
Reserves including gold *(US$ millions)*	..	..	334	360
Conversion rate *(DEC, local/US$)*	..	0.3	555.1	573.4



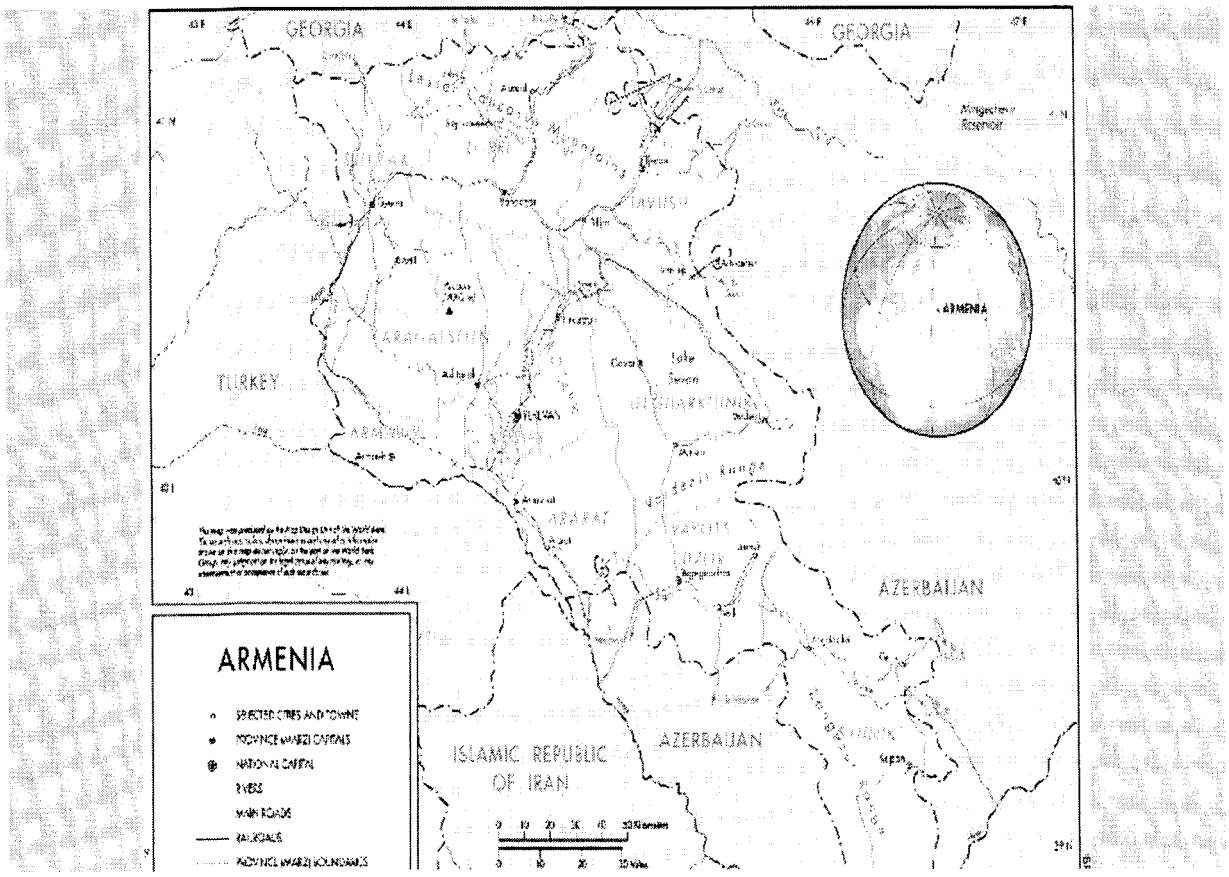
EXTERNAL DEBT and RESOURCE FLOWS

	1982	1992	2001	2002
(US$ millions)				
Total debt outstanding and disbursed	..	..	989	1,149
IBRD	..	..	7	8
IDA	..	..	428	530
Total debt service	..	..	55	74
IBRD	..	..	1	1
IDA	..	..	3	4
Composition of net resource flows				
Official grants	..	..	42	0
Official creditors	..	..	59	63
Private creditors	..	..	0	-4
Foreign direct investment	..	..	70	0
Portfolio equity	..	..	0	0
World Bank program				
Commitments	..	..	75	9
Disbursements	..	..	55	66
Principal repayments	..	..	0	0



Annex 15: Maps

ARMENIA: URBAN HEATING PROJECT



Annex 16: Lessons Learned from the Implementation of Pilot Projects

ARMENIA: URBAN HEATING PROJECT

As part of the Urban Heating Project and financed under the Project Preparation Facility, 10 heating pilot projects were implemented in the 2003/04 and 2004/05 heating seasons with more than 550 households participating. The objectives of the pilots were to test various technical options and commercial,contractual and financial arrangements, mobilize the private sector to provide heat services, and demonstrate advantages of collective actions.

Results from the pilot projects, which were all carried out in multi-apartment buildings in Yerevan,[8] are reported in the following, including the relevant lessons learned for the proposed project. Basic information on the pilots is reported in the two tables below.

Selection of pilots, financing conditions and costs. Pilots were selected on the basis of two tenders for which a total of 49 applications were received. Eligibility criteria included that applicants had to be either management bodies of multi-apartment buildings (HOAs), private heat producers or individual owners of apartments of multi-apartment buildings, and that the estimated cost of the project should not be more than $30/m2[9]. At least two thirds of the inhabitants had to agree to participate in the project and provide co-financing of at least 10 percent and 30 percent of the project costs for the first and second round of pilots, respectively.

The costs per project ranged from about US$ 1000 for individual heating and slightly more than US$ 50000 for decentralized boiler options. The project featuring a micro gas turbine which produces both heat and electricity has substantially higher investment costs – US$ 243000. Per apartment costs were as low as US$ 140 for metering and controls and as high as US$ 1000 for individual gas boilers, with autonomous boilers falling in-between with US$ 700-800. Beneficiaries provided their own contributions of 26 percent on average, ranging from 11 to 48 percent, the rest was provided as a loan from the World Bank project.

Terms of the loans were as follows: 5 percent interest rate, and maturity of 10 years. 2 years grace period were granted for 2003-2004 pilots, except project (4) which did not have a grace period. In Project (3), 16 poor households (entitled to support under the existing Poverty Family Benefit Program) received a grant for the amount of the investment after providing their co-financing. For the 2004-2005 pilots no grace period was granted. The interest rate is somewhat lower than the rate considered quasi commercial, since the participants in those early pilots were incurring higher costs due to existing legal, regulatory and institutional barriers.

As reported in Annex 9, the pilots have an average financial rate of return of 20%.

Fuel switching and other preconditions. In the first season pilots almost all apartments were previously heated by electricity and the number of wood or kerosene fuelled stoves was insignificant. The share of apartments which were heated with wood was significantly higher for the second season pilots. With about 23 percent it is very similar to the general incidence of

[8] A pilot project in Hrazdan with installation of a roof-mounted boiler house had to be postponed since the beneficiaries (municipality and HOA) were unable to provide the agreed co-financing.
[9] For 2004 projects instead of investment cost tariff was criteria, i.e.less than 17dram per kWth.

wood heating in Yerevan, which is lower (less than 30 percent) than in other parts of the country where it ranges from 35-98 percent. The level of comfort was low as typically only one room was heated. Therefore possible energy savings due to the new heat supply system will probably materialize as increased comfort. Some consumers may even experience an increase in heat consumption and possibly heating bills.

Table: Pilot Projects Technical Options

No.	Address	Technical Option	Remarks
1	Parujr Sevak 106	Boiler house constructed on the roof; internal network repaired; Regulatory vales, allocators, heat meter 1 building	
2	Avetisyan 70/2	Boiler house reequipped, external network to one building reconstructed; internal network repaired; allocators, regulatory valves, heat meter 1 building	
3	Surenyan 1,2,3,11a,11b	Internal network repaired; allocators and regulatory valves installed in 3 buildings, other two building apartment network is wall mounted, which doesn't allow to regulate consumed heat. Heat meters installed on 5 buildings.	
4	Shrghanajin 2/4,2/36	Individual boilers in two apartments with 3 rooms each. Internal network repaired	
5	Sayat-Nova dist. 7, 8, 8/1, 8/2	Previously received district heating; new heat source is a boiler house with modern boiler. Other investment: External network to 4 buildings; internal network repaired in 3 buildings, in building N8 new horizontal network and heat meters for each apartment installed. In other buildings metering system installed. Locally manufactured production meters are financed by borrower.	
6	Avetisyan 70/1, 70/2	Extension of project (2): Microgas turbine installation; boiler house equipment; external pipeline to 70/1 reconstructed, internal network repaired; Heat meter; regulating valves 3 buildings connected	Second phase of (2); micro turbine wasn't operative in 2004/05
7	Surenyan 1, 2, 3, 4	Extension of project (3): Boiler house reequipped; Internal network and metering/ regulating devices in #4; 6 buildings connected, of which only 4 are heated	Second phase of (3), taken over from HOA by ArmRusGas
8	Sayat-Nova av. 29, 31	Capacity of boiler house reequipped in USAID pilot project was increased, external network to one building reconstructed; internal network repaired; allocators, regulatory valves, heat meters are installed in 2 buildings; 3 buildings are connected and heated	
9	Manandyan 20, 22	Repair of internal network; heat meters at the CHP and building levels, allocators, regulatory valves Two buildings connected	Heat supply from CHP wasn't available 2004/05
10	Rubinyants 7	Capacity of boiler house increased, regulatory valves and allocators installed in one building which had already received metering equipment in a 2001 pilot with UNDP/GEF 8 buildings are connected due to requirement of municipality, but 7 don't have metering/regulation equipment or agreements with home owners	Only 8 days of heat supply in 2004/05

Note: Projects (1) – (4) are 2003/04 pilots, the remaining were implemented in 2004/05.

To facilitate the comparison between the situations before and after the implementation of the pilot projects, data have been adjusted as follows:

- All data are presented for the total number of apartments in a given block of flats (transformation based on no. of m^2),
- It is assumed that the level of comfort (the net heat demand) is the same before and after implementation.

Table: Pilot Project Results

	1	2->6	3->7	4	5	6	7	8	9	10	Total or average
Number of apartments (participating if less)	72	64	234 (229)	2	162 (154)	128 (104)	216 (174)	36 (28)	114 (0)	54 (33)	1082 (567)
Total living area, m^2	3251	2645	7702	94	6100	5476	6840	2276	3010	1608	39002
Beneficiary	HOA	Private supplier	HOA.	Apart-ment owners	PS	PS	PS	PS	PS	HOA.	
total investment cost (incl . works), $	51645	51713	32538	2062	127755	245593	66239	23339	13770	11818	626,472
cost/ apartment, $	717	808	139	1031	789	1919	307	648	121	219	473
own contribution,%	11.5	24.9	11.7	24.8	48.2	20.2	20.0	44.0	26.7	23.2	26.2
total loan, $	45681	38836	28730	1550	66148	195846	53011	13075	10088	9073	462,039
Investment, $ per m^2 and kW	15.9	19.5	4.2	21.9	20.9	44.8	9.7	10.3	4.6	7.3	13.1
	87.5	41.0	28.0	68.7	129	1471	33.1	33.3	25.5*	10.2	64.5
Heat tariff, $	0.027 [a]	0.027	0.024	79.1 [b]	0.032	0.024	0.022	0.022	0.018	0.22	NA
Collection rate[c], % (2003-04) 2004-05	(100) 69	(100) 100	53	100 [d]	8 [e]	100	37 [e]	(100) 84	No heat supplied	NA	NA
Cost of heating per household ... with electricity, $	426	472	334	535	746	759	720	1524	683	616	6815
... with project (full cost recovery), $	265	297	183	175	418	243	403	670	246	370	3270
reduction of heat cost, %	38	37	45	67	44	68	44	56	64	40	52

Notes: (a): Fixed part of tariff includes interest and loan payback and is paid every month; variable part (operating costs) is paid during heat season.; (b) per 1000 m^2 gas; (c) Collections are made throughout the year (d) includes loan payback and interest; (e) Billing process started only in March 2005, thus collection rate is low

Technical viability of heat supply options. The heat supply options tested in the pilots range from individual apartment-based gas heating systems to efficient boilers installed in former DH

boiler houses or on roof tops to micro gas turbines which generate both electricity and heat. Where necessary, the internal piping networks and radiators were reconstructed. Radiators were equipped with regulating valves and heat allocation meters, and ultrasonic heat meter and hot water meters were installed at the level of the buildings to measure total heat consumption and water tapping from radiators. The fuel consumption is measured by gas meters. In one building horizontal internal piping was installed in each apartment. Some thermal renovation of common spaces was included in several buildings.

The new heat generation equipment functioned well in general. Many problems were detected and had to be eliminated within the buildings themselves, such as the clogging of old risers and unbalanced heat supply.

The inhabitants in the apartments with horizontal piping expressed a significantly higher satisfaction with heating quality than their neighbors in other buildings. They also expressed much higher satisfaction with their heat meters than consumers with heat cost allocators in the systems with vertical risers. This comes at a significantly higher cost of metering, though.

Heating costs and energy savings. The tariffs for the pilots are agreed between heat provider (if applicable) and customers. They tend to be close to the tariff approved by the Utility Regulatory Commission for large centralized heating systems for the 2003/04 heating season which is 0.025 US$/kWh for a heating season of 90 days. But they are substantially below the current average electricity tariff of about 0.05 US$/kWh.

Even though investment costs of the microturbine are much higher, it is expected that the sale of electricity will lead to a very competitive heat tariff and low heating bill and thus to a reasonably quick payback of the investment. The individual heating systems have similar high front end costs and low recurring costs.

Compared to heating with electricity the pilot projects with gas-based heating have achieved substantial savings of energy and heating bills. Fuel savings are expected to be almost 70 percent. The resulting reductions in heating costs would be between 37 and 68 percent (see table above). When compared to wood-based heating the savings would be somewhat lower, but still significant.

Environmental impacts. Electricity for heating purposes is generated at a thermal power plant with a power efficiency of 33 percent. NO_x emissions will be eliminated almost completely for the pilot projects with decentralized gas-based heating systems. The reduction of CO_2 emissions depends directly on the reduction of fuel consumption. Carbon monoxide (CO) poisoning is a risk when burning gas, fuel wood and kerosene in stoves with open combustion chambers and without proper ventilation. Pilot project (4) includes the application of safety measures and education of the consumers about proper handling of the gas appliances to prevent any health or safety problems.

Affordability. Only few poor households participated in the pilots. They have lower heating expenses (about US$ 50) and they have paid their bills, partially pre-payment and the rest distributed over several months. More typical may be the GOA financed pilots in Gyumri

involving connection to the gas network and provision of gas heaters to households receiving payments from the PFBP. They confirm that poor households consume enough heat to be reasonably comfortable and that they are willing and able to pay for this consumption. The bills for the recurring costs of basic heating are about US$ 83 per heating season, whereas wood-based heating would cost 50% more and electricity-based heating twice as much.

User Satisfaction. Heat consumers in general are satisfied with the quality of heating from the new installations. The higher dissatisfaction level in some of the households in pilot (3) is due to the existing inefficient wall panel heating inherited from Soviet times, which results in higher heat losses, and does not allow to regulate and control heat consumption. Consumers, whose apartments are equipped with more radiators (mainly in balconies), would prefer to pay per m^2 /for living space/, as before. Some residents complain that they are unable to directly monitor their heat consumption, since the installed heat allocators are not proper metering devices.

Collections. Average collection rates for centralized heating used to be very low, only about 18 - 22 percent. Almost all pilot projects have reached 100 percent collection, even though many households need several months after the end of the heating season to complete their payments due.

Institutional issues. The pilots demonstrated not only new heating technologies but also different ways of organizing heat supply. 4 management bodies of multi-apartment buildings and 4 private entities were involved in the pilots so far. Projects implemented by the private sector or HOAs are very similar from the technical or legal point of view. They are, however quite different regarding organizational aspects. Advantages of private suppliers are evident: they have higher capacity, require less technical assistance, less risk-pledge possibility, higher ownership senses, flexibility in collection or tariff setting, etc. The only disadvantage is relatively higher tariff due to inclusion of profit.

The two pilots that were so far unsatisfactory had some kind of public burdens imposed on them. In pilot (10) the municipality required that additional buildings be heated. Since these buildings didn't have relevant equipment and their inhabitants had not been properly informed, the pilot eventually collapsed and only 8 days of heating were provided.

In pilot (9), it was attempted to establish a more commercial relationship between the Yerevan CHP plant (YPP) and its residential customers, by introducing a private sector heat distributor, buying (metered) heat from the YPP and selling to the customers on the basis of metered consumption. During the past heating season the arrangement collapsed when YPP did not produce heat at all.

Experience of pilot projects showed that HOAs are not organized yet; often, the management is provided by the chairman of HOS only. Meetings are just formal or never undertaken. As a result several HOA members are unaware of initiated measures, or informed later. Sometimes HOAs can be stimulated to become more active and ready for collective decisions when similar projects are implemented nearby. One project with two HOAs as beneficiary, (3), needed to be modified and their loan obligation transferred to a private operator – ArmRusGas.

It is considered a high priority to assist HOAs in developing organizational skills and to increase their role in contracting services, since the quality of services is conceivably better under continuous control and supervision from HOA. From the other hand if there will be well organized HOA, it will be more effective for private operator as well, since there will be easier to manage (one contract instead of hundreds). Besides, the quality of services will be higher under continuous control and supervision from HOA sight.

Increased demand for Pilot Projects: The following indicators are evidence of improved user satisfaction and sustainability of the projects:

- Continuous interests in participating in new projects from private sector heat providers. Two providers which participated in the 2003 pilots are participating with new proposals in the 2004 round of pilot projects. Several new private sector heat providers applied for participation in the 2004 pilot projects, one of them is the gas distribution company ArmRusGas.
- Beneficiaries from pilot (3) are participating in 2004 with an extension of the first project. Neighboring buildings of pilot (2) have been connected in the second round, thus lowering the overall costs of heating.
- The PIU has already received about 50 applications for participation in the 2005-06 heating projects.

Lessons Learned. The implementation of the proposed project will benefit from the following lessons learnt:

- The technical and financial viability of the decentralized heating solutions was confirmed, as well as the necessity to do rather extensive repairs of the building internal piping.
- Consumers are happy with the quality of heat from the new installations, but they would prefer "real" heat meters instead of heat allocation meters. Collections are much improved compared to the last years under the centralized DH supply.
- The resulting heat costs are affordable, including for poor families.
- Initial interest of households/HOAs to participate in the project is there, but would further improve with the use of the existing pilot projects as case studies to attract additional clients. Interest especially for individual heating solutions is strong, but awareness rising for the advantages of communal solutions appears necessary.
- HOAs continue to be weak, lacking organization and skills. Assisting HOAs in developing organizational skills and increasing their role in contracting services is considered a high priority since the quality of services is conceivably better under continuous control and supervision from HOAs.

MAP SECTION

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ARMENIA

- SELECTED CITIES AND TOWNS
- PROVINCE (MARZ) CAPITALS
- NATIONAL CAPITAL
- RIVERS
- MAIN ROADS
- RAILROADS
- PROVINCE (MARZ) BOUNDARIES
- INTERNATIONAL BOUNDARIES

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