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| Country Name | The Project for the Improvement of Mushviq Substation in Baku |
| Azerbaijan | |

I. Project Outline

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| Project Cost | E/N Grant Limit: 880 million yen | Contract Amount: 850 million yen |
| E/N Date | May, 2006 | |
| Completion Date | January, 2008 | |
| Implementing Agency | Azerenergy Joint Stock Company | |
| Related Studies | Basic Design Study: August 2005 – March 2006 | |
| Contracted Agencies | Consultant | Nippon Koei Co., Ltd. |
| | Contractor | - |
| | Supplier | ITOCHU Corporation |
| Related Projects (if any) | Japan's cooperation: <ul style="list-style-type: none"> Severnaya Gas Combined Cycle Power Plant Project I and II (1998 and 1999, ODA Loan) Shimal Gas Combined-Cycle Power Plant Construction Project (Second Unit) (2005, ODA Loan) | |
| Background | <p>Since most power facilities of Azerenergy, an implementing agency, were constructed during the era of the former Soviet Union and are therefore aged and deteriorating, there is an urgent need for improvement to provide a reliable power transmission system by construction and renewal of power facilities as set in 5-year National Development Program. In particular, stable and high quality power supply to Baku City, which is the capital of Azerbaijan with the population of 2 million and its political and economic center, is the most important task of the country's power sector.</p> <p>However, the facilities of Mushviq Substation, one of the most important substations within the power supply network of central Baku, were aged. Given the recent favorable economic conditions of Azerbaijan which accompanied a construction boom in Baku, electric power demand in Baku was increasing rapidly and was anticipated to exceed the rated capacity of these transformers within a few years. In the worst case, a shutdown of Mushviq Substation could therefore result in massive blackouts in the center of Baku.</p> <p>Under these circumstances, the Government of Azerbaijan requested grant aid from the Government of Japan for improvement of the main transformers in Mushviq Substation, including the increase of transformer capacity, in December, 2003.</p> | |
| Project Objectives | Outcome To ensure the stable power supply in Baku by procuring and installing main transformers and other equipment in Mushviq Substation. | |
| | Outputs Japanese Side: <ul style="list-style-type: none"> Procurement and installation of 250 MVA main transformers (2 units) at the Mushviq Substation Procurement and installation of 10 kV cubicles, Control and protection panels, Nitrogen-type fire prevention system, and others Azerbaijani Side: <ul style="list-style-type: none"> Securing land for installing the procured equipment Demolition and restoration of main gate (The existing main gate of Mushviq Substation is narrow and it could be an obstacle for carrying in the new main transformer.) Execution of power outage during installation work and load shedding, if necessary. | |

II. Result of the Evaluation

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| Summary of the Evaluation |
| <p>Since most power generation, transmission and distribution facilities in Azerbaijan were constructed during the era of the former Soviet Union and were therefore aged and deteriorating, there was an urgent need for improvement to provide a reliable power transmission system. The main power transformers in Mushviq Substation, one of the most important substations within the power supply network of central Baku, were installed in 1986 during the era of the former Soviet Union. As 20 years had elapsed since their installation, the transformers exhibited problems. Given the favorable economic conditions of Azerbaijan which accompanied a construction boom in Baku, electric power demand in Baku was increasing rapidly and was anticipated to exceed the rated capacity of these transformers within a few years. In the worst case, a shutdown of Mushviq Substation could therefore result in massive blackouts in the center of Baku.</p> <p>This project has largely achieved its objectives of supplying stable power in Baku: the power supply capacity has increased while the number and hours of outage have decreased. As for sustainability, although the number of staff at the implementing agency is minimum, they carry out regular training and maintain the equipment properly by using guidelines. They also seem to secure the sufficient maintenance expenses, however, the latest financial information was not obtained.</p> <p>For relevance, the project has been highly relevant with Azerbaijan's development policy, development needs as well as Japan's ODA policy at the time of both ex-ante and ex-post evaluation. For efficiency, both the project cost and the project period were within the plan.</p> <p>In the light of the above, this project is evaluated to be highly satisfactory.</p> |

1 Relevance

This project has been highly relevant with Azerbaijan's development policy "construction and renewal of power facilities for the stable power supply as set in the State Program for Development of Fuel and Energy Sector in Azerbaijan (2005)", development needs "response to the growing energy demand in Baku" as well as Japan's ODA policy at the time of both ex-ante and ex-post evaluation.

Therefore, relevance of this project is high.

2 Effectiveness/Impact

This project has largely achieved its objectives of supplying stable power in Baku by increasing the transformer capacity. With the increase of the transformer capacity, the planned outage is no longer needed even if one unit of the main transformers fails. In terms of anticipated quantitative effect, the number and hours of outage have decreased. Availability factor has decreased after the project completion because the consumers who used the power without paying the fee before the project have saved the use of electricity after the metered rate was introduced. Since installment of the meters to all consumers has been completed, the availability factor is expected to increase.

As to impact, stable power supply have supported not only the continuing construction boom in Baku, but stabilization of the social activities including living of inhabitants and internally displaced persons of Nagorno-Karabakh since the power is supplied stably even at midwinder. According to the implementing agency, no negative impact was observed in terms of natural environment and land acquisition.

Therefore, effectiveness/impact of this project is high.

Quantitative Effects

| | 2006 Actual (BD) | 2008 Planned (After completion) | 2008 Actual (After completion) | 2011 Actual (Ex-post Evaluation) |
|---|---------------------|------------------------------------|-----------------------------------|--|
| Indicator 1 Increase of transformer capacity | 400MVA | 500MVA | 500MVA | 500MVA |
| Indicator 2 (supplementary indicator) Availability factor | 50.1% | --- | 38% | 36% |
| Indicator 3 (supplementary indicator) Planned/unplanned outage hours (per year) | 77.07 | --- | 58.22 | 46.52 |
| Indicator 4 (supplementary indicator) Outage times (per year) | 14 | --- | 13 | 11 |
| Indicator 5 (supplementary indicator) Electricity supply (GWh) | 1,214.5 | --- | 1,229.6 | 1,448.4 |

(Source: Azerenergy)

3 Efficiency

The outputs of the project were produced as planned, and both the project cost and the project period were within the plan (ratio against the plan: 97%, 96%).

Therefore, efficiency of this project is high

4 Sustainability

The equipment provided by the project is maintained by Azerenergy, the implementing agency. In terms of institutional aspect, although the number of staff has decreased compared to the figure which was considered desirable at the time of the ex-ante evaluation due to the streamlining of the maintenance activities, there are enough number of staff for a 24-hour monitoring and therefore for sustaining the project effect. There is no problem in the technical aspect since training on the proper use and maintenance of the equipment procured by the project is carried out monthly. Although detailed information was not obtained the implementing agency seems to have no financial problem since Azerenergy keeps generating profit for years and secures the maintenance expenses. With respect to the current status of operation and maintenance, Azeregergy operates and maintains the equipment based on internal guidelines, and the equipment operates well without any breakdown so far. Although the implementing agency keeps the operating data in log sheets, it would be desirable to create a database to record all incidences of operation and maintenance, failures and accidents so that the maintenance staff are able to detect failures and prevent accident promptly.

As stated above, there is no problem in the institutional and technical aspect as well as the current status of operation and maintenance, however, since the latest financial details were not obtained, sustainability of the project effect is fair.

III. Recommendations & Lessons Learned

Recommendations for implementing agency:

The equipment has been maintained properly so far, however, the implementing agency should create an online database to record all incidences of operation and maintenance, failures and accidents so that the equipment status is centrally controlled and the maintenance staff are able to detect failures and prevent accident promptly.



(Main transformers)



(Control panels for main transforms in the control building)