

**A Regional Review of Social Safety Net Approaches
in Support of Energy-Sector Reform**

Appendix 2:

Energy Reform and Social Protection in Armenia

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Acronyms

AEAI	Advanced Engineering Associates International
AES	The AES Corporation
ARD	Armenian dram (currency)
ARS	Armenian Relief Society
ASE	Alliance to Save Energy
BCM	Billions of Cubic Meters
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
CA	Condominium Association
CEE	Central and Eastern Europe
CESCO	An Armenian ESCO
CFC	Chlorofluorocarbons
CH	Central heating
CHP	Combined Heat and Power
CIS	Commonwealth of Independent States
EBRD	European Bank for Reconstruction and Development
EdF	Electricité de France
ERM	Environmental Resources Management
ESCO	Energy service company
EU	European Union
FSU	Former Soviet Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gj	GigaJoule
GoA	Government of Armenia
HCA	Heat cost allocator
HIPC	Highly Indebted Poor Country
HPP	Hydro power plant
IDA	International Development Association
IIEC	International Institute for Energy Conservation
IMF	International Monetary Fund
KfW	Kapital für Arbeit
KWh	Kilowatt-hour
m ³	Cubic meter
MUNEE	Municipal Network for Energy Efficiency
MW	Megawatt
MWh	Megawatt hour
NACO	National Association of Condominium Owners
NGO	Non-governmental organization
PA	PA Consulting Group
PADCO	PADCO Inc
PAROS	Database software (created by PAROS Software Inc.)
PFB	Poverty Family Benefit
SCADA	Supervisory Control And Data Acquisition

TACIS	Technical Assistance to the Commonwealth of Independent States
TPP	Thermal power plant
TRV	Thermostatic radiator valve
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNHCR	United Nations High Commission for Refugees
UPSR	United Power Systems of Russia
USAID	United States Agency for International Development
USEA	United States Energy Association
VAT	Value Added Tax (European sales tax)

Preface

This report is one of five country reports and a synthesis report that were produced under the United States Agency for International Development (USAID)-sponsored project, Regional Review of Social Safety Net Approaches in Support of Energy-Sector Reform, as described below:

Abstract

The energy sector reform process is occurring throughout the transition countries of Central and Eastern Europe (CEE) and Eurasia. The United States Agency for International Development (USAID) has supported this process in numerous countries. The electricity sector reform process involves establishing a modern legal and regulatory framework, unbundling the monopoly electric utility into separate generation, transmission and distribution companies, and creating a competitive electricity market and privatization. This process is leading to the introduction of transparent commercial operations, modern technology, and investment that is needed to provide reliable and economic service for the long run. The transition to this end goal includes increasing tariffs and the collection enforcement for the supplied electricity.

During the transition there will be some impact on vulnerable populations. To identify approaches that will ease the impact on these populations, a multi-country study was conducted to identify social safety net approaches in support of energy-sector reform. This report documents this activity's results. The study identifies and documents lessons learned and best practices to ease the transition impact of power sector reform.

The three approaches to helping low-income households afford energy are contrasted and compared. The approaches are: 1) subsidies and assistance payments; 2) energy-efficiency mechanisms; and 3) tariffs. Each mechanism's impact is analyzed using a matrix that compares a range of quantifiable evaluation criteria.

The country reports (appendices) review the mechanisms that Armenia, Bulgaria, Hungary, Kazakhstan and Romania have used.

The results are available for government policymakers, international financial institutions, donors, and others interested in power sector reform and addressing the needs of vulnerable populations.

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Executive Summary

This report documents energy-related social safety net approaches used in Armenia, specifically subsidies/assistance payments, energy efficiency, and tariff mechanisms, within the context of energy sector reform. The report is one of five country appendices to a more-general “synthesis report” that compares approaches to the energy social safety net in Central and Eastern Europe and Eurasia and provides recommendations.

Research took place during spring, summer, and autumn 2002. The resulting report underwent peer reviews in spring 2003 and was finalized in the summer 2003.

A. Poverty Issues

An extremely poor country, Armenia has no significant natural resources, is heavily indebted, and ranks low in terms of human development in comparison with many other developing and transitional economies. In 2001, over half of the population lived below the national poverty line, with an estimated 16 percent lived in extreme poverty, reflecting the fact that average salaries and average pensions are both extremely low.

The Government of Armenia (GoA) is seeking to address the country’s poverty by maintaining a stable macroeconomic environment and placing the economy on a sustainable growth path. Efforts to tackle poverty were renewed in 2002, with the launch of an inter-ministerial and expert group charged with battling poverty. A USAID contractor, PADCO, together with governmental stakeholders, developed the PAROS database that registers and ranks the vulnerability level of households, enabling increasingly accurate targeting of social assistance.

It is clear that cash transfers alone cannot solve Armenia’s poverty problems, as poverty levels are too broad and too deep. In this context, economic growth and job creation must form key components of any poverty-reduction strategy.

B. Energy Issues

Fully one-third of the revenue from Armenia’s power sector is uncollected, which represents an enormous barrier to sector investment and development. Households (including low-income households) and commercial customers generally pay their electricity bills under threat of disconnection. Non-payers are mainly industrial and governmental.

The GoA was keen to privatize power distribution to a strategic investor that could bring Western expertise to all aspects of running a modern power-distribution business, including ways to improve collection rates. After two failed privatization attempts, the company was sold in 2002 to an offshore company with no apparent power-sector experience. In January 2003, an international company with some sectoral experience, (but not at the distribution level), was appointed by the new owners, which may or may not represent a turning point for this poorly performing sector.

The natural-gas distribution network deteriorated beyond repair in the early-mid 1990s and is being re-built slowly. The number of household connections, however, now stands at only 15 percent of households—down from 70 percent. The “new” gas network is privately owned, and the company has a modern flexible approach to helping low-income consumers who have difficulty meeting their bills; mutually agreed-upon payment schedules now serve as an alternative to disconnection for non-payment.

Of Armenia’s 55 district heating systems, 51 have stopped operating in recent years not only because natural gas was unavailable for some six years, but also because of customer non-payment. The remaining four systems may also collapse, as they too tolerate non-payment — connecting a building at the beginning of the heating season upon receiving a deposit of 30 percent of the winter bill, but typically collecting no more thereafter.

Unlike other countries in the region (except Georgia), Armenia is turning its attention to creating decentralized heating systems that serve two or three buildings as an alternative to seeking to modernize and privatize—or in Armenia’s case, revive—the district heating utilities.

With the collapse of natural gas and district heating came an over-reliance on electricity and wood for space heating. As low-income households have turned mainly to wood as the least-cost heating option, one-third of Armenia’s wood resources have been burned as firewood during the last 11 years. Wood is the primary heating fuel in rural areas, and some 50 percent use electricity in Yerevan. Overall, the country average is around 34 percent wood, 30 percent electricity, 10-15 percent centralized heating, with the rest using natural gas, kerosene, and animal waste. Social institutions such as hospitals and schools typically use electric heating.

C. Subsidies and Assistance Payments

There were no utility-specific assistance payments in 2002, although a one-time payment to reduce the financial impact of a sharp rise in the electricity price was made in 1999 and another in 2000. The Ministries of Social Services and Energy would like to introduce a utility subsidy, stressing that it should harmonize with and supplement the existing Poverty Family Benefit (PFB) system, not replace it.

A PFB of around \$14 per household per month is paid in cash to some 25 percent of households and is intended to help meet all needs, not just those relative to utilities. There is no check to ensure that utility payments are actually made. The number of PFB beneficiaries is gradually decreasing, and pensioners in particular are to be removed, thereby fully separating the PFB and pension systems. PFB eligibility criteria are expenditure-based, not income-based, as it is considered too easy for households to misreport their income. PFB provides a strong incentive for households to limit their use of electricity or natural gas, as supply will be withdrawn for non-payment, and encourages the use of the cheapest heating source, wood.

The government has requested \$16.25 million in donor assistance for utility subsidies, although the particular subsidy design as proposed may not represent the most economically efficient use of the money. Those funds might be better used for a subsidy that contributes to a wider range of social policy and energy policy goals, including energy efficiency.

Electricity tariffs include a cross-subsidy in favor of the household sector. According to the regulator, the subsidy will be removed gradually as part of a continuing process of tariff reform. However, tariffs that were introduced in January 1999 remained in place as of February 2003.

Toleration of household non-payment of power (a form of subsidy) used to be a serious problem, but this has been addressed. Many households simply turned back the old electromechanical meters in their apartments, but the transfer of meters from individual households into communal hallways went some way toward resolving the non-payment problem. Inverted block tariffs (lifeline tariffs) for power were withdrawn, as households and meter readers/payment collectors colluded to misreport winter consumption during the following summer. A continuing problem of fraud involving collusion between meter readers and households was resolved by removing the right of meter readers to collect cash and making households pay at the bank. Finally, strict enforcement of household disconnection policies means that electricity collection rates for the Armenian household sector are now extremely high.

The few district heating systems that remain provide low quality heating services. Households have been required to pay, but the companies have been able to recover only 10 to 35 percent of invoiced sales. Development of a social support scheme is an integral part of Armenia's 25-year heating strategy, developed in 2002 by the World Bank with consultants Environmental Resources Management (ERM) and Cowi (see chapter 3). Non-payment of utility bills by the remaining district heating companies, which cannot afford their natural gas, power, and water bills, also represents a major subsidy.

D. Energy Efficiency

To date, there has been no coherent approach to addressing the energy-efficiency needs of Armenia's more-vulnerable populations. There are substantial technical energy-efficiency gains to be made, but the capital investment barrier represents an insurmountable hurdle for low-income households, whose cash income levels are too low to support what many would consider non-essential purchases.¹ There is little that low-income households can do to reduce energy bills, with the exception of no-cost/low-cost weatherization, not paying for district heating, and/or switching to wood as the cheapest fuel source. Some low-income and other households use the "free" hot water

¹ Income estimates are as low as \$12 per month for some households, but this figure excludes a number of alternative income sources—cash gifts from relatives abroad, which are significant in Armenia; own production—particularly own production of food in rural areas; and unreported income.

from the radiators in district-heated apartments to wash clothes, etc. In addition, 5,000 low-income households received dual-rate electricity meters under a government-funded program, bringing supply-side energy-efficiency gains (flattening the demand curve), while also bringing household savings.

There is considerable scope for improving the energy efficiency of social institutions such as schools, hospitals, and orphanages in Armenia. USAID has conducted pilot projects, but there is still more to do. For example, the country's largest school extended the Christmas vacation from two to six weeks during the 2002/2003 winter, as classrooms were simply too cold.

The energy sector may receive a donation for the energy sector from the international community to compensate for an early closure of the nuclear power station, but no details have been agreed to, and no closure date has been set.

The Armenian Energy-Efficiency Council, established in April 2002 and supported by USAID, is bringing a new focus on energy efficiency within Armenia, and a draft Energy-Efficiency Law is under development in the Ministry of Energy.

E. Tariffs

Electricity tariffs rose sharply between 1995 and 1997, and are now broadly cost-reflective. Households and small commercial consumers pay slightly more than twice the rate for industrial power, so although it is accepted that a cross-subsidy is still in place, the subsidy is not so large.

There have been four broad phases of household tariffs in Armenia: pre-1994, when tariffs were very low and payment was not an issue; 1994–1996, when tariffs were raised but consumers turned meters back; 1996–1999, when lifeline tariffs were used but then failed as a result of fraud by households and meter readers; and since 1999, which has featured broadly cost-reflective household pricing. A “privileged” tariff that featured a 50 percent discount from the electricity bill was withdrawn in 1998.

The independent Energy Commission is relatively strong, empowered, and effective when compared with some of the other energy regulators in the region. This commission regulates energy tariffs.

Chapter 1

The Energy Sector and Poverty

Poverty is widespread, deep, and severe in Armenia, which continues to be among the poorest former Soviet Union (FSU) countries. Gross domestic product (GDP) per capita is lower than most other Commonwealth of Independent States (CIS) economies and significantly lower than Central and Southern European economies. Salaries, which are exceptionally low, represent 26 percent of household income in 1999, compared with 76 percent in 1985.² A combination of factors, including the collapse of the Soviet Union, a major earthquake in 1988, and an economic blockade by neighboring Azerbaijan and Turkey, all combined to increase the proportion of the population living below the national poverty line from 25 percent in 1988, to 55 percent in 1999, and then to 51 percent in 2001.³

Armenia is seeking to reduce poverty and unemployment by maintaining a stable macroeconomic environment and placing the economy on a sustainable growth path. USAID, the United Nations Development Programme (UNDP), and other members of the international community are providing substantial assistance to the GoA in this respect. Privatization is a key component of this strategy, as are financial-sector reform and improvements of the agricultural sector. Tackling civil service reform, fighting corruption, and improving the health, education, and social protection sectors are also the focus of both governmental and USAID activities. In addition, assistance for the earthquake zone was a major focus for governmental and international assistance throughout the 1990s, although this focus is declining as time progresses.

A detailed plan was developed with targets for implementing measures in economic growth, state governance/combating corruption, labor market and social protection, health, education, utilities, environmental protection, and monitoring of indicators. Important elements for the energy sector are the utilities and the design and approval of a financial-rehabilitation program for the heating sector for 2002-2004, with the objective of facilitating the urban population's access to affordable and clean heating services. In addition, one environmental target is to reverse the deforestation process, which has substantial implications for the energy sector now that wood has become a major source of winter fuel.

² Tereza Khechoyan, "Unemployment and Poverty in the Republic of Armenia" working paper (Armenian School of Public Administration, 2000).

³ UNDP, "Republic of Armenia: Interim Poverty Reduction Strategy Paper" (March 2001) estimated that 55% of the population lived below the poverty line in 1996, quoting a variety of sources including a 1996 survey by the Armenian Ministry of Statistics in cooperation with the World Bank. More recently, the IMF-World Bank 2002 report on "Poverty Reduction, Growth and Debt Sustainability in Low-Income CIS Countries," estimates the same level poverty level for 1999.

A. Poverty in Armenia

In Armenia, the national poverty line is set according to the cost of a specific list of food items (“minimum food basket”) plus an allowance for essential non-food items such as heat and cooking fuels. In 1996, the minimum consumption basket’s value amounted to 10,784 ARD/month (\$26.05) and in 1999, it was 11,735 ARD/month (\$21.93).

Households whose consumption did not meet this threshold were considered poor. Associated with the national poverty line is a value for extreme poverty, this defined as the national poverty line minus essential non-food items that represent approximately one-third of the value of the minimum consumption basket.

According to the World Bank, an estimated 51 percent of Armenia’s population lived below the national poverty line in 2001, with an estimated 16 percent in extreme poverty.⁴ The consumption of the average poor household is less than three-quarters of the value of the minimum consumption basket; among the extremely poor, average consumption is less than 80 percent of the poverty line.⁵

1. Recent Poverty Trends

Between 1992 and 1994, the vast majority of the Armenian population lived in conditions of absolute poverty. Since that time, however, there have been some improvements in living conditions. For example, the average wage has doubled since 1994, although it is still very low: \$8/month (2000) for a pension, \$14/household per month (2000) for poverty family benefit; and only \$44/month (2001) for an average wage (see appendixes 2.1 and 2.3). In 1999, over half (55 percent) of the population earned below the poverty line of \$22, although that percentage had fallen slightly to 51 percent by 2001.

As pensions, benefits, and wages are all so low, other income sources, such as private transfers from relatives living abroad, home production of food, and income from informal work, become very important in Armenia.

Poverty rates have declined only slightly since 1996, although the incidence of extreme poverty has declined significantly—from 27 percent down to 15 percent of the population. Appendix 2.2 includes statistics on the incidence of both of poverty and extreme poverty, as well as the depth and severity of poverty for the periods 1996, 1998/99, and 2001.

As poverty was so extensive and the labor market weak throughout the 1990s, many correlates of poverty normally associated with market economies do not appear as

⁴ World Bank, “Armenia Poverty Update” (June 2002).

⁵ T. Kelly, “The Nature of Poverty in ‘Growth, Inequality and Poverty in Armenia’” UNDP (New York, 2002).

significant in Armenia. For example, although the unemployed have the highest incidence of poverty, the working poor include the largest number of poor households.⁶

Although being employed reduces the risk of falling into poverty, it does not completely protect households from poverty because wages are so low. According to a recent study,⁷ urban populations face a 35 percent higher risk of poverty than do rural households, and when they are poor, 71 percent are more likely to be extremely poor. There is also a geographical element to poverty; the *marzes* of Lori and Shirak, which experienced extensive infrastructure damage during the earthquake of 1988, account for more than 25 percent of the poor.

An unusual characteristic of poverty in Armenia is that, unlike market economies and many post-communist societies, poverty is uniformly distributed across education levels.⁸ That is, higher educational levels do not protect people from poverty, as in most market economies. There is, however, a much stronger link between low education levels and extreme poverty.⁹

Armenia's combination of widespread poverty and low wages has led to a host of problems. For example, education quality has declined as a result of the non-availability of teaching materials, an exodus of teachers from the profession in search of better-paid work, and reduced school hours; the latter problem is particularly severe during the winter, when classrooms can be too cold to use. The introduction of paid health services has seen a two-thirds decline in the number of patients, the old social insurance and safety net mechanisms having all but collapsed during the 1990s. Moreover, a very large percentage of the working population moved abroad during the 1990s; this exodus distorted the age-group profile, creating new pressure on the remaining workforce and encumbering the pension system.¹⁰

2. Combating Poverty

The Armenian government appears to be making a renewed effort to tackle the problem of poverty, having established an inter-ministerial and expert "Battling Against Poverty"

⁶ World Bank, "Improving Social Assistance in Armenia, World Bank Report No. 19385-AM" (1999).

⁷ Kelly, "The Nature of Poverty."

⁸ UNDP Armenia, "Education, Poverty and Economic Activity in Armenia: Situation Analysis Report, (2002) and op. cit., World Bank.

⁹ On average, 16.4% of the surveyed population aged 10 and above were very poor in 2001, while the share is 31.6% among those without elementary education, 29.2% among those with elementary education, 22.9% among those with incomplete secondary education and 19% among those with secondary education.

¹⁰ It is noteworthy that money 'sent home' by relatives living outside Armenia is estimated to be the single largest source of national income. Although estimates vary, it is generally considered that there are more Armenians living outside Armenia than in Armenia. Households benefiting from transfers from abroad are, to some extent, insulated from poverty.

group in April 2002, which the Deputy Minister of Finance chairs. In addition, the GOA informed the IMF that reducing poverty and reversing the pattern of increasing income inequality are key elements of its medium-term economic strategy, together with combating corruption, reforming social protection through improved targeting, and revising the pensions system.¹¹

The accuracy of targeting social assistance in Armenia is being progressively enhanced through technical support from the USAID contractor PADCO, which has been instrumental in improving the PAROS database that registers and ranks the vulnerability level of households. The system is used to target the distribution of welfare payments and humanitarian assistance based upon a set of selective criteria and proxies for poverty/affluence. Applications range from targeting primary healthcare to the PFB. PADCO, which works closely with the National Statistics Service, Ministry of Urban Development, and Ministry of Social Services, is implementing its work on PAROS as part of a \$26 million social assistance program that is being conducted over a five-year period.¹²

B. Structure of Social Protection in Armenia

In common with other post-communist countries, Armenia began a process of fundamental reform of its social protection system during the 1990s. The pension system was reformed in 1995, and social assistance in the form of family allowances were replaced by proxy means-tested PFB in 1999.

In addition to under-funding, social protection targeting has been a chronic problem. According to the World Bank, the share of all state transfers was uniformly distributed across all income groups.¹³ Targeting benefits is difficult because of low capacity, corruption, and hidden employment.¹⁴

Armenia currently provides three major types of social assistance: old age and disability pensions, unemployment benefits, and the PFB. Pensions are the largest social transfer, although the number of pensioners has steadily decreased from 634,446 in 1992, to 560,082 in 2000. In 2000, Armenia spent US\$55.6 million on pension benefits, with the average monthly pension totaling 4,473 ARD (US\$8.28). A combination of gradually falling numbers of pensioners and gradually rising pensions has meant that the budget for pensions has remained relatively stable in recent years, hovering around US\$55 million per year. The government has responded through legislation, enacted in 1995 that increased the retirement age for men to 65 after 2005, and for women to 63

¹¹ Republic of Armenia, *Memorandum of Economic and Financial Policies for 2001-2003*, submitted to the IMF on April 26, 2001.

¹² A description of the project and more than 70 reports are available on the Internet at www.padco.am.

¹³ World Bank, "Improving Social Assistance in Armenia. World Bank Report No. 19385-AM" (1999), 52, table 11.

¹⁴ Notes by Christine Allison of Aguirre International on a PADCO briefing on "Social Transition in Armenia" on April 1, 2002.

after 2011. Appendix 3.3 contains the number of pensioners and size of pensions from 1992-2000.

The workforce dropped from 1.6 million in 1992, to 1.3 million in 2000, and the unemployment rate rose from 1.8 percent to 11.7 percent over the same period. However, these statistics do not reflect the fact that many people are no longer in the labor market. Appendix 3.1 includes a table describing employment levels and average salaries from 1992-2000.

Recent estimates suggest that somewhere between 25 and 33 percent of the workforce is no longer active. Many unemployed no longer bother to register because unemployment payments are so low: 3,176 ARD (about \$5.88) monthly for 7 to 10 months during 2000. Unemployment benefits reflect only 33 percent of the minimum food basket and only 20 percent of the poverty line. Approximately 15,600 workers received unemployment benefits in 2000, down from 30,500 registered unemployed receiving benefits in 1999.¹⁵

Social assistance programs originally included special pensions as well as family and child allowances that were not means tested but rather subsidies to certain “privileged” groups.¹⁶ In 1997, the state budget contributed US\$32 million to these programs, or 8 percent of government expenditures. This increased to US\$41 million in 1999, going to approximately 221,000 households (World Bank, 1999). Family and child allowances have now been replaced by the PFB.¹⁷ In 2000, the average benefit for a family of four was approximately \$15.

Basic healthcare, although nominally free of charge in Armenia,¹⁸ shares with certain other countries in the region a strong tradition of unofficial payments to healthcare professionals; it is unclear just where the boundary lies between tipping (a thank you for healthcare) and corruption (a mandatory payment as a condition for receiving healthcare). Already, low-income people are said to avoid healthcare because they think they will have to pay. Pharmacies and the dental health system have been successfully privatized, and there is a movement towards privatizing more of the healthcare system.

Social Transfers. As social transfers to Armenian households are now so low, they simply cannot protect families from poverty or alleviate poverty. If it is to reduce its

¹⁵ Khechoyan, “Unemployment and Poverty.”

¹⁶ A means-tested approach to poverty reduction was completely contrary to the Soviet principles of social assistance. Unemployment was rare in the Soviet Union and social assistance was based on supporting specific groups that were viewed as socially deserving of state support. This mindset remains entrenched in Armenia and other CIS states where social assistance remains associated with privilege.

¹⁷ See chapter 3 for a program description.

¹⁸ All healthcare was free during the communist era and up until July 1997, when charges were introduced as part of the market reform process.

poverty levels and provide additional subsistence to poor families, Armenia must create jobs; cash transfers alone cannot solve Armenia's poverty problems. Even with perfect targeting, additional transfers to bring every poor person up to the poverty line would require an additional expenditure level of 7 percent of GDP. With a more-realistic leakage rate of 30 to 40 percent, additional transfers would cost approximately 12 percent of GDP.¹⁹ Clearly this is neither feasible nor desirable.

C. Impact of Energy Costs on Low-Income Households

Statistical data on the impact of energy costs on low-income households has been improved as a result of two surveys, a sociological survey by UNDP/GEF in collaboration with the Ministry of Social Services and a survey conducted by ERM consultants for the World Bank and EU project TACIS (Technical Assistance to the Commonwealth of Independent States).²⁰ The surveys demonstrate that during the winter months, up to half of household expenditures are spent on heating.

Using the most commonly accepted international definition of "fuel poverty"—the use of more than 10 percent of household expenditure for heating—the majority of the Armenian population can be said to live in a "state of fuel poverty."

¹⁹ Kelly, "The Nature of Poverty."

²⁰ World Bank/Tacis, ERM, "Urban Heating Strategy for Armenia - Demand Analysis" (October 2001).

Chapter 2 Energy Subsidies and Assistance Payments

A. Electricity Subsidies

1. Direct Subsidies

There are no direct subsidies for the Armenian power sector.

2. Assistance Payments

a. Overview

As of 2002, Armenia had no utility-specific assistance payments, although a one-time payment to reduce the financial impact of a sharp rise in the electricity price was made in 1999, and a further one-time payment was made in 2000. The PFB system, designed with World Bank assistance, is payable to some 25 percent of households and is intended to help meet all needs, not just those relative to utilities. The number of PFB beneficiaries is being slowly reduced and, in particular, pensioners are to be removed, fully separating the PFB and pension systems. The Ministries of Social Services and Energy both want a utility subsidy, stressing that it should harmonize with and supplement the PFB system, not replace it.

b. Poverty Family Benefit

Introduced in January 1999, the PFB²¹ is paid to 183,293 households, a number that is gradually dwindling as eligibility criteria continue to tighten. The 2002 rate was 3,000 ARD/family plus 1,300 ARD per family member; thus, a typical monthly payment in 2002 was around 8,000 ARD per month (about \$14).

According to the Ministry of Social Services, the 1999 PFB budget was \$39.4 million among 217,265 households, so the mean household payment was \$15.10 per month. In 2001, the budget fell by around a quarter to \$31.3 million, but a tightening of eligibility criteria for the year 2000 resulted in only 183,900 households being eligible for payments, which averaged \$14.20 per month. (See appendix. 3.1 for a chart detailing the above.)

PFB payments are targeted using family vulnerability assessment criteria developed with financial and technical assistance from USAID, World Bank, and TACIS. Households apply for PFP at social assistance centers and, if they appear to meet the eligibility criteria, inspectors pay a home visit to assess the claim's veracity; this includes interviewing the neighbors to ask about unofficial employment, etc.

²¹ There are small inconsistencies in the data provided on the size and number of PFP beneficiaries, which are from a letter from a GoA letter and a Ministry of Social Services report. However, the discrepancies are not significant.

Reported income is not considered a reliable indicator of household income and assets, as there is a large shadow economy, so the Ministry of Social Security uses a proxy means test to provide social assistance to poor families. The PFB eligibility criteria are based entirely upon expenditure rather than income, as it is considered too easy for households to misreport their income. Selection is made based on a vulnerability score using the PAROS formula.²² The number of families qualifying for social assistance using the vulnerability score is directly related to the Ministry of Social Security budget outlays.

As PFB eligibility criteria are refined from year to year, the number of eligible consumers declined from 218,617 in 1999, to 198,504 in 2000, to 183,293 in 2001, and is continuing to decline. The criteria were to be further refined in 2002 to increase payments to households with children and to remove old-age pensioners from the system entirely. It should be noted that although 183,000 appears to be quite a small number of households, it represents a very large proportion—some 25 percent of households—in Armenia.

According to PADCO,²³ a 25-percent reduction in the social assistance budget (as well as health and education) is under way in 2002, so a new social assistance formula based on \$8 + \$4/child/month was being planned.

The original PFB beneficiary database was flawed and included, for example, beneficiaries who had died or left the country. However, the USAID-funded improvements to the PAROS database that PADCO made have permitted substantial improvements to be made to the targeting of poverty family benefits.

c. PFB's Impact on the Energy Sector

From the perspective of the energy sector, as PFB is paid in cash rather than in-kind or directed toward a particular utility, households have an economic incentive to use the money prudently.

PFB provides a strong incentive for households to limit their electricity use, as supply is withdrawn if a household over-consumes and cannot pay the bill. According to PADCO, 17 percent of social assistance payments go toward household electricity costs.

For low-income households using electricity, natural gas, wood, or coal, it is extremely common to close off rooms during the winter as a way to lower the heating bill or even to close off all but one room. This is not the case for district-heated households, which

²² See the World Bank Armenia Report, chapter 4, for a system description. The system takes into account average income, the number of family members, utility usage, ownership assets, and other factors and then provides a score to each household.

²³ Notes by Christine Allison of Aguirre International from a briefing on “Social Transition in Armenia” that PADCO gave for USAID and other interested parties in Washington, D.C. on April 1, 2002.

are billed according to the apartment's size regardless of its number of rooms/radiators in use, so living in one room would not change the district heating bill.

For district heating consumers, PFB provides no real incentive to pay. District heating companies will normally agree to begin supplying a building on receipt of a deposit of 30 percent of the price of heat for the upcoming winter. However, from the perspective of an individual low-income household, whether or not the company agrees to supply the building will probably not depend on that *particular household* making a deposit. As there is no tradition of withdrawing service from individual district-heated apartments in Armenia, (as disconnection is both technically and legally hard to do), there is little reason for a low-income household to use part of its PFB to pay the heating bill.

For all PFB beneficiaries, there is a strong incentive to find the least-cost heating option, which is typically wood. This has led to poor indoor air quality in many low-income households and an alarming deforestation rate.

(1) One-Time Cash Payments for Electricity

To mitigate the social impact of both the elimination of the inverted block tariff and a large price rise in January 1999 (see chapter 4), a one-time cash transfer of 1,450 ARD (\$2.71) per household was made to some 300,000 households, of which about 230,000 were eligible for the family benefit and the other 70,000 expected to have difficulty paying their electricity bills.

It is unclear exactly how the payments were targeted for the 70,000, but as this was a one-time measure, the details are not very important. However, it was determined that from a sub-sample of 1,514 households that the World Bank surveyed that low-income households were more than twice as likely to have received the payment as were richer households.

Households receiving the cash transfer increased their average monthly payment by only 4 percent, but as the prices had risen, it is not possible to determine the transfer's direct linear impact. (In other words, a greater drop in consumption and increase in arrears may have occurred had the cash transfer not taken place). A larger one-time payment was made to a smaller number of households in 2000. (See appendix 3.2 for more information.)

(2) Other Assistance

Between February and June 1997, a humanitarian organization, Aznavour pour l'Armenie, provided about 1,300 families without parents with 160 KWh of electricity.

In addition, the United Nations High Commission for Refugees (UNHCR) used an electricity coupon system targeted to 1,041 refugees above 70 years old during the winters 2000/2001 and 2001/2002. Residents of hostels in Yerevan, Gegharkunik, Lori, and several other marzes were provided with vouchers that ArmEnergó accepted. Social services and the non-governmental organization (NGO), Mission Armenia, a UNHCR implementing partner, distributed the vouchers.

(3) Proposed Low-Income Utility Subsidy

PADCO and PA, two USAID implementing organizations, are helping the Ministries of Energy and Social Services design a utility subsidy for Armenia. At the time of the Aguirre/ISTI mission to Armenia in April 2002, PA Consulting was planning a visit to Ukraine to study a coupon-based system, and initial design ideas had been developed for an Armenian system.

The program PADCO/PA envisages can be summarized as follows.

Goals. The utility subsidy program goals would be to help the most vulnerable households pay their utility bills, support privatization and the setting of economically-appropriate tariff increases, and increase the collection rate for all utility bills.

Need. The reasons cited for the need to increase tariffs over the next three years are as follows:

- The increases will allow maintenance of services and privatization.
- At least 40 percent of households have requested assistance in paying for electricity.
- Only 30 percent of households pay for water and wastewater treatment.
- Extending gas service to new customers depends upon a customer's ability to pay.

Approach. Payments would be limited to PFB beneficiaries, with a threshold of 75 KWh/household/month plus 10 KWh/child/month, and would feature a progressive level of subsidy. The poorest 25 percent of PFB beneficiaries would receive a 100 percent discount on electricity consumption (within the stated threshold), the next 25 percent would receive a 50 percent discount, and the other PFB households would receive a 25 percent discount. It was envisaged that payments would be made directly to the utility only when the household demonstrated that it had already paid the balance of the bill, which would encourage the utility to enforce payment. Donor subsidies would finance the first six years of the 10-year subsidy. Government subsidies would then be introduced progressively from year seven. The total cost to the donor community over 10 years was estimated to be \$43.8 million.

In August 2001, the GoA requested a \$16.25 million donation from the international community as a contribution to the suggested \$44 million subsidy, to be run over seven years. (See appendix 3.3 for a copy of the official letter.)

These are the key financial details:

Proposed local and donor contributions to an Armenian utility subsidy (In millions of USD)								
Year	2002	2003	2004	2005	2006	2007	2008	Total
Local financing.	0.4	1.0	2.4	4.2	6.0	6.25	7	27.75
Donor financing.	3.6	4.0	3.6	2.8	1.5	0.75	nil	16.25

Source: GoA letter to the donor community, August 2002

The subsidy proposal may benefit from additional design work. For example, a better-designed utility subsidy for Armenia could harmonize with and contribute to a wider range of social, environmental, and energy policy goals, as follows:

- Alleviating poverty;
- Accurately targeting the poorest households;
- Focusing on the five winter months, when meeting energy bills represent the greatest challenge;
- Encouraging changes in electricity consumption patterns to reduce seasonal and diurnal peak demand;
- Combating over-reliance on electric resistance heating;
- Encouraging the efficient use of electricity;
- Stimulating the re-emergence of a payment culture for district heating;
- Encouraging the use of natural gas (for certain households);
- Discouraging the use of natural gas in households with working district heating systems, thereby helping to prevent the collapse of the remaining heat networks;
- Discouraging the use of wood for heating for all households;
- Discouraging the use of any form of solid fuel in apartments;
- Encouraging energy efficiency and weatherization; and
- Encouraging the development of condominium associations (CAs) to stimulate communal heating and weatherization solutions for buildings.

The difficulty of designing an economically efficient utility benefit should not be underestimated. Before a final decision is taken about the design of an Armenian utility benefit, it may be beneficial to study a wide range of models²⁴ from other countries with a view to understanding some of the pitfalls of low-income utility subsidy design. For example, a Bulgarian low-income utility subsidy that was based on vouchers created a secondary currency and a large administrative load, both of which are undesirable features. In Hungary, some municipalities use social assistance funds to pay inflated and unaffordable heat bills of low-income households to the (municipally-owned) district heating companies, which is undesirable as it represents an energy subsidy disguised

²⁴ One source of comparative information is the set of country reports (sisters to this report) that were written on the energy social safety nets of Bulgaria, Hungary, Kazakhstan and Romania. All these countries have utility subsidies, all of which are very different, and all of which have strengths and weaknesses.

as a social subsidy. Kazakhstan had a utility subsidy that paid the balance of household utility bills if they exceeded 30 percent of household income—a model that encourages incremental energy consumption over energy saving for qualifying households.

3. Indirect and Cross-Subsidies

There are plans to eliminate cross-subsidies within two years. According to the Regulatory Commission, electricity tariffs still include a cross-subsidy between industry and households that should be removed within two years (i.e., by April 2004) as part of a continuing process of tariff reform.²⁵ It was generally considered that the latest tariff change in January 1999 had raised prices too much too quickly, so a more gradual approach has been adopted. (The January 1999 tariff was still in place in February 2003).

4. Toleration of Non-Payment as a Form of Subsidy

The electricity company loses \$40 to 60 million per year as a result of fraud, \$30 million of that sum to theft and \$20-30 million to non-payment. This represents about one-third of potential revenue — i.e., the company should collect \$150 million per year (\$180 million including VAT). It is unknown whether some or all of this revenue is genuinely uncollected, or collected and then diverted before it reaches the accounts of the electricity company.

State companies and private companies with political connections do not pay. Ministries, municipalities, and utilities also typically do not pay their electricity bills and/or run up debts. The water sector, which uses 20 percent of government/municipal electricity consumption, does not pay for electricity. District heating companies also do not pay; for example, Yerevan District Heating company owes US\$ 0.5 million for electricity.

Households are the only category of Armenian consumer populations that consistently pay their electricity bills.

According to the latest IMF Letter of Intent,²⁶ in the 2002-2003 period, the government is determined to significantly reduce non-payment within the energy and other quasi-fiscal sectors.

a. Meter Reading and Billing by Customer Cooperatives

In the early to mid-1990s, household non-payment was a very serious problem, with collection rates only 20 to 30 percent. The government responded by conducting a public awareness campaign stressing (a) that power supply is a commodity rather than

²⁵ Author's interview with the Regulatory Commission, April 2002.

²⁶ IMF, *Armenia: Letter of Intent, Memorandum of Economic and Financial Policies and Technical Memorandum of Understanding*, September 11, 2002.

a free service, and (b) if customers pay, the problem of frequent power cuts and limited power availability (i.e., a few hours at a time per day) would be resolved. A new payment system was established, under which customer cooperatives²⁷ conducted metering and billing for electricity in exchange for a fee of 8 percent and the promise of a substantially improved electricity supply. By the end of 1995, all households were metered and billed by such cooperatives, the size of which ranged from multi-apartment buildings to entire villages. Although collection rates rose as high as 90 percent, they began to decline again when some meter readers stole the money, some cooperative members refused to pay, leading to disconnection of the entire cooperative even though some members had paid up, and some households stole power by bypassing meters. As the success rate was falling and the cost of operating the system was high, the system was abandoned.

b. Four Successful Measures

In the mid-1990s, a series of four measures to address the problem of non-payment of household electricity bills successfully raised collection rates to almost 100 percent (up from 20 percent) of metered consumption. The measures are described below.

- ***Removal of meters from households.*** Many households simply turned back the old, very simple Russian electro-mechanical electricity meters in their households to record a lower consumption and pay less. This was not difficult. An informal study in the mid-1990s identified 120 ways to cheat the meters, ranging from the simple (tilting the meter so that it stops) to the more complex (putting a bucket of water underneath the meter, which freezes it in the winter).

Other households simply refused to open the door to the meter reader. In 1996-97, the government overcame this problem by removing meters from every household and putting them in locked steel boxes in the entrance to the apartment block or out on the street. Around 600,000 of the approximately 700,000 meters that were in place at the time were relocated under this program. According to the World Bank,²⁸ households met the cost of the work (with the utility providing the meters and the boxes) and perceived this to be honest and fair and participated to avoid the building being disconnected for non-compliance.

- ***Removal of the inverted block tariff.*** It was found that households and meter readers (who also collected payments) were colluding to report some winter electricity consumption later in the year, which resulted in a cost saving for the household that was shared with the meter reader. This undermined the purpose of running an inverted block tariff in the first place, so the tariff was withdrawn.

²⁷ World Bank, "Non-payment in the electricity sector in Eastern Europe and the Former Soviet Union," World Bank Technical Paper no. 425 (Washington, D.C., June 1999).

²⁸ Ibid.

- **Removal of the right for meter readers to collect money.** It was discovered that meter readers and households were continuing to collude—this time with the meter reader/electrician opening the locked steel box that housed the meters and turning them back, in return for a bribe from the household. The removal of the option to pay at the door removed the monthly contact between meter reader and household and reduced the possibility of collusion and corruption. Anecdotal evidence would suggest that this is a continuing problem although less so than in the past.
- **Strict enforcement of disconnection policies.** If a household partially pays, disconnection does not occur if the debt is cleared by the second month. For accumulated debt, a payment schedule can be arranged that involves full payment of new bills and gradual payment of old debts. As a result of these measures, the payment level for households is now very high.

Although there is some data inconsistency, households generally pay. During the mission to Armenia in April 2002 for this report as part of the Energy Social Safety Net project, there were apparent inconsistencies in the reported estimates of electricity collections, which ranged from “more than 90 percent,” to “almost 100 percent,” to “all households pay.” However, the message was that with the exception of technical losses, commercial losses (theft, see below), and short-term and temporary arrears (late payments and partial payments), households generally pay for electricity.

Some problems remain with short-term arrears and late payments, particularly in areas of high unemployment where large industries have closed and in the earthquake zone, but these are being solved through the disconnection and late payment policies. Neither the power company nor the regulator was able to provide statistics on non-payment.

c. Theft Issues

The “left wire” (or “left line”) is an Armenian euphemism for an illegal unmetered connection to the electricity network; it is not known whether this still represents a serious problem in the household sector. The problem was much more prevalent when electricity supply was not reliable and illegal lines would be connected to a “protected” institution, such as a hospital or police station, which would still have power when the surrounding areas were shut off. Now that power supply is more consistent, there are fewer illegal connections. If a household is caught stealing power, the utility makes an assumption of power consumption based on the number and type of appliances in the home and enforces payment.

According to the Regulatory Commission, a frequent cause of complaint by households is that the meter reader tampers with the meter to increase apparent consumption to cover the losses from customers who do not pay. The extent of this phenomenon is also unknown.

Under-recording household meters. PA tested 10 randomly selected household meters (old Russian meters) and found that, at a low consumption level, these meters record only 50 to 60 percent; at a higher consumption level, they record 90 percent.

Although there is an official meter-testing station that tests and re-calibrates meters if someone complains, because the station keeps no records of the accuracy of the meters tested there, there are no statistics. In general, Armenian electricity specialists were reluctant to accept that household meters could be under-recording to this extent.

An Armenian single-tariff electricity meter costs from \$15 to \$20, and there are several manufacturers. An equivalent U.S. meter costs around \$50.

B. Other Energy Sectors Subsidies

1. Direct Subsidies

a. District Heating

Even though households have been required to pay since district heating was re-started in 1997, the utilities have only been able to recover 10 to 35 percent of invoiced sales. The balance has been covered by a combination of explicit and implicit subsidies. Implicit subsidies range from the heat utility failing to pay for gas, electricity, and water—sometimes even staff salaries—to failing to invest in even the most basic forms of maintenance.

Efforts to determine the extent of direct subsidies since 1998 resulted in collecting a range of contradictory data. Given this situation, all data and sources are reported.²⁹

According to the IMF Letter of Intent of September 2002, district heating subsidies were zero in both 1998 and 1999, and 1,494 million ARD (about \$2.8 million) in 2000.

The Energy Regulatory Commission estimated a district heating financing gap of around \$8 million for the eight systems that were operating during the 1999-2000 heating season. This may have been an underestimation of \$1 to 2 million.³⁰

According to the ERM³¹, in 2000, the annual combined heating subsidy for the cities of Yerevan, Jermuk, Gyumri, and Charentsavan amounted to 2,404 million ARD (\$4.76 million), representing 2,490 buildings.

²⁹ The main reason for the discrepancy between IMF and ERM data provided in this section could lie in the accounting for explicit and hidden subsidy—with the ERM data including only municipal subsidies that lower the district heating price to less than the tariff set by the regulator, and the IMF data also including the cost of natural gas that the municipalities were unable to pay for.

³⁰ Interview with a World Bank consultant.

³¹ EU TACIS-ERM, “Urban Heating Strategy for Armenia: Demand Analysis” (October 2001).

According to the Yerevan District Heating Company in an interview, all the remaining district heating companies had to prepare business plans in the summer 2002 to be eligible for further subsidies for the winter 2002-2003. This implies that there were subsidies in place in the winter 2001-2002, but the extent is not known. In April 2002, preparation of a business plan was considered beyond the company's capability, which lacked internal know-how and was in chronic debt, owing \$9.2 million for natural gas, \$0.5 million for electricity, \$0.5 million for salaries, and \$0.25 million for water. Toleration of this debt is a form of implicit subsidy.

Several sources asserted that district heating is not subsidized at all. This implies that only some utilities may have been receiving subsidies, which is intuitively correct as most of the networks collapsed.

b. Future plans for district heating subsidies

Development of a "social support scheme" is an integral part of the 25-year heating strategy in Armenia that the World Bank with consulting firms ERM (UK) and Cowi (Denmark) developed in 2002. The study results are summarized in chapter 3.

2. Assistance Payments

There are no utility-specific payments at present.

3. Indirect and Cross-Subsidies

In April 2002, Yerevan district heating company owed \$8 million for natural gas, \$0.5 million for electricity, \$0.5 million for salaries, and \$0.25 million for water. As these debts are unlikely to be paid, they can be considered a form of indirect subsidy.

4. Toleration of Non-Payment as a Form of Subsidy

a. District Heating

Only 30 to 35 percent of household district heating payments are collected. District heating customers typically pay a low amount, in the range 3,000 to 25,000 ARD/year (\$5 to \$43). According to the World Bank Heating Strategy 2002, this is not enough to sustain any heating solution, as even wood-based heating costs more.

Although some households cannot pay, there are also a very large number of "free riders," who know there is no penalty for non-payment and choose not to pay.

An integral part of the non-payments problem is both the quality and quantity of heat provided. Customers pay a deposit, with the assumption that plenty of heat will be provided for the entire heating season, enough that no supplemental heat sources will be required. This has not proven to be the case, since most customers on DH systems are highly dissatisfied, as documented in the ERM report.

b. Natural Gas

According to ArmRusGasProm, collection rates in the spring 2002 were 92 percent for residential customers of natural gas, 100 percent for commercial customers, and very low for power plants.

It is sometimes technically difficult (expensive) to disconnect households, particularly in villages, so the company accepts late payment and approaches arrears sensitively and positively, agreeing to scheduled payments where necessary.

C. Impact of Subsidies and Assistance Payments

1. Reducing Poverty Levels

It is widely accepted in Armenia that, at around 25 percent of the population, the coverage of the PFB system is too high, while the level of financial support (roughly \$8/month plus \$2/child) is generally too low. At one time, there was a significant problem in targeting low-income consumers more narrowly, but the statistical problem has now been largely overcome through the UNDP sociological survey, USAID-funded support for improvements to the PAROS database, and World Bank work on the PFB system. The accuracy of targeting is expected to keep improving.

Support appears to be growing in Armenia for a separate utility benefit program, provided that it harmonizes with the PFB system rather than replacing it. There is continuing debate about the relevance of using expenditure, rather than income, as the basis for PFB in Armenia, but this debate goes beyond the scope of this country study.

2. Removing Barriers to Utility Privatization

As the measures implemented in the mid-1990s to improve collection rates in the household electricity sector effectively allowed the power sector to operate without subsidies, this sector did not represent a barrier to the privatization of power distribution that recently occurred. The natural gas sector is already in private ownership.

Substantial subsidies have failed to prevent the collapse of most district heating networks, and if the Armenian government respects its stated intention to provide no subsidies this winter, the remaining six networks may run for an artificially short heating season or may collapse altogether. Privatization here is extremely unlikely under current conditions.

Chapter 3

Energy Efficiency

A. The Low-Income Household Approach

Although there are substantial energy-efficiency gains to be had in Armenia's low-income homes, there appears to be no coherent approach to addressing such needs. In the absence of governmental assistance, energy-efficiency actions are left to individual households; these households face an insurmountable capital-investment barrier, as many have (cash) incomes as low as \$12/month.

The research team received conflicting information on the extent to which Armenian households are aware of and implement no-cost and low-cost energy-efficiency measures. On the one hand, the view was put forward that during the energy blockade, when fuel was scarce, households became adept at finding ways to conserve heat and understand the benefits of plugging holes in windows and doors and using thick curtains.

The most common strategies adopted by households to keep warm and save money cannot really be described as energy-efficiency measures. One money-saving strategy involves burning wood, as the cheapest fuel, even in apartments and refusing to pay for district heating. Another is to heat only one or two rooms rather than an entire apartment. Some households use (steal) "free" hot water from the radiators in district-heated apartments to wash clothes, etc. (Armenia has single-pipe district heating systems that are intended for heating, only, and not for domestic hot water). There is, for example, anecdotal evidence that relatives and key-holders of empty district-heated apartments visit just to use the free hot water.

B. Weatherization

As with other countries of the CEE and Eurasia, Armenian buildings tend to be thermally inefficient, particularly those constructed after 1970. Some households that control and pay for their own heating conduct basic no-cost weatherization. Some households implement low-cost weatherization techniques, such as polythene secondary glazing (plastic sheeting over windows). However, opportunities for developing a subsidy-free market for energy-efficient products and services are extremely limited, given the extent of poverty and shortage of disposable household income. Thus, opportunities to save energy that involve any form of expenditure on products specifically designed for that purpose are typically overlooked.

Similarly, insulation of the common spaces of multifamily apartment buildings is usually neglected, resulting in high heat losses through broken windows, missing doors, and open corridors.

C. Energy Efficiency of Household Electrical Appliances

As a result of the widespread collapse of district heating and natural gas networks, Armenian households are more dependent on electricity than are most other countries in the region. Electricity is commonly used for heating, cooking, hot-water heaters, refrigeration, and lighting.

To date, no measures to govern the energy efficiency of appliances are in place, such as standards or labeling programs for stoves, hot water heaters, and refrigerators.

In general, Armenian households use low-wattage incandescent lights. According to the Siemens Corporation's representatives in Armenia, there is some residential demand for low-cost Chinese compact fluorescent lamps (CFLs), as people understand their impact on an electricity bill. Higher-cost (and more-reliable) CFLs from manufacturers such as Osram and Philips are available, but there is little demand for them due to their higher up-front cost. Thus far, there have been no projects to distribute or promote these technologies in Armenia. The most-common strategy to lower lighting cost is to minimize lighting, e.g., no light in hallways, partial lighting, or no light in certain rooms.

According to the UNDP, nearly all households have refrigerators. The import of refrigerators using CFCs has been banned since September 2001, as these models—which have been outlawed in many countries—were being finding their way to Armenia in large quantities. It was suggested that low-efficiency refrigerators that would have to be labeled as such in EU countries and EU accession countries could likewise be getting “dumped” on the Armenian market, but no clear evidence supports this.

According to the Alliance to Save Energy, most refrigerators in Armenian households are old, energy-inefficient, Russian models, so there is much to be gained in the future by replacing these models with high-efficiency modern units.

D. Social Institutions and Energy Efficiency

There is substantial scope for improving the energy efficiency of Armenia's schools, hospitals, and orphanages. USAID has already conducted pilot projects.

According to CESCO (the name of an Armenian Energy Services Company, or ESCO), even when the schools are open, pupils wear hats and gloves during classes. The company was planning to apply—through Advanced Engineering Associated International (AEAI), an energy service company—for USAID funding to weatherize the school and improve its heating system.³²

EIICG, another ESCO that works closely with AEAI for USAID, provided typical costs for thermal rehabilitation of a 1000-bed hospital, noting that now hospitals are usually heated to only 10-12 degrees centigrade to save electricity costs; after thermal

³² In an email message from Ara Kocharyan of CESCO to the author, March 12 2003.

rehabilitation, however, this could be raised to 20 degrees centigrade. Appendix 4.1 contains EIICG data, which can be used to broadly calculate the cost of thermal rehabilitation of any social institution in Armenia.

E. Metering and Control

Day-night electricity metering can be important to Armenian low-income households. With the collapse of the district heating companies and deterioration of the natural gas distribution network, there has been an over-reliance on electric resistance heating. Day-night meters flatten the load curve, which is beneficial to the power sector as the cost of starting-stopping the thermal power plants is very high. The estimated saving to the system from shifting this load is probably in the region of 10 ARD/KWh³³, but exact figures were unavailable.

All 820,000 Armenian electricity customers are metered, of which 13,000 have day-night meters. Given the benefits of flattening the load curve, there is considerable scope for expanding the use of such meters.

In 2002, there were 114,000 gas consumers, all of whom are fully metered. In the days before the natural gas distribution system collapsed, however, there were 800,000 gas connections.³⁴

Metering is beginning to be introduced in the water sector, but the district heating sector remains completely unmetered.

1. Electricity Metering

a. Day-Night Meters

Day-night meters were first introduced in Armenia on the recommendation of Ruben Muradyan, of the Energy Strategy Center, following a World Bank project that demonstrated the benefit of moving part of diurnal peak load to nighttime.

Two or three Armenian companies have licenses to manufacture day-night meters; the market leader is Energia. Costs range from around \$45 to \$50 for a single-phase day-night meter to about \$350 for a multi-phase meter, making Armenian meters cheaper than many produced internationally. The Armenian electronic day-night meters are exactly the same size as the Russian single-rate electromechanical meters they replace, so they fit into the steel meter boxes as a straight replacement. The day-night meters are almost impossible to cheat.

³³ Ruben Muradyan of the Energy Strategy Center, who said in a conversation with the author that the figures have not been calculated and that this is a very broad estimate to indicate the scale of possible savings.

³⁴ Astghine Pasoyan, "Report on the kickoff meeting of the Energy Efficiency Council," MUNEE/ASE (Yerevan, April 2002).

Unlike in many other countries, most Armenian households that wish to install a day-night meter are required to pay for the meter, the exceptions being certain consumers eligible for a low-income program. Meter and installation together run around \$50 and may be paid by monthly installments over two years that are added to the electricity bill.

By spring 2002, around 13,000 day-night meters had been installed in Armenia, including 5,000 for low-income consumers as described below.

b. Subsidized day-night meters for low-income consumers

A program exists to provide “free” day-night meters to 6,700 low-income consumers. The Ministry of Social Services first determined the beneficiaries; these were households scoring up to 50 on a poverty-estimation scale of 0 to 72 under the PAROS program. A list of 7,503 qualifying household addresses was then given to the Ministry of Energy, which responds from time-to-time with the number of meters installed thus far from the list. Commencing in 1999, the program had installed 5,000 the meters by spring 2002.

Although a meter’s cost is around \$45 for the electricity company, it is considered to be a self-funding program, as the use of the meters removes some of the need to fire up costly peak-load generation.

It should be noted that, even accepting the lowest estimate of the number of low-income households in Armenia—100,000 households—only 5 percent have thus far been provided with day-night meters. There is considerable scope for expanding the free day-night metering program as part of an effort to assist low-income power consumers.

It has been suggested that a Japanese grant administered by the World Bank may be used to introduce day-night meters in a further 200,000 households. A large purchase like this could drive down the cost of the meters to as low as \$40 each, requiring an investment of \$8 million.

c. Metering Fraud

Theoretically, meter readers, electricians or households that cheat can be prosecuted under criminal law. This has never happened, however. Even if a meter appears to have been changed, it is difficult to prove that tampering actually did take place and almost impossible to prove exactly who was responsible.

An Institute of Professional Licensing, under the Ministry of Energy, closed down in April 2001.

d. Pre-payment

There is no tradition or experience of the use of pre-payment meters in Armenia.

2. Heat Metering and Control

Heating an entire apartment all winter is unaffordable for low-income consumers, so it is essential that metering and individual autonomous control be a component of any heating solution that involves centralized or decentralized systems.

Several internationally funded studies have recommended metering and control for Armenia's heating. One such study (by ERM³⁵) recommended a central heating (CH) system that is flexible and metered, noting that 90 percent of the households surveyed had said they would like a functioning CH service, even taking account of the extra costs they would incur to pay for the service. About 85 percent of the poor and the non-poor stated that they also wanted CH for convenience. The recommendations note that, although a targeted investment in a new form of CH service is required, maintaining the status quo is not an option and specify a system whereby households can control the heat they require in each room or overall via a meter.

A more recent Cowi report³⁶ notes that continuation of the district heating system appears to be one of the least-cost strategies for the short and medium term and confirms the ERM findings that individual control is required.

A USAID-funded study by PA Consulting (*Armenia: Energy Efficiency Rate Financing*) noted that Armenia could help promote energy efficiency most through an enforceable payment policy for end users. "Without a clear signal to consumers about the true costs of energy, they will not recognize the economic benefits that can be attained from the implementation of energy-efficiency measures." The importance of the ability to heat less space was stressed, as was the fact that district heating is currently seen as an all-or-nothing heating option, as it heats the entire apartment all of the time. The use of other heating options, from high-cost electricity to low-cost wood, is more flexible for the consumer in heating a range of rooms depending on demand and income constraints.

The PA study confirmed the EMS results, noting that households would like to continue to use a CH system of some sort to keep warm and that, if designed in the right way, such a system could be financially sustainable. "Demand analysis found that a flexible CH system (whereby the household can control the heat they require in each room or overall via a meter), with monthly individual payments going direct to the operators accounts, is the improved central heating investment option that is the most preferable to most households. Households are wary of collective billing or payment collection solutions, mainly as they have little experience of them."

³⁵ ERM, "Urban Heating Strategy for Armenia - Demand Analysis," TACIS/World Bank Joint Environmental Programme (October 2001).

³⁶ Cowi, "Outline of Urban Heating Strategy – Armenia," draft, World Bank (Yerevan, February 2002) and "Discussion Note" (Yerevan, January 2002).

3. Hot/Cold-Water Metering and Control

Hot water is not metered in Armenia, as the district heating networks are single-pipe systems that are not configured to provide hot water for washing; they only provide hot water only for radiators. As previously noted, many households remove hot water from the radiator for washing purposes.

Metering for cold water is beginning to take hold, however. According to the September 2002 *IMF Letter of Intent*³⁷, over the medium term, water and irrigation tariffs will be raised toward full cost-recovery, and the installation of water meters will be extended to multi-family apartment buildings and single-family units.

The German Development Bank KfW made a loan to the Ministry of Finance and Economy in 2002, amounting to 14.7 million Euros (about \$14.7 million) under International Development Association (IDA) terms: 40 years' maturity, 10 years' grace period, and 0.75 percent per annum. The funds are to be invested in 12 municipalities of the Armavir region and include funding for the purchase and installation of between 10,000 and 12,000 water meters during the next year. No concessions for socially vulnerable consumers are foreseen.³⁸

4. Gas Metering and Control

Gas metering is universal. ArmRosGasProm provides gas solely on the basis of individual contracts and metering. There is no unmetered cooking gas in Armenia.

F. Policies, Laws, Programs, Projects, and Organizations

Although no officially endorsed governmental document exists that describes the Armenian energy-efficiency policy, the Ministry of Energy³⁹ considers such a policy to encompass the following:

- Encouraging efficient use of energy resources;
- Identifying the direction for energy-efficiency development;
- Providing energy requirements as a state strategy component;
- Developing standardization and normative documentation supporting energy efficiency;
- Certifying energy-efficiency equipment;
- Developing an energy audit system for building;
- Creating systems for statistics and monitoring energy resources in the country; and,
- Developing economic tools/incentives for encouraging energy efficiency.

³⁷ IMF, "Armenia: Letter of Intent."

³⁸ According to a discussion with Karo Gevorgyan of KfW Yerevan.

³⁹ Areg Galstyan, Deputy Minister of Energy, speaking at the kickoff meeting of the "Energy Efficiency Council," April 2002, as reported by Astghine Pasoyan in the MUNEE/ASE report on the event.

An energy-efficiency law that is expected to reflect this policy was being developed in 2002.

According to PA Government Services Inc. and others, the Armenian government should develop an overall energy policy to address the sector's problems and provide guidance regarding the future development of new supply-side and demand-side resources.⁴⁰ The most important action needed to promote energy efficiency is an enforceable payment policy for end users, providing an incentive to reduce energy waste. An integrated least-cost resource plan that includes all available resources, both supply and demand, and also includes renewables is recommended as well.

1. Laws

A draft *Energy Efficiency Law* was developed in 1997, submitted to the National Assembly, and then withdrawn. Based upon the *Energy Efficiency Law of the Russian Federation*, this legislation was considered to be inappropriate in Armenia, as it had a strong focus on sanctions such as fines for energy-inefficient activities.

A new draft *Energy Efficiency Law*⁴¹ was under development in 2002, and subsequent drafts will be based on international best practices. The new law is expected to contain incentives to be energy efficient rather than sanctions for being energy inefficient; formalize the strategic priority placed upon energy efficiency by the state; and improve energy efficiency through the application of economic mechanisms. The law is expected to be wide ranging encompassing such areas as standards, certification of equipment, energy auditing, building standards, collection of energy statistics, and energy information awareness.

2. Programs

There is no national energy-efficiency program or focal point in the government for energy efficiency. Although a written plan⁴² for a national energy-efficiency program was prepared in 1997, it was never implemented.

Several bilateral and multilateral donors run assistance programs with energy-efficiency components, particularly the United States through USAID, the EU through the TACIS Program, and the United Nations/World Bank using the Global Environment Facility (GEF) and other funds.

USAID's energy sector assistance began in 1992, responding to the emergency situation then faced by Armenia. Humanitarian-oriented efforts included the provision of

⁴⁰ PA Knowledge Limited/PA Government Services, "Armenia: Energy Efficiency Rate Financing" (May 22, 2002).

⁴¹ A report by Astghine Pasoyan of MUNEE/ASE on the kickoff meeting of the Energy Efficiency Council (cited above) contains a fuller review of the progress of plans for an energy-efficiency law in Armenia.

⁴² Ministry of Energy, State Energy Inspection Department, "Complex Programme for Implementation Of Energy Saving Policy" (Yerevan, 1997).

fuel oil and spare parts for electricity generation from thermal power plants, as well as weatherization and heating system improvement. USAID's program has evolved in recent years to focus on development of an efficient, reliable, and cost-effective energy sector that is appropriate for the emerging Armenian market economy. Such an energy sector is critical for sustainable economic growth, environmental protection, and social welfare.

Toward this end, the USAID program has three major intermediate goals: increase private-sector participation, promote economic and environmental efficiency, and diversify energy sources. To address these goals, the following firms and projects are underway:

- AEAI—Energy Efficiency and Renewable Energy Resources Program;
- PA Consulting group (PA)—An electricity and natural gas sector reform program;
- U.S. Energy Association (USEA)—Conducting utility partnership training;
- U.S. National Association of Regulatory Utility Commissioners (NARUC)—supporting regional regulatory activities; and
- Alliance to Save Energy (ASE)—MUNEE activities.

A number of energy efficiency-related projects under some of the above programs are described below. "Energy efficiency" is defined widely for the purposes of this section and includes a range of internationally funded projects involving weatherization, fuel substitution, heating rehabilitation and related areas. Only projects that involved or are otherwise relevant social institutions and households are included. It has not been possible to focus specifically on low-income households, as there have been no such projects.

3. Projects

There have been several energy-efficiency projects in Armenia in recent years; some are still operating. The following is a summary of each project:

a. Alliance to Save Energy (ASE)

ASE, which promotes energy-efficiency awareness for condominiums, has conducted an information campaign for condominium residents using leaflets that provide information on efficiency practices and how to borrow money. It conducted a behavioral survey as well. ASE found the first priority to be essential repairs (roof, etc.), the second, rehabilitating a building's existing heating system, and the third, replacing heating systems and internal and external networks.

In particular, condominiums in Yerevan are considering leasing boiler houses from the municipalities and building their own boilers as an alternative to relying on under-performing district heating (where still available), expensive electric heating, or inconvenient and smoky solid fuels in apartments. This kind of communal activity can be done effectively only if condominium associations are well organized and informed.

A first pilot project with an ESCO owning the boiler house and supplying heat and a second with the condominium associations billing and collecting were implemented in

the winter 2002-2003. Substantial legal and regulatory barriers needed to be worked out with the Energy Regulatory Commission regarding the provision of a private heat supply. The boiler house was leased on a long-term basis from Yerevan municipality. Preliminary results of the mentioned pilot projects may be available from AEAI/UNDP.⁴³

b. CIDA Condominium Association Development Project

In 1998, the Canadian International Development Agency (CIDA) conducted a small building-repair project within the context of CA development rather than energy efficiency. Communal door and window glass was replaced in 10 buildings containing some 300 apartments. Households were invited to co-finance on the basis of the larger the contribution, the larger the assistance from the program. Low-income consumers were fully financed from program funds.

c. UNDP/GEF – Removing Barriers

The UNDP/GEF project, “Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply,” was conducted in 2001-2002. This pilot project installed building-level meters and heat allocators in apartments in four buildings and involved the CA in billing and collections. The project aimed to demonstrate whether its model, which involves both technical and institutional arrangements unfamiliar in Armenia, was workable in local conditions. Institutional arrangements were set up during the winter 2002-2003, and the work will be completed in 2003.

District heating is inherently low cost and energy efficient, but only when (1) the utility is well-managed, (2) the network is appropriately designed, and (3) the heat load is predictable; all three of these elements are missing in Armenia. A possible path toward realizing these elements is demonstrated by this project.⁴⁴

A key finding is that the main obstacle for reorganizing Armenia’s heat supply system is the absence of an appropriate institutional organization between consumers and heat-producing companies. Another key finding is that “the full price of heat would be unaffordable to low-income households, so a low-income subsidy must be in place in order to implement any proposal to re-organize/renovate the heat sector.”

A pilot project was implemented over the winters of 2001-2002 and 2002-2003, equipping basement heat meters, heat cost allocators (HCAs), and thermostatic radiator valves (TRVs) in a four-floor residential building with two entrances and 15 apartments. The project also weatherized the entrance doors, windows, and basement. Installation of the basement meter alone (first winter) demonstrated that a mere 69.7 percent of heat billed by the district heating company was actually delivered to the building.

⁴³ Conversation with Mary Worzala, 2003.

⁴⁴ The Cowi report suggests that district heating may not be the correct solution for much of Armenia.

Results from the 2002-2003 winter demonstrated that involving the CA as collector resulted in a much higher collection rate.⁴⁵

d. UNDP/GEF - Heat and Hot-Water Options for Yerevan

From this study's perspective, the key finding of the Ekono Energy of Finland study is that the full price of heat would be unaffordable to low-income households, so a subsidy for low-income households must be in place to implement any proposals to reorganize/renovate the heat sector.

e. USAID - Assistance to Armenian Schools

USAID has played a large role in the effort to keep schools warm, providing practical, financial, technical, and strategic assistance.

Initially, practical assistance took the form of funding distribution of kerosene for several years (1992 to 1995) under the humanitarian program entitled "Winter Warmth." That effort successfully kept schools open during the winter. Although appropriate within the context of humanitarian aid, the focus moved quickly to helping Armenia find sustainable, energy-efficient-based solutions rather than simple fuel-based solutions.

The Weatherization of Buildings during the Winter project was funded by USAID under its Armenian emergency-relief technical program in 1993. Thermal insulation (U.S. materials) was installed in hospitals, schools, and residential buildings in Yerevan, Gyumry, Vanadzor, Spitak, and Maralik. The thermal insulation helped to raise the indoor temperature in the buildings by 5 to 7 degrees centigrade.

In 1999-2000, USAID provided funding to install a new heating system and weatherize four schools in Armenia through implementing contractors, AEAI, and local subcontractor, Resource Management of Armenia. Highly energy-efficient, natural, gas-fired boilers were installed in two schools in Yerevan, one school in Gyumry, and one school in Spitak. A new boiler house was constructed at each school, and the internal heat distribution system was reconstructed. A natural gas spur was extended from the nearest main pipeline to serve the boiler house. To reduce heat losses from the buildings, all windows and external doors at each school were weatherized.

The results for the two Yerevan schools are impressive, demonstrating that it is possible to heat entire schools (rather than only some rooms) to comfortable temperatures of 18 to 20 centigrade rather than 10 to 12 centigrade) for less money.⁴⁶ Appendix 4.2 includes a table with additional information.

Based on the project's preliminary results, and with the stated GoA commitment to fund up to \$4 million in school heating-system replacements, USAID financed a further study that considers the costs of improving heating and weatherizing at all schools in

⁴⁵ From UNDP/NACO.

⁴⁶ AEAI, "School 132 and School 21 Monitoring Results for 2001/2002 heating season" (Yerevan, 2002).

Armenia. AEAI conducted the study. The subsequent project—Armenia School Boiler Replacement Study⁴⁷— calculates the cost of weatherizing walls, roofs, windows, and doors, and improving internal distribution networks, boiler house work, boilers, gas and heat distribution lines, and design and administration.

Life-cycle comparisons were made of the impact of using high-efficiency German boilers and low-efficiency Russian boilers (\$15,000 to \$20,000 cheaper), concluding that, as the life-cycle costs of the two alternatives are similar over 20 years, the rational decision is to invest in the Russian boilers with the lower up-front costs to be able to include more schools in the program.⁴⁸ The study also recommends the priority order in which schools should be assisted, reducing a list of 200 candidate schools to 40 or 50 for the first phase of implementation. Environmental and societal benefits are also assessed.

f. USAID - Municipal and Residential Energy-Efficiency Pilot Project

PA Consulting Group conducted this project for USAID in 2000.⁴⁹ The project demonstrated that Armenia has the local technical and installation expertise to develop and implement energy-efficiency projects for residential and municipal consumers; that Armenia has locally manufactured materials to provide adequate thermal insulation for residential and municipal buildings; and that consumers are anxious for cost-effective energy-efficiency measures to reduce their energy bills and increase their comfort.

g. USAID - Fuel Substitution Pilot Project

In the spring 2001, PA Consulting Group completed a demonstration project, under a USAID contract, that was intended to demonstrate the benefits of substituting natural gas for electricity (primarily for heating purposes). Natural gas heaters were installed in 147 residences in Yerevan, both in individual homes and apartment buildings. Heaters were unvented (i.e., did not require a flue). A review of the project by AEAI concluded that customers were dissatisfied with information on how to use the heaters and were unhappy as well with the increased humidity from non-vented models and with the lack of spare parts. However, from a financial perspective, the results were impressive: monthly household energy expenses dropped by 11,300 ARD per winter month (about \$20), representing a 48 percent reduction, and 1,600 ARD for average summer months (almost \$3), representing a 32 percent reduction. In addition, comfort levels increased, with average winter indoor temperature rising by 3.2 centigrade, or 22 percent.

h. USAID - Energy Efficiency, DSM, and Renewable Energy

AEAI is implementing this project, which encompasses pilot projects, policy assistance, work with private companies, information dissemination and public awareness campaigns, and a revolving loan fund. The program goal is “to identify and realize

⁴⁷ AEAI, “Armenia School Boiler Replacement Study, Final Report” (Yerevan, August 15, 2000).

⁴⁸ Natural gas prices are expected to rise very substantially over the next 20 years, which undermines this conclusion. The more capital-intensive solution may in fact be the least-cost option.

⁴⁹ PA Consulting Group, “Municipal and Residential Energy Efficiency Pilot Project” USAID, (November 2000).

substantial benefits for Armenia's economy and individual Armenians from increasing energy efficiency and developing Armenia's renewable energy resources." The broad objectives are to increase economic and environmental efficiency in the energy sector by demonstrating the cost-effectiveness of integrated solutions to electricity supply and heating demand, and to diversify energy sources both by reducing electricity as a rational approach to replacing new supply and by identifying economically viable renewable energy resources. Heating pilots include transferring long-term possession of a local boiler house to an independent heat supplier to supply heat to two buildings in Yerevan. Public outreach and the design of an energy-efficiency loan fund are also key elements of this work, which runs from May 2002 to September 2003.

i. USAID/The Armenian Relief Society - Weatherization

The Armenian Relief Society (ARS)⁵⁰ is an NGO founded in 1910 in New York as an independent, non-governmental and non-sectarian grassroots organization. Its goals are to serve the humanitarian needs of the Armenian people everywhere and to help preserve the cultural heritage and identity of the Armenian nation. Since October 1994, ARS has weatherized 35 health and educational institutions in the earthquake region of Armenia, as part of the USAID energy-sector reform strategy for Armenia. The structural refurbishment of windows and doors enabled those institutions to provide warm healthy environments for patients, schoolchildren, and staff. The ARS weatherization projects achieved the following results: reduced energy consumption by as much as 25-30 percent in some buildings, increased interior temperatures by 3° to 8° Celsius on average, and created jobs for over 150 local men and women.

j. World Bank - Urban Heating Strategy for Armenia

The World Bank has implemented a major heating strategy for Armenia, providing a comprehensive blueprint with practical steps to take Armenia forward from the unsustainable, energy-inefficient status quo to a sustainable, energy-efficient, and affordable future. The study is more than just an energy-efficiency report, as it incorporates considerations of household affordability, financing options, fuel substitution, and more. There are two main components: a demand analysis that ERM conducted and the main strategy by the Cowi company.

The ERM study⁵¹ reports that 90 percent of all households surveyed said they would like a functioning district heating/centralized heating service, even taking into account the extra costs they would incur to pay for the service. About 85 percent of poor households concurred with this view for reasons of convenience. ERM assumes that district heating would be viable at a tariff of 24,000-36,000 ARD/year—i.e., 12 monthly payments of 2,000-3,000 ARD month (\$3.60-\$5.40)—and that 80 percent of households would be actually pay if the level were 2,000 per month.

⁵⁰ More information is available on the Internet at: www.ars1910.org.

⁵¹ ERM, World Bank/TACIS, "Urban Heating Strategy for Armenia - Demand Analysis" (Yerevan, October 2001).

The Cowi strategy recommends a two-year “survival” period, a three-year “recovery” period, and a 20-year “growth” period. It is envisaged that the social support scheme will be designed during the survival period, implemented during the recovery period, and phased out sometime over the following 20 years.

Survival period. The first two years feature development of a regulatory base for condominiums and a heat market; restructuring of the centralized heating companies on a full cost-recovery basis; development of CA-assistance programs and implementation of pilot projects; development of social-support schemes; disconnection of risers to heat less space in apartments; installation of basement heat meters; a comprehensive public awareness campaign; promotion of improved wood stoves; and establishment of a condominium lending scheme and a boiler lending scheme.

Recovery period. This period features stimulation of the embryonic heat-market actors; commercialization and/or privatization of district heating companies; completion of the process of creating condominiums or collectives to represent collective heat consumers; implementation of a social support scheme; introduction of individual autonomous control for households; simple demand-side measures implemented in buildings; continued information campaigns; and the startup and operation of condominium and boiler lending schemes.

Growth period. The 20-year growth period envisages social support schemes being phased out over a suitable period; individual control of heat consumption becoming commonplace; improvements made to the centralized heating infrastructure; introduction of solar-energy solutions and more comprehensive building improvements; and lending by international financial institutions.

(See appendix 4.3 for a table summarizing the World Bank Heat Supply Strategy.)

k. World Bank - Urban Heating Project

The Bank has made a project preparation facility available to implement some of the Cowi study results. A number of pilot projects will be conducted using this facility.

l. Other Heating, Energy-Efficiency, and Weatherization Projects

Some of the following residential/institutional heating-related, energy-efficiency projects are among a larger number of heating projects that are reviewed in detail in the 2001 UNDP/GEF report, “Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply,” which is the main source of the much of the data presented below. Other projects are from a variety of sources.

Survey of heat indices of the centralized heat-supply systems in the framework of the TACIS Programme. In February 1995 and January 1996, the French company BCEOM conducted a survey of the heat indices in a district of Yerevan and the town of Masis. The survey recorded the poor condition of the systems, particularly noting leaks and excessive levels of heat loss through bad insulation. The survey noted that 15 percent of the pipelines and 100 percent of insulation should be replaced, as well as other technical measures that could substantially improve the systems. Technical,

financial, and economic aspects of a number of heat-system restoration alternatives were considered. The study concluded that investments to prevent further deterioration of the system and improve operations would cost on the order of \$145 per apartment.

Organization on using solar energy. This pilot project in Yerevan planned to produce 1t of hot water per day by installing 4 m² solar heat collectors with 300 liter capacity in the five apartment building, and eight solar collectors in the Tashir hospital. The solar energy helped to heat water up to 50 degrees centigrade. The heat collectors, which had a 60-70 percent efficiency, cost \$15,000, with a payback of five to six years. The organization produced heat collectors with a 2 m² surface, which cost \$400. The Social Investment Fund funded both projects.

Energy efficiency and renewable energy for the heated regions of Armenia (within the framework of the INTAS Program). This pilot project uses solar energy to supply heat to residential buildings in the town of Sevan. It involves reconstructing the boiler house for 18 buildings and using solar energy for heat generation. Water will be heated to 70-80 degrees centigrade during the summer, and stored in a well-insulated underground reservoir for use during the winter. An economic pre-feasibility study of one 8MW district heating system rehabilitation in Sevan city was conducted. The project considered improved insulation of the buildings and internal heating systems; full integration of the solar energy system; and rehabilitation of the fossil energy system. Total investment needs for the integrated heating system were estimated at 6.4 million Euros, reducing CO₂ emissions by 20 percent.

Creation of an EC Energy Center in Armenia. The consulting firm WS Atkins implemented this EU TACIS project, which had an industrial focus but also included raising public awareness of energy conservation issues through the use of mass media.

Introduction of Solar Water Heaters in Armenia. Ecofys International Projects, Econosto, and FACET of the Netherlands implemented this ArmNedSun project 2000-2001; Senter International sponsored it and the GoA supported it. Fifteen demonstration systems were installed and monitored, and a further 60 solar collectors sold as a result of the demonstration activities. The study concluded that the main applications of this technology are in the commercial sector; that there could be some demand in richer households and for holiday homes, where the solar season coincides with the period of hot-water demand; and that solar water heating in hospitals represents a possible application, where there is a need for hot water for bathing, laundry, and kitchens. A joint-venture company for the production of solar water heaters was set up, and awareness/lobbying activities were conducted to put solar energy on the political agenda.

The New Hagen City Twinning Program.⁵² This French bilateral program (run by French Armenians) demonstrated what can be achieved with limited funding. A \$4,000 grant was provided to rebuild a boiler house. Although that sum was too small to have

⁵² Interview with the boiler company Ar and Ar by the author.

the work done commercially, this problem was overcome by hiring residents of the beneficiary building to do some of the work. The donors considered the project very successful and provided a second grant for a similar project.

4. Energy-Efficiency Organizations

Armenia does not have a governmental energy-efficiency agency, so national responsibility for energy efficiency rests with the Ministry of Energy, Department of Development and Foreign Relations. Four staff members work on issues related to energy efficiency, of which one from the Foreign Relations Section is responsible for the *Energy Charter Treaty*, while three from the Alternative Energy Section work in alternative energy and investment attraction.

According to PA⁵³, the development of organizations to support the implementation of energy-efficiency programs in Armenia is in its infancy, and the energy sector should begin to focus on further development of its professional expertise and position itself to contribute to future developments in energy efficiency. However, there are numerous energy/environmental NGOs, such as Ecoteam, that have worked on energy and environmental issues/advocacy, as well as energy NGOs described below.

a. Armenian Chapter of the Association of Energy Engineers (ACAEE.)

ACAEE is a very active NGO that promotes energy efficiency and renewable energy. In operation since 1997, ACAEE has about 70 members. Its membership includes the private sector, government, academia, and energy suppliers. ACAEE has sponsored two international energy conferences, provided training in energy auditing, and operates a certified energy managers program.

b. Armenian Energy Efficiency Council

Established in 2002, the Energy Efficiency Council is a joint initiative of the Deputy Minister of Energy and the local office of USAID. Membership includes several ministries, academics, the National Association of Condominium Owners, consultants working in the energy-efficiency field, ESCOs, and other private firms. The Alliance to Save Energy (ASE) serves as the secretariat, and the MUNEE Program provides funding; ASE also administers MUNEE.

A large number of energy-efficiency stakeholders and media representatives attended the April 2002 kickoff meeting. In the absence of both governmental and non-governmental organizations⁵⁴ to promote energy efficiency, this new forum can be said to represent the main force behind the promotion of energy efficiency in Armenia. The AEE Council is fragile; USAID has promoted its formation, but whether it will be sustainable in the long-term is questionable.

⁵³ PA Knowledge Limited/PA Government Services, "Armenia: Energy Efficiency Rate Financing" (May 22, 2002).

⁵⁴ The Council has both governmental and non-governmental participants, but it is neither a governmental body nor a registered NGO.

The meeting aimed to develop a platform for disparate government, private, and non-governmental organizations to discuss barriers to successful implementation of energy-efficiency measures, identify priorities in improving the legal and institutional framework for energy efficiency, and develop recommendations on addressing such barriers.

c. Communities

Within this context, “communities” are housing authorities established at the sub-municipal level that are nominally responsible for communal services for buildings. They are a legacy from the “old” system in which the state owned all property and was responsible for its maintenance; although they nominally still retain this responsibility, their maintenance budgets—when they have them at all—may be sufficient to conduct a small amount of work in a handful of buildings.

Now that CAs have been established to take care of communal maintenance and repairs, there is a clear overlap of responsibility. The continuing existence of the communities is inhibiting the development of CAs, which delay essential maintenance in the hope that the communities may do the work for free.

There is clearly a case for either disbanding the communities, or at least formally removing their responsibility for building maintenance. However, according to the Urban Institute, the mayors generally do not want CAs to be strengthened and communities weakened, as this removes power and financing from the mayors.

d. Condominium Associations (CAs)

There is potential for CAs to develop into important energy-efficiency stakeholders, although at present they generally do not assume this role.

One of the largest barriers to improving the energy efficiency of buildings is that some households—as many as 70 percent in some buildings—refuse to pay for their share of communal services (heating, water, garbage collection, and building maintenance). In this environment, communal energy-efficiency solutions such as weatherizing or installing an energy-efficient heating system for the building clearly cannot be financed.

There are many reasons why households do not pay. For example, those who are owed back salary by a state-owned company can use this as justification to refuse to pay bills to state-owned utilities; some households justify non-payment because the neighbors do not pay; others are too poor to pay; still others could pay, but as there are no sanctions for non-payment—the water will still run, the garbage will still be collected, the heating will still be switched on—so they choose not to pay.

CAs are potentially vehicles for re-establishing a payment culture for energy and other communal services, but to achieve this they would have to be well-organized and empowered with clear legal rights and the means to enforce them if households refuse to pay. As of April 2002, the legal framework was inadequate, but a building-maintenance law that was adopted in late 2002, addresses some of the issues. A related problem is that some CAs cover too many buildings to effectively represent the interests of any particular building.

The Urban Institute is working on condominium formation and development in Armenia, helping to stimulate culture change and persuade a sometimes hesitant and suspicious public to buy into the idea of empowered CAs. This is no easy task, as there are several reasons why CAs are under-performing. For one thing, they were created top-down rather than bottom-up, meaning that they were established in response to a mandatory legal requirement⁵⁵ that all apartment buildings have a CA, rather than by a perceived need on the part of residents. As mentioned, there is no tradition of communal activity among households, which are used to relying on the state to do everything; thus, households are skeptical of efforts to strengthen the role of CAs. According to one analyst,⁵⁶ it may take 10 to 15 years to get the CAs to work effectively.

According to ASE, households are sometimes right to be suspicious of CAs, as such suspicions can be well-founded. In badly run condominiums, up to 80 percent of money collected can be retained by the president and accountant for spurious “services.” ASE has conducted a range of activities with condominiums, including an information campaign, workshops, and a survey of energy efficiency in condominiums. The main conclusion was that organization was the most difficult barrier to overcome when working with condominiums. It is, for example, very unusual for a solution to involve more than one CA. ASE was skeptical of the idea that the installation of decentralized heating systems for two or three buildings could take off if more than one CA were involved.

The international community is generally more positive about CAs than are Armenian stakeholders, who have limited experience of the potential benefits of strong CAs. USAID, through The Urban Institute, is the main driver behind the strengthening of CAs at present.

Measures to improve the legal status of condominiums could include an improved *Condominium Law* to resolve ownership issues for buildings and land, and an *Apartment Management Law* focusing on types of ownership, standards, norms, and requirements. These laws were under development in 2002, but none of the drafts circulating in April 2002 specifically addressed energy efficiency.

When interviewed in April 2002, the World Bank was considering support for an advisory service for CAs based upon its positive experiences of the work of CAs internationally, particularly in the Baltic countries. The Bank was looking for additional technical and legal advice in this area at the time. Since then, the Bank’s new credit facility for Armenia has been designed to allow for the financing of guarantee mechanisms, enabling households to access bank credits for residential energy-efficiency investments (mostly boilers).

⁵⁵ *The Condominium Act of 1996*, amended 1998.

⁵⁶ Levon Vardanyan of the Ministry of Energy.

The UNDP considers creation of strong CAs to be an essential step in enabling communal heating solutions for buildings, which represent a much cheaper and more energy efficient alternative than an individual apartment installing its own heating solution. There is widespread agreement on this point among the international community, and the GoA is supportive of this approach, according to AEAI.

(1) National Association of Condominium Owners (NACO)

Established in 1997, NACO was to represent the interests of CAs on a national level, but it appears to operate at too low a level to achieve much. Board members are all at the level of heads of condominiums; there are no influential public figures on the board. Although involved in some internationally funded projects, this involvement appears to be at the periphery rather than in a lead role. NACO appears to be both under-resourced and under-staffed.

Around 400 of the 630 condominium associations are NACO members, representing 3,009 buildings with 170,000 apartments. Membership fees are tiny at 1 ARD/M²/year, so a typical payment for a condominium association can be \$2.5/building/year). Most members do not pay their NACO dues.

According to AEAI, a competing association of CAs is understood to have emerged, but no details are known.

(2) Banks and Other Possible Financiers

There are no known cases of banks lending to CAs, and it is widely believed that CAs would never consider borrowing from local banks because the banks charge very high interest rates: around 3 percent per month. According to ASE, banks would likewise never lend to CAs, which have neither collateral nor a reliable repayment stream.

No energy-equipment loan fund or loan-guarantee fund exists from which well-functioning CAs could borrow, although several commentators suggested that it may be a good idea to set one up as these have been demonstrated to work well in some other countries (e.g., KredEx, the Credit and Export Guarantee Fund of Estonia). Samuel Coxson of the Urban Institute suggested that CAs with a collection rate of 65 percent would probably be considered sufficiently bankable to borrow from such a fund if one were established. AEAI designed a plan for USAID for an energy-efficiency fund, from which it was envisioned that CAs could borrow for energy-efficiency and heating solutions. However, but there are no firm plans to implement it at present.

According to the World Bank,⁵⁷ the government has suggested that five-year, zero-interest loans funded by the donor community could be a way of stimulating condominiums to borrow for energy efficiency.

⁵⁷ Interview with the World Bank Project Implementation Unit at the Ministry of Finance and Economy, April 2002.

e. Energy Service Companies

For the purposes of this report, an ESCO is defined as an engineering contractor that specializes in energy and energy efficiency, and works on a straightforward fee basis.⁵⁸ ESCOs started to develop in Armenia in around 2000. The ESCO concept appears to work here with fuel-switching investments for creditworthy customers in areas where natural gas is available, as projects to replace electric heating systems with gas heating systems are generally attractive. However, ESCOs do not represent a solution for low-income energy consumers, as ESCOs deal with only the most creditworthy clients on profitable and low-risk projects.

ESCO development has been a strong focus of USAID through AEAI currently and RMA previously, providing training and professional development to the ESCOs. While there can be more training and professional development activity oriented towards ESCOs, the main barriers are financial and the lack of a market.

An insight into the developing Armenian ESCO market was provided by the company Ar & Ar.⁵⁹ The company set up as a boiler manufacturer in 1993, but now manufactures and installs boilers, builds boiler houses, and creates internal networks.

In the early and mid-1990s, there was no market for small gas boilers because the Soviet concept of very large systems still prevailed. Nowadays, the requirement is for minimum 50 kW boilers for a small private house and up to 2, 3, or 4 MW for multi-apartment buildings. The company produced and installed 150 boilers over nine years; 75 of these were in 2001, which indicates how quickly the market is growing.

Typically, customers are from the commercial sector: businesses, hotels, and a cinema. Two residential boiler projects for multi-apartment buildings have taken place: a 350 kW boiler for two buildings and a 1.5 MW boiler for eight buildings. However, these condominiums had grant money available, so this does not indicate that the residential market has developed to a stage where bankable projects can be implemented yet.

It is difficult to speak generally about the payback for such projects, as it can be very low or very high depending upon the cost of the money. Local bank interest rates are as high as 20 percent per month. The high cost of capital makes it very difficult to find “bankable” projects in Armenia. However, there are approximately 5,000 buildings in Yerevan and, if the economy continues to recover, most of them will need heating solutions of some sort. So the future looks bright for ESCOs.

Heating costs for a newly installed system are around \$20/Gcal. If the company (or its potential customers) had access to low-cost finance, heating solutions could begin to be

⁵⁸ This is not the same as the traditional U.S. definition of an ESCO. A U.S. ESCO not only provides engineering work, but provides financing and management, and is paid from savings resulting from lower energy bills, normally over several years.

⁵⁹ Interview with Ara Petrosyan, Ar & Ar, April 2002.

implemented quickly. Risk is the greatest barrier, so if a way of protecting investors could be found (particularly from nonpayment), investment would go ahead more rapidly.

Ar and Ar considered that, at present, residential projects are only possible if they are grant supported. Other ESCOs working with AEAI on the behalf of USAID would concur with this finding, according to AEAI.

CESCO, which is involved in civil design/construction, HVAC, water supply/sewage, and design/installation of electrical and mechanical systems, is an ESCO with an annual turnover of around \$1.5 million. CESCO considered that 80–90 percent of ESCO work in Armenia is funded by international development and humanitarian organizations. CESCO staff have benefited from a number of courses on energy management funded by USAID and implemented by AEAI.⁶⁰

CESCO also noted that an ESCO model that involves third party financing could not work in Armenia, as local banks offer credit with unacceptable terms.

G. Impact of Energy Efficiency

1. Reducing Poverty Levels

Although the technical potential of energy efficiency to reduce poverty levels is high, little has been done apart from projects financed by the international donor community.

2. Removing Barriers to Utility Privatization

The district heating companies will probably not be privatized given current market conditions.

⁶⁰ Email from Ara Kocharyan of CESCO, March 12, 2003.

Chapter 4

Energy Prices and Tariffs

Almost all prices in Armenia have been liberalized, with the exceptions of urban transport, electricity, hot water/heating, natural gas, water and sewage, garbage collection, state-owned housing, telecommunications, and irrigation.

A. Electricity Prices and Tariffs

1. Evolution of Electricity Tariffs

At one time, the Ministry of Energy set electricity tariffs until the establishment of an inter-agency commission for defining tariffs in 1996, and finally, the Energy Commission in 1997. Tariffs include 20 percent value-added tax (VAT).

From 1995 to 1997, electricity rates rose very sharply and now broadly reflect real costs. Households generally consider the rate of 25 ARD/KWh to represent a very high price. The tariffs are voltage-based, so small commercial consumers and households pay the same rate of 25 ARD/KWh, with high-voltage customers and industrial customers paying 15 and 12 ARD/KWh, respectively.

There have been four broad phases of household tariffs:

- 1) Pre-1994, when tariffs were very low and payment was not an issue;
- 2) 1994-1996, when a higher single-rate household tariff led to widespread meter fraud that was overcome only by moving the meters out of apartments;
- 3) 1996-1999, when lifeline tariffs were used but found not to work because of collusion between meter readers and households to report winter consumption later in the year; and
- 4) Since 1999, which has been characterized by the successful elimination of widespread fraud in the household sector, the withdrawal of lifeline tariffs, and the introduction of optional time-of-day (day-night) tariffs.

Since 1994, prices (when converted to US cents/KWh) rose as follows: January 1995 - 2.5 c/KWh; October 1995 - 2.9 c/KWh; April 1996 - 3.3 c/KWh; January 1997 - 3.1 c/KWh up to a 100 KWh/month threshold and 4.7 c/KWh thereafter; September 1997 - 0.3 c/KWh up to 100 KWh/month, 4.4 c/KWh within the range of 100 KWh/month - 250 KWh/month, and 5.0 c/KWh above 250 KWh/month; January 1999 - 4.5 c/KWh daytime rate and 2.7 c/KWh nighttime rate. It is significant that the conversion rates used apply to the month when the tariff was set, as in all cases the value in U.S. cents eroded until the subsequent price rise. Appendix 5.1 contains details on the evolution of electricity tariffs.

Annual average household electricity prices, based on the standard daytime tariff, were as follows (US cents/KWh):

1996	1997	1998	1999	2000	2001	2002 (estimate)
3.3	3.8	4.2	4.7	4.6	4.5	4.4

The gradual fall in the value of the AMD against the USD eroded the electricity price, which fell in dollar terms from a peak of 4.8 US cents/KWh to only 4.3 US cents /KWh by May 2002. (See appendix 5.2 for more information.)

2. Inverted Block Tariff

The Inter-Agency Commission for defining tariffs introduced an inverted block tariff (lifeline tariff) for the first time in Armenia in January 1997. The rate was 3.1 US cents/KWh up to a threshold of 100 KWh/month and 4.7 US cents/KWh for consumption above the threshold. 100 KWh/month is enough electricity to quite comfortably run basic household electric appliances, but the use of electric heating would very soon take a household above the monthly threshold.

When the Energy Commission assumed responsibility for pricing, it refined the inverted block tariff by introducing a third tier in September 1997. The initial threshold of 100 KWh was retained at 3 US cents/KWh, the second tier from 100-250 KWh/month was set at 4.4 US cents/KWh, and consumption above 250 KWh/month was priced at 5 US cents/KWh. The 250 KWh threshold was in recognition that some households have little choice but to use electric resistance heating, so the tariff provided an incentive to keep consumption for heat use to a relatively low level.

After 16 months, the Energy Commission withdrew the inverted block tariff, which it considered a failure, largely because of fraud. At first, many households simply turned back the electricity meters to record lower consumption and pay less, but the government overcame this problem by removing meters from apartments and putting them in a locked steel box at the building's entrance or in the street. Then households bribed meter readers to report part of winter consumption during the following summer, when it was very easy to remain below the threshold, and thus appearing to remain below the threshold every month. This undermined the whole basis of the tariff, and so it was withdrawn.

Since the withdrawal of the inverted block tariff, the right of meter readers to collect electricity payments from households has been removed, so there is no longer any contact between the meter reader and the household. In this context, it may now be possible to reintroduce an inverted block tariff.

It should be noted that, although the inverted block tariff was generally considered to have failed as a result of fraud, there might be other reasons as well. The differential between 3, 4.4, and 5 US cents/KWh is not a great deal and provides little incentive for

households to monitor power consumption carefully. By contrast, when an inverted block tariff was introduced in Romania with a very, very low threshold—only 50 KWh/month—a massive 44 percent of the population chose the tariff and of these, 95 percent successfully kept monthly consumption below the threshold. The reason for the success of this measure was that consumption beyond the threshold was charged at a punitively high rate, more than four times higher, so there was a strong incentive to monitor household consumption very carefully. It is quite common for even relatively well-off Romanian households to choose this tariff, which is optional, investing in low energy lamps (CFLs) and high-efficiency refrigerators to meet the 50 KWh limit.

3. Day-Night Tariff

A day-night tariff of 25 ARD/KWh daytime and 15 ARD/KWh nighttime was introduced in January 1999. According to the Energy Strategy Center director, the tariff is very popular. A typical household can reduce its monthly electricity bill by 2,000 to 3,000 ARD (\$3.60 to \$5.40) by using this tariff.

The day-night tariff is popular because electricity bills are reduced with no change in consumption, since the daytime tariff is the same but the nighttime tariff is lower. There is no evidence that households change their behavior by consuming less in the daytime and more at night because of this tariff.

It is useful to compare this tariff, which is popular, against a similar tariff introduced in Romania, which is unpopular. In Romania, only 0.2 percent of households have opted for the tariff, despite the fact that Romanian households are offered the meters free, whereas Armenian households must pay approximately \$2/month for two years toward the meter's cost. The key difference between the Armenian and Romanian tariff mechanisms is that, while each offers a substantial discount for nighttime use, the Armenian daytime rate is no different from the standard all-day rate, whereas Romanian consumers have to pay a daytime premium of some 20 percent over the standard all-day rate if they choose this tariff option.

4. Setting of Future Tariffs

When interviewed for this study in April 2002, the Regulatory Commission considered that the conditions leading to the inverted block tariff's failure had now changed, and were considering re-introducing this type of tariff mechanism. Two barriers remained, however; first the definition of who would be eligible to benefit from the tariff was considered to be problematic; second, they were reluctant to introduce any tariff that could be open to abuse while the distribution company was still state-run.

The Regulatory Commission considers that the conditions leading to the inverted block tariff's failure have now changed and would like to reintroduce a similar tariff mechanism. Two barriers remain, however: first, the definition of who would be eligible to benefit from the tariff is considered to be problematic; second, they are reluctant to introduce any tariff that could be open to abuse while the distribution company is still state-run.

The idea of setting a tariff that is fixed in hard currency and payable in ARD at the prevailing rate was also under consideration.

5. The “Privileged Tariff”

According to the electricity utility, low-income consumers received a 50 percent discount on their electricity consumption until the Family Benefit System was introduced in May 1998. Low-income households, which account for around 25 percent of all households, benefited from the discount, as did electricity company employees, military personnel, and others. According to the World Bank, some 20 percent of households were eligible for privileged tariffs.⁶¹ (See appendix 5.3 for more information.)

Despite the fact that privileged tariffs have been withdrawn, ERM reported that there is a perception in the district heating sector that officials receive heating discounts and that this perception is one reason there is little incentive for households to pay the district heating bill.⁶²

B. Other Energy Prices and Tariffs

1. District Heating

In 1990 there were 55 district heating systems, but by the winter of 2000-01, there were only 9, 6 during 2001-2002, and 4 during 2002-2003. While the majority of the systems collapsed because of the energy blockade, these more recent failures occurred because of non-payment. The remaining (typically large) systems are now under threat and may or may not survive another winter. The largest, in Yerevan, supplied over 5,000 buildings in 1990, but only 700 by the beginning of 2002.

Until 1997, the state paid for district heating as a crisis measure for the few systems that were able to run intermittently during the blockade. Most systems did not run at all during the blockade and were not restarted thereafter, as the costs of putting them back into operation were assumed to be too high to be economically viable.

The tariff for households during the winter 2002 was 10,800 ARD/Gcal (approximately 18.62/Gcal), but this bears very little relationship to what the customer actually pays. As there is no metering, households are supposed to pay according to their apartment size, billed in ARD/square meter. In reality, the district heating company demands a 30 percent deposit for the total cost of winter heat, and once this has been collected, it starts the heating system. Most households refuse to pay any more, so the heat company shortens the heating season, running until it cannot get credit for more fuel.

⁶¹ World Bank, “Non-payment in the electricity sector in Eastern Europe and the Former Soviet Union, World Bank Technical Paper no. 425” (Washington, D.C., June 1999).

⁶² ERM/TACIS/World Bank, “Urban Heating Strategy for Armenia, Demand Analysis” (Yerevan, October 2001).

Typical household district heating bills during the winter of 2001-2002 were in the range 39,000 - 42,900 ARD/year (approximately \$67 - \$74); according to the World Bank Heating Strategy, this rate appears to be too high. Only 50 percent of survey respondents as part of the study indicated they would be willing to pay this amount; 80 percent would be willing to pay 24,000 ARD/year (about \$41) for a working heating system. However, it is suggested that an improved payment culture resulting from the various reforms that this study recommends could generate an average of 36,000 ARD/household/year (approximately \$62). (See appendix 5.4 for more details.)

2. Natural Gas

Although roughly 70 percent of Armenian households were using natural gas until 1990, after the blockade, the gas system fell into disrepair. A small amount of household gas has been introduced since 2000, but there are only around 114,000 connections because most of the distribution system is not recoupable.

The tariff history for households and other small consumers (up to 10,000 m³/month) is very straightforward. During the Soviet period, the price has been very low and consumption unmetered. Since gas was reintroduced in 1997, however, it has been sold exclusively on the basis of metered use. The tariff was set at 51 ARD/1000 m³ (\$102/1000 m³), payable in ARD, which by the spring 2002 had fallen to \$91/1000 m³ due to the dram's slide against the dollar. Households signing up in 1997 were required to pay a deposit of 25,000 ARD (about \$50) toward the meter installation cost, with that same sum credited to the first gas bills. The deposit has now risen to 40,000 ARD, also credited in gas.

Pricing Outlook. An April 2002 World Bank study, "Identification of Priority Investments in Gas Sector in Compliance with Urban Heating Strategy of the Republic of Armenia" (draft final report), includes an outlook for natural gas prices to the year 2023. The outlook for selected years is in appendix 5.5. As with all forecasting, the specific numbers should be treated with some caution, and the reader is referred to the scenarios and assumptions from the report.

The options in the table are variations of the three basic scenarios from the World Bank Heat Supply Strategy:

- Rehabilitate existing district heating networks;
- Construct small boiler houses to serve three blocks;
- Install individual gas heaters in apartments.

C. Impact of Pricing and Tariff-Setting

1. Reducing Poverty Levels

a. Electricity

According to the May 2001 World Bank study, "Utility Pricing and the Poor: Lessons from Armenia," elimination of the increasing block tariff was predicted to raise the average prices of electricity by 30 percent (from 19.2 ARD to 25 ARD). However, a household survey indicated instead that the new price of 25 ARD/KWh represented an unexpected 47 percent increase (from 17 ARD/KWh to 25 ARD/KWh), as the calculation of the average price was based on aggregate utility data rather than household utility data.

The study also measured the impact of utilities on the poor.

	Percentage of Utility Costs in Household Budget	
	Actual expenditure (Paid utility bills)	Theoretical expenditure (Paid and unpaid utility bills)
Non-poor	11%	14%
Poor	18%	27%

Source: World Bank, "1999-2000 Survey."

The same World Bank study included details of a 1999-2000 survey that identified the impact of energy pricing on low-income households; it reported that 80 percent of all households and 95 percent of rural low-income households had switched from electricity, mainly choosing wood (60 percent) or natural gas (24 percent).

b. Household Expenditure for Energy

According to the World Bank study mentioned above, poor rural households use 34 percent of their monthly income on energy, while at the other end of the scale, non-poor urban households use only 16 percent. (See appendix 5.6 for more information.)

According to PADCO, the PAROS database suggests that low-income consumers use 130 KWh/month. Heating and energy costs typically represent 25-30 percent of household income for low-income households during the winter, although according to a UNDP/GEF-funded sociological survey,⁶³ the percentage can be as high as 50 percent for some households.

⁶³ UNDP, "Problems in municipal heat supply: results of sociological survey done under the projects," UNDP/GEF/ARM/98/G41/A/G/99 (New York, 2000).

In 2002, the cost of heating an apartment was approximately \$20/Gcal for a wood-based heating system; \$20/Gcal for a decentralized heating system, and \$22/Gcal for an individual boiler-based system.⁶⁴ It is much higher for electrical resistance heating.

ERM⁶⁵ estimated that, for district-heated households, average bills for 2001 ranged from 35,000 to 42,900 ARD/ year (\$65 to \$76), but that, in general, overall expenditure on heat ranged from 22,000 to 26,000 ARD per household per year (approximately \$40-\$47). In other words, although district heating bills were higher than other heat expenditures, households actually paid less on district heating than they spend on other fuels to keep warm. (District heating is cheap only because non-payment is tolerated.) (See appendix 5.7 for more information.)

2. Removing Barriers to Utility Privatization

The electricity-distribution sector is now privately owned. It is too soon to know whether the new owners will take an uncompromising approach to disconnecting industrial, commercial, and tertiary customers that do not pay and/or who steal electricity—this behavior was largely ignored when the utility was State-owned. Assuming that the non-payment/theft problem is resolved, there are no apparent insurmountable barriers to subsequent privatization of the power-generation sector.

The district heating sector is clearly a very long way from being bankable at the present time, as the household payment culture has been lost. The ERM Study⁶⁶ suggests that, if the central heating systems were reformed to feature individual metering and control, 80 percent of households would pay up to 24,000 ARD/year (\$41.38) at the rate of 2,000 ARD/month (\$3.45), and that, based on evidence of payments, heating revenues could be maximized at 36,000 ARD/year (\$62.07) or 3,000 ARD/month (\$5.17).

The Armenian natural gas sector is already in private hands.

⁶⁴ Notes from an interview with Anahit Simonyan and Diana Harutiunyan, UNDP Armenia.

⁶⁵ TACIS/World Bank, “Urban Heating Strategy for Armenia.”

⁶⁶ Ibid.

Chapter 5

Financing the Energy Social Safety Net

A. Financing Subsidies and Assistance Payments

There are no direct utility assistance subsidies at present. As described in appendix 3.3, the GoA's request for financial assistance for a utility subsidy for 2002-2008 would involve \$16.25 million, mostly for the earlier years, and would be co-financed by \$27.75 million of government money, mostly in later years.

Possible future financing sources could include the state budget (which represents the best source of social assistance funding), local government budgets, and international donor contributions, (possibly including some of an anticipated international donation that may follow if and when agreement is reached on closure of the nuclear power plant).

Although social assistance funding from utility revenues and cross-subsidies between household and other sectors are not recommended as best practices, the fact that the power sector could release an additional \$60 million per year by eliminating fraud, theft, and other commercial losses should not be ignored as a possible source of subsidies for energy efficiency, metering, and special tariffs for low-income households.

B. Financing Energy Efficiency and Metering

No governmental financing has been made available for household energy-efficiency projects. The purchase and installation of day-night electricity meters for low-income households is the only metering project that has been financed.

No study has yet assessed the long-term impact of the day-night metering program. If consumers change their behavior and shift consumption from daytime to nighttime, this tariff mechanism may be self-financing, and it is an area for further study.

Financing sources that could become available include the international community (donor financing, dependent on closure of the nuclear plant as indicated above), as well as possible financing related to the reduction of greenhouse gas emissions.

Based on the experience of other countries, it may be possible to attract supplier credits to help finance CHP systems to replace heat-only boilers (as in Hungary) and for fitting HCAs and TRVs (as in Bulgaria). It is stressed that supplier credits typically become available only when there is high market confidence as a result of the removal of institutional, social, legal, and other barriers to energy efficiency, and when the price signal linking energy consumption to energy costs is firmly in place.

1. Revolving Energy-Efficiency Fund

A PA recent report recommends a revolving fund whereby energy-efficiency projects could be financed, either wholly or partially, from a fund set up to lend money at

reasonable and affordable rates.⁶⁷ AEAI has also suggested this, commenting that the World Bank is considering a heating fund, while the UNDP is considering a broader energy-efficiency fund.

Similarly, the Urban Institute suggested that a revolving fund based on the Croatian model could work well in Armenia, and suggested that a pilot project—perhaps \$15 million from which CAs could borrow at favorable terms—could work, particularly if low-income households were offered the opportunity to do the work for the condominiums in lieu of making payments. Condominiums that achieved a 65 percent collection rate should be considered “bankable” for the purposes of such a fund.

An expert from the International Institute for Energy Conservation (IIEC) worked with UNDP Armenia in 2002, to conceptualize how a \$1 million GEF fund could be used to support an energy-efficiency loan fund in Armenia. This work was done under the framework of the AEAI’s energy-efficiency work, that USAID financed, and a concept paper and a business plan were developed. The study concluded that a subsidy for low-income households would be required to make this work, as Armenian buildings are typically mixed income; thus, if an apartment building took out a credit, low-income households would not be able to service their share of the debt. Plans for this revolving fund have been shelved for the time being.

2. Energy-Efficiency Levy

The regulator is aware of “portfolio standards” (e.g., a requirement for a generator or industry to invest a fixed amount of revenue in renewables or energy efficiency, either themselves or through a third party), but considered this approach to be unsuitable for Armenia at the present time in view of the low collection rates for power. The Ministry of Nature suggested a levy of 1 ARD/liter on gasoline prices, but the reaction of the gasoline industry was so negative that plans were deferred. If recent privatization results in significantly higher collection rates, opportunities to create an energy-efficiency fund may emerge.

3. Other Financing Alternatives

EBRD’s Energy Efficiency Unit reviewed investing in Armenia but rejected it for the moment because sovereign borrowing capacity is limited and the most-likely beneficiaries—schools, hospitals, ministries, etc.—are not paying their energy bills.

C. Tariff Mechanisms to Address Low-Income Issues

At the present time, there are no low-income tariffs in place. The best option for financing low-income tariff mechanisms is the social assistance budget, as this could focus on designing a tariff that benefits low-income households but is conducted strictly within a pre-defined budget. Another financing option, which is not recommended but is

⁶⁷ PA Knowledge Limited/PA Government Services, “Armenia: Energy Efficiency Rate Financing” (May 22, 2002).

in use internationally, would be a cross-subsidy entirely within the household sector (i.e., richer households subsidizing the poor). Cross-subsidies between the household and other sectors are not recommended in any circumstances.

Chapter 6 Recommendations

A. Basis of Recommendations

Recommendations for Armenia take into account factors specific to local conditions, the most significant conditions being the following:

- **Poverty levels.** These are among the most acute in the region, with pension levels as low as US\$ 8/month.
- **Debt.** Now at the limit of its sovereign indebtedness and at risk of becoming a Highly Indebted Poor Country, Armenia clearly cannot afford substantial funding for new social assistance programs.
- **Poor condition of utilities.** The power system is in need of substantial rehabilitation; reliance on electricity for heating is extraordinarily high due to low availability of natural gas, district heating, and—increasingly—wood; the natural gas system has physically collapsed and now reaches only 14 percent of its former customers; 51 of the 55 district heating networks have collapsed.
- **Non-payment.** One-third of electricity revenues is uncollected or stolen, non-payment for district heating is endemic, and inter-utility debt is high.
- **Affordability.** Now below cost-recovery levels, household electricity tariffs are still unaffordable for low-income households. Natural gas is more affordable but has limited availability. District heating would be unaffordable to low-income consumers if payment were enforced, which it is not. Wood is the most affordable fuel at present, but 30-40 percent of the forests have been cut down in the last seven years, so prices are rising along with a pressing environmental need to stop burning wood.

B. General Recommendations

Given the situation as detailed above, the following recommendations are presented:

1. Adopt an Integrated Energy Policy

As a result of the large number of studies conducted in the past two to three years, Armenia is now in a position to make clear and well-supported energy policy decisions. Several commentators noted that the final step—clear policymaking—is now required so that all actors can begin to work in the same direction.

In the context of a written energy policy, Armenia could define fuel poverty, set a target for the elimination of fuel poverty, and describe the respective roles of energy subsidies, energy efficiency, and tariff mechanisms in the Armenian energy social safety net.

2. Make Decisions on the Natural Gas Strategy

Although relatively clean and energy-efficient natural-gas-based solutions would appear to represent an attractive option for Armenia, there is no household re-gasification strategy, either at the governmental or gas company level. It should be taken into account that the gas network relies on a single gas pipeline that transits through Georgia. As security of gas supply is so low, the GoA should review the extent to which extending the gas-distribution networks to more households is desirable in these circumstances. If there are realistic options for improving security of gas supply on a national scale, these should be examined.

C. Subsidies and Assistance Payments

Consider a utility subsidy that meets wider social-policy and energy-policy goals.

A utility benefit system can be designed to contribute to a wider range of policy goals than the GoA-proposed subsidy. Such goals could include:

- Alleviating poverty;
- Reducing winter peak electricity demand;
- Using electricity efficiently;
- Preparing the power-generation sector for privatization;
- Stimulating a payment culture;
- Using natural gas for certain households;
- Discouraging use of natural gas by households with working district heating systems;
- Preventing the collapse of remaining district heating systems;
- Discouraging the use of wood for heating;
- Encouraging energy efficiency;
- Developing CAs.

D. Energy Efficiency

1. Establish an Energy-Efficiency Program for Low-Income Households

A low-income energy-efficiency program could include components related to equipment, weatherization, and metering.

a. Equipment-Related

Such components could include distribution of CFLs and replacement of electric space heaters with gas furnaces. CFLs represent the lowest-cost, straight-replacement electrical technology relevant to all households. CFL's are universally easy to understand, can be installed by the household, and makes an immediate impact on power consumption. Both CFLs and the replacement of electric space heaters with gas furnaces would lower energy bills and directly address Armenia's specific need to reduce winter power demand.

b. Weatherization-Related

These could include low-cost solutions such as door and window insulation, glass replacement in windows and doors, and reflective radiator sheets, as well as higher-cost solutions such as insulating exterior walls and roof spaces.

Solutions within the metering-related category could be to extend the existing low-income, day-night, electric metering program and introducing technologies that enable individual autonomous metering and control to households, whatever the heating source.

Low-income programs can benefit not only households via more-affordable utility bills and increased comfort levels, but also utilities with improved payment discipline by customers and lower peak demand, and society through job creation, poverty reduction, and environmental improvements.

2. Consider Further Actions to Strengthen Condominiums

Although international experience suggests that CAs can be a considerable resource in terms of finding heating and weatherization solutions for households, considerable hurdles must be overcome. These include legislative improvements, training for condominium managers, and providing economic incentives to manage buildings well and raise collection rates.

NACO, which could play a role in helping CAs become more active in heating and weatherization solutions, instead appears to operate at the fringe of the international cooperation community rather than at its heart. This organization's impact is unlikely to increase without substantial and proactive support. The CAs need a strong national association that can be influential with both the Armenian government and international donors.

3. Consider Restricting the Powers of the Communities

The power struggle between communities and CAs appears to be hampering the latter's development. It is suggested that the role, powers, and budget of the communities be reexamined with a view to removing any duplication of legal responsibilities with the condominiums. (*The Buildings Maintenance Law* that was passed toward the end of 2002 is understood to have addressed some of these issues.)

4. Establish an Energy-Efficiency Program for Social Institutions

The USAID-funded school boiler project successfully demonstrated the beneficial impact of energy-efficiency improvements for schools. The project could be replicated widely in schools, hospitals, and social institutions throughout Armenia.

5. Strengthen the Legal Framework and Enforcement Powers for Disconnection

Utilities need strong powers to disconnect consumers for non-payment, particularly if the consumers are governmental, municipal, or private (with appropriate regulatory safeguards for residential consumers, hospitals, etc.). It is apparent that these powers are inadequate at the present time. Similarly, condominiums and/or district heating companies need powers to enter abandoned apartments and bypass the radiators to prevent continued heating of empty space.

A strengthening of the legal framework for disconnection should be conducted once the creation of a social safety net for low-income energy consumers is in place. The underlying principle should be that customers who can but won't pay will have their service disconnected rapidly, while customers who cannot pay but are willing to pay would be entered into an appropriate program.

6. Consider Energy-Efficiency Labeling for Refrigerators and Other Appliances

Although labeling has been extremely successful in improving the energy efficiency of appliances offered for sale in the EU and the EU accession countries, it is possible that the less-efficient models are now finding their way into countries such as Armenia that have no labeling requirements. This is an issue that affects many of the countries of the former Soviet Union, so it may be better to address it on a regional (multi-country) basis.

Low-energy refrigerators can make a substantial impact on lowering household electricity consumption, particularly for households that mainly use power for refrigeration, lighting, and TV (but not heating).

7. Take Determined Action to Implement the World Bank Heating Recommendations

The recent Cowi study, referenced above, provides clear guidelines. Rapid implementation of the recommendations may be required to prevent the remaining district heating networks from collapsing. Successful implementation of this study's recommendations would substantially improve the quality of heating available to low-income households at an affordable price. The World Bank has provided a project preparation facility to get implementation underway.

8. Consider a Revolving Energy-Efficiency Fund with a Low-Income Grant Component

Several international expert groups, including the locally-based USAID contractors, have already recommended establishing a revolving loan fund for energy efficiency. Preliminary analysis by IIEC/AEAI concluded that low-income energy consumers might be unable to service their debts to such a fund, so any revolving fund proposals should consider including a grant component to meet the needs of low-income households living in mixed-income buildings.

A combination loan/grant fund, rather than a straight revolving fund, should be considered to allow both moderate-income and low-income households to participate.

If the recent privatization of the power distribution sector leads to higher collection rates, financing an energy-efficiency fund through a levy on power consumers might become possible.

It is suggested that international assistance be sought in the design and implementation of a fund for energy efficiency, as there is considerable international experience in such schemes.

9. Consider “Free” Transfer of Municipal and Community Boiler Houses to CAs

Condominium associations that choose to find their own heating solution could be given the local boiler house. This would make a small but visible contribution to the financial viability of new investment in modern, energy-efficient, communal heating solutions.

10. Help to Prepare Business Plans for the Remaining District Heating Companies

The director of the Yerevan district heating company indicated that he had neither the internal resources nor the know-how to prepare a business plan, which has been a condition of receiving future financial assistance from the government. The government or international community might consider providing technical assistance to the preparation such business plans, within the context of the overall national heating strategy.

11. Consider Actions to Strengthen Energy-Efficiency NGOs

With the exception of those organizations detailed in this report, Armenia suffers from a shortage of empowered grassroots NGOs working in the energy-efficiency field. Such models as EnEffect of Bulgaria (www.eneffect.bg), the Energy Club of Hungary (www.energiaklub.hu), and the Romanian Energy Policy Association (www.aper.ro) could serve as useful models for the development of a grassroots organization, but the challenge is to find suitable organizations to support.

The experience of other countries suggests that energy-efficiency NGOs can make a substantial impact on raising awareness and understanding of household energy-efficiency options and low-income energy issues.

E. Tariff Mechanisms

1. Improve Collection of Non-household Electricity Payments

In the absence of a strong revenue stream, it will be impossible to finance the rehabilitation of the Armenian power sector and the modernization of working practices—including adoption of a modern approach to low-income issues. In this context, the single most important issue for the power sector is considered to be the reduction of its chronic levels of commercial losses.

It is recommended that the Government of Armenia and the Energy Regulatory Commission provide their full and proactive support to the new owners of the power distribution sector (Midland Resources) and their managers (Daewoo Engineering) in efforts to raise collection levels. As international experience suggests that disconnection for non-payment is the single most effective instrument to enforce payment discipline, it is recommended that the government adopt a strict non-interference policy should the power company choose to pursue that method.

2. Consider Reintroducing an Inverted Block Tariff (Lifeline Tariff) for Electricity

The basic conditions that led to the failure of a lifeline tariff in Armenia have now changed, so such a tariff may now once again be considered a viable option. Although lifeline tariffs are not suitable for all countries, they are often considered most suited to countries with a high proportion of low-income households, such as Armenia.

It is recommended that substantial care be taken in the detailed design of any possible new lifeline tariff for Armenia.⁶⁸ International experience suggests that a well-designed lifeline tariff can represent a low-cost and effective approach to helping low-income consumers afford energy costs, but that a poorly designed one can be very costly and achieve little.

3. Consider Extending the Day-Night Meters Program for Low-Income Households

The day-night metering program, which allows low-income households to benefit from cheap nighttime tariffs, is currently the only energy sector program specifically targeted at the poor. Anecdotal evidence suggests the program is popular and cost effective, but there is some doubt about its overall cost-benefit. It is recommended that a cost-benefit study be conducted to measure the program's impact on the entire power system and take into account both economic and societal benefits, with a view to extending the program to all low-income households if such a decision is supported by the study results.

⁶⁸ In designing an effective and appropriate lifeline tariff, see the recommendations section in the “Regional Review of Social Safety Net Approaches in Support of Energy Sector Reform” synthesis report that accompanies this Armenia country report.

Bibliography

Central Intelligence Agency. **The World Factbook – Armenia**. Washington, D.C., 2002.
Available at: www.cia.gov/cia/publications/factbook/geos/am.html.

Desilets, Brian and Mais Vanoyan. “Condominium Development in Armenia - An Introduction.” The World Bank and the Urban Institute, Washington, D.C., October 2001.

Ecofys International Projects. “ArmNedSun - Introduction of Solar Water Heaters in Armenia.” 2001.

Environmental Resources Management (ERM). “Urban Heating Strategy for Armenia - Demand Analysis.” TACIS/World Bank Joint Environmental Programme, Yerevan, October 2001.

International Monetary Fund (IMF). *Armenia: Letter of Intent, Memorandum of Economic and Financial Policies and Technical Memorandum of Understanding*. Washington, D.C., April 2001.

———. *Armenia: Letter of Intent, Memorandum of Economic and Financial Policies and Technical Memorandum of Understanding*. Washington, D.C., September 11, 2002.

IMF - World Bank. *Poverty Reduction, Growth and Debt Sustainability in ‘Low-Income CIS Countries.’* Washington, D.C., 2002.

Government of Armenia. Ministry of Energy, State Energy Inspection Department. *Complex Programme for Implementation Of Energy Saving Policy*. Yerevan, 1997.

———. Request for a Utility Subsidy. Yerevan, August 29, 2001.

———. Ministry of Energy, Energy Strategy Center. “Energy Overview (presentation).” Yerevan.

———. Ministry of Nature. UNFCCC - First National Communication. Yerevan, 1998.

———. National Statistics Service. *Social Snapshot and Poverty in the Republic of Armenia - 2001*. Yerevan, 1998.

JEN Financial, Engineering and Management Consulting Ltd. “Identification of Priority Investments in Gas Sector in Compliance with Urban Heating Strategy of the Republic of Armenia,” draft final report. Government of the Republic of Armenia/World Bank/Yerevan Project. Yerevan, April 2002.

Kelly, Thomas. “The Nature of Poverty in Growth, Inequality and Poverty in Armenia.” UNDP/Armenia. Yerevan, 2002.

- Khechoyan, Tereza. Unemployment and Poverty in the Republic of Armenia. Working paper, Armenian School of Public Administration. Yerevan.
- Lampietti, Julian A., Kolb A., et al. *Utility Pricing and the Poor - Lessons from Armenia, World Bank technical paper No. 497*. The World Bank, Washington, D.C., May 2001.
- National Association of Condominium Owners (NACO). *By-laws of the National Association of Condominium Owners*. Yerevan.
- PADCO/Armenia. 79 USAID-funded reports including: “#1 - Improving The Household Income And Expenditure Survey,” “#14 - Main Issues In Creating Unified Information System For The Social Security Sector,” “#15 - Capacity Of The GoA To Implement Social And Health Sector Reforms,” “#18 Recommendations For Improving Communal Services For Low Income Families In Armenia,” and “#23 Recommendations For Improving The Targeting Of The Poverty Family Benefits Program (to be released)” available at: www.padco.am. Yerevan.
- PADCO – PA. “Program to Help Low Income Households Pay for Utilities.” USAID, Washington, D.C., August 2001.
- Parvanyan, Tigran and A. Pasoyan. “Present Situation of Energy Saving in Armenian Condominiums and their Requirements. USAID/MUNEE/Alliance to Save Energy, Yerevan, 2001.
- Pasoyan, A. “Roundtable Meeting Protocol - Energy Efficiency Council Initiation Meeting.” MUNEE – ASE, Yerevan, April 23, 2002.
- Schulte, B. and P. Quaak. “Industrial Development of the District Heating Industry in Armenia - Project Summary.” ArmNedHeat - Senter International, February 2002.
- UNDP. *National Human Development Report 2001 - 10 Years of Independence and Transition in Armenia*. New York, 2001.
- UNDP. *Country Study on Climate Change*. Available with additional reports at: www.undp.am.
- . *Poverty of Vulnerable Groups*.” 1999. Available at: www.undp.am.
- . *Energy Efficiency in Municipal Heat and Hot Water Supply*. Available at: www.undp.am.
- . *Social Indicators of Poverty*. Available at: www.undp.am.
- UNDP/Armenia. *Education, Poverty and Economic Activity in Armenia: Situation Analysis Report*. Yerevan, 2002.
- UNDP- Armenian Ministry of Nature. *Removing Barriers To Energy Efficiency - Municipal Heat And Hot Water - Full Report*. Yerevan, 2001.

-
- UNDP - Ekono Energy. "Heat And Hot Water Options For Yerevan." Yerevan, January 2001.
- UNDP - Electrowatt-Ekono. "Pre-feasibility Analysis of the Different Heat and Hot Water Supply Options in One Selected District of Yerevan." Yerevan, January 2001.
- UNDP/ Global Environment Facility (GEF). "Removing Barriers to Energy Efficiency in Municipal Heat and Hot Water Supply - Problems In Municipal Heat Supply - Results of Sociological Survey." Yerevan, 2000.
- UNDP/GEF – Siemens. "Removing Barriers To Energy Efficiency - Municipal Heat And Hot Water Analysis: Pilot." Yerevan, 2002.
- USAID/AEAI. "Armenia Energy Efficiency, Demand-Side Management and Renewable Energy Project - Overview Paper." Yerevan, 2002.
- . "School Boiler Replacement Study - Final Report." Yerevan, August 2000.
- . "School Boiler Success Story." Yerevan, February 2002.
- . "Armenia ESCO Development Project – Results." Yerevan, July 10, 2001.
- . "Evaluation of Fuel Substitution Pilot Project." Yerevan, May 15, 2002.
- USAID/PA. "Armenia: Results of Pilot Project on Fuel Substitution." Yerevan, May 3, 2001.
- USAID/PADCO. "Briefing on the Armenia Social Transition Program." Notes by Christine Allison, Aguirre International. Washington, D.C., April 1, 2002.
- . "The Armenia Social Transition Program 2000 (overview)." Washington, D.C., 2000.
- USAID/Resource Management Associates. "Power Supply/Conservation Project: DSM Measures - Final Report." Washington, D.C., September 1998.
- U.S. Department of Energy, Energy Information Administration. "Country Analysis Brief - Armenia." Washington, D.C., August 2001.
- Vardanian, Astghik. "Armenia's Choice." *The Bulletin of the Atomic Scientist*. Educational Foundation for Nuclear Science, 1996.
- The World Bank. *Improving Social Assistance in Armenia. World Bank Report No. 19385-AM*. Washington, D.C., 1999.
- . *Non-payment in the electricity sector in Eastern Europe and the Former Soviet Union. World Bank Technical Paper no. 425*. Washington, D.C., June 1999.

———. *Armenia: Growth Challenges and Government Policies, Vol. 1 - Main Conclusions and Recommendations*. World Bank Report No. 22854. Washington, D.C., November 2001.

———. Cowi. "Outline of Urban Heating Strategy – Armenia, draft report. Yerevan, February 2002.

———. "Discussion Note." Yerevan, January 2002.

Yerevan and Gyumry. "Assessment of Energy Use by the Two Largest Municipalities in the Republic of Armenia." USAID-PA Consulting Group, Washington, D.C., 2000.

Appendices

Appendix 1.1: Organizations Interviewed in Yerevan

The author would like to thank the individuals from the following institutions who kindly contributed their time and expertise.

Advanced Engineering Associates International (AEAI)

Alliance to Save Energy

Ar and Ar Heating and Cooling Systems

Armenian Electric Network

ArmRusGasProm

EBRD

Energy Regulatory Commission of the Republic of Armenia

Energy Strategy Center

EU office in Armenia

International Institute for Energy Conservation

Ministry of Construction and Urban Development of the Republic of Armenia

Ministry of Energy of the Republic of Armenia

Ministry of Social Services of the Republic of Armenia

National Association of Condominium Owners

PA Consulting

PADCO

Siemens

United Nations Development Programme (UNDP)

Urban Institute

USAID Yerevan Office

VOCA

World Bank Project Implementation Unit and the World Bank Yerevan Office

Yerevan District Heating Company

Appendix 1.2:
Monthly and Annual Average Exchange Rates, ARD/USD 1996-2002

	1996	1997	1998	1999	2000	2001	2002
Jan	402.01	452.99	497.10	535.62	527.02	553.43	564.08
Feb	402.53	466.63	499.10	543.27	527.90	552.15	565.28
Mar	403.30	477.73	502.07	537.15	527.47	545.97	572.10
Apr	405.48	482.19	502.63	535.46	530.88	547.81	578.31
May	406.58	492.32	503.09	538.80	534.14	553.77	580.81
Jun	409.12	511.41	502.95	545.34	543.65	555.11	
Jul	413.19	504.32	501.73	542.82	548.09	554.05	
Aug	418.00	502.12	501.81	540.35	540.49	554.58	
Sep	413.95	501.10	506.38	534.18	539.79	554.07	
Oct	416.31	500.63	508.87	520.72	544.97	560.78	
Nov	437.81	499.89	514.88	523.26	555.46	564.66	
Dec	440.21	498.83	518.37	523.77	554.45	564.55	
Annual	414	491	505	535	540	555	

Source: "IMF International Financial Statistics."

**Appendix 1.3:
Conversion of Heat Energy Units (Gcal, GJ, MW heat)**

	Gcal	GJ	MW (heat)
Gcal	1	4.19	1.16
GJ	0.239	1	0.278
MW (heat)	7	29.3	1

**Appendix 1.4:
Government of Armenia - Approach to Privatization Options**

Privatization Method	Main Benefits, Issues	Armenia Policy Implication
Initial Public Offering	Raises investment; only for low-risk countries	Not applicable at present
Employee Ownership	Smooths labor relations, gives performance incentives	Doesn't bring new investment or expertise, but will apply partially 10 to 20 percent
Cooperatives, management buyouts, municipalization, vouchers	Pleases citizens, may make collections easier retains management, operating experience	Not applicable for large capital-intensive enterprises such as in energy sector; doesn't bring new investment or new expertise; not an optimal option
Management contract	Brings commercial expertise, avoids issues of valuations and ownership	Will consider as prelude to ownership transfer
Strategic Investors	Brings expertise, investment, technology	Brings badly needed investment for rehabilitation, may be minimal up-front proceeds, but overall is the best option

Sources: Aida Arshakyan developed materials for this appendix based on a number of sources, including the "Armenian Energy Sector Investment Conference - Energy Sector Overview," USAID/USEA (1998); a paper by the former First Deputy Minister of Energy, "Key Issues for the Armenian Energy Sector," presented at the First International Energy Conference in Armenia (July 1998); "Assistance to the Energy Strategy Center, Inception Report," (December 1999); and other materials from the Ministry of Energy.

Appendix 1.5:

The State of Energy Sector Reforms and Privatization in Armenia

1. History, structure and recent reforms

The Armenian electricity network was part of the Soviet power system but is now operated independently in Armenia. The early 1990s were characterized by chronic energy shortages as a result of collapse of the Soviet Union and conflict with neighboring Azerbaijan in 1992/93, which resulted in only a few hours of power per day, stop-start operations that damaged power system, fuel oil shortages, collapse of the district heating networks, and no natural gas.

Nowadays, although still unstable, the power supply has greatly improved. However, unmanageable levels of commercial losses have resulted in many years of under-investment in the maintenance and repair of the power system, which now is now badly in need of investment and rehabilitation.

Armenia currently exports power to Georgia and is negotiating reciprocal power exchanges with Iran and Turkmenistan as well as transit of power from Iran to Georgia.

Generation capacity includes hydroelectric and nuclear plants that produce relatively low-cost power and thermal plants that are relatively high cost.

Immediately following Armenian independence, the power system was operated as a vertically integrated monopoly, but in 1992, the Ministry of Energy was established to set a national energy policy, raise the sector's economic efficiency, and organize the process of de-monopolization and reform. In December 1995, the government decided to restructure the power sector, with distribution and retail sale functions to be transferred to regional distribution networks; generation functions to independent, potentially competitive generation enterprises; and transmission, dispatch and wholesale functions remaining with former monopoly Armenergo.

On July 1, 1997, the first energy law came into force and formed the basis for the establishment of separate production, transmission, and distribution companies. The intention was that the distribution networks and the thermal and hydro generation plants should be privatized. The high voltage transmission network and the nuclear plant will remain in state ownership. The state will continue the investment and expansion programs with support from international financing institutions. Other key steps towards liberalization of the power sector were the establishment of an independent energy commission to regulate tariffs and licensing in 1997, and a new energy law in 2001.

The power generation sector now consisted of a number of state-owned but independently-managed thermal, nuclear and hydro power plants: Yerevan TPP, Vanadzor TPP, Medzamor Nuclear Power Plant, Sevan-Hrazdan Cascade of HPPs, Vorotan HPP, and several small HPPs. The only exceptions to state ownership of generation so far have been the 2002 transfer of Hrazdan TPP to Russian owners as part of a debt swap arrangement (see below), and the successful privatization of the

small hydro sector. The first 11 small hydro plants were privatized in September 1997, two of which were bought by French businessmen, and a total of 25 hydro plants with a combined capacity of 85 MW were privately owned by 2002.

As well as running the transmission grid, state-owned Armenergo is a wholesale buyer-reseller of power, taking responsibility for optimal dispatch.

Distribution companies have merged rather than separated. Eleven regional power distribution enterprises were consolidated into four regional distribution utilities in preparation for privatization. A considerable amount of preparation work for privatization was done to make the companies attractive to the private sector. However, in 2002, after two attempts at privatization had failed to attract bidders, the companies were combined into a single company, "Armenian Distribution Network" which serves all 750,000 Armenian power customers, and which was finally privatized during the late summer 2002.

2. Collection of revenue from the power sector is the major problem

There is an extremely high level of uncollected revenue from state institutions, state-owned industrial and commercial customers, and (politically influential) private industrial and commercial customers. According to the Regulatory Commission for Energy, an estimated \$40 - 60 million per year is uncollected, of which \$30 million represents theft and \$20 - 30 million non-payment. This represents approximately one third of the total revenue that the company should be collecting. Whether some or all of this revenue is genuinely uncollected, or collected and diverted before it reaches the accounts is unknown

There are no official statistics on the extent of non-payment for power.

In view of the very large sums of money involved, rich and influential parties (those who are either stealing or not having to pay the millions of dollars) are highly motivated to undermine any change to the status quo.

In sharp contrast to the industrial, commercial and institutional sectors, the level of revenue collection from households is extremely good, having risen from around 20 percent to almost 100 percent as a result of a number of successful measures as described elsewhere in this report.

3. The privatization process

The privatization of state-owned property began in Armenia in 1991 with a broad land privatization program through which most agricultural land was privatized. Privatization of state-owned enterprises was introduced in 1992 by the "Law on privatization and denationalization of state-owned enterprises and unfinished construction projects," and became operational in 1994 with a voucher program under which approximately 5,000 large and small-scale enterprises changed hands.

The first successful large-scale privatization was the national telecommunications company, ArmenTel, sold in 1997 by international tender, which became the favored model for all large-scale privatization.

The 1997-1998 privatization program of the Ministry of Energy led to the privatization of 13 small hydroelectric power plants and the privatization of the gas sector.

The *Law on the Program For The Privatization Of State Property* created conditions for a program of large-scale strategic privatization during the period 1998-2000, including the privatization of large energy sector enterprises.

4. The Government of Armenia (GoA) approach to energy privatization

To date, the GoA has demonstrated a strong commitment to energy sector privatization. Since independence in 1991, the prerequisites for successful privatization have been steadily established, including these significant achievements: passage of the *Privatization Law*; passage of the *Foreign Investment Law*; passage of two energy laws; establishment of the independent Regulatory Energy Commission; material increases in tariffs and collection levels (at the household level); and separation and making into a corporation the electricity generation, transmission and distribution facilities.

The government has also taken some steps to reduce the actual and perceived risk to private investors who wish to invest in the Armenian energy sector. In late 1997, the government retained a financial advisor to assist in the privatization of state-owned power sector assets. A “Plan of Privatization” was developed with the active participation of experts from the World Bank, USAID, and other international organizations, the plan’s main goals being:

- The network -based energy systems will be restructured, turned into a corporation, and privatized with strategic investors;
- Non-strategic facilities were to be privatized without restructuring;
- New power stations will be established on the basis of the attraction to the private sector by projects such as BOT and BOOT schemes.

The government had also expressed a preference for selling the energy enterprises to strategic investors with experience in running energy utilities, as described in the appendix on “Government of Armenia - approach to privatization options.”

Although a power distribution company was sold to an offshore company after two failed attempts to sell it to a strategic investor, the strategic investor approach is still preferred by the government.

5. Investment in preparation for privatization of the power sector

To enable reform and privatization of the power sector, donors have provided grants and credits in substantial amounts. In 1993, EBRD extended a credit for the completion

of Hrazdan TPP Unit 5; in 1994, the World Bank provided a credit for the rehabilitation of the power sector; a credit from the World Bank and the Government of Japan is being planned to finance a project of reforms, rehabilitation of electrical networks and modernization of the dispatch (SCADA) system; the Government of Germany is expected to extend credit for the repair of the Kanaker HPP; and a large number of technical assistance and support programs have been carried out by bilateral and multilateral donors, notably USAID and EU TACIS.

Restructuring and development of the energy sector in preparation for privatization is being carried out in accordance with the “Program of development the energy sector of Armenia to 2010,” which was prepared with consultant support. The main features are:

- **Hydro:** Rehabilitate existing hydro plants; develop of 230-250 MW of economically expedient new hydro potential; construct small and micro HPPs with foreign and local private investors; establish pump storage plants with comparatively low investments.
- **Thermal power:** Extend the lifespan of existing units; commission a new 300 MW unit at Hrazdan TPP in central Armenia; refurbish Yerevan TPP on the basis of two modern Combined Cycle (CHP) units; develop geothermal sources.
- **Other:** Develop nuclear energy on the basis of modern technologies; develop renewables; implement an aggressive DSM campaign; integrate Armenian energy and fuel networks into regional energy markets on the basic principle of new and mutually beneficial economic relations.

Foreign investments enjoy a special protection status in Armenia according to the provisions of the *Law on Foreign Investments*. Some tax incentives and privileges for companies with foreign participation, introduced by this law, have been raised or modified by the new *Law on Profit (Corporate) Tax*.

6. The first attempt to privatize the electricity distribution networks failed

The privatization of the four distribution companies (Yerevan, Central, North and South) was to be implemented in 1999-2000, taking into account recommendations by a consortium of Raifeisen Investment and the Israeli advisory firm, Ben Shahaar Associates. The intention was to negotiate with strategic investors for each of the four networks, and privatize them according to the negotiated agreements. These agreements would have included obligations on the purchaser to implement energy-efficiency improvements, address social issues, and increase employment. Accordingly, sales memoranda, pilot contracts, and privatization concept papers were prepared.

In December 1999, a first attempt was made to privatize the distribution networks. The four companies were presented in two packages, of which bidders could compete for only one. The bidders would be allowed to obtain 51 percent ownership, with an additional 20 percent to be bought by the EBRD, 24 percent remaining in with the GoA, and 5 percent to be transferred to the employees.

Fourteen companies from eight countries (USA, France, Great Britain, Austria, Ireland, India, Russia and Switzerland) participated in the pre-qualification round. The main criterion was that their annual turnover be at least \$150 million.

By April 3rd, the first Deputy Minister of Energy Garen Galustyan announced that five of the companies had pre-qualified and could take part in the tender - ABB (Switzerland-Sweden), AES Silk Road (USA), EdF (France), ITERA (Russia), and Union Fenosa (Spain).

In April 2000, the National Assembly discussed the question of removing utilities from the Privatization Program. A decision was undertaken to pass a special law about privatization of networks.

The World Bank had made privatization of the networks a conditionality of a \$45 million credit that was to cover the 2000-2001 state budget deficit. According to the WB Resident Representative Owaice Saadat, the provision of the fourth tranche of the SAC-3 credit (\$11 million) would be delayed until the utilities had been privatized.

On December 21st 2000, EdF pulled out of the auction, and on March 29th 2001 the Minister of Energy, Garen Galustyan, who was chairing the Privatization Commission, announced that no bids had been received. The first attempt to privatize the distribution networks had failed.

7. The second attempt to privatize the power distribution networks also failed

On August 30, 2001, Deputy Minister of Energy Areg Galstyan announced new plans for privatizing of distribution networks. Two bidders, both from Russia, would participate in the new tender: ITERA and a joint stock company, United Power System of Russia (UPSR), which intended to lead a consortium. A Tender Commission was set up to sell planned to sell 75 percent of the shares plus one share to strategic investors. Bids were due to be placed by December 2, 2001, but neither of the above companies actually presented proposals.

At this point two solutions were considered: extend the deadline (as UPSR had requested more time to become better acquainted with the conditions of the tender), or establish a private management contract as a temporary alternative to privatization. However, the head of the Energy Regulatory Commission declared that simply hiring private management was not acceptable.

As a second attempt to privatize the networks had failed, on December 14, 2001, the government intervened, by uniting all four distribution networks in a single company, "Armenian Electric Network," to manage it more efficiently.

8. The third attempt to privatize the power distribution networks succeeded

Following the first two failed attempts, the government no longer expected privatization of the electricity sector to yield significant cash proceeds due to the poor physical condition of the assets, accumulated debt and other liabilities, and high perceived risk

on the part of potential investors. The goals became to improve sector performance, improve efficiency, reduce subsidies and bad debt, attract investment for rehabilitation, promote economic growth, rationalize energy usage, and allocate resources optimally.

On March 26, 2002, the GoA decided to look for a large international company to manage the Armenian distribution network for five years. The World Bank agreed that a management contract could replace privatization as the main condition for provision of the third \$20 million tranche of the \$50 million SAC-4 Loan Agreement.

Despite these developments, on August 25, 2002, a new privatization process started. Only one company participated, a holding company called Midland Resources UK Limited, which is Russian-owned and registered in the UK. Midland Resources acquired 80.1 percent of the shares in the power distribution company for \$37 million, of which \$25 million will go to unpaid staff salaries and retiring government and private debt.

There was an understanding in place that the EBRD would buy the remaining 19.9 percent of the power distribution network, but in October 2002, the bank announced that it would not invest. This was widely interpreted in the press as an indication that privatization to an offshore group with no energy sector experience did not meet the bank's expectation that the distribution company would be privatized to an experienced international energy company. Midland Resources subsequently acquired full ownership of the distribution company.

9. A manager for the distribution company took over in January 2003.

In 2001, the IMF noted⁶⁹ that “privatization of the energy distribution companies to internationally reputable companies on the basis of competitive tenders will be essential to promote the efficient and least cost operation of the companies.” As Midland Resources was the single bidder and has no apparent power sector experience, there was initial uncertainty about what the impact of this privatization would be. The distribution company requires fundamental restructuring and modernization, and it was not clear that the new owners had the experience to carry out such reform. In particular, the fact that one-third of billings that are currently uncollected suggests an urgent need for expertise in the difficult area of addressing endemic non-payment, resolution of which will be essential to support the large investments that are required to modernize the network. One of the terms of the privatization agreement is that the investor would reduce losses in the grids from 30 percent to 12 - 13 percent by the year 2007.

The model of an investor with no apparent power sector experience buying an under-performing power company is not unknown internationally, but it is believed to be the first time it has occurred in the former communist countries of CEE and Eurasia. The success or failure of this episode may turn on the capability and experience of the management team that the new owners appoint to run the company, as it is they who

⁶⁹ IMF, “Republic of Armenia - Memorandum of Economic and Financial Policies for 2001-2003,” (Washington, D.C.) paragraph 21.

must face the challenging tasks of raising collection levels. International experience (e.g., experience in Kazakhstan of U.S. company AES Silk Road and Belgian company Tracebel) suggests that a strict policy of disconnection for non-payment is the only strategy for dealing with non-payment that really works well. However, a strict disconnection policy may be difficult to implement in Armenia, where governmental and municipal entities are amongst the poor payers.

The South Korean firm Daewoo Engineering took over management of the Armenian power company on the behalf of the new owners from January 2003. The impact of this new development is untested.

10. Privatization of power generation stalled, but is moving again.

According to the Program of Privatization, the privatization of the power generation sector (with the exception of the Medzamor nuclear power plant) should be completed during 2001-2003.

So far, the only plant to move into the private sector is the Hrazdan Thermal Power Plant, which was part of a \$100 million debt-for-equity swap with Russia in November 2002. The only international interest in the power generation sector was focused on the Hrazdan plant.

There are ongoing plans to privatize Vanadzor TPP as part of a package with Vanadzor Chemical Plant.

Further privatization in the hydro sector is planned, including the larger hydro plants, Sevan Hrazdan and Vorotan, The government plans to only partially privatize these plants, releasing the rest of the shares in 5-8 years' time.

Appendix 2.1:
Employment Levels and Average Monthly Nominal Salaries, 1992 - 2000

Year	Employed ('000)	Unemployed ('000)	Percent unemployed	Average nominal salaries # (ARD)	ARD/USD	Average nominal salaries (US\$)
1992	1,578.1	29.1	1.8	1,395*		
1993	1,543.3	86.9	5.3	12,173*		
1994	1,487.6	105.5	6.6	1,748		
1995	1,476.4	105.5	6.7	7,060		
1996	1,435.6	147.9	9.3	9,469	414	22.87
1997	1,372.2	166.1	10.8	13,581	491	27.66
1998	1,337.3	139.1	9.4	18,000	505	35.64
1999	1,298.2	164.2	11.2	20,157	535	37.68
2000	1,277.7	169.5	11.7	22,706	540	42.05
2000	1,280					44**

Source: Ministry of Social Services.

*Average monthly salaries in rubles, equivalent to 7 ARD in 1992 and 61 ARD in 1993.

Nominal as salaries were not always paid.

** The datum for 2000 is from a different source, the latest IMF data,⁷⁰ which describes average salaries in Armenia for 1996-2001 as follows:

	1996	1997	1998	1999	2000	2001
Average monthly wage	\$22	\$24	\$31	\$34	\$40	\$44

⁷⁰ IMF, "Statistical Annex for Republic of Armenia, IMF Country Report No. 02/225," (Washington, D.C., October 2002).

Appendix 2.2:
Poverty in Armenia, 1996-2001

		Incidence of extreme poverty (Head Count) (Percent)	Incidence of poverty (Head Count) (Percent)	Depth of Poverty Gap (Poverty Gap) (Percent)	Severity of Poverty (FGT) (Percent)
1996	Urban	29.6	58.8	23.0	11.5
	Rural	24.4	48.0	18.9	10.3
	Total	27.3	54.7	21.5	11.0
1998/99	Urban	31.2	60.4	18.4	7.6
	Rural	17.7	44.8	11.6	4.2
	Total	25.4	53.7	15.5	6.1
2001	Urban	18.2	51.3		
	Rural	11.2	50.1		
	Total	15.9	50.1		

Sources: National Statistical Services, Armenia, "Social Snapshot and Poverty in the Republic of Armenia" (2001); World Bank, "Armenia: Poverty Update" (2002); A. Kakosyan and A. Mirzakhanyan, "Specifics of Poverty in Armenia and Poverty Reduction Targets" (July 2002).

Appendix 2.3:
Number of Pensioners and Size of Pensions, 1992 - 2000

Year	Pensioners ('000)	Average monthly pension. (ARD)	ARD / USD	Average monthly pension (USD)	Calculated annual budget for pensions (Millions of US\$)
1992	634,446	1,509			
1993	652,327	9,013			
1994	636,073	1,456			
1995	641,852	2,359			
1996	607,111	3,152	414	7.61	55.4
1997	587,739	3,673	491	7.48	52.8
1998	574,652	3,793	505	7.51	51.8
1999	568,169	4,421	535	8.26	56.3
2000	560,082	4,473	540	8.28	55.6

Source: Ministry of Social Services and IMF data, extrapolated.

**Appendix 3.1:
Heat Assistance Payments - Budget and Beneficiaries, 1999 – 2000**

Year	No. of households	Mean monthly payment (ARD)	Mean monthly payment (USD)	Total monthly budget ⁷¹ (ARD)	Total monthly budget (Millions of US\$)	Total annual budget (Millions of US\$)
1999	217,265	8,077	15.10	1,754,792,500	3.3	39.4
2000	183,900	7,667	14.20	1,410,034,900	2.6	31.3

Source: Ministry of Social Services, 2002.

**Appendix 3.2:
Lump-Sum Cash Transfers to Help Pay for Energy, 1999 and 2000**

Year	Number of beneficiary households	Average payment (ARD)	Average payment (USD)	Total budget ⁷² (ARD)	Total budget (US\$)
1999	50,755	1,486	2.78	75,436,750	141,003
2000	13,672	3,514	6.51	48,046,000	88,974

Source: Ministry of Social Security.

⁷¹ The monthly budget in ARD and number of beneficiary households are original data. Other data are extrapolated/calculated from these and IMF exchange rates.

⁷² The figures provided in the table are extrapolated from the total budget and number of beneficiaries as provided by the Ministry. There is a small discrepancy between the average payment data as described in the text.

Appendix 3.3: Government Request for Donor Assistance for Utility Subsidy

GoA request for donor assistance for utility subsidy

August 29th 2001

Introduction

Armenia's communal services - electricity, water and gas - face a growing problem that the Government of the Republic of Armenia is committed to resolve. Programs and initiatives underway now or the near future that promise to have a large impact on these services include:

- Privatization of the production and distribution of electricity.
- Rehabilitation of the water sector including capital improvements and restructuring.
- Rehabilitation of natural gas supply and distribution networks.
- Restructuring tariffs for these services to levels that ensure full recovery of the costs of production and distribution.
- Attracting investments in the modernization of production and distribution systems to ensure greater efficiency and the conservation of resources.

The GoA recognizes that these efforts are essential to ensure that the population of Armenia is provided with these basic services and that energy and other resources are used more efficiently. These initiatives, however, cannot be successful unless measures are introduced that protect the poorest families from the full impact of the necessary increases in tariffs. In 2004, the Government anticipates that electricity tariffs will be increased by about 20 percent. During the next several years, tariffs for water and wastewater services and for natural gas will necessarily increase significantly. These tariff increases will place an intolerable burden on families with low incomes. Currently for example, the approximate 3,000 AMD average monthly winter payment for electricity for a low-income residential household subsisting on a pension is equal to about 35 percent of the average monthly pension of 8,000 drams. It is estimated that as many as 100,000 households are solely dependant on the pension benefit.

The importance of developing measures to assist the poor in paying for utilities is recognized in the Poverty Strategy Reduction Program, which states:

38. The government intends to ensure delivery of high-quality drinking water, repair of the water supply and sewage systems to reduce water losses; review of water supply and sewage tariffs; and progress with further structural and organizational

reforms, including attraction of a private operator for the network and a higher degree of participation in the management by local governments. In line with the objectives of the program, during implementation of these measures, the government will focus on the needs of the most vulnerable groups, in order to protect them from possible adverse impacts of the program.

Without measures taken to protect low-income families from the effects of these necessary tariff increases, the GoA predicts that many residential customers will be unable to pay for basic services. Already, only about 30 percent of residential customers are paying for water services. Without a high compliance rate, investment in production and distribution systems will be impossible to attract and services will continue to deteriorate, threatening the well-being of the population.

Therefore, the government is requesting donor assistance in designing, implementing, and financing a program to provide assistance targeted at low-income households. The Government proposes a system that would be phased in to cover, first, electricity in 2002, and then would add water in 2003 and finally residential gas services in 2004, supported with credits and assistance from donors. Donor assistance would gradually be phased out over a six-year period, with the GoA fully paying for the program beginning in 2008. The program would be administered through the Regional Social Services Centers of the Ministry of Social Services of the Republic of Armenia. The following sections of this request summarize the GoA's proposal for the creation of this utility subsidy program.

Proposed Restructuring of the Utility Sector in Armenia

The GoA is committed to the privatization of systems for producing and distributing electricity and water and gas within the Republic of Armenia. This will require significant increases in the tariffs charged for these services that will allow the private investors to recover an appropriate rate of return on their investments.

In addition to permitting necessary increases in tariffs to ensure cost recovery, it will be necessary to take steps to ensure that the rate of compliance with tariff payments among the population of the Republic Armenia is maintained - in the case of electricity - and significantly increased in the case of water. Today, only about 30 percent of families are paying for water and wastewater treatment services. Increasing the rate of compliance will require improvements in procedures for metering, billing, and termination of services in the event of non-payment. But increased compliance in the face of rising tariffs can be achieved only if poor families can be protected from the full impact of the tariff increases.

The GoA recognized the need to provide social protection to low-income households with the creation of the Poverty Family Benefit (PFB) Program in January 1999. Today, this program provides monthly benefits to 183,293 families that average approximately 8,000 Drams. The benefit is calculated as 3000 drams for the family plus 1,300 drams for each family member. Eligibility is determined based on a series of factors that measure the vulnerability of the family. The

development of this program was supported by financial and technical assistance from the United States Agency for International Development, the World Bank, and TACIS.

The GoA is in the process of introducing a new formula to target benefits more effectively on the poorest among low-income families and to enforce more strictly the eligibility requirements. As a result, the number of families receiving benefits has been reduced from 218,617 in 1999 to 198,504 in 2000 to 183,293 today. The Government is committed to continuing this process of stricter auditing and verification of information.

Description of Proposed Utility Subsidy Program

The proposed utility subsidy program would be designed to include the following features:

- It would be provided only to families that are already eligible for the PFB program - requiring no initial registration to begin providing the subsidy.
- The subsidy would be provided in the form of a credit toward monthly payments for utility services - not in the form of cash.
- The amount of subsidy would be based on a credit for a minimum amount of service - a discount, for example, on the first 115 KWh of electricity consumed by a family of four people each month. The poorest 25 percent of families (among the PFB eligible families) would receive a 100 percent discount, the next poorest 25 percent of PFB families would receive a 75 percent discount, the next poorest families a 50 percent discount, and those with higher per capita incomes a 25 percent discount.
- The amount of monthly service against which the subsidy would be credited would be determined as below the minimum monthly consumption among low income families to ensure that all families would be required to pay some amount for services each month and therefore would be encouraged to conserve use of services.
- Eligible families would be notified of the amount of their monthly discount toward utility service and would, each month, pay for service the amount on the utility bill minus the amount of the subsidy.
- The utility distributor would be notified of the amount of monthly credit provided to subsidy eligible customers. Each month, the distribution entity would receive a payment equal to the total subsidies for all families that have paid their portion of their monthly utility payment due. Unless families have paid their portion of the monthly payment, the utility company would not receive the subsidy on behalf of the family. Thus, all utility companies would be encouraged to introduce systems to enforce payments of monthly utility

bills.

- Families that failed to pay their required portion of the utility bill within 30 days of the presentation of the bill by the utility company would be dropped from the program and services would be terminated.
- The overall operation of the program is represented schematically below.

Plan for Implementation

Phase In of Utility Subsidy Program

The GoA proposes to introduce in phases a program to provide a subsidy to assist low-income families pay for utilities. The subsidy will be in the form of a discount on monthly payments that will be greater, the lower the income of the families. But the subsidy will be designed in a way that ensures that all families will pay a portion of the monthly payment to ensure that families face an incentive to conserve in their use of utility services. The first phase of the program - introduced in 2002 -- will be for electricity payments only. The second phase - introduced in 2003 -- will be for electricity and water and wastewater services. The third phase - introduced in 2004 - - will extend the subsidy for the use of gas for home heating.

The projected annual costs of the subsidy program, and the share of the percentage of the costs paid by international donors are shown in Table 2 on the following page. The assumptions underlying the program are as follows: Electricity subsidy based on 100 KWh/month per family. Subsidy provided 12 months per year. Water subsidy based on 3m3 per family Gas subsidies based on tariffs for home heating that provide no reduced rate for minimum monthly consumption, and subsidies provided for first 10m3/month. Subsidies provided at 100 percent of cost of base consumption for poorest 25 percent of eligible families (those eligible for PFB), 75 percent for next quartile, 50 percent for next quartile and 25 percent for next quartile.

These assumptions are summarized in the table 1 below.

Table 1: Utility Subsidy Program Assumptions	
Utility Subsidy Component	Assumptions
Electricity subsidy	
Amount subsidized each month	100 KWh
Months' subsidized	12
First year of inclusion on program	2002
Water subsidy	
Amount subsidized each month	3m3
Months subsidized	12

	First year of inclusion on program	2003	
	Gas subsidy		
	Amount subsidized each month	10m3	
	Months subsidized	12	
	First year of inclusion on program	2004	

About 100,000 households require assistance. Their consumption is around 300,000 ARD/month (\$530,000/month, or \$5.30/month each).

The cumulative total of donor financing sought over the six-year period is \$16.25 million.									
Table 2: Projected costs of utility subsidy Program									
		Year							
		Power only	Power and gas	Power, water and gas					
		2002	'03	'04	'05	'06	'07	'08	
	Annual cost of utility subsidy (million US\$)	4	5	6	7	7.5	7.5	7	
	Percent paid by donors	90	80	60	40	20	10	0	
	Amount of donor financing necessary	3.6	4	3.6	2.8	1.5	0.75	0	
<p>Note: The cost of the subsidy falls after 2007 reflecting rising incomes and the phased in increase in family co-payment.</p> <p>The purpose of the subsidy for gas - introduced in the third phase - is to encourage the extension of gas connections to additional residential customers for home heating. Today, more than one half of all families heat their residences with wood and about 20 percent with electricity. Gas represents a more efficient and environmentally friendly alternative to electricity and wood.</p> <p>Tasks Necessary to Implement the Program</p> <p>The successful and timely implementation of this program will depend upon the execution of several tasks for which technical assistance from donors is</p>									

requested. These tasks are:

The overall design of all the steps necessary for program implementation.

Drafting of normative acts necessary for the implementation of the program.

The development of the computer software to be used by the local Region Social Services Centers (RSSCs) that will perform the following tasks:

Calculate the level of utility subsidy for which each PFB eligible family is entitled.

Prepare notification forms that are sent to families eligible to receive utility subsidies.

Prepare notification lists that are transmitted to the Ministry of Social Services' Information and Analytic center and the central office of each utility.

Maintain records of family compliance with monthly payments for utilities.

Creation of e-mail connections between RSSCs and central utility offices.

Develop systems for the sharing of information as outlined in the figure below.

Training of RSSC staff in the procedures necessary for the implementation of the utility subsidy program.

Designing and conducting a public education campaign to inform families about the new benefit. This will include public announcements on TV and radio as well as the distribution of brochures to the eligible population.

The design and implementation of new billing and accounting procedures by utilities will be the responsibility of these utilities as part of their overall program of modernization and preparation for privatization.

Sustainability

The Government intends that the utility subsidy program will be integrated, over time, into the Poverty Family Benefits program. Families receiving PFB already use a substantial portion of their benefit to pay their electricity bills - thus converting the electricity subsidy into a discount on utility payments rather than a cash payment will have little impact on the well-being of these families. The further reduction to pay for water will have an impact but the cost is less than that for electricity and will be phased in slowly. The gas subsidy will allow families to replace wood as a source of home heat. Relatively few families are anticipated to be affected by gas tariffs because

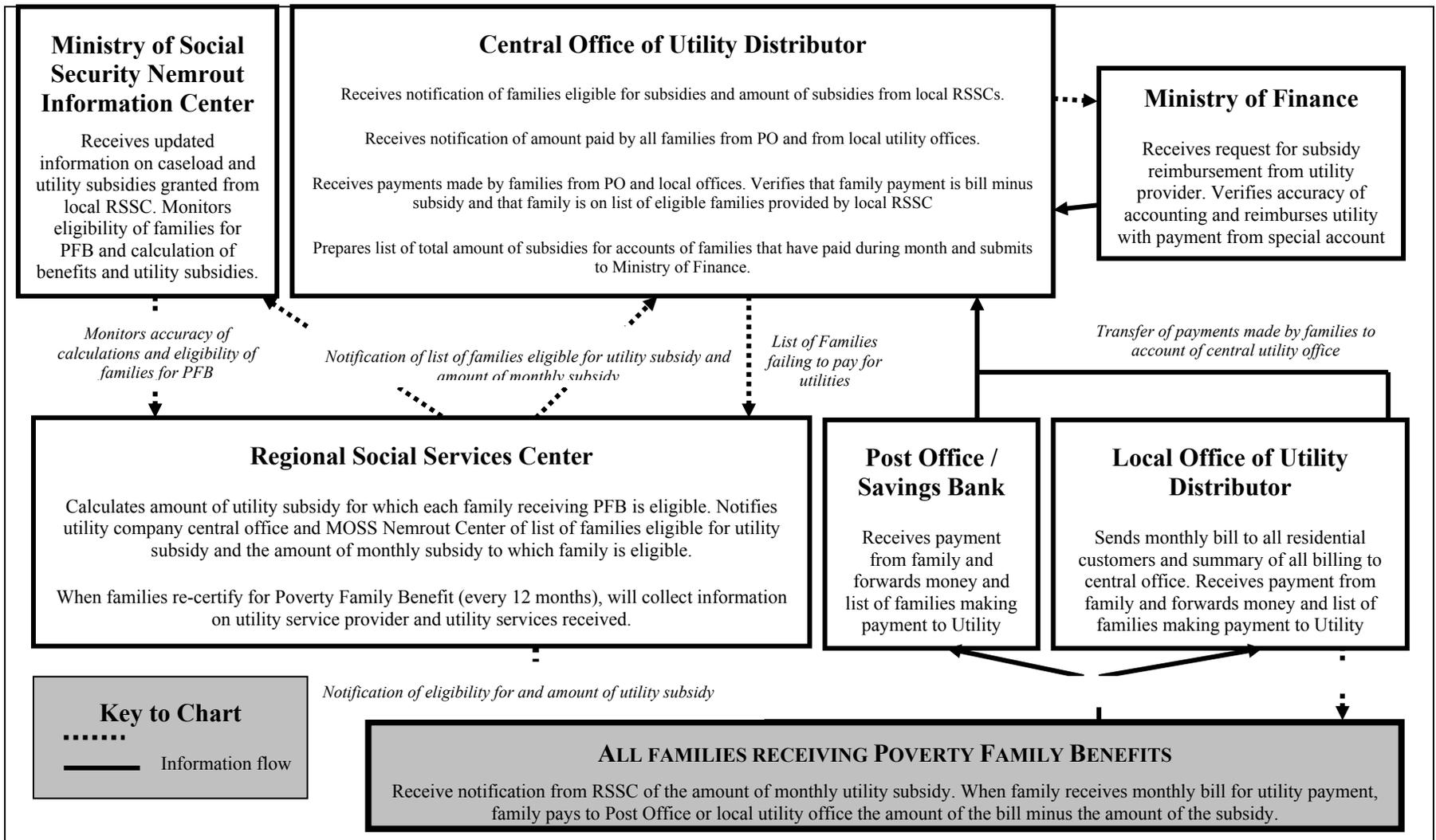
few families will receive gas services during the projected six years of the program.

By integrating the two programs over time, the Government believes that the administrative costs of the program will be kept to a minimum. By automating the program, it will be possible to introduce strict auditing procedures that will ensure the containment of the number of families receiving benefits.

The costs of the program can be controlled over time because two parameters of program design may be changed. These are:

The normative amount of monthly utility service against which the subsidy is applied may be adjusted. For example, the electricity component of the subsidy may be applied to 75 KWh per family, which may be reduced to 60 KWh per family if the cost of the program is above what was anticipated.

The percentage of the costs of these normative amounts may be reduced (e.g. the percentage subsidy for the poorest 25 percent of the PFB eligible families may be reduced from 100 percent to 80 percent).



Appendix 4.1:

Cost of Thermal Rehabilitation of a Social Institution

The ESCO EIICG, which conducts projects for USAID through AIEA, provided the following typical costs for thermal rehabilitation of a 1,000 bed hospital. The data is presented in a way that it can be used to broadly calculate the cost of thermal rehabilitation of any social institution.

The following work can be used to raise internal temperature to around 20 degrees centigrade. The standard temperature in an Armenian hospital is typically 10 – 12 degrees centigrade, using electric heating.

New boilers - approx 1.3 MW total capacity	\$ 20,000 - \$25,000
New boiler house	\$10,000 – \$15,000
New fully insulated underground heating pipes.	\$25 - \$30 per meter
New radiators	\$20 - \$25 (cast iron) \$20 - \$35 (aluminum)
Internal pipes	\$8 - \$12 per meter
Thermostatic radiator valves for each radiator	\$20 - \$35 each
Connection of boiler house to gas high pressure main	\$20 - \$40 per meter
Gas pressure lowering station	\$1,000 - \$2,500 (depends on pressure)
Labor	15 – 20% of costs
Social Taxes and Benefits	18% of labor
Profit ('depends on the company's appetite')	Usually 10-15%;
Profit tax	20% of profit
VAT	20% of project cost

Source: An email from Ashot Gevorgyan of EIICG, March 11, 2003.

**Appendix 4.2:
Results of USAID School Boiler/Weatherization Project in Yerevan**

		'Before'	'After'
Both schools			
	Type of heating system	Electric	Gas boiler
	Extent of heating	Classrooms and administrative offices only	Entire school including corridors, bathrooms etc.
Both of the schools			
	Average temperature - degrees C	10 - 12	18 - 20
	Increase - weatherized rooms - degrees C		6 - 10
	Increase - un-weatherized rooms deg.C.		6 - 8
Yerevan 'School 21'			
	Actual heating costs MARD / USD	1.5 / \$2,850	1.9 / \$3,360
	Heating budget for 2001/02 - MARD / USD		2.8 / \$4,950
	Savings for 2001/02 - MARD / USD		0.9 / \$1,590
	Natural gas consumption		39,000 m3
Yerevan 'School 132'			
	Actual heating costs - MARD / USD	2.2 / \$4,180	2.7 / \$4,780
	Heating budget for 2001/02 - MARD / USD		3.8 / \$6,730
	Savings for 2001/02 - MARD / USD		1.1 / \$1,950
	Natural gas consumption		52,483 m3

Years are winters - i.e. 2001/2002 is the end of 2001/start of 2002.

MARD are millions of ARD. USD data are rounded to the nearest \$10.

Conversion rates applied are \$1:526 ARD for 1998/99 and \$1:565 ARD for 2001/02.

Source: AEAI, 2002.

**Appendix 4.3:
Main Elements of the World Bank/Cowi Heating Strategy, 2002**

	Survival (Y1+Y2)	Recovery (Y3-Y5)	Growth (Y6-Y25)
Regulation / market stimulation	Develop regulatory base for condominiums and heat market	Stimulate and support embryonic heat market actors	Market monitoring
Institutional	Restructure CH companies / full cost recovery Develop condominium assistance program and implement pilot projects	Commercialization/privatization of CH companies All collective heat consumers are organized in condominiums and cooperatives.	- -
Social	Develop social support scheme	Social support scheme operational	Social support scheme is phased out over suitable period.
Technical (district heating systems)	Disconnect risers to heat less area in apartments, install meters	Individual control introduced Simple demand side management measures implemented in buildings	Individual control is commonplace. Improvements of CH infrastructure Introduction of solar energy solutions for HTW and more comprehensive building improvements
Promotional	Implement comprehensive public awareness campaign. Promote improved wood stoves	Continue information campaigns	-
Financial	Set up condo-lending scheme and	Start operation of condo and	Lending by international

	boiler lending schemes	boiler lending schemes	financial institutions
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Source: World Bank/Cowi, 2002.

**Appendix 5.1:
Household Low-Voltage Electricity Prices and Tariffs**

Date of price increase	Average price for all low-voltage consumers		Households		Threshold for inverted block and day/night for time of day tariffs KWh/month	Rate: \$1: ARD	Legal basis of price increase
	ARD/ KWh	USD/ KWh	ARD/ KWh	USD/ KWh			
01-Dec-94	8		8				Ministry of Energy RA (agreed with the Ministry of Economy)
01-Jan-95	10	0.025	10	0.025		405.8	
01-Oct-95	12	0.029	12	0.029		413	
01-Apr-96	14	0.033	14	0.033		425	Interagency commission for defining energy sector tariffs
01-Jan-97	17.6	0.041	13	0.031	Up to 100		
			20	0.047	Over 100		
01-Sep-97	21	0.042	15	0.030	Up to 100	500	Energy Commission
			22	0.044	100 - 250		
			25	0.050	Over 250		
01-Jan-99	22.8	0.041	25	0.045	Standard/day	552.5	
			15	0.027	Night		

Appendix 5.2:
Average Monthly Household Electricity Prices, U.S. cents/KWh

	1996	1997	1998	1999	2000	2001	2002
Jan	3.0	3.9	4.2	4.7	4.7	4.5	4.4
Feb	3.0	3.8	4.2	4.6	4.7	4.5	4.4
Mar	3.0	3.7	4.2	4.7	4.7	4.6	4.4
Apr	3.5	3.7	4.2	4.7	4.7	4.6	4.3
May	3.4	3.6	4.2	4.6	4.7	4.5	4.3
Jun	3.4	3.4	4.2	4.6	4.6	4.5	
Jul	3.4	3.5	4.2	4.6	4.6	4.5	
Aug	3.3	3.5	4.2	4.6	4.6	4.5	
Sep	3.4	4.2	4.1	4.7	4.6	4.5	
Oct	3.4	4.2	4.1	4.8	4.6	4.5	
Nov	3.2	4.2	4.1	4.8	4.5	4.4	
Dec	3.2	4.2	4.1	4.8	4.5	4.4	
Annual	3.3	3.8	4.2	4.7	4.6	4.5	4.4

*Prices calculated using the standard daytime tariff. Average prices are lower for customers with day-night meters who subscribe to the time-of-day tariff.

Appendix 5.3:
Privileged Electricity Tariffs' Beneficiaries.

(Withdrawn in 1998)

1. Disabled servicemen, the families of servicemen perished while fulfilling their service obligations; retired servicemen or servicemen who have reached pension age
2. Disabled (groups I and II)
3. Disabled of the Patriotic and Afghan Wars, participants of these wars which have become disabled of III group because of industrial trauma and because of other causes, widows of the disabled of the Great Patriotic War
4. Single pensioners who do not work
5. Personal pensioners
6. Workers of energy sector; retired persons having worked in energy sector not less than 5 years
7. Persons affected by Chernobyl NPP
8. Repressed citizens
9. Citizens who were sent for an official trip or for temporary work to Nagorno - Karabakh
10. From the national security service - a) servicemen, b) persons retired from that system because of age, long service, staff reduction or because of health problems and having served more than 20 years and members of their families
11. Heroes of USSR, persons rewarded with orders of "Glory" and "Labour Glory" of all three degrees

**Appendix 5.4:
District Heating Tariffs, Winters of '97/'98, '98/'99 and '99/'00**

District heating network	1997-1998		1998/1999		1999-2000	
	For heating 1m2 residential space (dr/ m2)	For heat supply to other consumers (ARD/Gcal)	For heating 1m2 residential space (ARD/ m2)	For heat supply to other consumers (ARD/Gcal)	For heating 1m2 residential space (ARD/ m2)	For heat supply to other consumers (ARD/Gcal)
Yerevan	1486	10965	1486	10965	1450	10696
Gyumry	2923	11128	2923	11128	2616	10221
Abovyan	1349	9484	1349	9484	1252	8798
Hrazdan	2109	10623	2109	10623	1323	9955
Vedi	1649	13075	1649	13075	1308	10110
Sevan	1696	8370	1696	8370	1678	8281
Charentsavan	1413	8976	1413	8976	1236	7857
Jermuk	1678	8461	1678	8461	1634	8237
Masis	1780	14261	1780	14261	closed	
Gavar	2021	10415	2021	10415	closed	
Chambarak	2788	15622	2788	15622	closed	
Martuni	1625	8766	1625	8766	closed	
Vanadzor	1416	10109	1416	10109	closed	
Armavir	1240	9591	1240	9591	closed	
Ijevan	873	10647	873	10647	closed	
Nor Hachn	1340	9419	1340	9419	closed	
Ejmiatsin	1031	8221	1031	8221	closed	
Kapan	1027	13009	1027	13009	closed	
Sisian	2696	15952	2696	15952	closed	
Meghri	1222	15979	1222	15979	closed	
Agarak	1081	14134	1081	14134	closed	
Goris	15291	1820	15291	1820	closed	
Average	1754	10227	1754	10227	1550	9428

Source: ERM.

Appendix 5.5:
Armenia - Outlook for Natural Gas Prices, 2003 – 2020

USD/1000 CM	2003	2004	2005	2010	2015	2020
Option 1. Rehabilitation of existing system, optimization of O&M costs	89.54	92.90	94.09	106.33	115.81	122.29
Option 2, local boilers, optimization of O&M costs	89.54	92.90	93.91	106.15	115.63	122.11
Option 3, individual heating, optimization of O&M costs	89.54	92.90	94.07	106.31	115.79	122.27
Option 4, local boilers, polyethylene relining, optimization of O&M costs	87.90	90.66	93.42	105.66	115.14	121.62

Source: World Bank, "Identification of Priority Investments in Gas Sector in Compliance with Urban Heating Strategy of the Republic of Armenia," draft final report (April 2002), Yerevan Project and Jen Financial, Engineering and Management Consulting Limited.

**Appendix 5.6:
Energy Expenditure as a Percent of Monthly Income**

	Rural (percent)		Urban (percent)	
	Poor	Non-poor	Poor	Non-poor
Electricity	13	7	16	9
Natural gas	6	4	3	2
Wood	16	8	5	2
Other	1	1	2	1
Total	34	21	27	16

Source: World Bank, "1999-2000 Survey."

Appendix 5.7:

Comparison of Heating Costs with Electricity, Wood, District Heating

Heating source / income category		Range of expenditure on heating, 2001	
		ARD/year Estimate	USD/year Approx.
Electricity			
	Non-poor households	26,700 - 35,000	\$48 - \$63
	Poor households	14,500 - 20,700	\$26 - \$37
Wood			
	Non-poor households	21,500 - 28,300	\$39 - \$51
	Poor households	17,600 - 24,100	\$32 - \$43
District heating (as paid)			
	Non-poor households	10,000 - 25,400	\$18 - \$46
	Poor households	3,000 - 21,500	\$5 - \$39
District heating (as billed)			
	All households	35,000 - 42,900	\$63 - \$77

Source: EU Tacis, "Urban Heating Strategy For Armenia," ERM (October 2001). ARD are converted to USD using IMF conversion factors.

Appendix 6:

Background: Energy-Sector Reform and Privatization

A. Introduction

This report documents energy-related social safety net approaches used in Armenia, specifically subsidies/assistance payments, energy efficiency, and tariff mechanisms, within the context of energy sector reform. It is one of five country appendices to a more general “synthesis report” that compares approaches to the energy social safety net in Central and Eastern Europe (CEE) and Eurasia.¹

Recommendations are based on comparison of approaches used in Armenia with best practices in the region.

Research consisted of a mission to Armenia by Mark Velody and Michael Philips during April 2002, follow-up research in Armenia by Aida Arshakyan, and desktop research during the summer and autumn 2002. Peer review took place in the spring 2003, and the report was finalized in the summer 2003.

B. Legacy of the Energy Blockade

The early 1990s were characterized by chronic energy shortages stemming from the energy blockade by Azerbaijan of 1992-93. These shortages resulted in but a few hours of power per day, stop-start operations that damaged the power system, fuel oil shortages, the collapse of district heating networks, and no natural gas.

At the time, the energy blockade’s impact was severe for all households, not only those with low incomes, as everyone scrambled to find ways to keep warm during the harsh winters. A decade later, the blockade’s impact is still apparent.

1. Availability of District Heating

Of Armenia’s 55 district heating systems, 51 have collapsed since 1990, as a result of a combination of the energy blockade of the early-mid 1990s, abandoned apartments,² and non-payment by consumers. Two systems did not operate for the first time during the winter 2002/2003; the remaining four systems will probably collapse soon. Rehabilitation of district heating has not been an energy-sector priority in the past as most of the focus was on the power sector and because improvements to centralized systems are clearly not bankable in the environment of extremely low collection rates. Low-income households living in formerly district-heated buildings have had to find the capital to buy other heating options and the fuel to run them.

¹ See Appendix 1.5 for a more-detailed account of the state of power sector reforms and privatization.

² An estimated 600,000 Armenians moved abroad during the 1990s, abandoning their apartments.

2. Natural Gas Availability

The availability of natural gas to households has been reduced substantially—from 70 percent of households during the Soviet era to 15 percent³ in 2002—this is because the distribution networks had deteriorated beyond recovery when the blockade ended. Over a half-million of Armenia's 870,000 households have had to find a gas replacement, whether for cooking, heating, or both.

3. Reliance on Electricity

Use of the most-costly household energy source has risen to meet some of the void created by the disappearance of natural gas and district heating.

4. Reliance on Wood for Heating

Even in apartments the use of wood for heating has increased, as it represents a lower-cost alternative to electricity for households that no longer have district heating and/or a gas supply. Burning wood has created new problems of deforestation and low indoor air quality. Wood prices are now rising as easy-to-cut, local resources are exhausted, but it is still the lowest-cost fuel source and is hence the heating fuel of choice for low-income households that do not have access to district heating or gas.

Deforestation. Since wood is now such a very common form of heating in Armenia, even in urban apartments, approximately one-third of the Armenian forests have been cut down in the past 11 years. Thus, fuel substitution away from wood is a pressing environmental problem. Experiments with fast-growing biomass have been generally unsuccessful. Legislation is being tightened, but deforestation continues nevertheless. Most low-income consumers use wood at present, but as wood becomes scarcer, its price advantage over other forms of heating is being eroded.

The fine for illegal tree cutting was raised from 1,000 Drams (less than \$2) to 150,000 Armenian Drams (approximately \$300) in 2002, in an attempt to overcome the deforestation problem.⁴

5. Damaged Power Networks

Start-stop operations of the power systems during the blockade years also damaged parts of the power networks, raising the cost of the electricity supply. This affects low-income customers only indirectly, as household tariffs are regulated.

³ Only 114,000 of the 870,000 Armenian households had gas connections in 2002.

⁴ "Environmental Awareness in Armenia" (January 22, 2003), available on the Internet at: CENN.org.

C. Low Collection Rates

Although the reliability of electricity supply has greatly improved since the blockade ended, a new problem has emerged in the form of unmanageable levels of commercial losses. There is an extremely high level of uncollected revenue, mainly from state and municipal institutions and state-owned industries.

No official statistics exist on the extent of non-payment for power. However, an estimated \$40 to \$60 million per year is uncollected,⁵ of which \$30 million is theft and \$20 to 30 million is non-payment. This represents approximately one-third of the total revenue that the power distribution utility should be collecting.

In view of the very large sums of money involved, rich and influential parties, (those who are either stealing or not paying the missing millions of dollars), are highly motivated to undermine any change to the status quo.

As one-third of the potential revenue does not reach the utility, there are insufficient funds for essential maintenance and repairs, much less rehabilitation and improvement of the network. This affects low-income households in three ways:

- 1) Although industrial, commercial, and institutional power customers and some rich/influential households can manage to avoid paying for power, low-income households must pay up or face disconnection.
- 2) A cash-starved utility cannot be expected to have spare resources to develop the full range of modern utility tools that are available to help low-income households afford energy (e.g., cooperating with governmental social-assistance initiatives, helping consumers to reduce energy bills through energy efficiency, and implementing sophisticated tariffs and payment mechanisms).
- 3) A cash-starved utility cannot invest to reduce system losses and thus has higher costs that must ultimately be passed on to the consumers.

D. Privatization of Utilities

1. Power Distribution

The government recognized that power sector privatization was a way to solve many problems facing the sector, particularly in the distribution sector. The government aimed to find a foreign strategic investor with power sector experience to bring know-how into running a modern power utility, capital to rehabilitate the system, and the experience of modern billing and collection techniques. Privatized companies would also have an economic incentive to rapidly eliminate commercial losses.

⁵ Author's interview with an energy regulator.

In 2001, the International Monetary Fund (IMF) noted⁶ that “privatization of the energy distribution companies to internationally reputable companies on the basis of competitive tenders will be essential to promote the efficient and least cost operation of the companies.”⁷ An understanding was reached between the GoA and the European Bank for Reconstruction and Development (EBRD) that 80.1 percent of power distribution would be privatized to a strategic investor and that the EBRD would buy the remaining 19.9 percent.

After two unsuccessful privatization rounds, the government dropped its expectation for the sector company to yield significant cash proceeds due to the poor physical condition of the assets, accumulated debt and other liabilities, and high perceived risk on the part of potential investors. The goals became to improve sector performance, improve efficiency, reduce subsidies and bad debt, attract investment for rehabilitation, promote economic growth, rationalize energy usage, and allocate resources optimally. However, even at a relatively low price, a buyer with power sector experience could not be found. Finally, in 2002, the network was being sold to an offshore holding company, Midland Resources Limited, with no apparent power sector experience.

In October 2002, the EBRD announced that it would not take up its option to buy into the distribution company. This was widely interpreted in the press as an indication that privatization to an offshore group with no energy sector experience did not meet the bank’s expectation that the distribution company would be privatized to an experienced international energy company. Midland Resources subsequently acquired full ownership of the distribution company.

In January 2003, the South Korean firm of Daewoo Engineering took over management of the Armenian power company on behalf of the new owners. It remains to be seen whether this company can meet the difficult task of raising collection levels and modernizing the Armenian distribution sector. International experience (e.g., the experience in Kazakhstan of the U.S. company, AES Silk Road, and Belgian company, Tracebel) suggests that a strict disconnection policy for non-payment is the only effective strategy for dealing with non-payment. However, this may be difficult to implement in Armenia, where governmental and municipal entities are among the non-payers.

2. Power Generation

The power generation sector comprises a number of state-owned but independently managed thermal, nuclear, and hydro power plants: Yerevan thermal power plant (TPP), Vanadzor TPP, Medzamor Nuclear Power Plant, Sevan-Hrazdan Cascade hydropower plants (HPPs), Vorotan HPP, and several small HPPs. The only exceptions

⁶ International Monetary Fund (IMF), “Republic of Armenia - Memorandum of Economic and Financial Policies for 2001-2003” (2003), paragraph 21.

⁷ The power distribution companies were subsequently amalgamated into a single company.

to state ownership so far have been the 2002 transfer of Hrazdan TPP to Russian owners as part of a debt-swap arrangement (see below) and the successful privatization of the small hydro sector. The first 11 small hydro plants were privatized in September 1997, of which French businessmen bought 2; by 2002, a total of 25 hydro plants with a combined capacity of 85 MW were privately owned.

Privatization of the power generation sector is relevant to low-income households in two ways. First, the plants are old and inefficient, producing high-cost power, so private investment capital to introduce energy-efficient modern technologies that can produce low-cost power is warranted. Second, international experience suggests that a competitive power generation market is unlikely to emerge until the majority of assets are removed from state control.

3. Natural Gas

The former state gas company is now owned by ArmRosGasProm, a company which was established in December 1997, as a joint venture between the Armenian State (represented by the Minister of Energy), Gazprom of Russia, and Itera of Russia. In July 2001, Itera agreed to write off Armenia's gas debt in exchange for the GoA's transferring its gas pipeline property to the joint enterprise towards Russia's share.⁸

Although 70 percent of Armenian households were connected to the natural gas network during the Soviet era, the pipes deteriorated during the years of the energy blockade, and most could not be reused. Nationally, natural gas consumption declined from a peak of 6.3 BCM (billions of cubic meters) in 1989 to only 1.4 BCM in 2001.⁹ In 2002, only some 35,000 households, all of which are single-family houses, are connected to the network. The household sector represents only some 10 percent of gas consumption.

Natural gas is a cheap, controllable form of heating and is the fuel of choice for the relatively few households—including low-income households—that are lucky enough to be connected to the network.

World Bank Gas Supply Strategy. The most up-to-date overview of options for the Armenian gas sector is provided by a natural gas strategy that was prepared as to harmonize with the World Bank heating strategy.¹⁰ The report identifies priority gas network rehabilitation investments for the next 20 years and presents three gas price outlooks using different scenarios.

⁸ U.S. Department of Energy, "Country Analysis Brief on Armenia."

⁹ The World Bank, "Identification of priority investments in gas sector in compliance with urban heating strategy of Republic of Armenia," draft final report, Yerevan Project and JEN Financial, Engineering, Management Consulting Ltd. (April 2002).

¹⁰ Ibid.

E. Effect of High National Indebtedness

Limited ability to borrow money for energy-sector reform (or indeed for any kind of reform) represents a substantial barrier in Armenia. According to the EBRD in mid-2002, it was considered likely that Armenia would soon be re-categorized as a Highly Indebted Poor Country (HIPC), being already at the limit of sovereign indebtedness. A \$100 million debt swap with Russia in November 2002, which involved Hrazdan Power Station and several non-energy assets, has theoretically eased the level of debt and freed \$100 million of debt potential, but this is for all sectors and not particularly the energy sector.

There are tentative plans for a European Union (EU)-led group of international donors to make a substantial donation for the Armenian power sector as compensation for planned closure of Medzamor nuclear power plant, but no date has been set and no sum agreed to.

The importance of the government's constrained budget is highlighted when comparing energy social safety net approaches of Armenia (severely constrained budget) and Kazakhstan (relatively unconstrained budget). The basic approach that Kazakh officials profess to wish to adopt—give the poor more money so they can afford the energy bill—is clearly not a realistic option in Armenia. As a result, Armenian public officials are motivated to find realistic solutions to solve the root cause of the energy problem for low-income consumers, while Kazakh public officials appear content to address the symptoms.