

## Armenia: Reforming Energy Sector



### Promoting safe and clean heating and increasing renewable energy generation in Armenia

#### Overview

Second generation energy reforms in Armenia focused on the use of safe, clean and affordable heating, and renewable energy generation. IDA-supported reforms drove up the share of urban households using safe and clean gas-based heating from 13 percent in 2005 to 71 percent in 2010. Gas-related explosions, poisonings and fires reduced four-fold. Privately-owned renewable energy generation grew from 137 GWh to 417 GWh.

#### Challenge

As of 2004, around 36 percent of residents of multi-apartment buildings relied on wood, household waste and other polluting fuels for heating, which were detrimental for health and the environment. The country had high incidence of gas-use related fires, explosions and poisonings due to the use of unsafe furnaces and stoves. The modern heater and gas connection costs were prohibitively high. Even the middle-income families could not afford buying modern heaters or boilers, and there was no consumer lending available for it. Due to the lack of appropriate heating, many schools either did not function during the winter months or classes were held in cold or polluted classrooms, reducing the quality of education and negatively affecting the students' health. In 2004, Armenia's estimated renewable energy potential was around 740 MW. However, only a small portion of it was utilized due to the lack of long-term and affordable financing and other non-financial barriers, including lack of publicly available information on the renewable energy, absence of reliable estimates for the potential of relevant technologies, and legal and regulatory barriers.

#### Approach

The success of the Energy program was due to a comprehensive approach to remove key regulatory, legal and information barriers, as well as to increase the engagement of the private sector.

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- » [Slideshow: Second generation energy reforms](#)

More Results



# 71%

the share of households in multi-apartment buildings with safe gas-based heating increased from 13% in 2005 to 71% in 2010

The **Urban Heating Project**, due to its demand-driven nature and application of best practice experience of financial intermediation, resulted in a new consumer lending product, which became a standard financial product. Sub-loans for the households and innovative output-based grants for the urban poor helped with installation of safe and clean gas heaters and/or connection to the gas network.

The **Renewable Energy Project** leveraged a US\$ 7 million non-sovereign loan from the European Bank of Reconstruction and Development and US\$ 3 million financing from a Diaspora organization. The project enabled the small renewable project developers to access long-term and affordable financing and confirmed the viability of lending for small renewable projects. Several local financial institutions now provide such loans.

The **Energy Sector Issues Note** looked into the generation options for meeting the future electricity demand, generation costs and energy security.

#### MORE INFORMATION

- » Urban Heating Project
- » Renewable Energy Project
- » Renewable Energy GEF Project
- » Geofund 2: Armenia Geothermal Project
- » Output-based Aid in Armenia: Connecting Poor Urban Households to Gas Service

## Results

- The share of households in multi-apartment buildings with safe gas-based heating increased from 13 percent in 2005 to 71 percent in 2010. Around 7,000 households took sub-loans to purchase individual heaters or boilers with repayments rates for sub-loans at nearly 100 percent. Over 8,000 urban poor received grants for individual gas heaters and/or connection to the gas network.
- As of 2011, due to the heating systems rehabilitation, average class temperature in 119 urban schools reached 18°C resulting in no idle classroom days during winter and benefitting around 53,000 students and 3,000 teachers. In 2003-2004, all of those schools had substantially lower classroom temperatures and several of them had more than 30 idle classroom days.
- The number of cases of poisonings, fires and explosions per 10,000 gas subscribers reduced from 37 in 2004 to 10.4 in 2010.
- The installed capacity of renewable sources connected to the power grid increased from 47 MW in 2005 to 137 MW in 2010. Renewable generation increased from 137 GWh to 417 GWh. 27 sub-loans were approved under the renewable energy project with 95 percent repayment rate for the entire portfolio.
- The analysis of energy sector challenges and possible solutions informed the government energy sector lending under the Country Partnership Strategy for fiscal years 2009-2013. The analysis included: (a) an assessment of future electricity demand and resulting supply gap; (b) trade-off analysis of the electricity generation options available to Armenia based on the considerations of generation costs and energy security; (b) estimate of overall investment needs; (c) identification of energy supply reliability bottlenecks in transmission and distribution networks; and (d) recommendation on addressing the energy tariff affordability issues.

## Bank Contribution

Under the **Urban Heating Project**, the Bank provided a US\$ 15 million IDA credit and a US\$ 3 million grant from the Global Partnership for Output-based Aid (GPOBA) to increase the use of safe, clean and affordable heating technologies in the country. Under the **Renewable Energy Project**, an IDA credit of US\$ 5 million and a GEF grant of US\$ 3 million supported financing of renewable investment projects and creation of enabling environment for renewables. The **Energy Sector Issues Note** had a budget of US\$ 40,000.

## Partners

The **UNDP/GEF** provided technical assistance complementing the World Bank Urban Heating Project and supplied funding for community and private sector mobilization activities as well as supported removal of some legal obstacles for development of urban heating.

The Renewable Energy Project was co-financed by US\$ 7 million from **EBRD** and US\$ 3 million equity contribution from the **Cafesjian Family Foundation**, the owner of the financial institution implementing the credit line component of the project.

## Moving Forward

Currently Armenia faces three principal challenges in meeting its energy sector objectives:

**An emerging supply gap:** Armenia will need at least 850 MW of new generating capacity as old, under-maintained energy infrastructure is retired, and demand continues to grow steadily.

**Maintaining energy security:** Heavy reliance on imported fuels and the old and under-maintained transmission and distribution assets put Armenia at risk of supply interruptions, price fluctuations, and possible outages.

**Maintaining affordable tariffs.** Rising fuel prices and the need for new, more expensive generating units make energy less affordable for low-income consumers. The World Bank energy program supports the government in enhancing the reliability of the power supply by improving the power transmission network back-bone infrastructure; and reducing power supply gap and enhancing energy security by improving the utilization of the country's energy efficiency potential.

## Beneficiaries

**Urban Heating Project:** Gas-based heating offers clean, efficient, and low-cost heating to urban poor. "*We used to burn wood before, but gas is so much cleaner and convenient. It's a great improvement in our life and it has eased our daily problems,*" explains **Sara Badalyan**, a housewife residing in a small, one-room apartment in Masis town (Ararat region) with her unemployed husband and 18-year-old daughter. As project beneficiaries, they have been using gas-based heating since September 2009.

**Renewable Energy Project:** "*We have a small gardening firm. We thought that since we were bringing in irrigation water; we could also build a hydropower station on that water flow,*" says **Marcos Gharibyan**, owner and director of Goght-1 and Goght-2 micro cascade hydro-stations. He has received a loan to make an investment in this sector. The company also constructed 10 kilometer-long power transmission line to connect the hydropower stations to the high-voltage electric grid.