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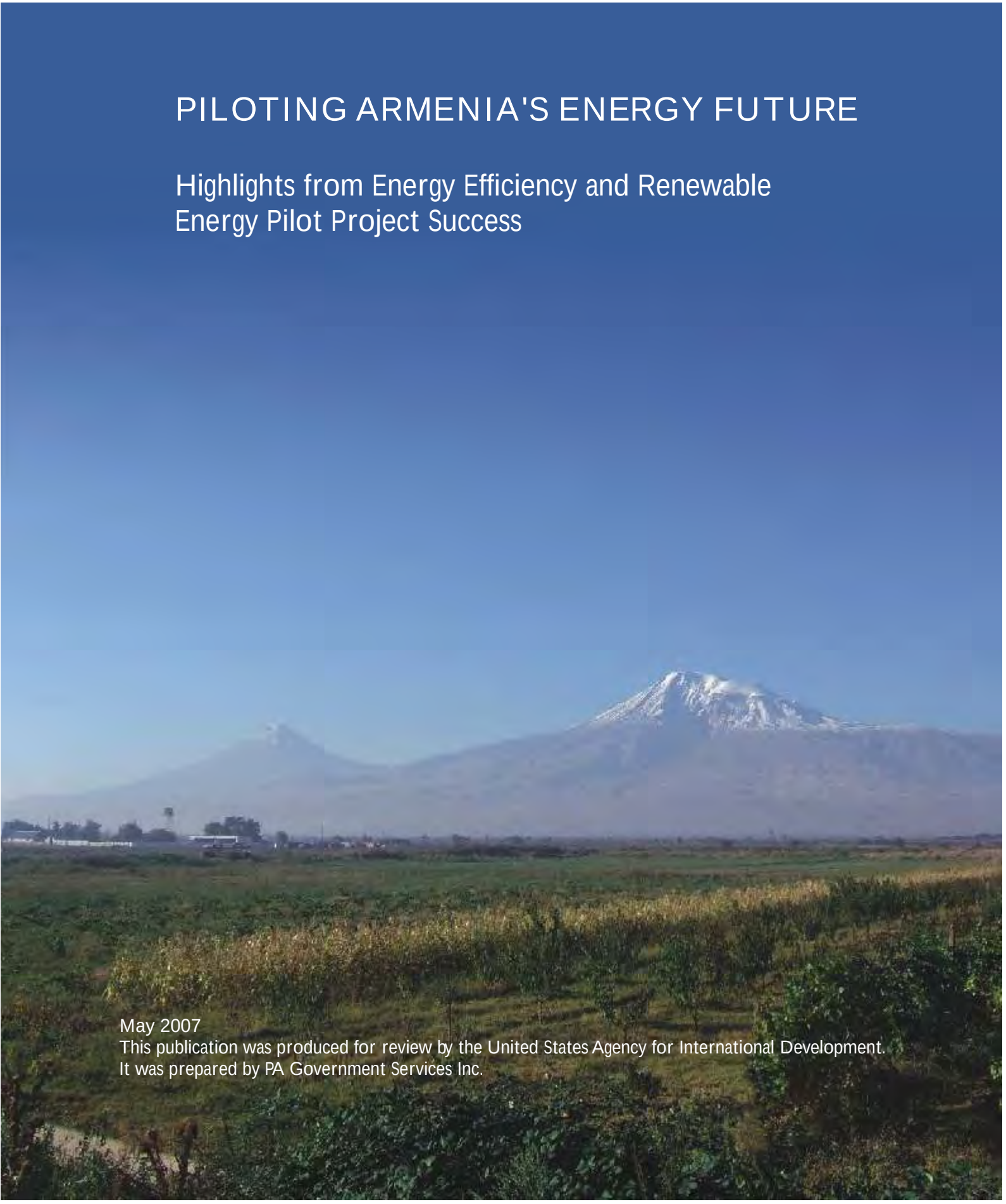
PILOTING ARMENIA'S ENERGY FUTURE

Highlights from Energy Efficiency and Renewable Energy Pilot Project Success



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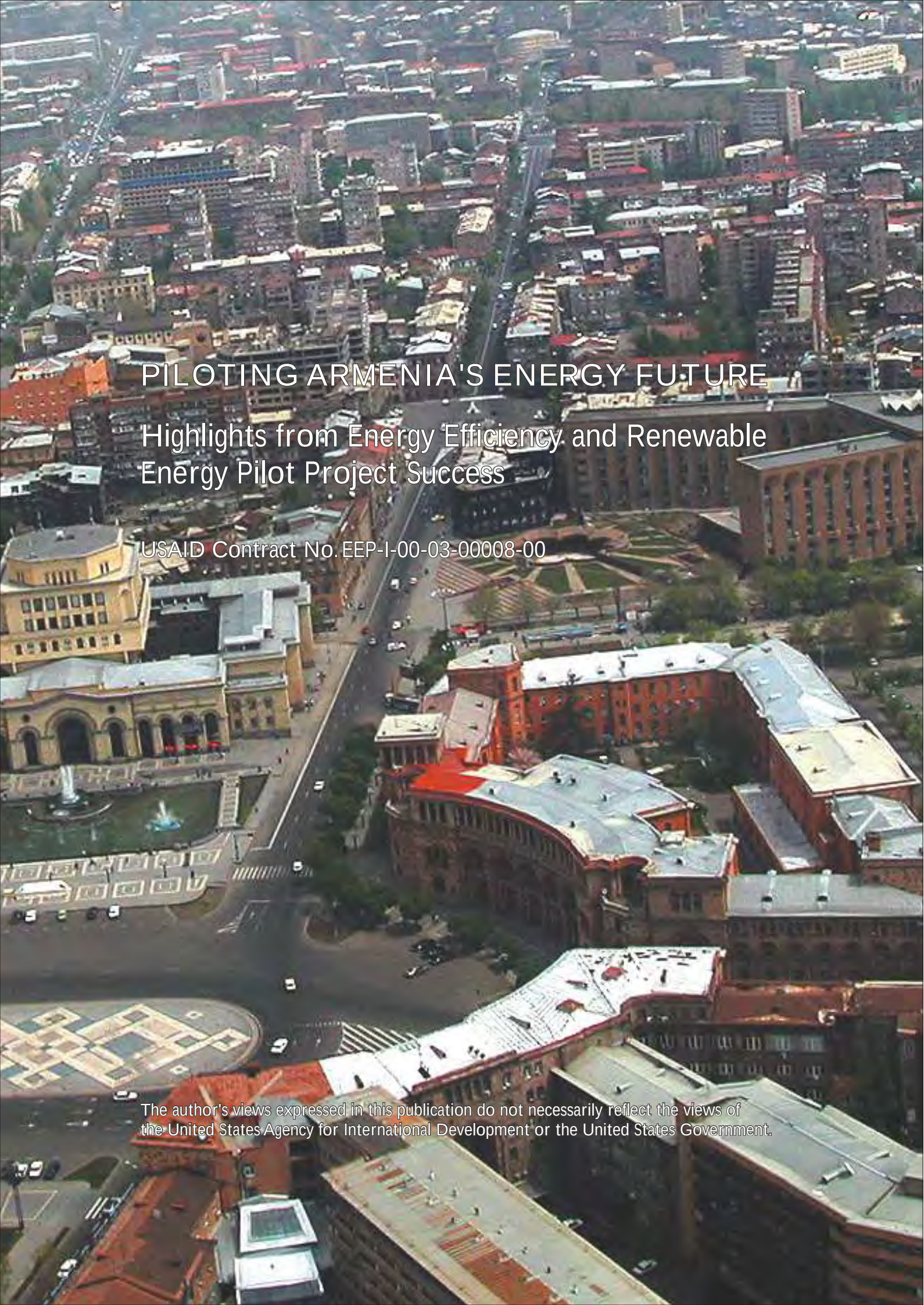

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USAID Contract No. EEP-I-00-03-00008-00


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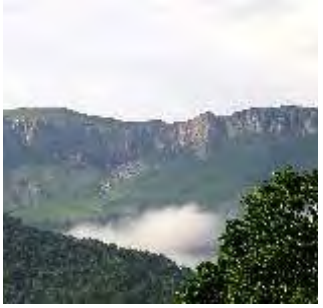


ENERGY EFFICIENCY/RENEWABLE ENERGY PILOT PROJECTS

Armenia is a broad mix of sights and sounds that juxtapose the ancient with the modern. Since the break-up of the Soviet Union, Armenia has labored to establish democracy and market reform in the face of many lingering challenges. Yet, as Armenia moves away from its past and toward a more promising future, perhaps no challenge is greater than continued energy security and independence.

The Armenian energy sector has made great progress in the last ten years. Energy sector reform was not an easy transition. Burdened with fraying infrastructure and a poorly managed State-run energy sector, its future once looked very bleak. However, by making the difficult decisions, remaining committed to market reform, and assistance from donors like the United States Agency for International Development (USAID), Armenia was able to restructure and privatize the energy sector and once again has reliable, affordable electricity and natural gas.

But, this is just part of the Armenian success story.

As the country moves beyond structural reform it now confronts new energy challenges, such as how to improve energy efficiency and how to use renewable resources to generate sustainable power?

Energy efficiency and renewable energy pilot projects form a core feature of USAID's *Program to Strengthen Reform and Enhance Energy Security in Armenia* (The Program). Implemented by PA Consulting Group (www.paconsulting.am), the Program is a critical bridge between large-scale energy reform and smaller initiatives affecting how energy resources are allocated and utilized. The pilot projects are designed to serve as working examples. The underlying principle is that once cost savings and efficiency are realized, communities, businesses, and individuals will seek to replicate their success. To make these projects a reality, the Program works with a mix of customer types and geographies including residential, institutional, municipal and industrial.

But, how are these projects implemented?

Pilot projects are grounded in a bottom-up approach and focus on cost sharing between the host and USAID. Projects are proposed and evaluated in an open tender to ensure transparency. Projects are then selected based on these important criteria: 1) cost-effective; 2) impact-oriented; 3) environmentally sound; 4) replicable; and, 5) cost-sharing. To some extent, the objectives of the projects are not only to demonstrate new technologies but also to demonstrate an approach to spur the market and increase the extent to which consumers are willing to finance investment in energy efficiency.

To build capacity and buy-in, local associate project managers (APMs) are engaged to oversee each project. This integrated approach provides valuable hands-on experience and ensures the APMs take ownership of the projects.

Pilot Project Implementation Steps

1. Public announcements for project applications

2. Applications reviewed

3. Selection of viable projects

4. Approval of the projects by USAID

5. Project tendered for implementation to ESCOs (builders)

6. ESCOs receive Certified Energy Management Training

7. Evaluation of tenders and awards to ESCOs

8. Implementation

9. Monitoring and preventive maintenance

Between 2004-2007, twenty-six USAID non-heat energy efficiency and renewable energy pilot projects were designed and completed for a total cost of $400,000.00. Not only do the pilot projects provide better services and cost savings, but in their small way, they reduce carbon dioxide emissions that produce global warming and nitrous oxides that produce smog.

The overall goal of the USAID remains, to conserve Armenia's precious energy supply through efficient usage and promotion of renewable energy.

The pages and DVD that follow provide a sample of the various pilot projects launched by USAID in Armenia and also offer a glimpse into the individual stories behind their impact and success.

Locations of EE/RE Pilot Projects (see page 16 for further details)

Yerevan Orphanage Upgrades Cooking System
Central Yerevan

Yerevan Orphanage Number No. 5 is home to over 180 children with learning and physical disabilities. At Orphanage No. 5 the Program teamed with the French Armenian Development Foundation and installed a natural gas network and new appliances. The orphanage was using highly inefficient electric equipment and appliances for cooking and heating domestic hot water for its showers and laundry. Operated by natural gas, the new highly efficient cooking appliances and hot water heating equipment reduce energy consumption and cost and will benefit the orphanage and the children under its care. Small energy efficient upgrades like these will save an enormous amount of resources in a short period of time.

New Streetlights Bring Hope to Ijevan
Ijevan, Tavush Marz

For almost 15 years, the streetlights of Ijevan remained off. The municipality could not afford to run the lights or repair damages. Residents and businesses were left to fend for themselves on dark, hazardous streets. Ijevan, like many outlying cities throughout Armenia, has suffered since the collapse of the Soviet Union. A once vibrant city, known for its carpet-making, wine production, and tourism, has been left to grapple with deteriorating infrastructure and dwindling budgets. Ijevan was one of the first communities to approach the Program. Through its vision and dedication, Ijevan was able to raise 30% of the cost for the high-pressure sodium street lamps, with the Program contributing technical know-how and the remaining financing. The new lamps provide four times more light than the older lamps for less money and will last at least five years. This street lighting project is an excellent example of how municipalities can team with the Program to reduce their energy costs through efficient technology.

Bio-gas Takes Form at Zatik Orphanage
Arzni, Kotayk Marz

The Program's energy efficiency initiative targets humanitarian projects such as Zatik Orphanage. Zatik Orphanage is an organization that provides refuge, schooling, and technical training to over 120 orphans between the ages of 6-18. When the orphans reach 18, some of them stay on at Zatik's satellite farm in Arzni to work while others go on to further studies. At the Zatik Farm, a 25m^3 biogas system was installed that uses manure from cows, pigs, and horses as biomass fuel to generate methane gas for cooking and hot water. By using biogas, the farm no longer uses costly electricity for heat, hot water, and cooking. The biogas system also provides a valuable bi-product, organic fertilize, that is employed on the farm to increase crop yield. This biogas project is exactly the type of small, affordable renewable energy initiative that will pay for itself in just over three years while at the same time saving fossil fuels and limiting carbon emissions.

Fish Hatchery Gets New Water Pumps
Sevan City, Gegharqunik Marz

Lake Sevan and the trout found in its waters are two of Armenia's more famous attractions. Located adjacent to the Lake Sevan is the Sevan Fish Hatchery, a privatized, 20-hectare complex of buildings and stock pools where trout are raised for release into Lake Sevan. Annually, the Sevan Fish Hatchery raises over 100,000 trout that are released as "fry" into Lake Sevan for commercial and recreational fishing. In order to raise trout it is essential that the conditions at the hatchery mimic the trout's natural habitat. To do so, large amounts of fresh water must be pumped and circulated in the stock pools. Previously, the Sevan Fish Hatchery was using inefficient, outmoded water pumps to meet this need. Yet, by partnering with the Program, new water pumps were introduced that circulate more water for less cost. The Sevan Fish Hatchery is now able to raise more fish, more profitability.

Lermontov Micro-Hydro Initiative
Lermontov, Lori Marz

Mr. Hovivyan, an entrepreneur and farmer from the Village of Lermontov, was meeting his power needs by purchasing electricity from the national grid. This was a little expensive at times but bearable until he decided to develop a small hotel and restaurant on his property that would dramatically increase his energy consumption. Yet, instead of going the standard route of simply buying more expensive, externally generated electricity, he decided to broaden his approach and contacted the Program. Through Program technical and financial assistance, his energy needs are now being met through a locally installed micro-hydro power plant. The clean, renewable energy generated by the micro-hydro unit will meet all of his energy needs and will provide an annual energy savings of over $8,500.

Narekatsi Medical Center Lowers Healthcare Costs
District of Erebuni, Yerevan

Grigor Narekatsi Medical Center is the focal point for healthcare in the neighborhood of Erebuni. Over 100 babies are born each month at the maternity hospital and its two polyclinics treat over 2,000 patients a year. Natural gas for hot water and cooking are critical to providing adequate healthcare to patients and new-born babies. Until 2005, the Medical Center was using old, Soviet-era cooking equipment and individual water heaters that were powered by expensive electricity. Under the Program, a new gas boiler and hot water storage system, as well as new natural gas burners were installed. They are three times more efficient than the old technology and will greatly reduce energy consumption and expense. This energy savings will reduce the overall cost of medical services, making the Grigor Narekatsi Medical Center more affordable for local residents.

Energy Savings Promotes Growth at Bakery District of Zeytun, Yerevan

Bread is a way of life in Armenia. Whether lavash (traditional Armenian flatbread) or matnakash a more robust, thick-crusted oval shaped bread, Armenians love their bread. Numerous small, privately-owned bakeries produce fresh bread all over Armenia. One of these bakeries is David 84, located in the neighborhood of Zeytun in Yerevan. Baking over 4,000 loaves a day, David 84 sells its bread to the general public and to kindergartens and retirement homes. Recently, David 84 faced increasing energy costs and the continued challenge of using highly inefficient Soviet-era ovens and heating systems. Recognizing the need for improved energy efficiency and economic opportunity, USAID experts were able to determine that better insulated ovens and efficient burners would save not only energy costs, but would also shorten production time, allowing David 84 to increase bread production. With the introduction of energy efficient technology, David 84 is now more competitive on the local market and its bread is more affordable to the local community.

Arjermek Optimizes Production Central Yerevan

Arjermek is one of post-Soviet Armenia's local economic success stories. Since 1993, this private company has been producing insulation materials made exclusively from local basalt. The insulation produced is widely used in a variety of construction materials including cement, sound proofing, and heat insulation. Arjermek had been producing insulation using the equipment and methodology they inherited from the previously State-run industrial sector. This type of production of basalt insulation materials requires a great deal of natural gas to generate heat. The Program was able to determine that with installation of one-stage production technology known as BKV-300, Arjermek could save annually upwards of $70,000 in their natural gas bills. With installation of the BKV-300 technology, Arjermek has reduced energy demand, production cost, and emissions.

Kindergarten Saves Valuable Resources Village of Alapars, Kotayk Marz

Like many schools and public institutions throughout Armenia, the kindergarten in the Village of Alapars struggles to provide its 53 children with a good education under difficult circumstances. Challenged for financial resources, every bit of cost savings counts for the children of Alapars. Previously, the kindergarten was using expensive and inefficient electricity to produce heat for hot water and cooking at the school. The Program and the local community came together to gasify the kindergarten and replace the old electric appliances with new, more efficient gas-powered appliances to heat water and for cooking. Gassification and the more efficient natural gas appliances reduce energy demand and save money at the kindergarten. This savings can now be applied toward other pressing needs at the school.

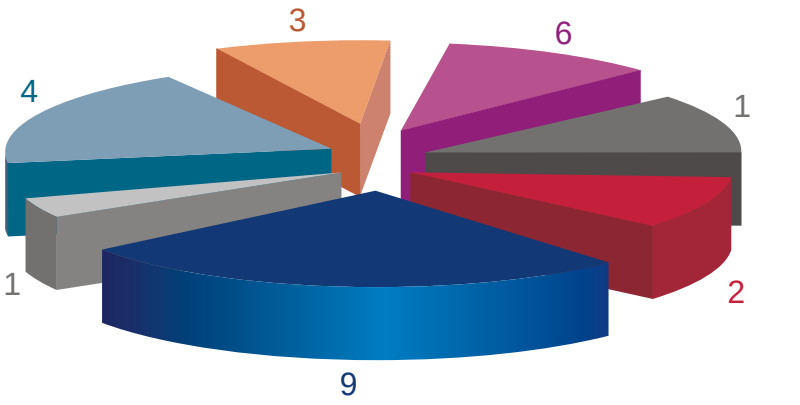
Retirees Benefit from Improved Heating Central Yerevan

Retirement Home No. 1 in Yerevan is home to 245 retired and dependent residents. It was using highly inefficient electric equipment and appliances for cooking and heating hot water for its shower and laundry. As part of the pilot project initiative, the Program gasified the building, helping the facility to make the transition away from electricity as a heat and hot water source. The Retirement Home now uses more efficient, less costly natural gas instead of electricity for its cooking and hot water needs. Switching from electricity to natural gas combined with the installation of new, more efficient appliances will annually save the retirement home over $7,000.

Micro-hydro Creates Jobs in Hatsavan
Hatsavan, Syunik Marz

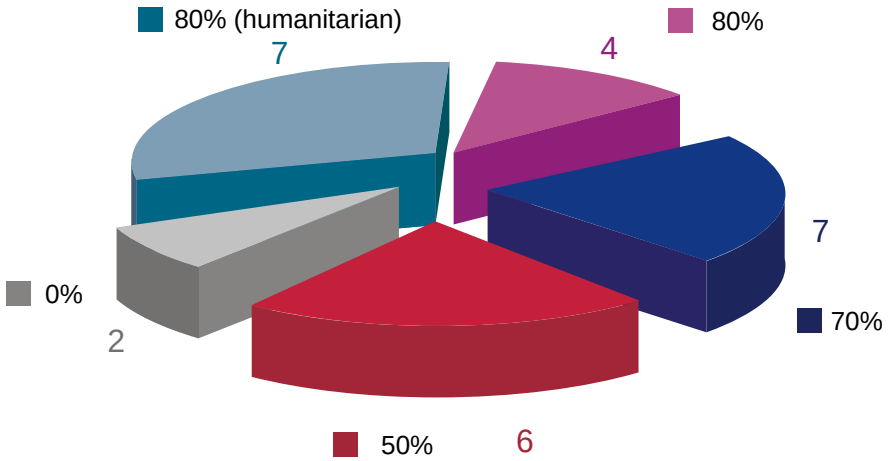
Hatsavan, a remote village in Southern Armenia, is a community struggling to make ends meet. Winters are long and cold here with many families working only seasonally. Farming and raising cattle make up the traditional livelihood for much of the community with energy costs running high. In Hatsavan, the private owner of an existing farm was interested in building a guesthouse and greenhouse to serve the local market but energy prices were too high. Program experts were able to determine that a local stream could supply cheap, renewable electricity through installation of a 60 kW micro-hydro power generator. The owner then raised 30% of the financing, and the project provided the remaining 70% as well as technical expertise and project management. This micro-hydro project is an excellent example of how renewable energy can be readily applied to reduce energy cost. The new micro-hydro employed 20 workers during construction and will also help create additional jobs at its guesthouse.

Breakdown of Pilot Projects by Technology



- Micro-hydro power plants
- Biogas
- Efficient streetlighting
- Fuel substitution
- Pump replacement
- Efficient natural gas systems
- Transformer replacement, metering and control systems

USAID Cost-Share in Financing of the Pilot Projects



Ararat Confectionary Changes Fuel Source
District of Shengavit, Yerevan

Generating heat and hot water are critical to candy production. Established in 2001, Ararat Confectionary is a privately owned, medium-sized enterprise in Yerevan that specializes in the production of chocolate, macaroons, and other sweets for the Armenian market. Ararat is one of the largest producers of chocolate in Armenia. Ararat had been using an old, Soviet-era industrial water heating system run on costly electricity. Joining forces with the Program, Ararat now has a new boiler and hot water storage system as well as new natural gas burners that are three times more efficient than the old technology and greatly reduce energy consumption. This energy savings reduces the overall cost of candy production, making Ararat more competitive.

Gevorgavan Promoting Micro-Hydro
Gevorgavan, Syunik Marz

The advent of new regulations at the Public Services Regulatory Commission is helping make renewable energy development a growing reality in Armenia. Newly established regulations allow developers to install micro- and small hydro power plants and to sell generation capacity to the power grid at established rates. Taking these positive developments to heart, a private developer in Gevorgavan teamed with the Program to install a 60 KW micro-hydro power plant. The owner will use the power generated for his own use and will sell the excess power back to the national grid. These types of micro-hydro projects quickly earn more than they cost and are attractive to investors. Many private land owners in mountainous areas of Armenia can replicate micro-hydro projects like Gevorgavan.

Upgrading the Electrotransport Trolley System Central Yerevan

Public transport is critical to the people and businesses of Yerevan. However, with the break-up of the Soviet Union, many public transport options ceased to exist. One of the few public transport options that continues to operate and serve the public is the electric trolley system managed by *Electrotransport*, a restructured State-run company. The company was using outdated, oversized transformers at the substations that powered its trolleys. These transformers were using and wasting high amounts of unnecessary electricity. The Program was able to determine that by replacing the old, inefficient transformers with small, high yield transformers the company would reduce excess electricity consumption and system losses. In turn, at the behest of Program experts, *Electrotransport* installed new transformers and has begun to save considerable amounts of money and electricity.

Nork Public Bath Becomes More Efficient
District of Nork, Yerevan

The Nork Public Bath is a community resource that provides hot water for bathing and showering for low-income residents who do not have readily available hot water. Constructed in 1971, Nork was using three highly inefficient Soviet Era boilers to heat large amounts of water for its local customers. With Program support these boilers were replaced by one modern boiler that provides the same amount of hot water while using three times less natural gas for heat. In addition to a new boiler, hot and cold water distribution systems were rehabilitated and insulated, reducing heat loss and increasing efficiency. Nork is now providing more hot water to local residents for less cost than before.

Energy Efficiency and Renewable Energy Pilot Projects Implemented by USAID

No.	Project Recipient	Total Cost	Cost Share		Annual Savings
			USAID	HOST	
1	Artmed Physical Rehabiltiation Center	$22,401	$17,920	$4,481	$5,153
2	Ecoperlite Industrial	$17,166	$13,733	$3,433	$15,713
3	David 84 Bakery	$22,950	$15,840	$7,110	$6,360
4	Nork Orphanage	$1,425	$925	$500	$320
5	Yerevan Retirement Home No.1	$18, 843	$15,074	$3,769	$8,036
6	Yerevan Special School No.5	$8,656	$6,906	$1,750	$5,382
7	Yerevan Public Bath No.16	$17,675	$12,373	$5,303	$12,994
8	Ararat Confectionery	$29,040	$14,520	$14,520	$14,739
9	Grigor Narekatsi Medical Center	$31,639	$25,251	$6,388	$19,139
10	Malatya Medical Center	$24,790	$19,782	$5,008	$14,818
11	Electrotransport of Yerevan	$6,300	$ -	$6,300	$1,500
12	Nairit Industrial Plant	$2,860	$ -	$2,860	$1,700
13	Arevshat-2 Water Pumping Station	$,24,700	$19,760	$4,940	$22,400
14	Sevan Fish Hatchery	$17,800	$8,900	$8,900	$3,833
15	Arjermek Insulation Company	$28,953	$20,042	$8,911	$70,000
16	Arzni Biogas	$12,121	$9,621	$2,500	$4,740
17	Arzni Spa	$36,515	$29,212	$7,303	$8,863
18	Alapars Kindergarten	$9,800	$7,840	$1,960	$3,182
19	Lermontov Micro-hydro	$29,566	$19,934	$9,632	$8,600
20	Kapan Streetlighting	$21,595	$17,276	$4,319	$6,092
21	Hatsavan Micro-hydro	$37,443	$26,210	$11,233	$11,409
22	Shaghat Micro-hydro	$62,235	$31,112	$31,123	$15,000
23	Smbul Micro-hydro	$28,159	$14,959	$13,200	$22,400
24	Gevorgavan Micro-hydro	$27,600	$12,835	$14,765	$8,600
25	Ijevan Streetlighting	$22,143	$15,500	$6,643	$8,895
26	Nektar Micro-hydro	$24,455	$11,655	$12,800	$4,500

DVD Index

Video: "Piloting Armenia's Energy Future"

- English
- Armenian
- Russian

Flash Videos: (10) Pilot Project Successes

For more information, please contact:

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