

# Street Lighting Rehabilitation in the City of Kapan

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# Project Description

- City of Kapan has a population of 46,700 people and an area of 3,750 ha
- Budget of the city's mayor's office is formed out of proceeds from land and real estate taxes which allow supporting fourteen kindergartens, schools of sports and music, seventeen libraries, and various centers of culture
- The proceeds do not allow making capital repairs or improvements

# Project description

- Mayor's office has been cooperating with various donors – USAID, PA Consulting Group, Eurasia Foundation, Save The Children, Urban Institute.
- With the intermediation of Urban Institute, we attended the meeting organized by PA Consulting Group, after which we had an opportunity to participate in the energy saving competition. We got an offer from PA Consulting Group, after which we drew up the budget and prepared lit streets scheme. PA Consulting Group organized training to ensure proper project setup.

# Project Structure

- 315 lamps were installed in the city. Most were electric bulbs (1,000, 500 W)
  - LN-500, 171 pieces
  - LN-1000, 12 pieces
  - DRL-250, 132 pieces
- Wire thickness did not meet the standards. 20 percent of cables were underground cables. There were energy losses due to damaged insulation.
- In winter, when there was a lot of snow, the wires would get broken, posing a threat to people around.
- Most wires were interconnected by joints, most often made of different metals (copper, aluminum). Technical condition of the lamp wires was unsatisfactory

# Project Type

- Our objective was to improve the status of street lighting in the City of Kapan, address the issue of energy saving, ensure environmental safety, and eliminate the impact of human factor on the lighting periods. The project goal was to develop the city and to address social issues.
- The project started in 2005 and lasted for three months.
- Users are: multistory buildings, institution of higher learning, secondary schools, kindergartens, shops, service facilities, market, libraries, museum, etc.; the number of users is as high as 7,000.

# Project Funding

- During cooperation with PA Consulting Group, AMD6,598,000 (USD12,449) worth of materials were purchased. The cost of operations was AMD3,082,000 (USD5,815). When calculations were made, 5-percent profit was planned, which amounts to AMD484,000 (USD913); VAT is USD3,836. Total project cost is USD23,013, of which 72 percent, or AMD9,757,000 (USD18,409) was provided by PA Consulting Group, and contribution by the mayor's office amounted to 28 percent, or AMD2,439,000.

# Operations Carried Out

- Mechanical clock was installed, which enabled to provide lighting according to a fixed schedule without having persons on duty in various sections of the city turn transformer stations on and off.
- Electricity meters were installed; electricity at AMD15 was supplied from 11 p.m. to 12 a.m.
- Street lighting is available in Kapan according to the following schedule:
  - Summer mode from 9 p.m. to 12 a.m.
  - Spring and autumn mode from 8 p.m. to 12 a.m.
  - Winter mode from 7 p.m. to 12 a.m.

# Calculations

- According to data available, losses make up 9 percent, which is above the standard.
- Before the activities were carried out, electricity consumption had amounted to  $W1 = (132 \times 0.25 \times 171 \times 0.5 + 12 \times 1,000) \times 365 \text{ days} \times 4 \text{ hours} \times 1.09 = 207,678 \text{ kWh/year}$
- After the activities had been carried out, annual electricity consumption amounted to  $W2 = (313 \times 0.25) \times 365 \text{ days} \times 4 \text{ hours} \times 1.025 = 117,834 \text{ kWh/year}$
- Electricity saving potential is  $W = W1 - W2 = 89,834 \text{ kWh/year}$ .

# Calculations

- Cost of actual energy consumption (as per installed meters) is  $207,678 \times \text{AMD}25 = \text{AMD}5,192,000$ .
- If all the lamps are replaced with DRL250, the cost of annual electricity consumption will be:  $W2 \times \text{AMD}25 = \text{AMD}2,946,000$
- If electric meters are installed, the cost of electricity consumption will amount to:
  - $315 \text{ pieces} \times 0.25 \text{ W} \times 365 \text{ days} \times 3 \text{ hours} \times \text{AMD}25 = \text{AMD}2,155,000$
  - $315 \text{ pieces} \times 0.25 \text{ W} \times 365 \text{ days} \times 1 \text{ hour} \times \text{AMD}15 = \text{AMD}431,000$
- Total –  $\text{AMD}2,586,000$ .

# Calculations

- After the project completion, total saving will amount to:  
$$\text{AMD}5,192,000 - \text{AMD}2,650,600 = \text{AMD}2,541,000$$
  
(USD4,795) (USD1 = AMD530 during the project implementation)
- The project was implemented within three months, total investment amounts to AMD9,472,300 (USD17,872).

# Repayment of Funding and Project Risk

- Annual cost saving will amount to USD4,795.
- Costs will be repaid within 3.7 years, after which the stations will operate for several more years.
- There are professional entities in the city, which can quickly fix any accident, so there is almost no risk.
- After the cost recovery, saving will be channeled to operation and repairs.