No.

Ex-Post Evaluation Report of Japanese ODA Loan Projects 2009 (Bulgaria, Albania)

January 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

OFFICE MIKAGE, LLC

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2007. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

January 2011

Atsuro KURODA
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Bulgaria

Port of Bourgas Expansion Project

External Evaluator: Kenichi Inazawa, Office Mikage, LLC

1. Project Description

Map of the Project Area

Terminal 2A at the Port of Bourgas

1.1 Background

The Port of Bourgas is located along the coast of the Black Sea in the southeastern part of Bulgaria. In 1996, its handling volume exceeded the peak[1] and increased to 7.1 million tons. With the capacity of the port facilities at the time, it was predicted that said volume would eventually reach a limit.[2] Also, since the cargo transportation carried by large cargo vessels was traveling longer distances, it became urgently necessary to renew cargo-handling equipment and to enhance handling capacity. The lack of yard in the port in particular became a stumbling block, and the efficiency and safety of handling cargoes were problematic. Under these circumstances, it was recognized that expanding and improving the facilities and installations of the Port of Bourgas were urgent.

Coals and ores from the Port of Bourgas were mainly handled at the Kremikovtzi AD, the largest metalworking company in the country. It was forecasted that demands regarding ores and coals at the company would soar after 2000. Therefore, it was recognized that the Port of Bourgas would also increase in importance in the future.

1.2 Project Outline

The objective of this project is to respond the increasing cargo handling volume and increasing

[1] Approximately 6.5 million tons (1986).
[2] The capacity of the facilities had reached the limit because the Port of Bourgas was constructed based on the premise of adjacent-sea vessels of the Council for Mutual Economic Assistance (COMECON) trading system.

use of large vessels at the Port of Bourgas, which has a bay entrance along the coast of the Black Sea in the southeast part of Bulgaria, by constructing a new breakwater, developing a bulk terminal for coals, ores, and clinkers, and conducting dredging works for vessels' entrance channel, etc., thereby contributing to improvement of economic activities in Bulgaria.

Approved Amount/Disbursed Amount	14,312 million yen/14,309million yen
Exchange of Notes Date/Loan Agreement Signing Date	March 1998/June 1998
Terms and Conditions	[Main Body] Interest Rate: 2.7% Repayment Period: 30 years (Grace Period: 10 years) Condition for Procurement: General Untied
	[Consulting Service] Interest Rate: 0.75% Repayment Period: 40 years (Grace Period: 10 years) Condition for Procurement: General Untied
Borrower/Executing Agency(ies)	Government of the Republic of Bulgaria/Port of Bourgas, PLC (POB) (*However, from now, the output of this project will be transferred to the Bulgarian Ports Infrastructure Company (BPICo), and the Executing Agency will be changed.)
Final Disbursement Date	March 2008
Main Contractor (Over 1 billion yen)	Penta-Ocean Construction Co., Ltd. and Mitsubishi Corporation (JV)/VAB-VATECH JV(Austria)
Main Consultant (Over 100 million yen)	Pacific Consultants International (PCI) (Japan)
Feasibility Studies, etc.	F/S prepared by GUS (Bulgaria) (1994)
Related Projects (if any)	"New Container Terminals Development Project at the Ports of Varna and Bourgas"（L/A: August 2008/Approved Amount: 36,932 million yen）

2. Outline of Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Evaluation Consultant, Office Mikage LLC

2.2 Duration of Evaluation Study

Duration of the Study: April, 2010-February, 2011

Duration of the Field Study: July 5-16, 2010 (1st study: Activities for Information and Data Collection and Interview Survey)

September 26-30, 2010 (2nd study: Activities for

Evaluation Feedback)

2.3 Constraints during the Evaluation Study and Point of Concern

This ex-post evaluation report has been written based on the results of the field survey (information and data collection and interview survey, etc.) conducted in July 2010. Meanwhile, since the "Special Assistance for Project Sustainability" (hereinafter SAPS) study[3] for this project was implemented after August 2010, some changes regarding the measures and policies taken by the Bulgaria's governmental agencies may occur based on the study results and recommendations.

3. Results of the Evaluation (Overall Rating: D)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Bulgaria

Before the project implementation, Bulgaria experienced negative growth in 1996 due to delayed privatization, soaring budget deficits, and collapsed financial sectors, etc. However, political reforms, stable currency management, and financial improvement measures implemented in 1997 resulted in further price liberalization and privatization. Even the GDP's private sector share expanded to 60%, and the domestic economy stabilized. While the economic stabilization was sought, development plans for the infrastructure serving as the development base also began to be considered. As for the port infrastructure, the "Master Plan for the Development of the Port of Bourgas" had been formulated in 1996.

At the time of the ex-post evaluation, the Bulgarian government formulated the "National Development Policy (2007-13)" in 2005 in which improvement of economic competitiveness as well as enhancement and development of the basic infrastructure have been identified as priorities. Additionally, the "Bulgarian Transportation System Development Strategy" was approved by the cabinet council in April 2007, so the transportation development strategy until 2020 has been established. Therefore, the infrastructure improvement plan regarding the transportation sector has continued to be considered important. In 2006, the Ministry of Transport, Information, Technology and Communications (hereinafter "MTITC") formulated the "Bulgarian Transportation Infrastructure Development Strategy" to adapt the existing

[3] The study focuses on reconstructing the purpose of port use regarding the whole Port of Bourgas, considering the use method of the project output, Terminal 2A, and aiming to increase revenue. The study mainly consists of 1) a current condition study regarding all ports in Bulgaria, 2) a technical study regarding the bulk cargo terminal at Port of Bourgas, 3) a use conditions study of the whole Port of Bourgas, 4) a market study regarding bulk cargoes around the Black Sea coast, and 5) a market study regarding container cargoes, etc.

infrastructure's facilities and operational levels to European Union (EU) standards. In terms of the port sector, according to the strategy, the concession system has been adopted and project efficiency has been aimed for by utilizing private sectors while setting the goal on service improvements in the transportation infrastructure facilities. Currently, under the initiative of the MTITIC, the "Transportation Operational Program (2007-13)" for adapting the existing transportation system to EU's transportation network is moving ahead. As a result, even at the time of the ex-post evaluation, the port sector has continued to be considered important.

Therefore, consistency of policies and measures both at the time of the appraisal and of the ex-post evaluation can be recognized.

3.1.2. Relevance with the Development Needs of Bulgaria

At the time of the appraisal (1998), the Port of Bourgas lacked a yard on its grounds, which resulted in cargoes having to temporarily be moved and stored at inland facilities outside the port when congestion was heavy. Therefore, efficiency and safety of handling cargoes became problematic, and improvement measures were being required. Moreover, since it was predicted that demands regarding ores and coals at Kremikovtzi AD, the largest metalworking company in the country, would soar in the near future, development and construction of the bulk terminal that handled main metals like coals and ores were considered as urgent needs.

At the time of the ex-post evaluation, the annual handling capacity of bulk cargoes and metals became approximately 8.9 million tons[4] by the project implementation. In addition, since the depth of water in the vessel entrance area also became deeper, the tonnage limit of incoming vessels also was alleviated, making it possible for vessels up to approximately 120,000 tons to come and go.[5] As of 2009, however, the total handling volume at the Port of Bourgas dropped to approximately 3.5 million tons since Kremikovtzi AD, which had served as a major source of supply for bulk cargoes (coals and ores), shut down production in 2008.[6]

Meanwhile, the Executing Agency, Port of Bourgas PLC (hereinafter called, "POB"), began transshipping bulk cargoes at the Port of Bourgas and exporting them to other ports, leading to the recovery of handling volume of some of the bulk. Additionally, the Bulgarian government (MTITC) is aiming to rent its terminals in accordance with the adoption of the concession

[4] The handing capacity is the theoretical value when supposing that the berth occupancy rate is 50%.
[5] The depth of water of the Port of Bourgas averages 15.5m (the depth of water at other ports along the coast of Black Sea is approximately 9m). Moreover, the Port of Bourgas from a geographic viewpoint is highly advantageous and expansive, considering that it is the gateway to countries (Russia, Ukraine, Georgia, etc) along the coast of the Black Sea and EU in terms of marine commerce.
[6] Refer to section of quantitative indicators at "Effectiveness". The total cargo handling volume at the Port of Bourgas before the Kremikovtzi AD suspended production (e.g., in 2006) was approx. 6.77 million tons per year.

system regarding the port's operation policies.[7] In particular, Terminal 2A, which was constructed through this project, has been considered important, and now measures and policies through which an efficient and beneficial management/operation structure for both the government and concessionaires can be actualized are currently being considered. Although there is no longer a major source of supply like Kremikovtzi AD, the development of the port is being promoted as a flexible response to port operation that would streamline cargo handling needs. Therefore, it can be said that this project is consistent with developmental needs even at the time of the ex-post evaluation.[8]

3.1.3. Relevance with Japan's ODA Policy

The Official Development Assistance (ODA) Charter, which was approved by the cabinet in 1992, states that "Attention should be paid to efforts for promoting democratization, the introduction of a market-oriented economy and the situation regarding the protection of basic human rights and freedoms in the developing countries." Moreover, it mentions that supporting the infrastructure development, an important basic condition of economic and social development, must be focused on. This project offers infrastructure development assistance to Bulgaria, which is striving to move from the existing COMECON trading system to a market economy structure. It is also consistent with the relevant principles. Therefore, it is considered relevant to Japan's foreign aid policy.

This project has been highly relevant with Bulgaria's development plan and development needs, as well as to Japan's ODA policy, therefore, its relevance is considered high.

3.2 Efficiency (Rating: c)

3.2.1 Project Outputs

Table 1 shows the planned and actual major outputs of the project.

Table 1: Comparison of Planned and Actual Major Outputs

Planned at the Time of the Appraisal	Actual at the Time of the Ex-post Evaluation

[7] The MTITC intends to rent out by terminal. There are currently four terminals, including Terminal East, Bulk Cargo Terminal (Terminal 2), Terminal 2A and Terminal West.

[8] Currently, improving container cargo handling capacity is being planned at the port. Since the progress of an expansion plan (JICA's new loan project "New Container Terminals Development Project at the Ports of Varna and Bourgas") is also expected at another terminal, there is a high possibility that it may develop into a multipurpose port that handles bulk, liquid, general, and container cargoes in the future.

<table>
<tr>
<td>1. Civil Work
1) Construction for Breakwater: 1,240m
2) Construction for Bulk Cargo Terminal (Terminal 2A)
<table><tr><th>Type of Berth</th><th>No.</th><th>Total Length</th><th>Design Depth</th></tr><tr><td>Clinkers (No. 30)</td><td>1</td><td>195m</td><td rowspan="3">14.2m</td></tr><tr><td>Coals (No. 31, 32)</td><td>2</td><td>510m</td></tr><tr><td>Ores (No. 33)</td><td>1</td><td>280m</td></tr><tr><td>Total</td><td>4</td><td>985m</td><td>-</td></tr></table>*Area for Storage Yards: 12.3ha (total)</td>
<td>1. Civil Work
1) 1,196m (almost as planned)
2) Partially reduced, compared with the original plan as follows
<table><tr><th>Type of Berth</th><th>No.</th><th>Total Length</th><th>Design Depth</th></tr><tr><td>Clinkers (No. 30) *Note 1</td><td>1</td><td>195m</td><td rowspan="3">15.78m</td></tr><tr><td>Coals *Note 2 and Ores (No. 31, 32)</td><td>2</td><td>510m</td></tr><tr><td>Unused (No. 33)</td><td>1</td><td>87.31m</td></tr><tr><td>Total</td><td>4</td><td>792.31m</td><td>-</td></tr></table>Note 1）However, the current handling bulk is copper.
Note 2） Included coke.
*Area for Storage Yards: Approx. 11.1ha (total) (almost as planned)</td>
</tr>
<tr>
<td>2. Dredging Works
Increased width and depth of entrance channel and in-port anchorage: approximately 5.5 million cubic meters total</td>
<td>2. Dredging Works
Increased width and depth of entrance channel and in-port anchorage: approximately 7.76 million cubic meters in total (more than planned)</td>
</tr>
<tr>
<td>3. Procurement and Installation of Cargo Handling Equipments
1) Portal Crane (lifting capacity 40t) (for coals: 1 unit-new)
2) Portal Crane (lifting capacity 16t) (for clinkers: 3 units-replacement)
3) Ship Unloader (grab type with capacity 1,500t/h) (for coals: 1 unit-new)
4) Ship Unloader (grab type with capacity 1,500t/h) (for coals: 1 unit-replacement)
5) Ship Unloader (grab type with capacity 1,500t/h) (for ores: 2 units-new)
6) Front Loader Tire Type for coals with 8.5 cubic meters basket (8 units-new)
7) Front Loader Tire Type for ores with 4.2 cubic meters basket (7 units-new)
8) Front Loader Tire Type for clinkers with 6.2 cubic meters basket (2 units-new)
9) Small Machines (bulldozers) (6 units-new)</td>
<td>3. Procurement and Installation of Cargo Handling Equipments
1) Cancelled (new)
2) 4 units (replacement)
3) 2 units (for coals and ores-new)
4) Cancelled (replacement)
5) Cancelled (replacement)
6) Cancelled (new)
7) 4 units (new)
8) As planned (new)
9) 2 units (new)</td>
</tr>
<tr>
<td>4. Consulting Services
Related to smooth project implementations such as retrospective study review, detailed design, bidding/contract assistance, supervision of works, etc. (The amount of M/M is 470M/M.)</td>
<td>4. Consulting Services
The services were implemented as planned. (The amount of M/M is 697.03M/M.)</td>
</tr>
</table>

Sources: JICA documents, Answers on Questionnaires

The following is a series of brief explanations of how what was planned differs from what was actually implemented.

1. Civil Work

1) Length of Breakwater

The difference between the planned value (1,240m) and actual value (1,196m) is due to the initial design being revised at the project implementation phase.[9]

2) Construction for Bulk Cargo Terminal (Terminal 2A)

The berth for clinkers (No. 30) was constructed as planned, but POB and a German company, AURUBIS have agreed regarding the use of the berth,[10] and AURUBIS currently is handling copper concentration.[11]

Although the berth for ores (No. 33) was initially planned to be 280m, the Bulgarian side ran short of funds,[12] so the output plan was changed and only 87.31m was constructed. Bulk cargo handling operations are not currently conducted at this berth (No. 33); only supplying of water and electricity for cargo vessels at anchor is being conducted.

Currently, ores are being handled at Berth No. 32, which was initially planned to be constructed as a berth for coals to a section for ores. (In other words, Berth No. 32 is being used as the berth for ores.)

Additionally, the reason that the maximum designed depth of water became 15.78m was because the initial design was revised at the project implementation phase.

2. Dredging Works

The reason that the dredge volume increased than initially planned was mainly because the maximum depth of water became deeper than what was anticipated in the design (design: 14.2m; actual: 15.78m), and there was more dredge surrounding the tip of the breakwater than what was assumed.[13] In regard to the dredge in the entrance channel, a shortage of the initial project budget resulted, so the works were conducted only up to a depth of approximately 11.5m. Subsequently, however, the Bulgarian government came up with additional funds, and

[9] When POB conducted the detail design at the project implementation phase, a slight difference of the length occurred.

[10] Contract concluded in April 2006 (five-year terminable contract). Initially, a different private company signed with POB, but since AURUBIS acquired that company, the current counterparty is AURUBIS.

[11] AURUBIS acquired a copper plant near Pirdop in the southwestern part of Sofia, the capital city. It is importing raw copper ores via the Port of Bourgas and refining and processing them at the plant. Ten percent of processed copper goods are exported from the Port of Bourgas, while 90% are exported to other EU nations by rail and trucks. (*Refer to the “Results from Operation and Effect Indicators” at “Effectiveness” section regarding the handling of copper.)

[12] Refer to 3.2.2.2 Project Cost.

[13] According to POB, dredging works became more difficult the more they were conducted offshore, and it was also difficult to predict the dredge amount.

additional dredging works equivalent to 4m were conducted. As a result, the depth of water changed to 15.78m, which is the same as the detail design.

3. Procurement and Installation of Cargo Handling Equipments

The reason for the difference between the plan and the actual result of Terminal 2A's entire berth (No. 30, 31, 32, 33) was mainly due to Bulgaria's lack of funds, as explained in 3.2.2.2 (Project Cost), however POB made its best efforts, in spite of the lack of funds. For example, while many cancellations occurred, POB worked on optimizing the cargo handling system just like the berth for clinkers (No. 30) by moving the existing cranes from a different terminal, since new procurement could not be expected.

4. Consulting Services

The reason that the actual M/M volume increased is mainly due to project cost excesses and delays. Additionally, consulting services, including the supervision of works related to the above-mentioned additional dredging works, are also considered as part of the increase.

Figure 1: Project Site (1) - The Whole Port of Bourgas

Figure 2: Project Site (2) - The Whole Terminal 2A

3.2.2 Project Inputs

3.2.2.1 Project Period

Table 2 compares the planned and actual periods. The planned project period was 71 months from June 1998 to April 2004; however, it actually took 118 months, from June 1998 to March 2008, 166% longer than planned. The reason for the delay is related to the reason mentioned in 3.2.2.2 (Project Cost) in the next section. As for the delay regarding civil work, it took more time than expected to procure sand and soil, while the dredging works were delayed because the project faced problems related to abandoned ammunitions, etc. The procurement/installation period of the cargo handling equipments was prolonged since it was implemented in accordance with the progress of the berth construction works (civil works). Due to the overall delay of construction, the period of consulting services was also extended.

Table 2: Planned and Actual Project Period

Outputs	Planned	Actual
(The Whole Project)	June 1998 to April 2004 (71 months)	June 1998 to March 2008 (118 months)
1) Civil Work (bidding and contract)	December 1998 to April 2000	December 1999 to June 2001
2) Civil Work (main construction work)	May 2000 to April 2004	June 2001 to September 2006
3) Dredging (bidding and contract)	December 1998 to April 2000	December 1999 to June 2001

4) Dredging (main dredging work)	May 2000 to April 2004	June 2001 to September 2006 September 2006 to March 2008 （additional dredging work）
5) Handling Equipments (bidding, contract, and manufacture)	April 2001 to October 2002	December 1999 to October 2002
6) Handling Equipments (installation)	November 2002 to April 2004	November 2002 to March 2006
7) Consulting Services	October 1998 to April 2004	August 1999 to March 2008

Source: JICA documents, Project Completion Report (PCR), answers on questionnaires.

3.3.2.2 Project Cost

The planned cost was 19,082 million yen (JICA loan amount was 14,312 million), and the actual cost was 23,716 million yen (JICA loan amount was 14,309 million), which was slightly higher than planned (about 124% of the plan). The main reasons for cost excesses are:

1） Problems Related to Abandoned Ammunitions/Firearms

During the dredging works, abandoned ammunitions and firearms used during World War II were frequently found on the ocean floor. Each time they were discovered, construction was interrupted, and officers were sent from the Ministry of Defense (in some cases, specialists were invited from the Netherlands and Germany) to conduct clearance operations. As a result, costs related to construction, insurance, etc., increased.

2） Problems Related to Dredge Soil Disposal

Since residents of Chernomoretz, the village considered as the site for dredge soil disposal, waged a protest opposing this decision, the Ministry of Environment ordered POB to dispose of the dredge soil 30 miles offshore from the village, which resulted in increased transfer and disposal costs.

3） Problems Related to Exploitation/Transfer of Construction Materials (Sand/Soil)

Initially, the plan was to obtain sand in the coastal area of Nesebar in the northern part of the Port of Bourgas as construction material for the berths. However, it was discovered that rare crabs, etc., lived in the sand surrounding the area, so it could not be used, since the Ministry of Environment also instructed POB not to use the sand. POB tried to obtain sand from another area (near Lake Vaya), but since POB could not get much, it decided to collect soil from the area surrounding a mine near the City of Bourgas. As a result, collection and transport costs increased.

Therefore, accomplishing the output based on the initial budget became difficult. Although

the original loan agreement stated that the Bulgarian government (MTITC) would cover the additional costs, additional funds disbursed by the government were limited to only a part of it. Striving to minimize the hindrance to the operation of the berths and cargo handling equipments after the project completion, POB worked to keep spending in line by scaling down other output plans and proceeded with construction of high-priority areas. As a result, as mentioned previously, reduction of the berth length and a decrease in the amount of cargo handling equipment procured occurred.

In the end, additional funds were only approved for the dredging works. Through the implementation of the additional dredging works, the depth of water changed from approximately 11.5m to 15.78m, and the maximum tonnage of vessels that could enter the port became approximately 120,000 tons. (Approximately 50,000 tons before the additional dredging works were implemented.) Meanwhile, additional budgets were not allocated for procuring cargo handling equipment.[14] According to POB, this resulted in the remote cause, in which the cargo handling equipments and part of the berth were damaged.[15]

Tues, the project period was higher than planned while the project cost was slightly higher than planned, therefore efficiency of the project is low.

Figure 3: Berth No.31

Figure 4: A vessel enters the Port of Bourgas. Vessels up to 120,000 tons may enter the port.

3.3 Effectiveness (Rating: b)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

[14] Also, due to the reason mentioned in footnote 13, additional budgets were not allocated for cargo handling equipment.

[15] Refer to 3.5.4. “Current Status of Operation and Maintenance” at Sustainability section.

With regard to evaluating the project effectiveness (quantitative evaluation), cargo handling volume (solid bulk, liquid cargo, and general cargo), number of vessels arriving in port and total gross tonnage of vessels arriving in port, berth occupation ratio, and operating ratio per crane were reviewed and analyzed.

1) Cargo Handling Volume at the Port of Bourgas

Table 3 shows transition of cargo handling volume (actual figures) at the Port of Bourgas. At the time of the appraisal, the annual handling volume after the project completion was estimated as 2.5 million tons for coals, 1.5 million tons for ores, and 0.6 million tons for clinkers.[16]

Table 3: Transition of Cargo Handling Volume at the Port of Bourgas (Unit: 1,000 tons)

Year	Solid Bulk					General Cargo	Liquid Cargo	Total Volume at the Port of Bourgas
		Coals	Ores	Copper and Other Concentrates	Clinkers			
1994	3,483	1,762	1,486		135	2,853	75	6,411
1995	5,376	1,953	2,191		560	3,107	56	8,539
1996	4,755	1,810	1,860		580	2,347	39	7,141
1997	4,847	1,769	1,766		591	2,657	26	7,530
1998*	3,959	1,189	1,742		449	2,243	58	6,260
1999	2,779	994	1,197		64	1,805	35	4,619
2000	3,625	1,191	1,018	735	65	2,154	96	5,875
2001	3,053	892	982	754	0	2,004	68	5,125
2002	3,255	734	1,039	769	0	1,685	43	4,983
2003	3,777	1,184	1,632	533	0	2,229	26	6,032
2004	3,460	1,084	1,275	386	0	2,319	42	5,821
2005	3,328	1,055	1,043	314	6	2,176	131	5,635
2006	4,222	1,124	1,337	749	125	2,276	273	6,771
2007	2,813	513	917	806	0	2,029	211	5,053
2008**	1,696	606	251	807	32	2,862	57	4,615
2009	1,891	45	914	932	0	1,616	56	3,563

Source: Project Completion Report (PCR), POB documents. *Project commencement year /**Project completion year.

Note: Between 1994 and 1999, "Ores" and "Copper and Other Concentrates" were recognized as the same type of bulk, and the handling volume was counted as one unit.

Compared to the handling volume of coals, ores, and clinkers at the time of the appraisal, the bulk handling volume after Terminal 2A was constructed is flagging. Although the reason is explained below, Kremikovtzi AD, the largest source of supply in the country of bulk cargoes,

[16] In addition, the demand for coals and ores at Kremikovtzi AD after the project completion was estimated with 1.3-1.5 and 2.2-2.3 million tons, respectively.

suffered financially and shut down production around the same time that Terminal 2A was completed, causing a dramatic decrease of the bulk handling volume at the Port of Bourgas[17].

- Handling of Clinkers

Since 2000, the handling of clinkers has almost ceased since it became possible to obtain cement materials in the country rather than importing them from overseas. As described in "Output" at "Efficiency" section, Berth No. 30 at Terminal 2A was initially constructed for clinkers, but copper is currently being handled by AURUBIS, which began doing so in 2006. As described in Table 3, the handling volume of other bulks including copper is on the rise since that same year. Meanwhile, even as for clinkers, actual handling results can be identified between 2005 and 2008, although the amount is small. Particularly in 2006, Bulgaria experienced a construction boom due to the booming economy. It is considered that relying on imports was necessary since domestic supply alone was not enough.

- Handling of Coals

The handling volume of coals has decreased since 2007. This is mainly due to the decrease in demands, as Kremikovtzi AD suffered financially and shut down production. Since there was no other major source of supply in the country, the decrease in handling of coals could not be avoided. After the company ceased production in 2008, there was little or no handling volume of coals. According to POB, they are importing a small amount of coals mainly as heating fuel for homes (45,000 tons in 2009).

- Handling of Ores

The handling volume of ores has also decreased since 2007. Same as what has been previously stated, the reason is because Kremikovtzi AD suffered financially and shut down production. The decrease in the handling volume could not be avoided since there was no major source of supply even for ores in the country. Meanwhile, the handling volume of ores in 2009 increased year-on-year since POB exported the ores to other ports after handling them at the Port of Bourgas. Namely, this was a result of starting to utilize the berths as a transit port.[18] According to POB, exportation in 2009 was mainly to the Port of Galati in Romania.

2) Number of Vessels Arriving in Port and Total Gross Tonnage of Vessels Arriving in Port at

[17] POB commented that "Demands for coals, ores, etc. of Kremikovtzi AD prior to the shutting down of production was approximately 3 million tons annually of which approximately 2 million tons were handled at Terminal 2A. Greatly affected by the production shutdown of Kremikovtzi AD, the total of the current handling volume has decreased approximately 50% than before" (see Table 3: approximately 6.77 million tons in 2006; approximately 3.56 million tons in 2009).

[18] An analysis of the coastal shipping on the Black Sea by POB revealed that 30-40% of all cargo traffic volume was transshipment (transit). Based on the study, introducing (new) cargo handling equipment to increase the handling volume of transshipment cargoes is currently being considered.

Bulk Cargo Terminal, Berth Occupation Ratio, and Operating Ratio per Crane

Table 4 shows the number of vessels arriving in port and the total gross tonnage of said vessels, berth occupation ratio, and operating ratio per crane at the Port of Bourgas, in the two years after the project completion.

Table 4: Number of Vessels Arriving in Port and Total Gross Tonnage, Berth Occupation Ratio, and Operating Ratio per Crane

	2008	2009
Number of Vessels Arriving in Port (total)	842	620
(number of vessels with coals)	29	5
(number of vessels with ores)	2	54
(number of vessels with copper and other concentrates)	120	155
(number of vessels with clinkers)	2	0
(number of vessels with general cargo)	668	397
(number of vessels with liquid cargo)	21	9
Total Gross Tonnage of Vessels Arriving in Port (1,000 ton) *Note 1	4,918	3,917
Berth Occupation Ratio (%) *Note2		
Berth No. 30 (handling for copper)	54	N/A *Note 3
Berth No. 31 (handling for coals and coke)	18	
Berth No. 32 (handling for ores)	12	
Operating Ratio per Crane (%) *Note 4		
(average operating ratio with four handling equipments (portal crane) at Berth No. 30)	11.5	10.3
(average operating ratio with two handling equipments (ship unloader) at Berths No. 31 and No. 32) *Note 5	6.5	12.5

Source: POB documents

Note 1) Tonnage per terminal is unknown.
Note 2) Duration that berth was occupied (hours) ÷ duration that berth was operated (hours).
Note 3) No data were prepared in 2009.
Note 4) Crane operating hours (hours) ÷ (7 days ×24 hours)
Note 5) Two cargo handling equipments (ship unloaders) are shared and used at Berths No. 31 and No. 32.

The followings are descriptions of differences of analysis and reviews, regarding these data.

- Number of Vessels Arriving in Port

According to POB, the number of coal/ore vessels arriving in the port has been affected by the shut-down of Kremikovtzi AD. In particular, the number of coal vessels arriving in the port has dropped significantly. As the table shows, it is judged that the number of coal/ore vessels arriving in the port has remained low compared to the number of vessels arriving at Berth No. 30, where the handling bulk is copper, which was constructed at the same terminal (Terminal 2A). The reason that the number of ore vessels arriving in the port has increased from 2008 to

2009 is that the berths are now being utilized as a transit port. Moreover, although the overall number in 2009 has decreased compared to the previous year, it is likely that the global financial crisis may have caused the drop. According to POB, 2010 is a year that has seen some degree of recover, and an increase in the overall number compared to 2009 is predicted.

- Total Gross Tonnage of Vessels Arriving in Port

There is no data for the total gross tonnage of vessels per terminal. The data available is in regard to the entire Port of Bourgas, thus it may be difficult to determine certain points. Nevertheless, it can be assumed that the total gross tonnage of vessels arriving in the port decreased due to the decrease in bulk cargo handling volume.

- Berth Occupation Ratio

If the occupation ratio is set with 26%[19] for one berth, the ratios at most berths are low, except the ratio at Berth No. 30.[20] The occupation ratio declined due to the decrease in handling volume of bulk cargoes such as coals and ores.

- Operating Ratio per Crane

As for the crane operating ratio, this indicator is not used to determine the Effectiveness since the target value was not set in advance. Nevertheless, the number was found to be around 10%[21].

Figure 5: Berth No. 32
(in the far back is the ship unloader procured for the project)

Figure 6: Breakwater Constructed by the Project

3.3.1.2 Calculations of Internal Rates of Return (IRR)

Financial Internal Rate of Return (FIRR):

At the time of the appraisal, financial analysis was conducted by setting port usage fees and

[19] According to the criteria from JICA's Operation/Effect Indicator Reference.
[20] Berth No. 30 is currently being used by AURUBIS. Detailed information pertaining to the operating time at the berth could not be obtained.
[21] Basically, it is thought that the crane operating time will increase given that there is an increase in bulk cargo demands as well as in the number of vessels arriving in port.

income from cargo handling charges as benefits and investment costs (operating cost), administrative/maintenance, and operation costs as costs. In addition, the project life was set at 30 years. Then, the Financial Internal Rate of Return (FIRR) was calculated as 8.5%. At the time of the ex-post evaluation, recalculation was attempted using the same calculation method, which showed that expected benefits (port usage fees, income from cargo handling charges, etc.) were not satisfactory. There were also excessive operating costs and project delays. Therefore, the internal rate of return was negative (not calculated).

The Economic Internal Rate of Return (EIRR) was not calculated at the time of the appraisal. At the time of the ex-post evaluation, it was not recalculated because specifying the prerequisites of benefits both at the time of the appraisal and ex-post evaluation was considered to be difficult.

3.3.2 Qualitative Effects (Safety of Handling of Bulks and Improvement of Work Efficiency)

Improvements pertaining to safety and efficiency are unknown in situations in which the handling volume of bulk cargoes is decreasing and the operating time of cargo handling equipments (cranes, etc.) is relatively short. However, POB states that cargo transport is now being conducted more safely as a result of equipping a new ship unloader (crane for bulk) at Berth No. 31.

(Determination of the Effectiveness Rating and Conclusions)

When comparing the quantitative indicative data (actual) of 2009 with that forecast at the time of the appraisal (2.5 million tons of coals and 1.5 million tons of ores regarding annual handling volume at the project completion stage), coals were 1.8% (45,000 tons) and ores were 60.9% (914,000 tons), which declined greatly. However, these forecast figures were performance goals based on the assumption that the Kremikovtzi AD would continue operating. In addition, POB's efforts to develop project effects such as starting transshipment transport of ores to increase handling volume should be considered. Therefore, its effectiveness is fair.

[Column: How and Why the Kremikovtzi AD Shut Down Production]

Founded in 1961, the Kremikovtzi AD is the country's largest metalworking company. At the time of the appraisal, its crude steel production capacity was 1,750,000 tons by converters and 400,000 tons by electric furnaces, while its revenue was 2.6 million dollars (actual figures in 1996). The company produced approximately 75% of all the

crude steel in Bulgaria, and its products were mainly exported to EU countries and Turkey. Although Bulgaria continued experiencing economic growth and faced increasing wages of domestic workers after 2000, the administrative side was not very proactive about the wage tendency and investing in the old metalworking plant. Since operating costs (e.g., fuels) and wages of the workers were not satisfactory, strikes were occurred frequently. Throughout these incidents, production dropped and deficits expanded. In 2007, both the administrative side and the government held discussions regarding continuing the business. As a result, production ceased in 2008 and the company filed for bankruptcy.

Moreover, around the same time that the Kremikovtzi AD's business conditions were worsening, Bulgaria was forging ahead to become an EU member, so the company was required to meet EU's environmental standards. Nevertheless, problems related to air pollution from the exhaust gas from the plant were not alleviated.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Impact on the Improvement of Economic Activities in Bulgaria

With the project implementation, it was expected that cargo handling volume at the Port of Bourgas would increase and that the production at Kremikovtzi AD would also grow, in order to contribute to the Bulgaria's economic activity. However, as stated earlier, due to the company's shut-down, it resulted in a decline in the bulk cargo handling volume at the Port of Bourgas. Therefore, it can be assumed that the impact of the project is limited at this point.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

There is no negative impact on the environment from the project.[22] Moreover, the following explanations are the need of improving environmental issues pointed out before the project implementation, the implementation of environmental monitoring during the project implementation, and the environmental monitoring system and implementation condition after the project completion.

[22] No major observations of negative impact on the environment were found in the field survey.

1) Improvement of Environmental Issues Such as Soot and Dust

Environmental standards in Bulgaria require that a distance of more than 1,000 meters must be secured between the yard of the port facilities and the urban area to prevent soot and dust from scattering into the neighboring cities. Since at the time of the appraisal the yard was located approximately 800 meters from the urban area,[23] improvements were required. Meanwhile, at the time of the ex-post evaluation, measures such as covering bulk cargoes with calcareous matter to prevent dust from scattering have been taken at Berth No. 30 (see Figures 1 and 2) at Terminal 2A, which is the closest to the urban area and is recognized to be less than 1,000 meters away, which violates the environmental standards. Therefore, problems related to dust have not occurred. Additionally, AURUBIS, which is currently using Berth No. 30, is planning to construct a warehouse in the near future to store bulk cargoes indoors,[24] so such problems will continue being prevented.

2) Implementation of Environmental Monitoring

According to POB, no environmental problems occurred at all during the project implementation. Moreover, it can be considered that no problem exists concerning the environmental monitoring system and implementation conditions[25] after the project was completed. Since the Bourgas branch of the Ministry of Environment is in charge of conducting overall environmental monitoring of the city of Bourgas, it also conducts monitoring for the Port of Bourgas. Should any environmental pollution (e.g., oil leakages) be confirmed, residents or POB staff will contact the branch, and external companies commissioned by the office will conduct cleaning.

3) Impact on the Ecosystem

As explained in 3.2.2.2 Project Cost (“Efficiency”), although the original plan was to obtain sand in the coastal area of Nesebar for building the berths, it was discovered that rare crabs and other animals lived there. Thus, POB decided to collect soil from the area around a mine near the city of Bourgas, since the Ministry of Environment also instructed not to use the sand. Therefore, it can be said that impact on the ecosystem was considered during the project implementation.

3.4.2.2 Land Acquisition and Resettlement

Neither resettlement nor land acquisition occurred in the project. It was confirmed through

[23] According to JICA appraisal documents.
[24] There are two objectives for storing materials indoors: damages to the materials can be minimized, and environmental issues can be considered.
[25] The environmental monitoring included inspections of treatment of waste water drained when the terminal is used.

interviews with POB employees and local site investigations.

3.5 Sustainability (Rating: c)

3.5.1 Structural Aspects of Operation and Maintenance

Since the Bulgarian Port Infrastructure Company (hereinafter called "BPICo")[26] has been required by law to construct, manage, and operate the ports in Bulgaria, the company should be the one in charge of this project management and operation under ordinary circumstances. The outputs constructed by the project would have been transferred from POB to BPICo, and operation and maintenance would have been conducted by BPICo. However, the maintenance work have been conducted continuously by the Facility Administration Department[27] of POB[28]. Meanwhile, the Bourgas branch of BPICo controls and supervises[29] the facilities at the Port of Bourgas. The reason that the outputs' transfer have not completed yet is, as described in 3.5.4 Current Status of Operation and Maintenance, that there has been an instance where a damaged part (a dent) was found in the berth No.32 after the project completion. According to BPICo and POB, until the damaged part is repaired, POB is in charge of the operation and maintenance. Hereafter, the repair is scheduled to be conducted after a detailed study is concluded and possible measures are examined, and the transfer is scheduled to officially be approved based on a decision to be made in the cabinet council meeting. However, the date was not specified at the time of the ex-post evaluation (as of July 2010). In addition, although who shall be conducting the repair of the damaged part and how the budget should be handled still seem to be undecided, BPICo commented that this task may be imposed[30] on future concessionaires. In the case of the

[26] Established in 2005. There currently are 135 employees. The headquarter office is located in Sofia, the capital city. BPICo is a public corporation (national enterprise) that owns and manages port facilities in the country. There are four BPICo branches (Port of Bourgas branch and Varna branch near the Black Sea, Port of Ruse branch near the Danube, and Port of Lom branch). Each branch manages and supervises its port facilities by working with local port operators.

[27] The department is in charge of operational and maintenance tasks of the bulk cargo terminal facilities.

[28] Established in 1903. The Executing Agency at the time of the appraisal was also POB. In POB's appointment system of its executive personnel, the executive board members who are the top decision-making body are first appointed by the MTITC. Based on the board's resolution, the executive director is elected, and this decision is reported to the MTITC. Subsequently, an agreement regarding the approval of operation is signed between the MTITC and the executive director, and thus the organizational structure is established.

[29] Should repairs or works on a larger scale be necessary, a structure is set up that allows BPICo to exercise certain control and supervision rights such as approving POB to delegate repair and construction works to external companies (or sometimes bidding that directly concerns the selection of external companies to outsource the tasks is conducted by BPICo).

[30] As a matter of planning for both the MTITC and BPICo, it is considered that all port facilities will be loaned to and cargo handling tasks will be outsourced to the concessionaires from now. If the plan decision comes to fruition, after the repairs to the damaged parts of the berth are completed, all facilities will be transferred from POB to BPICo and will immediately be loaned and outsourced to concessionaires. According to BPICo, future concessionaires are not assumed to be domestic companies but rather those outside the country (with profitability in mind).

Port of Bourgas, concession biddings are conducted per terminal for loaning and outsourcing. Therefore, whether or not concessionaires can be found is what remains to be done.

Although there were 2,756 POB employees at the time of the appraisal, the number dropped to approximately 1,000 at the time of the ex-post evaluation (as of July 2010). Among them, 224 employees are in the operation and maintenance division (bulk cargo division). By the end of this year, it is anticipated that the number will be downsized to 970 employees because staff downsizing was gradually being conducted through such measures as adopting an early retirement plan. It is also recognized that Kremikovtzi AD's shut-down has affected staff downsizing.[31]

Therefore, there are concerns regarding future maintenance implementation structure since POB has faced worsening operational and financial conditions, and it has downsized the staff. However, it seems that there is no major problem regarding the current maintenance structure or BPICo's control and supervision structures.[32]

3.5.2 Technical Aspects of Operation and Maintenance

The Human Resources Division at POB creates an annual training plan to offer support so employees may qualify for various certifications and improve their PC skills.[33] In 2008, 19 training courses were conducted with more than 140 participants. In 2009, 12 training courses were conducted with more than 100 participants. Moreover, many maintenance staff members have extensive experience, and on-the-job training (OJT) is conducted occasionally. The staff has high professional qualifications.[34] Therefore, POB's technical level in terms of operation and maintenance is adequate.

3.5.3 Financial Aspects of Operation and Maintenance

Table 5 explains the operation and maintenance budget regarding the project. The reason that the budget decreased in 2009 is because the handling volume at the Port of Bourgas dropped significantly, and POB's operating revenue also declined due to Kremikovtzi AD's shut-down.

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[31] For reference, there are 1,350 employees in 2009, and the decrease is considered as great as the one last year.

[32] Although the Executing Agency of this project is currently in the transitional phase, sustainability is considered in this ex-post evaluation, assuming that POB will continue being responsible for operation and maintenance.

[33] On the POB's site, there is an educational center used exclusively for training and run by the Human Resources Division. This is where the staff members receive training.

[34] Regarding the staff's qualifications, in the case of crane operators, for example, they will be qualified to take the operation test after receiving crane maneuvering training for about a month. If they pass the test, they may assume the responsibility of maneuvering operations. Moreover, managing engineers of the facilities and staff in charge of the power distribution division must have graduated at least from technical schools.

Table 5: Operation and Maintenance Budget of POB (Unit: 1,000 BGN)

	2006	2007	2008	2009
Operation Budget	3,030	3,282	3,110	800
Maintenance Budget	1,693	2,015	2,643	994
Total	4,723	5,297	5,753	1,794

Source: POB documents

POB has been operated with an independent profit system, and the maintenance budgets have to be allocated from operation revenues. POB's financial resources consist of cargo handling operation income, rental income from renting warehouses, and power/water supply income obtained from vessels arriving in port.[35] Regarding the data on Table 5, POB commented that "regular maintenance was conducted until 2008 by eking out the maintenance budget. Since 2009, however, enough budgets could not be secured thus only emergency maintenance is currently being conducted." As background, POB has officially announced its plan to cut costs, reduce labor costs, and acquire new customers in 2008 and has been striving to improve its financial standing since then. Since the plan was announced, the operation and maintenance budgets decreased in 2009, as shown in Table 5.

Table 6 is the Statement of Income of POB for the last four years. Due to Kremikovtzi AD shutting down, POB's revenues and expenses have also been affected. There has been some impact from the global financial crisis in 2009, which also has depressed operating revenue.[36] Therefore, despite POB's efforts to cut costs to improve revenues, there is concern about the financial condition of operation and maintenance, since the budget to conduct regular maintenance cannot be secured.

Table 6: Statement of Income of POB (Unit: 1,000 BGN)

	2006	2007	2008	2009
Operating Revenue	35,836	33,438	40,462	26,046
Non-operating	5,271	3,543	2,878	1,352

[35] Meanwhile, BPICo collects harbor charges from vessels arriving in port, which have become the company's source of income.

[36] Operating revenue, non-operating income, and operation cost and financial cost increased from 2007 to 2008. This mainly relates to the economic boost in Bulgaria that resulted from the country's joining EU and the economic boom worldwide at that time. According to POB, the main factors are 1) the handling volume of general cargoes increased, compared to 2007 (see Table 3 on page 12), and the operating revenue also increased (since the unit price of the handling volume per ton is higher than that of bulk cargoes, the influence is definitely reflected in the operating revenue). In addition, with increases of handling volume of general cargoes, the operating cost, etc., also increased; 2) the handling volume of container cargoes increased by approximately 16,000 TEU in Port of Bourgas, compared to the previous year, and the operating revenue and cost, etc., also increased, and so on. (Information about the detailed reasons for the increase of the operating cost from 2007 to 2008 was not available.)

Income				
Operating Cost and Financial Cost	35,775	38,840	50,766	32,470
Profit Before Tax	5,332	-1,859	-7,426	-5,072
Current Net Profits (losses)	4,500	-1,859	-7,588	-5,027

Source: POB documents

3.5.4 Current Status of Operation and Maintenance

The staff members of the Facility Administration Department at POB are conducting maintenance work by following the facility/equipment usage manual. As for repairs, staff members who have professional knowledge and experience are conducting the work. Moreover, POB has a certain amount of spare parts stored.[37] Nevertheless, due to maintenance budget shortfalls, the current situation is that only emergency maintenance is being conducted as of this moment. As for the breakwater, there have been no damages, and there is no record of repairs after the project completion, either. No problems could be identified regarding the conditions of the facilities (regular inspections are being conducted). Nor is there a problem regarding the staff's skill and maintenance implementation status both for Terminal 2A and cargo handling equipment.[38]

As shown in Figure 8 below, there is a damaged part (a dent) on the surface of Berth No. 32. According to POB, the dent was made when bulk transport that should have not been conducted was actually conducted, due to the lack of cargo handling equipment.[39] As a result, it seems that an excessive load was placed on the area where the dent eventually formed, making the foundation sag.[40]

[37] The structure allows orders to be placed on an as-needed basis. POB commented that although it takes some time from the point that repair becomes necessary to actually placing the order, the delivery time itself is relatively short. Nevertheless, due to the current budget shortfall, sometimes parts cannot be purchased.

[38] The staff members are engaged in maintenance tasks at the terminal all day and all night on a two-shift system.

[39] Transport by bulldozers and heavy machineries adds lots of burden (excess load).

[40] As noted in "Constraints During the Evaluation Study and Point of Concern" on pages 2 and 3, the study (SAPS study) aimed at reconstructing the purpose of port use regarding the whole Port of Bourgas, considering the use method of the project output, Terminal 2A, and at increasing the revenue along with the project purpose, is underway. In the study, the examination of cause and remediation of the damaged part is being investigated.

Figure 7: Berth No.30

Figure 8: Dent at Berth No.32[41]

As a general conclusion of the "Current Status of Operation and Maintenance," there is no problem regarding the implementation details of maintenance. Nevertheless, as mentioned above, there are concerns that damage has occurred at the berth and that there is no plan to repair this affected area even now. Repair work must be conducted as soon as possible.

(Determination of the Sustainability Rating and Conclusions)

As explained, it may be safe to assume that there is no major problem regarding POB's operation and maintenance. However, problems of sustainability under the current conditions have been observed because deficits persist, the operation and maintenance budget is insufficient, regular maintenance is not being conducted, and the damage to the surface of the berth still has not been repaired. Therefore, sustainability of the project is low.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

It can be seen that the project conforms to national policy and development needs. Meanwhile, the project period became longer and the cost greater than initially planned. Some of the outputs could not be achieved. Moreover, demands declined and bulk handling volume of coals and ores also decreased due to the production shutdown of Kremikovtzi AD. This meant that regular maintenance has not been conducted due to budget shortfalls resulting from the Executing Agency's poor operating revenue. Additionally, there is concern that repairs of damage to the surface of the berth still have not been scheduled. Therefore, this project is evaluated as unsatisfactory (D), however the Executing Agency has been promoting new efforts

[41] Water has collected in the dent, which appears to be approximately 100m by 3-7m in size, with an estimated maximum depth of approximately 40-50 cm.

such as exporting ores that have once been handled to other ports (utilizing facilities as a transit port) and the new approach can be evaluated as appreciable.

4.2 Recommendations

(Recommendations for the Executing Agency)

1) To expand the low cargo handling volume, it is desirable to continue securing new sources of supply and to promote the facility as a transit port. The Port of Bourgas is blessed with advantageous conditions. Geographically, it is the eastern gateway to the EU. Its water is also deep, allowing large vessels access to it. To maximize its advantages and to lower risks of cargo handling volume decreasing when major sources of supply like Kremikovtzi AD shut down suddenly, it is desirable to establish strategies and management plans that accommodate the cargo growth trend at different times (e.g., promote plans as a transit port), continuously in the future.

2) Regarding the damage in Berth No. 32 at Terminal 2A, Bulgarian side should immediately identify repair methods, a schedule, and costs. The cargo handling volume is currently decreasing, and should berth operating hours become longer because the berths are being used as a transit port, cargo handling will be affected if repairs are delayed. This could become a heavy burden on the financial condition of the Executing Agency, if concerns regarding the lack of maintenance budgets cannot be resolved.

(Recommendation for JICA)

As for this project's outcome indicators such as cargo handling volume, it is desirable to continue conducting monitoring. While a new loan project (development of a container cargo terminal) is yet to begin and the total cargo handling volume at the Port of Bourgas must always be monitored, it is especially worth considering using the relevant monitoring data as a performance indicator to optimize existing and new projects.

4.3 Lessons Learned

(Lessons Learned Regarding Project Cost Excess and Project Period Delay)

Due to project cost excesses and delays, the project faced a budget shortfall, and some of the cargo handling equipment could not be procured. Regarding the costs which were not covered by JICA's loan, the aid-receiving country usually has to owe those amounts, which are ruled by the loan contract. In case that there is negative impact on the appearance of the project's effects, when the aid-receiving country realizes that additional budgets are necessary, it must take action

to secure the budgets as much as possible. At the same time, JICA should occasionally ask for the execution of such tasks to the country. Throughout this process, it is desirable to enhance the certainty of disbursing additional costs.

(Lessons Learned Regarding the Necessity of Considering Risks at the Project Planning Stage)

The cargo handling volume at the Port of Bourgas was directly affected by the shutdown of Kremikovtzi AD, which was the port's major supplier of bulk cargoes. Should there be only one supplier or only a few at the planning stage, it is desirable to carefully consider and analyze the risks associated with the project.

Comparison of the Original and Actual Scope of the Project

Items	Original	Actual
1. Project Outputs	1. Civil Work 1) Construction for Breakwater: 1,240m 2) Construction for Bulk Cargo Terminal (Terminal 2A) - Clinkers, 1, 195m, 14.2m - Coals, 2, 510m, 14.2m - Ores, 1, 280m, 14.2m (total number of berths is 4 and total length is 985m) - Area for Storage Yards: 12.3ha (total)	1. Civil Work 1) 1,196m (almost as planned) 2) Partially reduced, compared with the original plan as follows - Clinkers (copper), 1, 195m, 15.78m - Coals/Ores, 2, 510m, 15.78m - Unused, 1, 87.31m, 15.78m (total number of berths is 4 and total length is 792.31m) - Area for Storage Yards: Approx. 11.1ha (total)
	2. Dredging Works Increased width and depth of entrance channel and in-port anchorage: approximately 5.5 million cubic meters total	2. Dredging Works Increased width and depth of entrance channel and in-port anchorage: approximately 7.76 million cubic meters in total (more than planned)
	3. Procurement and Installation of Cargo Handling Equipments 1) Portal Crane (lifting capacity 40t) (for coals: 1 unit-new) 2) Portal Crane (lifting capacity 16t) (for clinkers: 3 units-replacement) 3) Ship Unloader (grab type with capacity 1,500t/h) (for coals: 1 unit-new) 4) Ship Unloader (grab type with capacity 1,500t/h) (for coals: 1 unit-replacement) 5) Ship Unloader (grab type with capacity 1,500t/h) (for ores: 2 units-new) 6) Front Loader Tire Type for coals with 8.5 cubic meters basket (8 units-new) 7) Front Loader Tire Type for ores with 4.2 cubic meters basket (7 units-new) 8) Front Loader Tire Type for clinkers with 6.2 cubic meters basket (2 units-new) 9) Small Machines (bulldozers) (6 units-new)	3. Procurement and Installation of Cargo Handling Equipments 1) Cancelled (new) 2) 4 units (replacement) 3) 2 units (for coals and ores-new) 4) Cancelled (replacement) 5) Cancelled (replacement) 6) Cancelled (new) 7) 4 units (new) 8) As planned (new) 9) 2 units (new)

	4. Consulting Services Related to smooth project implementations such as retrospective study review, detailed design, bidding/contract assistance, supervision of works, etc. (The amount of M/M is 470M/M.)	4. Consulting Services The services were implemented as planned. (The amount of M/M is 697.03M/M.)
2. Project Period	June 1998 – April 2004 (71 months)	June 1998 – March 2008 (118 months)
3. Project Cost		
Amount paid in Foreign currency	5,843 million yen	14,309 million yen
Amount paid in Local currency	13,240 million yen	9,407 million yen
Total	14,312 million yen	14,309 million yen
Japanese ODA loan portion	14,312 million yen	14,309 million yen
Exchange Rate	1 USD=121 yen (As of June 1998)	1 USD=115.21 yen (Average between June 2001 and March 2008)

Albania

Drin River Hydropower Stations Rehabilitation Project

External Evaluator: Kenichi Inazawa, Office Mikage, LLC

1. Project Description

Map of the Project Area

Fierza Hydropower Station
(Power Generation Building and Dam)

1.1 Background

In Albania, a number of hydropower stations were built as a part of the water resource development policy implemented by the former socialist regime. However, most of them were built in the period between the 1950s and 70s, and rehabilitation was required due to aging infrastructure. Meanwhile, an increase in power demand, mostly for household consumption, had been expected after 1995. At that time, Albania struggled with a shortage of funds to develop the domestic power sector to meet the surging power demand, as the country was then transitioning to a market-oriented economy. Immediate actions to stabilize the power supply were sought. Under these circumstances, rehabilitation efforts were launched for existing domestic hydropower stations, with the help of loans provided by international aid organizations.

1.2 Project Outline

The objective of the project is to strengthen power generation capacity and increase its production, by rehabilitating and modernizing the existing hydropower stations (Fierza Hydropower Station and Vau i Dejes Hydropower Station) such as upgrading mechanical, electrical and control equipments, converting the existing equipments into high grade ones;

thereby contributing to stabilize the supply of power and economic growth in Albania.

Approved Amount/Disbursed Amount	1,681 million yen/1,681 million yen
Exchange of Notes Date/Loan Agreement Signing Date	October 1995/November 1995
Terms and Conditions	Interest Rate: 2.6% Repayment Period: 30 years (Grace Period: 10 years) Condition for Procurement: General Untied
Borrower / Executing Agency(ies)	Albania Power Corporation (KESH)/ Albanian Power Corporation (KESH) Guarantor: Government of the Republic of Albania
Final Disbursement Date	December 2006
Main Contractor (Over 1 billion yen)	ABB SAE Sadelmi S.p.A. (Italy)
Main Consultant (Over 100 million yen)	N/A
Feasibility Studies, etc.	F/S prepared by Lahmeyer International (Germany) (1993)
Related Projects (if any)	Drin River Cascade Rehabilitation Project (1995-2007) (Entire project covered mostly by EBRD loans[1])

2. Outline of Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Evaluation Consultant, Office Mikage, LLC

2.2 Duration of Evaluation Study

Duration of the Study: April, 2010 – February, 2011

Duration of the Field Study: June 22–30, 2010 (1st study)

October 4–8, 2010 (2nd study)

2.3 Constraints during the Evaluation Study

N/A

[1] Name of the entire project mostly covered by the loan from European Bank for Reconstruction and Development (EBRD), including a portion covered by a JICA loan (this project). (For more information, see Table 1 on page 5. Portion covered by EBRD loan: utility construction work for the power station, rehabilitation for the control systems, etc. Portion covered by the grant aid provided by the Swiss and Austrian governments: rehabilitation and other activities for water mechanical equipment for intakes and conduits.

3. Results of the Evaluation (Overall Rating: B)

3.1 Relevance (Rating: a)

3.1.1 Relevance with the Development Plan of Albania

Albania undertook economic restructuring in 1990 when it introduced market competition principles and achieved increased GDP growth in 1993. Aided by the IMF's Enhanced Structural Adjustment Facility (ESAF) in 1993, the Albanian government formulated a policy called the Medium-term Macro-economic Policy (1993–1996). The main focus of the policy was cultivating core elements of external economic policy by facilitating exports and attracting direct investments. Under these circumstances, electric power was recognized as a major export item for Albania as well as a leading infrastructure that would attract direct investment from the outside world. Additionally, the Albanian government formulated the Public Investment Plan (PIP), in which the power sector was placed as a high priority.

At the time of the ex-post evaluation, the Albanian government (Ministry of Economy, Trade and Energy) formulated the National Energy Strategy in May 2007 to promote energy development, with the aim of resolving domestic power demand issues in the country. In addition, the government also formulated a 2009–2011 policy for the power sector and an energy program by approving the Ninth Power Sector Action Plan in February 2009. As a result, even at the time of the ex-post evaluation, the power sector has continued being considered important. Therefore, consistency of policies and measures with this project both at the time of the appraisal and the ex-post evaluation can be recognized.

3.1.2. Relevance with the Development Needs of Albania

At the time of the appraisal (1995), Albania was using its rich water resources to generate power and exporting it to other countries. In 1992, the value of the country's exported power was 16 million US dollars, equivalent to some 25% of the country's total exports. However, in the next year, that value dropped to 5 million US dollars due to the increased domestic power demand, a figure equivalent to some 5% of the country's total exports. Meanwhile, it was anticipated that the country's household power consumption would rise sharply, by approximately 13–16%, in 2001. Therefore, it was also anticipated that Albania's power demand would exceed its production, since the power generation capacity was still restricted.

At the time of the ex-post evaluation, the total domestic power generation has increased in comparison with its level at the time of the appraisal. The total domestic power generation was

around 3,400GWh at the time of the appraisal, which has increased to around 5,200GWh[2] at the time of the ex-post evaluation. Overall power consumption, mainly by household, increased by 1% each year in the last decade, and thus further increases in power demand are predicted. Additionally, the Dam Safety Project was recently launched, mainly with the help of a World Bank loan,[3] for the purpose of ensuring the safety of dams for domestic hydropower generation, improving operations, and stabilizing the power supply.

Therefore, it can be assumed that Albania will continue to have a pressing need to develop its hydropower generation capacity.

3.1.3. Relevance with Japan's ODA Policy

The Official Development Assistance Charter (ODA Charter) approved by Japan's Cabinet in 1992 states, "Attention should be paid to efforts for promoting democratization, the introduction of a market-oriented economy and the situation regarding the protection of basic human rights and freedoms in the developing countries." Since this project aims to support Albania's shift to a market-oriented economy, it is considered relevant to Japan's foreign aid policy.

This project has been highly relevant with Albania's development plan and development needs, as well as to Japan's ODA policy, therefore, its relevance is considered high.

3.2 Efficiency (Rating: c)

3.2.1 Project Outputs

1) Planned and Actual Outputs of the Entire Project

Table 1 shows planned and actual outputs and lists the sources of funding for the entire project. The main focus of the project was to rehabilitate Albania's largest hydropower stations, Fierza Hydropower Station and Vau i Dejes Hydropower Station,[4] with the aid of the European Bank for Reconstruction and Development (hereinafter, EBRD) loan, JICA loan, and grant aids from the Swiss and Austrian governments. Under the terms of the EBRD loan, utility civil works of the power stations and rehabilitation of the control systems were planned, while the

[2] Actual data in 2009.
[3] To be completed in 2013.
[4] Total output capacity is: Fierza Hydropower Station, 500MW (4 generator units of 125MW); Vau i Dejes Hydropower Station, 250MW (5 generator units of 50MW). Both are general hydropower stations. The generator units were made in China, and the turbine generator model is a vertical-shaft Francis Turbine. For reference, Japan's largest hydropower station with the same generator model is the Arimine-Daiichi Power Station (1 generator unit of 265MW) of the Hokuriku Electric Power Company.

JICA loan planned for rehabilitation of power generator units and replacement of electrical equipment installed in the power generation chambers and substation facilities. Furthermore, with the help of grant aids provided by the Swiss and Austrian governments, rehabilitation of water mechanical equipment for intakes and conduits was planned. The output of the project as a whole was implemented as planned.

Table 1: Planned and Actual Outputs and Sources of Project Funding

Rehabilitation Project of Fierza Hydropower Station	
Planned (at the time of the appraisal)	Actual (at the time of the ex-post evaluation)
1) Utility civil works (ground utilities) ->EBRD loan and Albania's own funds 2) Mechanical equipment (intake, conduit, new runners, etc.) ->Grant aid from the Swiss government 3) Electrical equipment (see upper row of Table 2) ->JICA loan 4) Instrumentation and control equipment ->EBRD loan	1) 2) 3) 4) Implemented as planned
Rehabilitation Project of Vau i Dejes Hydropower Station	
Planned (at the time of the appraisal)	Actual (at the time of the ex-post evaluation)
1) Utility civil works (ground utilities) ->EBRD loan and Albania's own funds 2) Mechanical equipment (intake, conduit, new runners, etc.) -> Grant aid from Austrian government 3) Electrical equipment (see lower row of Table 2) ->JICA loan 4) Instrumentation and control equipment ->EBRD loan	1) 2) 3) 4) Implemented as planned
Consulting Services (The Entire Project)	
Planned (at the time of the appraisal)	Actual (at the time of the ex-post evaluation)
->To be implemented with funds provided by EBRD. Activities include project preparation, tender evaluation, management of utility civil works, etc. (223M/M)	->Implemented as planned. (232M/M: slightly exceeded the planned value due to the additional need for design engineers and additional works caused by the extension of the project period.[5])

Sources: JICA documents, Answers on Questionnaires

[5] The Executing Agency commented that the additional consulting services remained insignificant in terms of volume since strict controls were placed on the project operation of consultants and fund control.

2) Planned and Actual Outputs of JICA Loan Portion

Table 2 shows planned and actual outputs regarding the JICA loan portion, across the entire project. The project was almost implemented as planned at the time of the appraisal: rehabilitation of power generation units (four units of Fierza Hydropower Station and five units of Vau i Dejes Hydropower Station) and replacement of electrical equipment installed in the power generation chambers and substation facilities.

Table 2: Planned and Actual Outputs Regarding JICA Loan Portion

Outputs	Planned (at the time of the appraisal)	Actual (at the time of the ex-post evaluation)
Fierza Hydropower Station	- Testing and upgrading of unit-transformers - Rewinding and stacking of 2 generator units - Testing of generator units - Replacement of excitation for 4 units - Upgrading of cooling system for 2 generators - Replacement of 220KV isolator switches (18x) - Improvement of A.C. and D.C. system - Upgrading of illumination system - Procurement of spare parts - Procurement of emergency diesel generator	Procurement, installation and replacement were implemented as planned.
Vau i Dejes Hydropower Station	- Testing and upgrading of unit-transformers - Replacement of unit protection system - Replacement of excitation systems - Replacement of A.C. and D.C. system - Replacement of 4 x 220kV-bays -Replacement of 1 x 110KV-bays - Upgrading of cooling system for 5 units - Testing of generator units - Improvement of illumination system - Procurement of spare parts - Procurement of emergency diesel generator	Procurement, installation and replacement were implemented as planned.

Sources: JICA documents, Answers on Questionnaires

Figure 1: Project Site[6]
(Fierza Hydropower Station and Vau i Dejes Hydropower Station)

3.2.2 Project Inputs

3.2.2.1 Project Period

The planned project period was 47 months, from November 1995 to September 1999; however, it actually took 144 months, from November 1995 to October 2007,[7] 306% much longer than planned. The major reason of the delay is explained as follows:

1. Due to the worsened security condition, sparked by Ponzi scheme failures[8] in 1997, commencement of the construction was delayed by 9–10 months.[9]
2. EBRD held financing and loans in abeyance for a period of 38 months from April 1997 to May 2000, mainly due to the insufficient performance of the Executing Agency such as high transmission loss rate, low performance in collecting power charges, etc. This

[6] Shown in this figure, there are three hydropower stations on the Drin River. In fact, Komani Hydropower Station was out of the project scope.
[7] Rehabilitation of the Fierza and Vau i Dejes hydropower stations was completed in February 2007 and October 2007, respectively.
[8] Although Albania introduced a market-oriented economic system in the early 1990s, its financial system remained primitive. A significant number of Albanians invested in Ponzi schemes that had been condoned by the government. However, dividend payments fell behind schedule, and the scheme eventually went bankrupt in 1997, losing 1.2 billion US dollars. This triggered rebellions throughout the nation, reflecting increased disillusionment towards the government among Albanians. The government imposed a state of emergency to quell a rebellion (approx. 2,000 lost their lives in the disturbance). Albania was in chaos in that year.
[9] The tender period was extended by one month. This caused another 8-month delay until the construction agreement became effective.

led JICA to adjust their work schedule, including the timing of the loading, because the JICA loan portion (electrical equipment and devices, etc.) had to be correlated with the progress of the EBRD loan portion (control and monitoring systems).

3. In connection with the abeyance of financing and suspension of the project, in August 2008, a contractor in charge of the power-generating facilities demanded an additional fund from the Executing Agency as costs for the storage of delivered equipment and personnel secured during the time. After significant time was spent for the negotiation regarding the amount for the demanded fund and securing the additional budget, the additional agreement finally became effective in September 2002. As a result, the construction commenced by the contractor after 30 months of delay. (The actual construction on the site started in January 2003).
4. After the construction commenced, unexpected water leakage occurred from the power-generation and peripheral facilities. This caused a six-month delay. (The water leakage has already been resolved.)

As described above, the main reason for the delay in the project schedule was the abeyance of financing and loans from EBRD. In hindsight, however, it is questionable whether the implementation of co-financing/financial aid by multiple donors was really effective. According to the interview with the Executing Agency, “Albania at that time was unable to obtain necessary funding for the project without securing multiple donors for co-financing or funding. However, procuring methods for the facilities and equipments varied by donor and the related procedures were also complicated. Therefore, it is considered unavoidable that the project cost ended up exceeding the original plan due to the delay in processes.” This shows that, given the circumstances of multiple financing/funding, it is important both for donors and recipient countries to manage project progress and costs more carefully.

3.3.2.2 Project Cost

The planned cost was 4,387 million yen (JICA loan amount was 1,681 million), and the actual cost was 6,470 million yen (JICA loan amount was 1,681 million), which was higher than planned (about 147% of the plan). As explained in 3.2.2.1. (Project Period), the main reason that the actual project cost exceeded the planned cost was delays in the schedule for procuring facilities/equipment and commencement of the rehabilitation work. Specific reasons for the delays include: an increase in the Albanian government’s spending as a consequence of the

abeyance of financing and loans by the EBRD, which made a contractor of power-generating facilities demand additional funds to cover the cost of storage of delivered equipment and personnel secured during the time; unexpected costs arising from foreign exchange fluctuations; and disassembling work for generator units.

Table 3 shows the planned and actual costs of the project. As stated above, the Albanian government struggled to secure funds to cover the additional costs incurred in connection with delays in project progress. The additional costs were covered by loan assistance (Italy's ODA loan) provided by Italian Finance Corporation for Mid-Term Financing (Mediocredito Centrale: MCC).

Table 3: Total Project Cost (Planned at the Time of the Appraisal and Actual at the Time of the Ex-post Evaluation) (Unit: million yen)

Items	Planned (at the time of the appraisal)			Actual (at the time of the ex-post evaluation)		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
1. Fierza Hydropower Station						
1) Utility civil works	68	105	172	76	45	121
2) Mechanical equipment	644	35	679	1,029	454	1,483
3) Electrical equipment	909	37	946	1,014 *Note 1	797	1,811
4) Instrumentation and control equipment	136	12	148	412	65	477
2. Vau i Dejes Hydropower Station						
1) Utility civil works	19	21	39	25	2	27
2) Mechanical equipment	777	85	862	629	204	833
3) Electrical equipment	692	13	705	1,012 *Note2	209	1,221
4) Instrumentation and control equipment	589	7	596	432	65	497
3. Contingencies	192	16	207	0	0	0
(JICA loan)	(80)	(0)	(80)	(0)	(0)	(0)
4. Tax and duties	0	33	33	0	0	0
Total	4,024	364	4,387	4,629	1,841	6,470
(Total of JICA loan)	(1,681)	(0)	(1,681)	(1,681)	(0)	(1,681)

Sources: JICA documents, Answers on Questionnaires

*Note 1) Total cost of the project at the time of the appraisal (partial) may not be consistent due to rounding.

*Note 2) Actual cost of the project for electrical equipment includes a portion covered by MCC (Fierza Hydropower Station, approx. 84 million yen, and Vau i Dejes Hydropower Station, approx. 261 million yen).

Tues, the project period was significantly higher than planned while the project cost was higher than planned, therefore efficiency of the project is low.

3.3 Effectiveness (Rating: a)

3.3.1 Quantitative Effects

3.3.1.1 Results from Operation and Effect Indicators

With regards to evaluating the project effectiveness (quantitative evaluation), maximum output, net electric energy production, unplanned outage hours, etc. regarding both Fierza Hydropower Station and Vau i Dejes Hydropower Station were reviewed and analyzed.

1) Fierza Hydropower Station

Table 4 shows a transition of maximum output and actual net electric energy production regarding Fierza Hydropower Station. Disassembling and rehabilitation of four generator units began in 2003. Since one of the generator units was under rehabilitation each year, they produced 125MW less power, which is equivalent to the capacity of a generator unit, between 2003 and 2006.

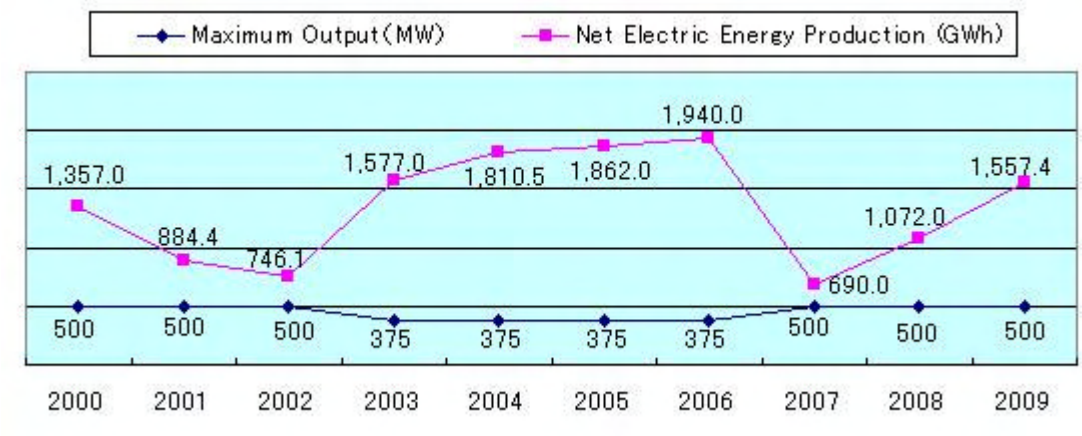
As shown in Table 4, annual average power generation varies widely by year. At the time of the appraisal, the project was predicted to improve their power generation by 417GWh. Before the project was implemented, actual power generation (annual average between 1981 and 1991) was 1,378GWh. Therefore, assuming the planned value as 1,795GWh, a total of those figures, the planned value was reached some years only before 2007 (the year the project completed). Nonetheless, it should be kept in mind that the above result does not necessarily show the actual effects of the rehabilitation, because power generation performance depends on factors that can greatly influence the figures such as amount of rainfall and dam flow (discharge), with or without instrument malfunctions.[10] For instance, the 2007–2008 figure shows a decrease in power generation despite virtual completion of the rehabilitation project. This can be explained by a breakdown[11] of the generator unit caused by a malfunction of an aged wall tube insulator[12]

[10] With regards to the point that the actual power generation (1,557.4 GWh) in Table 4 was almost the same as it was in the year 2003, the year before the implementation of the rehabilitation, it is because the Executing Agency adjusted the amount of the power generation from Fierza Hydropower Station for the purpose of securing the amount generated from the existing hydropower station in Drin River, Komani Hydropower Station (see Figure 1 on page 7), to some extent. Therefore, according to the Executing Agency, the actual power generation at Fierza Hydropower Station in 2003 did not become as high, although the rehabilitation had already ended.

[11] Despite the smooth progress of the rehabilitation work, operation of one of the generator units ceased due to the malfunction of an aged wall tube insulator installed in the step-up transformer of the No. 4 generator unit. This occurred between August and December 2007, causing a decrease in power generation. No major problems have

installed in the step-up transformer of the No. 4 generator unit as well as by a decrease in average flow rate per year (see Table 5).

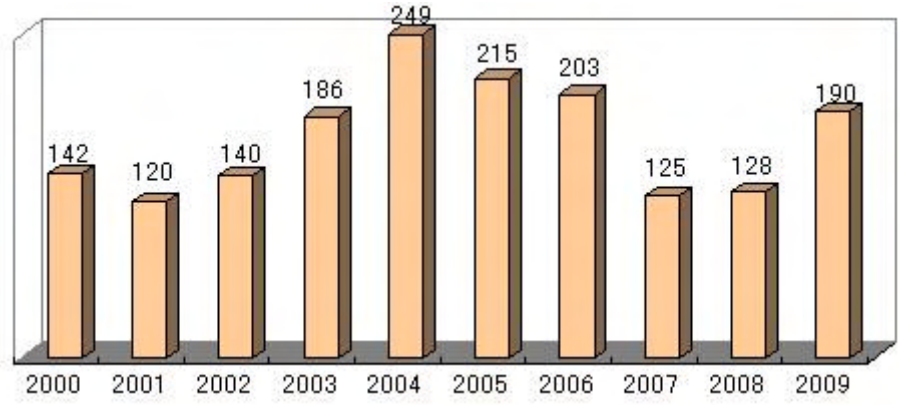
Table 4: Maximum Output and Actual Net Electric Energy Production Regarding Fierza Hydropower Station



Sources: Answers on Questionnaires

Table 5: Annual Average Water Inflow from the Reservoir Dam to Fierza Hydropower Station

(Unit: m³/sec.)



Sources: Executing Agency's documents

Unplanned outage hours totaled about 1,300 hours [13] before the commencement of rehabilitation (2000), while as shown in Table 6, unplanned outage hours after the rehabilitation

occurred after the rehabilitation work completed. It should be noted that the problematic wall tube insulator installed in the step-up transformer was not included in the entire rehabilitation project.

[12] It is a tube-shaped insulator made from insulating material such as porcelain, which is generally used as an external insulator for devices such as instrument transformers and breakers.

[13] According to the Executing Agency's data.

(2008–2009) have dramatically reduced to around 52–44 hours. This is because the frequency of failures/malfunctions was significantly reduced after rehabilitation of all generator units. The figure reached 4,832 hours per year in 2007 as described earlier, due to a malfunction of the wall tube insulator installed in the step-up transformer of the No. 4 generator unit. Following the completion of rehabilitating efforts, all generator units have been operating normally without any failures or malfunctions. Looking at the performance from 2005 through 2009 (aside from 2007), clear progress can be seen as generator units are rehabilitated one by one and unplanned outage hours decrease in proportion.

Table 6: Unplanned Outage Hours at Fierza Hydropower Station (Unit: hours/year)

	2005	2006	2007	2008	2009
Unplanned Outage Hours	329	172	4,832	44	52
(Outage Hours by Human Error)	0	0	0	0	0
(Outage Hours by Machine trouble)	329	172	4,832	44	52

Sources: Answers on Questionnaires

Figure 2: 220KV Isolator Switches
(Fierza Hydropower Station)

Figure 3: Generator Units
(Fierza Hydropower Station)

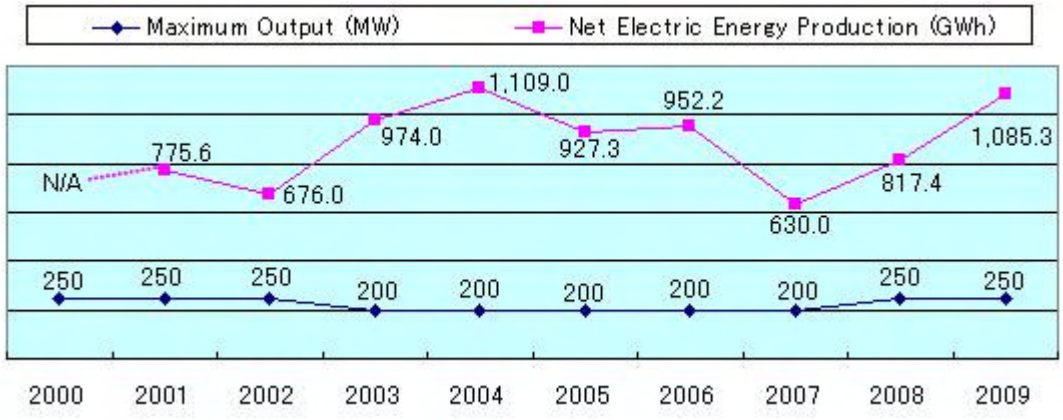
2) Vau i Dejes Hydropower Station

Table 7 shows a transition of maximum output and actual net electric energy production regarding Vau i Dejes Hydropower Station. Beginning from 2003, disassembling and rehabilitation of five generator units were implemented for this power station. Since one of the generator units was under rehabilitation in each year, power output (50MW) was decreased by a certain amount, equivalent to the capacity of one generator, between 2003 and 2007.

Like the Fierza Hydropower Station, Table 7 shows that annual average power generation widely varies year by year. At the time of the appraisal, it was predicted that the amount of power generation improved by this project would achieve 178GWh. Before the project

implementation, actual power generation was 878GWh (annual average of power generation between 1981 and 1991). Therefore, assuming the planned value as the total of those figures, 1,056GWh, the planned value was achieved in 2009[14] after the project completion in 2007. Nonetheless, it should be kept in mind that the above result does not necessarily show the actual effect of rehabilitation due to some fluctuant parameters, such as amount of rainfall and dam flow (discharge) and occurrence of instrument malfunction, that have a major influence on the figures. For instance, the 2005–2006 figure shows decrease in power generation (see Table 7) despite virtual completion of the rehabilitation project. This can be explained by the breakdown[15] of the generator unit caused by the malfunction of the aged wall tube insulator installed in the step-up transformer of the No. 2 generator unit, as well as by a decrease in average flow rate per year (see Table 8). Particularly during 2007–2008, a decrease in average flow rate per year (see Table 8) can be considered the sole cause.

Table 7: Maximum Output and Actual Net Electric Energy Production Regarding Vau i Dejes Hydropower Station

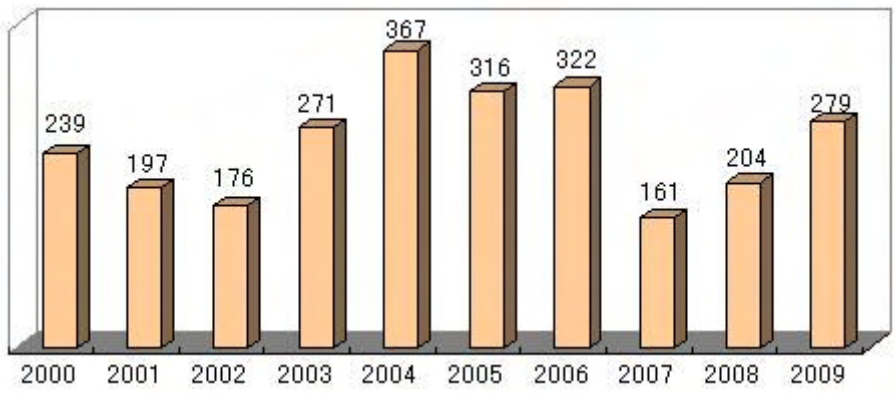


Sources: Answers on Questionnaires

[14] 1,085.3GWh was recorded.

[15] In June 2005, a malfunction of a wall tube insulator installed in the step-up transformer caused a fire. The transformer was set in a generator that connected to the No. 2 generator unit. (The suspected cause was an aged instrument.) Due to this accident, the entire generator units went into abeyance for nearly a month, and the No. 2 generator unit was in abeyance until March 2006. Since rehabilitation and inspection took place during this period, the power generation amount during 2005–2006 dropped in comparison with that of 2004. Like the situation at the Fierza Hydropower Station, it should be noted that the high-pressure wall tube insulator was not included in the rehabilitation target of the entire project. After the rehabilitation work completed, the entire generator unit has operated without problems.

Table 8: Annual Average Water Inflow from the Reservoir Dam to Vau i Dejes Hydropower Station (Unit: m³/sec.)



Sources: Executing Agency's documents

Unplanned outage hours totaled approximately 610 hours[16] before the commencement of rehabilitation (2000), while as shown in Table 9, those after the rehabilitation in 2008–2009 were dramatically reduced to around 73–44 hours. Like the Fierza Hydropower Station, this is because frequency of failure/malfunction dropped dramatically after the rehabilitation of all generator units. Looking at the performance of 2005 through 2009, a tendency can be seen: as the rehabilitation process of the generator unit progresses one by one, unplanned outage hours decreases in proportion. It should be noted that the reason for the increased outage hours during 2005–2006 (from 283 to 559 hours) was because of the complete outage of the No. 2 generator unit March 2006.

Table 9: Unplanned Outage Hours at Vau i Dejes Hydropower Station (Unit: hours/year)

	2005	2006	2007	2008	2009
Unplanned Outage Hours	283	559	81	73	44
(Outage hours by human error)	0	0	0	0	0
(Outage hours by machine trouble)	283	559	81	73	44

Sources: Answers on Questionnaires

[16] According to the Executing Agency's data.

Figure 4: Generator Units
(Vau i Dejes Hydropower Station)

Figure 5: Pipelines (bottom), Power Generation Building (center), and Substation Facilities (upper left)
(Vau i Dejes Hydropower Station)

3.3.1.2 Calculations of Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

Recalculating the financial internal rate of return with 1) revenue by domestic electricity sales and 2) revenue by exports as the benefits and project construction costs, operational and maintenance expenses and taxes as the costs, and assuming a project life of 25 years, the result is 13.89%. It is a slightly lower figure than the 16.00% estimation figure at the time of the appraisal. The FIRR fell lower than the estimate because of the delay in project period and project costs which exceeded those of the original plan. (Additional explanation: since the unit price of electricity [sales price] increased from 4.40 lek/KWh at the time of the appraisal to 7.0–7.5 lek/KWh (2007–2009 actual), it is considered that there is a positive influence on the result of the recalculation of FIRR, because a certain amount of profit was secured through an increase in the unit price.)

(2) Economic Internal Rate of Return (EIRR)

Recalculating the economic internal rate of return with 1) revenue by domestic electricity sales and 2) revenue by exports as the benefits and project construction costs and operational and maintenance expenses as the costs, and assuming a project life of 25 years, the result is 21.92%. It is a lower figure than the 29.00% estimation figure at the time of the appraisal. The EIRR result is lower than the estimate because of the delay in project period and the project cost which exceeded that of the original plan.

3.3.2 Qualitative Effects

(1) Project Life about the Hydropower Stations

Compared to the situation before the rehabilitation, when Fierza and Vau i Dejes hydropower stations suffered from frequent failure and malfunctions, the project life is thought to be improved because the proper operation and maintenance have been carried out at both stations. According to the Executing Agency, the project life has been prolonged after the completion of the rehabilitation due to the drastic decreases in the frequency of turbine outages, rehabilitation time, and length of downtime. If properly maintained in the future, it is likely that the hydropower stations can remain in operation for 50 years or more.

(2) Improvement of Work Environment (Safety)

It is believed that the work environment (in terms of safety) for staff has also improved since the completion of the rehabilitation. Technical staff at the hydropower stations commented in an interview, “We have been working earnestly and thoroughly on safety management even after the completion of the rehabilitation. Our work environment has improved thanks to the introduction of the latest instruments, which realized higher work efficiency.”

(Determination of the Effectiveness Rating and Conclusions)

Because of the character of the project (rehabilitating hydropower stations), effectiveness of the project should be primarily determined by looking at the increase/decrease in hours and failure/malfunction occurrence. A dramatic reduction in frequency has been observed in unplanned outage hour data for the Fierza and Vau i Dejes hydropower stations after the completion of the rehabilitation project, which proves that the project has had a positive effect. Therefore, this project has largely achieved its objectives, therefore its effectiveness is high.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Impact on the Stabilization of Electricity Supply

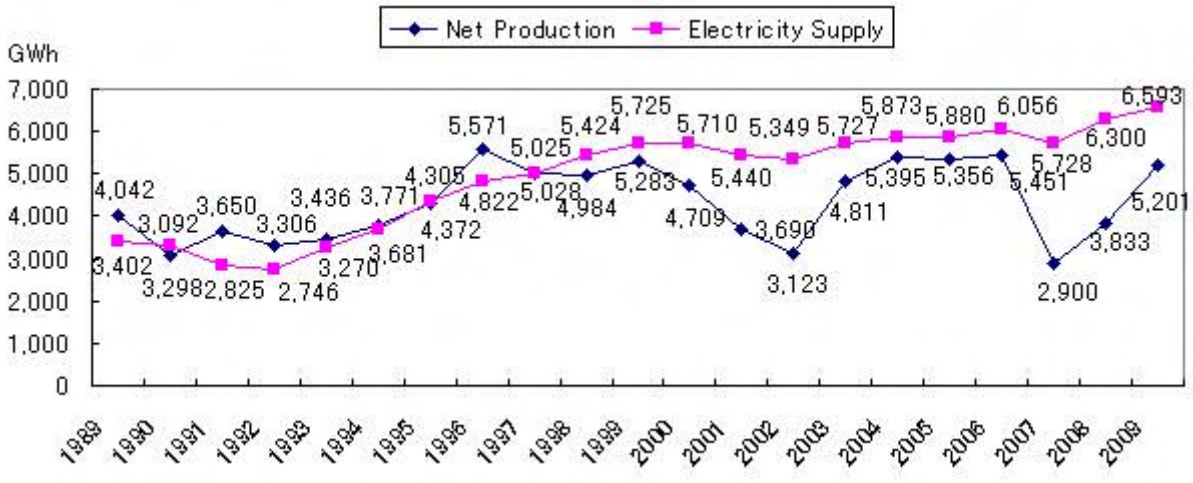
This project was implemented with the purpose of stabilizing the electricity supply by rehabilitating hydropower stations, the main power sources for Albania. Table 10 shows the country’s power consumption (power demand) and actual power production from five years prior to the project commencement to 2009. At the time of the appraisal, power demand was

estimated to grow by 1.5% or so every year after 1995. Albania's power demand has roughly trended upward since the time of the appraisal, while power production varies year by year. After around 1997, power demand began to exceed production; however, as described in 3.4.1.2, the country has imported electricity (purchased power) from neighboring countries to make up for deficiencies.

Currently, Albania's total domestic power production capacity is 1,557MW, whereas the sum total of the Fierza and Vau i Dejes hydropower stations accounts for nearly half of the country's entire power production capacity (500MW+250MW=750MW). Therefore, the impact of this rehabilitation project on domestic power supply can be considered enormous. If the rehabilitation project had not been implemented, generator units at the two stations would have faced more frequent failures/malfunctions than they had at the time of appraisal, and power production would have been much lower. Therefore, the project is considered to have had a positive impact on Albania's domestic power supply system by achieving normal operation of the two power stations, and by reducing generation unit downtime triggered by failures/malfunctions significantly.

Table 10: Transition of Net Production and Electricity Supply of the Whole Country

(Unit: GWh)



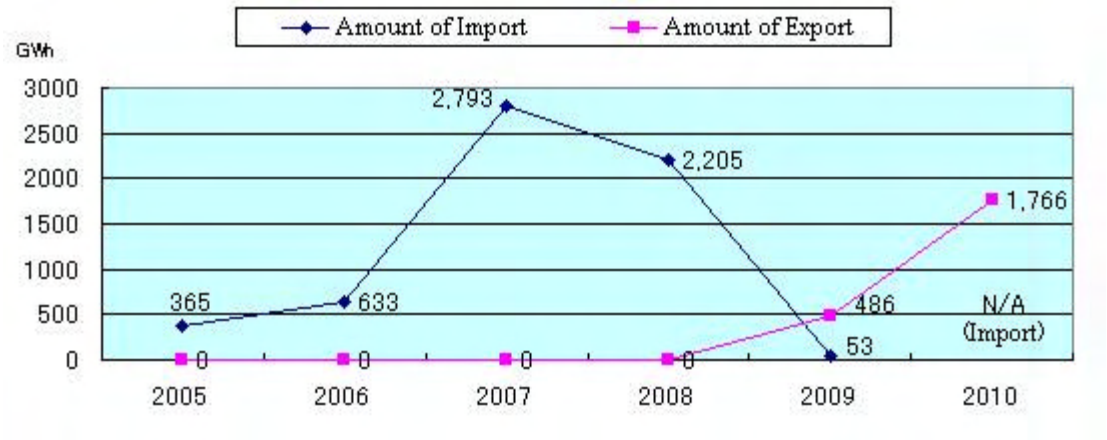
Sources: JICA documents, Answers on Questionnaires, Energy Regulatory Entities

3.4.1.2 Impact on Export, Import, and Trade Balance of Power

At the time of the appraisal, the project purpose included meeting Albania's domestic power demand and exporting electricity abroad for a certain period[17] by rehabilitating existing domestic hydropower stations to prolong the lives of their facilities. In terms of the trade balance, power production was always behind domestic power consumption in Albania until 2009, and as shown in Table 11, the country had imported electricity (purchased power) from neighboring countries to supply a deficiency in domestic demand. However, during the rainy season between October 2009 and April 2010, the country was able to produce electricity exceeding the domestic demand thanks to high rainfall. Since the end of 2009 through the first half of 2010, electricity export (selling of electricity) has generated profit as shown in Table 12.

As stated earlier, if this rehabilitation project had not been implemented, failures/malfunctions of the generator units at the existing hydropower stations would have occurred more frequently. Therefore, the rehabilitation project is thought to have brought benefits such as securing rainfall and dam flow (discharge) along with normal operation of power stations, thereby further contributing to Albania's ability to successfully export electricity to other countries.

Table 11: Transition of Albania's Electricity Export and Import Amount (Unit: GWh)

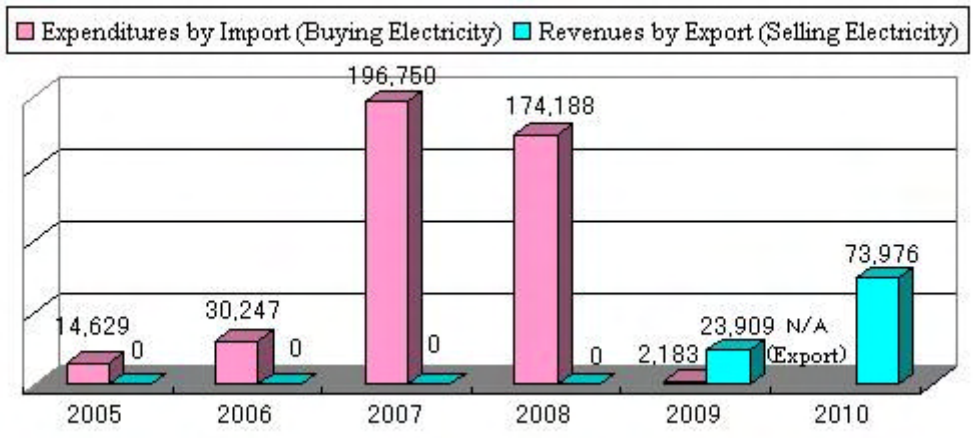


Sources: Executing Agency's documents
Note 1) Data about amount of export in 2010 is at the time of field survey (at the end of June 2010).
Note 2) Electricity export did not occur from the end of 1990 to 2004.

[17] According to JICA's appraisal documents.

Table 12: Transition of Albania's Expenditures by Import and Revenues by Export

(Unit: 1,000 Euro)

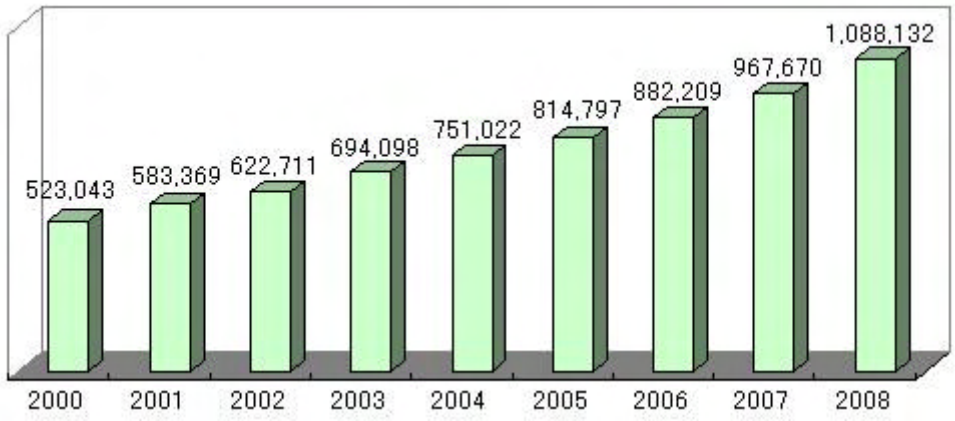


Sources: Executing Agency's documents
Note 1) Data about amount of export in 2010 is at the time of field survey (at the end of June 2010).
Note 2) Electricity export did not occur from the end of 1990 to 2004.

3.4.1.3 Impact on Economic Development

Table 13 shows Albania's Gross Domestic Product (GDP) after 2000. The GDP shows an upward trend after that year. Various factors other than this project have an influence on the economic growth of the country. However, the completion of the rehabilitation on the two hydropower stations seems to have provided a significant improvement of the power supply of Albania, since these two stations account for nearly half of the country's entire power production. Thus, it is assumed that the project is directly or indirectly supporting the people's life environment and economic activities.

Table 13: Transition of Albania's Gross Domestic Product (GDP) (Unit: million Leke)



Sources: Executing Agency's documents and Albanian Statistics Bureau

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

There was no negative impact on the environment by the project.[18] Furthermore, noise and vibration were not particular concerns as the two power stations are located in isolated mountain areas.

Figure 6: Intake
(Reservoir Dam at Fierza Hydropower Station)

Figure 7: Electrical Equipment Rehabilitated by JICA Loan (Vau i Dejes Hydropower Station)

3.4.2.2 Land Acquisition and Resettlement

As a result of the interviews with the Executing Agency and the field survey, it was confirmed that no resettlement and land acquisition occurred, as the project only involved rehabilitation of the existing hydropower stations.

3.5 Sustainability (Rating: a)

3.5.1 Structural Aspects of Operation and Maintenance

The Executing Agency at the time of the ex-post evaluation was the Albanian Power Corporation (KESH).[19] In 2003, the Albanian government restructured KESH with the purpose of facilitating the entry of private sectors into the power industry. As a part of its activities, although KESH continued to be involved in the power generation project, the power transmission/distribution sector was separately handed over to two newly established organizations in 2006: the Transmission System Operator (OST) and the Distribution System Operator (DSO). KESH and these two organizations came under the jurisdiction of the Ministry

[18] At the time of the field study, no major negative impact on the natural environment was observed. According to KESH, there was no need to implement the Environment Impact Assessment (EIA) because of the rehabilitative nature of this project.

[19] KESH has recently come under the control of the Ministry of Economy, Trade and Energy (METE). METE is assigned jurisdiction over all commissioners of the monitoring committee, a higher policymaking institution of KESH. This means that the General Director of KESH is appointed by the monitoring committee.

of Economy, Trade and Energy (METE). However, the privatization of the DSO was initiated under the guidance of the International Finance Corporation (IFC), and in 2009, the Albanian government signed an agreement with a Czech corporation regarding the DSO's project operation and sharing profit. As a result, DSO was privatized and the said Czech corporation is currently in charge of the power distribution project.

The number of KESH's employees was 9,500 at the time of the appraisal, which fell to 1,250 by the time of the ex-post evaluation (June 2010). The major reason for the drop in the number of employees is the separation of the power transmission/distribution sector (as described above). As a result, the organization is now only in charge of the power generation sector. According to KESH, the current number of employees is reasonable to implement the project.

The following outlines work descriptions, number of staff, and organization of the operation and maintenance departments of this project at the time of the ex-post evaluation. It can be judged that there are no problems with the structural aspects of operation and maintenance at the Fierza and Vau i Dejes hydropower stations and that the number of staff is sufficient.

1) Both of the power stations have operation and maintenance departments, which take charge of operation and maintenance, respectively. The number of staff in these departments are 62 and 55 in the Fierza Hydropower Station and 52 and 68 in the Vau i Dejes Hydropower Station, respectively.

2) The Department of Operation is in charge of operations related to the starting/stopping of generator units, where the data of various instruments and equipments including generator units and transformers is measured and relevant operations are monitored.

3) The Department of Maintenance has three subsidiary groups: the Machinery Section, Power Section, and Hydro-technology Section. Periodic maintenance on generators and peripheral facilities and rehabilitation for failures/malfunctions are conducted.

3.5.2 Technical Aspects of Operation and Maintenance

The Human Resources Department at KESH is mainly in charge of conducting staff courses and training programs at the hydropower stations. In 2004, during the project implementation, a training program called Control Monitoring System Training for power generation and

transforming was held in France.[20] Nine staff from Fierza Hydropower Station and eight from Vau i Dejes Hydropower Station participated in the training. In 2009, after the completion of the rehabilitation, training programs called Power Station Operation Techniques Training and Safety Issues and Maintenance Technique Training were held in Italy.[21] Three members from each power station participated in these trainings. The two power stations have a significant number of experienced staff who provide OJT training for new members as needed. Furthermore, it was observed during the field survey that skilled staff are assigned to the appropriate works in both stations. Based on the above, it can be judged that the technical level of the hydropower stations with regards to operation and maintenance is sufficient.

3.5.3 Financial Aspects of Operation and Maintenance

Table 14 explains operation and maintenance budget regarding the project. Rehabilitation of the Fierza and Vau i Dejes hydropower stations were completed in February 2007 and October 2007, respectively. After the project completion, no financial deficit was observed in the operation and maintenance budget. According to the staff from KESH and the hydropower stations, both stations receive nearly the full amount of necessary budget they requested from KESH. Therefore, it can be judged that there is no problem regarding the finances for the operation and maintenance of the both stations.

Table 14: Operation and Maintenance Budget at Fierza and Vau i Dejes Hydropower Station (Unit: 1,000 Lek)

	Fierza Hydropower Station			Vau i Dejes Hydropower Station		
	2007	2008	2009	2007	2008	2009
Operational Budget	136,549	139,529	148,137	165,760	147,075	135,153
Maintenance Budget	28,800	28,604	28,420	14,093	25,822	40,529
Total	165,349	168,133	176,557	179,853	172,897	175,682

Sources: Answers on Questionnaires

3.5.4 Current Status of Operation and Maintenance

The status of operation and maintenance regarding the main facilities at Fierza Hydropower Station and Vau i Dejes Hydropower Station can be described as follows. Periodical maintenance is being implemented. Spare parts are also being procured and stored appropriately.

[20] Alstom, a French contractor of this project, offered the training for staff from both stations.
[21] Similarly, AEM Milano, an Italian corporation, offered the training for staff from both stations.

In addition, manuals regarding operation and maintenance are being prepared. It is evident that there are no problems with the status of operation and maintenance at the hydropower stations.

1) Control Room

Compared to the situation before the completion of the rehabilitation project, performance of the control/monitoring systems has been improved and the generator/substation and water intake, etc. has been controlled/managed more smoothly. The staff works on a three-shift system around the clock. After the completion of the rehabilitation, no failure/malfunction of the control panel or other instruments including computers has been reported. (Rehabilitation of the control and monitoring systems and instruments was implemented mainly with the help of the EBRD loan.)

2) Generator Chamber/Generator Units

The generator units have been working normally thanks to the full-scale inspection and maintenance that take place once a year. According to the staff working at the power stations, the generator units suffered from frequent failures/malfunctions and prolonged abeyance in operation due to the aged instruments before the completion of the rehabilitation. However, no mechanical problems resulting in abeyance in operation have been reported since then. (Rehabilitation of the generator units was implemented with the help of Swiss and Austrian grant aids and JICA loan. Rehabilitation of the electrical devices in the generator chamber and test for the generator units were implemented through the JICA loan.)

3) Substation Facilities

For both power stations, substation facilities are located adjacent to the power generation building. Instruments such as disconnecting switches, which were the targets of rehabilitation, have been working normally, and no particular problems have been observed. (Regarding the substation facilities, rehabilitation of the electric devices was funded by the JICA loan and construction of the ground facilities was funded by the EBRD loan.)

4) Intake

Since no malfunctions in opening/closing or the control system of the intake gate were found, it can be deemed that there are no mechanical problems[22] at this facility. (Rehabilitation of the control unit and other instruments installed within the intake facility

[22] However, as of now, the spillway tower installed at reservoir dam has been degrading. According to KESH, rehabilitation is planned in the near future.

was implemented primarily through the EBRD loan.)

Figure 8: Control Room
(Fierza Hydropower Station)

Figure 9: Generator Step-up Transformer[23]
(Adjacent to Power Generation Building at
Fierza Hydropower Station)

In relation to the above, no major problems have been observed in the operation and maintenance system, therefore sustainability of the project is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project is in compliance with development policy and needs. Although the period of the project implementation took much longer and project costs were higher than initially planned, outputs were generally constructed according to plan. Furthermore, expected effects of the project such as a drastic reduction in unplanned outage hours due to failures/malfunctions have been achieved. In addition, the capacity of technical staff and maintenance budget are sufficient, and no problems were seen with respect to operation and maintenance.

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

4.2 Recommendations

None

4.3 Lessons Learned

Immediately after the project commencement, EBRD, a primary donor in this project, held financing and loans in abeyance due to the inferior performance of KESH such as high transmission loss rate, low performance in collecting power charges, etc. This led the Executing Agency to adjust their work schedule including the timing of the loading because the JICA loan

[23] As described on page 9, a wall tube insulator of the step-up transformer failed in 2007 and was repaired. As of now, the insulator is working properly.

portion (electrical equipment and devices, etc.) had to be correlated with the progress of the EBRD loan portion (control and monitoring systems). This caused a significant delay in the project completion compared to the initial plan. Therefore, as lessons learned, if multiple donors are involved, the donors should carefully discuss matters where a dispute or discontent may arise over a party's policy, to avoid a delay in the project schedule and to improve the performance as much as possible. Project delay might result in additional costs; moreover, in a situation that involves power shortages, it will greatly affect people's lives and cause economic losses. From that point of view, it is believed that the extent of the impact will not be so small.

Comparison of the Original and Actual Scope of the Project

Items	Original	Actual
1. Project Outputs	(Fierza Hydropower Station) --- The Entire Project--- 1) Utility civil works (ground utilities) ->EBRD loan and Albania's own funds 2) Mechanical equipment (intake, conduit, new runners, etc.) ->Grant aid from the Swiss government 3) Electrical equipment ->JICA loan 4) Instrumentation and control ıipment ->EBRD loan --- JICA Loan --- - Testing and upgrading of unit-transformers - Rewinding and stacking of 2 generator units - Testing of generator units - Replacement of excitation for 4 units - Upgrading of cooling system for 2 generators - Replacement of 220KV isolator switches (18x) - Improvement of A.C. and D.C. system - Upgrading of illumination system - Procurement of spare parts - Procurement of emergency diesel generator	As planned

	(Vau i Dejes Hydropower Station) --- The Entire Project--- 1) Utility civil works (ground utilities) ->EBRD loan and Albania's own funds 2) Mechanical equipment (intake, conduit, new runners, etc.) -> Grant aid from Austrian government 3) Electrical equipment ->JICA loan 4) Instrumentation and control ıipment ->EBRD loan --- JICA Loan--- - Testing and upgrading of unit-transformers - Replacement of unit protection system - Replacement of excitation systems - Replacement of A.C. and D.C. system - Replacement of 4 x 220kV-bays -Replacement of 1 x 110KV-bays - Upgrading of cooling system for 5 units - Testing of generator units - Improvement of illumination system - Procurement of spare parts - Procurement of emergency diesel generator	
	(Consulting Services) - To be implemented with funds provided by EBRD. Activities include project preparation, tender evaluation, management of utility civil works, etc. (223M/M)	As planned (232M/M: slightly exceeded the planned value)
2. Project Period	November 1995 - September 1999 (47 months)	November 1995 - October 20007 (144 months)
3. Project Cost Amount paid in Foreign currency Amount paid in Local currency Total	 4,024 million yen 324 million yen 4,387 million yen	 4,629 million yen 1,841 million yen 6,470 million yen

Japanese ODA loan portion	1,681 million yen	1,681 million yen
Exchange Rate	1 ECU=122 yen (1 USD= 91 Lek) (As of November 1995)	1 EURO=141.97 yen (1 USD=106.44 Lek) (Average between January 2003 and October 2007)