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GRIDLINES

Sharing knowledge, experiences, and innovations in public-private partnerships in infrastructure

Armenia travels the bumpy road to all-day electricity supply

How perseverance pays off in power sector reform

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Armenia's power sector has suffered many setbacks: in the late 1980s an earthquake that took its major nuclear plant off-line, and in the early 1990s the collapse of the Soviet Union, economic blockade, and repeated sabotage of a new gas pipeline—all of which severely disrupted fuel supply. Technical and commercial problems further crippled operations. Armenians endured hard winters with barely two hours of electricity a day. The government set out to reform and privatize the sector, persevering through setbacks and learning from initial failure. Its persistence paid off: today the system runs efficiently and delivers power 24 hours a day.

The Soviet Union's collapse left Armenia with a fragment of a power system, never meant to function as a stand-alone grid. Plants were built to run on fuel imported from thousands of miles away, from neighbors that, without the Soviet Union, could not offer certainty of supply or terms that Armenia could afford.

In 1992, at the beginning of the war over the ethnic Armenian–dominated region of Nagorno-Karabakh, neighbors Azerbaijan and Turkey imposed an economic blockade, cutting off Armenia's only source of gas and oil for its thermal plants (see table 1 for details on Armenian power plants). Four years earlier a massive earthquake had shut down the Medzamor nuclear power plant, source of roughly a third of Armenia's electricity generation at that time. Supply from a new gas pipeline, built in 1993 through neighboring Georgia, was regularly interrupted by acts of sabotage.

TABLE 1
Installed capacity of Armenia's power plants, 1992–2004

Generation plant	Capacity (megawatts)
Thermal	1,746
Hrazdan	1,100
Yerevan	550
Vanadzor	96
Hydropower	1,032
Sevan-Hrazdan	556
Vorotan	400
Small plants	76
Nuclear	408
Medzamor Unit 2	408
Total	3,196

Source: Armenia, Ministry of Energy.

Armenia was left to rely almost entirely on its hydropower resources, at great expense to Lake Sevan, one of the world's largest high-altitude lakes and a source of pride to Armenians. A source for irrigation and drinking water as well as power generation, the lake was soon severely depleted. In 1992–96 Armenians suffered brutal winters with little more than two hours of electricity a day.

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Electricity reform is launched

By late 1996, 24-hour electricity supply was restored. The Medzamor nuclear power plant was restarted, the gas pipeline sabotage abated, the small hydropower plants pitched in their share. With donor assistance, the government began a campaign to link service quality to payment of bills. Tariffs were set at equal levels for all customers, spurring tariff rebalancing to remove the cross-subsidies that were a legacy of the Soviet-era energy system. Large industrial and commercial customers had subsidized residential customers, with the result that tariffs in 1992–93 averaged roughly a tenth of the level needed to cover costs.

Still, significant problems remained. In 1995 explicit and implicit subsidies to the power sector reached roughly 11 percent of GDP. Billing collections barely surpassed 50 percent, and nearly 25 percent of power produced disappeared through commercial losses or electricity theft (representing electricity injected into the transmission system but not metered or billed, net of electricity lost for technical reasons).

The first, failed attempt at privatization offered lessons—and the government took note

In 1995 the government unbundled the state utility Armenergo into separate companies for generation, transmission, and distribution. It installed an independent regulator, the Armenian Energy Regulatory Commission (AERC), with a reform-minded team at the helm. It sold several small hydropower generation plants in 1997. And in 1998 the government began efforts to privatize the distribution company.

Reformers also tackled commercial losses and nonpayment (or undercollection), the power sector's two biggest problems. Some 12,000 new, tamper-proof meters were installed and existing meters relocated to common areas of apartment blocks to discourage tampering and aid accurate reading. An automated metering and data acquisition system and a customer information system were adopted to identify the source and extent of the system's problems.

Privatization through trial and error

The first attempt to privatize the distribution system, in 2001, met with little support within the government. Moreover, the tender documents were flawed, and the legal and regulatory framework incomplete. Still, the tender took place, and international operators expressed interest. Motivated to try again, the government hired new transaction advisers, overhauled the tender documents, and refined its legal and regulatory framework.

In autumn 2001 the government launched its second tender for the distribution system. But then the terrorists attacked the World Trade Center, Enron collapsed, and the California electricity crisis spawned litigation and investigations. International operators had little appetite for new purchases in emerging markets and in a sector with regulated returns in an untested regulatory framework.

In 2002 the government went to plan B: a management contractor rather than an owner. A little-known company registered in Guernsey, Midland Resources Holding (MRH), expressed interest. Primarily a trading company, MRH had no experience in electricity operations. Though skeptical, the government proceeded (cautiously), accommodating this atypical "strategic investor."

MRH assumed control of Armenia's distribution system in autumn 2002, leading the way to privatization in generation. Several Russian companies swapped financial control of Medzamor and ownership of the Hrazdan thermal power plant and Sevan-Hrazdan hydropower cascade against US$96 million in state debt forgiveness in 2002–03.

A big turnaround

Armenia has maintained 24-hour electricity service since 1996. Collections are at nearly 100 percent of sales. Commercial losses register at only 4 percent. Tariffs, set by a regulator with eight years of experience, are nearly high enough to recover medium-term costs. The reforms have saved the government roughly US$386 million in explicit and implicit subsidies since 1994.

The higher electricity prices brought gains in efficiency by prompting users to invest in more energy-efficient technologies. Armenia's water utilities, for example, upgraded inefficient electrical pumping systems or switched to gravity-fed systems

that use no electricity. The higher prices also led to the expansion of the gas network, and some users have switched to gas for heating and cooking.

The higher prices must have been difficult for the poorest Armenians to pay. But the government deemed that they would not have been better off without the reform. Moreover, Armenia's poor customers generally had a good record of paying utility bills. It was industrial customers and government institutions receiving free power (sometimes with authorization, sometimes without) that accounted for most of the fiscal deficit. Social transfers may not yet be enough to offset the effect of the price increases on the poor. But with the power sector's higher earnings, the government can now fund those transfers. Indeed, social spending rose as a share of both fiscal spending and GDP between 2001 and 2004.

How did Armenia do it?

Armenia's strategy of relocating meters from apartments to common areas, rather than replacing them all, proved to be cost-effective in addressing the high commercial losses and low collections at the heart of the power sector's problems. And the donor-supported information systems helped the government pinpoint the problems.

These technical improvements, and the politically contentious tariff rebalancing, were completed before privatization, spearheaded by the new regulator. Faced with influential opponents in the early stages of reform, AERC effectively defended its role and mission. Its independence came thanks to its early leadership. The first commissioners were reformers from outside the Ministry of Energy, respected by both the government and international donors.

Learning from the first failed tender for the distribution system, the government, the regulator, advisers, and donors adopted critical changes in the second try. The tender package now reflected the concerns of potential buyers. The two distribution companies were consolidated into a single asset. Cross-ownership of distribution and generation was allowed. And the tender included indemnity against contingent liabilities, registration of the assets of the electricity distribution company (now called Electricity Networks of Armenia, or ENA) with the government to prevent asset stripping, and 110-kilovolt substations, a source of big commercial losses beyond the distribution company's control.

The government also rectified weaknesses in the legal and regulatory framework. It authorized ENA to disconnect customers failing to pay. It guaranteed that the Central Bank would pay the bills of defaulting "VIP customers"—mostly government agencies and state-owned enterprises. And it no longer required that the new owners commit to a fixed level of investment, instead outlining service quality standards for judging their performance.

Initiating reform before privatization can signal intent to private investors

The privatization effort gained even more momentum when the justice ministry took over from the energy ministry, to address concerns about conflicts of interest, political infighting, and obstruction.

While donors and transaction advisers viewed MRH with skepticism, the government proceeded with its own due diligence and imposed additional safeguards:

- To ensure that MRH had the necessary technical capacity, the government required that it hire a management contractor with power sector experience.
- MRH would deposit all customer receipts in an account agreed to with the power generators, to ensure that they would be paid before other creditors.
- To guard against misuse of cash flows and prevent the stripping of assets, no more than 25 percent of ENA's shares could be sold without prior approval by the regulator.

The partnership appears to work. Commitments to disconnect nonpaying customers have been honored, including when it came to such prominent nonpayers as the Ministry of Internal Affairs, a Russian military base, city government offices in Yerevan, and even the Ministry of Energy. And the government has stayed the

course despite changes in leadership and a difficult market.

ENA is now a profitable and well-run enterprise.[1] Suppliers and employees are paid in full and on time. To control nontechnical losses, MRH raised the salaries of directors, engineers, and inspectors by five- to tenfold and includes in employees' (now far higher) salaries a variable component based in part on improvements in losses and collections.

Sustained partnerships with donors allowed the government to proceed gradually and even through trial and error. Donor representatives and government counterparts developed mutual respect and resolved issues through extensive consultation.

What lessons for others?

Armenia's experience offers lessons that may be helpful to other countries pursuing similar reforms:

- **Political will is paramount.** The best efforts of donors will ultimately prove ineffective if a country's government and people do not support the reform.
- **Champions matter.** Government officials who enjoy broad respect and influence and are not perceived as having a vested interest drive successful reform. Donors and governments can help enable these champions through early, substantive consultations.
- **Initial failure may be better than not trying at all.** The bidding documents and legal and regulatory framework in Armenia benefited substantially from the lessons of the first, failed tender.
- **Frequent, substantive communications with bidders helps**. Extensive interaction between the government and bidders established credibility between the parties and helped institutionalize a two-stage bidding process for tendering other contracts.
- **A comprehensive, cross-sectoral approach to reform is beneficial.** The results of reform in the power sector can be enhanced by reform in the water sector and other industries. When these big consumers of electricity improve the efficiency of their energy use, their financial performance improves and they are better able to pay their bills on time—and all this boosts the performance of the power sector. To address equity concerns, social protection mechanisms should be implemented in parallel.
- **Reform should start before privatization.** To attract serious bidders, a solid legal and regulatory framework must be in place well before privatization.
- **Donors should provide the right mix of support.** The donor-funded effort to relocate meters proved to be cheaper than and just as effective as installing new meters. Much progress can be made by tackling the easiest and most cheaply solved problems early.
- **Service quality matters most**. In contracting with a private operator, governments should focus less on investment and more on service quality or other outputs in obtaining commitments from the operator. The government need worry about *inputs* only if it is certain what *outputs* it wants to achieve.

Notes

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1 In November 2004 MRH began discussions with a subsidiary of Russia's RAO UES (Interenergo BV) to sell 100 percent of its ownership in ENA. The Armenian cabinet approved the transaction in principle in September 2005. Final approval is subject to negotiations and the drafting of a contract between the government and the new owners. In early 2006 negotiations were still under way.

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