

Ֆինանսավորումը, որը չի տարբերվում կապիտալ նորոգման գործընթացներից: Սակայն էական փուլը նախագծային աշխատանքների պատվերն է, որի պարագայում պատվիրատուն պարտավոր է սահմանել պահանջներ էԱ գնահատման, միջոցառումների նախագծման, տեղակայվող սարքավորումների բնութագրերի վերաբերյալ: Այս դեպքում էԱ երաշխիքը նախագծային փաստաթղթերի և աշխատանքի տեխնիկական վերահսկողության որակի ապահովումն է:

SOCIAL SURVEY AND ASSESSMENT OF ENERGY EFFICIENCY INVESTMENTS IN ARMENIA

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Energy efficiency promotion is a priority in public policy of almost all countries. For a comprehensive assessment of the impact of energy efficiency (EE) investments, it is necessary to design and implement a monitoring system for EE indicators, which will enable to understand not only the energy saving in physical and monetary terms, but also to evaluate its social, environmental, gender and other possible impacts. For that purpose it is necessary to conduct social survey using a questionnaire and methodology that would identify the results and impact of energy efficiency interventions.

The purpose of this paper is to present a system of sociological assessment of impact of the EE investments in state owned and municipal buildings, as well as external lighting systems. It is based on the actual data of the investments under the EE Project¹¹. The Energy Service Agreement (ESA) was elaborated for the project, according to which, the Beneficiary is responsible for repayment of investments from the savings. The objective of the project was to decrease energy consumption in the public and municipal buildings and street lighting systems. The project was demand-based, i.e. the potential beneficiaries were selected based on the application and initial data and information provided in their applications. The presented system is a

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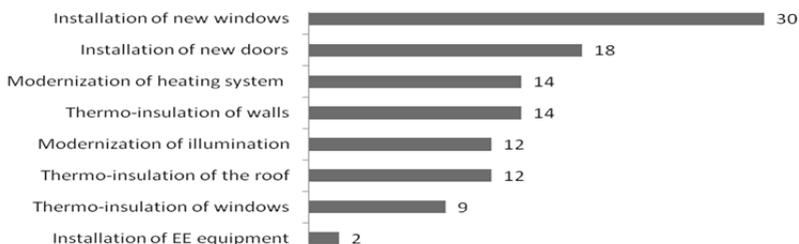
multidisciplinary independent sociological survey methodology, its database, combined with objective data, and a system of assessment indicators. The objective of the survey is to assess the efficiency of EE Project in the facilities that have been involved. The survey aims also to reveal implementation issues or success in order to make appropriate adjustments in processes and procedures. For that purpose, a special survey was conducted with the involved contractors and management of facilities. In this paper the focus is the survey of beneficiaries about the impact of energy efficiency measures. The survey identifies the changes in facilities in terms of the comfort and operation, financial savings, awareness of beneficiaries regarding the energy efficiency activities, changes of behavior, as well as difficulties in operation during the implementation of energy efficiency measures.

The sampling of the survey consists of the management and visitors of the beneficiary institutions. To assess the implementation rating the contractors were also involved in the survey. It was decided to select all facilities that have been involved in project and completed activities in 2012-15. Beneficiary facilities are schools, hospitals, cultural and administrative buildings, municipal street lighting system. Geographically the survey was conducted in all marzes. The vast majority of respondent employees and visitors – 93% - have been attending/visiting the institution for more than 2 years (and in case of communities – live there), 5% - from 1 to 2 years, the others – less than 1 year. 94% of them visit the given facility or community every day, 2% - several times per week, the others, specifically visitors of hospitals, more rarely.

The survey was conducted to identify results and findings in the following aspects: i) Changes in comfort before and after EE measures, i.e. changes in indoor temperature, operation days/hours, heated area, number of clients served, number of visitors, etc. ii) Changes in financing situation: generally it was improved, but it is also possible to pay more for energy bills to provide higher comfort level than the baseline conditions. iii) Changes in energy management: this should reveal potential improvement of energy management, monitoring of energy consumption, trained operators, etc. iv) Behavioral changes of employees and clients. v) Unforeseen changes, positive or negative. vi) Satisfaction with the services and results, including timelines and quality of the works performed. Satisfaction with heating conditions, equipment and materials installed, designs, etc. Satisfaction with charges/payment for services and for energy consumption.

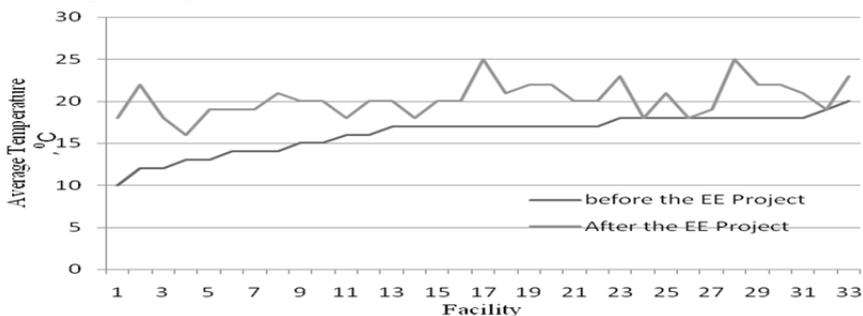
As a first step of the survey, the consumption pattern before and after energy saving measures was reviewed based on presented reports, energy bills and other documents. During the interviews the same information was verified with the management and beneficiaries of the facilities. Gender disaggregated indicators are surveyed. Implemented EE measures are presented below.

Fig. 1. Implemented EE measures



Changes in comfort before and after the EE measures. In all cases the respondents mentioned about increased comfort. Indoor temperature was increased in all cases. The satisfaction was higher in facilities where the normal conditions were not maintained before the project. The increased comfort was also presented as a larger area of facility used during the heating season. Another observation is the reduced idle days and hours of operation during the winter. Street lighting system comfort is expressed by the increased illuminated area and operating hours. The visitors mention the increased comfort in terms of indoor temperature, reduced noise and dust, as well as overall esthetic atmosphere.

Fig. 2. Average temperature in facilities in winter months before and after the EE Project



Changes in financing situation before and after energy efficiency measures.

93% of institutions (39 institutions) mentioned that EE measures contributed to the increase of savings, the other institutions mentioned that either they have not noticed any difference or the indicators for the savings are not yet visible due to the increased comfort the facilities spent more. Financial situation was improved in some cases also due to the reduced operational costs of the winter maintenance (repair and insulation of windows, doors, etc). Cash flow was improved in some facilities also due to the increased number of visitors, i.e. new students or patients' inflow adequately increases the revenue. Social impact is assessed both for visitors and operators of the selected facilities. While the operators are satisfied with the savings in the monetary term and more attractive appearance of the facilities, the visitors mention the increased comfort in terms of temperature, reduced noise and dust, as well as overall esthetic atmosphere. It is worth to mention that although the application from the facilities was for improving the EE however during the survey the respondents mentioned that the main reason for applying was the need for improvement of the conditions of the building and increase of comfort in the facility.

Conclusions: It is necessary to apply a sound monitoring system for EE project: i)energy consumption and thermal comfort should be monitored using meters' readings, energy bills and monitoring devices; ii)reduced GHG emissions should be calculated by the professional staff; iii) survey should be conducted to identify benefits and issues for beneficiaries.

PROBLEMS OF ENSURING ENERGY SECURITY AND INCREASING ENERGY EFFICIENCY

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Development of each country's economic system is highly dependent on performance of energy system and efficient solutions of its problems. Obviously, natural resources of a country, production, scientific, technological and human potential of energy sector are key determinants of country's position and role in political and economic processes. In fact, efficient use of those factors creates preconditions for sustainable development of national economy, as well as for securing population welfare