

**Institutional Capacity Development Program for  
Electricity Sector in Iraq  
(Financial Analysis and Planning, and Project Management)**

**Discussion Report**

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## Abbreviation

CBI	Central Bank of Iraq
DG	Director General
ERP	Enterprise Resources Planning System (of NEPCO)
FAS	Financial Affaires Section
GOI	Government of Iraq
IRR	Internal Rate of Return
ISR	Institutional System and Regulation
JICA	Japan International Cooperation Agency
MOE	Ministry of Electricity of Iraq
MOF	Ministry of Finance of Iraq
NDS	National Development Strategy
NEPCO	National Electric Power Company of Jordan
O&M	Operation and Maintenance
TA	Technical Assistance
UN	United Nations

## Currency

IQD	Iraq Diner
USD	Unites States Dollar

(USD)	(IQD)	(As of)
1.00	= 1,463	2004/7/3
	1,467	2005/7/4
	1,486	2006/7/2
	1,290	2007/3/14

## **1. Introduction**

The power sector in Iraq has seriously deteriorated due to devastation, lack of investment, insufficient operation and maintenance (O&M), and looting since the outbreak of the past wars. Installed power capacity totaled 9,295 MW in 1990, but about 70 percent of it was damaged during the 1991 Gulf War. Although it once recovered to the 4,000 MW level thanks to the Oil for Food Programme assisted by the United Nations (UN), it again dropped to 3,300 MW during the last conflict.

Reconstruction work by various donor agencies started soon after the conflict broke out. However, the generation capacity is still hovering around the pre-war level because reconstruction work has been making only slow progress due to serious security constraints and repeated sabotage. As a result, people nationwide have been suffering from frequent load shedding almost all day long.

Reconstruction and rehabilitation of power facilities are the top priorities for coping with this power shortage, but at the same time, the strengthening of institutional capacities such as laws, regulations, and administrative and management systems is also of great importance for future power development.

Meanwhile, various reports have revealed enormous needs for institutional capacity-building because the establishment of effective institutional, administrative, and management schemes is a prerequisite condition for remedying the current difficult situation of power supply.

The National Development Strategy (NDS), which was made public at the donor conference held in Tokyo in October 2004, clearly stipulates that the government should concentrate on policy and regulation issues, while public services, such as electricity, water and so forth, should be enhanced through private-sector participation.

In cooperation with the National Electric Power Company in Jordan (NEPCO), in fiscal 2005, the Japan International Cooperation Agency (JICA) started a capacity development program for “Institutional System and Regulation (ISR)” aimed at instilling the concept of sectoral reform in the Iraqi Ministry of Electricity (MOE). Sectoral reform covers a wide range of aspects such as laws and regulations, the tariff scheme, private sector participation, procurement, and metering and billing.

Various lessons learned from other countries were also presented in the workshops of the ISR program so that the Iraqi participants acquired a clear idea of the steps needed for future power sector development and perspectives on the future power industry picture. In particular, in the second and third workshops, a series of discussions was held to formulate a vision for and a roadmap of institutional capacity development. Ultimately, the Iraqi participants compiled a tentative vision, which set forth both individual tasks to be carried out and targets to be attained in the long term (see Figure 1-1).

As shown in the road map, urgent task of the MOE is to rebuild the capacity of destroyed power facilities and secure a sufficient supply of power to the Iraqi people.

To reconstruct and develop the power sector over the short- and mid-terms, official

moneys provided by bi- and multilateral institutions must play an important role for the necessary fundraising. In other words, it is definitely necessary for the MOE to prepare for tapping this official money.

Many countries and financial institutions have already pledged to support Iraq and provide financial assistance including grant and loan funds. However, there still remain obstacles to the implementation of power reconstruction and development plans, and especially of the electricity master plan compiled by the MOE.

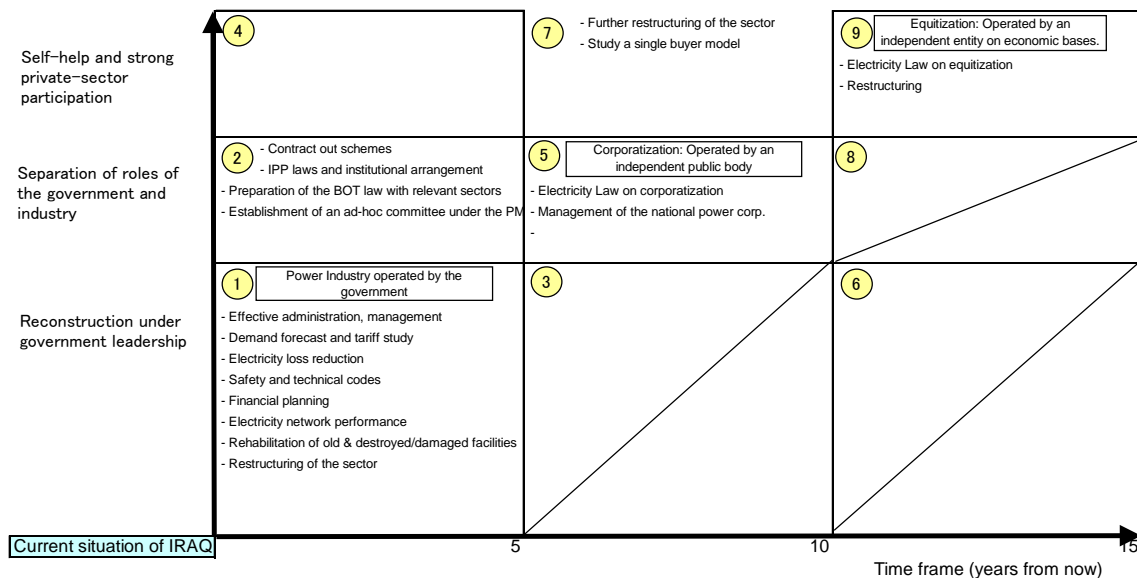
One of the obstacles is the MOE organizational arrangement including accounting and project management, which is still too immature to run various kinds of project using such official assistance.

With regard to the technical assistance (TA) necessary to attain targets clarified in the roadmap, at the previous workshop in fiscal 2005, JICA and the Iraqi side discussed expected TA themes for fiscal 2006 as shown in Figure 1-2.

Of these proposed themes, JICA decided to focus mainly on two critical issues for the institutional development: project-based financial analysis and planning, and project management<sup>1</sup>.

This document summarizes the result of discussions and analyses carried out during the workshop in fiscal 2006.

**Figure 1-1: Roadmap for the Institutional Development of Iraq’s Power Sector**



Source: JICA

<sup>1</sup> In line with this “Financial Analysis and Planning, and Project Management” training, another training course of the “Loss Reduction” was also carried out under the JICA program.

**Figure 1-2: Possible TA Themes for Fiscal 2006**

<b>Category A: To Revamp Destroyed Facilities</b>	<b>Category B: To improve the financial position</b>	<b>Category C: To Prepare for the Next Steps</b>
Program A-1: Planning for reconstruction --Diagnosis of existing facilities (JICA, UNDP) --Short-term demand forecast (or allocation of power supply) (USAID) --Short-term power development (USAID) --Installation of new generators (GOJ, UNDP, US, DFID) --Reinforcement of network (ibid) --Fund procurement (ibid) --Grant --Concessional loans (IBRD, JBIC etc.) --Necessary training (Outside this TCTP, JICA will continue the ongoing training programs in Japan and Egypt)	Program B-1: Revenue increase and loss reduction --Appropriate tariff scheme --Real cost of power supply ---Depreciation, O&M, and fuel ---Necessary cost for future investment --New investment cost ---Construction cost ---Fundraising cost --Loss reduction ---Reduction of technical loss ---Optimization of networks --Reduction of non-technical loss (Lessons and learning from neighboring countries are important.) ---Metering system or alternatives (e.g., prepaid card system)	Program C-1: Detailed road map for the institutional development --Establishment of the national power corporation (Mid-term target) --Roles, functions, and responsibility --Prospect for the balance of revenue and cost, and necessity of subsidies --Status of staff and employees --Introduction of IPPs (Mid- and long-term target) --Risk analysis and risk allocation --Power purchase agreement --Fuel supply agreement
Program A-2: Modernization of facilities --Optimization of network ---Transmission and substations --Improvement of maintenance system ---Computerization --Improvement of safety conditions ---Safety code		Program C-2: Enhancement of organizational capacity --Road map for the institutional development --Revision of the vision: Structure of the industry ---Single- or multiple-buyer system??? ---Corporatization, equitization, or privatization??? ---Use of private energies (e.g., contract-out and BOT schemes) --Corporate governance --Finance and accounting --Rules of organizational management --Evaluation of staff performance --Motivation --Quality assurance

Source: JICA

## 2. Current Status and Problems of the Organizational Formation and Project Management in the MOE

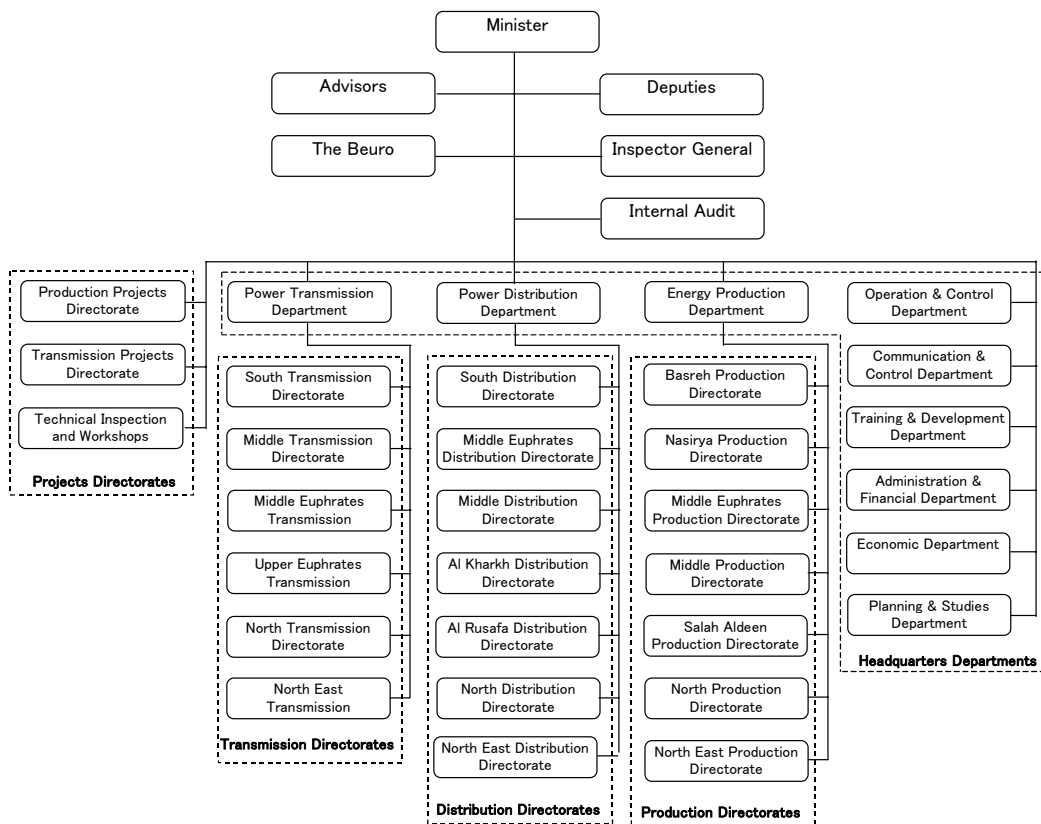
### 2.1. Organizational structure

As one of the industrial ministries, the MOE was established in 2003 by reorganizing the former Commission of Electricity, which was established in 1999.

The organization consists of five directorate and headquarters-department groups, which are divided by function into categories such as headquarters, generation, transmission, distribution and new projects. The individual groups are further divided by region or task. There were 23 directorates and nine departments (see Figure 2-1).

The number of the officials was 40,000 before the war in 2003 but has since increased to around 85,000.

**Figure 2-1: MOE Organizational Structure**



Source: MOE

## 2.2. Budget system

The MOE management depends wholly on the government budget allocated by the Ministry of Finance (MOF).

There are two categories of budget: current and investment. The former is used for day-to-day O&M activities, and the latter, new investment for tasks such as construction of facilities.

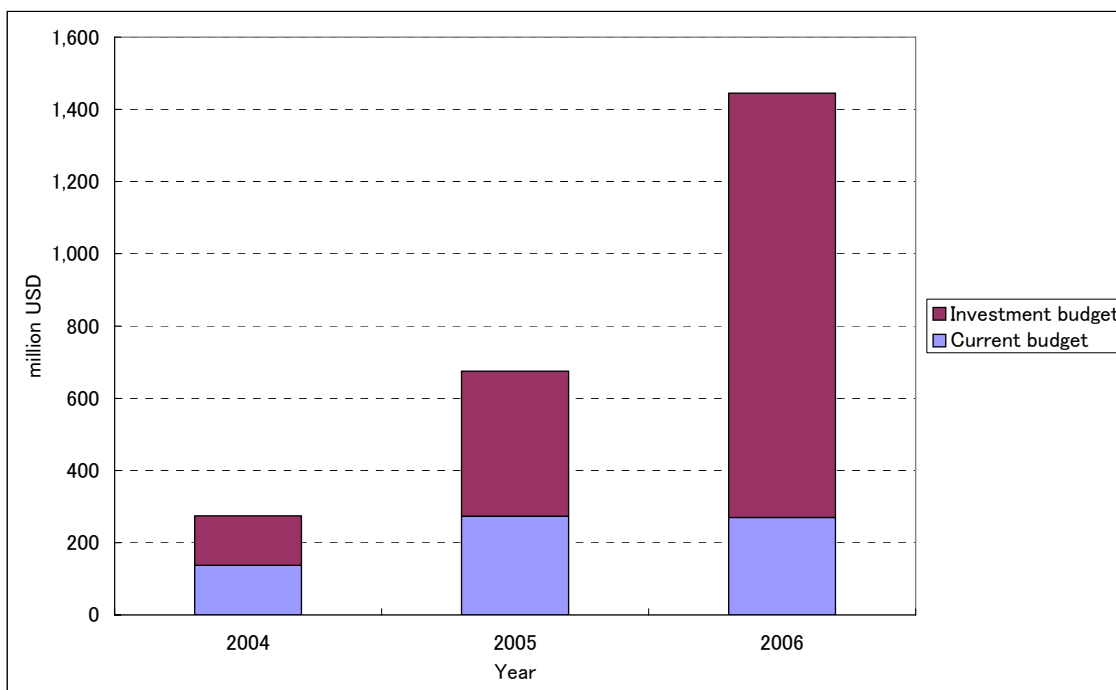
In the past, cost for day-to-day operation including salary was covered by tariff revenue. However, tariff correction became difficult due to the prevailing social instability, and the current budget system was introduced to compensate for tariff revenue shortage.

The destiny of a new project fully depends on the availability of budget, which will be allocated to each directorate and department.

The MOE budget increased rapidly in the past three years and reached IQD2.147 trillion (USD1.445 billion) in 2006. Of this total, the investment budget accounted for IQD1.746 trillion (USD1.175 billion), and current budget, IQD410 trillion (USD270 million). This is due mainly to the rise in oil prices and partly to the increase in oil export following the lifting of the UN embargo. It also reflects the strong commitment of the new government to the reconstruction of the social infrastructure.

However, there still exists uncertainty about the availability of the MOF budget. In practice, the budget originally proposed by the MOE is often reduced by the MOF. In fiscal 2006, for example, the MOF cut 40% of the original budget requested by the MOE.

**Figure 2-2: MOE Annual Budget**



(Unit: million IQD)

Year	Total budget	Current budget	Investment budget
2004	401,000 (USD 274 milion)	201,000 (USD 137 milion)	200,000 (USD 137 milion)
2005	989,956 (USD 675 milion)	401,000 (USD 273 milion)	588,956 (USD 401 milion)
2006	2,147,030 (USD 1,445 milion)	401,000 (USD 270 milion)	1,746,030 (USD 1,175 milion)

Exchange rate:

USD 1 = IQD 1,463

IQD 1,467

IQD 1,486

as of 2004/7/3

as of 2005/7/4

as of 2006/7/2

Source: MOE & CBI

Under the current financial condition, the MOE suffers from a serious shortage of investment funds, although the investment budget rapidly increased over the past three years.

Meanwhile, the MOF has stated that it will allow the MOE to borrow loans in order to procure funds required for future investment from international institutions at its own responsibility because of the government budget shortage.

### 2.3. Management system

At present, the MOE has the status of an industrial ministry. The entire project management as well as accounting is performed and administrated in accordance with



the governmental budget-control system. Some of the salient features of the MOE management system are as follows:

### 2.3.1. Project management

Although there are some differences of organizational structure between the MOE (i.e., a governmental body) and ordinary power companies like NEPCO, the MOE has a project-management system.

As regards investment projects, while the Planning and Studies Department compiles initial plans<sup>2</sup>, the Project Directorates manage project implementation, which consists of design, tendering, procurement, construction, and inspection. In this way, the organization in charge of the project management exists in the MOE and is similar to that of NEPCO. In the project implementation stage, an official from the Project Directorates is assigned to the project to serve as its manager

The problem is that their management system is obsolete. In particular, the system has not been computerized to a sufficient degree, and almost all information is instead still handled on the paper basis.

In addition, budget shortages seriously affect the implementation of investment projects.

### 2.3.2. Procurement

The organizational structure for MOE procurement management is also similar to that of NEPCO.

The Commercial Affair Section is responsible for procurement. However, one big difference, for example, is that, while the Procurement Department of NEPCO is independent, the Commercial Affair Section of the MOE is directly linked to individual directorates<sup>3</sup>. This means that procurement is managed on directorate basis, and there is no linkage with other directorates, although the management procedure is the same among all directorates.

The Directorate General (DG) has the authority to conduct procurement up to the price IQD 250 million. Due to the promulgation of a new regulation, this ceiling was raised to IQD750 million in January 2007. The DG must announce planned procurement to bidders in local newspapers one month before the implementation.

Small-scale procurement up to IQD50 million does not need announcement but must receive permission from the procurement committee<sup>4</sup>. In addition, this procurement needs to receive at least three quotations.

As regards the procurement beyond these ceiling and conditions, the DG must obtain a ministerial approval.

While the authority over use of procurement budget belongs to each directorate as

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<sup>2</sup> From the year 2007, the Economic Directorate takes this responsibility.

<sup>3</sup> Although the Commercial Affair Section of each directorate including Project Directorates carries out tasks such as tendering, evaluation, and awards, awarding needs a ministry approval.

<sup>4</sup> The member of the committee is composed of the staff of the same directorate.

mentioned above, actual procurement works, such as contracting and payment, are carried out by the Economic Department of headquarters.

In NEPCO, if procurement is urgent and no time for tendering, the Procurement Department is allowed to skip the ordinary tendering process and make a direct-call to well-known contractors. But in the MOE, the authority to make a direct-call resides solely in the cabinet.

### 2.3.3. Financial system

Basically, the financial system in the MOE is not much different from that of ordinary utilities like NEPCO. The Economic Department of the MOE is in charge of financial management. However, one difference is that the MOE does not have a computerized accounting system like NEPCO's Enterprise Resources Planning (ERP) system, and thus its management is conducted manually on paper basis.

As a result, officials are forced to follow cumbersome steps to conduct their tasks. Processing takes a lot of time for requirements such as budget requests, approval, confirmation, and implementation.

For example, in case of procurement, firstly an official must receive approval from the DG of his/her Directorate. The DG then sends signed approval to the Commercial Affaire Section. Secondly, the Commercial Affaire Section evaluates the availability of budget and makes a reply to the DG. Finally, the decision of the Commercial Affaire Section is reported to the official.

The progress of project implementation is very slow in the MOE mainly because of this bureaucratic procedure as well as the current security problem.

In addition, since the MOF controls the entire budget, the budget needed for procurement is often reduced substantially by it, as mentioned in Section 2.2, "Budget system".

Problems in the financial management may be summarized in the following three points:

- Since the financial system is not computerized, needed information is neither integrated into the system nor appropriately shared among relevant officials;
- The MOE lacks advanced financial analysis and planning methods and still adheres traditional methodology; and
- The bureaucratic disposition in the MOE lowers the efficiency of financial management.

## 2.4. **Tariff revenue**

Since there is much uncertainty about government budget allocations in the future, improvement in the self-financing capacity of the MOE is definitely necessary to establish rigid and sound footing in order to attain the short- and mid-term targets—i.e., reconstruction of the destroyed power facilities and development of the power sector towards more reliable and self-supporting operation as a utility.

To this end, tariff revenue must be an important source of funds to secure future investment in power development.

The current tariff levels are, however, still low. The tariff rate range is ¢0.155 - 1.938/kWh for commercial customers, ¢0.078 - 2.326/kWh for domestic customers, ¢0.388/kWh for agricultural customers, ¢0.155/kWh for government, and ¢0.233 - 0.659/kWh for industrial customers (see Table 2-1). The averaged tariff revenue paid by consumers is estimated at ¢0.2 - 0.8/kWh against estimated power supply cost ¢8/kWh.

Meanwhile, based on other data collected by the workshop participants, the tariff revenue of the Al Rusafa Distribution Directorate is estimated at only ¢0.152/kWh. This figure varies from one consumer category to another: the lowest was ¢0.072/kWh for domestic consumers and the highest, ¢0.51/kWh for industrial consumers (see Figure 2-3).

There is some difference between the above two estimations. However, due to the low tariff collection rate, it is very difficult to calculate the real tariff paid by consumer. For example, in the latter estimation of the Al Rusafa Distribution Directorate, we used data for electricity sales in two terms, i.e., energy (kWh) and monetary value (IQD), but there is surely a substantial amount of discrepancy caused by unpaid bills.

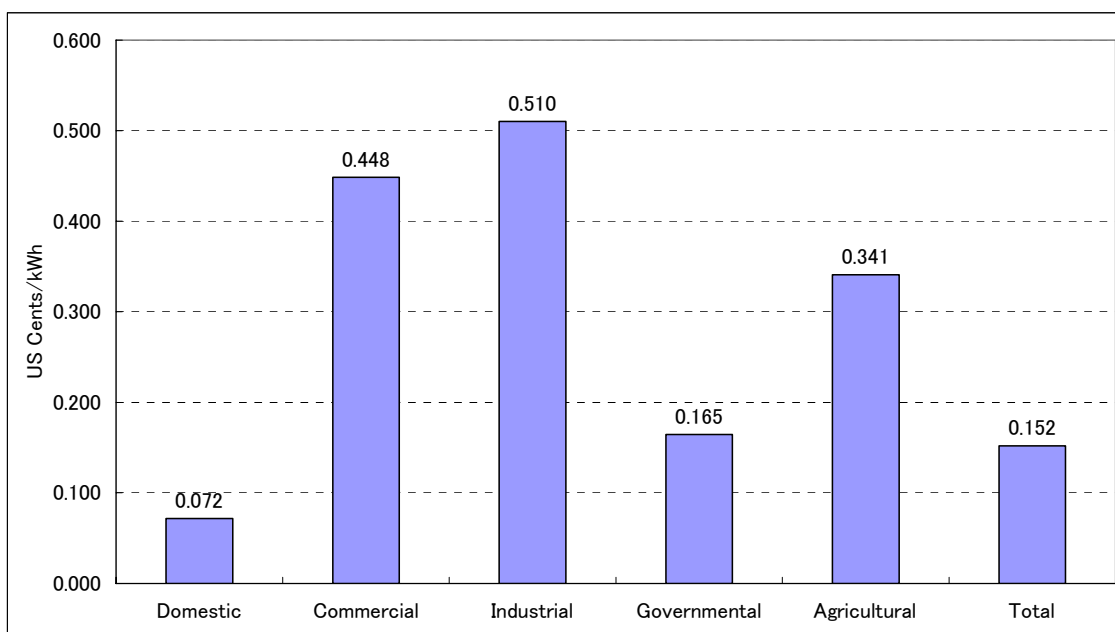
In either case, tariff levels are definitely far below ¢1/kWh, and this situation is far from the position that tariff revenue and outlay must strike a balance.

**Table 2-1: Power Tariffs**

		Fils/kWh	US Cents/kWh
Commercial	10kWh/day	2,000	0.155
	10kWh/day	4,000	0.310
	10kWh/day	8,000	0.620
	20kWh/day	12,000	0.930
	30kWh/day	20,000	1.550
		25,000	1.938
Domestic	10kWh/day	1,000	0.078
	20kWh/day	4,000	0.310
	30kWh/day	7,000	0.543
	40kWh/day	15,000	1.163
		30,000	2.326
Agricultural		5,000	0.388
Government		2,000	0.155
Industrial	11kV	3,000	0.233
	33kV	2,500	0.194
	132kV	2,000	0.155
	0.4kV	8,500	0.659

Exchange rate: USD 1 = IQD 1,290 as of 2007/3/14  
Source: MOE & CBI

**Figure 2-3: Average Tariffs in the Al Rusafa Distribution Directorate, 2005**



	Fils/kWh	US Cents/kWh
Domestic	1,053	0.072
Commercial	6,579	0.448
Industrial	7,483	0.510
Governmental	2,416	0.165
Agricultural	5,001	0.341
Total	2,227	0.152

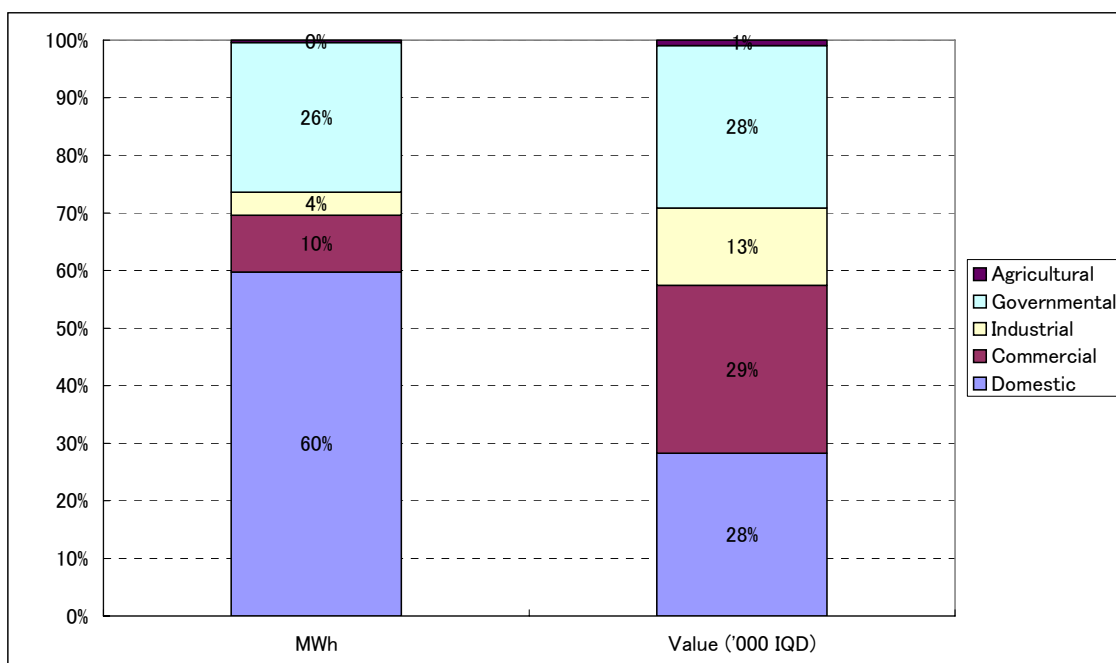
Exchange rate:

USD 1 = IQD 1,467 as of 2005/7/4

Source: MOE & CBI

Figure 2-4 shows the breakdown of tariff revenue by user category in the Al Rusafa Distribution Directorate. Domestic consumers hold the majority share at 60% in terms of kWh, but their share in terms of monetary value is only 28%. On the other, the share occupied by commercial consumers is 10% in kWh terms, but 29% in monetary terms.

**Figure 2-4: Share of Tariff Revenue in the Al Rusafa Distribution Directorate, 2005**

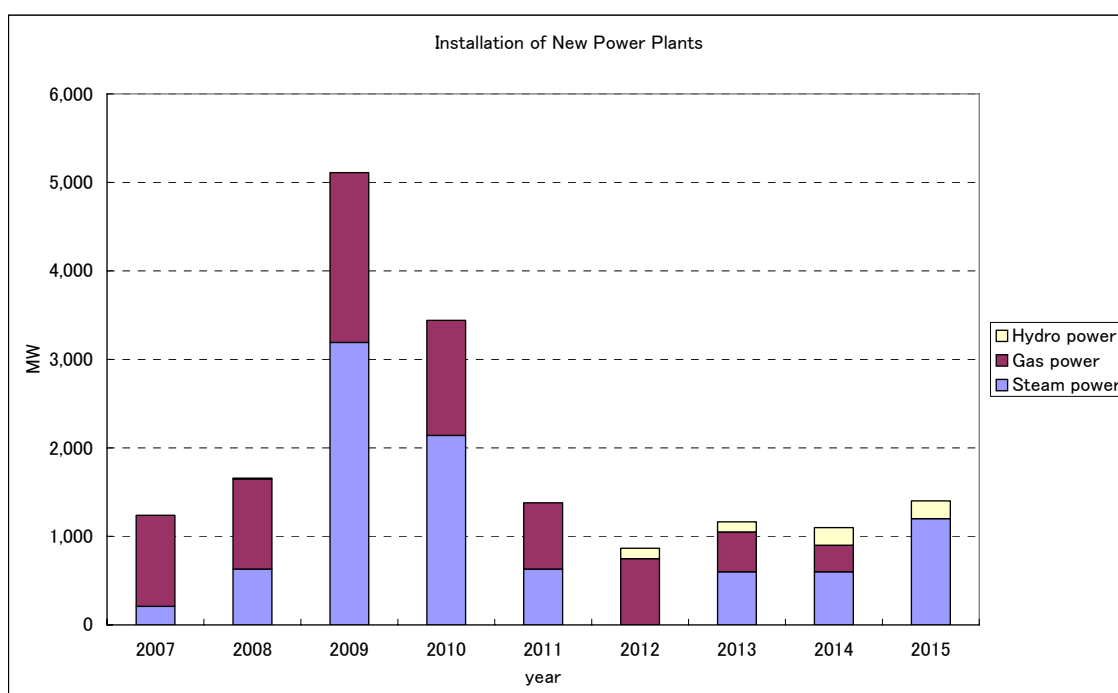


Source: MOE

### **3. Issues to be discussed in the Reconstruction of Power Facilities and Implementation of Projects Using Loans**

The current generation capacity is only one third as high as that before the 1991 Gulf War. Reconstruction of the power facilities is an urgent task for the Government of Iraq (GOI), and the MOE compiled a master plan aimed at rebuilding the current power system and increasing power supply over the next ten years.

**Figure 3-1: Plans for the Construction of New Power Stations**



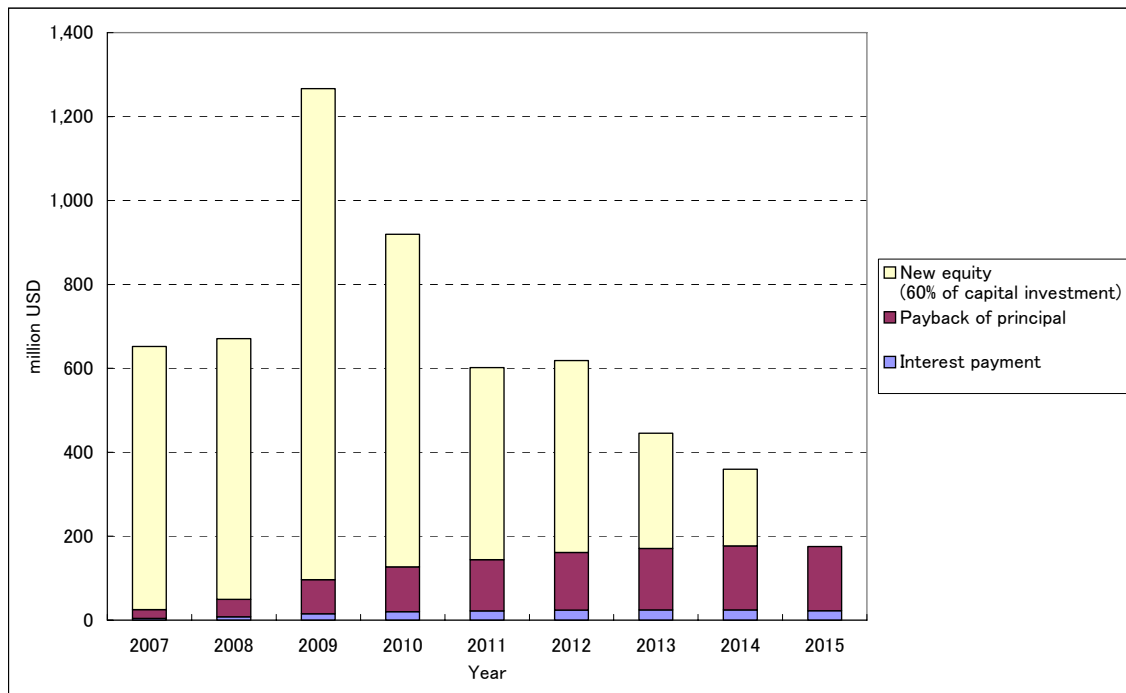
Source: JICA

This master plan accurately discussed the measures necessary for rebuilding the power supply capacity from the technical viewpoint, but the next issue that it must address is the means of financing the reconstruction and implementing the planned projects. In the workshops, the JICA expert and the Iraqi participants as well as NEPCO officials evaluated the magnitude of the financial burden arising from the installation of new power stations, although this analysis is still crude and based on simplified premises.

One of the notable findings of the analysis is that fund requirement only for the installation of new gas power stations is expected to be more than USD1 billion in the peak year, i.e., 2009. Given that funding is also needed for other generation sections such as steam and hydropower, as well as for the transmission and distribution divisions, the actual fund requirement could possibly be double or triple this figure.

The GOI announced that it would arrange around USD2 billion annually for the MOE to implement the power reconstruction, but the magnitude of the real fund requirement might be more than this level. As this indicates, the question of how to assure procurement of funds is still a big issue for the MOE.

**Figure 3-2: MOE Outlay Necessary for the Installation of New Gas Power Stations**

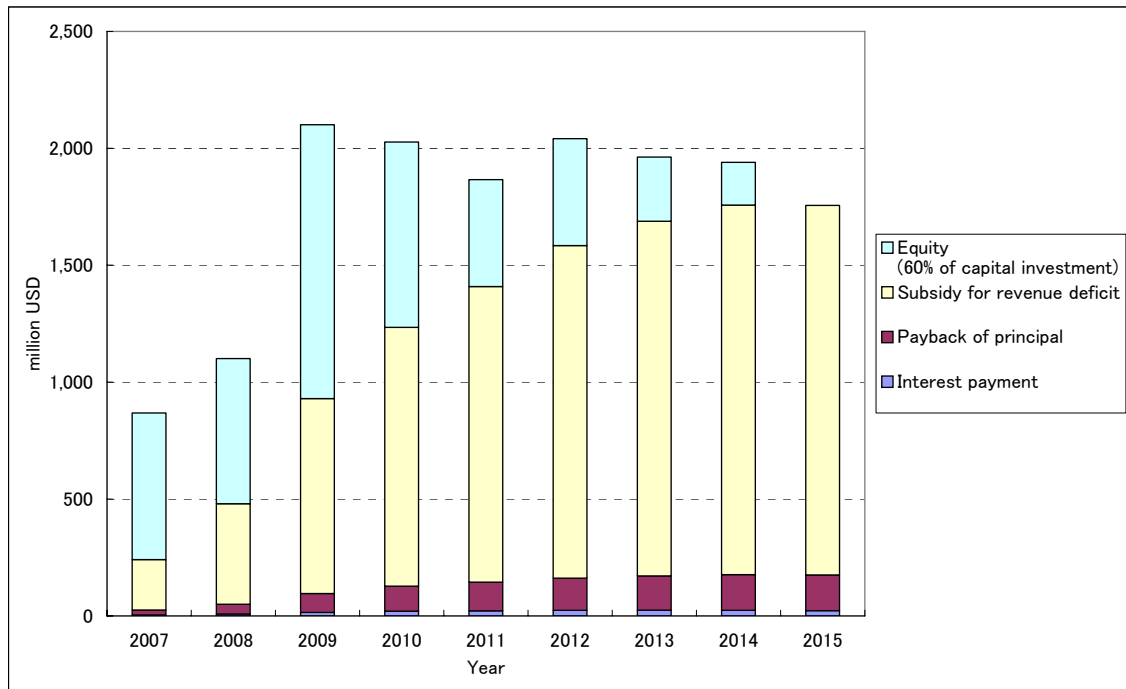


Source: JICA

Furthermore, there is the hidden problem of the current low tariff levels. If the tariffs stay on the current low level, the GOI will have to provide subsidies to compensate for the revenue shortage caused by the operation of the new power stations. This situation will worsen the funding condition in a downward spiral: the more new power stations are constructed, the more subsidies will be needed. As such, it will make fund procurement more difficult every year.

The analysis showed that, without any measures to solve the tariff problem, beyond the year 2010, the requisite amount of income subsidy would take up the entire budget of around USD2 billion which the government has announced to appropriate. Moreover, this simulation result pertains only to the construction of new gas power stations. If a similar size of income subsidy is needed for the new steam power stations, it would be almost impossible for the MOE to manage the power system operation on a financially sustainable basis.

**Figure 3-3: Necessary Income Subsidy to Compensate for the Revenue Shortage of the New Gas Power Stations**



Source: JICA

Related issues behind the implementation of the master plan are very complicated. First, reconstruction of power facilities is an urgent priority for stabilization of the current social disruption. Second, it would be politically difficult to hike tariff levels. Finally, the master plan manifests a strong commitment on the part of the new government.

#### **4. Recommendations:**

##### **4.1. Strong commitment by the GOI to realize the master plan**

As we have already discussed, the magnitude of the fund requirement for reconstruction of the power system is enormous. If we take into account the income subsidy needed to compensate for additional income shortage arising from the operation of new power stations with the current low tariff levels, the annual fund requirement will easily reach several billion US dollars.

Given that a substantial increase in tariff levels and dramatic improvement in the tariff-collection rate cannot be expected in the short-term, the government budget will continue to be the major fund source even though loans provided by bi- and multilateral institutions can supplement the necessary funding.

For this reason, it is crucial for the GOI to make a strong commitment to provision of funds from the national budget and implementation of the master plan.



#### **4.2. Review of the power sector reconstruction and development plan**

Careful analysis and evaluation are necessary to successfully implement the current master plan. In particular, the following factors must be taken into account:

- Availability of funds including self-financing (i.e., the national budget plus cash flow accrued from tariff revenue) and debts (i.e., loans from bi- and multilateral institutions)
- Financial balance of expected revenue and necessary expenses.
- Maintenance of the debt service coverage ratio on a sound level to secure the payment of interest and principal of loans.

#### **4.3. Compilation of business and investment planning**

In the future, the MOE will need to procure necessary funds by itself to run a new project to supplement the MOE investment budget. To secure such fund procurement, the MOE, as a quasi-electric utility, must compile long- and mid-term business planning and an investment program for the future power development, even though it still has the status of a governmental body instead of a commercial entity.

In the business planning in particular, the following items must be clearly stated:

- Magnitude of investment in power facilities needed to solve the current power shortage and meet future demand increase;
- Analysis of the financial burden imposed by the investment;
- Measures to raise funds and perspective on the related financial position including debt-and-service coverage; and
- Approaches to modification and change of the current project and organizational management system for efficient operation of utility business.

In addition, an appropriate tariff structure must also be discussed, although tariff increase is politically sensitive, and the tariff scheme cannot easily be changed rapidly and dramatically. However, tariff revenue is a very important factor for the MOE effort to achieve self-financing and repay borrowed money, i.e., loans.

#### **4.4. Further assistance for the MOE**

In light of such discussions, the potential themes of JICA TA for the next fiscal year will probably be in the following areas:

- Business planning based on the master plan and investment planning
- Project management methods and tools using computers

## **Appendix 1: Summarization of the Discussion Under the Workshop in Fiscal 2006**

The aim of this paper is to summarize the discussion during the workshop which was held three times from December 2006 to June 2007. In line with the lectures regarding financial analysis and planning, and project management, the Iraqi participants and the JICA short-term expert as well as the NEPCO officials analyzed and discussed the fund procurement necessary for implementation of the master plan and preparation required for efficient project management.

### **A. Issues Related to Fund Procurement Necessary for the Implementation of the Master Plan**

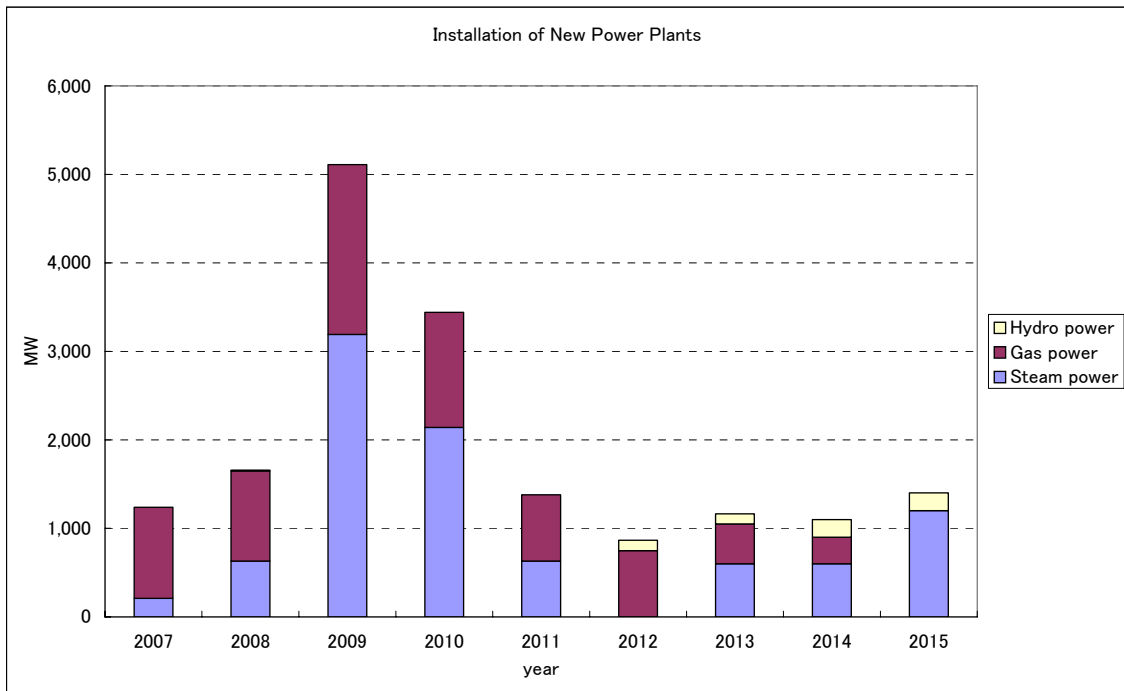
In June 2006, the MOE compiled a paper entitled “Master Plan for the Electricity System—Years 2006 – 2015.” This master plan is the basis for the reconstruction of Iraq’s power sector and details the rehabilitation of existing facilities and installation of new facilities.

The workshop analyzed and discussed the question of how to procure the necessary funds and the magnitude of the financial burden caused by the construction of new gas power stations over the years 2007 – 2015. Due to the time limitations, however, it could not cover the whole spectrum of questions about how to secure all of the necessary investment to run the master plan.

#### **(1) Construction of new power stations**

The MOE plans to install an additional generation capacity totaling 17,356MW during the 2007 – 2015 period. The planed addition is comprised mostly of thermal power consisting of 9,200MW of steam and 7,516MW of gas power. A particularly large addition is to be made from 2009 to 2010,.

Figure A1-1: Plans for the Construction of New Power Stations



(Unit: MW)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Steam power	210	630	3,190	2,140	630	0	600	600	1,200	9,200
Gas power	1,028	1,018	1,920	1,300	750	750	450	300	0	7,516
Hydro power	0	10	0	0	0	115	115	200	200	640

Source: Master Plan

## (2) Fund requirement for the construction of new gas-power stations

We focused on the installation of new gas power capacity and simulated fund procurement required for plant construction. To simplify the simulation, we assumed the following conditions:

- Tariff rate in the future

We evaluated the following two cases:

Case 1: The power tariff is hiked to a level that covers power supply cost, and  $\phi 3.5/\text{kWh}$  of the tariff revenue is allocated to the generation division. This level of revenue can generate enough cash flow to operate the power plant on a sustainable basis, and the project internal rate of return (IRR) is expected to be around 10%.

Case 2: The power tariff remains at the current level, and  $\phi 0.5/\text{kWh}$  is allocated to the generation division. This revenue level is far below the actual generation cost and needs  $\phi 3.0/\text{kWh}$  of income subsidies (i.e., differential of  $\phi 3.5/\text{kWh}$  and  $\phi 0.5/\text{kWh}$ ) to secure plant operation.

- Cost escalation is not considered.

- Income tax is not considered.
- Debt/equity ratio: 40%/60%
- Interest rate of debt (soft-loan): 1% p.a.
- Payback period of debt: 20 years
- Grace period is not considered.

### (3) Magnitude of necessary outlay

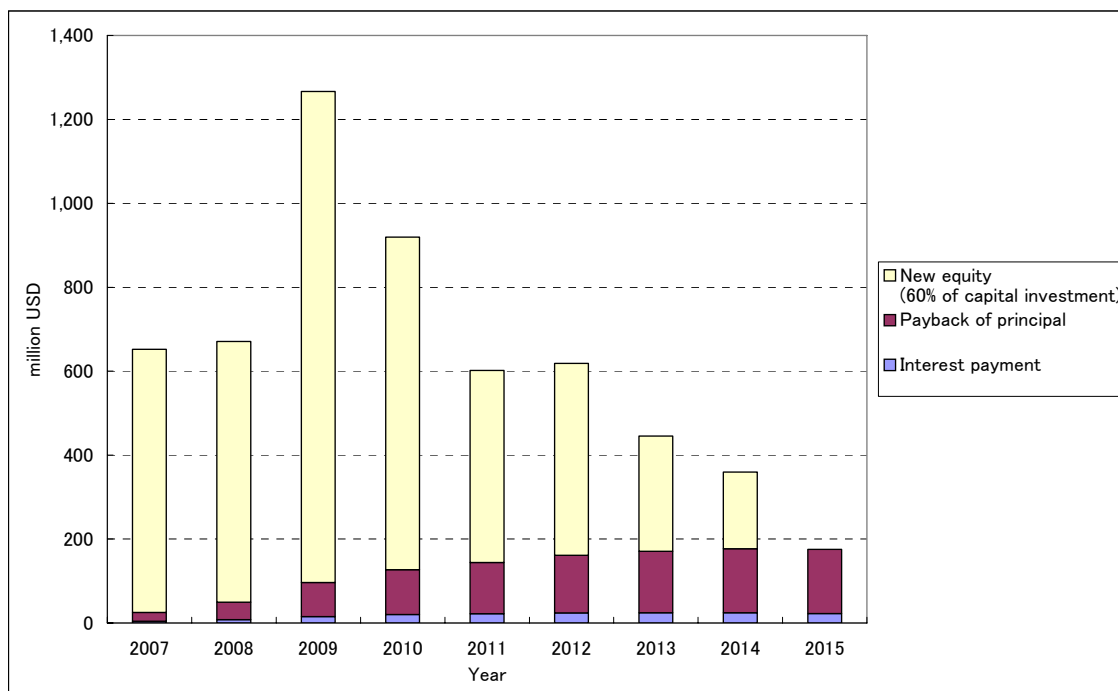
The MOE must invest in new gas power plants every year during the 2007 – 2015 period. In Case 1, three kinds of outlay are required:

- Equity portion of investment;
- Amortization of the debt portion (loan), which continues to accumulate in accordance with the progress of the investment (e.g., at the end of the year N, the MOE must amortize the principals of the loans borrowed during the 1 – N period)
- Interest payment, which will also be accumulated in accordance with the progress of the investment (e.g., at the end of the year N, the MOE must pay the interest on the loans borrowed during the 1 – N period)

Accumulated debt will continue to increase and reach the remarkable level of more than USD2.4 billion by the year 2013. In the year 2009, the necessary outlay will reach around USD1.3 billion. In Case 1, however, payment necessary for amortization of debt and interest will be generated by power sales, and the MOE would not have to appropriate this money from its annual budget.

To this end, the MOE must acquire more than USD600 million over the years from 2007 to 2010 as a net budget-outlay basis.

Figure A1-2: Necessary MOE Outlay (Case 1)



(Unit: million USD)

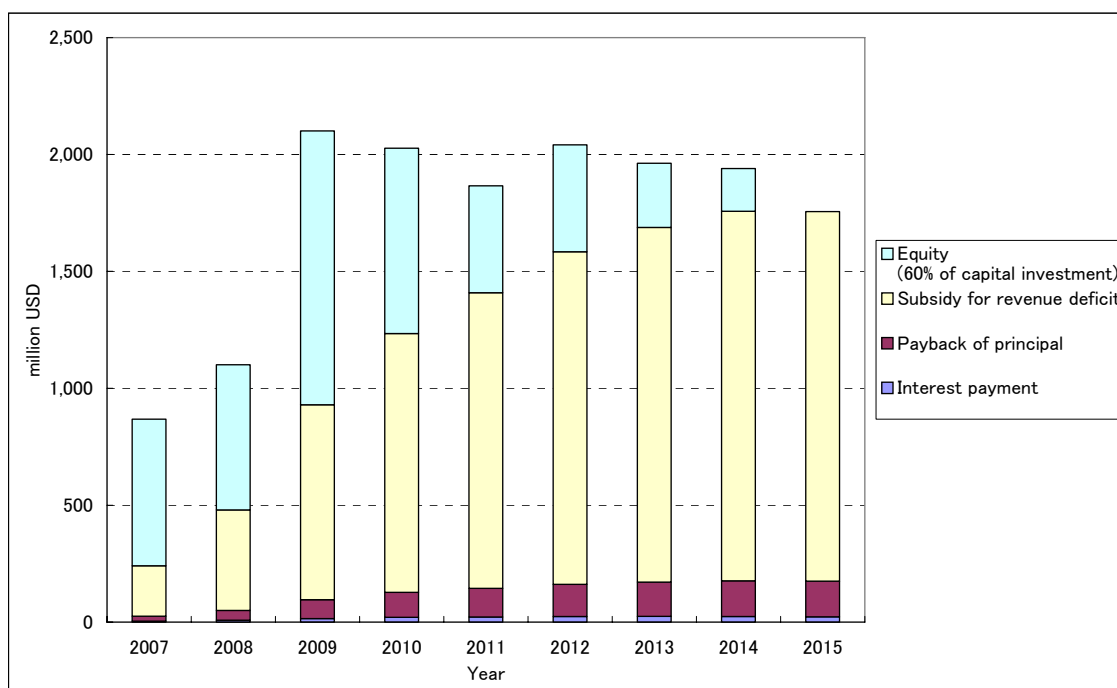
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
New debt	418	414	780	528	305	305	183	122	0
Accumulated debt (As of Jan. 1)	418	811	1,550	1,997	2,195	2,378	2,423	2,399	2,246
Interest payment	4	8	15	20	22	24	24	24	22
Payback of principal	21	42	81	107	122	138	147	153	153
Sub-total	25	50	96	127	144	161	171	177	175
New equity (60% of capital investment)	627	621	1,171	793	457	457	274	183	0
Necessary outlay	652	670	1,267	920	602	619	445	360	175

Source: JICA estimates

In Case 2, the situation will be very serious. This is because tariff revenue cannot cover the actual power-generation cost. As a result, the more new power stations are installed, the more subsidies will be needed to run these plants.

As shown in Figure A1-3, the amount of subsidies needed to compensate for the revenue shortage will rapidly increase. In the year 2010, it will account for more than one half of the total outlay. Beyond the year 2009, the outlay will reach the range of USD1.7 – 2.1 billion (USD1.6 – 2.0 billion on a net budget-outlay basis)

Figure A1-3: Necessary MOE Outlay (Case 2)



(Unit: \$mil)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
New debt	418	414	780	528	305	305	183	122	0
Accumulated debt (As of Jan. 1)	418	811	1,550	1,997	2,195	2,378	2,423	2,399	2,246
Interest payment	4	8	15	20	22	24	24	24	22
Payback of principal	21	42	81	107	122	138	147	153	153
Subsidy for revenue deficit	216	430	834	1,107	1,265	1,422	1,517	1,580	1,580
Sub-total	241	480	930	1,234	1,409	1,584	1,688	1,757	1,755
Equity (60% of capital investment)	627	621	1,171	793	457	457	274	183	0
Necessary outlay	868	1,101	2,101	2,027	1,866	2,041	1,962	1,940	1,755

Source: JICA estimates

#### (4) About grace periods

In this simulation of fund procurement, we ignored the grace period for loans to simplify the discussion. For example, the Japan Bank for International Cooperation (JBIC) offers a ten-year grace period for amortization of principal, and a borrower can postpone the payback in the initial stage. However, this cannot solve the financial problem suggested by this simulation, because beyond the year 2015 the MOE must continue to invest in the generation division to meet the growing power demand. This means that new debt will continue to accumulate year by year during the grace period, and that the MOE must eventually pay back the principal which it borrowed 10 years ago. The grace period cannot mitigate the debt itself; it merely gives the borrower more time to consider measures.

#### (5) Conclusive remarks

As shown in this simulation, the MOE needs USD600 million – 1.2 billion towards the year 2010 for the gas power stations alone. If the tariffs continue to stay on the current level, the government will have to appropriate more than USD1 billion to subsidize the

operation of the newly installed power stations beyond the year 2010. Given that the MOE must also investment in other power sources such as steam and hydropower, and furthermore in transmission and distribution divisions, the requisite MOE outlay will double and even triple. This will obviously be beyond the government’s financial capacity. To implement the current master plan successfully, the MOE must carefully examine its investment schedule in correspondence with the necessary increase in the tariff revenue and possible allocation of the government budget for the power reconstruction.

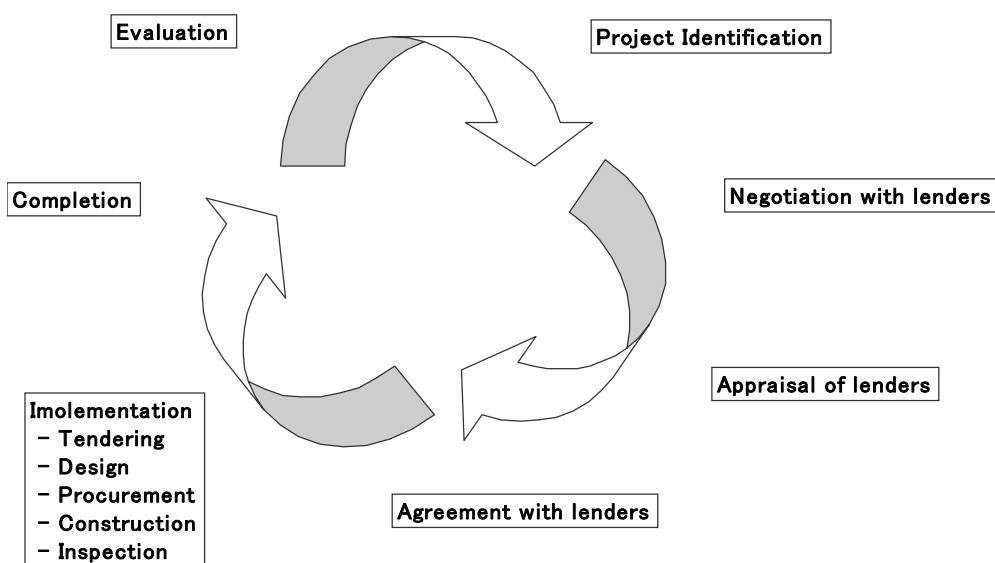
## **B. Necessary Measures and Actions for Solution of the Current Problems**

For procurement of the fund required to reach the target stated in the master plan, the use of loans provided by international institutions is unavoidable.

Some institutions (lenders) including JBIC have already pledged to provide their loans to the GOI. However, to run a project using these loans, the MOE is absolutely must introduce a well-organized management system, which is compatible with their guidelines, and improve the project efficiency.

Although the front-end work such as preparation and appraisal of a project is no easy task, the most emphasized and energy-consuming phase of project management is the procurement and construction stages (see Figure A1-4). While the MOE currently has its own management style, which is similar to that of ordinary utilities, it needs to strengthen its management capacity for conformance with the guidelines of lenders. The focal point of their requirements is that the borrower must practice a sound project cycle management, which proves the trustworthiness and transparency of project operation. Needless to say, this approach will improve the economy and quality of not only the project but also the borrower’s management.

Figure A1-4: Project Cycle Management



Source: JICA

### **(1) Dynamic linkage of relevant directorates and departments throughout the ministry to manage loan projects**

The individual functions of the project management is closely linked each other, and a delay in one task may have a chain-reaction effect on another task. The cumbersome procedure of approval at each step of project implementation such as budgeting, tendering, awarding, and procurement will be a big obstacle to running a loan project.

Dynamic linkage of each directorate, department, and section is still weak in the current MOE management system. To break the closed environment of the current directorate-based project management system, it is necessary to introduce a highly integrated organizational formation in the MOE.

While it is not realistic to completely change the existing MOE management system, an integrated project-management system facilitating communication and collaboration among relevant directorates and departments must be introduced for loan projects.

Specifically, information on project implementation stages such as budgeting, tendering, procurement, payment, monitoring of the progress of work, and inspection must be readily accessible to relevant officials across directorate and departmental boundaries. Such integrated project management will help to open up the current closed environment of not only project management but also communication among officials.

### **(2) Establishment of the integrated accounting system**

As for project management, the MOE is also required to practice strict budget control and bookkeeping as presented by the official of JBIC during the first workshop.

The accounting system also plays an important role in the project cycle. This is because it does not exist in isolation but is instead closely linked to the other functions of project management such as monitoring of assets and inventory, purchase order, status of accounts receivable and payable, and status of the progress of project work.

Aside from project management, information on the accounting system must be used to check the current financial position and as needed to control the total budget and the status of existing debt and necessary payback.

As such, establishment of an integrated accounting system on the ministerial level is urgently required to run loan projects.

In addition, over the medium and long-terms, it is also necessary to computerize the accounting system and information linkage with other project-management components such as schedule control and procurement.

### **(3) Tendering and procurement**

Tendering and procurement are important stages of the project cycle. They must be implemented, monitored and administrated as part of the project management.

The MOE must follow lender guidelines. Lenders also require the borrower to apply



very stringent rules for pre-qualification of tenders and consultants, and prior review of requirements.

#### **(4) Project implementation and supervision**

Many sections and officials of the relevant directorates and departments will be involved in the implementation of loan projects. Among them are the engineering, inspection, construction, and accounting sections. Their functions are deeply intertwined with each other. If a schedule delay occurs in one section, it could trigger another delay in the following task or the next section. Systematic schedule control of project implementation is very important to reduce time and economic losses.

Various types of computerized schedule-control tools are commonly used in power utilities including NEPCO, and some of them are available in the form of ordinary application software. Use of such software can improve the efficiency of project schedule management.

#### **(5) Power development planning**

The MOE has already compiled the Master Plan for the Electricity System—Years 2006–2015. Although this master plan is put together well in the technical aspects, discussion from other aspects, i.e., approaches to procurement of the necessary funding and control of the debt-service-coverage ratio, is also needed to implement the power sector reconstruction successfully. Moreover, the power sector is only one of the social infrastructures, and there is a large funding demand for other infrastructures. The size of budget which the government can appropriate for the power sector is naturally limited.

For these reasons, the MOE must formulate its power development strategy, which must discuss proper tariff schemes, measures to improve the MOE management, and perspectives on the future utility operation in the country.

## **Appendix 2: Overall Appraisal of the TA Program of Fiscal 2006**

For the FY2006 TA entitled “Financial Analysis and Planning, and Project Management,” 15 officials of the MOE participated in the workshop. Their expertise varied from person to person; some of them had a background of engineering, and others, accounting.

Although we experienced some difficulty in communication in English, the motivation of the Iraqi participants was in general very high. During the NEPCO lecture, in which communication was in Arabic, the participants enthusiastically exchanged opinions with the lecturers.

## Appendix 3: Schedule and Participant List of the Workshop in Fiscal 2006

Table A3-1: First Workshop Schedule (December 2006)

Date	Day	Time	Subject	Presenter
12/4	Mon	Afternoon	Arrival of the Iraqi participants in Amman	
12/5	Tue	9:00	Opening	NEPCO, JICA
		9:30	Background and aims of the workshop	JICA
		11:00	Guidance for the lectures of project management	Ishiguro
		12:00	Corporate planning	NEPCO
		14:00	Interview with Iraq participants	Niigata Prefecture
12/6	Wed	9:00	Accounting cycle	NEPCO
12/7	Thu	9:00	Procurement	NEPCO
12/8	Fri		Off	
12/9	Sat	9:00	Project planning	NEPCO
12/10	Sun	9:00	Corporate planning	NEPCO
12/11	Mon	9:00	Demand forecast, Generation planning, Transmission planning	NEPCO
12/12	Tue	9:00	Transmission planning, PC program package of demand forecast and generation planning used in NEPCO	NEPCO
12/13	Wed	9:00	Project planning of substations	NEPCO
12/14	木	9:00	Site visit (substations and distribution lines)	NEPCO
12/15	Fri		Off	
12/16	Sat	9:00	Guidance for the second half of the workshop Review of the current system of project planning and management in the MOE and comparison with that of NEPCO	Ishiguro
12/17	Sun	9:00	Review of the current system of project planning and management in the MOE and comparison with that of NEPCO	Ishiguro
12/18	Mon	9:00	Review of the current system of project planning and management in the MOE and comparison with that of NEPCO	Ishiguro
12/19	Tue	9:00	Project base financial analysis	Ishiguro
12/20	Wed	9:00	Roles of JBIC and yen-loans Project base financial analysis (exercise)	JBIC Ishiguro
12/21	Thu	9:00 13:00	Project base financial analysis (exercise) Towards the second workshop	Ishiguro

Table A3-2: List of the Iraqi Participants in the First Workshop (December 2006)

Table A3-3: Second Workshop Schedule (March 2006)

Date	Day	Time	Subject	Presenter
3/17	Sat	Afternoon	Arrival of the Iraqi counterparts	
3/18	Sun	9:00	Guidance about the second workshop	JICA, Ishiguro
		9:30	Analysis of the collected data on financial condition of the MOE and tariff revenue	Ishiguro
3/19	Mon	9:00	Financial evaluation of the future investment; Clarification of the problems in fundraising (loan and cash generation)	Ishiguro
3/20	Tue	14:00	Problems in the MOE Project Management System	Ishiguro
3/21	Wed	9:00	Financial management	NEPCO
		11:00	Problems in the MOE Project Management System	Ishiguro
3/22	Thu		Organizational Preparation for the Reconstruction of Power Facilities Wrap-up	Ishiguro

Table A3-2: List of the Iraqi Participant in the Second Workshop (March 2007)