

# **Ex-Post Monitoring Report of Japanese ODA Loan Projects 2010**

**(Thailand, Sri Lanka, Cameroon)**

**March 2012**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**International Development Center of Japan, Inc.**

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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 shall be enhanced.

This volume shows the results of the ex-post monitoring for ODA Loan projects that were mainly completed seven years ago and was given ex-post evaluation five years ago. The ex-post monitoring was entrusted to external evaluators to review the projects' effectiveness, impact, and sustainability, to follow up the recommendations made in the ex-post evaluation, and to make further recommendations for future sustainability.

The lessons and recommendations drawn from these monitorings will be shared with JICA's stakeholders in order to apply to the planning and implementation of similar ODA projects in the future.

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

March 2012

Masato Watanabe

Vice President

Japan International Cooperation Agency (JICA)

## Disclaimer

This volume of monitorings, the English translation of the original Japanese version, shows the results of objective ex-post monitorings made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA.

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Thailand

“Track Rehabilitation Project (1)-(3)”

External Evaluator: George Terahara, International Development Center of Japan, Inc.

1. Project Description



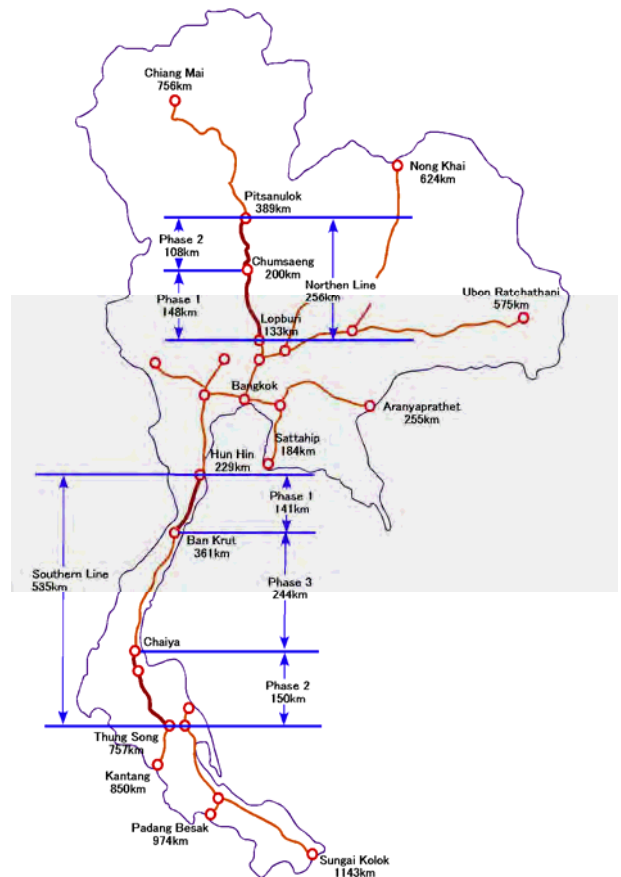
Map of the Project Area



Rehabilitated Section  
(Near Lop Buri Station, Northern Line)

1.1 Project Objective

The objective of this project is to promote the safety of operation of railway trains and reduce maintenance and management costs by refurbishing a total of 791km of railway tracks on both the Northern and Southern lines of State Railway of Thailand (SRT) and thereby contribute to the development of the economy of Thailand by strengthening and maintaining the railway transport capacity in Thailand.



## 1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	(1)10,331 million yen / 10,174 million yen (2) 7,651 million yen / 6,905 million yen (3) 7,973 million yen / 6,792 million yen (Additional Funding ) 2,979 million yen / 2,428 million yen
Loan Agreement Signing Date / Final Disbursement Date	(1) January 1993 / November 2001 (2) September 1994 / July 2003 (3) September 1996 / January 2004 (Additional Funding) July 1998 / September 2001
Ex-Post Evaluation	Fiscal 2005
Executing Agency	State Railway of Thailand (SRT)
Main Contractor	Mitsui & Co., Ltd. (Japan), John Holland Asia Ltd. (Hong Kong)/ Namprasert Construction Co., Ltd.(Thailand) (JV), Sumitomo Corporation (Japan), Barclay Mowlem Construction Limited (Australia).
Main Consultant	National Engineering Consultations Co., Ltd.(Thailand),STS Engineering Consultations Co., Ltd. (Thailand),Japan Transportation Consultants, Inc. (Japan),Pacific Consultants International (Japan) (JV), Ocean Consultant Japan Co., Ltd.

## 1.3 Background of Ex-post Monitoring

Centering on Bangkok, Thailand's capital, the SRT's railway lines radiate outwards to connect to nationwide destinations. However, apart from the railway line covering Bangkok and its surrounding areas, the tracks are single and non-electrified with a gauge width of 1,000mm. Furthermore, decades have passed since the tracks were first laid and aging and deterioration are conspicuous. Frequent breakdowns of rails have happened since 1984 and caused interruptions to services by which the railway fell into a serious situation.

This project refurbished a total of 791km of major rail lines on the Northern Line (Bangkok - Chiang Mai) and Southern Line (Bangkok - Malaysia Border) and was conducted in three phases from 1993 to 2004.

According to the ex-post evaluation conducted in Fiscal Year 2005, this project brought about both tangible and intangible benefits for the railway's operation, but the positive effects were limited to the refurbished segments of the railway only. In addition, the contribution to enhancing operational efficiency and to development of the SRT was limited.

In addition, the ex-post evaluation pointed out that SRT needed to promote an increase in fare revenue and enhance management by improving marketing and passenger service since SRT was chronically in debt both at the time of loan approval and ex-post evaluation.



As such, the following recommendations were made upon ex-post evaluation in order to achieve better results considering cost versus effects and demand for railway travel:

- (1) Refurbishment of tracks of the remaining sections,
- (2) Improvement of related facilities such as signals and branch lines, and
- (3) Construction of double railway track, etc.

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

## **2. Outline of the Monitoring Study**

### **2.1 Duration of the Monitoring Study**

Duration of the Monitoring Study: April 2011 to February 2012

Duration of the Field Survey: July 18 to August 6, 2011

### **2.2 Constraints of the Monitoring Survey**

None

## **3. Monitoring Results**

### **3.1 Effectiveness**

#### 3.1.1 Quantitative Effects

##### 3.1.1.1 Effects of Track Rehabilitation

###### (1) Number of Operation Delays due to Rail Breakdowns

Although the rails had broken down frequently before the project, the number of breakdowns greatly decreased with the completion of the project. There were no accidents attributed to rail breakdown on the refurbished sections (at the time of ex-post evaluation in 2006). Afterward, although no accident had been reported on the Northern Line, four accidents were confirmed at the 518km point on the Southern Line.

###### (2) Number of Derailment Accidents due to Rail Breakdowns

No derailment accident was reported in the past three years at the time of ex-post evaluation in 2006, and no accidents were reported at the time of this monitoring. However, at some grade crossings on refurbished sections, six to twelve collisions with automobiles occurred annually.

###### (3) Travel Time on Refurbished Sections

Table 1 shows the travel time on refurbished sections based on the timetable. It indicates a slight decrease on refurbished sections of the Northern Line, but increases in other sections. Especially, large increases were observed for freight trains. SRT explained that the increased time

due to the train diagram which prioritizes passenger trains rather than freight trains on single track sections.

Table 1: Average Travel Time on Refurbished Sections

Unit: hour:minute

Section	Train Type	2001 Before Project	2006 Ex-post Evaluation	2011 Ex-post Monitoring	Change from 2006 to 2011
Northern Line : Lop Buri~ Pitsanulok 256 km	Passenger	2:48	3:02	3:00	-0:02
	Freight	3:34	3:27	8:09	4:42
Southern Line: Hua Hin~ Thung Song 535 km	Passenger	8:50	7:13	7:36	0:23
	Freight	10:38	8:50	15:20	6:30

Source: SRT data

### 3.1.1.2 Reduction of Operation and Maintenance Cost

The maintenance cost of rail tracks is shown in Table 2 according to SRT. Considering total refurbished length of 791km, the total savings in 2010 will be 127 million baht compared to the cost before the Project in 2001.

Table 2: Track Maintenance Cost

Unit: Baht 10,000/km/year

Year	Before Rehabilitation	At Ex-post Evaluation (2006)	At Ex-post Monitoring (2011)
Track Maintenance Cost	23.6	8.3	7.49

Source: SRT data

### 3.1.1.4 Internal Rate of Return (IRR)

Since IRR was not calculated at the time of ex-post evaluation, this monitoring survey does not cover this item.

### 3.1.2 Qualitative Effects

According to SRT, this Project increased users' confidence in punctuality and safety and enhanced comfort of railways.

The above facts reflecting some positive outcomes, such as a decreased number of railway accidents due to rail breakdowns and a short-term reduction in operation and maintenance costs, were mostly observed in 2011 just as they were at the time of ex-post evaluation in 2006. Meanwhile, travel time increased from that at the time of ex-post evaluation due to single track, grade crossing and train diagram issues.

### 3.2 Impact

#### 3.2.1 Intended Impact

##### 3.2.1.1 Passengers Transport Volume and Reliance on Railway

Impact indicators which were identified at the time of ex-post evaluation were reviewed to assess the current situation. These indicators, shown in Table 3 to 5, are not those of the Project target (791 km; 19.6% of total line distance), but all across Thailand (total operating distance of 4,043 km).

As Table 3 shows, the number of first-class passengers rapidly increased from 1993 to 2004 and remained almost unchanged, and slightly decreased from 2004 to 2009. On the other hand, the number of third-class passengers decreased from 1993 to 2004, but increased afterward up to 2009. Although the third-class fare is kept low due to government regulations, SRT shifted the focus on ticket sales to first and second class passengers, where additional fares can be applied.

In addition, first and second class passengers tend to travel much longer than third class passengers in terms of passenger-km (Table 4) and average travel distance per passenger (Table 5). A travel distance of 600~700km is close to the distance between Chiang Mai and Bangkok (751km) and which entails overnight sleeper service. This implies most first and second class passengers ride long distances between metropolitan areas. Thus, despite the competition with bus transport and civil aviation, long distance passenger transport on SRT is considered to maintain comparative advantages. Meanwhile, urban rail transport, which is not directly operated by SRT, has been developed in the Bangkok Metropolitan Area and the urban rail service was reevaluated in terms of mitigating traffic jams, punctuality and speed.

Table 3: Number of Passengers on SRT

Unit: 1,000 persons

Year	1993 (Before Project)	2004 (After Project)	2009	Increase/ Decrease (%) (2004-2009)
First Class	18	124	121	-2.4
Second Class	4,532	4,391	3,788	-13.7
Third Class	69,763	41,688	43,577	4.5
Total	75,053	46,203	47,486	2.8
Total Transportation Volume of Domestic Public Transportation	1,477,792	821,514	N/A	
Railway Share	5.0%	5.6%	N/A	

Source: SRT data

Table 4: SRT Passenger Volume (Person per Kilometer)

Annually: 1,000 person/km

Year	1993 (Before Project)	2004 (After Project)	2009	Increase/Decrease (%) (2004-2009)
First Class	13,451	88,891	86,071	-3.2
Second Class	2,926,622	2,732,556	2,383,309	-12.8

Third Class	10,762,444	6,460,886	6,355,311	-1.6
Total	14,020,975	9,282,333	8,824,691	-4.9

Source: SRT data

Table 5: Average Travel Distance per Passenger

Year	Unit: km/person			
	1993 (Before Project)	2004 (After Project)	2009	Increase/Decrease (%) (2004-2009)
First Class	747	717	711	-0.8
Second Class	646	622	629	1.1
Third Class	154	155	146	-5.9
Total	187	201	186	-7.5

Source: SRT data

### 3.2.1.2 Freight Transport Volume and Reliance on Railway

Since the 1990s, truck transportation has dominated the domestic freight transportation market (ton base), and accounted for 88% of share in 2003 (Table 6), while, rail transportation accounted for only 2% of the total amount.

As for heavy freight transportation, from the political viewpoint of transport efficiency and environmental issues, the Ministry of Transportation (MOT) promoted a modal shift program from truck transportation to railway and shipping. However, the program did not result in a significant recovery of rail transportation.

Table 6: Freight Transportation Volume and SRT's Share

Unit: 1,000 ton

Year	1993 (Before Project)	2003 (After Project)	2009	Increase/ Decrease (%) (2003-2009)
Total Domestic Transportation	364,134	500,308		
Road Transportation	316,134	440,018		
Rail Transportation	7,477	11,456	11,505	0.40%
Railway Share	2.1%	2.3%		

Source: SRT data

### 3.2.2 Other Impacts

#### 3.2.2.1 Impact on Natural Environment

According to SRT, this Project refurbished existing railway tracks completely, while reducing noise for passengers and neighborhoods along rail lines.

#### 3.2.2.2 Resettlement and Land Acquisition

This project utilized existing right-of-way railroad land and there was no new resettlement or land acquisition during its construction.

These facts reveal that the track refurbishment done through this project has not resulted in a significant increase in total passenger or freight transportation volume on railways, this is partially due to the recent boom in Thailand of private ownership of automobiles. This situation is similar as at the time of ex-post evaluation.

### 3.3. Sustainability

#### 3.3.1 Structural Aspect of Operation and Maintenance

Currently, the Ministry of Transport (MOT) has not been examining a privatization scheme for SRT and SRT continues to be operated as a state-owned enterprise. SRT clarifies responsibility for track maintenance for each local railway bureau and maintains track maintenance programs comprised of four levels, operation and maintenance structure is judged to have no problems.

#### 3.3.2 Technical Aspect of Operation and Maintenance

Project Completion Report (PCR) and SRT state that operation and maintenance manuals have been prepared, which specify measure to be taken depending on level of wear damage. Railway maintenance workers are employed by SRT and trained regularly to maintain technical skills.

#### 3.3.3 Financial Aspect of Operation and Maintenance

MOT budgets funds for SRT (Table 7) and provides annual maintenance costs (Baht 9.3 billion in fiscal year 2010 budget) to SRT (Table 8). Meanwhile, the Cabinet decides implementation of new projects (Table 9).

Table 7: Budget of MOT

Mode Department	FY2009 (Actual) THB mil.	FY2010 (Budget) THB mil.	Portion to total budget (%)
Road Transportation			
Department of Highways (DOH)	40,511	26,672	35.9
Department of Regional Roads (DRR)	22,369	16,895	22.7
Department of Land Transport (DLT)	2,333	2,238	3
Express Authority of Thailand (EXAT)	9,419	7,036	9.5
Bangkok Metropolitan Transit Authority		35	0
Railway Transportation			
SRT	9,843	9,335	12.6
Mass Rapid Transit Authority (MRTA)	7,919	6,526	8.8
Water Transportation			
Maritime Department	3,732	3,557	4.8
Civil Aviation			
Department of Aviation	923	909	1.2
Civil Aviation Training center	126	197	0.3
Policy and Planning			
Others	336	341	0.5
Office of Transport Policy and Planning	489	576	0.8
<b>Total</b>	<b>98,000</b>	<b>74,317</b>	<b>100</b>

Source : MOT.

Note: Thai fiscal years start in October and end in September.

As for management reform of SRT as a whole, no drastic improvement to increase the operating revenue from railways has been made and SRT annually posts ordinary loss even after government subsidies (Table 8). On the other hand, SRT accelerated reforming of its structure and Airport – Rail Link is operated by its subsidiary. In addition, SRT reformed itself by increasing non-operating revenue from alternate sources such as real estate and installation of optical fiber cable. SRT also established a Marketing Department in an effort promote its services and increase the number of passengers and freight volume.

The Thai Cabinet approved new projects in April 2010 (Table 9).

-Track Rehabilitation Project Phase 5-6, Bridge Improvement Project (2010-2014)

-Telecommunications Network Project, Crossing Safety Project, Colored signal lights Project, and Rail Line Protective Fencing Project (2010-2014)

-Track Doubling Project (767km; there is no implementation plan on Northern and Southern Lines except Bangkok and its suburbs.)

The above Track Rehabilitation Projects followed Project Phases 1-3. Phase 4 was conducted to refurbish a 227km section of Northern and Southern Lines using Thai government funding. Phase 5 and 6 are to be implemented on 308km (North-eastern Line, 2010-2013) and 278km (North-eastern Line, 2010-2013) respectively.

Phase 4-6 correspond to ex-post evaluation Recommendation (1) Refurbishment of tracks of the remaining sections, Recommendation (2) improvement of related facilities such as signals and branch lines, and Recommendation (3) construction of double railway track are being implemented as part of the above new projects.

These facts indicate SRT is receiving continual government revenue support for current expenses and investment costs. Although SRT is trying to increase non-operational revenue from sources other than railways, it has not improved management drastically, resulting in a final deficit. In addition, the final loss is increasing recently. However, as long as government support continues, there will be little financial problem for operation and maintenance.

Table 8 Profit and Loss Statement of SRT

Unit: Million Baht

Item	Fiscal Year									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Revenues</b>										
Traffic revenues	5,558	5,668	5,816	6,080	6,108	5,976	6,305	6,370	6,591	6,398
Property revenues	553	615	692	977	885	952	1,086	1,042		
Fibre optic cable transmission system	870	895	921	943	955	746	689	759		
Concession fares from the government	80	68	57	60	59	57	52	50	2,058	2,055
Compensation from the government	-	-	6	-	-	63	115	69		
Other revenues	474	590	571	594	641	696	720	750		
<b>Total operating revenues</b>	<b>7,535</b>	<b>7,835</b>	<b>8,064</b>	<b>8,653</b>	<b>8,647</b>	<b>8,489</b>	<b>8,967</b>	<b>9,040</b>	<b>8,649</b>	<b>8,453</b>
<b>Expenses</b>										
Maintenance of way & signalling and communication	1,736	1,730	1,802	1,337	1,139	1,163	1,294	1,332		
Maintenance of locomotive and rollingstock	1,838	1,993	1,961	1,978	1,941	2,110	2,016	2,267		
Traffic and transportation	4,186	4,539	4,577	4,744	4,938	5,449	6,571	6,399	N/A	N/A
General expenses	506	494	540	574	544	690	615	562		
Others	-	-	-	-	-	-	47	10		
<b>Total operating expenses</b>	<b>8,266</b>	<b>8,756</b>	<b>8,879</b>	<b>8,633</b>	<b>8,562</b>	<b>9,412</b>	<b>10,542</b>	<b>10,571</b>	<b>11,649</b>	<b>10,956</b>
<b>Profit(Loss) from operating</b>	<b>-731</b>	<b>-921</b>	<b>-815</b>	<b>20</b>	<b>85</b>	<b>-923</b>	<b>-1,575</b>	<b>-1,531</b>	<b>-3,000</b>	<b>-2,503</b>
<b>Other income</b>										
Land deed compensation	278	526	124	194	-	5	-	-	-	-
Profit from sales of property	0	-4	22	11	10	32	-	-	-	-
<b>Total income</b>	<b>278</b>	<b>523</b>	<b>145</b>	<b>206</b>	<b>10</b>	<b>37</b>	<b>1,995</b>	<b>1,088</b>	<b>0</b>	<b>0</b>
<b>Other Expenses</b>										
Pension expenses	1,499	1,688	1,759	1,842	1,924	2,076	2,399	2,525	3,220	3,683
Pension reserves	-	-	-	271	1,364	387	404	739	-	-
Depreciation	1,217	1,324	1,373	1,366	1,867	1,708	1,830	1,701	1,639	1,980
Financial expense	1,634	1,863	1,987	2,039	1,959	1,779	1,855	2,168	2,504	2,495
Devaluation of investment	22	-	-	-	-	-	-	-	-	-
Loss (Profit) on writing off assets	4	0	-1	0	1	4	60	9	-	-
Loss (Profit) from foreign exchange	525	-500	-421	304	795	-454	-0	3	-158	-425
Loss on writing off materials and supplies	0	0	4	30	-1	2	274	276	-	-
<b>Total expenses</b>	<b>4,901</b>	<b>4,376</b>	<b>4,700</b>	<b>5,852</b>	<b>7,909</b>	<b>5,502</b>	<b>6,822</b>	<b>7,422</b>	<b>7,205</b>	<b>7,733</b>
<b>Net Profit (Loss) for the year</b>	<b>-5,354</b>	<b>-4,773</b>	<b>-5,370</b>	<b>-5,627</b>	<b>-7,814</b>	<b>-6,388</b>	<b>-6,403</b>	<b>-7,864</b>	<b>-10,205</b>	<b>-10,236</b>

Source: SRT data

### 3.3.4 Current Status of Operation and Maintenance

According to on-site inspection and SRT, the tracks have been operated and maintained properly without any specific problem.

The above facts show that there is no major concern on sustainability of the Project, because the government decided to provide financial support to SRT for current expenses and investment costs going forward. The local railway bureaus of SRT have maintained necessary technical skill levels for operation and maintenance of rail tracks.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This Track Rehabilitation Project achieved initial targets of reduction of train accidents and reduction of operation and maintenance costs. However, due to the single track and stagnant railway passenger demand, the long term impact on the railway business of SRT is limited and any ripple effect on the Thai economy is unclear.

SRT's chronic deficit, pointed out by the ex-post evaluation, remains unchanged and SRT needs to continuously strive for management improvement to recover from chronic deficit.

Recommendations (1) to (3) made by ex-post evaluation have been completed or are still in progress as described above.

## **4.2 Recommendation**

### 4.2.1 Recommendation to SRT

The Project led to a reduction in the number of accidents due to rail breakdown, and a reduction in operation and maintenance costs. In order to sustain the effects, it is desired that the operational lifetime of rail be prolonged by establishing a more detailed maintenance system. For example, they are recommended to check tracks more frequently using an automatic testing train in order to operate trains more smoothly and to improve on points such as avoidance of sudden speed reduction or acceleration. Although the frequency of checks depends on how much tonnage has passed on a track, four times a year is considered ideal.

### 4.2.2 Recommendation to MOT and Thai Government

It is recommended that budget for SRT's current expenses and investment cost continue to be secured.

## 4.3 Lessons Learned

None



Table 9 Cabinet Approved Investment Budget for SRT (2010-2014)

State Railway of Thailand - Budget Plan for Infrastructure - Urgent Period 2010-2014  
(According to Cabinet Resolution Dated 27 April 2010)

Project	Budget	Foreign Content	Disbursement Plan (Fiscal Year)						Total	Distance (Km)	Period (Month)	Deadline
			2010	2011	2012	2013	2014	2015				
			Unit: Million Baht									
Available plan / budget that can be implemented immediately - 11 items												
1. Railway rehabilitation project phase 5	8,508	50		2,369	3,725	2,173					36	2013
2. Railway rehabilitation project phase 6	6,779	50		1,926	3,028	1,766					36	2013
3. Construction of Double-track railway - Chacherngsao - Klong 19 - Kangkoy	11,348	40			2,940	3,363		3,363	1,682		48	2015
4. Provision of 13 diesel-electric locomotives (20 tons/shaft)	2,145	90		195	3	1,947					36	2013
5. Improvement of unsafe railway	23,671	41		4,737	14,693	4,241					36	2013
6. Improvement of bridges	12,167	35		1,599	3,463	3,139		3,966			48	2014
7. Colored signal lights	11,358	45		433	2,167	5,466		3,292			48	2014
8. Installation and improvement of road blocks	5,456			877	1,434	1,782		1,363			48	2014
8.1 Installation of road blocks	4,446	12		809	1,189	1,085		1,363			48	2014
8.2 Provision and improvement of road blocks	1,010		Local	68	245	697					36	2013
9. Installation of fences along railway	4,737		Local	1,005	3,732	583					24	2012
10. Construction of locomotive garage at Kangkoy	1,000		Local	18				400			36	2014
11. Construction of locomotive garage at Sriracha and Unit 10 Ladkrabang	360		Local	60	300						24	2012
<b>TOTAL</b>	<b>87,529</b>			<b>13,219</b>	<b>35,484</b>	<b>24,459</b>		<b>12,384</b>	<b>1,682</b>			
Projects that require feasibility study - 10 items												
1. Double-track railway Lopburi-Paknam	7,860	40		90	10	2,586		2,586	2,588		48	2015
2. Double-track railway Mabkabao - Nakorn Rachasima (Jira Junction)	11,640	40		135	10	3,831		3,831	3,833		48	2015
3. Double-track railway Jira Junction - Khonkaen	13,010	40		120	10	4,293		4,293	4,294		48	2015
4. Double-track railway Nakorn Pathom - Nongpladuk - Hua Hin	16,600	40		130	10	5,486		5,486	5,624		48	2015
5. Double-track railway Prachuabkhiran - Chumporn	17,000	40		120	10	5,623		5,623	591		48	2015
6. Provision of 50 diesel-electric locomotives GE	6,563	90			592	863		4,518			48	2015
7. Refurbishment of 56 locomotives	3,360	68		13	216	2,580		551			48	2014
8. Provision of 115 new passenger cars for commercial services	4,981	90			451	4,081		448			48	2014
9. Construction of inland container depot (ICD) station 2	6,066		Local		2,000	2,000		2,066			36	2014
10. Installation of telecom network	2,200		Local	56	876	1,268					36	2013
<b>TOTAL</b>	<b>89,280</b>			<b>664</b>	<b>4,185</b>	<b>32,611</b>		<b>29,402</b>	<b>22,418</b>			
<b>GRAND TOTAL</b>	<b>176,808</b>			<b>13,883</b>	<b>39,669</b>	<b>57,070</b>		<b>41,766</b>	<b>24,099</b>			

Notes: 2010 budget plan for provision and improvement of road blocks worth 5 million Baht transferred to 2011 budget of 63 million Baht as DPL loan for 2011, total 68 million Baht

### Comparison of Original and Actual Scope

Item	Plan	Actual
1. Output	<p>Phase 1</p> <p>-Northern Line from Lop Buri to Chumsaeng (148km)</p> <p>-Southern Line from Hua Hin to Ban Krut (141km)</p> <p>Total 289km</p> <p>Phase 2</p> <p>-Northern Line from Chumsaeng to Phitsanulog (108km)</p> <p>-Southern Line from Chai Ya to Thung Song (150km)</p> <p>Total 258km</p> <p>Phase 3</p> <p>Southern Line from Ban Krut to Chai Ya (244km)</p>	<p>As planned</p> <p>As planned</p> <p>As planned</p>
2. Project Period	<p>Phase 1 October 1992toDecember 1997 (63 months)</p> <p>Phase 2 July 1994toSeptember 1999 (63 months)</p> <p>Phase 3 July 1996toSeptember 2001 (63 months)</p>	<p>June 1993toOctober 2001 (100 months)</p> <p>January 1995toJune 2002 (89 months)</p> <p>September 1996toAugust 2002 (73 months)</p>
3. Project Cost  ODA Loan Portion	<p>Phase 1 14,758 million yen</p> <p>Phase 2 11,490 million yen</p> <p>Phase 3 11,527 million yen</p> <p>Total 37,775 million yen</p> <p>Phase 1 10,331 million yen</p> <p>Phase 2 7,651 million yen</p> <p>Phase 3 7,973 million yen</p> <p>Total 25,955 million yen</p>	<p>12,043 million yen</p> <p>11,033 million yen</p> <p>12,783 million yen</p> <p>35,859 million yen</p> <p>11,428 million yen</p> <p>7,436 million yen</p> <p>7,435 million yen</p> <p>26,299 million yen</p> <p>(Inclusive of additional financing in local currency of 2,428 million yen)</p>

Thailand

**“Environmental Fund Project”**

External Evaluator: George Terahara: International Development Center of Japan, Inc.

**1. Project Description**



Map of the Project Area



Sanitary Landfill in Khon Kaen

**1.1 Project Objective**

The objective of this project is to promote environmental conservation activities (mainly wastewater treatment plant and waste disposal plant projects) by local governments throughout Thailand by expanding the established Environmental Fund and providing funds through a set of grants and loans under the unified supervision of the Thai Government, thereby contributing to environmental conservation and improvement in the Kingdom of Thailand.

**1.2 Outline of Loan Agreement**

Approved Amount/ Disbursed Amount	11,200 million yen / 2,971 million yen <sup>1</sup>
Loan Agreement Signing Date/Final Disbursement Date	September 1993 / January 2004
Ex-Post Evaluation	Fiscal 2005
Executing Agency	Office of Environmental Policy and Planning , Ministry of Science, Technology and Environment
Main Contractor	Krung Thon Engineers Co., Ltd. (Thailand), Prayoonvisava Engineering Co., Ltd. (Thailand), See Sang Karn Yotah (1979)

<sup>1</sup> Excluding amount of prepayment (4,888 million yen) for the Samut Prakarn wastewater management project.

	Co., Ltd. (Thailand), Vichitbhan Construction Co., Ltd. (Thailand), Gateway Development Co., Ltd. (Thailand), North West Water International Ltd.(United Kingdom)(JV)
Main Consultant	W.S. Atkins International Ltd. (United Kingdom),Sinclair Knight Merze Propriety Ltd. (Australia),Macro Consultants Company Ltd. (Thailand) (JV), Padeco (Thailand) Ltd. (Thailand),Tesco Ltd. (Thailand) (JV), ICF Consulting Group (USA)

### 1.3 Background of Ex-post Monitoring

With rapid economic growth and urbanization since the latter half of the 1980s, the urban environmental pollution problem in Thailand has become serious. In order to address this environmental deterioration, this Project financed the environmental protection activities of the local government through a set of grants and loans under the unified supervision of the Thai Government. Two urban wastewater treatment plants and 22 sanitary landfills have been constructed through this fund. These subprojects, excluding Samut Prakarn wastewater management project, cost 1,346 million baht of which 1,000 million baht was financed by the ODA loan.

Ex-post evaluation deemed the Project as a whole as low due to i) the inadequate planning ability of local governments and the executing agency of the subprojects to achieve the planned effects, ii) the Project period took much longer than planned and iii) there were problems in operation and management structure of wastewater treatment projects.

Under these circumstances, ex-post evaluation made recommendations to the Thai government as follows:

- 1) Establishment of sub-project selection criteria,
- 2) Implementation of Environmental Impact Assessment,
- 3) Requirement of reduction and separation of wastewater and solid waste, and recycling activity to receive financing for subproject, and
- 4) Establishment of organization that enables promotion of experience.

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

## 2. Outline of the Monitoring Study

### 2.1 Duration of the Monitoring Study

Duration of the Study: April 2011 to February 2012

Duration of the Field Study: July 18 to August 6, 2011

### 2.2 Constraints during the Monitoring Study

Although Office of Natural Resources and Environmental Policy and Planning was designated to evaluate and monitor the subprojects, its structure was insufficient to monitor all the current status of subprojects and some indicators of subprojects have not been collected.

### **3. Monitoring Results**

#### **3.1 Effectiveness**

##### 3.1.1 Quantitative Effects

###### 3.1.1.1 Indicators of Operational Effects

###### (1) Volume of Urban Wastewater Treated

At the time of ex-post monitoring, the urban wastewater treatment volume at Tarae City was 746 m<sup>3</sup>/day, which was 36% of treatment capacity in 2011. The figure far below the 2,054 m<sup>3</sup>/day planned for at the time of subproject and the 1,300 m<sup>3</sup>/day at ex-post evaluation. is. On the other hand, in Huakhwang City wastewater of 1,300 m<sup>3</sup>/day was treated as 87% of initially planned. The total treatment volume of the two cities was 2,046 m<sup>3</sup>/day (Table 1), which is far below the planned volume of 528,000 m<sup>3</sup>/day (in around 2000 after the recomposition of subprojects). The major reason is that the Environment Fund financed only two wastewater treatment plants<sup>2</sup> although initially 9 cities had planned to construct such facilities at the time of Loan Agreement and three cities were selected after the recomposition<sup>3</sup> (Table 2).

In addition, it was confirmed the wastewater treatment capacity of the two plants has been maintained since the ex-post evaluation.

###### (2) Increase Proper Treatment Volume of Urban Solid Waste

In around 2000, according to the plans of the Project, after the recomposition of subprojects, total treatment capacity of urban solid waste was estimated to be 6.19 million m<sup>3</sup> and the completed treatment capacity became 5.96 million m<sup>3</sup>. According to the Office of Natural Resources and Environmental Policy and Planning (ONEP) and Regional Environmental Offices, as of 2012, four sites out of a total of 22 have already reached treatment capacity and other six remaining sites are constructing next phase facility or will reach capacity within five years<sup>4</sup> (Table 1). These facts indicate the sanitary landfill subprojects have been fully utilized almost reaching their respective capacities.

In other words, before the sanitary landfills were established, urban solid waste had been improperly processed, with such practices as open dumping and illegal abandonment, but they

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<sup>2</sup> Samut Prakarn Wastewater project, one of 3 selected subprojects after the recomposition, had been once financed by the Environment Fund (ODA loan portion Baht 1,750 million) but Thai Government voluntarily repaid the amount after a protesting activity in 2003. Then, this monitoring study does not include the subproject. Since the project had the capacity of 525,000 m<sup>3</sup>/day, the indicator of capacity volume significantly dropped from the planned volume.

<sup>3</sup> The Ex-Post evaluation concluded the reason primarily because Public Works Department and Pollution Control Department also constructed wastewater treatment facilities and secondarily because the technical standard and fund procurement ability of local governments were insufficient to realize the decentralized environmental management.

<sup>4</sup> After reaching capacity, the waste collection cannot be stopped and the waste is stacked up exceeding capacity or dumped openly near landfill waste treatment plants.

were being treated at the pace of 1,271 ton per day at the time of ex-post monitoring. In 2011, the pace is 1,264 ton per day (Table 1). For example, the solid waste treatment volume for Khon Kaen City is shown in Table 3. These numbers include the collected volume beyond the capacity of subprojects. After reaching capacity at the treatment facility, it can be stated that the collected urban waste was not treated properly, though the increasing urban solid waste was collected effectively after the sanitary landfill subprojects reached capacity.

Table 1 Current Condition of Subprojects

**Urban Wastewater Management Projects**

	City Name	Capacity	Unit	Cost (Mil. Baht)	Treatment Volume (m <sup>3</sup> /day in 2011)	Current Condition (2012)
1	Tarae	2,054	m <sup>3</sup> /day	64	746	In operation.
2	Huakwang	1,500	m <sup>3</sup> /day	22	1,300	In operation.
	Subtotal	3,554	m <sup>3</sup> /day	86	2,046	

**Solid Waste Treatment Subproject**

	City Name	Capacity	Unit	Cost (Mil. Baht)	Collection Volume (ton/day in 2011)	Current Condition (2012)
1	Sensuk	148,701	m <sup>3</sup>	94	80	Full. Moved to Chonburi Central Treatment Facility.
2	Sadao	79,088	m <sup>3</sup>	82	38	In operation.
3	Samut Songklam	139,364	m <sup>3</sup>	47	27	Stopped operation due to protest activity.
4	Nakhon Panom	730,000	m <sup>3</sup>	79	24	In operation.
5	Bang Kla	147,188	m <sup>3</sup>	26	8	In operation. Up to 2017.
6	Varin Chumrab	84,409 →122,400	m <sup>3</sup>	58	28	In operation. Phase 3 under construction.
7	Buri Ram	130,033	m <sup>3</sup>	52	54	In operation. Phase 2 by provincial budget.
8	Khon Kaen	1,000,000	m <sup>3</sup>	46	203	Full. Disposed in open dumping.
9	Yasothon	158,840	m <sup>3</sup>	53	20	In operation.
10	Si Sa Ket	198,872	m <sup>3</sup>	66	62	In operation.
11	Sena	90,000	m <sup>3</sup>	46	16	Full. Disposed in open dumping.
12	Maha Sarakam	720,000	m <sup>3</sup>	32	87	Full. Phase 2 in operation.
13	Chumpon	227,552	m <sup>3</sup>	48	60	In operation.
14	Pattaya	825,000	m <sup>3</sup>	53	250	In operation.
15	Sukhothai Thani	247,200	m <sup>3</sup>	58	49	In operation.
16	Taklee	91,250	m <sup>3</sup>	48	46	In operation.
17	Chiang Yun	23,614 →36,350	m <sup>3</sup>	22	28	In operation. Phase 2 by provincial budget in 2009.
18	Bethong	32,400	m <sup>3</sup>	83	28	In operation.
19	Pattani	255,500	m <sup>3</sup>	70	50	In operation.
20	Trat	270,000	m <sup>3</sup>	89	31	In operation. Up to 2017.
21	Klang	200,000	m <sup>3</sup>	62	25	In operation. Up to 2014.
22	Yala	160,000	m <sup>3</sup>	80	50	In operation.
	Subtotal	5,959,011	m <sup>3</sup>	1,294	1,264	Total capacity and cost are at the time of completion.
	Total			1,380		

Note: "→" shows increase of capacity from initial subproject.

Source: ONEP and Regional Environmental Office.

Table 2 Outline of Subproject Indicators of Operational Effect

Type	Year	1993	2000	2006	2011
		L/A	After Subproject Recomposition	Ex-Post Evaluation	Ex-Post Monitoring
Wastewater Treatment Plant	Count	9	3	2	2
	Treatment Capability (m <sup>3</sup> /day)	Not Estimated	528,554	3,554	2,046 (Treatment Volume)
Sanitary Landfill	Count	41	22	22	22
	Capacity(m <sup>3</sup> )	Not Estimated	6,194,629	5,959,011	1,264ton/day collection. Remaining capacity unavailable.

Source: Appraisal, Ex-Post Evaluation and this survey.

Table 3 Urban Solid Waste Collection Volume in Khon Kaen City

Fiscal Year	2007	2008	2009	2010	2011 (9 months)
Total Treatment Volume (ton)	66,228	62,588	67,148	84,928	64,680
Average Daily Treatment Volume (ton/day)	181	170	185	233	239

Source: Khon Kaen City data

### 3.1.1.2 Internal Rate of Return (IRR)

Since IRR was not calculated at the time of ex-post evaluation, this ex-post monitoring survey does not cover this item.

### 3.1.2 Qualitative Effects

Based on hearings of Pattaya and Khon Kean City officials in charge of waste treatment, as for construction of waste treatment facilities and collection of charges on emissions, the cities and citizens conferred on waste treatment and waste collection in late 2000s and it was confirmed that the segregation of waste was now a necessity more than ever. This means that this Project had certain positive effect on citizens' environmental awareness, especially concerning the categorization of waste general, medical and hazardous waste.

## 3.2 Impact

### 3.2.1 Intended Impact

#### 3.2.1.1 Improvements in Environmental Quality for Urban Residents of Target Cities

The beneficiary populations of Tarae and Huakhwang City wastewater treatment services were increased by 33% from 9,370 persons (at ex-post evaluation) to 12,440 persons (at ex-post monitoring). However, the impact is limited and is equal to 0.5% of the planned 2.32 million persons because the number of subprojects implemented was far less than the original plan as described in 3.1.1.1(1) (See also footnote 2).

The beneficiary populations of urban waste treatment services increased by 34% from 970,000 in the urbanized area of 22 cities to 1,304,000 in 2010. The number exceeds 18% from the planned service population of 1,100,000 and it is judged the service contributed to improve urban environment significantly.

#### 3.2.1.2 Improvement of Urban Sanitation Environment

Regarding the environmental problems near the landfills pointed out by the ex-post evaluation, the ex-post monitoring confirmed the local governments and neighborhood residents hold regular meetings on the subject. In particular, as for Pattaya, City although ex-post evaluation pointed out that there was a strong odor and air pollution from the adjacent medical waste incineration facility, Pattaya City solved the problem by improving the operation of the plant through dialogue with local residents.

Thus, by appropriate waste treatment, this Project contributed to improve the urban sanitary environment to some extent.

#### 3.2.2 Other Impacts

##### 3.2.2.1 Impact on Natural Environment

Site survey confirmed that sanitary landfill by subprojects in Khon Kaen and Pattaya properly treated effluent. Therefore, negative impact on natural environment by these waste treatment facilities in both cities was mitigated more than that at the time of ex-post evaluation.

##### 3.2.2.2 Resettlement and Land Acquisition

Land acquisition for construction of new sanitary landfills is becoming more difficult than ever because of construction costs and opposition by neighbors. Once the waste volume exceeds the facility capacity, it is obliged to dump openly on adjacent land and environmental management problems will arise in the future.

##### 3.2.2.3 Other Positive and Negative Impacts

###### (1) Foster Responsibility of Local Governments

The Enhancement and Conservation of National Environmental Quality Act of 1992 and Local Decentralization Act in 2002 expanded the scope of responsibility of local government in environmental management. Before enactment of these Acts, the national government was responsible for wastewater treatment and sanitary landfills. After enactment of the law, local governments are required to participate in these projects independently through the Environmental Fund which is funded by the national government. Then, local government is required to secure own financial resources for environmental projects. Therefore, this Project promoted active project formulation by local governments and raised awareness and ownership of local governments to advance environmental projects.



Although the national decentralization policy targeted local project formulation by local fund, this project was transitional style of local project formulation by central fund. In addition, transfer of revenue source and revenue allotment from national to local government did not progressed smoothly and local revenue is limited.. Consequently, local revenue proportion (national government revenue divided by local revenue) remained at 24.1%, far below the original target of 35% which was to be attained by 2006(JICA Report “Analysis from a Capacity Development Perspective: JICA Program on Capacity Building of Thai Local Authorities” 2007). Later, the proportion increased to 25.2% in 2008.

According to ONEP and hearings at project sites, with the growth in income, the environmental awareness of local governments and citizens is rising and willingness to pay the cost to protect the environment is fostered.

### (2) Strengthening of Project Formulation and Operation and Maintenance Capability of Local Government

The site survey found local governments directly hired necessary engineers and improved their project formulation and operation and maintenance capability, although some local governments outsourced operation and maintenance of facilities.

In addition, Environmental Impact Assessment (EIA) was required for subproject appraisal from 2003. In 2005, a new law required the holding of public hearings in advance of application to the Environmental Fund. Based on this law, the local governments are responsible for conducting not only project formulation, but also public hearings and EIAs. A treatment facility with more than a capacity 3,000 m<sup>3</sup>/day is required to conduct an EIA by law. In the case of Chern Talay Wastewater subproject, the Tambon (corresponding to city) Administration Office conducted Initial Environmental Examination (IEE) instead of EIA because the design treatment volume is low enough to exempt from conducting EIA.

### (3) Segregation and Recycling of Waste

Segregation and recycling of urban solid waste have been performed mainly at the treatment site and only partially near the source such as households and enterprises. In general, urban waste in Thailand is segregated into two categories, general and hazardous, as they are not incinerated. This monitoring could not confirm activation of recycling activities by citizens triggered by the subprojects, but ONEP requests subproject applicants to incorporate the concept of 3Rs (Reduce, Reuse and Recycle) activities for subproject formulation.

By these facts, this ex-post monitoring found positive impacts, improvement of living environment of targeted urban area residents due to proper treatment of solid waste, improvement in project formulation, improvement of operation and maintenance capability of local governments in environmental conservation, and increased environmental awareness of the citizenry.

### **3.3. Sustainability**

#### **3.3.1 ONEP and Secretariat of Environmental Fund**

##### **3.3.1.1 Structural Aspect of Operation and Maintenance**

By the reorganization of Ministry of Science, Technology and Environment into Ministry of Natural Resources and Environment (MONRE), ONEP became a department under the MONRE. The ONEP subordinates the Secretariat of Environmental Fund. As of 2011, the Secretariat had five divisions and one committee, with 45 staff members (19 senior, 24 general and 2 permanent). Among this, Project Analysis and Evaluation Division (9 staffs) and Technical Affairs Division (5 staffs) are appraising subprojects, excluding EIAs. Environmental Impact Assessment Bureau is responsible to appraise EIAs.

ONEP is proactively involved in public relations activities such as publication of brochures. In particular, ONEP prepared and revised the following provisions and clarified the selection process of subprojects and criteria with the Prime Minister's notification.

- The Notification of the National Environmental Board Concerning the Basis of Environmental Fund allocation (June 2009)
- Regulations of the Environmental Fund Committee Concerning Principles, Conditions and Procedure Concerning a Request for Fund Allocation and Loans of the Environmental Fund (June 2009)
- Regulations of the Environmental Fund Committee Concerning the Authority of Fund Managers concerning the Receipts and the Disbursements of the Environmental Fund (June 2009)

Ministry of Industry and its local bureaus are responsible for guidance and supervision of major pollution emissions sources such as factories. Pollution Control Department of MONRE prepares guidelines, but local government, such as provinces, does not have direct authority over factories.

Ex-post evaluation recommended establishing an organization to promote the experience. In response to this, Environment Quality Improvement Bureau in cooperation with ONEP, provides various training programs. However, a new organization has not been established yet.

As such, it is confirmed as for the operation and maintenance structure of Environmental Fund, expanded PR and training activities compared to those at the time of ex-post evaluation.

However, the monitoring and evaluation system of the subprojects by the executing agency has not been established after the submission of Project Completion Report in 2004.

##### **3.3.1.2 Technical Aspect of Operation and Maintenance**

To complement technical skills aspects of ONEP, an engineering consultant from Lat Krabang Institute of Technology was employed and improved its engineering skill level.

##### **3.3.1.3 Financial Aspect of Operation and Maintenance**

As shown in Table 4, the Environment Fund has revenue from government subsidy of Baht 6.25 billion (Oil Fund Baht 4.5 billion and others Baht 1.75 billion), JBIC loan of Baht 2.59 billion<sup>5</sup>, and interest from bank accounts of Baht 5.29 billion and others. Total revenue was Baht 14.13 billion.

Table 4 Change in Revenue and Expenditure of Environment Fund

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
<b>Revenue</b>																				
Oil Fund		4,500																		4,500
Budget for Environmental Development and Quality of Government Subsidy		500																		500
Interest from Bank Account	29	365	375	676	774	681	759	327	143	55	32	86	80	68	117	159	124	114	57	5,021
Repayment from Sub-projects			2	9	4	4	2	62	15	5	10	61	41	21	5	15	3		2	261
JBIC Loan						25	765	76	278	572	519	312	45							2,592
	5,029	865	877	935	778	710	1,526	465	436	632	561	459	166	89	122	174	127	114	59	14,124
<b>Expenditure</b>																				
Subsidy for construction and maintenance of pollution control system	15	5	473	3	277	289	2,954	905	1,143	1,062	616	287	74	164	8	23	92	6		8,396
Subsidy for the enhancement and coservation of environment and quality of life		40	3	30	74	646	137	57	62	55	62	32	38	19	77	9	13	25	468	1,847
Environment Fund management		1		1	2	3	10	4	7	8	5	10	9	10	6	14	12	8	7	117
Difference of exchange rate						3		2	4			4								13
Fee to IFCT								1	1	2	2	4	5							15
	15	46	476	34	353	941	3,101	969	1,217	1,127	685	337	126	193	91	46	117	39	475	10,388
Balance	5,014	819	401	901	425	-231	-1,575	-504	-781	-495	-124	122	40	-104	31	128	10	75	-416	3,736
Other Balance															643	2	6	-720	718	649
Cumulative Balance	5,014	5,833	6,234	7,135	7,560	7,329	5,754	5,250	4,469	3,974	3,850	3,972	4,012	3,908	4,582	4,712	4,728	4,083	4,385	4,385

Source: ONEP.

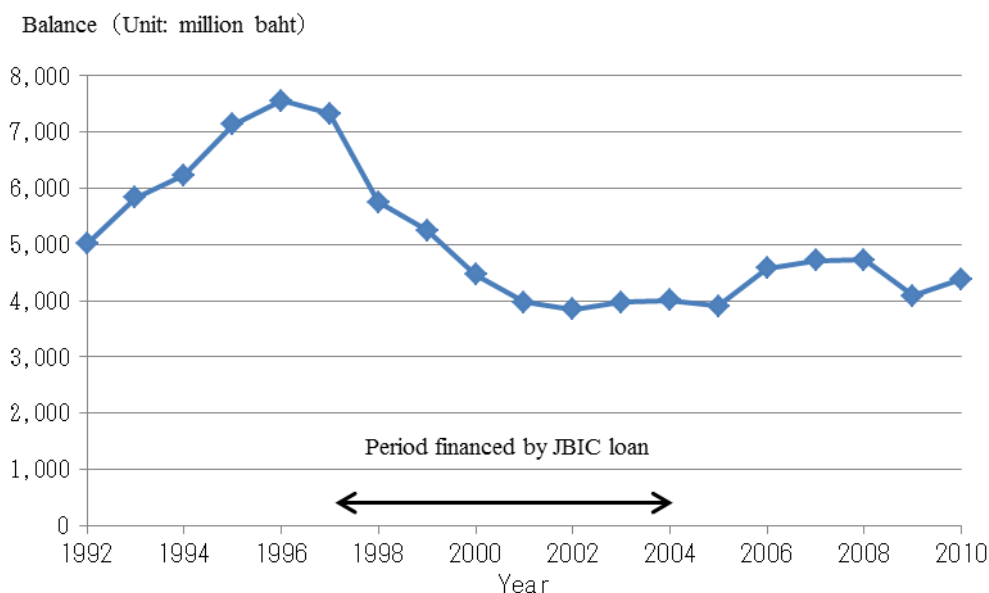


Figure 1 Change in the Balance of Environment Fund

As of June 2011 (End of Fiscal Year 2010), the balance of the Environmental Fund was Baht 4.39 billion. During fiscal 2011 and 2012, the Fund will spend Baht 880 million and 780 million respectively. In addition, there is a project planned of Baht 340 million. As a result, the balance of the Fund will be Baht 2,390 million<sup>6</sup>. Cherng Talay Wastewater Treatment Plant subproject and Nakhon Sawan Central Sanitary Landfill are included in this fund.

Although loan program for the Fund decreased the interest rate from 6.8% to 2.0% for the sake of private sector's convenience, it has not been utilized. At the time of ex-post evaluation,

<sup>5</sup> Including a loan portion to Samut Prakarn Wastewater project.

<sup>6</sup> This does not include the repayment from loan and interest income.

the Fund planned to secure government funding, but there has been no additional government support since 1996. Thus, at the time of ex-post monitoring, it is considered that the government will not budget the Fund in the future and the financial sustainability of the Fund is judged to be low.

### 3.3.2. Loan Recipients: Sustainability of Local Governments and Subprojects

#### 3.3.2.1 Technical and Structural Aspects of Operation and Maintenance

##### (1) Wastewater Treatment Plants

After the expiration of contract with the initial wastewater operator, Wastewater Management Authorities (WMA), each city administration employed engineers by itself. Thus, the sanitary department of local authorities employed external engineers and directly operate the plants. In case of Huakhwang City, five staff members (one engineer, one technician, and three workers) have been employed in operation of the plant as of 2011. Some of them are re-employed by WMA, and the city maintains technical standards.

##### (2) Sanitary Landfills

Pattaya and Khon Kaen: these cities outsource maintenance operations and their scope is limited to unskilled work such as dumping and scavenging and only simple training programs are provided for the workers. This ex-post monitoring cannot confirm that the outsourced companies maintain the necessary technical standards.

Pattaya city employed engineers for the operation of effluent treatment plant by itself and the effluent from the sanitary landfill of the subproject was treated properly. On the other hand, at other general dumping sites, ONEP and local authorities do not have sufficient information whether the appropriate engineering level and structure are maintained partially because of outsourcing of maintenance operations.

#### 3.3.2.2 Financial Aspect of Operation and Maintenance

##### (1) Wastewater Treatment Plants

Although only several local authorities in Thailand are collecting treatment fees, the both cities of Tarae and Huakhwang are collect treatment fees from users which are allocated for operating costs. In the case of Tarae City, collected Baht 470,000 and spent Baht 580,000 for operation in 2009 and the City subsidized the difference. Huakhwang City charges 10 Baht on each household and 20 Baht on each enterprise every month and collects Baht 84,000 per annum in total. On the other hand, the City spends Baht 600,000 per annum for operation and the City subsidizes the difference.

##### (2) Sanitary Landfills

Financial status of the two sanitary landfills in Pattaya and Khon Kaen, where this monitoring mission visited as sample cases, are as below.

Pattaya City Sanitary Landfill: it outsources maintenance operations. The City collects garbage collection fee of 40 Baht every month from households and has revenue of Baht 31.20 million per year. On the other hand, the city paid Baht 72.50 million for the outsourced company in 2009. The company claimed that labor cost was climbing so that the outsourcing price was revised from 649 Baht to 1,100 Baht per ton after negotiations between the city and the company in 2010, which further stressed the city's finances.

Khon Kaen Sanitary Landfill: the Khon Kaen City collects 40 Baht per household every month and has annual revenue of Baht 16.60 million, but with the outsourcing cost at Baht 18.30 million per annum, the City subsidizes the difference.

As described above, the discharge revenue and expenditure, regardless of direct operation or outsourcing, cannot be balanced and it became a financial burden on local finances for both wastewater treatment plants and sanitary landfills. In addition, because there is much ambiguity on cost sharing and responsibility among the government, local governments and residents (polluters), these environment management costs will remain a burden on local finances in the future. In particular, the cost of solid is so high that it will be likely not to perform appropriate treatment with the increase in financial burden.

## **4. Conclusion, Lessons Learned and Recommendations**

### **4.1 Conclusion**

By the subprojects of Environment Fund financed by this Project, wastewater treatment plants and sanitary landfills have been constructed and local cities started appropriate environmental management. Although 9 wastewater treatment plants had been planned initially, only two have been constructed after all because of project cancellation, etc.. This leads to low effectiveness as same as at the time of ex-post evaluation.

This monitoring recognized certain impact on environmental improvement by wastewater treatment plants and sanitary landfills.

There are no problems to report in terms of technical aspects of sustainability, but there are some financial problems to report. This is because the local governments will remain dependent on the financial resources of the central government in order to develop environmental projects. Especially, even if the central government bears the construction cost, the recurring costs will be a large burden on local finances. Because the financial demands for wastewater treatment plants and sanitary landfills are large, the current scale of the Fund is too limited to fulfill the demand.

### **4.2 Recommendations**

None.

### **4.3 Lessons Learned**

Although this Project was designed as a two-step loan<sup>7</sup>, the relationship among the implementing agencies, such as ONEP and Environmental Fund, and local authorities, and subproject has not been clear after the funding and the monitoring and evaluation systems have not been established. It is recommended that as for future two-step loan projects an executing agency be established to appropriately monitor and evaluate the system to receive appropriate feedback from local authorities.

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<sup>7</sup> Actually, the subprojects were financed as grant base.

### Comparison of Original and Actual Scope

Item	Planned (Following Subproject Recomposition)	Actual
1. Output	<p>1) Financial allowances for environmental management projects</p> <ul style="list-style-type: none"> <li>• Construction of urban wastewater treatment plants (3 cases) Treatment capacity: 528,554m<sup>3</sup>/day</li> <li>• Construction of sanitary landfill waste disposal sites (22 cases) Capacity: 6,194,629m<sup>3</sup></li> </ul> <p>2) Consulting Service</p> <ul style="list-style-type: none"> <li>• Suggestions pertaining to lending procedures and operation</li> <li>• Support for loan supervision</li> <li>• Support to supervise execution</li> <li>• Aid for technical appraisal</li> <li>• Liaison and coordination between the OECF (at that time) and the executing agency</li> <li>• Support for dissemination of Environment Fund</li> <li>• Technical advice</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of urban wastewater treatment plants (2 cases) Treatment capacity: 2,300m<sup>3</sup>/day</li> <li>• Construction of sanitary landfill waste disposal sites (22 cases) Capacity: 5,959,011m<sup>3</sup></li> <li>• SAPI Team for Overseas Economic Cooperation Fund, Japan, 1995.</li> <li>• SAPI Team for Japan Bank for International Cooperation, 2002.</li> <li>• SAPI Team for Japan Bank for International Cooperation, 2003.</li> </ul>
2. Project Period	September 1993 to August 1997 (48months)	September 1993 to January 2003 (113 months)
3. Project Cost		
Foreign Currency	11,200 million yen	2,971 million yen (approx. 1,000 million Baht)
Local Currency	3,886 million yen	346 million Baht
Total	15,086 million yen	1,346 million Baht
ODA loan portion	11,200 million yen	2,971 million yen

## Ex-Post Monitoring of Completed ODA Loan Project

Sri Lanka

### "Kelanitissa Combined Cycle Power Plant Project"

External Evaluator : Mimi Sheikh, International Development Center of Japan, Inc.

#### 1 . Project Description



Map of Project Area



Kelanitissa Combined Cycle Power Plant

#### 1.1 Project Objective

The objective of this project is to increase base load power sources and stabilize the power supply by building a 150MW grade combined cycle power plant in Kelanitissa district, located in the north of Colombo City, thereby contributing to economic growth in Sri Lanka as a whole.

#### 1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	13,481 million yen / 13,406 million yen
Loan Agreement Signing Date/final Disbursement Date	October 1996 / June 2003
Ex-post Evaluation	2005
Executing Agency	Ceylon Electricity Board (CEB)
Main Contractor	Marubeni (Japan), Alstom Power Centrale (France)
Main Consultant	Lahmeyer International (Germany), Chuo Kaihatsu



### 1.3 Background of Ex-post Monitoring

When the project was initiated, the demand for electricity was rising in Sri Lanka due to the country's sustained economic growth. It was forecasted that by the year 2000, the nation's output capability would not meet the expected peak demand. To respond to this situation, a 150 MW grade combined cycle power plant was built by this project.

At the time of ex-post evaluation, the efficiency of the project was evaluated as low because the actual project cost and period for building Kelanitissa Combined Cycle Power Plant had exceeded the initial plan. In addition, three concerns were pointed out in the report. The first concern was the future impact on the surrounding area of the power plant since the environmental monitoring system was not fully established and functional at that time. The second concern was the sustainability of the operation and maintenance skills of the staff as the equipment at training center was old and run down. The third concern was the improvement of CEB financial situation and their low profitability. It was point out that urgent measures were need.

As a result, the ex-post evaluation recommended CEB to develop an environmental monitoring system and measure the environmental impact on the surrounding areas; and for the Sri Lankan government to take measures to improve CEB's profitability.

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with final conclusion being drawn from the findings of the field survey and other research activities.

## 2. Outline of the Monitoring Study

### 2.1 Duration of Monitoring Study

Duration of Monitoring Study : April 2011~February 2012

Duration of the Field Study : 7 August, 2011~18 August, 2011

### 2.2 Constraints during the Monitoring Study

None.

## 3 Monitoring Results

### 3.1 Effectiveness

#### 3.1.1 Quantitative Effects

##### 3.1.1.1 Results from Operation and Effect Indicators

(1) Comparison to the ex-post evaluation

As can be seen in the following table 1, the operation and effect indicators, namely, power output and plant load factor were lower than the target values of the ex-post evaluation. The reasons for the result are 1) a failure of a major part of the steam turbine in August 2010 and discontinuation of operations since then; 2) and reduction of thermal power generation usage due to increase in annual rain fall from 1,711 mm in 2009 to 1,992 in 2010. The broken steam turbine has already been repaired in India and is awaiting customs clearance and the repairs of other parts have already been completed. If customs clearance is carried smoothly, the steam turbine should be in use by the end of 2011. The operation and effect indicators in 2008, before the steam turbine broke down, were not much different from the ex-post evaluation in 2005. Therefore it is considered that the current situation is only temporary and there will not be a problem in the future.

Table 1: Operation and Effect Indicators (unit: 1000 tons)

	Ex-post evaluation in 2005	Ex-post monitoring in 2011 <sup>1</sup>
Maximum output (MW)	168	165
Power generation (GWh)	1043.5	493.3
Plant load factor (%)	72.2	31.9

Source: Data submitted by Kelanitissa Combined Cycle Power Plant

(2) Outage hours

Regarding outage hours of Kelanitissa Combined Cycle Power Plant, until 2009, the total outage hours of gas turbine and steam turbine were lower than the number in 2003; however, the outage hours have largely increased in 2010.

Table 2: Outrage Hours

	Gas Turbine	Steam Turbine	Total Outrage hours
2003	444.40	1826.26	2,270.66
2004	222.45	936.20	1,158.65
2005	299.50	675.37	974.87
2006	468.11	1219.30	1,687.50
2007	448.42	1101.41	1,549.83
2008	187.36	1064.06	1,082.42
2009	259.10	558.56	314.66
2010	340.21	4896.28	5,236.49

<sup>1</sup> The data used was fiscal year 2010, Plant load factor = annual operation hours / annual hours (8,760 hours).

Source: Data submitted by Kelanitissa Combined Cycle Power Plant

It is because the main part of the steam turbine broke down and needed replacement. Although outage of either the gas turbine or the steam turbine occurred frequently, it is confirmed that Kelanitissa Combined Cycle Power Plant has been trying hard to maintain the generation of a certain volume of power and to minimize the outage hours at the facility.

### 3.1.1.2 Financial and Economic Internal Rate of Return (FIRR)

The Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) at the time of ex-post monitoring, were both negative as it is shown in the table 3. The increase in maintenance costs and the lowered electricity unit pricing could be the main reasons for the results. Even in this situation, it is important to keep operating the plant in order to maintain sustainable power supply in Sri Lanka.

As it will be discussed later in this document the sustainability and financial situation of CEB are not favorable; however, some positive factors were observed. These were 1) the financial structural reform including amendment of the electricity bill by revision of Electric Utility Law had been active since 2009; and 2) the maintenance cost of specially the Steam turbine could be reduced after 2012 by completing the current major repairs of it. Thus, the internal rates of returns could be improved in the future. Regarding, the conditions assumed when calculating the Internal Rates of Return see the following Table 4.

Table 3 : Internal Rate of Return

	Ex-post evaluation in 2005	Ex-post monitoring in 2011
FIRR	14.5%	Negative
EIRR	14.2%	Negative

Table 4 : Conditions Assumed when Calculating the Internal Rates of Return

Project life	Twenty years from when the facilities begin operation
Fiscal year	Same as the calendar year
Fixed price calculation method	Costs are converted to fixed prices by taking the year of project completion as the base year and discounting for the consumer price indices for both the local and foreign currencies. Fixed prices expressed in foreign currencies are converted using the exchange rates of the base year.
Cost breakdown	Project cost, operation and maintenance cost

Breakdown of FIRR	i) Income from sales of the electricity generated by the power plant ii) Fuel savings
Breakdown of EIRR	Same as above

### 3.1.2 Qualitative Effects

It is not identified.

In summary, although the internal rate of returns of the project are negative due to the increase in the maintenance cost and the lowered sales price; from the viewpoint of maximum output, power output and plant load factor, it is concluded that the project is mostly effective as was expected at the time of ex-post monitoring.

## 3.2 Impact

### 3.2.1 Intended Impact

#### 3.2.1.1 Stabilization of the Power Supply

The amount of electricity generated by the Kelanitissa Combined Cycle Power Plant (493.3GWh) accounted for 4.6% of total electricity generation (10,714GWh) in Sri Lanka in 2010. In the same year, Sri Lanka's potential output (2,818MW) exceeded peak demand (1,955MW), thereby securing a supply reserve of 863MW. Considering the supply reserve was 766MW at the time of the ex-post evaluation in 2005, the power supply in Sri Lanka has become more stabilized than it was in the past. Table 5 shows the composition of power sources in Sri Lanka. Although the percentage of hydroelectric power has slightly increased in 2010 in comparison to 2004 because of the increase in rainfall, it is evident that the over dependence on hydroelectric power as was the case in the 1990s has been reduced.

Table 5 : The Composition of Power Sources (%)

	Hydroelectric Power	Thermal Power
1992	82%	18%
2004	50%	50%
2008	48%	52%
2009	48%	52%
2010	53%	47%

Source : CEB

#### 3.2.1.2 Impact on the Surrounding Environment

It was pointed out in the ex-post evaluation that it was difficult to know the effect of the project on the surrounding environment. In response to this, the manager of Kelanitissa Combined Cycle Power Plant assigned an Environmental Officer in 2006 and since then, the officer has been carrying out monthly monitoring of effluent discharge, noise and vibrations. In addition to this, the plant has then commissioned a quarterly environmental inspection by a third party inspection body that has been in carrying out inspections since 2006 in accordance with the Environmental law of Sri Lanka. All inspections have been conducted using inspection equipments brought by the third party inspection body to the power plant. The subjects of the inspections are noise, vibrations, and concentration of contaminant emission from smokestacks.

When the past environmental inspection reports were reviewed; the Kelanitissa Combined Cycle Power Plant had never received warnings about an environmental problem up to today. It is also confirmed that an environmental license has been issued to the plant by the Central Environmental Agency (CEA).

As for the concern of the concentration of contaminant emission from the smokestacks shown in the ex-post evaluation report, the results from environmental test report conducted by an independent third party are shown in the table 6. From this results, all the contaminants including Nitrogen Oxide (Nox), sulfur dioxide (SO<sub>2</sub>), Suspended Particulate Matter (SPM) are much less than the national standard of Sri Lanka, therefore, it is concluded that the impact of this plant gives on the natural environment will be limited.

Table 6: Concentration of Contaminant Emission from Smokestacks

	NO <sub>x</sub> (mg/Nm <sup>3</sup> )	SO <sub>2</sub> (mg/Nm <sup>3</sup> )	SPM (mg/Nm <sup>3</sup> )
2009	85	27	8
2011 (July)	71	41	85
Environmental Standard of Sri Lanka	3,000	250	300

Source: Test report of Industrial Technology Institute

The continuous monitoring system to measure the concentration of contaminants from smokestacks, which was installed when the plan was constructed, has never been operational since the start of operation of the power plant, due to problems associated with the monitoring equipment and its installation. At the time of the ex-post monitoring, CEB had decided to replace the entire equipment and been processing to prepare and review.

### 3.2.1.3 Contribution to the Economic Development

As shown in Table 7, real economic growth rate of Sri Lanka is quite positive except during the Lehman Shock period in 2009. The high growth rate of around 8.0% is expected also in 2011.

Table 7: Real Economic Growth Rate (%)

	2005	2006	2007	2008	2009	2010
GDP growth rate (%)	6.2	7.7	6.8	6.0	3.5	8.0

Source : World Bank, World Indicators, 2010

With the composition of the gross domestic product, as shown in Table 8, industrial sector and service sector percentages have been increasing against the agricultural sector. The development of the industrial and service sectors require stable electricity power supply and thus the project had met such needs. It can be also said that the project had a positive impact on the economic development of the Sri Lanka

Table 8: Composition of Gross Domestic Product in Sri Lanka (%)

Sector	1999	2008	2009
Agriculture	20.7	13.4	12.6
Industry	27.3	29.4	29.7
Manufacture	16.4	18.0	18.0
Service	52.0	57.7	57.7

Source : World Bank, World Indicator, 2010

In summary, it is confirmed that the project has still been playing an important role in the sustainable electric power supply and the economic development of Sri Lanka at the time of ex-post monitoring. As for the environmental impact concerns highlighted at the time of ex-post evaluation, it is also confirmed that internal and external third party monitoring for the environment has been undertaken since 2006, and these report proved that the amount of contaminated waste from the project is within the national standard of Sri Lanka. Further, the project has never caused any problems till today.

### 3.3. Sustainability

#### 3.3.1 Structural Aspects of Operation and Maintenance

No particular problem had been identified at this time with respect to institutional structures including decision-making process, human resources management, facility management, legal system, and operation and maintenance system.

#### 3.3.2 Technical Aspects of Operation and Maintenance

No particular problem had been identified at the time. In the field survey, it is confirmed there are many engineers who work at the Kelanitissa Combined Cycle Power Plant and have been working there since its establishment. And those engineers contribute to the maintenance and improvement of the facility. Furthermore, according to the facility manager, the technical levels of the young engineers have improved compared with the past, as a result of the CEB's training systems and daily on-the-job training.

### 3.3.3 Financial Aspects of Operation and Maintenance

As pointed out in 3.1.1.2 Financial and Economic Internal Rate of Return, the financial situation of CEB has been the constant budget shortfalls over a long period and the situation is still not good at present. The cumulative losses reached to 10.5 billion rupees at the end of 2008. To this situation, the government of Sri Lanka took the following actions to fundamentally change the financial structure of CEB.

- With the enactment of Sri Lanka Electricity Act in 2009, Public Utilities Commission of Sri Lanka (PUCS) became the economic regulator of the electricity industry.
- The government took over payment of interest on borrowings for the period from 2011 to 2014.

Furthermore, the CEB Finance Office targets to make CEB profitable by 2015 by implementing the following plans. These plans have been progressing well, CEB should be in the black and profitable around 2013 according to these plans.

- The operation of Coal-fired power plant in Puttalam will be started in 2011 and the second plant will be fully operational by 2014.
- Upper Kotmale hydro energy plant will be operational in 2012 and Broad Land Hydro energy plant will be operational in 2015.
- Supply amount from costly West Coast plant will be expected to diminish from 2014.

PUCSL considers if CEB implements all the above-mentioned plans and the country maintains high economic development, the CEB's targets will be achievable. In addition, it was confirmed that the budget for operation and maintenance of the Kelanitissa Combined Cycle Power Plant was appropriately allocated because the fine operation of the plant is directly related to the electricity sales to utilities revenue of CEB.

### 3.3.4 Current Status of Operation and Maintenance

A concern highlighted in the ex-post evaluation report was that the future quality of operations and maintenance could be degraded due to the aging of Piliyandala training center. When the evaluator visited and studied the training center, the facility was entirely renewed, the number of trainees had been increased, and the inside facility was also filled with positive spirit.



Moreover, the reputation of the training participants is good, and these days, the center had been receiving trainees not only from CEB but also from independent power industry companies. Therefore all of the identified issues pointed out at the time of ex-post evaluation have been solved. Table 9 shows the number of trainees at promotion training program in this training center.

Table 9: Number of Trainees  
at Promotion Training Programs in Piliyandala Training Center

	2007	2008	2009	2010
Number of Trainees	254	405	831	2,029

Source: Piliyandala Training Center

In summary, no particular problems on the capacity of the implementation agency and operation and maintenance system were identified, and the financial situation concerned at the time of the ex-post evaluation showed signs of improvement. Therefore, the sustainability of the project does not have a problem.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

It is confirmed that the project has still been playing an important role for the sustainable electric power supply and the economic development of Sri Lanka at the time of ex-post monitoring. As for the concerns on the environmental monitoring system pointed out in the ex-post evaluation report, CEB has assigned an Environmental Officer of the power station and the undertaking of monthly inspections, and in addition, the environmental inspection includes the measurement of contaminants from smokestacks



undertaken regularly by an independent third party since 2006. Therefore it is concluded that the issues on the environmental monitoring system has been mostly solved

As for the sustainability of the project, there is no visible problem on capacity and operation and monitoring system of the implementing agency.

The financial challenges of CEB, have remained. However, there are signs of improvement in the CEB's financial management and the budgets for operation and maintenance of the Kelanitissa Combined Cycle Power Plant have been appropriately allocated due to the importance of the plant for this country. Therefore, the sustainability of the project does not have a problem at this time.

The aging of CEB's training center, buildings and training equipment has been addressed and there has been tremendous improvements, thus the concerned issues at the time of the ex-post evaluation has been solved.

#### **4.2 Recommendations**

To implementation agency:

As for the environmental monitoring system pointed out in the ex-post evaluation of JICA, it was confirmed that CEB had been putting continuous efforts to improve the situation. The replacement of the monitoring equipment for the measurement of concentration of contaminants from the smokestacks considered by CEB should be well examined from the aspect of necessity, usefulness; and then most appropriate approach taken for CEB.

#### **4.3 Lessons Learned**

It is not identified.

### Comparison of Original and Actual Scope

Items	Plan	Actual
(1) Outputs		
1) Combined cycle power generation facilities	150 MW	165MW
a) Gas Turbines	Two or three units with an output of 37-67MW	One unit with an output of 110MW
b) Exhaust heat recovery boilers	Two or three units	One unit
c) Steam turbines	One unit with an output of 37-67MW	One unit with an output of 55MW
2) Fuel Storage tanks	Two 17,000 ton tanks	Two 4,500 ton tanks
3) Cooling water equipment	Direct cooling or a cooling tower	As planned
(2) Project Period	October 1996 - March 2000 (42 months)	October 1996 - March 2003 (78 months)
(3) Project Cost		
Foreign currency	10,926 million yen	12,613 million yen
Local currency	5,288 million yen	5,199 million yen
Total	16,214 million yen	17,812 million yen
ODA Loan Portion	13,481 million yen	13,406 million yen
Exchange rate	1 rupee = 1.9 yen (October 1996)	1 rupee = 1.4 yen (Average between May 1996 - June 2003)

Ex-Post Monitoring of Completed ODA Loan Project

Republic of Cameroon

**“Douala Port Container Terminal Modernization Project”**

External Evaluator: George Terahara, International Development Center of Japan, Inc.

**1. Project Description**



Map of Project Area



Gantry Cranes in Operation

**1.1 Project Objective**

The objective of this project is to contribute to expand container handling capacity through the installation of gantry cranes at Douala Port, the largest port in Cameroon, thereby contributing to the economic development of Cameroon and neighboring landlocked countries.

**1.2 Outline of the Loan Agreement**

Approved Amount/ Disbursed Amount	6,000 million yen/5,999 million yen
Loan Agreement Signing Date/ Final Disbursement	May 1987/May 2001
Ex-Post Evaluation	2005
Executing Agency	Port Authority of Douala (PAD) Guarantor: Government of Republic of Cameroon
Main Contractor	Mitsui & Co., Ltd.
Main Consultant	Ocean Consultant, Japan Co., Ltd

**1.3 Background of Ex-post Monitoring**

Cameroon showed steady economic growth of 7.5% per annum through the early 1980s and the amount of cargo handled at Douala Port reached its peak of 3.92 million tons in 1983. Under these circumstances, the Loan Agreement was signed in 1987 to prepare for the increase

in cargo volume by developing container facilities featuring safer and more economical containers.

However, the project was not completed until 14 years after the Agreement due to procedural delays on Cameroon's side, and lack of coordination with the World Bank on issues such as demand forecast, economic impact, questions regarding management structure of the executing agency, and differences in viewpoints on the privatization of the maintenance and management structure.

In addition, the Cameroon economy experienced negative economic growth between 1988 and 1994 and stagnated severely. Thus, the container traffic volume in the year of completion (2001) did not reach the volume forecasted in 1987 nor did it reach that forecasted for the year of post evaluation (2004).

This project introduced consulting services and prepared recommendations on the operations and maintenance during project execution, but privatization after project completion lowered project sustainability by insufficient improvement of the operation and maintenance system. Furthermore, improvement of the outer ring road around the Douala Port, which was expected to further positively impact the project, was recommended. Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

## **2. Outline of the Monitoring Study**

### **2.1 Duration of Monitoring Study**

Duration of the Study: April 2011~February 2012

Duration of the Field Study: August 29~September 10, 2011

### **2.2 Constraints during the Monitoring Study**

None

## **3. Monitoring Results**

### **3.1 Effectiveness**

#### **3.1.1 Quantitative Effects**

##### **3.1.1.1 Improvement in Container Handling Capacity**

(1) Container Handling Efficiency (Unit/Hour)

Container handling efficiency, containers processed per hour, improved from 7~8 units per hour (before project) to 24.4 units per hour at the time of ex-post evaluation (Table 1). Subsequently, the efficiency has ranged between 20 and 22 units per hour, and decreased by 10% from the time of ex-post evaluation. The around the clock operating rates are 55~65%.

**Table 1: Container Handling Efficiency**

Year	1996 (Before Project)	2004 (Ex-Post Evaluation)	2005	2006	2007	2008	2009	2010 (Ex-Post Monitoring)
Container Handling Efficiency (Unit/hour)	7~8	24.4	22.6	20.2	20.7	20.6	21.2	22

Source: PAD

(b) Container Handling Capacity (TEU/year)

Annual container handling capacity has been set as 262,000 TEU<sup>1</sup> per year since 2001 after project completion and has remained unchanged from the designed capacity.

(c) Annual Container Traffic (TEU)

Along with the growth of the economy, the total container traffic in 2010 increased by 57% from that in 2004. This means that the current traffic is beyond the original capacity of 262,000 TEUs (Table 2).

**Table 2: Container Traffic and GDPs**

Year	1996 (Before Project)	2004 (Ex-Post Evaluation)	2005	2006	2007	2008	2009	2010 (Ex-Post Monitoring)
Container Traffic(TEU)	106,000	179,538	187,506	199,985	217,171	270,245	281,438	288,932
GDP(bil. CFA) Yr. 2000 price	5,508	7,755	7,933	8,188	8,465	8,682	8,851	9,117

Source: PAD and IMF

(d) Containerization Rate (%)

With the increasing volume of containers, the containerization rate has also been increasing. The rate was 27.6% in 2005 (from January to September) after project completion, but it increased to 41% in 2010. Nonetheless, these numbers are lower than the forecasted number of 61.7% at the time of project appraisal. The forecasted number was too high and non-containerized cargo also developed.

(e) Average Berthing Time and Other Indicators

Average berthing time, berth occupancy rate, and average container yard staying time are shown in Table 3. Among these, the average berthing time diminished from 4.04 days (1995) to 3.20 days (2004) and reached 3.10 days (2009) as a result of project completion. Container yard

<sup>1</sup> Twenty-foot Equivalent Unit. A 40 foot container is 2 TEUs.

staying time improved from 22.00 hours (2004) to 19.53 hours (import, 2009) and 7.97 hours (export, 2009) after project completion. The concessionaire, Douala International Terminal (DIT), is to report these indicators regularly to PAD and is improving efficiency from both land- and sea-sides.

**Table 3: Average Berthing Time and Other Indicators**

		Year	1995	2004	2009
			Before Project	Ex-Post Evaluation	Ex-Post Monitoring
Indicator	Unit				
Average Berthing Time	Day		4.04	3.20	3.10
Berth Occupancy Rate	%		55.80	62.00	51.66
Average Staying Time on Container yard	Import	Day	24.10	22.00	19.53
	Export				7.97

Source: PAD

These indicators present that the operation and effect indicators are maintaining and developing the numbers at the time of ex-post evaluation and quantitative effects are judged to appear continuously.

### 3.1.1.2 Internal Rate of Return (IRR)

Without data provided from PAD, the ex-post evaluation calculated the Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) as 7.7% and 10.5% respectively by partially inferred data. Because PAD and DIT did not provide necessary financial data for IRRs, this ex-post monitoring survey does not calculate the rates.

### 3.1.2 Qualitative Effects

Since the ex-post evaluation did not measure qualitative effects, this ex-post monitoring survey does not compare those.

## 3.2 Impact

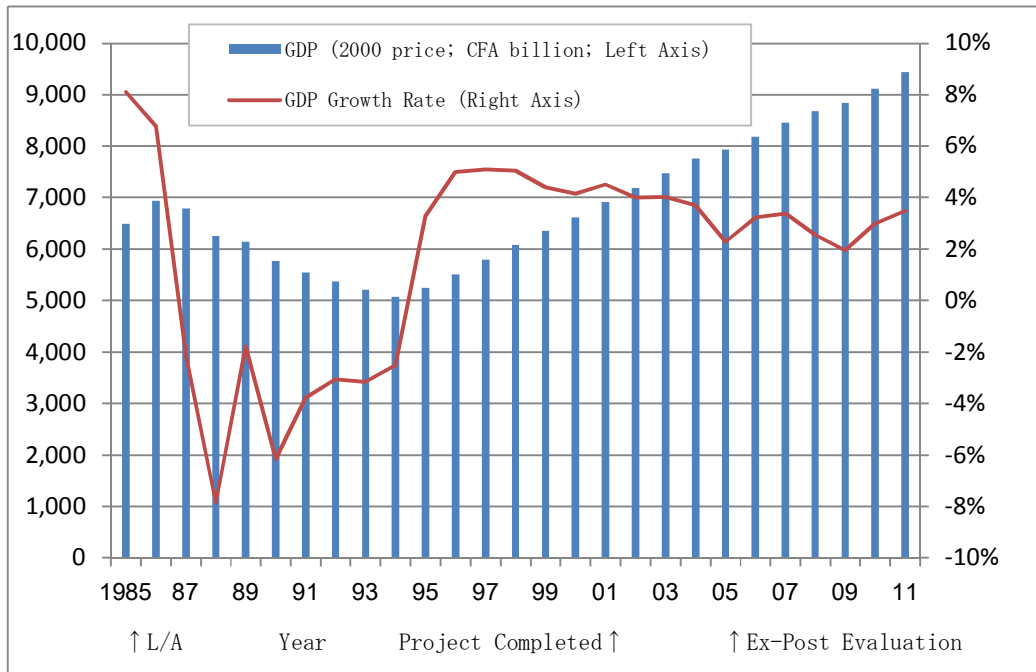
### 3.2.1 Situation of Impact

#### 3.2.1.1 Impact on Cameroon's Economy

Cameroon's economy observed negative growth from the late 1980s to early 1990s and positive growth after hitting bottom in 1994 (Table 2 and Figure 1). In addition, macroeconomic and fiscal management conditions are improving after the completion of Heavily Indebted Poor Countries (HIPC) Initiative<sup>2</sup> application in 2006. Consequently, the Gross National Income (GNI) per capita became US\$1,180 (2010, World Bank) and Cameroon

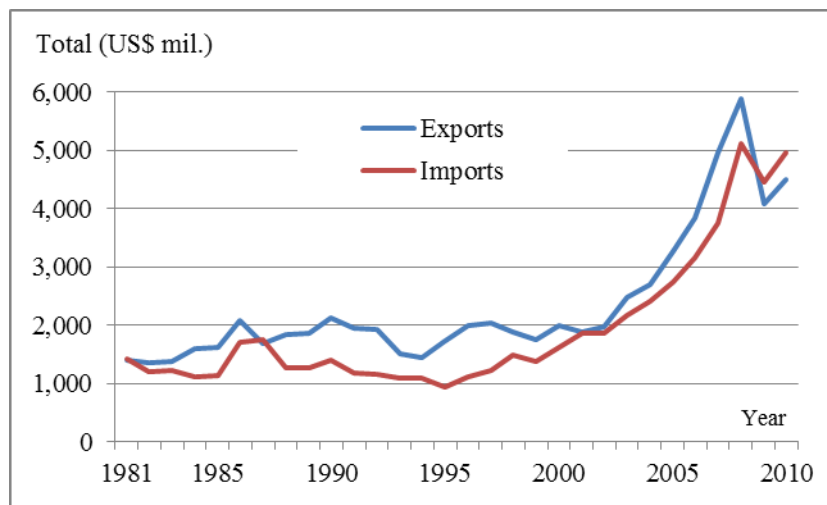
<sup>2</sup> By this process, a total debt amount of 10 billion Japanese yen loans was exempted in October 2006.

is classified as a “Lower Middle Income Country.”



Source: IMF Economic Outlook 2011 (2011 value is estimated)

**Figure 1: Actual GDP of Cameroon and its Growth Rates**



Source: Economic Intelligence Unit (2011)

**Figure 2: Imports and Exports of Cameroon**

With economic growth, the export of oil, timber, aluminum, coffee and cotton expanded (Figure 2) and Douala Port contributed to the growth through containerization of these export products.

### 3.2.1.2 Impact on Neighboring Countries

Douala Port is also functioning as an external port for Chad, Central African Republic (CAR) and north Congo (not an inland country). Among them, Chad and CAR have no external ocean ports other than Douala Port.

Table 4 shows the economic importance of the Douala Port although the trade amounts of the three fluctuate over the years. Of the total cargo through Douala Port, 20-30% is imported to and exported from three neighboring countries and 80-90% of this is with Chad. In recent years, cargo to Chad has frequently been related to plant and pipelines. Containerization rates are not available.

**Table 4: Transit Cargo through Douala Port to and from Neighboring Countries**

Country		2004	2006	2007	2008	2009	2010
Chad	Imports	184,261	180,823	196,358	278,249	474,676	460,940
	Exports	60,183	28,078	34,086	34,004	24,071	30,332
	Total	244,444	208,901	230,444	312,253	498,747	491,272
Central African Republic	Imports	78,895	192,931	63,091	83,433	96,030	111,091
	Exports	174,076	244,606	155,222	168,802	104,376	126,020
	Total	252,971	437,537	218,313	252,235	200,406	237,111
Congo (north)	Imports		4,694	5,438	21,919	17,765	11,712
	Exports		171,155	173,774	196,780	103,299	138,580
	Total		175,849	179,212	218,699	121,064	150,292

Unit: ton

Source: PAD

### 3.2.2 Other Positive/Negative Impacts

#### 3.2.2.1 Impact on Natural Environment

PAD is contracting out channel dredging work to a private company. According to PAD, the channel has been maintained properly and no negative environmental impact is reported.

There is no national standard to regulate air quality, water quality and noise and evaluation criteria have not been established. The port is located in a remote location away from residential areas and there is no effect on residents (based on the field survey).

#### 3.2.2.2 Impact on Douala Urban Transport

Ex-post evaluation pointed out the traffic on the road to and from the port caused traffic congestion in the city center and prevented smooth cargo operations because of the poor condition of the outer ring road of Douala Port. According to the field survey, cargo trucks are temporarily stopped at the port gate for document inspection. Additionally, most cargo trucks now do not go through the city center because the outer ring road connecting the port has been completed. Senior District Officer of Douala issued an administrative order to regulate truck and container trailer bans in the city area between 5 am and 9 pm and it is mostly upheld.



Consequently there is little negative impact on traffic conditions around the port.

### **3.2.2.3 Resettlement and Land Acquisition**

There has been no resettlement and no new land acquisition.

The above factors indicate the positive economic impact on Cameroon and the three neighboring countries through the increase in trade volume. In addition, any negative impact, such as traffic congestion in Douala City, pointed out by the ex-post evaluation, has been confirmed to be largely mitigated.

## **3.3. Sustainability**

### **3.3.1 Structural Aspect of Operation and Maintenance**

PAD conceded the container terminal operation to DIT, which has direct responsibility for operation and maintenance until the year 2020. DIT conducts operation and maintenance and reports to PAD. DIT dedicates 250 employees out of 280 to operation and maintenance. The staffing number is sufficient to operate two gantry cranes and conduct container yard work around the clock.

DIT workers in the container terminal requested the same level of wages as PAD workers in other terminals and went on strike in 2007. DIT workers consider their labor conditions worse than those of PAD workers and this is a concern for DIT (according to PAD and DIT).

The Ex-Director General and Ex-Chairperson of the Board of PAD have been charged with suspicion of embezzlement of PAD financial resources. Both received a guilty sentence in the Higher Court and appealed to the Supreme Court in 2009. Cameroon newspapers often inquire about the non-transparency of PAD management.

### **3.3.2 Technical Aspect of Operation and Maintenance**

DIT employs technicians trained in the Republic of South Africa. DIT conducts operational training in a training facility of a subcontracted Dutch company four times annually.

DIT staff conduct routine repair work such as painting and replacement of consumables. More important repair work is carried out by the foreign engineers as necessary.

Periodical maintenance of gantry cranes is scheduled based on the crane maker's criteria. Based on the hours operated, certain maintenance is performed and large scale repair work is to be conducted by South African and European engineers. Thus, DIT is maintaining the gantry cranes properly in terms of routine maintenance work.

### **3.3.3 Financial Aspect of Operation and Maintenance**

Although PAD operated in the red until 2004, it is in the black since 2005. In 2005 PAD conceded its port operation to DIT, thus the leasing fee revenue influenced the financial

condition. DIT pays 3.8 billion CFA francs to PAD and charges on average 145,000 CFA francs for each 40 foot container. DIT had revenue of 38.17 billion CFA francs and expenditures of 37.56 billion CFA francs in 2008. Operation and maintenance costs accounted for 24.93 billion CFA francs. These numbers show that DIT secured operation and maintenance costs. However, the financial statements of DIT have not been disclosed for this monitoring purpose.

### **3.3.4 Current Status of Operation and Maintenance**

The container yard has strict gate control and unauthorized vehicles and persons cannot enter the yard. Safety management system is also reinforced. Gantry cranes are properly maintained as described above and they are operational around the clock. There have been no specific problems observed during the field survey.

By these facts, DIT is conducting operation and maintenance up to the year of 2020, the final year of the concession contract, and no specific problems are anticipated in terms of technical and financial matters. On the other hand, the labor issues of DIT and non-transparency of past management of PAD remain concerns in structural aspects of operation and maintenance.

## **4. Conclusion, Lessons Learned and Recommendations**

### **4.1 Conclusion**

As the container traffic (288,000 TEUs, 2010) has already exceeded the designed handling capacity (262,000 TEUs), significant effects have been observed.

This project played an important role for Douala Port to function not only as the main port for Cameroon, but also as an external port for central African countries. Especially, the role it played in contributing to Cameroon's export and import boom since 2005 is significant.

The ex-post evaluation concluded that the concession of the terminal had led to low sustainability of the project. Contrarily, this monitoring survey found that the sustainability is held by the concession scheme.

The ex-post evaluation recommended: i), cooperation from implementing agency, and ii), improvement of outer ring road of container yard. Regarding i), PAD cooperated with this monitoring mission to a certain extent in matters such as provision of information and facilities. Regarding ii), the traffic problem has been solved by the improvement of the outer ring road as described in 3.2.2.2.

### **4.2 Recommendations**

None

### **4.3 Lessons Learned**

None

### Comparison of Planned and Actual Outcomes

Item	Planned	Actual
1. Output	<p>(1) Procurement of Equipment</p> <p style="padding-left: 20px;">1) 2 gantry cranes for quays 2) 4 transfer cranes for container yard 3) 8 tractors, 10 trailers 4) Computer system</p> <p>(2) Utilities, civil engineering and construction work, etc.</p> <p>(3) Engineering services</p>	<p>(1) Procurement of Equipment</p> <p style="padding-left: 20px;">Mostly as planned. 1) as planned, 2), 3) and 4) cancelled. Additions: 1 small fire engine, 1 mobile workshop, operation and maintenance training)</p> <p>(2) Utilities, civil engineering and construction work, etc.</p> <p style="padding-left: 20px;">Mostly as planned. (There was some additional civil engineering and construction work.)</p> <p>(3) Engineering services</p> <p style="padding-left: 20px;">Mostly as planned.</p>
2. Duration	May 1987~December 1990 (44 months)	July 1990~July 2001 (133 months)
3. Project Costs		
Foreign Currency	6,000 million yen	5,999 million yen
Local Currency	1,875 million CFA francs	481 million CFA francs <sup>3</sup>
Total	6,994 million yen	6,079 million yen
ODA loan Portion	6,000 million yen	5,999 million yen
Conversion Rate	1 CFA franc = 0.53 yen (as of January 1985)	1 CFA franc = 0.166 yen (2001 average)

<sup>3</sup> Estimated figures have been used as the executing agency did not provide data.