RoA Ministry of Nature Protection
RoA Ministry of Urban Development

Empowered lives.
Resilient nations.

"Improving Energy Efficiency in Buildings" UNDP-GEF/00059937 Project

Study of energy efficiency state in newly-constructed multi-apartment buildings

Shirak Region of the Armenia, city of Gyumri, "Mush-2" district

Background

It is planned to construct a multi-apartment residential building in the earthquake-affected area in Armenia with the support and co-funding of UNDP-GEF Project "Improving Energy Efficiency in Buildings" (hereinafter the Project) aiming to demonstrate potential for energy saving and cost-effectiveness in an integrated building design.

Given the activities to be undertaken in the frames of the Project, it became necessary to collect relevant data about the newly-constructed buildings and to study residents' opinions on buildings energy efficiency and approaches to its enhancement. Taking into consideration that the construction of the demonstration building planned in Akhurian village should be implemented with application of the same technology and of the same building envelope as in the city of Gyumri, the social survey was conducted in 5 newly-built multi-apartment buildings of "Mush-2" district of Gyumri.

Model view of buildings in Mush-2 district

As of March 2011, construction of 38 buildings was completed. Most of those buildings are already occupied by residents, including socially vulnerable families.

A multi-apartment residential building under construction in Mush-2 district

The social survey was conducted by "Third Nature" non-governmental organization. Information was collected by method of enquiry among residents. The survey was carried out in 94 apartments of 5 newly constructed buildings in Mush-2 district (the total number of apartments in those buildings is 204; of those, 134 were inhabited during the 2010-2011 heating season).

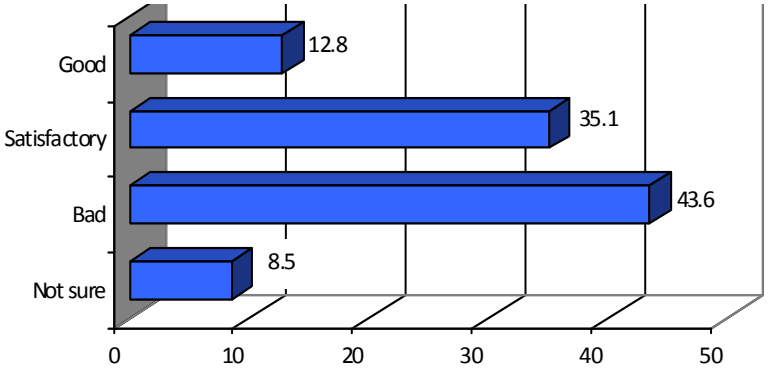
Besides, aiming to compare certain data, interviews were held in 22 apartments of an old building in the district (the total number of apartments in the building is 56; of those, 39 were inhabited during the 2010-2011 heating season).

Collected data and main results of the survey will be taken into account during integrated design and construction of the demonstration building in Akhurian.

Main conclusions

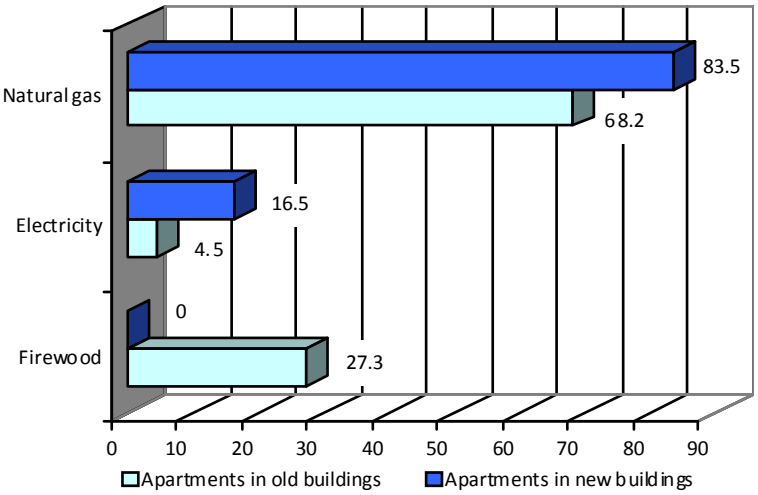
The analysis of the survey of residents of newly constructed buildings in Mush-2 district gives ground to make the following main conclusions:

1. All together, shares of the responses assessing the construction quality of the buildings as good (about 12.8% of the respondents) and satisfactory (35.1%) slightly exceed that of the responses assessing the construction quality as bad. The main reasons for discontent were dampness of walls (46.8%), windows (60.6%) and ceiling (18.1%).



2. In 22.3% of the apartments, residents made repairs or renovations seeking to improve energy efficiency or energy saving. Those activities aimed for the most part at renovating the heating system (33.3% of all activities) as well as changing the place of a boiler (also 33.3%). The share of the repairs to windows, plastering of walls and adding of radiators is smaller (10%-14%).

3. Initially individual gas boilers were installed in the apartments. Nevertheless, 16.5% of the newly-constructed apartments were heated using electricity. All other apartments (83.5%) were heated using natural gas, with 78% of the apartments heated by an installed local-individual gas boiler, while in a small percentage (5.5%) of the apartments gas stoves were used. In old apartments in the same district firewood is used quite widely (27.3%).



4. Satisfaction of residents of newly built apartments with the heating system is at a high level: 29.7% are satisfied and 54.9% are satisfied partly. The main reasons of discontents are a fee to be paid for the used natural gas (64.9%) as well as insufficient number of radiators and absence of radiators in the apartment corridor (uneven heating) (23.1%).

5. In case of about 11% of the apartments with heating not the entire apartment is heated. 60% of those apartments are one-room apartments and the families that live in them are extremely socially vulnerable. The families heated only the kitchen or the room in the apartment. The average heated surface area is 51 square meters per apartment.

6. During the heating season the temperature in various apartments ranged from 7°C to 24°C. The prevalent temperatures are 17-18°C (40.7%) and 15-16°C (28.6%). The temperatures measured in staircases were always above zero.

7. The average length of a heating season was 5.3 months, with the most common daily length of heating ranging from 3 to 12 hours.

8. In newly-constructed buildings, water for household use is heated primarily with local-individual gas boilers (86.2%), whereas in the old building, heating water on a gas stove is more widely used (45.5%).

9. An average monthly consumption of gas in newly-built apartments during a heating season is about 1.5 cubic meters per square meter of the surface (198 AMD per square meter), whereas in case of electricity the consumption was about 2.45 kWh per square meter (73.5 AMD per square meter). An average monthly bill for gas was over 10,000 AMD and for electricity was about 3,800 AMD per 1 apartment (average heated area of 51 square meters).

10. The single type of heating most favored by residents was a local-individual gas boiler (86.2%). The two most-often stated reasons were possibility to regulate temperature at will as well as clean and safe heating.

11. Residents in newly-built apartments regarded installation of better-quality doors and windows (26.6%) and increasing the number of radiators and placing them in the apartment corridor (17%) as a main strategy to cut heating expenses. Residents in the old building regarded as important thermal insulation of their apartments (31.8%), installation of better-quality doors and windows (50%) and especially the problem of thermal insulation of staircases and entrances (90.9%).

12. It has been found that there is a necessity to raise public awareness concerning energy saving and energy efficiency. *To that end the flier "Let's save energy: Energy saving and energy efficiency guidelines for multi-apartment buildings" was produced and was presented with appropriate clarifications.*



During the survey of residents of newly constructed buildings in Mush-2 district("Third Nature" NGO)

Recommendations

1. It is advisable that the heating system should be designed in line with the principle of even heating of the apartment. The residents' actions of moving the boilers and building separate chimney flues should be prohibited. It is suggested to consider options for improvement of work of the central chimney.

2. It is recommended to give preference to a central heating option at the demonstrative buildings' technical design and construction stages in energy efficiency projects for multi-apartment buildings and to underscore all the advantages of that system. At the same time, choosing the option of central heating rests on the idea that residents make collective decisions, which can provide an impetus to management and use of the building on the basis of new, efficient principles of common share ownership.

A multi-apartment inhabited residential building in Mush-2 district

3. It is recommended to make an energy-efficiency assessment and comparative analysis of multi-apartment buildings in Akhurian, where it is planned to undertake an integrated building design and construction of a demonstration energy efficient multi-apartment building with the support from the Project and in existing buildings of the same type in Gyumri.

The use of the analytical computer software will make it possible to develop mini business projects, which will aim to improve energy efficiency of the existing multi-apartment buildings in the community and which will need funding as small as possible, while at the same time entailing significant positive results and a short pay-back period. The local self-government bodies will get an opportunity to consider the community potential to implement those projects, including loan resources attraction and residents' participation.