

FY2022 Simplified Ex-Post Evaluation Report of Japanese Grant Aid Project

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Duration of the Study: September 2022 – January 2024

Duration of the Field Study: 9 January 2023 – 2 February 2023

Country Name Republic of Tajikistan	< Project Name > The Project for Improvement of Substations in Dushanbe
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Location of the Project Site

(Source: Prepared by the External Evaluator from the materials provided by JICA)



Radiostantsiya Substation Developed Under the Project

(Source: Photo by the External Evaluator)

I. Project Outline

Background	Tajikistan relied on hydropower for approximately 90% of its domestic electricity generation, but because the output of hydropower plants fell to approximately 70% of the summer output in winter due to frozen rivers and low flows, electricity was imported from neighbouring Uzbekistan to make up the shortfall. In the capital city of Dushanbe, a district heating system using natural gas imported from Uzbekistan was also in operation, but as natural gas exports from Uzbekistan were phased out after the early 2000s, consumers were forced to switch to electric heating, leading to a sharp increase in electricity demand during winter. In addition, there was an urgent need to increase the capacity of power installed capacity, including transmission and substations, along with power sources. However, many of the substations and other power distribution facilities had not been upgraded to meet the increase in demand, as the facilities had not been renewed since they were built during the former Soviet Union era. As a result, the equipment was deteriorating over time and repair parts were becoming increasingly difficult to obtain. Furthermore, when loads exceeded design standards due to increased demand, the facilities were subject to emergency shutdowns, resulting in frequent power outages, and the ageing and shortage of substations had become a bottleneck for the stable supply of electricity.			
Objectives of the Project	To improve power supply situations in Dushanbe City by rehabilitating and constructing substations, thereby contributing to sustainable social and economic development			
Contents of the Project	<ol style="list-style-type: none"> 1. Project Site: Dushanbe City (population: approximately 1.17 million) 2. Japanese side [Facilities¹] Cable and Control Room (278 m² (Promyshlennaya Substation), 210 m² (Radiostantsiya Substation)) [Equipment] Transformers (4 units), Circuit Breakers (4 units), Disconnectors (24 units), Voltage Transformers (12 units), Protection Control Panels (2 sets), etc. [Consulting Services] Implementation Design, Construction and Procurement Supervision. No soft components. 3. Tajikistan side: [Common to both substations] Securing land and parking lot for temporary equipment and material storage, relocation of existing overhead lines/underground cables or pipes and obtaining permits, provision of disposal sites for waste soil and miscellaneous construction water, preparation and operation of outage work plans, provision of the office, etc. [Promyshlennaya Substation] Removal of transformers off site. [Radiostantsiya Substation] Securing and clearing the site and removing obstacles, construction for voltage boosting of 110 kV existing transmission lines, construction of ancillary facilities for the new substation (water supply and drainage works), construction of the access road, etc. 			
Implementation	E/N Date	March 9, 2017	Disbursement Date	N/A

¹ The Promyshlennaya Substation is the largest of the substations west of the Dushanbe River, and the district has a high concentration of factories and residential areas. The Radiostantsiya district is a rapidly growing area with many government offices, commercial facilities and high-rise residential buildings.

Schedule	G/A or L/A Date	June 30, 2017	Completion Date	December 30, 2019
Project Cost	E/N Grant Limit / G/A Grant Limit : 2,190 million yen, Actual Grant Amount: 2,154 million yen			
Executing Agency	Ministry of Energy and Water Resources, Barqi Tojik (Tajikistan electric power corporation)			
Contracted Agencies	Main Contractor(s): NISHIZAWA LIMITED			
	Main Consultant: Asia Engineering Consultant Co., Ltd. Agent: N/A			

II. Result of the Evaluation

Summary

This project aimed to improve the electricity supply in the capital city of Dushanbe by constructing substation facilities, thereby contributing to sustainable economic and social development. This project was in line with Tajikistan's national and sectoral development plans at the time of planning, and also was consistent with the development needs, as it aimed to stabilise electricity supply in the capital. Although no concrete outcomes were observed under the coordination with other projects by JICA or other donors, the project was consistent with Japan's ODA policy, and was also consistent with international frameworks. Therefore, the overall relevance and coherence of the project were high. In terms of project effectiveness, the quantitative effectiveness indicators envisaged at the time of planning were achieved and a stable electricity supply from the substations was ensured without overloading of equipment or power outages due to equipment accidents. On the other hand, it was also found that in one of the two target areas, the distribution network still had some issues, and a stable electricity supply for the consumers has not always been achieved. It was confirmed that there were no negative environmental impacts, resettlement or land acquisition associated with the implementation of the project, and that there were no negative impacts in terms of gender, impacts on the marginalised people, social systems, norms and human well-being. Therefore, overall, the effectiveness and impacts of this project are high. With regard to the implementation of the project, both the project cost and the project period exceeded the plan, but not significantly. Therefore, the efficiency of the project is judged to be high. Sustainability is considered to be moderately low as a whole, as no particular problems were observed in many aspects while there were some challenges observed in terms of financial sustainability.

In light of the above, this project is evaluated to be satisfactory.

Overall Rating²	B	Relevance & Coherence	③ ³	Effectiveness & Impacts	③	Efficiency	③	Sustainability	②
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1 Relevance/Coherence

<Relevance>

- Consistency with the Development Policy of Tajikistan at the Time of Ex-Ante Evaluation

The national development plan at the time of the project's ex-ante evaluation was the *National Development Strategy of the Republic of Tajikistan for the period up to 2030* (NDS), which identified the solution of energy problems as one of the key issues. Specifically, one of the measures for energy security and efficient use of electricity was the efficient operation of electricity distribution facilities. The sector plan included the *Guideline for Energy Development 2003-2015*, which was to establish the necessary structures, regulations and promote international cooperation to improve the unstable energy supply situation.

Therefore, this project was fully in line with the national development plan and the energy sector policies at the time of ex-ante evaluation.

- Consistency with the Development Needs of Tajikistan at the Time of Ex-Ante Evaluation

As noted in the "Background" above, the capital city of Dushanbe had been dependent on the import of natural gas from Uzbekistan for its district heating system during the winter season, but this was being phased out, and as a result, each consumer was switching to electric heating, resulting in the issue of a sharp increase in electricity demand during the winter season. Along with power sources, increasing the capacity of power facilities, including transmission and substation, was also an urgent issue, but many of the substations and other power distribution facilities had not been upgraded since they were built during the time of the former Soviet Union, and had not been reinforced to meet the increase in demand. As a result, the equipment was deteriorating over time and repair parts were becoming increasingly difficult to obtain. In addition, when loads exceeded the design standards due to increased demand, the facilities were subject to emergency shutdowns, resulting in frequent power outages, and the ageing and shortage of substations had become a bottleneck for the stable supply of electricity.

This project aimed to provide a stable supply of more electricity, which met these needs that Dushanbe had at the time of ex-ante

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ④: Very High, ③: High, ②: Moderately low, ①: Low

evaluation.

- Appropriateness of Project Design/Approach

The two substations developed under this project were the substations in particular need of expansion and improvement in order to achieve a stable supply of electricity for stable industrial activities and the livelihoods of the population in the capital city of Dushanbe. It was also a project that directly benefited all the people of Dushanbe. The ex-post evaluation of similar projects in the past showed that it was important to avoid delays in the timing of the construction of the transmission line to the substation, which was a matter to be borne by the recipient government, and it was confirmed that this work was carried out on schedule that did not affect the construction process in this project. On the other hand, in the area supplied with electricity from the Promyshlennaya Substation, one of the substations covered by the project, it was confirmed that the distribution network had not been sufficiently rehabilitated, and power outages still occurred in the section from the substation to the end-users. Although it was necessary to make arrangements with the executing agency to ensure that the dilapidated power distribution network would be rehabilitated before the completion of the project, from the perspective of ensuring timely project outcomes, the fact that such action was not taken was not necessarily appropriate as an approach to the project. However, it would be too much to say that there were major problems with the content of the plan or the approach. In addition, the lessons learned from the previous evaluation of a similar project were taken into account, and the project plan and approach can be said to have been generally appropriate as a whole.

<Coherence>

- Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation

Japan's development cooperation policy for Tajikistan at the time of the ex-ante evaluation was the 'Country Assistance Policy for the Republic of Tajikistan' (formulated in December 2012), which defined economic infrastructure development as a priority objective. The JICA Country Analytical Paper for the Republic of Tajikistan (formulated in December 2014) also analysed the potential for transport and small-scale infrastructure development at the connecting point between Central Asia and South Asia as a priority area.

The project provided support to the power sector, which was in line with Japan's development cooperation policy at the time of the ex-ante evaluation, which stated that the project would support the development of economic and small-scale infrastructure.

- Internal Coherence

No other JICA-related projects were planned or implemented during the planning and implementation period of this project. Therefore, no linkages between JICA projects were envisaged and no particular internal coherence was identified.

- External Coherence

As for the cooperation of other institutions with the power sector in Tajikistan, the Asian Development Bank (ADB) accounted for the majority of grant aid projects, while support from the Export-Import Bank of China was prominent in terms of loan projects. The ADB implemented the Regional Power Transmission Project as a large-scale project, which included the construction of 220 kV transmission lines, upgrading of substations and installation of Supervisory Control And Data Acquisition (SCADA) system, etc. However, as confirmed during the ex-post evaluation, there was no particular coordination and collaboration with this project, which supported the strengthening of substations in Dushanbe city, other than the overall objective of stabilising the electricity supply in Tajikistan as a whole, nor the generation of outcomes as a result of it. In addition, although a coordination mechanism through regular meetings among the major donors (ADB, World Bank, European Bank for Reconstruction and Development, JICA, etc.) existed in Tajikistan, no specific coordination was envisaged during the planning and implementation of this project. Therefore, it can be said that no particular external coherence was observed.

With regard to consistency with international frameworks, the project is considered to be consistent with Goal 7 of the Sustainable Development Goals (SDGs), 'Ensure access to affordable, reliable, sustainable and modern energy for all', in that the project will improve people's access to energy.

<Evaluation Result>

In light of the above, the relevance and coherence of the project are high⁴.

2 Effectiveness/Impacts⁵

<Effectiveness>

(Quantitative Effects)

In this project, the substation capacity, annual power supply capacity, the number of outages caused by transformer overloads and the amount of electricity loss caused by the outages were set as the measurement indicators of quantitative effects.

The annual power supply capacity at both substations increased as a result of the increased substation capacity, and the actual values for both substations were in line with the expectations. As these indicators are so-called 'output indicators', which are achieved automatically through the construction of facilities, the data on the actual annual amount of power supplied was also collected as a reference value. In 2022, they were found to be 52% of the available supply capacity for the Promyshlennaya Substation and 16% for the Radiostantsiya Substation. Therefore, it can be said that the effects of substation enhancement have been achieved in terms of ensuring a stable electricity supply without equipment overloading or power outages due to equipment accidents.

On the other hand, in the area served from the Promyshlennaya Substation, which has increased its capacity, there is an aspect in which the electricity supply to consumers is partially restricted due to the problems with the distribution network. In addition, in the area served from the Radiostantsiya Substation, an urban redevelopment project formulated in 2014 was underway, with many buildings still under

⁴ Relevance: ③, Coherence: ②

⁵ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

construction at the time of ex-post evaluation. The project was implemented in anticipation of electricity demand after the redevelopment, and as the redevelopment project was still being implemented at the time of ex-post evaluation, it can be said that the operational status was low compared to the capacity that had been enhanced.

It was confirmed that the reinforcement of substation facilities has eliminated the occurrence of power outages caused by transformer overloads, and that both the number of outages and the amount of power loss have met the target values. In this respect, it can be said that a stable supply of electricity has been provided from both substations.

Therefore, it can be judged that the overall target of stable electricity supply was achieved, although there was an aspect of the actual annual electricity supply being low due to the faulty and underdeveloped distribution networks.

Table 1: Quantitative Effects of This Project

Indicators		Baseline 2015 Actual	Target 2022 3 Years after Completion	Actual 2021	Actual 2022
Promyshlennaya Substation	Substation capacity	50 MVA	80 MVA	80 MVA	80 MVA
	Annual power supply capacity	332,880 MWh	520,125 MWh	520,125 MWh	520,125 MWh
	<i>(Reference value)</i> Amount of power supplied annually	183,445 MWh	N/A	244,790 MWh	271,141 MWh
	<i>(Reference value)</i> Amount of power supplied annually / Annual power supply capacity	55%	-	47%	52%
Radiostantsiya Substation	Substation capacity	N/A	80 MVA	80MVA	80MVA
	Annual power supply capacity	N/A	432,744 MWh	432,744 MWh	432,744 MWh
	<i>(Reference value)</i> Amount of power supplied annually	N/A	N/A	64,744 MWh	67,691 MWh
	<i>(Reference value)</i> Amount of power supplied annually / Annual power supply capacity	-	-	15%	16%
Number of outages caused by transformer overloads in the service areas of the two substations		268	0	0	0
Amount of electricity loss caused by the outages by transformer overloads		4,081 MWh	0 MWh	0 MWh	0 MWh

Note: Substation capacity indicates that transformers (40 MVA x 2 units) were installed at the respective substations. The annual power supply capacity is the amount of electricity based on the length of time that can be supplied in a year with the transformers and distribution system in place, and the actual amount of power supplied in a year is given as a reference value.

Source: Ex-ante Evaluation Summary pp.3-4, Preparatory Survey Report pp.4-5, Information provided by the Executing Agency

(Qualitative Effects)

In this project, it was assumed as qualitative effects that the voltage fluctuation range and frequency would be stabilised in the electricity supply from the substations.

The ex-post evaluation confirmed these effects: both voltage and frequency fluctuations became very small (0.025% at Promyshlennaya Substation and 0.005% at Radiostantsiya Substation) due to the introduction of high-precision equipment and automation of the power supply system in the project, which enabled stable operation at all times. The range of frequency fluctuations has also remained within the acceptable limits and there are no problems with the power quality at the substations. In addition, as indicated in the Quantitative Effects, the substations developed under this project have not caused any power outages due to breakdowns since they were put into service, leading to a stable power supply (improved power quality) in the target areas.

<Impacts>

(1) Intended Impacts

The impact through the implementation of this project was envisaged to be the promotion of economic and social development through the stable supply of electricity in the project area.

The substations constructed under this project have so far experienced no power outages caused by breakdowns, and the substations are capable of providing a stable supply of electricity to 200,000 residents in the Sino District, where the Promyshlennaya Substation is located, and 100,000 residents in the Somoni District, where the Radiostantsiya Substation is located. While no quantitative data were available to show the stimulated local economic activities, according to the executing agency, the Promyshlennaya Substation plays a significant role in supplying electricity to factories, bazaars, corporate offices, medical facilities, etc. located in the neighbouring industrial area. The Radiostantsiya Substation contributes to the stable supply of electricity to many government institutions, commercial establishments, hotels, etc. In fact, interviews with factories in the Sino District, offices, hotels and supermarkets in the Somoni District indicated that the number of power cuts has decreased.

On the other hand, there were indications of insufficient electricity supply in some areas of the Sino District and, although less frequent, power outages still occur in some areas served by both substations. This is due to the problems with the transformers closer to the

customers, where the electricity that was stepped down at both substations is further stepped down, as well as the problems with the ageing distribution network in the Sino District, and is not caused by the substations constructed under this project. However, the situation is such that the ‘promotion of economic and social development through the stable supply of electricity’ set out as the impact of the project has not been fully realised, and further improvement of electricity supply is expected through continuous inspections, repairs and equipment replacements by the executing agency.

Based on the above, it can be judged that the impacts envisaged at the time of planning have partially been generated.

(2) Other Positive and Negative Impacts

1) Impacts on the Environment

The environmental and social consideration guideline applied to this project was the JICA Guidelines for Environmental and Social Considerations (2010), with an environmental category of C.

The environmental permit for the implementation of this project was obtained in October 2016 during the preparatory study phase. Following this, the executing agency developed an environmental management plan, and it was confirmed that this plan was also approved on 2 August 2018, prior to the commencement of construction of the subject substations. Since then, all environmental permit conditions were complied with and no negative environmental impacts occurred during the construction or after completion.

Therefore, it can be said that there were no negative environmental impacts from this project, as the environmental permit conditions were complied with and no specific negative impacts on the natural environment were identified during the site survey.

2) Resettlement and Land Acquisition

The land for the construction of the Radiostantsiya Substation was owned by the power distribution company of Dushanbe city under the executing agency, and there were no problems with the land acquisition. In addition, no one had lived on the construction site and no resettlement occurred. As for the Promyshlennaya Substation, it was confirmed that new substation facilities were constructed on the site of the substation.

Therefore, resettlement and land acquisition did not occur as a result of the implementation of this project.

3) Gender Equality, Marginalised People, Social Systems and Norms, Human Well-being and Human Rights

This project was to benefit all facilities and residents in the target areas, and no negative gender impacts or people prevented from equitable social participation were identified. Although not all power supply challenges can be solved only by improving substation facilities, electricity prices have been kept low in Tajikistan and the positive impacts of improved electricity quality on livelihoods spread out to all users. In particular, improved reliance on electricity was observed in health facilities.

The project area was not originally a non-electrified area, and the impact on people's well-being and improved school education was not known, but the overall improvement in the environment of electricity use is considered to have improved the comfort of living.

4) Other Positive / Negative Impacts

Shabakahoi Taqsimoti Barq (hereinafter referred to as ‘STB’), the electricity distribution subsidiary of the executing agency, acquired knowledge from the consultants and the contractors during the implementation of this project on how to effectively develop substations, and also improved its capacity to operate and maintain high-performance equipment. The experience gained enabled the development of a small-scale substation in another redevelopment area in Dushanbe city (see photo on the last page). Although this project did not provide any specific technical guidance through its soft component, etc., the positive impact of this project was observed in the fact that the knowledge learned through the implementation of this project itself was used to design and build a new substation on their own.

<Evaluation Result>

Therefore, although there are some issues in terms of ‘Impacts’, the effectiveness and impacts of the project are high as a whole.

3 Efficiency

(1) Project Outputs

Several minor changes were made to the project as shown below. However, they did not affect the project effectiveness.

- Common to the two substations
 - Changes to the components and functions of the protection and control equipment
 - Omission of 110 kV voltage transformer
 - Installation of a disconnecter with grounding switchgear on the secondary side of the transformer (35 kV) (to avoid prolonged outage hours in the event of power failures)
 - Change of control cable laying method in the control building (to facilitate maintenance in the event of breakdowns, etc.)
 - Procurement of two spare chargers (because it was assumed that the chargers in the existing facilities could be used, but due to a breakdown, they became no longer suitable for use).
- Radiostantsiya Substation
 - Change in quantity of the components of the switchgear for 35 kV distribution
 - Changes to the external appearance and construction area of the building housing the switchgear and control room for power distribution
 - Installation of drainage ditches on the periphery of the site (because the adjacent urban planning road had not yet been dug down and the road on the premises could be flooded).
- Promyshlennaya Substation
 - Change in quantity of the components of the switchgear for 10 kV distribution
 - External appearance of the building housing the switchgear and control room for power distribution

Change in the structure and the construction area

With regard to the components to be borne by the Tajikistan side, as the redevelopment of the area around the Radiostantsiya Substation was in the process of being implemented, the construction of the access road and drainage works had not been completed at the time of ex-post evaluation. Other items were found to have been generally implemented.

(2) Project Cost

The project cost on the Japanese side was 2,154 million yen, 98% of the planned amount of 2,190 million yen. On the other hand, the actual project cost on the Tajikistan side was 6,131 thousand Somoni (approximately 73.3 million yen, calculated using the average rate for the project period) compared to the planned cost of 1,306 thousand Somoni (approximately 17.6 million yen), which was a significant excess. This was caused by a significant increase in the actual cost due to the fact that an additional 1.5 m of the site had to be excavated during the land preparation in relation to the redevelopment plan for the surrounding area and because the design of the voltage boosting work method was changed from strengthening the existing transmission lines to installing a new tower.

As a result, the overall project cost was 2,227 million yen compared to the planned amount of 2,207 million yen, higher than the planned amount (101% of the plan).

(3) Project Period

The project period was from June 2017 to December 2019 and exceeded the plan (124% of the plan). The main reasons were the delay in the commencement of the full renovation of the Promyshlennaya Substation and the changes in the transport route of materials (from via Turkmenistan to via Russia and Kazakhstan), as well as the delay in the work to change the connection of distribution lines.

<Evaluation Result>

Both the project cost and the project period exceeded the plan, but only slightly. Therefore, the efficiency of the project is high.

4 Sustainability

• Policy and System

Tajikistan's national development plan at the time of ex-post evaluation is the *National Development Strategy of the Republic of Tajikistan for the period up to 2030* (NDS), which was identical to that of the ex-ante evaluation. The *Power Sector Development Master Plan* (2017) and the *Power Sector Financial Recovery Plan* (2019) were positioned as the sector plans, after the end of the period covered by the *Guideline for Energy Development 2003-2015* which was effective at the time of the ex-ante evaluation. With regard to the power sector management structure, the Ministry of Energy and Water Resources is responsible for the policy aspects. The entire power generation and distribution was handled by Barqi Tojik (BT), but a sector reform was carried out in 2018, and power distribution is now handled by STB, which is positioned as a subsidiary of BT⁶. The two substations developed under the project are under the jurisdiction of STB in Dushanbe.

At the time of the ex-post evaluation, the same national development plan as at the time of planning was in place as policy, and the sector plans are in line with this national plan, so there are no changes in terms of policy. The organisation responsible for electricity distribution in Dushanbe is also clearly positioned.

Therefore, the sustainability in terms of policy and system is high.

• Institutional/Organizational Aspect

The substations developed under this project are operated under the following structure under the STB in Dushanbe.

- Promyshlennaya Substation: operated by the Sino District Control Station, maintained by the Dushanbe Right Bank Substation Service
- Radiostantsiya Substation: operated by the Somoni District Control Station, maintained by the Dushanbe Left Bank Substation Service
- Operators: both substations are constantly operated by two shifts of six people.
- Maintenance personnel: 18 on the right bank of the Dushanbe River and 16 on the left bank of the Dushanbe River, which are well staffed.

The operation and maintenance status of both substations suggests that the number of personnel is sufficient for smooth operations of the substations. Therefore, the sustainability of the institutional/organisational aspects is considered to be high.

• Technical Aspect

On average, the operators responsible for operation and maintenance of both substations had the necessary skills through more than 20 years of experience, and the various Russian-language manuals developed under this project were also kept and utilised. Operation and maintenance personnel attend training by engineers every six months and go through a certification process every year. Engineers also reportedly receive regular training from the Ministry of Energy and Water Resources and others, and a certain training plan has been developed and implemented.

This systematic implementation of training and the fact that there have been no power outages caused by the two substations indicate that the technical level required for operation and maintenance is adequate.

• Financial Aspect

While the individual financial statements of each of the three power generation, transmission and distribution companies that split up as

⁶ Transmission was to be handled by Shabakakhoi Intikoli Bark OJSC (SIB), which was established as a subsidiary of BT.

a result of the power sector reform have not been published, the consolidated accounts and audit report for the entire power sector in 2021 were published for the first time in 2023⁷. According to the report, the power sector is in a difficult financial situation, with significant debt overhangs and current year losses. In response to this situation, the Government has taken measures to reduce debt, and the World Bank and the Asian Development Bank have provided support to BT to improve its financial soundness. The audit report also states as a going concern assumption that the debt will be covered by the government loan and that BT's management expects continued financial support from the government.

Regarding the two substations developed under this project, the STB has also stated that it has sufficient budget for operation and maintenance. However, the STB has not been able to collect sufficient electricity tariffs and the power sector's receivables are still increasing. In addition, although the substations developed by this project are operating without problems, there continue to be power outages in Dushanbe city, mainly due to insufficient replacement of transformers closer to the end of the line, mainly from the substations onwards, as mentioned above.

From the above, it is considered that, although efforts are being made to improve the severe financial situation with support from the World Bank and the Asian Development Bank, there are some financial challenges, given that, at the time of ex-post evaluation, the financial soundness necessary to ensure a constant and stable supply of electricity in the project area without power outages is not yet sufficiently secured.

- Environmental and Social Aspect

As stated above, it was confirmed that no specific negative environmental impacts have occurred and the executing agency does not expect any specific negative impacts in the future. The site survey during the ex-post evaluation also showed that no future environmental and social concerns existed.

- Preventative Measures to Risks

Although some issues with the development of the power distribution network in the target area were indicated above, no particular risks were identified with regard to the operation and maintenance of the substations developed under this project.

- Current Status of Operation and Maintenance

Maintenance plans for the facilities and equipment, including major repairs, are formulated every year and certain budget allocations are made accordingly. Both substations were operated according to the plan and were maintained in good condition. Regarding the procurement of spare parts, the STB said that no major problems had been encountered so far, but that genuine parts for the equipment delivered under the project were not available in Tajikistan and that it took a lot of time to get them from other countries.

As a whole, the substation equipment installed under the project has been operating in good condition, with no power outages due to overloads and no major problems or breakdowns since the project was put into service.

<Evaluation Result>

Based on the above, no problems were found in terms of policy and system, institutional and organisational aspect, technical aspect, operation and maintenance status, but the executing agency had some financial challenges, and the prospects for improvement and resolution were not clear at the time of ex-post evaluation. Therefore, the sustainability of the project effects is moderately low.

III. Recommendations & Lessons Learned

- Recommendations to Executing Agency

In the areas covered by this project, power outages due to overloading of substations have been eliminated and the factors that were hindering the stable supply of electricity have been removed, but localised power outages have continued to occur even after the completion of this project. This is mainly due to faults in the distribution network and small-scale transformers between the substations developed under the project and the end-users. Therefore, it is important for the STB responsible for power distribution in the target area to realise the original objective of stable power supply in the entire area through the sequential replacement of aged related-facilities as soon as possible and the creation of an environment in which the effects of this project can be fully demonstrated.

- Recommendations to JICA

None

- Lessons Learned

Thorough maintenance of the distribution section between the substation developed through the aid project and the end-users

Although the project developed highly urgent substations in Dushanbe city, the ex-post evaluation found that the improvement in the quality of electricity supply was not always sufficient for end-users in the supply areas. This was because, although power outages caused by substation faults had been eliminated as a result of the improved and newly constructed substation facilities, the distribution network (distribution lines and transformers) from the substation to the end-users remained dilapidated, and these faults did not eliminate the power outages for the end-users and the project effects could not be considered to have been sufficiently generated.

In this project, two substations with particular urgency were developed, but it was important that the distribution network beyond these substations functioned without any problems in order to fully realise the project effects. It was necessary for JICA to analyse such risks when planning the project and fully consider the plans for improving the power distribution network, and if there were concerns, to

⁷ The audit of BT was carried out by an Armenian auditing firm (BDO Armenia CJSC), which prepared the report.

encourage the executing agency to implement the rehabilitation plan or to encourage other donors to rehabilitate the power distribution network. When planning a similar project in the future, it is important to simultaneously implement overall improvements to ensure that the electricity network as a whole functions adequately and that the quality of electricity is improved for end-users, and to monitor the progress of such improvements.

Consideration of outcome indicators to measure the project effects

In this project, four indicators were established to measure the project effects, two of which were the substation capacity and the annual power supply capacity. The substation capacity is an ‘output indicator’ that is directly achieved through the construction of the substation, while the annual power supply capacity is also an indicator close to ‘output’ that is expected to be achieved to a certain extent through the expansion of facilities. However, as project effects are to be captured by measuring the outcomes achieved, it is necessary to also establish outcome indicators to measure whether the substations developed through the implementation of the project are being fully utilised. Therefore, when implementing a similar project, it is important that JICA, from the planning stage, thoroughly discuss with the executing agency not only the indicators related to the capacity of the facility, but also the appropriate indicators and target values related to the utilisation of substations to ensure the stable supply of electricity on the distribution network.

IV. Non-Score Criteria

- Performance (Objective Perspective)
None

- Additionality
None



Substation equipment developed at the Promyshlennaya Substation
(Source: External Evaluator)



Small-scale substation independently developed by the executing agency after the project
(Source: External Evaluator)

(end)