CHAPTER 1

How Did It Happen? A Brief Overview of Power Sector Reform

The last 15 years have seen Armenia emerge from Soviet rule and a severe economic and energy crisis, both complicated by its newfound political surroundings. The last 10 years have seen significant reform and progress in the power sector which, when compared to the progress made by its neighbors, is all the more remarkable. The benefits of reform have not been easily won, however, and Armenia's success is a tribute to its ability to learn from mistakes and persevere. A combination of improper planning and bad fortune forced the Government of Armenia (GoA) to go through three separate tenders for its privatization assets. A combination of good planning and good fortune ultimately allowed for what has turned out to be one of the region's most successful infrastructure privatizations so far.

Why Reform was Necessary

In the wake of the Soviet Union's collapse, Armenia, like other former Soviet republics, began to struggle with the implications of its newfound independence. Independence brought with it abstract questions about national identity as well as more concrete—but often inseparable—questions about property rights, both between and within each of the republics. That is, when the central planner disappears, who controls what?

Armenia's electricity system had been developed as part of a much larger, Trans-Caucasus electrical grid and not as an independent system. Dispatch and planning decisions to serve load in Armenia were integrated with the much larger planning decisions of a regional system. Plants were built to run on fuel imported from thousands of miles away, from neighbors that, with the Soviet Union gone, could offer little certainty that such supply would continue or under terms that Armenia could afford.

Natural gas for thermal plants came exclusively from Russia and Iran through Azerbaijan. Nuclear fuel for the Medzamor plant came exclusively from Russia. Table 1.1 shows the current level of installed capacity in Armenia, which has remained unchanged since the country declared independence, except for roughly 30 MW new small hydropower capacity. From the perspective of national energy security, Armenia found itself in a very uncertain position.

Table 1.1. Installed Capacity and Ownership of Armenia's Power Plants

Generation Type and Name	Capacity	Owner
Thermal	**1756**	
Hrazdan TPP	1100	Russian Federation
Yerevan TPP	550	Ministry of Energy, GoA
Vanadzor TPP	96	Zakneftgasstroy-Promethey
Hydropower	**1032**	
Sevan-Hrazdan cascade	556	RAO "Nordic"
Vorotan cascade	400	Ministry of Energy, GoA
Small HPPs	76	Various private owners
Nuclear	**408**	
Medzamor Unit 2	408	GoA (but under financial management of INTER RAO EES)
Total	**3196**	

Note: TPP, thermal power plant; HPP, hydropower plants.

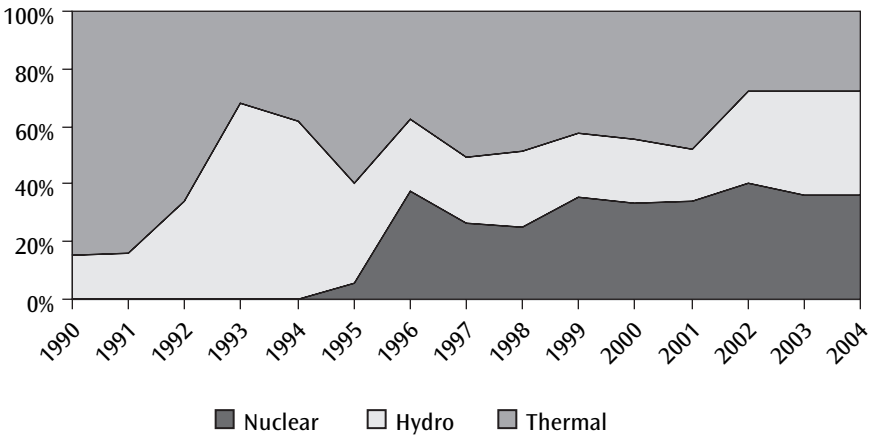
The delicacy of the country's energy balance began to manifest itself in 1992 with the start of the war over Nagorno Karabakh, and the resulting imposition by Azerbaijan and Turkey of an economic blockade. A massive 1988 earthquake had forced a shut down of Medzamor, a source of roughly one-third of Armenia's generating capacity. Without Medzamor, and without access to gas supply through Azerbaijan, Armenia was forced to rely heavily on domestic hydropower resources and imports of fuel oil through Georgia.

Though an alternative Georgian gas pipeline was completed in 1993, sabotage and separatist strife in that country regularly disrupted supply. Electricity service dwindled to two to four hours per day, and the entire system—generating stations, grid infrastructure, and users' equipment—began to suffer the effects of repeated, unpredictable outages and restarts.

Armenia's water resources also suffered as a result of increased reliance on hydropower generation. Output at the Sevan-Hrazdan hydropower unit was boosted in an effort to alleviate power shortages. Lake Sevan, Armenia's largest hydropower resource had been severely depleted by 1994. Lake Sevan is the largest lake in the Transcaucuses, one of the world's largest high altitude lakes, and is of tremendous cultural and symbolic significance to Armenia and to the Armenian people. The consequences of Lake Sevan's depletion goes far beyond its immediate economic value as a source of water for irrigation, drinking, and hydropower generation. Figure 1.1[1] shows the change in generation mix over the past 10 years.

1. This and much of the data used in this report have been taken from a dataset compiled for Lampietti, Julian A., ed. 2004. *Power's Promise: Electricity Reforms in Eastern Europe and Central Asia.* World Bank Working Paper No. 40. Washington, D.C.

Figure 1.1. Changing Generation Mix in Armenia Throughout the Reforms



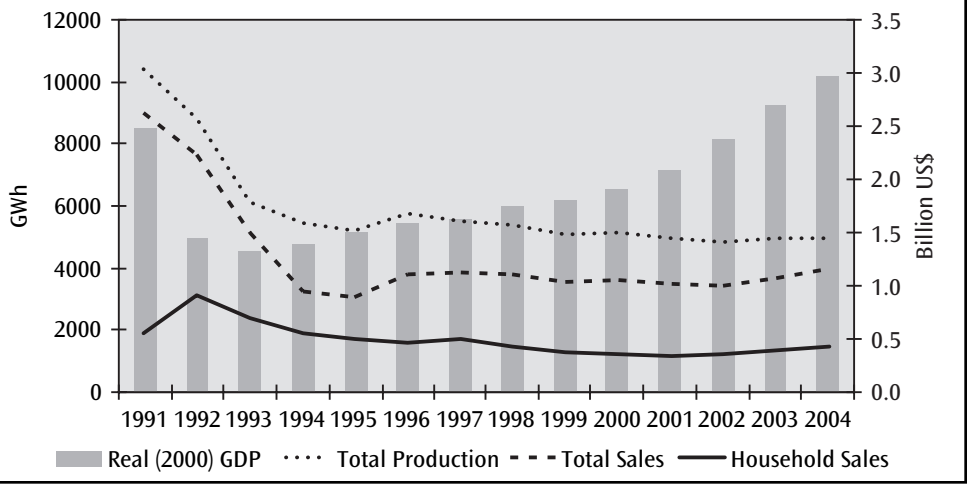
Source: Power's Promise Dataset.

Lingering Soviet energy policies served to worsen the effect of Armenia's supply constraints. Under the Soviet system, industrial and commercial customers subsidized consumption by lower voltage customers. Below-cost pricing encouraged electricity utilization at more than twice current levels. Average tariffs in 1992 and 1993 were roughly one-tenth of current average tariffs. Under the rationing system created during the energy crisis, many industries had electricity quotas far in excess of their needs, and simply resold the excess power at a higher price. As the Soviet Union's economic engine ground to a halt, this practice became increasingly common.

The industrial collapse that in many republics accompanied the fall of the Soviet Union was particularly severe in Armenia because of the economic blockade and energy crisis. Armenia's industries relied extensively on a range of imported raw materials, with energy significant among them. Between 1991 and 1994, electricity sales plummeted. Figure 1.2 shows how sales and production changed dramatically after independence. The gap between the total production and total sales represents total losses (commercial and technical); a gap that widens during the years of energy crisis and narrows gradually since the beginning of reforms. Gross domestic product (GDP) is also plotted in this figure (versus the right-most Y axis) to illustrate the relationship between the energy crisis and economic collapse.

The restart of Medzamor Unit 2 is sometimes credited as having ended the energy crisis, but 24-hour service had been restored several months before the restart. As Figure 1.2 shows, household sales changed very little during the energy crisis, and as Figure 1.1 shows, hydropower was run (albeit at the expense of Lake Sevan) to compensate for the loss of Medzamor. Medazmor's recommissioning in November 1995 was essential for guaranteeing Armenia's long-term energy security. The gas pipeline attacks halted when Medzamor restarted, as saboteurs perhaps realized the destruction was no longer as effective in disrupting Armenia's electricity supply. The protection of Lake Sevan also returned to the GoA's agenda. The GoA imposed strict new regulation on water use at Lake Sevan, limiting the Sevan-Hrazdan cascade's utilization of the lake's waters to the water available as a byproduct of seasonal irrigation.

Figure 1.2. Electricity Sales and Production in Armenia Compared to GDP



Source: Power's Promise Dataset and (for GDP data) World Bank WDI database.

The end of the immediate energy crisis allowed the GoA to begin implementing a program of deeper energy sector reform. Fiscal and quasi-fiscal subsidies to the power sector had reached a level equivalent to roughly 11 percent of Armenia's GDP by 1995. Collections were barely above 50 percent, and nearly 25 percent of all power produced disappeared before the meter as commercial losses. The system remained dilapidated from years of crisis operation and underinvestment, and dependent upon massive public subsidies. Many within the GoA began to see no other solution but to restructure and consider some form of private management or ownership for its troubled power sector enterprises.

Steps Armenia Took Toward Reform

The GoA took early steps to impress upon Armenians the notion that electricity was a commodity, like any other good, and no longer an entitlement. Even before 24-hour service was restored, the GoA and donors took measures to establish in customers' minds a link between service quality and price. The utility began offering more continuous supply to apartment blocks whose residents could organize themselves to pay their bills. With industrial demand flagging, the residential customer base became the sector's primary source of revenues.

Efforts to combat commercial losses, begun during the energy crisis simply as a means of maintaining adequate supply, also took on increased importance after 1994. These efforts had to be redoubled once 24-hour service was restored, as continuous supply and higher tariffs created greater incentives for power theft. The Electricity Distribution Company (EDC) responded by hiring an army of inspectors to reduce illegal connections. In a twist of irony, these inspectors later proved to be the source of significant collections problems, colluding with customers to keep payments below metered values. These problems eventually forced the EDC to develop, in 1999, a new collections scheme that required payment of bills at post offices rather than cash payments to local EDC offices.

The GoA's institutional and regulatory changes largely followed conventional prescriptions for power sector reform. At the core of the reform program were: (a) a gradual transition to cost-based tariffs; (b) unbundling of part of the state-owned, vertically integrated utility; and (c) imposition of a new regulatory framework. The transition to cost-based tariffs had began in late 1994, when household tariffs were first raised to the level of other retail tariffs, and a schedule was established for further household tariff hikes. Household tariffs were raised to the level of average industrial and commercial tariffs in 1994, and since 1999 have remained well above the overall average tariff.

The unbundling process began in March 1995 with the creation, from the state-owned, vertically integrated Armenergo, of separate generation and distribution entities. Regulatory reform was launched by Presidential Order in March 1997, and supported by the Energy Law that formalized the separation of generation, distribution, transmission, and dispatch into separate companies and established an independent sector regulator, the Armenian Energy Regulatory Commission (AERC).

The institutional and regulatory reforms were coupled with an ambitious metering and meter relocation program, installation of an Automated Metering and Data Acquisition System (AMDAS), and creation of a computerized customer billing system. Twelve thousand new tamper-proof meters were also installed throughout the power system between 1997 and 1998, at a variety of voltage levels down to 0.4 kV. Existing household customer meters were relocated from individual apartments to public areas of apartment blocks. This effort contributed substantially to the reduction of meter tampering, and the facilitation of accurate meter reading. The AMDAS system, completed in 2001, relied on newly installed automated digital meters at the 110 kV level and above, connected by telephone lines to a centralized settlement center. A complete customer information system was also put in place at the EDC to more accurately track utilization and billing.

The first attempt to privatize the low-voltage network suffered from a mix of insufficient preparation and obstruction from vested interests. The GoA passed a Law on Privatization in 1997, defining the power sector companies and assets to be privatized. Privatization of 25 small hydropower plants took place gradually between 1997 and 2002. Privatization of the distribution system—then grouped as four regional entities—would not prove to be quite as easy. The GoA first hired a transaction advisor in December 1998. Prequalification documents for the first tender were issued in late 1999, and by early 2000 had attracted five major international energy companies as bidders. Four of those companies successfully prequalified, but none ultimately submitted offers by the April 2001 deadline.

The tender documents and legal framework had substantial flaws, and leadership of the process remained under the Ministry of Energy, the same entity that controlled and was still tightly integrated in the operations of Armenergo. Privatization met considerable resistance from within the very ministry that was meant to spearhead the process. Many politicians connected to the sector, whether formally or informally, also fiercely resisted giving up control of what was one of the most politically powerful and potentially lucrative segments of the energy sector.

The GoA responded by rectifying flaws in the bidding documents and the legal framework and by shifting responsibility for privatization away from the line ministry. The GoA revised the Energy Law in April 2001 (See Box 1.1), and appointed new transaction advisors (International Finance Corporation [IFC] Private Sector Advisory Services) and new legal advisors. Political obstruction of the privatization process slackened as responsibility for the

Box 1.1. Refinements to the Legal Framework

The Energy Law was revised in April 2001 to reduce the potential for government interference in sector operations. In particular, the government was forbidden from appropriating any revenues from the sector (to direct to one entity or another) if collections were less than 100 percent. The revised Law on EDC Privatization was passed in August 2001. Among its more important changes, the law:

- Removed any requirement that bidders commit to a fixed amount of investment amount,
- Relaxed certain provisions on losses,
- Allowed bidders to bid on both distribution companies and not just one, and
- Limited the risk of bidders of contingent liabilities of the distribution entities.

tender shifted to the Ministry of Justice, a ministry under new, progressive leadership. By autumn 2001, the GoA was ready to launch its second tender.

By the time of the second tender, however, the bidders had world events on their minds. A "perfect storm" was buffeting financial markets, and the power sector in particular: the September 11 terrorist attacks on the World Trade Center, Enron's collapse in October/November 2001, and the litigation and investigations into the causes of the California electricity crisis (See Box 1.2). Had the climate for international power sector investment been different in October 2001, Armenia's second attempt to privatize may indeed have succeeded. By late 2001, the GoA had resigned itself to finding a management contractor instead of an owner for the EDC. In early 2002, however, a little-known company stepped forward to express interest.

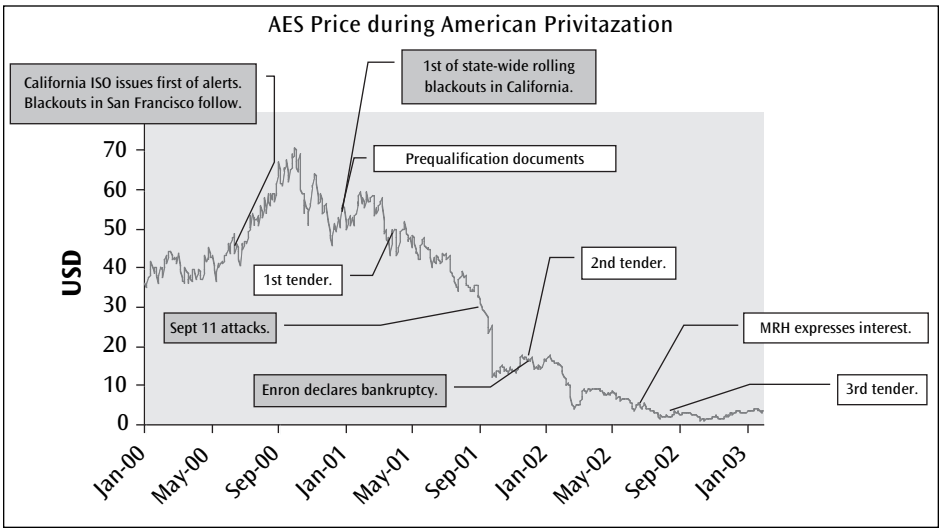
The offer from a new bidder, Midland Resources Holding (MRH), at first received a cautious welcome. MRH failed to fit the mould of strategic investor originally envisioned by the GoA, its donors, and transaction advisors (a profile of MRH is included in Box 1.3). The original tender documents were drafted to accommodate bids from an international energy company, with previous experience operating distribution networks. MRH was a purely financial investor, with no experience in any segment of electricity operations.[2] MRH's status as an offshore company (registered in U.K.'s Guernsey) was also cause for concern. The company's exemption from external financial, accounting, and corporate governance regulations carried reputational baggage as well as practical implications for evaluating compliance with the requirements of the tender documents. Though the tender documents prepared by the IFC's Private Sector Advisory Services were used for the transaction with MRH, these advisors ultimately distanced themselves from the deal.

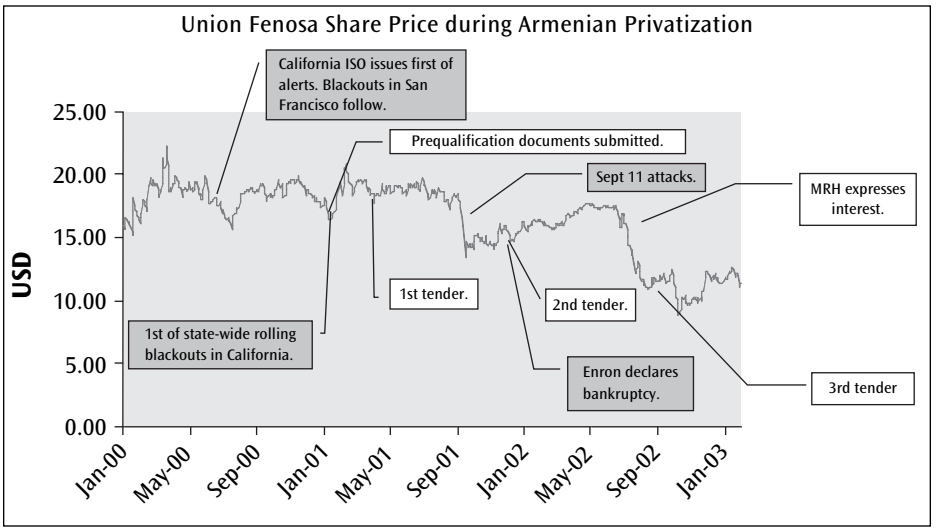
MRH assumed control of the EDC in autumn 2002, and ownership transfer of several major generating plants followed soon after. Ownership of the Hrazdan thermal power plant, the Sevan-Hrazdan hydropower cascade, and financial control of Medzamor, were swapped during 2002–03 against US$96 million in state debt forgiveness: The Hrazdan thermal power plant was swapped to a company owned by the Russian government for US$31 million; the Sevan-Hrazdan cascade was swapped to RAO Nordic (a subsidiary company of RAO United

2. Although MRH had, at one point in the mid-1990s, owned part of a regional energy distributor in the Ukraine in connection with its ownership of the Ukrainian steel plan Zaporizhstahl.

Box 1.2. Armenia Launches its Second Tender Amid the Perfect Storm

Few companies had a taste for overseas electricity investments during autumn 2001, and in December no bids were received. The California Electricity Crisis, 9/11, and Enron took their toll on international energy companies' balance sheets as well as their appetites for risk. The following charts show the equity prices of two prequalified bidders, AES and Union Fenosa, relative to these events, and the timing of Armenia's various attempts to privatize its distribution network.





Source: Equity price data taken from Yahoo Finance (whose provider is Commodity Systems, Inc.).

Box 1.3. Profile of Midland Resources Holding

Midland Resources Holding is part of the Midland Group, a privately owned company registered in Guernsey in the UK's Channel Islands. MRH describes itself as "a trading and investment organization . . . ," with "interests in a broad range of industries including steel, shipping, construction and real estate, energy distribution, and agriculture." MRH has its roots in steel trading, having set up shop in Ukraine in the early years after independence, and eventually acquiring ownership in Zaporizhstal, one of Ukraine's largest steel mills. MRH now owns the Red October Steel Mill in Volgograd, Russia, recently listed in Forbes as one of Russia's 200 largest privately held companies. Midland Group companies have also held ownership of a Ukrainian scrap metal processor and linen manufacturer.

Some of MRH's recent, more visible acquisitions include the purchase of the Jordan Formula 1 team, and a majority equity stake in the new Trump International Hotel and Tower in Toronto, planned to be Canada's tallest building.

For more information see www.midland.gg and Brown, Heidi, and Nathan Vardi. 2005. "Man of Steel." *Forbes,* March 28.

Electricity Network of Russia) for US$25 million; and financial management of Medzamor was given to another RAO subsidiary, Inter-RAO EES, in exchange for US$40 million in debt for nuclear fuel. Under this arrangement, Inter-RAO must approve all of Medzamor's financial transactions, and has the right to recover their full cost of delivered nuclear fuel, but receives no other compensation.

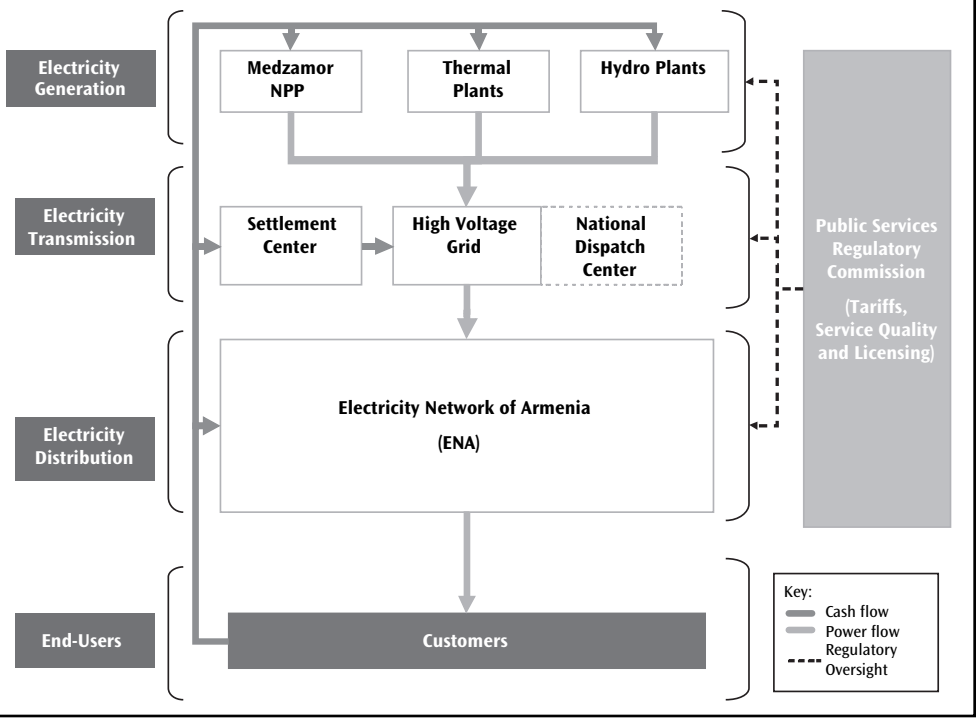
What Reform Has Achieved

The picture of the power sector in 2005 is very different than 10 years earlier. Armenergo, the state-owned, vertically integrated utility no longer exists. In its place are separate transmission, dispatch, and settlements companies tasked with delivering power from diversely owned generating facilities to a single, privately owned distribution entity now called Electricity Network of Armenia (ENA). Figure 1.3 shows the current structure of Armenia's power sector.

Collections are at nearly 100 percent of sales, and only 4 percent of what should be delivered to customers become commercial losses. Tariffs are set by a regulator with eight years of regulatory experience and are—despite some ongoing debate between the regulator and its licensees—generally regarded as near medium-term cost recovery levels (that is, recovering short-term cost of service, depreciation, and at least some level of new investment). Twenty-four hour service has been maintained since 1995 throughout the country. Some problems with voltage fluctuations persist, but the distribution company has measures in place for reimbursing customers for appliances damaged by supply interruptions or irregularities. Rural areas also continue to experience more frequent outages owing to the poor physical condition of poles and lines, but the ENA's investment program now includes replacement of poles and lines in these areas.

The reform has achieved the objective of unburdening the GoA of fiscal and quasi-fiscal support to the power sector. Armenia clearly did not undertake privatization for privatization's sake. The GoA was backed into a corner by the cumulative effect of commercial losses,

Figure 1.3. Structure of Armenia's Electricity Industry in 2005



below-cost tariffs, and poor collections. The annual fiscal deficit attributable to the power sector peaked in 1995, at US$141 million, and has steadily decreased since. The economic welfare benefits of power sector reform, and the longer-term financial benefits, have been even greater, and are addressed in more detail in Chapter 2.

Despite initial misgivings about MRH, the results of distribution privatization have not been disappointing. Many involved in the privatization process, including its opponents, recognize that the distribution network has fared much better than expected under MRH. Very few changes to the tender documents were ultimately made to accommodate MRH's bid. Those made were to compensate for certain financial weaknesses in MRH's bid and its lack of sector-specific experience. The company began fulfilling its obligations almost immediately upon taking control in October 2002. Total collections increased from 81 percent of total sales in 2001 to close to 100 percent by end-2004. Commercial losses decreased from 12 percent to 4 percent of total production during the same period. MRH turned the distribution company into a profitable enterprise, for which it received at least two purchase offers during 2004.[3]

The introduction of private sector participation (PSP) in small hydropower generation has also shown promising results. Private investment has flown readily into small hydropower generation. In addition to the 25 hydropower plants privatized, the AERC (now

3. As indicated in the postscript to this paper, MRH eventually sold its equity in ENA for more than seven times the initial purchase price.

called the Public Services Regulatory Commission [PSRC] as its powers were extended to cover the water and telecommunications sectors in 2003) has granted 6 new construction licenses for privately owned small hydropower plants (HPPs), and another 11 are currently under construction. Small HPPs, most of which had large unpaid receivables with Armenergo, are now guaranteed payment in full for all of the power they generate. Whereas most of the new small HPPs were developed by domestic investors with borrowed capital, Armenian Diaspora have been showing increasing interest in these plants, often investing without guarantees offered by the GoA for investments in renewable energy. The European Bank for Reconstruction and Development (EBRD) also recently waived the GoA guarantee in agreeing to invest 1.1 million Euro in a new mini-hydropower plant to be built along the Yeghegis River.

Domestic and foreign interest in larger-scale energy infrastructure has also increased. Armenia's gas supply network has expanded rapidly since the beginning of power sector reform. Iran and Armenia are currently building a major gas pipeline linking the two countries, with Iran financing the cost of completing the Armenian portion, in return for future electricity supply. Armenia commissioned a 2.6 MW wind plant in its northern Lori region in December 2005, built with the assistance of a US$3.5 million loan from Iran. Iran has also agreed to invest US$150 million to completing a fifth unit of the Hrazdan thermal power plant (TPP), and will provide financing for a major new hydropower plant at Megri. The Japan Bank for International Cooperation has extended a US$150 million loan to build a new combined cycle plan in Yerevan to generate power at a cost of roughly US$.02/kWh, roughly half the cost of the Hrazdan TPP. A private sector U.S. firm, ESI, is also currently building a 5 MW hydropower facility, Jradzor, in the Shirak region.

Though the large generators were not subject to an orthodox privatization process, simply putting different owners in charge seems to have made a difference. Before its transfer to Russia's Unified Energy Systems' (RAO UES) subsidiary, International Energy Company CJSC, the Sevan-Hrazdan hydropower plant received payment for only 20–30 percent of the electricity it generated, leaving enough cash after operation and maintenance for only 5–10 percent of necessary maintenance and 5–6 percent of total arrears in salaries. Despite the high collections and low commercial losses achieved by the distribution company, the state-owned single buyer, Armenergo, remained a bottleneck for payments to generators until its dissolution in December 2004. The International Energy Company, upon taking ownership of Sevan-Hrazdan, financed the company's cash shortfall. Between the third quarter 2003 and third quarter 2004, salaries were raised by 20–30 percent, electricity generation increased by 15 percent, all debts and wage arrears were paid down, all maintenance needs were addressed (repair and operations expenditures doubled), and the company was able to start making some new investments and renovations. Even Medzamor's performance has reportedly improved. In 2004 the plant produced a record volume of electricity (2 million GWh), balanced its books for the first time since its 1995 restart, and avoided the refueling delays that had plagued its operations in years past.[4]

4. "Russian Utility 'Rescued Armenian Nuclear Plan.' " 2005. Radio Free Europe/Radio Liberty. March 16.