# *CHAPTER IX*

# *EFFECT ON ENVIRONMENT OF POWER LOSS REDUCTION*

# Chapter 9 Effect on Environment of Power Loss Reduction

Based on the result of the study on respective rehabilitation of distribution network and annual trend of power loss reduction in accordance with construction schedule of project, reduction in emission gases such as green house effect gas was evaluated.

## 9.1 Power Loss Reduction due to Improvement of Distribution System

Total reduction in distribution losses by respective countermeasures on target feeders in ten years can be estimated to be 411.7 GWh as shown in Table 8.4-2. The annual trend of power loss reduction of the first stage loss reduction project has been estimated in Table 8.4-5 and Table 8.4-6. Based on these values, reduction in both fuel consumption and emission of gasses with environmental impact were estimated as follows.

## 9.2 Estimation of Emission of Gasses per KWh (Intensity of Gas Emission)

Emission of gasses such as carbon dioxide ($CO_2$), sulfur oxide ($SO_X$), and nitrogen oxide ($NO_X$) per unit electricity energy was estimated based on the CEGCO's actual record of fuel consumption and intensity of emitted gases per fuel-ton in 1999.

The fuel consumption per kWh generated of CEGCO in 1999: : 250g/kWh

The fundamental data for estimation of emission of gasses such as metric ton per fuel tons and intensity of gas emission are tabulated as shown in Table 9.1-2.

**Table 9.2-1 Intensity of Gas Emission**

| | Emission Metric ton per Fuel ton | Intensity of Emission per kWh |
|---|---|---|
| $CO_2$ | 3.11668 ton/fuel-ton | 779.17g/kWh |
| $SO_X$ | 0.080 ton/fuel-ton | 20.0g/kWh |
| $NO_X$ | 0.0038 ton/fuel-ton | 0.95g/kWh |

## 9.3 Environmental Effect of Power Loss Reduction

Environmental effect of power loss reduction was evaluated in two aspects. One is to evaluate the total amount of reduction in emitted gases due to network reinforcement ignoring time frame and the other is to estimate the effect on environment in accordance with project procedure. Followings are the result of the study on both aspects.

### 9.3.1 Reduction of Gases of Target Feeders

Reduction in emission of gasses such as $CO_2$ and $SO_X$ are estimated by multiplying intensity of emission of gasses and annual amount of reduced power losses in Table 8.4-2. Results of the total and annual amount of reduced gasses are shown in Table 9.3-1 and Table 9.3-2, respectively. The total amount of reduced losses by reinforcement of target feeders is estimated assuming reinforcement of the distribution system be completed in the year 2000 in this study.

**Table 9.3-1 Total Value of Reduction of Gasses (for ten years)**

| Gas | Reduction in Gasses (ton) | | | |
|---|---|---|---|---|
| | EDCO | JEPCO | IDECO | Total |
| $CO_2$ | 113,433 | 90,932 | 116,431 | 320,796 |
| $SO_X$ | 2,912 | 2,334 | 2,988 | 8,234 |
| $NO_X$ | 138 | 111 | 142 | 391 |

**Table 9.3-2 Annual Value of Reduction of Gasses**

| Gas | Com-pany | 1st yr. | 2nd yr. | 3rd yr. | 4th yr. | 5th yr. | 6th yr. | 7th yr. | 8th yr. | 9th yr. | 10th yr. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $CO_2$ | EDCO | 6,901 | 7,817 | 8,640 | 9,531 | 10,603 | 11,746 | 12,872 | 14,065 | 15,146 | 16,114 | 113,433 |
| | IDECO | 5,532 | 6,266 | 6,926 | 7,640 | 8,499 | 9,416 | 10,318 | 11,275 | 12,141 | 12,918 | 90,932 |
| | JEPCO | 7,083 | 8,023 | 8,869 | 9,783 | 10,883 | 12,056 | 13,212 | 14,436 | 15,546 | 16,540 | 116,431 |
| | Total | 19,515 | 22,106 | 24,435 | 26,954 | 29,985 | 33,218 | 36,402 | 39,776 | 42,834 | 45,572 | 320,796 |
| $SO_X$ | EDCO | 177 | 201 | 222 | 245 | 272 | 302 | 330 | 361 | 389 | 414 | 2,912 |
| | IDECO | 142 | 161 | 178 | 196 | 218 | 242 | 265 | 289 | 312 | 332 | 2,334 |
| | JEPCO | 182 | 206 | 228 | 251 | 279 | 309 | 339 | 370 | 399 | 424 | 2,988 |
| | Total | 501 | 567 | 627 | 692 | 770 | 853 | 934 | 1,021 | 1,099 | 1,170 | 8,234 |
| $NO_X$ | EDCO | 8 | 10 | 11 | 12 | 13 | 14 | 16 | 17 | 18 | 20 | 138 |
| | IDECO | 7 | 8 | 8 | 9 | 10 | 11 | 13 | 14 | 15 | 16 | 111 |
| | JEPCO | 9 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 19 | 20 | 142 |
| | Total | 24 | 27 | 30 | 33 | 37 | 40 | 44 | 48 | 52 | 56 | 391 |

### 9.3.2 Effect of the First Stage Power Loss Reduction Project on Environment

Based on Table 8.4-5 and Table 8.4-6, reduction in emitted gases was estimated multiplying intensity of .gas emission. Table 9.3-3 illustrates annual trend of emitted gas reduction including the effect of capacitors, while Table 9.3-4 tabulates the case deducting the effect of capacitors.

**Table 9.3-3 Volume of Gasses to be Reduced due to Project (ton)（with Capacitor）**

| Year | Whole Project | | | EDCO | | | JEPCO | | | IDECO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO2 | SOx | Nox | CO2 | SOx | Nox | CO2 | SOx | NOx | CO2 | SOx | NOx |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 4420 | 112 | 5 | 2,091 | 54 | 3 | 932 | 24 | 1 | 1,397 | 36 | 2 |
| 2004 | 13,635 | 350 | 17 | 7,224 | 185 | 9 | 2,516 | 65 | 3 | 3,895 | 100 | 5 |
| 2005 | 29,984 | 770 | 37 | 10,601 | 272 | 13 | 8,500 | 218 | 10 | 10,883 | 279 | 13 |
| 2006 | 33,217 | 853 | 40 | 11,745 | 301 | 14 | 9,416 | 242 | 11 | 12,056 | 309 | 15 |
| 2007 | 36,402 | 934 | 44 | 12,872 | 330 | 15 | 10,319 | 265 | 13 | 13,211 | 339 | 16 |
| 2008 | 39,776 | 1021 | 48 | 14,065 | 361 | 17 | 11,275 | 289 | 14 | 14,436 | 371 | 18 |
| 2009 | 42,834 | 1099 | 52 | 15,146 | 389 | 18 | 12,142 | 312 | 15 | 15,546 | 399 | 19 |
| 2010 | 45,572 | 1170 | 56 | 16,114 | 414 | 20 | 12,918 | 332 | 16 | 16,540 | 426 | 20 |
| 2011 | 48,297 | 1240 | 59 | 17,077 | 438 | 21 | 13,690 | 351 | 17 | 17,530 | 450 | 21 |
| 2012 | 51,100 | 1312 | 62 | 18,069 | 464 | 22 | 14,485 | 372 | 18 | 18,546 | 476 | 23 |
| 2013 | 53,418 | 1371 | 65 | 18,827 | 483 | 23 | 15,179 | 390 | 19 | 19,412 | 498 | 24 |
| 2014 | 55,368 | 1421 | 68 | 19,165 | 492 | 23 | 15,929 | 409 | 19 | 20,274 | 520 | 25 |

**Table 9.3-4 Volume of Gasses to be Reduced due to Project (ton)（without Capacitor）**

| Year | Whole Project | | | EDCO | | | JEPCO | | | IDECO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO2 | SOx | Nox | CO2 | SOx | NOx | CO2 | SOx | NOx | CO2 | SOx | NOx |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 2,806 | 72 | 3 | 1,315 | 34 | 2 | 610 | 16 | 1 | 880 | 23 | 1 |
| 2004 | 7,208 | 185 | 9 | 3,814 | 98 | 5 | 1,346 | 35 | 2 | 2,048 | 53 | 2 |
| 2005 | 16,380 | 420 | 20 | 5,856 | 150 | 7 | 5,142 | 132 | 6 | 5,382 | 138 | 7 |
| 2006 | 18,145 | 466 | 22 | 6,488 | 167 | 8 | 5,696 | 146 | 7 | 5,961 | 153 | 7 |
| 2007 | 19,885 | 510 | 24 | 7,110 | 183 | 9 | 6,242 | 160 | 8 | 6,533 | 168 | 8 |
| 2008 | 21,728 | 558 | 26 | 7,769 | 199 | 9 | 6,820 | 175 | 8 | 7,139 | 183 | 9 |
| 2009 | 23,399 | 601 | 29 | 8,367 | 215 | 10 | 7,344 | 189 | 9 | 7,688 | 197 | 9 |
| 2010 | 24,895 | 639 | 30 | 8,901 | 228 | 11 | 7,814 | 201 | 10 | 8,180 | 210 | 10 |
| 2011 | 26,383 | 677 | 32 | 9,433 | 242 | 12 | 8,281 | 213 | 10 | 8,669 | 223 | 11 |
| 2012 | 27,915 | 717 | 34 | 9,981 | 256 | 12 | 8,762 | 225 | 11 | 9,172 | 235 | 11 |
| 2013 | 29,136 | 748 | 36 | 10,382 | 266 | 13 | 9,176 | 236 | 11 | 9,578 | 246 | 12 |
| 2014 | 30,236 | 776 | 37 | 10,594 | 272 | 13 | 9,655 | 248 | 12 | 9,986 | 256 | 12 |

# *CHAPTER X*

# *ECONOMIC AND FINANCIAL ANALYSIS*

# CHAPTER 10 ECONOMIC AND FINANCIAL ANALYSIS

## 10.1 Methodology of Economic Evaluation

### 10.1.1 Outline

In general, a project will be evaluated taken engineering, economic and financial aspects into consideration. The engineering aspects are studied on the technical feasibility of the project from the viewpoint of construction, operation and maintenance. And with regard to the financial aspects, the financial analysis is to be determined whether the enterprise is likely to be financially viable. The financial analysis focuses on the costs and revenues of the enterprise for the project, and is usually summarized in income and cash flow statements, loan repayment and balance sheet. However, the income statement and balance sheet are not included in the financial analysis on the project.

Economic analysis appraises a project under study in terms of a National Economy by comparing and measuring its economic costs and benefits. In other words, economic analysis evaluates a degree of economic impacts on a project under study that would bring about in the national economy.

Project inputs such as construction costs and operation and maintenance costs, including fuel cost in case of a project under study for electricity loss reduction are evaluated in terms of the national economy. These project inputs evaluated in terms of the national economy are called as "economic costs."

Decreased long term investment costs due to reduce the electricity loss such as reduced capacity cost and/or reduced energy cost in case of the said project under study are also evaluated in terms of the national economy. These reduced investment costs evaluated in terms of the national economy are called as "economic benefits." In this case, the benefits should be at least as great as those obtainable from other marginal investment opportunities.

Economic costs and benefits are estimated throughout the project life. The first year of the project life is the year when the construction is completed. The last year of the project life is the year when the facility constructed by the project is scrapped.

Economic costs and benefits throughout the project life and construction period are compared in terms of present values. If the total present value of economic costs equals that of economic benefits (when, B/C=1), the discount rate applied to calculate the present value is called as "economic internal rate of return (EIRR)."

### 10.1.2 Identification of Economic Benefits of Electricity Loss Reduction Project

**(1) Economic Benefit Derived from Electricity Loss Reduction**

If a countermeasure would not be executed, the electricity losses would remain as a high percentage against a total generation. This electricity loss without any counter-measure is called as “an electricity losses without the project”.

If the countermeasure would be executed, the electricity losses will be reduced. These reduced electricity losses are called as “the electricity losses with the project”. It is assumed that annual reduction of electricity losses increases in proportion to square of demand during 10 years after completion of the works of countermeasure. It is also assumed that the annual electricity losses will be kept the same level after the said $10^{th}$ year.

The economic benefit of a project under study can be estimated as a difference between the electricity loss “with the project” and that “without the project.” In this case, the electricity losses are derived as power value or capacity value(kW-value) and energy value as mentioned below(kWh-value). The electricity losses counting as economic benefits should be considered in total of those values.

In order to evaluate the economic benefits, a power value or a capacity value described as "kW-value" and an energy value described as "kWh-value" are firstly calculated. KW-value represents the construction and fixed O/M costs of power plant for unit kW volume for a year, and is called as "power benefit." KWh-value represents fuel and variable O/M costs of the power plant for unit kWh volume, and is called as "energy benefit."

Unit values of costs per kW and per kWh are estimated based on these values according to “Long Run Marginal Cost Method (LRMC Method)”. And the benefit (cost to be saved due to electricity loss reduction) is calculated using this unit value multiplying difference of electricity losses between designed with- and without-the Project (reduced volume of electricity losses).

**(2) Economic Benefit Derived from External Cost Saving**

In this Project, the external cost burdened by the people caused by air pollution due to emission of $CO_2$, $SO_x$ and $NO_x$ should also be considered. When the emitted volume of $CO_2$, $SO_x$ and $NO_x$ will be decreased in the case of the execution of the proposed countermeasures in the Project, the Project will get an additional economic benefit from an environmental viewpoint as an external cost saving.

### 10.1.3 Identification of Economic Cost

Economic cost of a project is identified as an opportunity cost of the Project. In this case, definition of the opportunity cost of the Project can be given as follows, i.e.: (1) if goods and services would be invested in the project under study, they could no longer be utilized for other projects, (2) this implies that the benefits of the other projects could have been created would be sacrificed, and (3) these sacrificed benefits of the other

projects are called opportunity cost of the project.

**(1) Foreign currency portion**

The foreign currency portion of the construction costs is estimated in Cost Insurance Freight (CIF) price. These international prices are assumed to reflect economic cost directly.

**(2) Local currency portion**

Because it is presumed that prices in local markets in developing countries are distorted by price controls and other regulations, prices in the domestic markets do not reflect economic scarcity of goods and services. This means that the prices can not be used to evaluate economic costs of local procurement and have to be converted into economic prices.

In economic analysis of a project, conversion factors are used to convert the costs in domestic markets into economic costs of a project.

Using export and import statistics, a standard conversion factor (SCF) is estimated. The SCF converts the domestic commodity prices into the economic prices that can be assumed to reflect the economic scarcity of the local costs.

However, the SCF is applied to only tradable goods. The economic costs of non-tradable goods and services have to be separately evaluated. Conversion factors of land, skilled and non-skilled labors, and transportation are respectively estimated.

Then, the weighted average of the conversion factors is calculated, and apply it to the financial cost to convert it into the economic cost.

### 10.1.4 Evaluation Criteria

The economic internal rate of return (EIRR) is calculated and used as a main index of economic feasibility of project with net present value (NPV = B - C) and B/C ratio. This EIRR is defined by the following formula:

$$\sum_{t=1}^{t=T} \frac{C_{ep}}{(1+R)^t} = \sum_{t=1}^{t=T} \frac{B_{ac}}{(1+R)^t}$$

where, $T$ = the last year of the project life,

$C_{ep}$ = an annual economic cost flow of the project under study in year $t$,

$B_{ac}$ = an annual benefit (cost) flow derived from an alternative countermeasure in year $t$, and

$R$ = the Economic Internal Rate of Return.

## 10.2 Methodology of Financial Evaluation

### 10.2.1 Outline

Financial analysis appraises the degree of financial return of a project under study that is expected to earn and is carried out in terms of the project owner's profitability.

Project inputs are evaluated in terms of market prices. The inputs thus evaluated are called as "financial costs." Project outputs are also evaluated in terms of market prices. The outputs thus evaluated are called as "financial benefit."

Financial costs and benefits throughout the project life are compared in terms of present values. If the total present value of financial costs equals that of financial benefits (when, B/C=1), the discount rate used to calculated the present value is called as "financial internal rate of return (FIRR)."

### 10.2.2 Financial Cost and Benefit

Financial costs include direct construction cost, taxes, compensation, physical contingency, administration, and engineering expenses. However, price escalation is excluded from the costs.

Financial benefit is increased sales revenue of electricity. In the Project, in other words, the financial benefit is an incremental margin of electricity sales derived from saving of operating expenses due to execution of countermeasures in the Project.

### 10.2.3 Evaluation Criteria

The financial internal rate of return is calculated and used as a main index of financial feasibility of the project with NPV and B/C ratio. This FIRR is defined by the following formula:

$$\sum_{t=1}^{t=T} \frac{C_{ft}}{(1+R_f)^t} = \sum_{t=1}^{t=T} \frac{B_{ft}}{(1+R_f)^t}$$

where, $T$ = the last year of the project life,

$C_{ft}$ = an annual financial cost flow of the project under study in year $t$,

$B_{ft}$ = an annual benefit (cost) flow derived from an alternative countermeasure in year $t$, and

$R_f$ = the Financial Internal Rate of Return.

## 10.3 Results of Economic and Financial Evaluation

The aim of the project is to reduce power losses by reinforcement of the distribution system such with installation of distribution lines, so the benefit derived from installation of capacitors should be excluded from economic and financial evaluation. Installation of capacitors is studied in order to minimize the

reinforcement of distribution system itself by improving transfer of capability of distribution system. The Master Plan Study has also recommended that the capacitors should be installed by Jordanian side due to its small amount of investment .

The economic and financial costs and benefits including the installation of capacitors has also been identified as a reference as well as repayability analyses in the case of with-capacitor.

### 10.3.1 Economic and Financial Cost of Project

#### (1) Construction Schedule

Respective the LV line works and installation of capacitors require a period of less than one year for their completion, and the MV line works require a period of two years for their completion. Before commencement of the said works, a period of one year is needed for designing for the LV line works, capacitors and re-conductoring of the MV line works. And a period of two years is needed for new line construction works and re-routing (removing of existing lines and construction of the new line of MV).

The Project is proposed to complete in 2004. Following Table shows the annual cost allocation for the net construction works:

**Table 10.3-1 Annual Cost Allocation for Net Construction Works**

(JDs.)

| By Distribution companies | System | Works | 2001 | 2002 | 2003 | 2004 | Total |
|---|---|---|---|---|---|---|---|
| EDCO's Works | LV system | Capacitors | 0 | 6.691 | 6.691 | 6.691 | 20,072 |
| | | LV line works | 0 | 81.527 | 81.527 | 81.527 | 244,582 |
| | | MV line works | 0 | 261,631 | 261,631 | 261,631 | 784,894 |
| | MV system | Capacitors | 0 | 16,500 | 16,500 | 0 | 33,000 |
| | | MV line works | 0 | 103,598 | 103,598 | 0 | 207,196 |
| JEPCO's Works | LV system | Capacitors | 0 | 5,071 | 5,071 | 5,071 | 15,212 |
| | | LV line works | 0 | 58,918 | 58,918 | 58,918 | 176,754 |
| | | MV line works | 0 | 107,598 | 107,598 | 107,598 | 322,793 |
| | MV system | Capacitors | 0 | 9,000 | 18,000 | 9,000 | 36,000 |
| | | MV line works | 0 | 0 | 184,300 | 184,300 | 368,600 |
| IDECO's Works | LV system | Capacitors | 0 | 6,411 | 6,411 | 6,411 | 19,232 |
| | | LV line works | 0 | 73,210 | 73,210 | 73,210 | 219,630 |
| | | MV line works | 0 | 218,685 | 218,685 | 218,685 | 656,056 |
| | MV system | Capacitors | 0 | 11,500 | 21,500 | 10,000 | 43,000 |
| | | MV line works | 0 | 12,143 | 219,843 | 207,700 | 439,685 |
| Total | | | | | | | 3,586,706 |

#### (2) Identification of Construction Cost for Economic and Financial Analysis

Using above net construction cost, financial and economic costs of the Project are estimated. In this case, the costs include 3 cost items as (1) construction cost, (2) engineering (consulting) cost for supervision of the works with a rate of 5 % and (3) administration cost of the distribution companies with a rate of 3.0 % both to the construction cost.

For estimating the economic and financial costs of the Project, following conditions are considered based on the results of discussion with NEPCO and other 3 distribution companies:

- Share rates of cost for materials and labor to the cost of each work item are assumed at 0.750 and 0.250 for installation of capacitors, 0.800 and 0.200 for construction works of low voltage system, and 0.700 and 0.300 for construction works of medium voltage.
- Among the materials to be procured for the construction works, 25 % of materials are to be procured domestically. Therefore, 25 % of costs for materials is allocated in local currency portion.
- A standard conversion factor (SCF) is estimated at 0.94254 based the data on external trading statistics as shown in Appendix 10.1.
- A cost for labors is allocated in the local currency portion with a rate of 5.0 % of their income tax according to the Low of Income Tax of the nation.
- A net profit with a rate of 10 % is applied for contractors and consultation firms for supervision for the construction works.
- A physical contingency with a rate of 2.5 % is applied for the cost consisting of construction cost, and costs for engineering services and administration.
- Price contingencies with rates of 3.0 % for foreign currency portion and 5.0 % for local currency portion are applied for estimation of actual necessary construction cost based on statistical data shown in Appendix 10.2 and the note-8 in Appendix 10.3.

Based on the assumption mentioned above for estimation of cost for the Project, the cost by each distribution company including the cost for installation of capacitors are estimated as:

For the whole Project:

- Financial cost: JDs.4,483,000.- (incl. price contingency for execution of the Project)
- Financial cost: JDs.3,976,000.- (excl. price contingency for financial evaluation)
- Economic cost: JDs.3,709,000.- (excl. price contingency for economic evaluation)

For the EDCO's Works:

- Financial cost: JDs.1,602,000.- (incl. price contingency for execution of the Project)
- Financial cost: JDs.1,430,000.- (excl. price contingency for financial evaluation)
- Economic cost: JDs.1,334,000.- (excl. price contingency for economic evaluation)

For the JEPCO's Works:

- Financial cost: JDs.1,154,000.- (incl. price contingency for execution of the Project)
- Financial cost: JDs.1,019,000.- (excl. price contingency for financial evaluation)
- Economic cost: JDs. 951,000.- (excl. price contingency for economic evaluation)

For the IDECO's Works:

- Financial cost: JDs.1,726,000.- (incl. price contingency for execution of the Project)
- Financial cost: JDs.1,527,000.- (excl. price contingency for financial evaluation)
- Economic cost: JDs.1,424,000.- (excl. price contingency for economic evaluation)

Appendix 10.3-1 shows the detail of the annual allocations of the said costs with capacitors and are briefly summarized as follows :

**Table 10.3-2 Annual Cost Allocation with Capacitors**

(JDs.)

| By Distribution companies | | 2001 | 2002 | 2003 | 2004 | Total |
|---|---|---|---|---|---|---|
| Whole Project | Financial cost[1)] | 49,700 | 1,161,579 | 1,696,069 | 1,575,698 | 4,483,046 |
| | Financial cost[2)] | 47,333 | 1,074,032 | 1,507,946 | 1,346,689 | 3,976,000 |
| | Economic cost[3)] | 42,735 | 1,002,712 | 1,407,419 | 1,256,853 | 3,709,718 |
| EDCO's Works | Financial cost[1)] | 17,872 | 554,949 | 577,178 | 452,109 | 1,602,108 |
| | Financial cost[2)] | 17,021 | 513,167 | 513,167 | 386,374 | 1,429,728 |
| | Economic cost[3)] | 15,367 | 479,015 | 479,015 | 360,696 | 1,334,093 |
| JEPCO's Works | Financial cost[1)] | 12,739 | 219,320 | 457,587 | 464,868 | 1,154,514 |
| | Financial cost[2)] | 12,133 | 202,787 | 406,864 | 397,362 | 1,019,146 |
| | Economic cost[3)] | 10,954 | 189,449 | 379,790 | 370,881 | 951,074 |
| IDECO's Works | Financial cost[1)] | 19,089 | 387,311 | 661,303 | 658,720 | 1,726,423 |
| | Financial cost[2)] | 18,180 | 358,078 | 587,914 | 562,953 | 1,527,126 |
| | Economic cost[3)] | 16,414 | 334,248 | 548,614 | 525,276 | 1,424,552 |

*(Note)* *1) Incl. price contingency for execution of the Project*
*2) Excl. price contingency for financial evaluation*
*3) Excl. price contingency for economic evaluation*

Appendix 10.3-2 shows also the detail of the cost allocation in case of excluding the installation of capacitors, and summarized as follows:

**Table 10.3-3 Annual Cost Allocation without Capacitors**

(JDs.)

| By Distribution companies | | 2001 | 2002 | 2003 | 2004 | Total |
|---|---|---|---|---|---|---|
| Whole Project | Financial cost[1)] | 47,393 | 1,096,260 | 1,605,649 | 1,527,252 | 4,276,554 |
| | Financial cost[2)] | 45,136 | 1,013,586 | 1,427,440 | 1,305,246 | 3,791,408 |
| | Economic cost[3)] | 40.750 | 946,113 | 1,332,012 | 1,218,072 | 3,536,948 |
| EDCO's Works | Financial cost[1)] | 17,136 | 527,739 | 548,892 | 443,019 | 1,536,786 |
| | Financial cost[2)] | 16,320 | 487,983 | 487,983 | 378,609 | 1,370,895 |
| | Economic cost[3)] | 14,735 | 455,426 | 455,426 | 353,440 | 1,279,027 |
| JEPCO's Works | Financial cost[1)] | 12,030 | 202,534 | 429,471 | 446,720 | 1,090,755 |
| | Financial cost[2)] | 11,457 | 187,256 | 381,831 | 381,831 | 962,375 |
| | Economic cost[3)] | 10,344 | 174,910 | 356,342 | 356,342 | 897,938 |
| IDECO's Works | Financial cost[1)] | 18,227 | 186,442 | 627,285 | 637,514 | 1,649,013 |
| | Financial cost[2)] | 17,359 | 169,108 | 557,626 | 544,806 | 1,458,138 |
| | Economic cost[3)] | 15,672 | 146,538 | 520,244 | 508,290 | 1,359,982 |

*(Note)* *1) Incl. price contingency for execution of the Project*
*2) Excl. price contingency for financial evaluation*
*3) Excl. price contingency for economic evaluation*

### 10.3.2 Economic Benefit

#### (1) Economic Benefit Derived from Electricity Loss Reduction

In the case of without-project, electricity enterprises should pay additional capacity cost and energy cost for construction of facilities to cover electricity losses so that the customers may be supplied necessary electricity without any trouble. In other words, distribution companies have invested additionally these costs corresponding to the electricity losses. If the Project is executed, these additional costs will be saved. These saved costs are given as economic benefits in the case of this kind of project.

Using the long run marginal cost (LRMC) of NEPCO, a unit marginal capacity cost(kw-cost) and a unit marginal energy cost(kWh-cost) are estimated for low voltage facilities and medium voltage facilities. The results are as follows:

**Table 10.3-4 LRMC for Capacity and Energy**

| System | Capacity cost (JDs./kW/Year) | Energy cost (JDs./kWh) |
|---|---|---|
| Low voltage facilities | 82.24 | 0.0278 |
| Medium voltage facilities | 58.71 | 0.0257 |

The amount of the electricity loss reduction is estimated from these capacity and energy loss reduction volumes multiplying the said unit marginal capacity and energy costs. And, the effect of the countermeasures is assumed to derive just after completion of the works and, increase during 10 years after completion of the whole works corresponding to demand increase as mentioned in previous sub-clause. And the works will need 4 years from their commencement including design stage, so that the electricity loss reduction volumes will be increased up to the year 2014 when the works are started from 2001. Estimation processes are shown in Appendix 10.4-1 and 10.4-2.

Following tables show the summarized results of estimation of electricity loss to be annually reduced due to completion of the Project.

**Table 10.3-5 Annual Electricity Loss Reduction Due to Completion of Project with Capacitor**

| Year | Whole project | | | | EDCO's Works | | | | JEPCO's Works | | | | IDECO's Works | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | |
| | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 1,186 | 5,673 | 0 | 0 | 561 | 2,683 | 0 | 0 | 250 | 1,197 | 0 | 0 | 375 | 1,793 | 0 | 0 |
| 2004 | 2,616 | 12,519 | 1,041 | 4,980 | 1,237 | 5,921 | 700 | 3,351 | 552 | 2,641 | 123 | 588 | 827 | 3,957 | 217 | 1,041 |
| 2005 | 4,365 | 20,889 | 3,676 | 17,593 | 2,065 | 9,879 | 779 | 3,727 | 921 | 4,407 | 1,359 | 6,502 | 1,380 | 6,603 | 1,539 | 7,364 |
| 2006 | 4,836 | 23,141 | 4,073 | 19,490 | 2,287 | 10,944 | 863 | 4,130 | 1,020 | 4,882 | 1,505 | 7,202 | 1,529 | 7,315 | 1,705 | 8,158 |
| 2007 | 5,299 | 25,360 | 4,463 | 21,359 | 2,506 | 11,994 | 946 | 4,526 | 1,118 | 5,350 | 1,649 | 7,893 | 1,675 | 8,016 | 1,868 | 8,940 |
| 2008 | 5,790 | 27,711 | 4,877 | 23,338 | 2,739 | 13,106 | 1,033 | 4,945 | 1,222 | 5,846 | 1,802 | 8,625 | 1,830 | 8,759 | 2,041 | 9,768 |
| 2009 | 6,236 | 29,842 | 5,252 | 25,132 | 2,949 | 14,114 | 1,113 | 5,325 | 1,316 | 6,295 | 1,941 | 9,288 | 1,971 | 9,433 | 2,198 | 10,519 |
| 2010 | 6,634 | 31,749 | 5,587 | 26,739 | 3,138 | 15,015 | 1,184 | 5,666 | 1,400 | 6,698 | 2,065 | 9,881 | 2,097 | 10,036 | 2,339 | 11,192 |
| 2011 | 7,031 | 33,647 | 5,922 | 28,338 | 3,325 | 15,913 | 1,255 | 6,004 | 1,483 | 7,098 | 2,188 | 10,472 | 2,222 | 10,636 | 2,479 | 11,862 |
| 2012 | 7,439 | 35,600 | 6,265 | 29,982 | 3,518 | 16,837 | 1,328 | 6,353 | 1,569 | 7,510 | 2,315 | 11,080 | 2,352 | 11,253 | 2,622 | 12,549 |
| 2013 | 7,714 | 36,914 | 6,612 | 31,643 | 3,648 | 17,458 | 1,401 | 6,705 | 1,627 | 7,788 | 2,444 | 11,693 | 2,438 | 11,668 | 2,768 | 13,245 |
| 2014 | 7,905 | 37,830 | 6,944 | 33,230 | 3,739 | 17,892 | 1,401 | 6,705 | 1,668 | 7,980 | 2,605 | 12,463 | 2,499 | 11,958 | 2,938 | 14,062 |

**Table 10.3-6 Annual Electricity Loss Reduction Due to Completion of Project without Capacitor**

| Year | Whole project | | | | EDCO's Works | | | | JEPCO's Works | | | | IDECO's Works | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | | Low voltage system | | Medium voltage system | |
| | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) | Power (kW) | Enegy (MWh) |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 753 | 3,601 | 0 | 0 | 353 | 1,688 | 0 | 0 | 164 | 783 | 0 | 0 | 236 | 1,130 | 0 | 0 |
| 2004 | 1,660 | 7,946 | 273 | 1,305 | 778 | 3,725 | 245 | 1,170 | 361 | 1,728 | 0 | 0 | 521 | 2,493 | 28 | 135 |
| 2005 | 2,771 | 13,260 | 1,622 | 7,762 | 1,299 | 6,215 | 272 | 1,301 | 603 | 2,884 | 776 | 3,715 | 870 | 4,161 | 574 | 2,746 |
| 2006 | 3,070 | 14,689 | 1,797 | 8,599 | 1,439 | 6,885 | 301 | 1,442 | 668 | 3,195 | 860 | 4,115 | 963 | 4,609 | 636 | 3,042 |
| 2007 | 3,364 | 16,097 | 1,969 | 9,424 | 1,577 | 7,545 | 330 | 1,580 | 732 | 3,501 | 942 | 4,510 | 1,056 | 5,051 | 697 | 3,334 |
| 2008 | 3,675 | 17,589 | 2,152 | 10,297 | 1,723 | 8,245 | 361 | 1,726 | 799 | 3,825 | 1,030 | 4,928 | 1,153 | 5,519 | 761 | 3,643 |
| 2009 | 3,958 | 18,942 | 2,317 | 11,089 | 1,855 | 8,879 | 389 | 1,859 | 861 | 4,119 | 1,109 | 5,307 | 1,242 | 5,944 | 820 | 3,923 |
| 2010 | 4,211 | 20,153 | 2,465 | 11,798 | 1,974 | 9,446 | 413 | 1,978 | 916 | 4,383 | 1,180 | 5,646 | 1,321 | 6,324 | 872 | 4,174 |
| 2011 | 4,463 | 21,358 | 2,613 | 12,503 | 2,092 | 10,011 | 438 | 2,096 | 971 | 4,645 | 1,250 | 5,983 | 1,400 | 6,702 | 924 | 4,424 |
| 2012 | 4,722 | 22,597 | 2,764 | 13,229 | 2,213 | 10,592 | 464 | 2,218 | 1,027 | 4,914 | 1,323 | 6,331 | 1,482 | 7,091 | 978 | 4,680 |
| 2013 | 4,896 | 23,431 | 2,917 | 13,962 | 2,295 | 10,983 | 489 | 2,341 | 1,065 | 5,096 | 1,396 | 6,681 | 1,536 | 7,352 | 1,032 | 4,940 |
| 2014 | 5,018 | 24,013 | 3,091 | 14,792 | 2,352 | 11,256 | 489 | 2,341 | 1,091 | 5,222 | 1,498 | 7,170 | 1,575 | 7,535 | 1,104 | 5,281 |

The results of estimation of loss reduction in monetary terms are summarized as follows:

**Table 10.3-7 Amount of Electricity Loss Reduction by Year with Capacitor**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 255 | 121 | 54 | 81 |
| 2004 | 752 | 393 | 141 | 217 |
| 2005 | 1,607 | 586 | 445 | 576 |
| 2006 | 1,780 | 649 | 493 | 638 |
| 2007 | 1,951 | 711 | 540 | 700 |
| 2008 | 2,132 | 777 | 590 | 765 |
| 2009 | 2,296 | 837 | 635 | 823 |
| 2010 | 2,442 | 890 | 676 | 876 |
| 2011 | 2,588 | 943 | 717 | 928 |
| 2012 | 2,739 | 998 | 758 | 982 |
| 2013 | 2,861 | 1,040 | 794 | 1,027 |
| 2014 | 2,962 | 1,059 | 832 | 1,071 |

**Table 10.3-8 Amount of Electricity Loss Reduction by Year without Capacitor**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 162 | 76 | 35 | 51 |
| 2004 | 407 | 212 | 78 | 117 |
| 2005 | 891 | 329 | 271 | 291 |
| 2006 | 987 | 364 | 300 | 323 |
| 2007 | 1,081 | 399 | 329 | 354 |
| 2008 | 1,182 | 436 | 359 | 386 |
| 2009 | 1,273 | 470 | 387 | 416 |
| 2010 | 1,354 | 500 | 411 | 443 |
| 2011 | 1,435 | 530 | 436 | 469 |
| 2012 | 1,518 | 561 | 461 | 496 |
| 2013 | 1,584 | 583 | 483 | 518 |
| 2014 | 1,641 | 595 | 507 | 539 |

**(2) Economic Benefit Derived from External Cost Saving**

As mentioned in previous Clause, the external cost burdened by the people due to air pollution due to emission of $CO_2$, $SO_x$ and $NO_x$ should also be considered in this Project. When the emitted volume of $CO_2$, $SO_x$ and $NO_x$ will be decreased in the case of the execution of the proposed countermeasures in the Project, the Project will get an additional economic benefit from an environmental viewpoint as an external cost saving.

As mentioned in previous Chapter, the electricity loss reduction will make decrease the fuel consumption. Therefore, those gasses to be emitted will also be controlled as follows:

**Table 10.3-9 Intensity of Gasses to be Emitted**

| Kind of gas | Intensity of gases to be emitted (ton/GWh) |
|---|---|
| $CO_2$ | 779.17 |
| $SO_x$ | 20.00 |
| $NO_x$ | 0.95 |

Based on the information reported in "Incorporating Environmental Concerns into Power Sector Decision-making" issued by the World Bank (WB) as a World Bank Environment Paper No.6, unit costs of $CO_2$, $SO_x$ and $NO_x$ are estimated as follows:

**Table 10.3-10 Unit Costs of Gasses to be Emitted**

| Kind of gas | Unit costs of gases as a basis reported by WB (US$/ton as of 1990) | Unit costs of gases to be controlled by Project* (US$/ton as of 2000) |
|---|---|---|
| $CO_2$ | 15.0 | 20.3 |
| $SO_x$ | 180.4 | 244.6 |
| $NO_x$ | 446.6 | 605.5 |

*(Note) * : Estimated based on CPI in general item in Jordan.*

Volume of emitted gases to be controlled for estimation of the external cost saving can be calculated by applying the said intensity of gasses to be emitted multiplying the volume of the electricity loss reduction (GWh) as shown in the following table:

**Table 10.3-11 Volume of Gasses to be Controlled Due to Project without Capacitor**

(ton)

| Year | Whole Project | | | EDCO's Works | | | JEPCO's Works | | | IDECO's Works | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 2,806 | 72 | 3 | 1,315 | 34 | 2 | 610 | 16 | 1 | 880 | 23 | 1 |
| 2004 | 7,208 | 185 | 9 | 3,814 | 98 | 5 | 1,346 | 35 | 2 | 2,048 | 53 | 2 |
| 2005 | 16,380 | 420 | 20 | 5,856 | 150 | 7 | 5,142 | 132 | 6 | 5,382 | 138 | 7 |
| 2006 | 18,145 | 466 | 22 | 6,488 | 167 | 8 | 5,696 | 146 | 7 | 5,961 | 153 | 7 |
| 2007 | 19,885 | 510 | 24 | 7,110 | 183 | 9 | 6,242 | 160 | 8 | 6,533 | 168 | 8 |
| 2008 | 21,728 | 558 | 26 | 7,769 | 199 | 9 | 6,820 | 175 | 8 | 7,139 | 183 | 9 |
| 2009 | 23,399 | 601 | 29 | 8,367 | 215 | 10 | 7,344 | 189 | 9 | 7,688 | 197 | 9 |
| 2010 | 24,895 | 639 | 30 | 8,901 | 228 | 11 | 7,814 | 201 | 10 | 8,180 | 210 | 10 |
| 2011 | 26,383 | 677 | 32 | 9,433 | 242 | 12 | 8,281 | 213 | 10 | 8,669 | 223 | 11 |
| 2012 | 27,915 | 717 | 34 | 9,981 | 256 | 12 | 8,762 | 225 | 11 | 9,172 | 235 | 11 |
| 2013 | 29,136 | 748 | 36 | 10,382 | 266 | 13 | 9,176 | 236 | 11 | 9,578 | 246 | 12 |
| 2014 | 30,236 | 776 | 37 | 10,594 | 272 | 13 | 9,655 | 248 | 12 | 9,986 | 256 | 12 |

Amounts of the external cost savings are resulted as follows:

**Table 10.3-12 Amount of External Cost Saving by Year without Capacitor**

(JDs.1,000)

| Year | Whole Project | | | EDCO's Works | | | JEPCO's Works | | | IDECO's Works | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 40 | 31 | 1 | 19 | 14 | 0 | 9 | 7 | 0 | 13 | 10 | 0 |
| 2004 | 104 | 79 | 2 | 55 | 42 | 1 | 19 | 15 | 0 | 30 | 23 | 0 |
| 2005 | 236 | 180 | 3 | 84 | 65 | 1 | 74 | 57 | 1 | 78 | 59 | 1 |
| 2006 | 262 | 200 | 4 | 94 | 71 | 1 | 82 | 63 | 1 | 86 | 66 | 1 |
| 2007 | 287 | 219 | 4 | 103 | 78 | 2 | 90 | 69 | 1 | 94 | 72 | 1 |
| 2008 | 313 | 239 | 5 | 112 | 86 | 2 | 98 | 75 | 1 | 103 | 79 | 2 |
| 2009 | 337 | 258 | 5 | 121 | 92 | 2 | 106 | 81 | 2 | 111 | 85 | 2 |
| 2010 | 359 | 274 | 5 | 128 | 98 | 2 | 113 | 86 | 2 | 118 | 90 | 2 |
| 2011 | 380 | 291 | 6 | 136 | 104 | 2 | 119 | 91 | 2 | 125 | 96 | 2 |
| 2012 | 402 | 308 | 6 | 144 | 110 | 2 | 126 | 97 | 2 | 132 | 101 | 2 |
| 2013 | 420 | 321 | 6 | 150 | 114 | 2 | 132 | 101 | 2 | 138 | 106 | 2 |
| 2014 | 436 | 333 | 6 | 153 | 117 | 2 | 139 | 106 | 2 | 144 | 110 | 2 |

### 10.3.3 Economic Evaluation of Project

The economic evaluation of the Project is made by using cash flows of the said economic costs and benefits taking sunk cost into account. The results are shown in Appendix 10.5-1 through 10.5-4 and summarized below. In this case, B/C rates are comparison of benefit and cost in present value of them, and NPV(=B-C) means net cash balance between benefits and costs also expressed by their present value. For calculation of present value, a discount rate of 10 % is applied as same as in similar projects.

**Table 10.3-13 Result of Economic Evaluation**

| By works | Economic evaluation | | |
|---|---|---|---|
| | NPV(JDs.$10^3$) | EIRR(%) | B/C |
| Whole Project | 7,161 | 32.99 | 3.42 |
| EDCO's works | 2,076 | 29.19 | 2.91 |
| JEPCO's works | 2,615 | 40.92 | 4.52 |
| IDECO's works | 2,470 | 31.18 | 3.18 |

Resulted EIRR in all cases seem to be too much high comparing with those in the other projects in electricity sector. But from the viewpoint of design criteria, only the most economical countermeasures in terms of cost performance are adopted for the Project. So, the said results are quite reasonable and the Project is sound economically.

For EDCO's Works, the EIRR seem to be rather small (but, it is enough sound economically) comparing with others. It is caused by the sunk cost.

Generally, the economic analysis evaluates a degree of economic impacts on a project that would bring about in the national economy by using economic cost and economic benefit in monetary terms by EIRR. From this viewpoint, in the economic operation of a project, the benefit (the economic benefit) means an amount of economic impact due to execution of the project converted into monetary terms, so it does not mean an actual money. On the other hand, in the commercial operation of the project, the benefit (the financial benefit or

revenue) means the actual amount of revenue (incremental margin to be increased in the case of this Project) which may be gained from the commercial operation of the project.

The sunk cost means that the cost for facilities witch is already constructed, and to be needed to use for this Project without any cost. In the works of re-conductoring, one third (1/3) of its cost is counted in the Project. Therefore, remaining two third (2/3) of its cost are the cost witch is already invested. In EDCO's case, around 20 % of it's total cost is for re-conductoring works while the others include 5 % of the cost for re-conductoring. Therefore, around 40 % of the economic benefit in EDCO's case and 10 % in others' cases are derived from the works which are already invested. If these benefits are included in this Project, the benefit is thus doubly counted from the viewpoint of national economy.

The resulted EIRR in EDCO's works is caused by deduction of the said benefit derived from the existing facilities from the total economic benefit. The EIRR for the other 2 distribution companies are also taking these sunk cost into account, but those are not so much high comparing with EDCO's case..

### 10.3.4 Financial Benefit

If the Project is executed, the operating expenses will be decreased corresponding to the electricity loss reduction. In this case, the operating expenses mean all the cost for electricity sales. Therefore, a margin between the operating expenses and sales amount of electricity will be increased. This incremental increased margin to be called as probable revenue is a financial benefit for financial evaluation of the Project.

For estimation of the said probable revenue, a unit operating expenses was estimated from the past 9 years financial data presented by EDCO (separated from NEPCO since 1998), JEPCO and IDECO as summarized below:

**Table 10.3-14 Unit Operating Expenses by Distribution Companies**

(Fils/kWh)

| Year | EDCO | JEPCO | IDECO |
|---|---|---|---|
| 1991 | 30.06 | 28.31 | 30.19 |
| 1992 | 30.15 | 27.33 | 29.52 |
| 1993 | 32.87 | 30.21 | 32.48 |
| 1994 | 34.91 | 32.41 | 33.75 |
| 1995 | 34.50 | 32.33 | 33.59 |
| 1996 | 37.69 | 35.75 | 36.61 |
| 1997 | 38.49 | 37.51 | 37.69 |
| 1998 | 38.98 | 37.63 | 37.44 |
| 1999 | 37.51 | 37.96 | 43.73 |

*Sources: Financial reports of EDCO (NEPCO), JEPCO, and IDECO.*

Based on the extrapolation method, envisaged unit operating expenses are estimated using the above mentioned data as shown below:

**Table 10.3-15 Unit Operating Expenses by Distribution Companies**

| Distribution company | Unit operating expenses (Fils/kWh as of 2000) |
|---|---|
| EDCO's works | 40.19 |
| JEPCO's works | 40.58 |
| IDECO's works | 42.46 |

Using these unit operating expenses and the energy loss reduction volume, the probable revenue is estimated as shown in the following Tables.

**Table 10.3-16 Amount of Probable Revenue by Year (with Capacitor)**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 233 | 108 | 49 | 76 |
| 2004 | 716 | 373 | 131 | 212 |
| 2005 | 1,583 | 547 | 443 | 593 |
| 2006 | 1,753 | 606 | 490 | 657 |
| 2007 | 1,921 | 664 | 537 | 720 |
| 2008 | 2,099 | 725 | 587 | 787 |
| 2009 | 2,261 | 781 | 632 | 847 |
| 2010 | 2,405 | 831 | 673 | 901 |
| 2011 | 2,549 | 881 | 713 | 955 |
| 2012 | 2,697 | 932 | 754 | 1,011 |
| 2013 | 2,819 | 971 | 791 | 1,058 |
| 2014 | 2,923 | 989 | 830 | 1,105 |

**Table 10.3-17 Amount of Probable Revenue by Year (without Capacitor)**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 148 | 68 | 32 | 48 |
| 2004 | 378 | 197 | 70 | 112 |
| 2005 | 863 | 302 | 268 | 293 |
| 2006 | 956 | 335 | 297 | 325 |
| 2007 | 1,048 | 367 | 325 | 356 |
| 2008 | 1,145 | 401 | 355 | 389 |
| 2009 | 1,233 | 432 | 383 | 419 |
| 2010 | 1,312 | 459 | 407 | 446 |
| 2011 | 1,390 | 487 | 431 | 472 |
| 2012 | 1,471 | 515 | 456 | 500 |
| 2013 | 1,535 | 535 | 478 | 522 |
| 2014 | 1,593 | 546 | 503 | 544 |

Appendix 10.4-1 and 10.4-2 show their calculation process in detail.

### 10.3.5 Financial Evaluation of Project

The financial evaluation of the Project is made by using cash flows of the said financial costs and benefits. The results are shown in Appendix 10.6-1 through 10.6-4 and summarized below. In this case, B/C rates are comparison of benefit and cost in present value of them, and NPV(=B-C) means net cash balance between benefits and costs also expressed by their present value in the same manner of the said economic evaluation. For calculation of present value, a discount rate of 10 % is applied as same as in similar projects.

**Table 10.3-18 Result of Financial Evaluation**

| By works | Financial evaluation | | |
|---|---|---|---|
| | NPV(JDs.$10^3$) | FIRR(%) | B/C |
| Whole Project | 4,604 | 24.83 | 2.45 |
| EDCO's works | 1,584 | 24.27 | 2.36 |
| JEPCO's works | 1,596 | 29.18 | 3.00 |
| IDECO's works | 1,423 | 22.34 | 2.17 |

Resulted FIRR in all cases also seem to be too much high comparing with those in the other projects in electricity sector. But from the viewpoint of design criteria as already mentioned above, only the most economical countermeasures in terms of cost performance are adopted for the Project. So, the said results are quite reasonable and the Project is sound financially too.

## 10.4 Sensitivity Analyses

### 10.4.1 Fluctuation in Cost and Benefit

**(1) Fluctuation of Prices in Cost**

There is constant fluctuation in prices of construction materials for these kind of projects as a reflection of economy in the state.

**(2) Fluctuation in Benefit**

From the viewpoint of fluctuation of prices, it also gives an impact to the economic benefit because that the economic benefit has estimated on the basis of LRMC consisting of kW-value and kWh-value. Main component of the kW-value is construction cost of the power plant, and that of kWh-value consists mainly fuel cost.

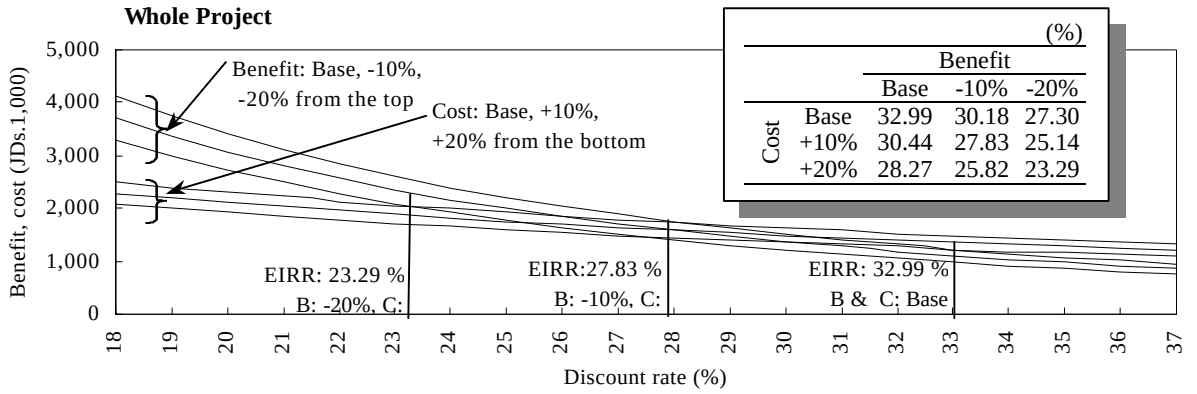
The financial benefit consists of operating expenses for electricity sales. All 3 distribution companies purchase their electricity to be sold from a power company, CEGCO through NEPCO. The purchase prices are also subject to the generation price, so the financial benefits are also influenced by the said prices.

Furthermore, demand also may be fluctuated in the future. NEPCO has forecasted that the peak demand in Jordan will be increased at an annual average gross rate of 4.6 % per annum for 10 years from 2000 . Here, if the said annual growth rate in the peak demand will be decreased by 3.7 % for 10 years, the economic and the financial benefit will also be decreased by 10 % corresponding to the decrease in the peak demand. Furthermore, if the said annual growth rate in the peak demand will be decreased by 2.6 % for 10 years, the economic and the financial benefit will also be decreased by 20 % also corresponding to the decrease in the peak demand.

### 10.4.2 Economic Sensitivity Test

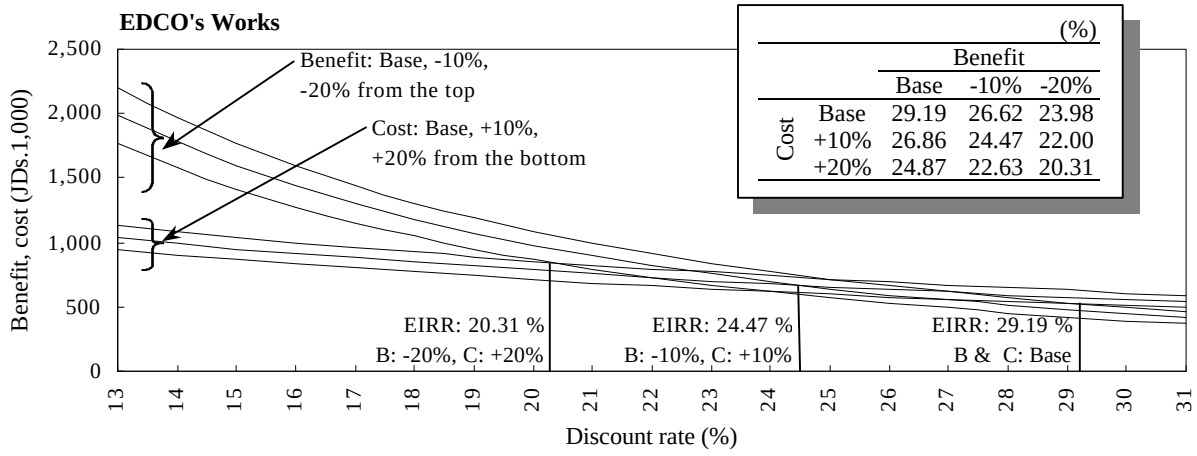
Considering these situation, a sensitivity analysis is made for 8 combined cases in addition to the base case under the conditions that the benefit will be decreased by -10 % and -20%, and the cost will be increased by +10 and +20%. The result of this sensitivity analysis is illustrated and summarized as below:

**Fig.10.4-1 Sensitivity of EIRR for the Project**



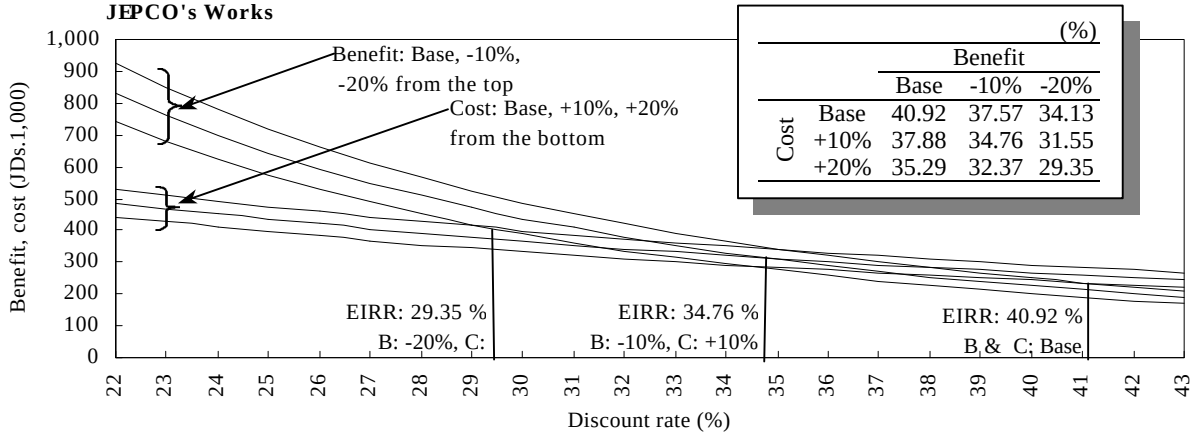

(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 32.99 | 30.18 | 27.30 |
| +10% | 30.44 | 27.83 | 25.14 |
| +20% | 28.27 | 25.82 | 23.29 |



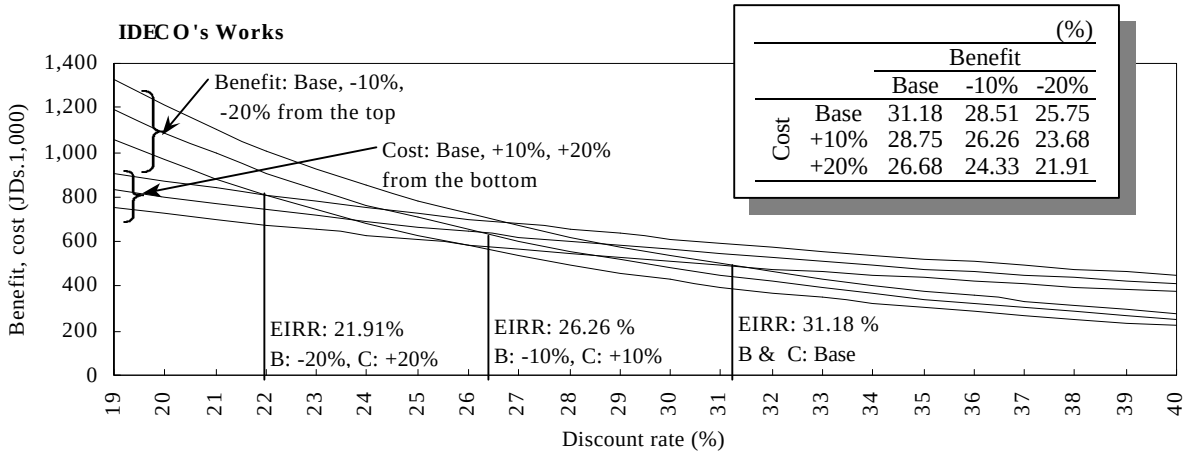

(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 29.19 | 26.62 | 23.98 |
| +10% | 26.86 | 24.47 | 22.00 |
| +20% | 24.87 | 22.63 | 20.31 |




(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 40.92 | 37.57 | 34.13 |
| +10% | 37.88 | 34.76 | 31.55 |
| +20% | 35.29 | 32.37 | 29.35 |

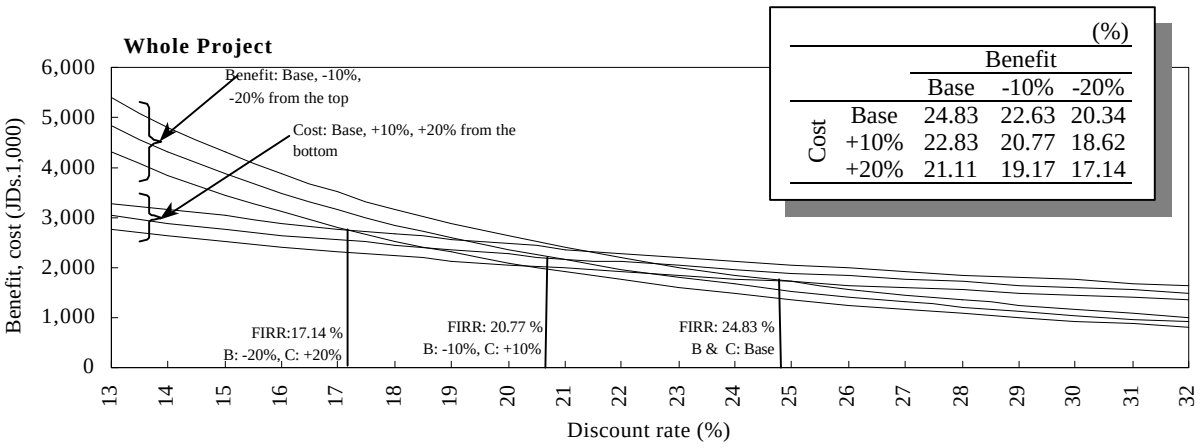


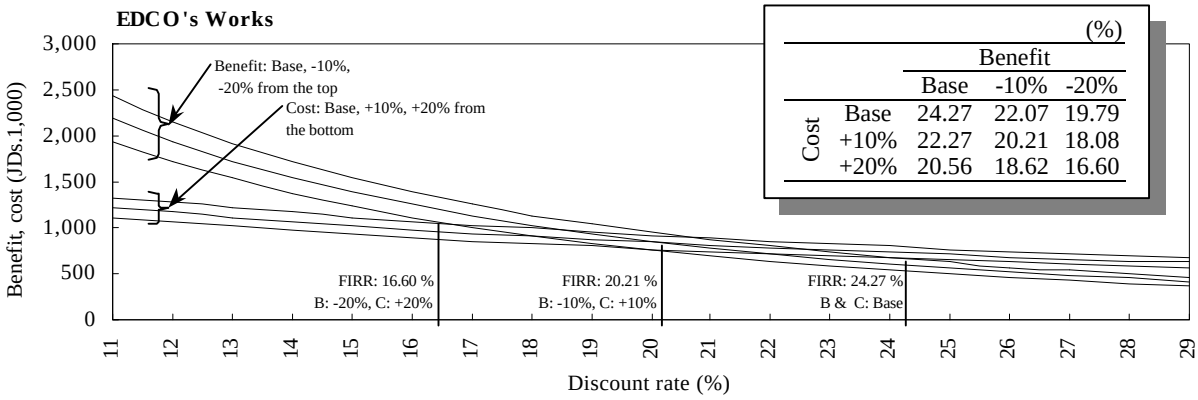

As shown in the above Figures, even the most pessimistic cases under the conditions of the costs increased by 20 % and the benefits decreased by 20 % show also still enough high EIRR as 23.29 %, 20.31 %, 29.35 % and 21.91 % for whole Project, EDCO's works, JEPCO's works and IDECO's works respectively. It means that the Project under study is economically sound in all cases.

### 10.4.3 Financial Sensitivity Test

Also considering the situation mentioned above, a sensitivity analysis is made in financial evaluation of the Project for 8 combined cases in addition to the base case under the conditions that the benefit will be decreased by -10 % and -20%, and the cost will be increased by +10 and +20%. The result of this sensitivity analysis is illustrated and summarized as below:

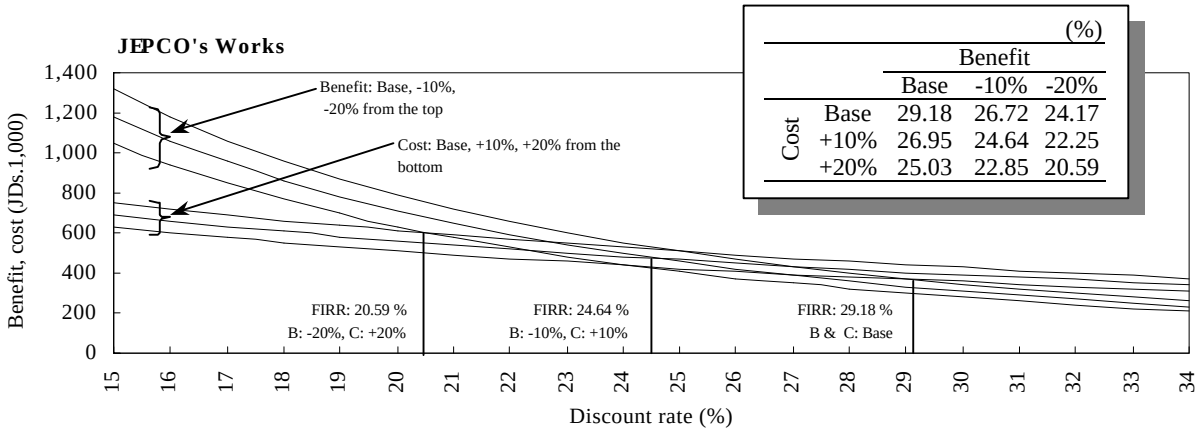
**Fig.10.4-2 Sensitivity of FIRR for the Project**





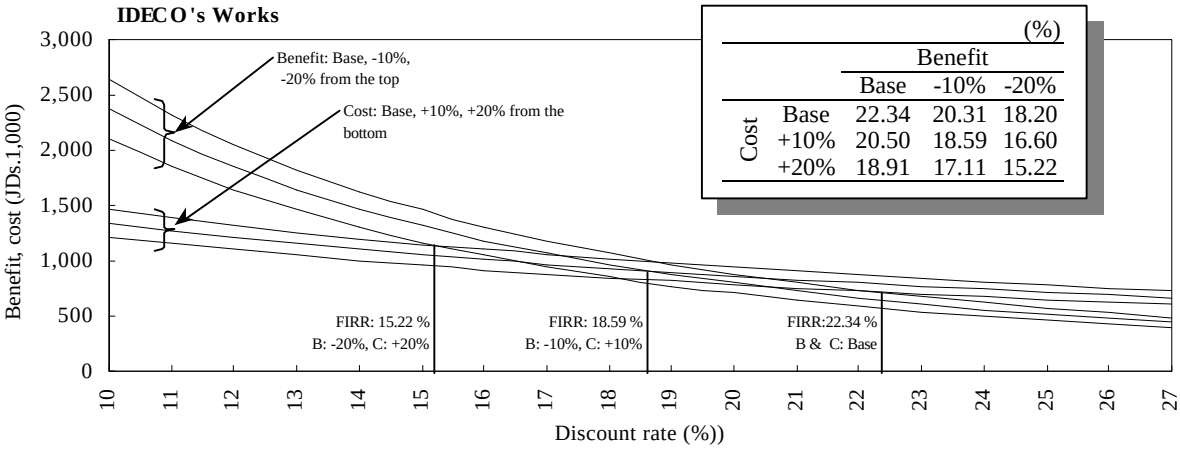

(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 24.27 | 22.07 | 19.79 |
| +10% | 22.27 | 20.21 | 18.08 |
| +20% | 20.56 | 18.62 | 16.60 |




(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 29.18 | 26.72 | 24.17 |
| +10% | 26.95 | 24.64 | 22.25 |
| +20% | 25.03 | 22.85 | 20.59 |




(%)

| Cost \ Benefit | Base | -10% | -20% |
|---|---|---|---|
| Base | 22.34 | 20.31 | 18.20 |
| +10% | 20.50 | 18.59 | 16.60 |
| +20% | 18.91 | 17.11 | 15.22 |

As shown in the above Figures, even the most pessimistic cases under the conditions of the costs increased by 20 % and the benefits decreased by 20 % show also still enough high FIRR as 17.14 %, 16.60 %, 20.59 % and 15.22 % for whole Project, EDCO's works, JEPCO's works and IDECO's works respectively. It means that the Project under study is also financially sound in all cases.

## 10.5 Overview of Project Evaluation

From the viewpoint of both the economic and financial aspects, the Project has a viability to execute according to the resulted EIRRs and FIRRs for whole Project and in all cases by 3 distribution companies as EDCO's works, JEPCO's works and IDECO's works as mentioned above.

Especially, resulted EIRRs for whole Project, EDCO's works, JEPCO's works and IDECO's works as 32.99 %, 29.19 %, 40.92 % and 31.18 % respectively are quite high rates reflecting the external cost savings derived from decreasing of emission of gases of $CO_2$, $SO_x$ and $NO_x$ as one of the economic benefits. It may say that the Project is that for preventing the environmental degradation as air pollution.

## 10.6 Repayability Analysis

### 10.6.1 Financing Resources

For execution of the Project, electricity enterprises as EDCO, JEPCO and IDECO should use loan from some financing institutions. There are several Arabic and international financing institutions. Their financing conditions are shown below.

**Table 10.6-1 Several Arabic and International Financing Institutions**

| Name of institution | Grace period | Repayment period | Annual interest | Repayment method | Remarks |
|---|---|---|---|---|---|
| Arab Fund for Economic and Social Development (AF) | 6 years | 10 - 20 years (excl. grace period) | 4.5 % to 6.0 % | • Annual equal installment consisting of principal and interest.<br>• The interest should be paid during the grace period. | 100 % of the cost can be financed. |
| International Bank for Rehabilitation and development (IBRD) | 5 years | 15 - 20 years (excl. grace period) | 6.7 % | • Annual equal installment consisting of principal and interest.<br>• The interest should be paid during the grace period. | Handling charge of 0.25 % will be levied on the remaining balance. |
| European Investment Bank (EIB) | 5 years | 10 years (excl. grace period) | 1.45 % to 2.0 % | - ditto - | 100 % of the cost can be financed. |
| Islamic Development Bank (IDB) | 2 years | 5 – 8 years (incl. grace period) | 9 % to 10 % | • Bi-annual equal installment consisting of Principal and interest.<br>• The interest should be paid during the grace period. | It has also a Cost-Plus Financing Method*. |
| International Development Association (IDA) | 10 years | 40 years (incl. Grace period) | No interest. | • Annual equal installment for principal. | No interest, but handling charge of 0.75 % will be levied on the remaining balance. |

*(Note) *: Cost-Plus Financing Method is locally called as "Murabaha". If the project wishes to purchase equipment or goods, it requires a profit rate of 50 % or 60 % to the total capital with bi-annual equal installment payment within the repayment period of 10 or 15 years.*

## Financing Institution

Here, some brief explanations for such financing institutions mentioned in the said Table are given hereunder.

**(1) Arab Fund**

The Arab Fund for Economic and Social Development (AF, hereinafter referred to as "Arab Fund") makes up a banking group, so it is called as the Arab Bank Group too. The loan from the Arab Fund is classified as a soft loan type. It may finance for any kind of development projects, environmental improvement oriented-projects, and so on.

**(2) International Bank for Rehabilitation and Development**

The International Bank for Rehabilitation and Development (IBRD) is an entity of the World Bank group. It may finance to member countries, which are in low GDP level between US$1,465 and US$5,296 per capita with levying handling charge on the remaining balance of loan amount.

**(3) European Investment Bank**

The European Investment Bank (EIB) may finance for environmental improvement oriented-projects only, and the loan from it is classified as a soft loan type.

**(4) Islamic Development Bank**

The Islamic Development Bank (IDB) has a unit investment fund (the Fund) by using a cost-plus financing locally called as "Murabaha" as a most popular way to finance. The IDB explains about this way as "a sales contracts between the IDB's unit investment fund (the Fund) and the client in which the later wishes to purchase equipment or goods, requests the Fund to purchase these items for the client. After the Fund obtains the ownership of the items, the Fund then sells these equipment or goods to the client at cost-plus a reasonable profit. Capital and profit are payable on items agreed between the parties." In this case, the payment will be commenced after withdrawal without any grace period. The said profit can be looked as an interest from the viewpoint of the client.

**(5) International Development Aid**

The International Development Aid (IDA) is an entity of the World Bank group. It may finance to member countries, which are in low GDP level being less than US$1,465 per capita with no interest but levies handling charge on the remaining balance of loan amount.

## Grant Aid Institution

Other than those financing institutions mentioned above, there is an independent entity for giving the grant named as Global Environment Facility. Its brief explanation is given hereunder.

**(6) Global Environment Facility**

The Global Environment Facility (GEF) gives a grant for environmental improvement oriented-projects, and its implementing agencies are the United Nation Development Programme (UNDP), the United Nation Environment Programme (UNEP) and the World Bank. It finances to medium size projects within US$ 10 million (average financing amount was US$ 5.5 million per project in the past), and it requests co-financing from the other financial institutions.

**For Domestic Financing**

(7) There are several local financing banks having conditions as annual interest rate ranging from 9 % to 11 % with grace period of 2 or 3 years and repayment period of 5 to 10 years excluding the grace period using bi-annual equal installment payment.

**Other Availability as Financing Resources**

(8) Jordan has several bi-lateral co-operations with developed countries. So there is a possibility to use such co-operations to finance the project.

### 10.6.2 Financing Resources to be Applied for Repayability Analysis

Taking into consideration of the above financing institutions and characteristics of the Project, repayability analyses are made in 3 cases as conservative cases such as:

(1) Financing by the Arab Fund by using 5.5 % of interest rate with 20 years of repayment period in addition to 6 years of grace period,

(2) International commercial loan of public financing institution such as the IBRD with the interest rate of 7.0 % consisting of interest rate and handling charge and repayment period of 20 years in addition to 5 years of grace period, and

(3) International commercial loan by private banks. Assumed loan conditions are 8.5 % of interest rate with repayment period of 10 years including 2 years of grace period.

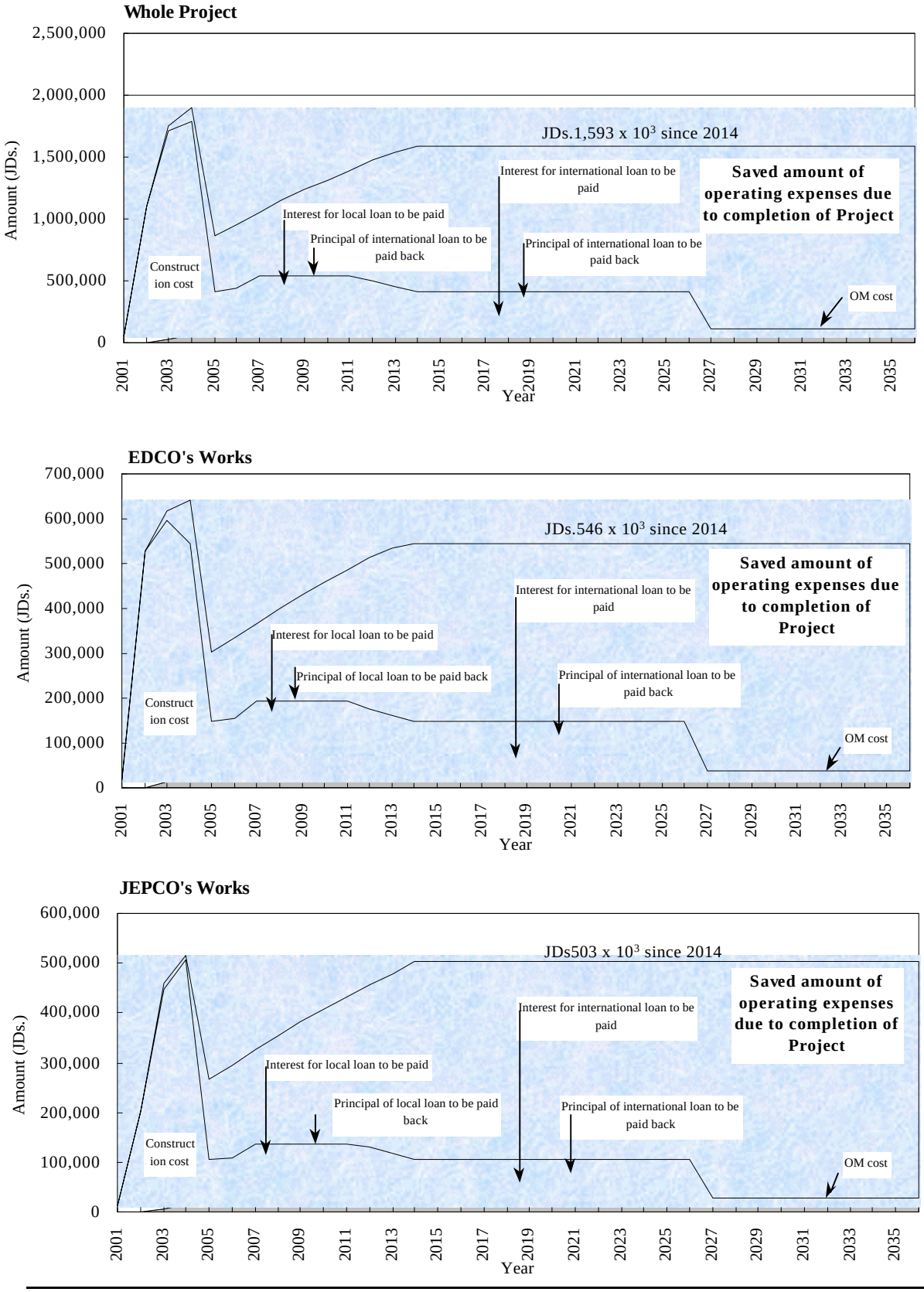
In these cases, 15 % of the total cost are assumed to prepare by each distribution company its-self as their burdening capability as already agreed by them.

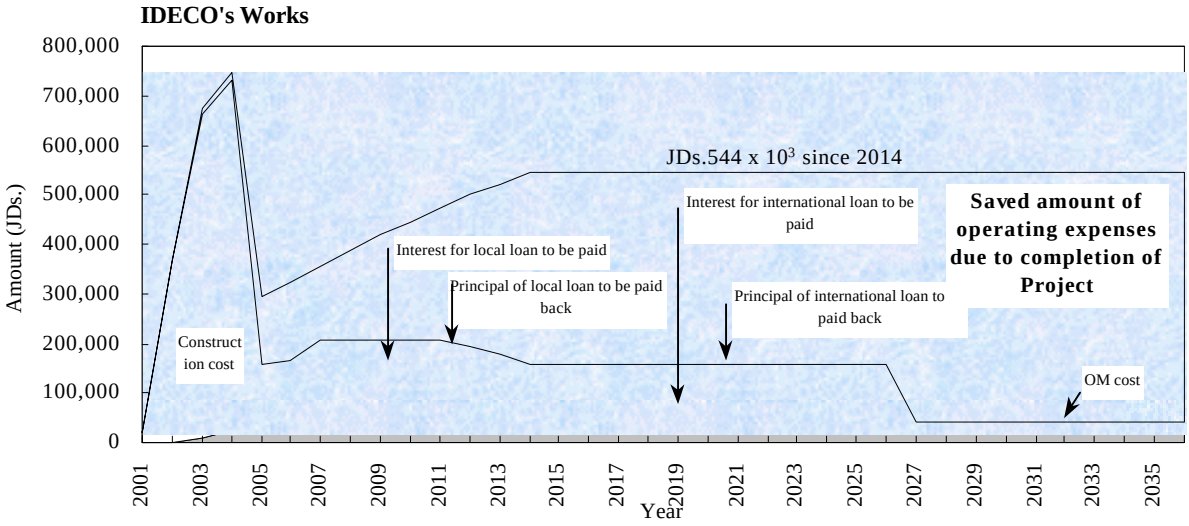
### 10.6.3 Repayability of Loan Amount in Case of Arab Fund

It has been presumed that the interest for both the foreign and local loans will be paid by enterprises' own fund within the amount of probable revenue. In this case, it is assumed that the 15 % of the total construction cost should prepare by electricity enterprises themselves as mentioned above. Namely, it is assumed that the amount to be burdened by the enterprises is financed by local loan. The contingency for price escalation should be included in the Project cost in this case so that the Project is executed safely. All cases excluded the cost for installation of capacitors.

Appendices 10.7-1 to 10.7-4 show cash flows as results of loan repayability analysis and illustrated as shown hereunder:

**Fig.10.6-1 Repayability of Loan in Case of Arab Fund**

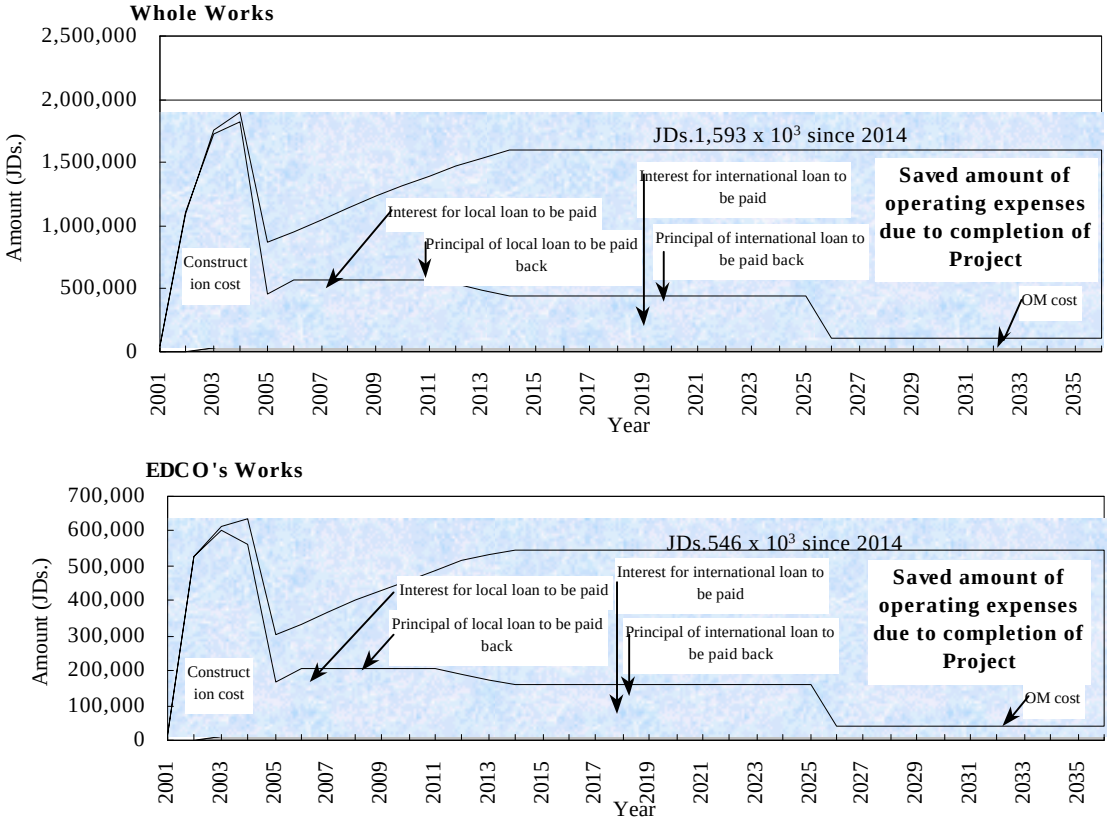


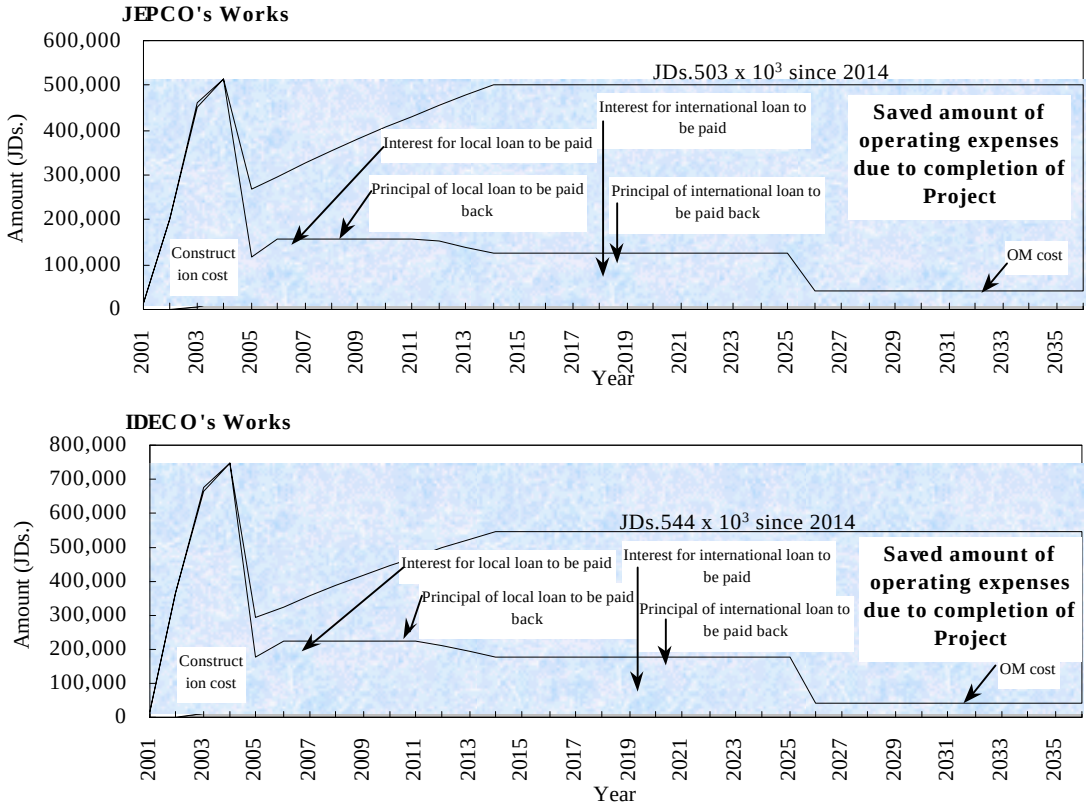



### 10.6.4 Repayability of Loan Amount in Case of International Commercial Loan of Public Financing Institution

In case of international commercial loan of public financing institution such as IBRD, cash flows as the result of repayability analysis is shown in Appendix 10.8-1 to 10.8-4, and illustrated hereunder:

**Fig.10.6-2 Repayability of Loan in Case of International Commercial Loan of Public Financing Institution**

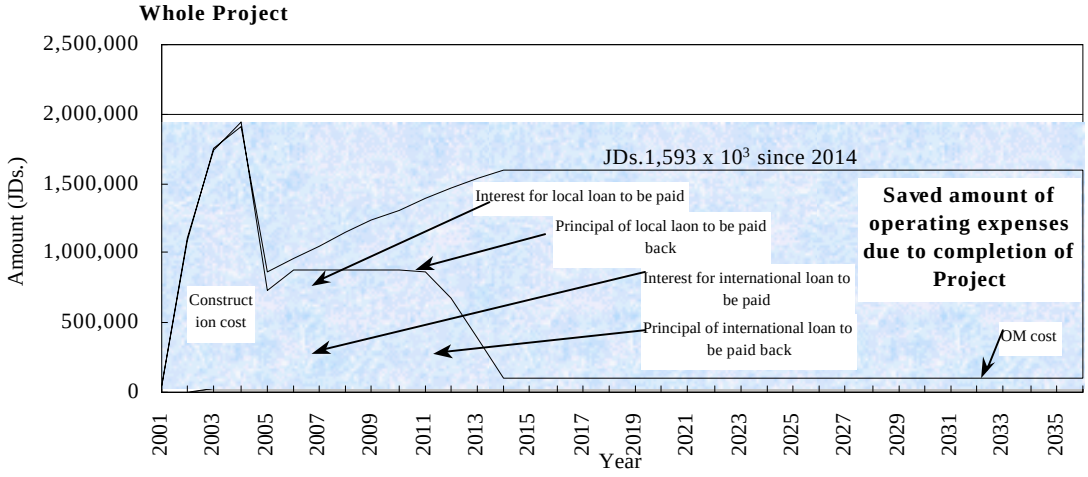


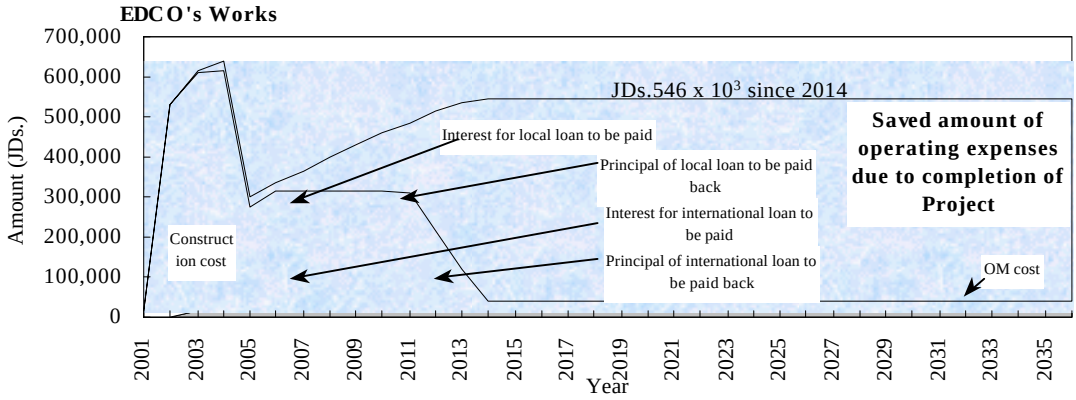


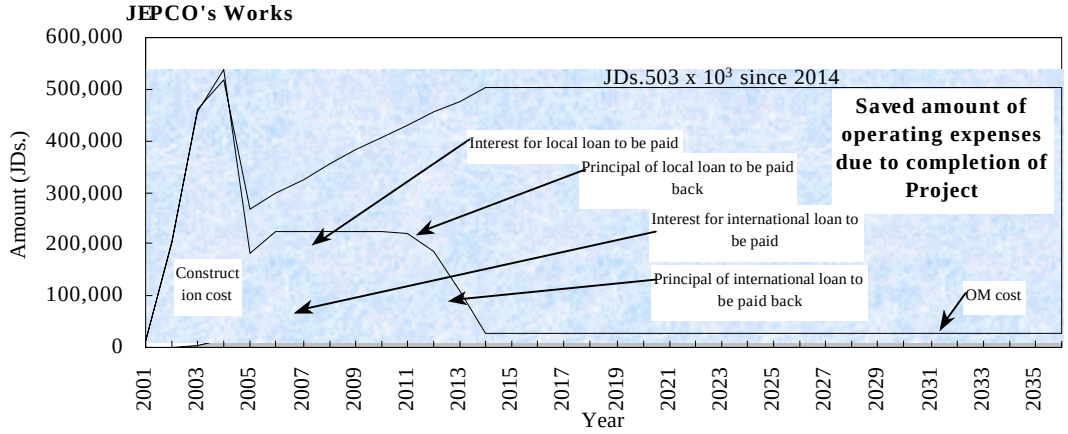

### 10.6.5 Repayability of Loan Amount in Case of International Private Commercial Loan

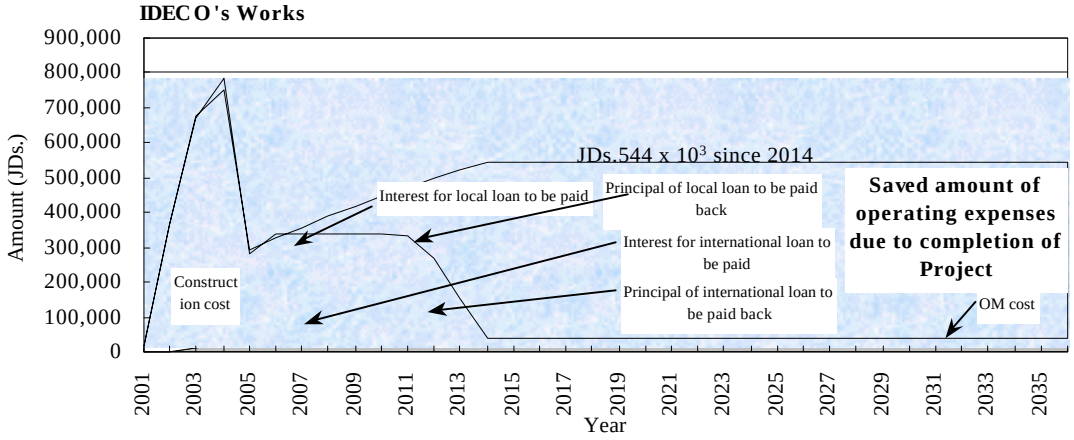
In case of international private commercial loan, cash flows as the result of repayability analysis is shown in Appendix 10.9-1 to 10.9-4, and illustrated hereunder:

**Fig.10.6-3 Repayability of Loan in Case of International Private Commercial Loan**






### 10.6.6 Overview of Repayability Analyses of Loan Amount

As shown in Appendixes 10.7-1 through 10.7-4, 10.8-1 through 10.8-4 and 10.9-1 through 10.9-4, there will register deficits as shown in Table below:

**Table 10.6-2 Deficits Appearing in Cash Flows of the Project without Capacitor**

(JDs.)

| Financing resource | Deficit-ridden year | Whole Project | EDCO's works | JEPCO's works | IDECO's works |
|---|---|---|---|---|---|
| In case of Arab Fund | 2002 | -2,998 | -1,084 | -761 | -1,153 |
| In case of international commercial loan of public financing institution such as IBRD | 2002 | -3,602 | -1,302 | -914 | -1,385 |
| In case of international private commercial loan | 2002<br>2004<br>2006 | -4,206<br>-38,516 | -1,521 | -1,068<br>-22,690 | -1,618<br>-38,486<br>-12.987 |

These deficits come from interests of loan amount during the construction period in 2002 in case of Arab Fund and international commercial loan of public financing institution. In case of international private commercial loan, the outflow exceeds the inflow in 2004 and 2006 both for 2 years after first disbursement for net construction works and final disbursement of loan. This exceeding of outflow causes the deficits in 2004 and in 2006 as shown in the above Table. The amounts of these deficits are negligible small comparing with surpluses thereafter. From the viewpoint of each work, it turns an active balance in 2005 for the whole Project, in 2003 for EDCO's works, in 2005 for JEPCO's works and, in 2007 for 2007 for IDECO's works.

As a result, nevertheless there will register some deficits in their cash flows, all distribution companies have capabilities to execute their works with financing by any financing institution. However, from the viewpoint of deficit to be a minimum amount, the case using the Arab Fund is the best case for electricity enterprises.

For reference, repayability analyses with capacitors are also made as shown in Appendixes 10.10-1 through 10.10-4, 10.11-1 through 10.11-4 and 10.12-1 through 10.12-4. In these cases, the said deficits becomes as follows:

**Table 10.6-3 Deficits Appearing in Cash Flows of the Project with Capacitor**

(JDs.)

| Financing resource | Deficit-ridden year | Whole Project | EDCO's works | JEPCO's works | IDECO's works |
|---|---|---|---|---|---|
| In case of Arab Fund | 2002 | -3,144 | -1,130 | -806 | -1,207 |
| In case of international commercial loan of public financing institution such as IBRD | 2002 | -3,777 | -1,358 | -968 | -1,451 |
| In case of international private commercial loan | 2002 | -4,411 | -1,586 | -1,131 | -1,694 |

The deficits are registering in 2002 only, and they return to the active balance in 2003 in any cases. Those deficits come from the interests during the construction period. From the viewpoint of a ratio to the amount of surpluses thereafter, its extent is smaller by far than that in case without capacitors mentioned above. Because that the cost is not so much increased for installation of capacitors by comparison with probable

revenue (saving amount of operating expenses for electricity sales) to be increased as mentioned in previous sub-clause, it is the matter-of-course. Therefore, all distribution companies have capabilities to execute their works with financing by any financing institution in this case too. However, from the viewpoint of deficit to be a minimum amount, the case using the Arab Fund is the best case for electricity enterprises.

# Appendix 10.1 Estimation of Standard Conversion Factor

**(Note)**

Equaition for calculation of standard conversion factor (SCF):

$$SCF = \frac{\text{Import amount + Export amount}}{\text{(Import amount + Import customs) + (Export amount - Export tax + Subsidy)}}$$

| Year | Import amount (million JD.) | Export amount (million JD.) | Import customes (million JD.) | Export taxes (million JD.) | Subsidy (million JD.) |
|---|---|---|---|---|---|
| 1994 | 2,363 | 995 | 217 | 0 | 0 |
| 1995 | 2,590 | 1,241 | 204 | 0 | 0 |
| 1996 | 3,044 | 1,288 | 219 | 0 | 0 |
| 1997 | 2,908 | 1,301 | 240 | 0 | 0 |
| 1998 | 2,714 | 1,278 | 288 | 0 | 0 |
| 1999 | 2,635 | 1,299 | 274 | | |
| Total | 16,254 | 7,403 | 1,442 | 0 | 0 0 |
| Sources: | | | | SCF= | 0.94254 |

Statistical Yearbook 1999, Ddepartment of Statistics (Draft)

## Appendix 10.2 Whole Sales Price Index and Salaries and Wages

**A. Goods** (Base:100 % as of 1992)

| Items | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | Annual average growth(%) |
|---|---|---|---|---|---|---|---|---|---|
| Transport vehicles | 100.0 | 109.6 | 111.4 | ##### | 115.2 | 116.4 | ##### | 100.8 | 2.19 |
| Spare parts and fuels | 100.0 | 106.4 | 106.4 | ##### | 106.8 | 107.3 | ##### | 109.4 | 1.10 |
| Food items | 100.0 | 97.6 | 124.0 | ##### | 104.8 | 107.5 | ##### | 101.2 | 2.01 |
| Vegitables and fruirts | 100.0 | 94.9 | 133.3 | ##### | 98.0 | 98.7 | ##### | 88.5 | 1.87 |
| Dairy products and eggs | 100.0 | 104.2 | 110.8 | ##### | 149.2 | 154.3 | ##### | 133.7 | 5.79 |
| Meat and fishes | 100.0 | 96.1 | 96.2 | 98.6 | 102.9 | 104.1 | ##### | 112.3 | 0.81 |
| Cigarettes and drinks | 100.0 | 106.5 | 113.6 | ##### | 113.8 | 114.4 | ##### | 114.4 | 2.01 |
| Other food items | 100.0 | 104.8 | 115.7 | ##### | 120.4 | 136.0 | ##### | 136.6 | 4.81 |
| Cloths, textiles and footwears | 100.0 | 102.0 | 99.1 | 95.3 | 97.1 | 96.5 | 96.1 | 96.3 | -0.55 |
| Households instruments | 100.0 | 100.0 | 100.0 | ##### | 104.7 | 104.9 | ##### | 103.6 | 0.76 |
| Medicaments | 100.0 | 86.3 | 86.3 | 87.8 | 87.9 | 87.9 | ##### | 100.2 | 0.37 |
| Fuels oil and gas | 100.0 | 110.5 | 118.0 | ##### | 118.0 | 118.0 | ##### | 119.1 | 2.60 |
| Wood | 100.0 | 90.4 | 91.4 | ##### | 93.2 | 94.0 | 93.2 | 81.9 | -0.74 |
| Construction materials | 100.0 | 106.4 | 107.3 | ##### | 117.1 | 121.1 | ##### | 115.4 | 3.05 |
| Fertilizers and insecticides | 100.0 | 105.3 | 105.3 | ##### | 106.9 | 106.6 | ##### | 106.4 | 0.95 |
| Machinery and equipment | 100.0 | 106.3 | 106.5 | ##### | 103.6 | 103.6 | ##### | 103.6 | 0.54 |
| Brokaerage margins | 100.0 | 100.0 | 100.0 | ##### | 100.0 | 100.0 | ##### | 100.0 | 0.00 |
| Cereals and oil seeds | 100.0 | 92.9 | 95.4 | 90.3 | 100.8 | 103.1 | ##### | 101.8 | 0.44 |
| Trading live animals | 100.0 | 99.8 | 97.1 | 98.3 | 109.1 | 114.5 | ##### | 99.6 | 1.70 |
| Other goods | 100.0 | 103.3 | 102.3 | ##### | 117.9 | 120.0 | ##### | 120.8 | 2.36 |
| General | 100.0 | 103.4 | 108.4 | ##### | 107.9 | 109.6 | ##### | 105.7 | 1.45 |

**B. Salaries and wages**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Salaries and wages(1,000JD) | 24,899 | ##### | ##### | - | ##### | 46,989 | - | ##### | (1992 - 1997) |
| Number of employees | 14,960 | ##### | ##### | - | ##### | 20,799 | - | ##### | |
| Per capita salaries and wages(JD) | 1,664 | 1,821 | 2,162 | - | 2,189 | 2,259 | - | 2,467 | 5.79 |

Source : Statistical Year Book 1993, 1994, 1995, 1997, 1998 and 1999 (Draft).

# Appendix 10.3-1 Annual Disbursement of Construction Cost with Capacitor

**A. Whole Project** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 528,647 | 443,836 | 972,483 | 745,134 | 638,349 | 1,383,483 | 663,558 | 567,184 | 1,230,742 | 1,937,339 | 1,649,369 | 3,586,708 |
| Installation of capacitors | 0 | 0 | 0 | 31,035 | 24,138 | 55,173 | 41,722 | 32,451 | 74,173 | 20,910 | 16,263 | 37,173 | 93,667 | 72,852 | 166,519 |
| Construction of LV facilities | 0 | 0 | 0 | 128,193 | 85,462 | 213,655 | 128,193 | 85,462 | 213,655 | 128,193 | 85,462 | 213,655 | 384,579 | 256,386 | 640,965 |
| Construction of MV facilities | 0 | 0 | 0 | 369,419 | 334,236 | 703,655 | 575,219 | 520,436 | 1,095,655 | 514,455 | 465,459 | 979,914 | 1,459,093 | 1,320,131 | 2,779,224 |
| Engineering cost for supervision | 0 | 44,834 | 44,834 | 0 | 44,834 | 44,834 | 0 | 44,834 | 44,834 | 0 | 44,834 | 44,834 | 0 | 179,335 | 179,335 |
| Sub-total | 0 | 44,834 | 44,834 | 528,647 | 488,670 | 1,017,317 | 745,134 | 683,183 | 1,428,317 | 663,558 | 612,018 | 1,275,576 | 1,937,339 | 1,828,705 | 3,766,043 |
| Administration | 0 | 1,345 | 1,345 | 0 | 30,520 | 30,520 | 0 | 42,850 | 42,850 | 0 | 38,267 | 38,267 | 0 | 112,981 | 112,981 |
| Sub-total | 0 | 46,179 | 46,179 | 528,647 | 519,190 | 1,047,836 | 745,134 | 726,032 | 1,471,166 | 663,558 | 650,285 | 1,313,843 | 1,937,339 | 1,941,686 | 3,879,025 |
| Phisical contingency | 0 | 1,154 | 1,154 | 13,216 | 12,980 | 26,196 | 18,628 | 18,151 | 36,779 | 16,589 | 16,257 | 32,846 | 48,433 | 48,542 | 96,976 |
| Sub-total | 0 | 47,333 | 47,333 | 541,863 | 532,169 | 1,074,032 | 763,763 | 744,183 | 1,507,946 | 680,147 | 666,543 | 1,346,689 | 1,985,772 | 1,990,228 | 3,976,000 |
| Price contingency | 0 | 2,367 | 2,367 | 32,999 | 54,547 | 87,547 | 70,821 | 117,302 | 188,123 | 85,364 | 143,644 | 229,008 | 189,185 | 317,860 | 507,045 |
| Total | 0 | 49,700 | 49,700 | 574,862 | 586,717 | 1,161,579 | 834,584 | 861,485 | 1,696,069 | 765,511 | 810,187 | 1,575,698 | 2,174,957 | 2,308,088 | 4,483,046 |
| Financi.(Total-Price conti.) | 0 | 47,333 | 47,333 | 541,863 | 532,169 | 1,074,032 | 763,763 | 744,183 | 1,507,946 | 680,147 | 666,543 | 1,346,689 | 1,985,772 | 1,990,228 | 3,976,000 |
| Economic cost | 0 | 42,735 | 42,735 | 541,863 | 460,849 | 1,002,712 | 763,763 | 643,656 | 1,407,419 | 680,147 | 576,707 | 1,256,853 | 1,985,772 | 1,723,946 | 3,709,718 |

**B. EDECO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 253,706 | 216,241 | 469,947 | 253,706 | 216,241 | 469,947 | 190,036 | 159,813 | 349,849 | 697,449 | 592,294 | 1,289,743 |
| Installation of capacitors | 0 | 0 | 0 | 13,045 | 10,146 | 23,191 | 13,045 | 10,146 | 23,191 | 3,764 | 2,927 | 6,691 | 29,854 | 23,219 | 53,073 |
| Construction of LV facilities | 0 | 0 | 0 | 48,916 | 32,611 | 81,527 | 48,916 | 32,611 | 81,527 | 48,916 | 32,611 | 81,527 | 146,749 | 97,832 | 244,581 |
| Construction of MV facilities | 0 | 0 | 0 | 191,745 | 173,484 | 365,229 | 191,745 | 173,484 | 365,229 | 137,356 | 124,275 | 261,631 | 520,847 | 471,242 | 992,089 |
| Engineering cost for supervision | 0 | 16,122 | 16,122 | 0 | 16,122 | 16,122 | 0 | 16,122 | 16,122 | 0 | 16,122 | 16,122 | 0 | 64,487 | 64,487 |
| Sub-total | 0 | 16,122 | 16,122 | 253,706 | 232,362 | 486,069 | 253,706 | 232,362 | 486,069 | 190,036 | 175,935 | 365,971 | 697,449 | 656,781 | 1,354,230 |
| Administration | 0 | 484 | 484 | 0 | 14,582 | 14,582 | 0 | 14,582 | 14,582 | 0 | 10,979 | 10,979 | 0 | 40,627 | 40,627 |
| Sub-total | 0 | 16,605 | 16,605 | 253,706 | 246,944 | 500,651 | 253,706 | 246,944 | 500,651 | 190,036 | 186,914 | 376,950 | 697,449 | 697,408 | 1,394,857 |
| Phisical contingency | 0 | 415 | 415 | 6,343 | 6,174 | 12,516 | 6,343 | 6,174 | 12,516 | 4,751 | 4,673 | 9,424 | 17,436 | 17,435 | 34,871 |
| Sub-total | 0 | 17,021 | 17,021 | 260,049 | 253,118 | 513,167 | 260,049 | 253,118 | 513,167 | 194,787 | 191,587 | 386,374 | 714,885 | 714,843 | 1,429,728 |
| Price contingency | 0 | 851 | 851 | 15,837 | 25,945 | 41,782 | 24,114 | 39,898 | 64,011 | 24,447 | 41,288 | 65,736 | 64,398 | 107,981 | 172,380 |
| Total | 0 | 17,872 | 17,872 | 275,886 | 279,063 | 554,949 | 284,163 | 293,016 | 577,178 | 219,235 | 232,875 | 452,109 | 779,283 | 822,825 | 1,602,108 |
| Financi.(Total-Price conti.) | 0 | 17,021 | 17,021 | 260,049 | 253,118 | 513,167 | 260,049 | 253,118 | 513,167 | 194,787 | 191,587 | 386,374 | 714,885 | 714,843 | 1,429,728 |
| Economic cost | 0 | 15,367 | 15,367 | 260,049 | 218,966 | 479,015 | 260,049 | 218,966 | 479,015 | 194,787 | 165,909 | 360,696 | 714,885 | 619,208 | 1,334,093 |

**C. JEPCO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 99,755 | 80,832 | 180,587 | 201,575 | 172,312 | 373,887 | 196,512 | 168,375 | 364,887 | 497,842 | 421,519 | 919,361 |
| Installation of capacitors | 0 | 0 | 0 | 7,915 | 6,156 | 14,071 | 12,977 | 10,094 | 23,071 | 7,915 | 6,156 | 14,071 | 28,807 | 22,406 | 51,213 |
| Construction of LV facilities | 0 | 0 | 0 | 35,351 | 23,567 | 58,918 | 35,351 | 23,567 | 58,918 | 35,351 | 23,567 | 58,918 | 106,052 | 70,702 | 176,754 |
| Construction of MV facilities | 0 | 0 | 0 | 56,489 | 51,109 | 107,598 | 153,246 | 138,652 | 291,898 | 153,246 | 138,652 | 291,898 | 362,982 | 328,412 | 691,394 |
| Engineering cost for supervision | 0 | 11,492 | 11,492 | 0 | 11,492 | 11,492 | 0 | 11,492 | 11,492 | 0 | 11,492 | 11,492 | 0 | 45,968 | 45,968 |
| Sub-total | 0 | 11,492 | 11,492 | 99,755 | 92,324 | 192,079 | 201,575 | 183,804 | 385,379 | 196,512 | 179,867 | 376,379 | 497,842 | 467,487 | 965,329 |
| Administration | 0 | 345 | 345 | 0 | 5,762 | 5,762 | 0 | 11,561 | 11,561 | 0 | 11,291 | 11,291 | 0 | 28,960 | 28,960 |
| Sub-total | 0 | 11,837 | 11,837 | 99,755 | 98,087 | 197,841 | 201,575 | 195,366 | 396,940 | 196,512 | 191,158 | 387,670 | 497,842 | 496,447 | 994,289 |
| Phisical contingency | 0 | 296 | 296 | 2,494 | 2,452 | 4,946 | 5,039 | 4,884 | 9,924 | 4,913 | 4,779 | 9,692 | 12,446 | 12,411 | 24,857 |
| Sub-total | 0 | 12,133 | 12,133 | 102,249 | 100,539 | 202,787 | 206,614 | 200,250 | 406,864 | 201,425 | 195,937 | 397,362 | 510,288 | 508,859 | 1,019,146 |
| Price contingency | 0 | 607 | 607 | 6,227 | 10,305 | 16,532 | 19,159 | 31,564 | 50,723 | 25,281 | 42,226 | 67,506 | 50,666 | 84,702 | 135,368 |
| Total | 0 | 12,739 | 12,739 | 108,475 | 110,844 | 219,320 | 225,773 | 231,814 | 457,587 | 226,706 | 238,163 | 464,868 | 560,954 | 593,560 | 1,154,514 |
| Financi.(Total-Price conti.) | 0 | 12,133 | 12,133 | 102,249 | 100,539 | 202,787 | 206,614 | 200,250 | 406,864 | 201,425 | 195,937 | 397,362 | 510,288 | 508,859 | 1,019,146 |
| Economic cost | 0 | 10,954 | 10,954 | 102,249 | 87,201 | 189,449 | 206,614 | 173,176 | 379,790 | 201,425 | 169,456 | 370,881 | 510,288 | 440,786 | 951,074 |

**D. IDECO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 175,186 | 146,763 | 321,949 | 289,853 | 249,796 | 539,649 | 277,009 | 238,997 | 516,006 | 742,048 | 635,556 | 1,377,604 |
| Installation of capacitors | 0 | 0 | 0 | 10,075 | 7,836 | 17,911 | 15,700 | 12,211 | 27,911 | 9,231 | 7,180 | 16,411 | 35,006 | 27,227 | 62,233 |
| Construction of LV facilities | 0 | 0 | 0 | 43,926 | 29,284 | 73,210 | 43,926 | 29,284 | 73,210 | 43,926 | 29,284 | 73,210 | 131,778 | 87,852 | 219,630 |
| Construction of MV facilities | 0 | 0 | 0 | 121,185 | 109,643 | 230,828 | 230,227 | 208,301 | 438,528 | 223,852 | 202,533 | 426,385 | 575,264 | 520,477 | 1,095,741 |
| Engineering cost for supervision | 0 | 17,220 | 17,220 | 0 | 17,220 | 17,220 | 0 | 17,220 | 17,220 | 0 | 17,220 | 17,220 | 0 | 68,880 | 68,880 |
| Sub-total | 0 | 17,220 | 17,220 | 175,186 | 163,983 | 339,169 | 289,853 | 267,016 | 556,869 | 277,009 | 256,217 | 533,226 | 742,048 | 704,436 | 1,446,484 |
| Administration | 0 | 517 | 517 | 0 | 10,175 | 10,175 | 0 | 16,706 | 16,706 | 0 | 15,997 | 15,997 | 0 | 43,395 | 43,395 |
| Sub-total | 0 | 17,737 | 17,737 | 175,186 | 174,158 | 349,344 | 289,853 | 283,722 | 573,575 | 277,009 | 272,214 | 549,223 | 742,048 | 747,831 | 1,489,879 |
| Phisical contingency | 0 | 443 | 443 | 4,380 | 4,354 | 8,734 | 7,246 | 7,093 | 14,339 | 6,925 | 6,805 | 13,731 | 18,551 | 18,696 | 37,247 |
| Sub-total | 0 | 18,180 | 18,180 | 179,565 | 178,512 | 358,078 | 297,099 | 290,815 | 587,914 | 283,935 | 279,019 | 562,953 | 760,599 | 766,526 | 1,527,126 |
| Price contingency | 0 | 909 | 909 | 10,936 | 18,298 | 29,233 | 27,549 | 45,840 | 73,389 | 35,636 | 60,130 | 95,767 | 74,121 | 125,177 | 199,298 |
| Total | 0 | 19,089 | 19,089 | 190,501 | 196,810 | 387,311 | 324,649 | 336,655 | 661,303 | 319,571 | 339,149 | 658,720 | 834,720 | 891,703 | 1,726,423 |
| Financi.(Total-Price conti.) | 0 | 18,180 | 18,180 | 179,565 | 178,512 | 358,078 | 297,099 | 290,815 | 587,914 | 283,935 | 279,019 | 562,953 | 760,599 | 766,526 | 1,527,126 |
| Economic cost | 0 | 16,414 | 16,414 | 179,565 | 154,682 | 334,248 | 297,099 | 251,515 | 548,614 | 283,935 | 241,342 | 525,276 | 760,599 | 663,952 | 1,424,552 |

(Note)

1. Share rate of material and labor by work item:
   - Installation of capacitors: 75% (For material), 25% (For labor)
   - Construction of LV: 80% (For material), 20% (For labor)
   - Construction of MV: 70% (For material), 30% (For labor)
2. Allocated rate of FC and LC:
   - For material: 75% (For FC), 25% (For LC)
   - For the others: 0% (For FC)
3. Engineering cost: 5.0% of the construction cost.
4. Administration cost: 3.0%
   Based on the estimation by 3 electricity enterprises.
5. Income tax of labor: 5% according to the Income Tax Law of Jordan.
6. Net profit: 10% of the net offering amount of the works to be proposed by contractors..
   Provided that levies the government tax applicable on contract amount will be borne in LC portion.
7. Phisical conti.: 2.5%
8. Price escalation:
   - For FC portion: 3.0% (Assumed based on the similar projects in NEPCO)
   - For LC portion: 5.0%

   Estimation process:

   Average average growth rate of construction materials: 3.05% (1991 - 1999)

   Average average growth rate of per capita salaries and wages: 5.79% (1991 - 1999, temprary)

| | | Labor | Materials | Labor | Materials | |
|---|---|---|---|---|---|---|
| Installation of capacitors: | 4.64% | 1.16% | 0.87% | 57.14% | 42.86% | 0.21% |
| Construction of LV: | 17.87% | 3.57% | 3.57% | 50.00% | 50.00% | 0.79% |
| Construction of MV: | 77.49% | 23.25% | 13.56% | 63.16% | 36.84% | 3.70% |
| Total | 100.00% | | | | | 4.71% |

9. Standard conversion factor (SCF): 0.94254 (Tentative. Based on the data of external trade))

# Appendix 10.3-2 Annual Disbursement of Construction Cost without Capacitor

**A. Whole Project** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 497,612 | 419,698 | 917,310 | 703,412 | 605,898 | 1,309,310 | 642,648 | 550,921 | 1,193,569 | 1,843,672 | 1,576,517 | 3,420,189 |
| Installation of capacitors | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Construction of LV facilities | 0 | 0 | 0 | 128,193 | 85,462 | 213,655 | 128,193 | 85,462 | 213,655 | 128,193 | 85,462 | 213,655 | 384,579 | 256,386 | 640,965 |
| Construction of MV facilities | 0 | 0 | 0 | 369,419 | 334,236 | 703,655 | 575,219 | 520,436 | 1,095,655 | 514,455 | 465,459 | 979,914 | 1,459,093 | 1,320,131 | 2,779,224 |
| Engineering cost for supervision | 0 | 42,752 | 42,752 | 0 | 42,752 | 42,752 | 0 | 42,752 | 42,752 | 0 | 42,752 | 42,752 | 0 | 171,009 | 171,009 |
| Sub-total | 0 | 42,752 | 42,752 | 497,612 | 462,450 | 960,062 | 703,412 | 648,650 | 1,352,062 | 642,648 | 593,674 | 1,236,321 | 1,843,672 | 1,747,527 | 3,591,198 |
| Administration | 0 | 1,283 | 1,283 | 0 | 28,802 | 28,802 | 0 | 40,562 | 40,562 | 0 | 37,090 | 37,090 | 0 | 107,736 | 107,736 |
| Sub-total | 0 | 44,035 | 44,035 | 497,612 | 491,252 | 988,864 | 703,412 | 689,212 | 1,392,624 | 642,648 | 630,763 | 1,273,411 | 1,843,672 | 1,855,263 | 3,698,934 |
| Phisical contingency | 0 | 1,101 | 1,101 | 12,440 | 12,281 | 24,722 | 17,585 | 17,230 | 34,816 | 16,066 | 15,769 | 31,835 | 46,092 | 46,382 | 92,473 |
| Sub-total | 0 | 45,136 | 45,136 | 510,052 | 503,534 | 1,013,586 | 720,997 | 706,443 | 1,427,440 | 658,714 | 646,532 | 1,305,246 | 1,889,763 | 1,901,644 | 3,791,408 |
| Price contingency | 0 | 2,257 | 2,257 | 31,062 | 51,612 | 82,674 | 66,856 | 111,353 | 178,209 | 82,674 | 139,332 | 222,006 | 180,592 | 304,554 | 485,146 |
| Total | 0 | 47,393 | 47,393 | 541,114 | 555,146 | 1,096,260 | 787,853 | 817,796 | 1,605,649 | 741,388 | 785,864 | 1,527,252 | 2,070,356 | 2,206,198 | 4,276,554 |
| Financi.(Total-Price conti.) | 0 | 45,136 | 45,136 | 510,052 | 503,534 | 1,013,586 | 720,997 | 706,443 | 1,427,440 | 658,714 | 646,532 | 1,305,246 | 1,889,763 | 1,901,644 | 3,791,408 |
| Economic cost | 0 | 40,750 | 40,750 | 510,052 | 436,060 | 946,113 | 720,997 | 611,015 | 1,332,012 | 658,714 | 559,358 | 1,218,072 | 1,889,763 | 1,647,184 | 3,536,948 |

**B. EDCO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 240,661 | 206,095 | 446,756 | 240,661 | 206,095 | 446,756 | 186,272 | 156,886 | 343,158 | 667,595 | 569,075 | 1,236,670 |
| Installation of capacitors | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Construction of LV facilities | 0 | 0 | 0 | 48,916 | 32,611 | 81,527 | 48,916 | 32,611 | 81,527 | 48,916 | 32,611 | 81,527 | 146,749 | 97,832 | 244,581 |
| Construction of MV facilities | 0 | 0 | 0 | 191,745 | 173,484 | 365,229 | 191,745 | 173,484 | 365,229 | 137,356 | 124,275 | 261,631 | 520,847 | 471,242 | 992,089 |
| Engineering cost for supervision | 0 | 15,458 | 15,458 | 0 | 15,458 | 15,458 | 0 | 15,458 | 15,458 | 0 | 15,458 | 15,458 | 0 | 61,834 | 61,834 |
| Sub-total | 0 | 15,458 | 15,458 | 240,661 | 221,553 | 462,214 | 240,661 | 221,553 | 462,214 | 186,272 | 172,344 | 358,616 | 667,595 | 630,908 | 1,298,504 |
| Administration | 0 | 464 | 464 | 0 | 13,866 | 13,866 | 0 | 13,866 | 13,866 | 0 | 10,758 | 10,758 | 0 | 38,955 | 38,955 |
| Sub-total | 0 | 15,922 | 15,922 | 240,661 | 235,419 | 476,081 | 240,661 | 235,419 | 476,081 | 186,272 | 183,102 | 369,375 | 667,595 | 669,863 | 1,337,459 |
| Phisical contingency | 0 | 398 | 398 | 6,017 | 5,885 | 11,902 | 6,017 | 5,885 | 11,902 | 4,657 | 4,578 | 9,234 | 16,690 | 16,747 | 33,436 |
| Sub-total | 0 | 16,320 | 16,320 | 246,678 | 241,305 | 487,983 | 246,678 | 241,305 | 487,983 | 190,929 | 187,680 | 378,609 | 684,285 | 686,610 | 1,370,895 |
| Price contingency | 0 | 816 | 816 | 15,023 | 24,734 | 39,756 | 22,874 | 38,036 | 60,909 | 23,963 | 40,446 | 64,410 | 61,860 | 104,032 | 165,891 |
| Total | 0 | 17,136 | 17,136 | 261,701 | 266,039 | 527,739 | 269,552 | 279,341 | 548,892 | 214,893 | 228,126 | 443,019 | 746,145 | 790,642 | 1,536,786 |
| Financi.(Total-Price conti.) | 0 | 16,320 | 16,320 | 246,678 | 241,305 | 487,983 | 246,678 | 241,305 | 487,983 | 190,929 | 187,680 | 378,609 | 684,285 | 686,610 | 1,370,895 |
| Economic cost | 0 | 14,735 | 14,735 | 246,678 | 208,748 | 455,426 | 246,678 | 208,748 | 455,426 | 190,929 | 162,511 | 353,440 | 684,285 | 594,742 | 1,279,027 |

**C. JEPCO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 91,840 | 74,676 | 166,516 | 188,597 | 162,219 | 350,816 | 188,597 | 162,219 | 350,816 | 469,034 | 399,114 | 868,148 |
| Installation of capacitors | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Construction of LV facilities | 0 | 0 | 0 | 35,351 | 23,567 | 58,918 | 35,351 | 23,567 | 58,918 | 35,351 | 23,567 | 58,918 | 106,052 | 70,702 | 176,754 |
| Construction of MV facilities | 0 | 0 | 0 | 56,489 | 51,109 | 107,598 | 153,246 | 138,652 | 291,898 | 153,246 | 138,652 | 291,898 | 362,982 | 328,412 | 691,394 |
| Engineering cost for supervision | 0 | 10,852 | 10,852 | 0 | 10,852 | 10,852 | 0 | 10,852 | 10,852 | 0 | 10,852 | 10,852 | 0 | 43,407 | 43,407 |
| Sub-total | 0 | 10,852 | 10,852 | 91,840 | 85,528 | 177,368 | 188,597 | 173,071 | 361,668 | 188,597 | 173,071 | 361,668 | 469,034 | 442,521 | 911,555 |
| Administration | 0 | 326 | 326 | 0 | 5,321 | 5,321 | 0 | 10,850 | 10,850 | 0 | 10,850 | 10,850 | 0 | 27,347 | 27,347 |
| Sub-total | 0 | 11,177 | 11,177 | 91,840 | 90,849 | 182,689 | 188,597 | 183,921 | 372,518 | 188,597 | 183,921 | 372,518 | 469,034 | 469,868 | 938,902 |
| Phisical contingency | 0 | 279 | 279 | 2,296 | 2,271 | 4,567 | 4,715 | 4,598 | 9,313 | 4,715 | 4,598 | 9,313 | 11,726 | 11,747 | 23,473 |
| Sub-total | 0 | 11,457 | 11,457 | 94,136 | 93,120 | 187,256 | 193,312 | 188,519 | 381,831 | 193,312 | 188,519 | 381,831 | 480,760 | 481,615 | 962,375 |
| Price contingency | 0 | 573 | 573 | 5,733 | 9,545 | 15,278 | 17,925 | 29,715 | 47,641 | 24,262 | 40,627 | 64,889 | 47,921 | 80,460 | 128,380 |
| Total | 0 | 12,030 | 12,030 | 99,869 | 102,665 | 202,534 | 211,237 | 218,234 | 429,471 | 217,575 | 229,146 | 446,720 | 528,681 | 562,074 | 1,090,755 |
| Financi.(Total-Price conti.) | 0 | 11,457 | 11,457 | 94,136 | 93,120 | 187,256 | 193,312 | 188,519 | 381,831 | 193,312 | 188,519 | 381,831 | 480,760 | 481,615 | 962,375 |
| Economic cost | 0 | 10,344 | 10,344 | 94,136 | 80,774 | 174,910 | 193,312 | 163,030 | 356,342 | 193,312 | 163,030 | 356,342 | 480,760 | 417,178 | 897,938 |

**D. IDECO Services Area** (JDs.)

| Cost item | Distribution | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2001 | | | 2002 | | | 2003 | | | 2004 | | | Total | | |
| | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Sub-total | FC | LC | Total |
| Construction works for countermeasure | 0 | 0 | 0 | 165,111 | 138,927 | 304,038 | 274,153 | 237,585 | 511,738 | 267,778 | 231,817 | 499,595 | 707,042 | 608,329 | 1,315,371 |
| Installation of capacitors | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Construction of LV facilities | 0 | 0 | 0 | 43,926 | 29,284 | 73,210 | 43,926 | 29,284 | 73,210 | 43,926 | 29,284 | 73,210 | 131,778 | 87,852 | 219,630 |
| Construction of MV facilities | 0 | 0 | 0 | 121,185 | 109,643 | 230,828 | 230,227 | 208,301 | 438,528 | 223,852 | 202,533 | 426,385 | 575,264 | 520,477 | 1,095,741 |
| Engineering cost for supervision | 0 | 16,442 | 16,442 | 0 | 16,442 | 16,442 | 0 | 16,442 | 16,442 | 0 | 16,442 | 16,442 | 0 | 65,769 | 65,769 |
| Sub-total | 0 | 16,442 | 16,442 | 165,111 | 155,369 | 320,480 | 274,153 | 254,027 | 528,180 | 267,778 | 248,259 | 516,037 | 707,042 | 674,098 | 1,381,140 |
| Administration | 0 | 493 | 493 | 0 | 9,614 | 9,614 | 0 | 15,845 | 15,845 | 0 | 15,481 | 15,481 | 0 | 41,434 | 41,434 |
| Sub-total | 0 | 16,935 | 16,935 | 165,111 | 164,984 | 330,095 | 274,153 | 269,872 | 544,026 | 267,778 | 263,740 | 531,518 | 707,042 | 715,532 | 1,422,574 |
| Phisical contingency | 0 | 423 | 423 | 4,128 | 4,125 | 8,252 | 6,854 | 6,747 | 13,601 | 6,694 | 6,594 | 13,288 | 17,676 | 17,888 | 35,564 |
| Sub-total | 0 | 17,359 | 17,359 | 169,238 | 169,108 | 338,347 | 281,007 | 276,619 | 557,626 | 274,473 | 270,334 | 544,806 | 724,718 | 733,420 | 1,458,138 |
| Price contingency | 0 | 868 | 868 | 10,307 | 17,334 | 27,640 | 26,057 | 43,602 | 69,659 | 34,449 | 58,259 | 92,707 | 70,812 | 120,062 | 190,875 |
| Total | 0 | 18,227 | 18,227 | 179,545 | 186,442 | 365,987 | 307,064 | 320,221 | 627,285 | 308,921 | 328,592 | 637,514 | 795,530 | 853,482 | 1,649,013 |
| Financi.(Total-Price conti.) | 0 | 17,359 | 17,359 | 169,238 | 169,108 | 338,347 | 281,007 | 276,619 | 557,626 | 274,473 | 270,334 | 544,806 | 724,718 | 733,420 | 1,458,138 |
| Economic cost | 0 | 15,672 | 15,672 | 169,238 | 146,538 | 315,776 | 281,007 | 239,237 | 520,244 | 274,473 | 233,817 | 508,290 | 724,718 | 635,264 | 1,359,982 |

(Note)

1. Share rate of material and labor by work item:
   - Installation of capacitors: 75% (For material), 25% (For labor)
   - Construction of LV: 80% (For material), 20% (For labor)
   - Construction of MV: 70% (For material), 30% (For labor)
2. Allocated rate of FC and LC:
   - For material: 75% (For FC), 25% (For LC)
   - For the others: 0% (For FC)
3. Engineering cost: 5.0% of the construction cost.
4. Administration cost: 3.0%
   Based on the estimation by 3 electricity enterprises.
5. Income tax of labor: 5% according to the Income Tax Law of Jordan.
6. Net profit: 10% of the net offering amount of the works to be proposed by contractors..
   Provided that levies the government tax applicable on contract amount will be borne in LC portion.
7. Phisical conti.: 2.5%
8. Price escalation:
   - For FC portion: 3.0% (Assumed based on the similar projects in NEPCO)
   - For LC portion: 5.0%

   Estimation process:

   Average average growth rate of construction materials: 3.05% (1991 - 1999)

   Average average growth rate of per capita salaries and wages: 5.79% (1991 - 1999, temprary)

| | | Labor | Materials | Labor | Materials | |
|---|---|---|---|---|---|---|
| Installation of capacitors: | 4.64% | 1.16% | 0.87% | 57.14% | 42.86% | 0.21% |
| Construction of LV: | 17.87% | 3.57% | 3.57% | 50.00% | 50.00% | 0.79% |
| Construction of MV: | 77.49% | 23.25% | 13.56% | 63.16% | 36.84% | 3.70% |
| Total | 100.00% | | | | | 4.71% |

9. Standard conversion factor (SCF): 0.94254 (Tentative. Based on the data of external trade))

# Appendix 10.4-1 Calculation of Electricity Loss To Be Reduced with Capacitor

**A. Whole Project**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 433.1 | 36 | 752.7 | 62 | 2,072 | 58 | 3,601 | 100 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 255 | 5,673 | 233 |
| 4 | 2004 | 955.5 | 79 | 1,660.4 | 137 | 4,573 | 127 | 7,946 | 221 | 767.9 | 45 | 272.7 | 16 | 3,675 | 94 | 1,305 | 33 | 752 | 17,499 | 716 |
| 5 | 2005 | 1,594.4 | 131 | 2,770.8 | 228 | 7,629 | 212 | 13,260 | 368 | 2,054.2 | 121 | 1,622.1 | 95 | 9,831 | 252 | 7,762 | 199 | 1,607 | 38,482 | 1,583 |
| 6 | 2006 | 1,766.3 | 145 | 3,069.5 | 252 | 8,452 | 235 | 14,689 | 408 | 2,275.7 | 134 | 1,797.0 | 106 | 10,891 | 280 | 8,599 | 221 | 1,780 | 42,631 | 1,753 |
| 7 | 2007 | 1,935.6 | 159 | 3,363.7 | 277 | 9,263 | 257 | 16,097 | 447 | 2,493.8 | 146 | 1,969.2 | 116 | 11,935 | 306 | 9,424 | 242 | 1,951 | 46,719 | 1,921 |
| 8 | 2008 | 2,114.9 | 174 | 3,675.4 | 302 | 10,122 | 281 | 17,589 | 489 | 2,725.1 | 160 | 2,151.8 | 126 | 13,041 | 335 | 10,297 | 264 | 2,132 | 51,049 | 2,099 |
| 9 | 2009 | 2,277.6 | 187 | 3,958.0 | 326 | 10,900 | 303 | 18,942 | 526 | 2,934.6 | 172 | 2,317.2 | 136 | 14,043 | 360 | 11,089 | 285 | 2,296 | 54,974 | 2,261 |
| 10 | 2010 | 2,423.2 | 199 | 4,211.2 | 346 | 11,596 | 322 | 20,153 | 560 | 3,122.1 | 183 | 2,465.2 | 145 | 14,941 | 384 | 11,798 | 303 | 2,442 | 58,488 | 2,405 |
| 11 | 2011 | 2,567.9 | 211 | 4,462.9 | 367 | 12,289 | 342 | 21,358 | 594 | 3,308.9 | 194 | 2,612.6 | 153 | 15,835 | 406 | 12,503 | 321 | 2,588 | 61,985 | 2,549 |
| 12 | 2012 | 2,717.1 | 223 | 4,721.9 | 388 | 13,003 | 361 | 22,597 | 628 | 3,500.9 | 206 | 2,764.3 | 162 | 16,753 | 430 | 13,229 | 340 | 2,739 | 65,582 | 2,697 |
| 13 | 2013 | 2,817.4 | 232 | 4,896.3 | 403 | 13,483 | 375 | 23,431 | 651 | 3,694.9 | 217 | 2,917.4 | 171 | 17,681 | 454 | 13,962 | 358 | 2,861 | 68,557 | 2,819 |
| 14 | 2014 | 2,887.4 | 237 | 5,018.0 | 413 | 13,817 | 384 | 24,013 | 667 | 3,852.9 | 226 | 3,091.1 | 181 | 18,438 | 473 | 14,792 | 380 | 2,962 | 71,060 | 2,923 |

**B. EDECO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 208.0 | 17 | 352.8 | 29 | 995 | 28 | 1,688 | 47 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 121 | 2,683 | 108 |
| 4 | 2004 | 458.9 | 38 | 778.3 | 64 | 2,196 | 61 | 3,725 | 104 | 455.8 | 27 | 244.5 | 14 | 2,181 | 56 | 1,170 | 30 | 393 | 9,272 | 373 |
| 5 | 2005 | 765.7 | 63 | 1,298.8 | 107 | 3,664 | 102 | 6,215 | 173 | 507.0 | 30 | 272.0 | 16 | 2,426 | 62 | 1,301 | 33 | 586 | 13,606 | 547 |
| 6 | 2006 | 848.3 | 70 | 1,438.8 | 118 | 4,059 | 113 | 6,885 | 191 | 561.7 | 33 | 301.3 | 18 | 2,688 | 69 | 1,442 | 37 | 649 | 15,074 | 606 |
| 7 | 2007 | 929.6 | 76 | 1,576.7 | 130 | 4,449 | 124 | 7,545 | 210 | 615.5 | 36 | 330.2 | 19 | 2,946 | 76 | 1,580 | 41 | 711 | 16,520 | 664 |
| 8 | 2008 | 1,015.7 | 84 | 1,722.8 | 142 | 4,861 | 135 | 8,245 | 229 | 672.6 | 39 | 360.8 | 21 | 3,219 | 83 | 1,726 | 44 | 777 | 18,051 | 725 |
| 9 | 2009 | 1,093.8 | 90 | 1,855.2 | 153 | 5,235 | 145 | 8,879 | 247 | 724.3 | 43 | 388.5 | 23 | 3,466 | 89 | 1,859 | 48 | 837 | 19,439 | 781 |
| 10 | 2010 | 1,163.8 | 96 | 1,973.9 | 162 | 5,569 | 155 | 9,446 | 263 | 770.6 | 45 | 413.3 | 24 | 3,688 | 95 | 1,978 | 51 | 890 | 20,681 | 831 |
| 11 | 2011 | 1,233.3 | 101 | 2,091.9 | 172 | 5,902 | 164 | 10,011 | 278 | 816.7 | 48 | 438.0 | 26 | 3,908 | 100 | 2,096 | 54 | 943 | 21,917 | 881 |
| 12 | 2012 | 1,304.9 | 107 | 2,213.3 | 182 | 6,245 | 174 | 10,592 | 294 | 864.1 | 51 | 463.5 | 27 | 4,135 | 106 | 2,218 | 57 | 998 | 23,190 | 932 |
| 13 | 2013 | 1,353.1 | 111 | 2,295.0 | 189 | 6,475 | 180 | 10,983 | 305 | 912.0 | 54 | 489.1 | 29 | 4,364 | 112 | 2,341 | 60 | 1,040 | 24,163 | 971 |
| 14 | 2014 | 1,386.7 | 114 | 2,352.1 | 193 | 6,636 | 184 | 11,256 | 313 | 912.0 | 54 | 489.1 | 29 | 4,364 | 112 | 2,341 | 60 | 1,059 | 24,597 | 989 |

**C. JEPCO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 86.5 | 7 | 163.7 | 13 | 414 | 12 | 783 | 22 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 54 | 1,197 | 49 |
| 4 | 2004 | 190.7 | 16 | 361.1 | 30 | 913 | 25 | 1,728 | 48 | 122.9 | 7 | 0.0 | 0 | 588 | 15 | 0 | 0 | 141 | 3,229 | 131 |
| 5 | 2005 | 318.3 | 26 | 602.5 | 50 | 1,523 | 42 | 2,884 | 80 | 582.3 | 34 | 776.2 | 46 | 2,787 | 72 | 3,715 | 95 | 445 | 10,909 | 443 |
| 6 | 2006 | 352.6 | 29 | 667.5 | 55 | 1,687 | 47 | 3,195 | 89 | 645.1 | 38 | 859.9 | 50 | 3,087 | 79 | 4,115 | 106 | 493 | 12,084 | 490 |
| 7 | 2007 | 386.4 | 32 | 731.5 | 60 | 1,849 | 51 | 3,501 | 97 | 706.9 | 42 | 942.3 | 55 | 3,383 | 87 | 4,510 | 116 | 540 | 13,243 | 537 |
| 8 | 2008 | 422.2 | 35 | 799.3 | 66 | 2,021 | 56 | 3,825 | 106 | 772.5 | 45 | 1,029.7 | 60 | 3,697 | 95 | 4,928 | 127 | 590 | 14,471 | 587 |
| 9 | 2009 | 454.7 | 37 | 860.8 | 71 | 2,176 | 60 | 4,119 | 114 | 831.9 | 49 | 1,108.9 | 65 | 3,981 | 102 | 5,307 | 136 | 635 | 15,583 | 632 |
| 10 | 2010 | 483.7 | 40 | 915.9 | 75 | 2,315 | 64 | 4,383 | 122 | 885.0 | 52 | 1,179.7 | 69 | 4,235 | 109 | 5,646 | 145 | 676 | 16,579 | 673 |
| 11 | 2011 | 512.6 | 42 | 970.6 | 80 | 2,453 | 68 | 4,645 | 129 | 938.0 | 55 | 1,250.3 | 73 | 4,489 | 115 | 5,983 | 154 | 717 | 17,570 | 713 |
| 12 | 2012 | 542.4 | 45 | 1,026.9 | 84 | 2,596 | 72 | 4,914 | 137 | 992.4 | 58 | 1,322.8 | 78 | 4,749 | 122 | 6,331 | 163 | 758 | 18,590 | 754 |
| 13 | 2013 | 562.4 | 46 | 1,064.9 | 88 | 2,692 | 75 | 5,096 | 142 | 1,047.4 | 61 | 1,396.1 | 82 | 5,012 | 129 | 6,681 | 172 | 794 | 19,481 | 791 |
| 14 | 2014 | 576.4 | 47 | 1,091.3 | 90 | 2,758 | 77 | 5,222 | 145 | 1,106.1 | 65 | 1,498.4 | 88 | 5,293 | 136 | 7,170 | 184 | 832 | 20,443 | 830 |

**D. IDECO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (kW) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) | ($JDs.10^3$) | (MWh) | ($JDs.10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 138.6 | 11 | 236.2 | 19 | 663 | 18 | 1,130 | 31 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 81 | 1,793 | 76 |
| 4 | 2004 | 305.9 | 25 | 521.0 | 43 | 1,464 | 41 | 2,493 | 69 | 189.2 | 11 | 28.2 | 2 | 906 | 23 | 135 | 3 | 217 | 4,998 | 212 |
| 5 | 2005 | 510.4 | 42 | 869.5 | 72 | 2,442 | 68 | 4,161 | 116 | 964.9 | 57 | 573.9 | 34 | 4,618 | 119 | 2,746 | 70 | 576 | 13,967 | 593 |
| 6 | 2006 | 565.4 | 46 | 963.2 | 79 | 2,706 | 75 | 4,609 | 128 | 1,068.9 | 63 | 635.8 | 37 | 5,116 | 131 | 3,042 | 78 | 638 | 15,473 | 657 |
| 7 | 2007 | 619.6 | 51 | 1,055.5 | 87 | 2,965 | 82 | 5,051 | 140 | 1,171.4 | 69 | 696.7 | 41 | 5,606 | 144 | 3,334 | 86 | 700 | 16,956 | 720 |
| 8 | 2008 | 677.0 | 56 | 1,153.3 | 95 | 3,240 | 90 | 5,519 | 153 | 1,280.0 | 75 | 761.3 | 45 | 6,125 | 157 | 3,643 | 94 | 765 | 18,527 | 787 |
| 9 | 2009 | 729.1 | 60 | 1,242.0 | 102 | 3,489 | 97 | 5,944 | 165 | 1,378.4 | 81 | 819.8 | 48 | 6,596 | 169 | 3,923 | 101 | 823 | 19,952 | 847 |
| 10 | 2010 | 775.7 | 64 | 1,321.4 | 109 | 3,712 | 103 | 6,324 | 176 | 1,466.5 | 86 | 872.2 | 51 | 7,018 | 180 | 4,174 | 107 | 876 | 21,228 | 901 |
| 11 | 2011 | 822.0 | 68 | 1,400.4 | 115 | 3,934 | 109 | 6,702 | 186 | 1,554.2 | 91 | 924.3 | 54 | 7,438 | 191 | 4,424 | 114 | 928 | 22,498 | 955 |
| 12 | 2012 | 869.8 | 72 | 1,481.7 | 122 | 4,162 | 116 | 7,091 | 197 | 1,644.4 | 97 | 978.0 | 57 | 7,869 | 202 | 4,680 | 120 | 982 | 23,802 | 1,011 |
| 13 | 2013 | 901.9 | 74 | 1,536.4 | 126 | 4,316 | 120 | 7,352 | 204 | 1,735.5 | 102 | 1,032.2 | 61 | 8,305 | 213 | 4,940 | 127 | 1,027 | 24,913 | 1,058 |
| 14 | 2014 | 924.3 | 76 | 1,574.6 | 129 | 4,423 | 123 | 7,535 | 209 | 1,834.8 | 108 | 1,103.6 | 65 | 8,781 | 225 | 5,281 | 136 | 1,071 | 26,020 | 1,105 |

(Note) LV Facilities:
Marginal capacity cost: 82.24 (JDs/kW/Year)
Marginal energy cost: 0.02779 (JDs./kWh)

MV Facilities:
Marginal capacity cost: 58.71
Marginal energy cost: 0.02567

# Appendix 10.4-2 Calculation of Electricity Loss To Be Reduced without Capacitor

**A. Whole Project**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 0.0 | 0 | 752.6 | 62 | 0 | 0 | 3,601 | 100 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 162 | 3,601 | 148 |
| 4 | 2004 | 0.0 | 0 | 1,660.4 | 137 | 0 | 0 | 7,946 | 221 | 0.0 | 0 | 272.7 | 16 | 0 | 0 | 1,305 | 33 | 407 | 9,251 | 378 |
| 5 | 2005 | 0.0 | 0 | 2,770.8 | 228 | 0 | 0 | 13,260 | 368 | 0.0 | 0 | 1,622.1 | 95 | 0 | 0 | 7,762 | 199 | 891 | 21,022 | 863 |
| 6 | 2006 | 0.0 | 0 | 3,069.5 | 252 | 0 | 0 | 14,689 | 408 | 0.0 | 0 | 1,797.0 | 106 | 0 | 0 | 8,599 | 221 | 987 | 23,288 | 956 |
| 7 | 2007 | 0.0 | 0 | 3,363.7 | 277 | 0 | 0 | 16,097 | 447 | 0.0 | 0 | 1,969.2 | 116 | 0 | 0 | 9,424 | 242 | 1,081 | 25,521 | 1,048 |
| 8 | 2008 | 0.0 | 0 | 3,675.4 | 302 | 0 | 0 | 17,589 | 489 | 0.0 | 0 | 2,151.8 | 126 | 0 | 0 | 10,297 | 264 | 1,182 | 27,886 | 1,145 |
| 9 | 2009 | 0.0 | 0 | 3,958.0 | 326 | 0 | 0 | 18,942 | 526 | 0.0 | 0 | 2,317.2 | 136 | 0 | 0 | 11,089 | 285 | 1,273 | 30,031 | 1,233 |
| 10 | 2010 | 0.0 | 0 | 4,211.1 | 346 | 0 | 0 | 20,153 | 560 | 0.0 | 0 | 2,465.2 | 145 | 0 | 0 | 11,798 | 303 | 1,354 | 31,951 | 1,312 |
| 11 | 2011 | 0.0 | 0 | 4,462.9 | 367 | 0 | 0 | 21,358 | 594 | 0.0 | 0 | 2,612.6 | 153 | 0 | 0 | 12,503 | 321 | 1,435 | 33,861 | 1,390 |
| 12 | 2012 | 0.0 | 0 | 4,721.9 | 388 | 0 | 0 | 22,597 | 628 | 0.0 | 0 | 2,764.3 | 162 | 0 | 0 | 13,229 | 340 | 1,518 | 35,826 | 1,471 |
| 13 | 2013 | 0.0 | 0 | 4,896.3 | 403 | 0 | 0 | 23,431 | 651 | 0.0 | 0 | 2,917.4 | 171 | 0 | 0 | 13,962 | 358 | 1,584 | 37,393 | 1,535 |
| 14 | 2014 | 0.0 | 0 | 5,018.0 | 413 | 0 | 0 | 24,013 | 667 | 0.0 | 0 | 3,091.1 | 181 | 0 | 0 | 14,792 | 380 | 1,641 | 38,805 | 1,593 |

**B. EDCO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 0.0 | 0 | 352.8 | 29 | 0.0 | 0 | 1,688 | 47 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 76 | 1,688 | 68 |
| 4 | 2004 | 0.0 | 0 | 778.3 | 64 | 0.0 | 0 | 3,725 | 104 | 0.0 | 0 | 244.5 | 14 | 0.0 | 0 | 1,170 | 30 | 212 | 4,895 | 197 |
| 5 | 2005 | 0.0 | 0 | 1,298.8 | 107 | 0.0 | 0 | 6,215 | 173 | 0.0 | 0 | 272.0 | 16 | 0.0 | 0 | 1,301 | 33 | 329 | 7,516 | 302 |
| 6 | 2006 | 0.0 | 0 | 1,438.8 | 118 | 0.0 | 0 | 6,885 | 191 | 0.0 | 0 | 301.3 | 18 | 0.0 | 0 | 1,442 | 37 | 364 | 8,327 | 335 |
| 7 | 2007 | 0.0 | 0 | 1,576.7 | 130 | 0.0 | 0 | 7,545 | 210 | 0.0 | 0 | 330.2 | 19 | 0.0 | 0 | 1,580 | 41 | 399 | 9,125 | 367 |
| 8 | 2008 | 0.0 | 0 | 1,722.8 | 142 | 0.0 | 0 | 8,245 | 229 | 0.0 | 0 | 360.8 | 21 | 0.0 | 0 | 1,726 | 44 | 436 | 9,971 | 401 |
| 9 | 2009 | 0.0 | 0 | 1,855.2 | 153 | 0.0 | 0 | 8,879 | 247 | 0.0 | 0 | 388.5 | 23 | 0.0 | 0 | 1,859 | 48 | 470 | 10,738 | 432 |
| 10 | 2010 | 0.0 | 0 | 1,973.9 | 162 | 0.0 | 0 | 9,446 | 263 | 0.0 | 0 | 413.3 | 24 | 0.0 | 0 | 1,978 | 51 | 500 | 11,424 | 459 |
| 11 | 2011 | 0.0 | 0 | 2,091.9 | 172 | 0.0 | 0 | 10,011 | 278 | 0.0 | 0 | 438.0 | 26 | 0.0 | 0 | 2,096 | 54 | 530 | 12,107 | 487 |
| 12 | 2012 | 0.0 | 0 | 2,213.3 | 182 | 0.0 | 0 | 10,592 | 294 | 0.0 | 0 | 463.5 | 27 | 0.0 | 0 | 2,218 | 57 | 561 | 12,810 | 515 |
| 13 | 2013 | 0.0 | 0 | 2,295.0 | 189 | 0.0 | 0 | 10,983 | 305 | 0.0 | 0 | 489.1 | 29 | 0.0 | 0 | 2,341 | 60 | 583 | 13,324 | 535 |
| 14 | 2014 | 0.0 | 0 | 2,352.1 | 193 | 0.0 | 0 | 11,256 | 313 | 0.0 | 0 | 489.1 | 29 | 0.0 | 0 | 2,341 | 60 | 595 | 13,597 | 546 |

**C. JEPCO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 0.0 | 0 | 163.7 | 13 | 0.0 | 0 | 783 | 22 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 35 | 783 | 32 |
| 4 | 2004 | 0.0 | 0 | 361.1 | 30 | 0.0 | 0 | 1,728 | 48 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 78 | 1,728 | 70 |
| 5 | 2005 | 0.0 | 0 | 602.5 | 50 | 0.0 | 0 | 2,884 | 80 | 0.0 | 0 | 776.2 | 46 | 0.0 | 0 | 3,715 | 95 | 271 | 6,599 | 268 |
| 6 | 2006 | 0.0 | 0 | 667.5 | 55 | 0.0 | 0 | 3,195 | 89 | 0.0 | 0 | 859.9 | 50 | 0.0 | 0 | 4,115 | 106 | 300 | 7,310 | 297 |
| 7 | 2007 | 0.0 | 0 | 731.5 | 60 | 0.0 | 0 | 3,501 | 97 | 0.0 | 0 | 942.3 | 55 | 0.0 | 0 | 4,510 | 116 | 329 | 8,011 | 325 |
| 8 | 2008 | 0.0 | 0 | 799.3 | 66 | 0.0 | 0 | 3,825 | 106 | 0.0 | 0 | 1,029.7 | 60 | 0.0 | 0 | 4,928 | 127 | 359 | 8,753 | 355 |
| 9 | 2009 | 0.0 | 0 | 860.8 | 71 | 0.0 | 0 | 4,119 | 114 | 0.0 | 0 | 1,108.9 | 65 | 0.0 | 0 | 5,307 | 136 | 387 | 9,426 | 383 |
| 10 | 2010 | 0.0 | 0 | 915.9 | 75 | 0.0 | 0 | 4,383 | 122 | 0.0 | 0 | 1,179.7 | 69 | 0.0 | 0 | 5,646 | 145 | 411 | 10,029 | 407 |
| 11 | 2011 | 0.0 | 0 | 970.6 | 80 | 0.0 | 0 | 4,645 | 129 | 0.0 | 0 | 1,250.3 | 73 | 0.0 | 0 | 5,983 | 154 | 436 | 10,628 | 431 |
| 12 | 2012 | 0.0 | 0 | 1,026.9 | 84 | 0.0 | 0 | 4,914 | 137 | 0.0 | 0 | 1,322.8 | 78 | 0.0 | 0 | 6,331 | 163 | 461 | 11,245 | 456 |
| 13 | 2013 | 0.0 | 0 | 1,064.9 | 88 | 0.0 | 0 | 5,096 | 142 | 0.0 | 0 | 1,396.1 | 82 | 0.0 | 0 | 6,681 | 172 | 483 | 11,777 | 478 |
| 14 | 2014 | 0.0 | 0 | 1,091.3 | 90 | 0.0 | 0 | 5,222 | 145 | 0.0 | 0 | 1,498.4 | 88 | 0.0 | 0 | 7,170 | 184 | 507 | 12,392 | 503 |

**D. IDECO Service Area**

| Year in order | Year | Low voltage system (LV) | | | | | | | | Medium voltage system (MV) | | | | | | | | Total electricity loss reduced | Total reduction | Amount of operating cost saved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Power | | | | Energy | | | | Power | | | | Energy | | | | | | |
| | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | Capacitor | | Line | | | | |
| | | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (kW) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) | (JDs.$10^3$) | (MWh) | (JDs.$10^3$) |
| 1 | 2001 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2002 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 2003 | 0.0 | 0 | 236.1 | 19 | 0.0 | 0 | 1,130 | 31 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0 | 0 | 51 | 1,130 | 48 |
| 4 | 2004 | 0.0 | 0 | 521.0 | 43 | 0.0 | 0 | 2,493 | 69 | 0.0 | 0 | 28.2 | 2 | 0.0 | 0 | 135 | 3 | 117 | 2,628 | 112 |
| 5 | 2005 | 0.0 | 0 | 869.5 | 72 | 0.0 | 0 | 4,161 | 116 | 0.0 | 0 | 573.9 | 34 | 0.0 | 0 | 2,746 | 70 | 291 | 6,907 | 293 |
| 6 | 2006 | 0.0 | 0 | 963.2 | 79 | 0.0 | 0 | 4,609 | 128 | 0.0 | 0 | 635.8 | 37 | 0.0 | 0 | 3,042 | 78 | 323 | 7,651 | 325 |
| 7 | 2007 | 0.0 | 0 | 1,055.5 | 87 | 0.0 | 0 | 5,051 | 140 | 0.0 | 0 | 696.7 | 41 | 0.0 | 0 | 3,334 | 86 | 354 | 8,385 | 356 |
| 8 | 2008 | 0.0 | 0 | 1,153.3 | 95 | 0.0 | 0 | 5,519 | 153 | 0.0 | 0 | 761.3 | 45 | 0.0 | 0 | 3,643 | 94 | 386 | 9,162 | 389 |
| 9 | 2009 | 0.0 | 0 | 1,242.0 | 102 | 0.0 | 0 | 5,944 | 165 | 0.0 | 0 | 819.8 | 48 | 0.0 | 0 | 3,923 | 101 | 416 | 9,867 | 419 |
| 10 | 2010 | 0.0 | 0 | 1,321.3 | 109 | 0.0 | 0 | 6,324 | 176 | 0.0 | 0 | 872.2 | 51 | 0.0 | 0 | 4,174 | 107 | 443 | 10,498 | 446 |
| 11 | 2011 | 0.0 | 0 | 1,400.4 | 115 | 0.0 | 0 | 6,702 | 186 | 0.0 | 0 | 924.3 | 54 | 0.0 | 0 | 4,424 | 114 | 469 | 11,126 | 472 |
| 12 | 2012 | 0.0 | 0 | 1,481.7 | 122 | 0.0 | 0 | 7,091 | 197 | 0.0 | 0 | 978.0 | 57 | 0.0 | 0 | 4,680 | 120 | 496 | 11,771 | 500 |
| 13 | 2013 | 0.0 | 0 | 1,536.4 | 126 | 0.0 | 0 | 7,352 | 204 | 0.0 | 0 | 1,032.2 | 61 | 0.0 | 0 | 4,940 | 127 | 518 | 12,292 | 522 |
| 14 | 2014 | 0.0 | 0 | 1,574.6 | 129 | 0.0 | 0 | 7,535 | 209 | 0.0 | 0 | 1,103.6 | 65 | 0.0 | 0 | 5,281 | 136 | 539 | 12,816 | 544 |

(Note) LV Facilities:
Marginal capacity cost: 82.24 (JDs/kW/Year)
Marginal energy cost: 0.02779 (JDs./kWh)

MV Facilities:
Marginal capacity cost: 58.71
Marginal energy cost: 0.02567

## Appendix 10.5-1 Calculation of Economic Internal Rate of Return for Whole Project

OM Cost: 2.50%

| Year in order | Year | Cost (JDs.1,000) Construction cost FC | Construction cost LC | O/M cost | Total cost | Benefit (JDs.1,000) Benefit due to loss reduction | Negative benefit (sunk C) 20.00% | External cost saving Due to $CO_2$ reduction | Due to $SO_x$ reduction | Due to $NO_x$ reduction | Total benefit | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 41 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | -41 |
| 3 | 2002 | 510 | 436 | 1 | 947 | 0 | 0 | 0 | 0 | 0 | 0 | -947 |
| 4 | 2003 | 721 | 611 | 25 | 1,357 | 162 | 39 | 40 | 31 | 1 | 195 | -1,162 |
| 5 | 2004 | 659 | 559 | 58 | 1,276 | 407 | 104 | 104 | 79 | 2 | 487 | -789 |
| 6 | 2005 | | | 88 | 88 | 891 | 188 | 236 | 180 | 3 | 1,123 | 1,035 |
| 7 | 2006 | | | 88 | 88 | 987 | 208 | 262 | 200 | 4 | 1,244 | 1,156 |
| 8 | 2007 | | | 88 | 88 | 1,081 | 228 | 287 | 219 | 4 | 1,364 | 1,275 |
| 9 | 2008 | | | 88 | 88 | 1,182 | 249 | 313 | 239 | 5 | 1,490 | 1,402 |
| 10 | 2009 | | | 88 | 88 | 1,273 | 268 | 337 | 258 | 5 | 1,605 | 1,516 |
| 11 | 2010 | | | 88 | 88 | 1,354 | 285 | 359 | 274 | 5 | 1,707 | 1,619 |
| 12 | 2011 | | | 88 | 88 | 1,435 | 302 | 380 | 291 | 6 | 1,809 | 1,721 |
| 13 | 2012 | | | 88 | 88 | 1,518 | 320 | 402 | 308 | 6 | 1,914 | 1,826 |
| 14 | 2013 | | | 88 | 88 | 1,584 | 333 | 420 | 321 | 6 | 1,998 | 1,909 |
| 15 | 2014 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 16 | 2015 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 17 | 2016 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 18 | 2017 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 19 | 2018 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 20 | 2019 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 21 | 2020 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 22 | 2021 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 23 | 2022 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 24 | 2023 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 25 | 2024 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 26 | 2025 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 27 | 2026 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 28 | 2027 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 29 | 2028 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| 30 | 2029 | | | 88 | 88 | 1,641 | 343 | 436 | 333 | 6 | 2,074 | 1,986 |
| Total | | 1,890 | 1,647 | 2,294 | 5,831 | 38,132 | 8,007 | 10,116 | 7,731 | 148 | 48,121 | 42,289 |
| In the condition of discount rate at 10 %: | | | | | | | | | | | | |
| Present value: | | | | | 2,963 | | | | | | 10,123 | 7,161 |
| Internal rate of return (EIRR): | | | | | | | | | | | | 32.99% |
| B/C | | | | | | | | | | | | 3.42 |

(Note)

| By gas | Unit price as of 1990* | Unit price as of 2000** | Unit voleme to be controled by gas (by CEGCO) |
|---|---|---|---|
| | US$/ton | | ton/GWh |
| $CO_2$ | 15.0 | 20.3 | 779.17 |
| $SO_x$ | 446.6 | 605.5 | 20.00 |
| $NO_x$ | 180.4 | 244.6 | 0.95 |

Remarks:

* Excerpt from "Incorporating Environmental Concerns into Power Sector Decision-Making" studied and edited by the World Bank, a series of "Environment Paper" No.6, 1991.

** Estimated on the basis of CPI in General Item according to the Statistical Yearbook of Jordan indicated hereunder.

Annual price increasing ratio based on Consumer Price Index (CPI) in General Item: 3.09%

Exchange rate: (JDs/US$, mid-rate as of June 16, 2000) 0.709

## Appendix 10.5-2 Calculation of Economic Internal Rate of Return for EDCO's Service Area

OM Cost: 2.50%

| Year in order | Year | Cost (JDs.1,000) Construction cost FC | Construction cost LC | O/M cost | Total cost | Benefit (JDs.1,000) Benefit due to loss reduction | Negative benefit (sunk C) 40.00% | External cost saving Due to $CO_2$ reduction | Due to $SO_x$ reduction | Due to $NO_x$ reduction | Total benefit | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 15 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | -15 |
| 3 | 2002 | 247 | 209 | 0 | 456 | 0 | 0 | 0 | 0 | 0 | 0 | -456 |
| 4 | 2003 | 247 | 209 | 12 | 467 | 76 | 30 | 19 | 14 | 0 | 79 | -388 |
| 5 | 2004 | 191 | 163 | 23 | 377 | 212 | 85 | 55 | 42 | 1 | 225 | -152 |
| 6 | 2005 | | | 32 | 32 | 329 | 132 | 84 | 65 | 1 | 348 | 316 |
| 7 | 2006 | | | 32 | 32 | 364 | 146 | 94 | 71 | 1 | 385 | 353 |
| 8 | 2007 | | | 32 | 32 | 399 | 160 | 103 | 78 | 2 | 422 | 390 |
| 9 | 2008 | | | 32 | 32 | 436 | 175 | 112 | 86 | 2 | 461 | 429 |
| 10 | 2009 | | | 32 | 32 | 470 | 188 | 121 | 92 | 2 | 496 | 465 |
| 11 | 2010 | | | 32 | 32 | 500 | 200 | 128 | 98 | 2 | 528 | 496 |
| 12 | 2011 | | | 32 | 32 | 530 | 212 | 136 | 104 | 2 | 560 | 528 |
| 13 | 2012 | | | 32 | 32 | 561 | 224 | 144 | 110 | 2 | 592 | 560 |
| 14 | 2013 | | | 32 | 32 | 583 | 233 | 150 | 114 | 2 | 616 | 584 |
| 15 | 2014 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 16 | 2015 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 17 | 2016 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 18 | 2017 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 19 | 2018 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 20 | 2019 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 21 | 2020 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 22 | 2021 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 23 | 2022 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 24 | 2023 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 25 | 2024 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 26 | 2025 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 27 | 2026 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 28 | 2027 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 29 | 2028 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| 30 | 2029 | | | 32 | 32 | 595 | 238 | 153 | 117 | 2 | 629 | 597 |
| Total | | 684 | 595 | 835 | 2,114 | 13,980 | 5,592 | 3,589 | 2,743 | 53 | 14,773 | 12,659 |
| In the condition of discount rate at 10 %: | | | | | | | | | | | | |
| Present value: | | | | | 1,088 | | | | | | 3,164 | 2,076 |
| Internal rate of return (EIRR): | | | | | | | | | | | | 29.19% |
| B/C | | | | | | | | | | | | 2.91 |

(Note)

| By gas | Unit price as of 1990* | Unit price as of 2000** | Unit voleme to be controled by gas (by CEGCO) |
|---|---|---|---|
| | US$/ton | | ton/GWh |
| $CO_2$ | 15.0 | 20.3 | 779.17 |
| $SO_x$ | 446.6 | 605.5 | 20.00 |
| $NO_x$ | 180.4 | 244.6 | 0.95 |

Remarks:

* Excerpt from "Incorporating Environmental Concerns into Power Sector Decision-Making" studied and edited by the World Bank, a series of "Environment Paper" No.6, 1991.

** Estimated on the basis of CPI in General Item according to the Statistical Yearbook of Jordan indicated hereunder.

Annual price increasing ratio based on Consumer Price Index (CPI) in General Item: 3.09%

Exchange rate: (JDs/US$, mid-rate as of June 16, 2000) 0.709

## Appendix 10.5-3 Calculation of Economic Internal Rate of Return for JEPCO's Service Area

OM Cost: 2.50%

| Year in order | Year | Cost (JDs.1,000) Construction cost FC | Construction cost LC | O/M cost | Total cost | Benefit (JDs.1,000) Benefit due to loss reduction | Negative benefit (sunk C) 10.00% | External cost saving Due to $CO_2$ reduction | Due to $SO_x$ reduction | Due to $NO_x$ reduction | Total benefit | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | -10 |
| 3 | 2002 | 94 | 81 | 0 | 175 | 0 | 0 | 0 | 0 | 0 | 0 | -175 |
| 4 | 2003 | 193 | 163 | 5 | 361 | 35 | 4 | 9 | 7 | 0 | 47 | -314 |
| 5 | 2004 | 193 | 163 | 14 | 370 | 78 | 8 | 19 | 15 | 0 | 104 | -265 |
| 6 | 2005 | | | 22 | 22 | 271 | 27 | 74 | 57 | 1 | 375 | 353 |
| 7 | 2006 | | | 22 | 22 | 300 | 30 | 82 | 63 | 1 | 416 | 393 |
| 8 | 2007 | | | 22 | 22 | 329 | 33 | 90 | 69 | 1 | 456 | 433 |
| 9 | 2008 | | | 22 | 22 | 359 | 36 | 98 | 75 | 1 | 498 | 476 |
| 10 | 2009 | | | 22 | 22 | 387 | 39 | 106 | 81 | 2 | 536 | 514 |
| 11 | 2010 | | | 22 | 22 | 411 | 41 | 113 | 86 | 2 | 571 | 548 |
| 12 | 2011 | | | 22 | 22 | 436 | 44 | 119 | 91 | 2 | 605 | 582 |
| 13 | 2012 | | | 22 | 22 | 461 | 46 | 126 | 97 | 2 | 640 | 617 |
| 14 | 2013 | | | 22 | 22 | 483 | 48 | 132 | 101 | 2 | 670 | 647 |
| 15 | 2014 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 16 | 2015 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 17 | 2016 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 18 | 2017 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 19 | 2018 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 20 | 2019 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 21 | 2020 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 22 | 2021 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 23 | 2022 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 24 | 2023 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 25 | 2024 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 26 | 2025 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 27 | 2026 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 28 | 2027 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 29 | 2028 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| 30 | 2029 | | | 22 | 22 | 507 | 51 | 139 | 106 | 2 | 704 | 681 |
| Total | | 481 | 417 | 580 | 1,478 | 11,659 | 1,166 | 3,197 | 2,443 | 47 | 16,180 | 14,702 |
| In the condition of discount rate at 10 %: | | | | | | | | | | | | |
| Present value: | | | | | 743 | | | | | | 3,358 | 2,615 |
| Internal rate of return (EIRR): | | | | | | | | | | | | 40.92% |
| B/C | | | | | | | | | | | | 4.52 |

(Note)

| By gas | Unit price as of 1990* | Unit price as of 2000** | Unit voleme to be controled by gas (by CEGCO) |
|---|---|---|---|
| | US$/ton | | ton/GWh |
| $CO_2$ | 15.0 | 20.3 | 779.17 |
| $SO_x$ | 446.6 | 605.5 | 20.00 |
| $NO_x$ | 180.4 | 244.6 | 0.95 |

Remarks:

* Excerpt from "Incorporating Environmental Concerns into Power Sector Decision-Making" studied and edited by the World Bank, a series of "Environment Paper" No.6, 1991.

** Estimated on the basis of CPI in General Item according to the Statistical Yearbook of Jordan indicated hereunder.

Annual price increasing ratio based on Consumer Price Index (CPI) in General Item: 3.09%

Exchange rate: (JDs/US$, mid-rate as of June 16, 2000) 0.709

## Appendix 10.5-4 Calculation of Economic Internal Rate of Return for IDECO's Service Area

OM Cost: 2.50%

| Year in order | Year | Cost (JDs.1,000) Construction cost FC | Construction cost LC | O/M cost | Total cost | Benefit (JDs.1,000) Benefit due to loss reduction | Negative benefit (sunk C) 10.00% | External cost saving Due to $CO_2$ reduction | Due to $SO_x$ reduction | Due to $NO_x$ reduction | Total benefit | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 16 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | -16 |
| 3 | 2002 | 169 | 147 | 0 | 316 | 0 | 0 | 0 | 0 | 0 | 0 | -316 |
| 4 | 2003 | 281 | 239 | 8 | 529 | 51 | 5 | 13 | 10 | 0 | 68 | -460 |
| 5 | 2004 | 274 | 234 | 21 | 530 | 117 | 12 | 30 | 23 | 0 | 158 | -372 |
| 6 | 2005 | | | 34 | 34 | 291 | 29 | 78 | 59 | 1 | 400 | 366 |
| 7 | 2006 | | | 34 | 34 | 323 | 32 | 86 | 66 | 1 | 443 | 409 |
| 8 | 2007 | | | 34 | 34 | 354 | 35 | 94 | 72 | 1 | 486 | 452 |
| 9 | 2008 | | | 34 | 34 | 386 | 39 | 103 | 79 | 2 | 531 | 497 |
| 10 | 2009 | | | 34 | 34 | 416 | 42 | 111 | 85 | 2 | 572 | 538 |
| 11 | 2010 | | | 34 | 34 | 443 | 44 | 118 | 90 | 2 | 608 | 574 |
| 12 | 2011 | | | 34 | 34 | 469 | 47 | 125 | 96 | 2 | 645 | 611 |
| 13 | 2012 | | | 34 | 34 | 496 | 50 | 132 | 101 | 2 | 682 | 648 |
| 14 | 2013 | | | 34 | 34 | 518 | 52 | 138 | 106 | 2 | 712 | 678 |
| 15 | 2014 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 16 | 2015 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 17 | 2016 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 18 | 2017 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 19 | 2018 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 20 | 2019 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 21 | 2020 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 22 | 2021 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 23 | 2022 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 24 | 2023 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 25 | 2024 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 26 | 2025 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 27 | 2026 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 28 | 2027 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 29 | 2028 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| 30 | 2029 | | | 34 | 34 | 539 | 54 | 144 | 110 | 2 | 741 | 707 |
| Total | | 725 | 635 | 880 | 2,240 | 12,493 | 1,249 | 3,331 | 2,545 | 49 | 17,168 | 14,928 |
| In the condition of discount rate at 10 %: | | | | | | | | | | | | |
| Present value: | | | | | 1,132 | | | | | | 3,602 | 2,470 |
| Internal rate of return (EIRR): | | | | | | | | | | | | 31.18% |
| B/C | | | | | | | | | | | | 3.18 |

(Note)

| By gas | Unit price as of 1990* | Unit price as of 2000** | Unit voleme to be controled by gas (by CEGCO) |
|---|---|---|---|
| | US$/ton | | ton/GWh |
| $CO_2$ | 15.0 | 20.3 | 779.17 |
| $SO_x$ | 446.6 | 605.5 | 20.00 |
| $NO_x$ | 180.4 | 244.6 | 0.95 |

Remarks:

* Excerpt from "Incorporating Environmental Concerns into Power Sector Decision-Making" studied and edited by the World Bank, a series of "Environment Paper" No.6, 1991.

** Estimated on the basis of CPI in General Item according to the Statistical Yearbook of Jordan indicated hereunder.

Annual price increasing ratio based on Consumer Price Index (CPI) in General Item: 3.09%

Exchange rate: (JDs/US$, mid-rate as of June 16, 2000) 0.709

## Appendix 10.6-1 Calculation of Financial Internal Rate of Return for Whole Project

(Unit: JDs.1,000)

**A. Whole Project** OM Cost: 2.50%

| Year in order | Year | Cost: Construction cost FC | Cost: Construction cost LC | Cost: O/M cost | Cost: Total cost | Financial benefit by saving operation expense | Cash balance |
|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 45 | 0 | 45 | 0 | -45 |
| 3 | 2002 | 510 | 504 | 1 | 1,015 | 0 | -1,015 |
| 4 | 2003 | 721 | 706 | 26 | 1,454 | 148 | -1,306 |
| 5 | 2004 | 659 | 647 | 62 | 1,367 | 378 | -989 |
| 6 | 2005 | | | 95 | 95 | 863 | 768 |
| 7 | 2006 | | | 95 | 95 | 956 | 861 |
| 8 | 2007 | | | 95 | 95 | 1,048 | 953 |
| 9 | 2008 | | | 95 | 95 | 1,145 | 1,050 |
| 10 | 2009 | | | 95 | 95 | 1,233 | 1,138 |
| 11 | 2010 | | | 95 | 95 | 1,312 | 1,217 |
| 12 | 2011 | | | 95 | 95 | 1,390 | 1,295 |
| 13 | 2012 | | | 95 | 95 | 1,471 | 1,376 |
| 14 | 2013 | | | 95 | 95 | 1,535 | 1,441 |
| 15 | 2014 | | | 95 | 95 | 1,593 | 1,499 |
| 16 | 2015 | | | 95 | 95 | 1,593 | 1,499 |
| 17 | 2016 | | | 95 | 95 | 1,593 | 1,499 |
| 18 | 2017 | | | 95 | 95 | 1,593 | 1,499 |
| 19 | 2018 | | | 95 | 95 | 1,593 | 1,499 |
| 20 | 2019 | | | 95 | 95 | 1,593 | 1,499 |
| 21 | 2020 | | | 95 | 95 | 1,593 | 1,499 |
| 22 | 2021 | | | 95 | 95 | 1,593 | 1,499 |
| 23 | 2022 | | | 95 | 95 | 1,593 | 1,499 |
| 24 | 2023 | | | 95 | 95 | 1,593 | 1,499 |
| 25 | 2024 | | | 95 | 95 | 1,593 | 1,499 |
| 26 | 2025 | | | 95 | 95 | 1,593 | 1,499 |
| 27 | 2026 | | | 95 | 95 | 1,593 | 1,499 |
| 28 | 2027 | | | 95 | 95 | 1,593 | 1,499 |
| 29 | 2028 | | | 95 | 95 | 1,593 | 1,499 |
| 30 | 2029 | | | 95 | 95 | 1,593 | 1,499 |
| Total | | 1,890 | 1,902 | 2,459 | 6,251 | 36,976 | 30,725 |
| In the condition of discount rate at 10 %: | | | | | | | |
| Present value: | | | | | 3,176 | 7,780 | 4,604 |
| Internal rate of return (FIRR): | | | | | | | 24.83% |
| B/C | | | | | | | 2.45 |

## Appendix 10.6-2 Calculation of Financial Internal Rate of Return for EDCO's Service Area

(Unit: JDs.1,000)

OM Cost: 2.50%

| Year in order | Year | Cost: Construction cost FC | Cost: Construction cost LC | Cost: O/M cost | Cost: Total cost | Financial benefit by saving operation expense | Cash balance |
|---|---|---|---|---|---|---|---|
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 16 | 0 | 16 | 0 | -16 |
| 3 | 2002 | 247 | 241 | 0 | 488 | 0 | -488 |
| 4 | 2003 | 247 | 241 | 13 | 501 | 68 | -433 |
| 5 | 2004 | 191 | 188 | 25 | 403 | 197 | -207 |
| 6 | 2005 | | | 34 | 34 | 302 | 268 |
| 7 | 2006 | | | 34 | 34 | 335 | 300 |
| 8 | 2007 | | | 34 | 34 | 367 | 332 |
| 9 | 2008 | | | 34 | 34 | 401 | 366 |
| 10 | 2009 | | | 34 | 34 | 432 | 397 |
| 11 | 2010 | | | 34 | 34 | 459 | 425 |
| 12 | 2011 | | | 34 | 34 | 487 | 452 |
| 13 | 2012 | | | 34 | 34 | 515 | 481 |
| 14 | 2013 | | | 34 | 34 | 535 | 501 |
| 15 | 2014 | | | 34 | 34 | 546 | 512 |
| 16 | 2015 | | | 34 | 34 | 546 | 512 |
| 17 | 2016 | | | 34 | 34 | 546 | 512 |
| 18 | 2017 | | | 34 | 34 | 546 | 512 |
| 19 | 2018 | | | 34 | 34 | 546 | 512 |
| 20 | 2019 | | | 34 | 34 | 546 | 512 |
| 21 | 2020 | | | 34 | 34 | 546 | 512 |
| 22 | 2021 | | | 34 | 34 | 546 | 512 |
| 23 | 2022 | | | 34 | 34 | 546 | 512 |
| 24 | 2023 | | | 34 | 34 | 546 | 512 |
| 25 | 2024 | | | 34 | 34 | 546 | 512 |
| 26 | 2025 | | | 34 | 34 | 546 | 512 |
| 27 | 2026 | | | 34 | 34 | 546 | 512 |
| 28 | 2027 | | | 34 | 34 | 546 | 512 |
| 29 | 2028 | | | 34 | 34 | 546 | 512 |
| 30 | 2029 | | | 34 | 34 | 546 | 512 |
| Total | | 684 | 687 | 895 | 2,266 | 12,840 | 10,574 |
| In the condition of discount rate at 10 %: | | | | | | | |
| Present value: | | | | | 1,166 | 2,750 | 1,584 |
| Internal rate of return (FIRR): | | | | | | | 24.27% |
| B/C | | | | | | | 2.36 |

## Appendix 10.6-3 Calculation of Financial Internal Rate of Return for JEPCO's Service Area

(Unit: JDs.1,000)

OM Cost: 2.50%

| Year in order | Year | Cost | | | | Financial benefit by saving operation expense | Cash balance |
|---|---|---|---|---|---|---|---|
| | | Construction cost | | O/M cost | Total cost | | |
| | | FC | LC | | | | |
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 11 | 0 | 11 | 0 | -11 |
| 3 | 2002 | 94 | 93 | 0 | 188 | 0 | -188 |
| 4 | 2003 | 193 | 189 | 5 | 387 | 32 | -355 |
| 5 | 2004 | 193 | 189 | 15 | 396 | 70 | -326 |
| 6 | 2005 | | | 24 | 24 | 268 | 244 |
| 7 | 2006 | | | 24 | 24 | 297 | 273 |
| 8 | 2007 | | | 24 | 24 | 325 | 301 |
| 9 | 2008 | | | 24 | 24 | 355 | 331 |
| 10 | 2009 | | | 24 | 24 | 383 | 358 |
| 11 | 2010 | | | 24 | 24 | 407 | 383 |
| 12 | 2011 | | | 24 | 24 | 431 | 407 |
| 13 | 2012 | | | 24 | 24 | 456 | 432 |
| 14 | 2013 | | | 24 | 24 | 478 | 454 |
| 15 | 2014 | | | 24 | 24 | 503 | 479 |
| 16 | 2015 | | | 24 | 24 | 503 | 479 |
| 17 | 2016 | | | 24 | 24 | 503 | 479 |
| 18 | 2017 | | | 24 | 24 | 503 | 479 |
| 19 | 2018 | | | 24 | 24 | 503 | 479 |
| 20 | 2019 | | | 24 | 24 | 503 | 479 |
| 21 | 2020 | | | 24 | 24 | 503 | 479 |
| 22 | 2021 | | | 24 | 24 | 503 | 479 |
| 23 | 2022 | | | 24 | 24 | 503 | 479 |
| 24 | 2023 | | | 24 | 24 | 503 | 479 |
| 25 | 2024 | | | 24 | 24 | 503 | 479 |
| 26 | 2025 | | | 24 | 24 | 503 | 479 |
| 27 | 2026 | | | 24 | 24 | 503 | 479 |
| 28 | 2027 | | | 24 | 24 | 503 | 479 |
| 29 | 2028 | | | 24 | 24 | 503 | 479 |
| 30 | 2029 | | | 24 | 24 | 503 | 479 |
| Total | | 481 | 482 | 621 | 1,584 | 11,547 | 9,964 |
| In the condition of discount rate at 10 %: | | | | | | | |
| Present value: | | | | | 796 | 2,393 | 1,596 |
| Internal rate of return (FIRR): | | | | | | | 29.18% |
| B/C | | | | | | | 3.00 |

## Appendix 10.6-4 Calculation of Financial Internal Rate of Return for IDECO's Service Area

(Unit: JDs.1,000)

OM Cost: 2.50%

| Year in order | Year | Cost | | | | Financial benefit by saving operation expense | Cash balance |
|---|---|---|---|---|---|---|---|
| | | Construction cost | | O/M cost | Total cost | | |
| | | FC | LC | | | | |
| 1 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2001 | 0 | 17 | 0 | 17 | 0 | -17 |
| 3 | 2002 | 169 | 169 | 0 | 339 | 0 | -339 |
| 4 | 2003 | 281 | 277 | 9 | 567 | 48 | -519 |
| 5 | 2004 | 274 | 270 | 23 | 568 | 112 | -456 |
| 6 | 2005 | | | 36 | 36 | 293 | 257 |
| 7 | 2006 | | | 36 | 36 | 325 | 288 |
| 8 | 2007 | | | 36 | 36 | 356 | 320 |
| 9 | 2008 | | | 36 | 36 | 389 | 353 |
| 10 | 2009 | | | 36 | 36 | 419 | 382 |
| 11 | 2010 | | | 36 | 36 | 446 | 409 |
| 12 | 2011 | | | 36 | 36 | 472 | 436 |
| 13 | 2012 | | | 36 | 36 | 500 | 463 |
| 14 | 2013 | | | 36 | 36 | 522 | 485 |
| 15 | 2014 | | | 36 | 36 | 544 | 508 |
| 16 | 2015 | | | 36 | 36 | 544 | 508 |
| 17 | 2016 | | | 36 | 36 | 544 | 508 |
| 18 | 2017 | | | 36 | 36 | 544 | 508 |
| 19 | 2018 | | | 36 | 36 | 544 | 508 |
| 20 | 2019 | | | 36 | 36 | 544 | 508 |
| 21 | 2020 | | | 36 | 36 | 544 | 508 |
| 22 | 2021 | | | 36 | 36 | 544 | 508 |
| 23 | 2022 | | | 36 | 36 | 544 | 508 |
| 24 | 2023 | | | 36 | 36 | 544 | 508 |
| 25 | 2024 | | | 36 | 36 | 544 | 508 |
| 26 | 2025 | | | 36 | 36 | 544 | 508 |
| 27 | 2026 | | | 36 | 36 | 544 | 508 |
| 28 | 2027 | | | 36 | 36 | 544 | 508 |
| 29 | 2028 | | | 36 | 36 | 544 | 508 |
| 30 | 2029 | | | 36 | 36 | 544 | 508 |
| Total | | 725 | 733 | 943 | 2,402 | 12,588 | 10,187 |
| In the condition of discount rate at 10%: | | | | | | | |
| Present value: | | | | | 1,214 | 2,637 | 1,423 |
| Internal rate of return (FIRR): | | | | | | | 22.34% |
| B/C | | | | | | | 2.17 |

## Appendix 10.7-1 Fund Repayability Analysis for the Whole Project without Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 47,393 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47,393 | 40,284 | 7,109 | 0 | 47,393 | 0 |
| 2 | 2002 | 1,096,260 | 2,216 | 0 | 2,216 | 782 | 0 | 782 | 0 | 1,099,258 | 931,821 | 164,439 | 0 | 1,096,260 | -2,998 |
| 3 | 2003 | 1,605,649 | 53,466 | 0 | 53,466 | 18,870 | 599 | 19,470 | 28,591 | 1,707,176 | 1,364,801 | 240,847 | 147,595 | 1,753,243 | 46,068 |
| 4 | 2004 | 1,527,252 | 128,530 | 0 | 128,530 | 45,298 | 14,531 | 59,829 | 68,733 | 1,784,343 | 1,298,165 | 229,088 | 378,437 | 1,905,690 | 121,346 |
| 5 | 2005 | 0 | 199,929 | 0 | 199,929 | 68,899 | 36,438 | 105,337 | 106,914 | 412,179 | 0 | 0 | 863,127 | 863,127 | 450,947 |
| 6 | 2006 | | 199,929 | 0 | 199,929 | 64,891 | 59,763 | 124,654 | 106,914 | 431,496 | | | 956,163 | 956,163 | 524,667 |
| 7 | 2007 | | 199,929 | 104,251 | 304,180 | 58,317 | 66,337 | 124,654 | 106,914 | 535,748 | | | 1,047,847 | 1,047,847 | 512,099 |
| 8 | 2008 | | 194,195 | 109,985 | 304,180 | 51,020 | 73,634 | 124,654 | 106,914 | 535,748 | | | 1,144,950 | 1,144,950 | 609,202 |
| 9 | 2009 | | 188,146 | 116,034 | 304,180 | 42,920 | 81,734 | 124,654 | 106,914 | 535,748 | | | 1,233,020 | 1,233,020 | 697,272 |
| 10 | 2010 | | 181,764 | 122,416 | 304,180 | 33,929 | 90,725 | 124,654 | 106,914 | 535,748 | | | 1,311,852 | 1,311,852 | 776,105 |
| 11 | 2011 | | 175,031 | 129,149 | 304,180 | 23,949 | 99,323 | 123,272 | 106,914 | 534,366 | | | 1,390,275 | 1,390,275 | 855,908 |
| 12 | 2012 | | 167,928 | 136,252 | 304,180 | 13,024 | 78,294 | 91,318 | 106,914 | 502,412 | | | 1,470,953 | 1,470,953 | 968,540 |
| 13 | 2013 | | 160,434 | 143,746 | 304,180 | 4,412 | 40,105 | 44,517 | 106,914 | 455,611 | | | 1,535,321 | 1,535,321 | 1,079,710 |
| 14 | 2014 | | 152,528 | 151,652 | 304,180 | 0 | 0 | 0 | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 15 | 2015 | | 144,187 | 159,993 | 304,180 | 0 | 0 | 0 | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 16 | 2016 | | 135,387 | 168,793 | 304,180 | 0 | 0 | 0 | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 17 | 2017 | | 126,104 | 178,076 | 304,180 | 0 | 0 | 0 | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 18 | 2018 | | 116,310 | 187,871 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 19 | 2019 | | 105,977 | 198,204 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 20 | 2020 | | 95,076 | 209,105 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 21 | 2021 | | 83,575 | 220,605 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 22 | 2022 | | 71,442 | 232,739 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 23 | 2023 | | 58,641 | 245,539 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 24 | 2024 | | 45,136 | 259,044 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 25 | 2025 | | 30,889 | 273,292 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 26 | 2026 | | 15,858 | 288,323 | 304,180 | | | | 106,914 | 411,094 | | | 1,593,498 | 1,593,498 | 1,182,404 |
| 27 | 2027 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 28 | 2028 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 29 | 2029 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 30 | 2030 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 31 | 2031 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 32 | 2032 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 33 | 2033 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 34 | 2034 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 35 | 2035 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 36 | 2036 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| Total | | 4,276,554 | 3,032,604 | 3,635,071 | | 426,309 | 641,483 | | | | 3,635,071 | 641,483 | | | |

(Note)

| | | | | | |
|---|---|---|---|---|---|
| | | Foreign borrow | | Local borrow | |
| (1) Interest rate of foreign loan: | | 5.50% | | 11.00% | |
| (2) Equal annual repayment amount of capital for foreign loan: | | 304,180 | For 1st year | 1,381 | |
| Repayment period: | 20 years | | For 2nd year | 31,954 | |
| Grace period: | 6 years (excluded in the repayment period) | | For 3rd year | 46,802 | |
| | | | For 4th year | 44,517 | |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.7-2 Fund Repayability Analysis for EDCO's Works without Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 17,136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,136 | 14,566 | 2,570 | 0 | 17,136 | 0 |
| 2 | 2002 | 527,739 | 801 | 0 | 801 | 283 | 0 | 283 | 0 | 528,823 | 448,578 | 79,161 | 0 | 527,739 | -1,084 |
| 3 | 2003 | 548,892 | 25,473 | 0 | 25,473 | 8,990 | 217 | 9,207 | 13,622 | 597,194 | 466,558 | 82,334 | 67,841 | 616,733 | 19,539 |
| 4 | 2004 | 443,019 | 51,134 | 0 | 51,134 | 18,023 | 6,916 | 24,939 | 27,344 | 546,435 | 376,566 | 66,453 | 196,730 | 639,749 | 93,313 |
| 5 | 2005 | 0 | 71,845 | 0 | 71,845 | 24,572 | 14,619 | 39,191 | 38,420 | 149,456 | 0 | 0 | 302,068 | 302,068 | 152,612 |
| 6 | 2006 | | 71,845 | 0 | 71,845 | 22,964 | 21,830 | 44,794 | 38,420 | 155,059 | | | 334,662 | 334,662 | 179,603 |
| 7 | 2007 | | 71,845 | 37,463 | 109,308 | 20,563 | 24,231 | 44,794 | 38,420 | 192,522 | | | 366,734 | 366,734 | 174,212 |
| 8 | 2008 | | 69,784 | 39,523 | 109,308 | 17,898 | 26,897 | 44,794 | 38,420 | 192,522 | | | 400,734 | 400,734 | 208,213 |
| 9 | 2009 | | 67,611 | 41,697 | 109,308 | 14,939 | 29,856 | 44,794 | 38,420 | 192,522 | | | 431,560 | 431,560 | 239,038 |
| 10 | 2010 | | 65,317 | 43,990 | 109,308 | 11,655 | 33,140 | 44,794 | 38,420 | 192,522 | | | 459,131 | 459,131 | 266,609 |
| 11 | 2011 | | 62,898 | 46,410 | 109,308 | 8,009 | 36,286 | 44,295 | 38,420 | 192,022 | | | 486,580 | 486,580 | 294,558 |
| 12 | 2012 | | 60,345 | 48,963 | 109,308 | 4,018 | 24,894 | 28,912 | 38,420 | 176,640 | | | 514,834 | 514,834 | 338,194 |
| 13 | 2013 | | 57,652 | 51,655 | 109,308 | 1,280 | 11,633 | 12,913 | 38,420 | 160,641 | | | 535,492 | 535,492 | 374,851 |
| 14 | 2014 | | 54,811 | 54,497 | 109,308 | 0 | 0 | 0 | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 15 | 2015 | | 51,814 | 57,494 | 109,308 | 0 | 0 | 0 | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 16 | 2016 | | 48,652 | 60,656 | 109,308 | 0 | 0 | 0 | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 17 | 2017 | | 45,316 | 63,992 | 109,308 | 0 | 0 | 0 | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 18 | 2018 | | 41,796 | 67,512 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 19 | 2019 | | 38,083 | 71,225 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 20 | 2020 | | 34,166 | 75,142 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 21 | 2021 | | 30,033 | 79,275 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 22 | 2022 | | 25,673 | 83,635 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 23 | 2023 | | 21,073 | 88,235 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 24 | 2024 | | 16,220 | 93,088 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 25 | 2025 | | 11,100 | 98,208 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 26 | 2026 | | 5,699 | 103,609 | 109,308 | | | | 38,420 | 147,727 | | | 546,463 | 546,463 | 398,736 |
| 27 | 2027 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 28 | 2028 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 29 | 2029 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 30 | 2030 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 31 | 2031 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 32 | 2032 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 33 | 2033 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 34 | 2034 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 35 | 2035 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 36 | 2036 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| Total | | 1,536,786 | 1,100,982 | 1,306,268 | | 153,195 | 230,518 | | | | 1,306,268 | 230,518 | | | |

(Note)

| | | | | |
|---|---|---|---|---|
| (1) Interest rate of foreign loan: | | Foreign borrow 5.50% | | Local borrow 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | | 109,308 | For 1st year | 499 |
| Repayment period: | 20 years | | For 2nd year | 15,383 |
| Grace period: | 6 years (excluded in the repayment period) | | For 3rd year | 15,999 |
| | | | For 4th year | 12,913 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.7-3 Fund Repayability Analysis for JEPCO's Works without Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 12,030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,030 | 10,225 | 1,804 | 0 | 12,030 | 0 |
| 2 | 2002 | 202,534 | 562 | 0 | 562 | 198 | 0 | 198 | 0 | 203,295 | 172,154 | 30,380 | 0 | 202,534 | -761 |
| 3 | 2003 | 429,471 | 10,031 | 0 | 10,031 | 3,540 | 152 | 3,692 | 5,364 | 448,559 | 365,051 | 64,421 | 31,774 | 461,245 | 12,687 |
| 4 | 2004 | 446,720 | 30,109 | 0 | 30,109 | 10,610 | 2,731 | 13,340 | 16,101 | 506,270 | 379,712 | 67,008 | 70,122 | 516,842 | 10,572 |
| 5 | 2005 | 0 | 50,993 | 0 | 50,993 | 17,680 | 8,463 | 26,143 | 27,269 | 104,405 | 0 | 0 | 267,787 | 267,787 | 163,382 |
| 6 | 2006 | | 50,993 | 0 | 50,993 | 16,749 | 15,044 | 31,793 | 27,269 | 110,055 | | | 296,640 | 296,640 | 186,585 |
| 7 | 2007 | | 50,993 | 26,590 | 77,583 | 15,095 | 16,699 | 31,793 | 27,269 | 136,645 | | | 325,086 | 325,086 | 188,441 |
| 8 | 2008 | | 49,530 | 28,052 | 77,583 | 13,258 | 18,536 | 31,793 | 27,269 | 136,645 | | | 355,197 | 355,197 | 218,552 |
| 9 | 2009 | | 47,987 | 29,595 | 77,583 | 11,219 | 20,575 | 31,793 | 27,269 | 136,645 | | | 382,507 | 382,507 | 245,862 |
| 10 | 2010 | | 46,360 | 31,223 | 77,583 | 8,956 | 22,838 | 31,793 | 27,269 | 136,645 | | | 406,977 | 406,977 | 270,332 |
| 11 | 2011 | | 44,642 | 32,940 | 77,583 | 6,443 | 24,999 | 31,443 | 27,269 | 136,294 | | | 431,284 | 431,284 | 294,990 |
| 12 | 2012 | | 42,831 | 34,752 | 77,583 | 3,693 | 21,846 | 25,539 | 27,269 | 130,391 | | | 456,322 | 456,322 | 325,931 |
| 13 | 2013 | | 40,919 | 36,663 | 77,583 | 1,290 | 11,731 | 13,021 | 27,269 | 117,873 | | | 477,911 | 477,911 | 360,038 |
| 14 | 2014 | | 38,903 | 38,680 | 77,583 | 0 | 0 | 0 | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 15 | 2015 | | 36,776 | 40,807 | 77,583 | 0 | 0 | 0 | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 16 | 2016 | | 34,531 | 43,051 | 77,583 | 0 | 0 | 0 | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 17 | 2017 | | 32,163 | 45,419 | 77,583 | 0 | 0 | 0 | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 18 | 2018 | | 29,665 | 47,917 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 19 | 2019 | | 27,030 | 50,553 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 20 | 2020 | | 24,249 | 53,333 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 21 | 2021 | | 21,316 | 56,266 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 22 | 2022 | | 18,221 | 59,361 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 23 | 2023 | | 14,957 | 62,626 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 24 | 2024 | | 11,512 | 66,070 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 25 | 2025 | | 7,878 | 69,704 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 26 | 2026 | | 4,045 | 73,538 | 77,583 | | | | 27,269 | 104,851 | | | 502,867 | 502,867 | 398,016 |
| 27 | 2027 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 28 | 2028 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 29 | 2029 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 30 | 2030 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 31 | 2031 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 32 | 2032 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 33 | 2033 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 34 | 2034 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 35 | 2035 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 36 | 2036 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| Total | | 1,090,755 | 767,198 | 927,142 | | 108,732 | 163,613 | | | | 927,142 | 163,613 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 5.50% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 77,583 | For 1st year | 351 |
| Repayment period: 20 years | | For 2nd year | 5,903 |
| Grace period: 6 years (excluded in the repayment period) | | For 3rd year | 12,518 |
| | | For 4th year | 13,021 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.7-4 Fund Repayability Analysis for IDECO's Works without Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 18,227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,227 | 15,493 | 2,734 | 0 | 18,227 | 0 |
| 2 | 2002 | 365,987 | 852 | 0 | 852 | 301 | 0 | 301 | 0 | 367,140 | 311,089 | 54,898 | 0 | 365,987 | -1,153 |
| 3 | 2003 | 627,285 | 17,962 | 0 | 17,962 | 6,340 | 231 | 6,570 | 9,605 | 661,423 | 533,192 | 94,093 | 47,980 | 675,265 | 13,842 |
| 4 | 2004 | 637,514 | 47,288 | 0 | 47,288 | 16,664 | 4,885 | 21,549 | 25,287 | 731,638 | 541,886 | 95,627 | 111,585 | 749,098 | 17,460 |
| 5 | 2005 | 0 | 77,091 | 0 | 77,091 | 26,646 | 13,356 | 40,002 | 41,225 | 158,319 | 0 | 0 | 293,271 | 293,271 | 134,952 |
| 6 | 2006 | | 77,091 | 0 | 77,091 | 25,177 | 22,889 | 48,066 | 41,225 | 166,382 | | | 324,861 | 324,861 | 158,479 |
| 7 | 2007 | | 77,091 | 40,199 | 117,290 | 22,659 | 25,407 | 48,066 | 41,225 | 206,581 | | | 356,027 | 356,027 | 149,446 |
| 8 | 2008 | | 74,880 | 42,410 | 117,290 | 19,864 | 28,201 | 48,066 | 41,225 | 206,581 | | | 389,019 | 389,019 | 182,437 |
| 9 | 2009 | | 72,548 | 44,742 | 117,290 | 16,762 | 31,304 | 48,066 | 41,225 | 206,581 | | | 418,953 | 418,953 | 212,372 |
| 10 | 2010 | | 70,087 | 47,203 | 117,290 | 13,319 | 34,747 | 48,066 | 41,225 | 206,581 | | | 445,745 | 445,745 | 239,164 |
| 11 | 2011 | | 67,491 | 49,799 | 117,290 | 9,497 | 38,038 | 47,534 | 41,225 | 206,050 | | | 472,410 | 472,410 | 266,360 |
| 12 | 2012 | | 64,752 | 52,538 | 117,290 | 5,312 | 31,554 | 36,867 | 41,225 | 195,382 | | | 499,797 | 499,797 | 304,415 |
| 13 | 2013 | | 61,862 | 55,428 | 117,290 | 1,841 | 16,741 | 18,582 | 41,225 | 177,098 | | | 521,918 | 521,918 | 344,821 |
| 14 | 2014 | | 58,814 | 58,476 | 117,290 | 0 | 0 | 0 | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 15 | 2015 | | 55,598 | 61,692 | 117,290 | 0 | 0 | 0 | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 16 | 2016 | | 52,205 | 65,085 | 117,290 | 0 | 0 | 0 | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 17 | 2017 | | 48,625 | 68,665 | 117,290 | 0 | 0 | 0 | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 18 | 2018 | | 44,848 | 72,442 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 19 | 2019 | | 40,864 | 76,426 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 20 | 2020 | | 36,661 | 80,629 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 21 | 2021 | | 32,226 | 85,064 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 22 | 2022 | | 27,547 | 89,743 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 23 | 2023 | | 22,612 | 94,678 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 24 | 2024 | | 17,404 | 99,886 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 25 | 2025 | | 11,911 | 105,380 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 26 | 2026 | | 6,115 | 111,175 | 117,290 | | | | 41,225 | 158,515 | | | 544,167 | 544,167 | 385,652 |
| 27 | 2027 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 28 | 2028 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 29 | 2029 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 30 | 2030 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 31 | 2031 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 32 | 2032 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 33 | 2033 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 34 | 2034 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 35 | 2035 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 36 | 2036 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| Total | | 1,649,013 | 1,164,424 | 1,401,661 | | 164,382 | 247,352 | | | | 1,401,661 | 247,352 | | | |

(Note)

| | | | | |
|---|---|---|---|---|
| (1) Interest rate of foreign loan: | | Foreign borrow 5.50% | | Local borrow 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | | 117,290 | For 1st year | 531 |
| Repayment period: | 20 years | | For 2nd year | 10,668 |
| Grace period: | 6 years (excluded in the repayment period) | | For 3rd year | 18,284 |
| | | | For 4th year | 18,582 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.8-1 Fund Repayability Analysis for the Whole Project without Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 47,393 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47,393 | 40,284 | 7,109 | 0 | 47,393 | 0 |
| 2 | 2002 | 1,096,260 | 2,820 | 0 | 2,820 | 782 | 0 | 782 | 0 | 1,099,862 | 931,821 | 164,439 | 0 | 1,096,260 | -3,602 |
| 3 | 2003 | 1,605,649 | 68,047 | 0 | 68,047 | 18,870 | 599 | 19,470 | 28,591 | 1,721,757 | 1,364,801 | 240,847 | 147,595 | 1,753,243 | 31,486 |
| 4 | 2004 | 1,527,252 | 163,583 | 0 | 163,583 | 45,298 | 14,531 | 59,829 | 68,733 | 1,819,397 | 1,298,165 | 229,088 | 378,437 | 1,905,690 | 86,293 |
| 5 | 2005 | 0 | 254,455 | 0 | 254,455 | 68,899 | 36,438 | 105,337 | 106,914 | 466,706 | 0 | 0 | 863,127 | 863,127 | 396,421 |
| 6 | 2006 | | 254,455 | 88,670 | 343,125 | 64,891 | 59,763 | 124,654 | 106,914 | 574,693 | | | 956,163 | 956,163 | 381,471 |
| 7 | 2007 | | 248,248 | 94,877 | 343,125 | 58,317 | 66,337 | 124,654 | 106,914 | 574,693 | | | 1,047,847 | 1,047,847 | 473,155 |
| 8 | 2008 | | 241,607 | 101,518 | 343,125 | 51,020 | 73,634 | 124,654 | 106,914 | 574,693 | | | 1,144,950 | 1,144,950 | 570,257 |
| 9 | 2009 | | 234,500 | 108,625 | 343,125 | 42,920 | 81,734 | 124,654 | 106,914 | 574,693 | | | 1,233,020 | 1,233,020 | 658,328 |
| 10 | 2010 | | 226,897 | 116,228 | 343,125 | 33,929 | 90,725 | 124,654 | 106,914 | 574,693 | | | 1,311,852 | 1,311,852 | 737,160 |
| 11 | 2011 | | 218,761 | 124,364 | 343,125 | 23,949 | 99,323 | 123,272 | 106,914 | 573,311 | | | 1,390,275 | 1,390,275 | 816,963 |
| 12 | 2012 | | 210,055 | 133,070 | 343,125 | 13,024 | 78,294 | 91,318 | 106,914 | 541,357 | | | 1,470,953 | 1,470,953 | 929,596 |
| 13 | 2013 | | 200,740 | 142,385 | 343,125 | 4,412 | 40,105 | 44,517 | 106,914 | 494,555 | | | 1,535,321 | 1,535,321 | 1,040,765 |
| 14 | 2014 | | 190,773 | 152,352 | 343,125 | 0 | 0 | 0 | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 15 | 2015 | | 180,109 | 163,016 | 343,125 | 0 | 0 | 0 | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 16 | 2016 | | 168,698 | 174,427 | 343,125 | 0 | 0 | 0 | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 17 | 2017 | | 156,488 | 186,637 | 343,125 | 0 | 0 | 0 | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 18 | 2018 | | 143,423 | 199,702 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 19 | 2019 | | 129,444 | 213,681 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 20 | 2020 | | 114,486 | 228,639 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 21 | 2021 | | 98,482 | 244,643 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 22 | 2022 | | 81,357 | 261,768 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 23 | 2023 | | 63,033 | 280,092 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 24 | 2024 | | 43,426 | 299,699 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 25 | 2025 | | 22,447 | 320,678 | 343,125 | | | | 106,914 | 450,039 | | | 1,593,498 | 1,593,498 | 1,143,459 |
| 26 | 2026 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 27 | 2027 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 28 | 2028 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 29 | 2029 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 30 | 2030 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 31 | 2031 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 32 | 2032 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 33 | 2033 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 34 | 2034 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 35 | 2035 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 36 | 2036 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| Total | | 4,276,554 | 3,716,334 | 3,635,071 | | 426,309 | 641,483 | | | | 3,635,071 | 641,483 | | | |

(Note)

| | | Foreign borrow | | Local borrow |
|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | 343,125 | For 1st year | 1,381 |
| | Repayment period: 25 years | | For 2nd year | 31,954 |
| | Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 46,802 |
| | | | For 4th year | 44,517 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.8-2 Fund Repayability Analysis for EDCO's Works without Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | In flow: Local borrow | In flow: Revenue (operating expense to be saved) | In flow: Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Interest for international loan to be paid | | | | | | | | | | | | |
| 1 | 2001 | 17,136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,136 | 14,566 | 2,570 | 0 | 17,136 | 0 |
| 2 | 2002 | 527,739 | 1,020 | 0 | 1,020 | 283 | 0 | 283 | 0 | 529,042 | 448,578 | 79,161 | 0 | 527,739 | -1,302 |
| 3 | 2003 | 548,892 | 32,420 | 0 | 32,420 | 8,990 | 217 | 9,207 | 13,622 | 604,141 | 466,558 | 82,334 | 67,841 | 616,733 | 12,592 |
| 4 | 2004 | 443,019 | 65,079 | 0 | 65,079 | 18,023 | 6,916 | 24,939 | 27,344 | 560,381 | 376,566 | 66,453 | 196,730 | 639,749 | 79,368 |
| 5 | 2005 | 0 | 91,439 | 0 | 91,439 | 24,572 | 14,619 | 39,191 | 38,420 | 169,050 | 0 | 0 | 302,068 | 302,068 | 133,018 |
| 6 | 2006 | | 91,439 | 31,864 | 123,303 | 22,964 | 21,830 | 44,794 | 38,420 | 206,517 | | | 334,662 | 334,662 | 128,145 |
| 7 | 2007 | | 89,208 | 34,094 | 123,303 | 20,563 | 24,231 | 44,794 | 38,420 | 206,517 | | | 366,734 | 366,734 | 160,217 |
| 8 | 2008 | | 86,822 | 36,481 | 123,303 | 17,898 | 26,897 | 44,794 | 38,420 | 206,517 | | | 400,734 | 400,734 | 194,218 |
| 9 | 2009 | | 84,268 | 39,034 | 123,303 | 14,939 | 29,856 | 44,794 | 38,420 | 206,517 | | | 431,560 | 431,560 | 225,044 |
| 10 | 2010 | | 81,536 | 41,767 | 123,303 | 11,655 | 33,140 | 44,794 | 38,420 | 206,517 | | | 459,131 | 459,131 | 252,614 |
| 11 | 2011 | | 78,612 | 44,691 | 123,303 | 8,009 | 36,286 | 44,295 | 38,420 | 206,017 | | | 486,580 | 486,580 | 280,563 |
| 12 | 2012 | | 75,484 | 47,819 | 123,303 | 4,018 | 24,894 | 28,912 | 38,420 | 190,635 | | | 514,834 | 514,834 | 324,199 |
| 13 | 2013 | | 72,136 | 51,166 | 123,303 | 1,280 | 11,633 | 12,913 | 38,420 | 174,635 | | | 535,492 | 535,492 | 360,856 |
| 14 | 2014 | | 68,555 | 54,748 | 123,303 | 0 | 0 | 0 | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 15 | 2015 | | 64,722 | 58,580 | 123,303 | 0 | 0 | 0 | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 16 | 2016 | | 60,622 | 62,681 | 123,303 | 0 | 0 | 0 | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 17 | 2017 | | 56,234 | 67,068 | 123,303 | 0 | 0 | 0 | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 18 | 2018 | | 51,539 | 71,763 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 19 | 2019 | | 46,516 | 76,787 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 20 | 2020 | | 41,141 | 82,162 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 21 | 2021 | | 35,390 | 87,913 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 22 | 2022 | | 29,236 | 94,067 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 23 | 2023 | | 22,651 | 100,652 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 24 | 2024 | | 15,605 | 107,697 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 25 | 2025 | | 8,067 | 115,236 | 123,303 | | | | 38,420 | 161,722 | | | 546,463 | 546,463 | 384,741 |
| 26 | 2026 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 27 | 2027 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 28 | 2028 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 29 | 2029 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 30 | 2030 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 31 | 2031 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 32 | 2032 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 33 | 2033 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 34 | 2034 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 35 | 2035 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 36 | 2036 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| Total | | 1,536,786 | 1,349,739 | 1,306,268 | | 153,195 | 230,518 | | | | 1,306,268 | 230,518 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 123,303 | For 1st year | 499 |
| Repayment period: 25 years | | For 2nd year | 15,383 |
| Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 15,999 |
| | | For 4th year | 12,913 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.8-3 Fund Repayability Analysis for JEPCO's Works without Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | In flow: Local borrow | In flow: Revenue (operating expense to be saved) | In flow: Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 12,030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,030 | 10,225 | 1,804 | 0 | 12,030 | 0 |
| 2 | 2002 | 202,534 | 716 | 0 | 716 | 198 | 0 | 198 | 0 | 203,448 | 172,154 | 30,380 | 0 | 202,534 | -914 |
| 3 | 2003 | 429,471 | 12,767 | 0 | 12,767 | 3,540 | 152 | 3,692 | 5,364 | 451,294 | 365,051 | 64,421 | 31,774 | 461,245 | 9,951 |
| 4 | 2004 | 446,720 | 38,320 | 0 | 38,320 | 10,610 | 2,731 | 13,340 | 16,101 | 514,482 | 379,712 | 67,008 | 70,122 | 516,842 | 2,361 |
| 5 | 2005 | 0 | 64,900 | 0 | 64,900 | 17,680 | 8,463 | 26,143 | 27,269 | 118,312 | 0 | 0 | 267,787 | 267,787 | 149,475 |
| 6 | 2006 | | 64,900 | 22,616 | 87,516 | 16,749 | 15,044 | 31,793 | 38,420 | 157,729 | | | 296,640 | 296,640 | 138,911 |
| 7 | 2007 | | 63,317 | 24,199 | 87,516 | 15,095 | 16,699 | 31,793 | 38,420 | 157,729 | | | 325,086 | 325,086 | 167,358 |
| 8 | 2008 | | 61,623 | 25,893 | 87,516 | 13,258 | 18,536 | 31,793 | 38,420 | 157,729 | | | 355,197 | 355,197 | 197,468 |
| 9 | 2009 | | 59,810 | 27,705 | 87,516 | 11,219 | 20,575 | 31,793 | 38,420 | 157,729 | | | 382,507 | 382,507 | 224,778 |
| 10 | 2010 | | 57,871 | 29,645 | 87,516 | 8,956 | 22,838 | 31,793 | 38,420 | 157,729 | | | 406,977 | 406,977 | 249,248 |
| 11 | 2011 | | 55,796 | 31,720 | 87,516 | 6,443 | 24,999 | 31,443 | 38,420 | 157,378 | | | 431,284 | 431,284 | 273,906 |
| 12 | 2012 | | 53,576 | 33,940 | 87,516 | 3,693 | 21,846 | 25,539 | 38,420 | 151,475 | | | 456,322 | 456,322 | 304,847 |
| 13 | 2013 | | 51,200 | 36,316 | 87,516 | 1,290 | 11,731 | 13,021 | 38,420 | 138,956 | | | 477,911 | 477,911 | 338,954 |
| 14 | 2014 | | 48,658 | 38,858 | 87,516 | 0 | 0 | 0 | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 15 | 2015 | | 45,938 | 41,578 | 87,516 | 0 | 0 | 0 | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 16 | 2016 | | 43,027 | 44,489 | 87,516 | 0 | 0 | 0 | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 17 | 2017 | | 39,913 | 47,603 | 87,516 | 0 | 0 | 0 | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 18 | 2018 | | 36,581 | 50,935 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 19 | 2019 | | 33,015 | 54,500 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 20 | 2020 | | 29,200 | 58,315 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 21 | 2021 | | 25,118 | 62,397 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 22 | 2022 | | 20,750 | 66,765 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 23 | 2023 | | 16,077 | 71,439 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 24 | 2024 | | 11,076 | 76,440 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 25 | 2025 | | 5,725 | 81,790 | 87,516 | | | | 38,420 | 125,935 | | | 502,867 | 502,867 | 376,932 |
| 26 | 2026 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 27 | 2027 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 28 | 2028 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 29 | 2029 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 30 | 2030 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 31 | 2031 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 32 | 2032 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 33 | 2033 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 34 | 2034 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 35 | 2035 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| 36 | 2036 | | | | | | | | 38,420 | 38,420 | | | 502,867 | 502,867 | 464,448 |
| Total | | 1,090,755 | 939,873 | 927,142 | | 108,732 | 163,613 | | | | 927,142 | 163,613 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 87,516 | For 1st year | 351 |
| Repayment period: 25 years | | For 2nd year | 5,903 |
| Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 12,518 |
| | | For 4th year | 13,021 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.8-4 Fund Repayability Analysis for IDECO's Works without Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 18,227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,227 | 15,493 | 2,734 | 0 | 18,227 | 0 |
| 2 | 2002 | 365,987 | 1,084 | 0 | 1,084 | 301 | 0 | 301 | 0 | 367,372 | 311,089 | 54,898 | 0 | 365,987 | -1,385 |
| 3 | 2003 | 627,285 | 22,861 | 0 | 22,861 | 6,340 | 231 | 6,570 | 9,605 | 666,321 | 533,192 | 94,093 | 47,980 | 675,265 | 8,944 |
| 4 | 2004 | 637,514 | 60,184 | 0 | 60,184 | 16,664 | 4,885 | 21,549 | 25,287 | 744,535 | 541,886 | 95,627 | 111,585 | 749,098 | 4,564 |
| 5 | 2005 | 0 | 98,116 | 0 | 98,116 | 26,646 | 13,356 | 40,002 | 41,225 | 179,344 | 0 | 0 | 293,271 | 293,271 | 113,927 |
| 6 | 2006 | | 98,116 | 34,191 | 132,307 | 25,177 | 22,889 | 48,066 | 41,225 | 221,598 | | | 324,861 | 324,861 | 103,264 |
| 7 | 2007 | | 95,723 | 36,584 | 132,307 | 22,659 | 25,407 | 48,066 | 41,225 | 221,598 | | | 356,027 | 356,027 | 134,429 |
| 8 | 2008 | | 93,162 | 39,145 | 132,307 | 19,864 | 28,201 | 48,066 | 41,225 | 221,598 | | | 389,019 | 389,019 | 167,421 |
| 9 | 2009 | | 90,422 | 41,885 | 132,307 | 16,762 | 31,304 | 48,066 | 41,225 | 221,598 | | | 418,953 | 418,953 | 197,355 |
| 10 | 2010 | | 87,490 | 44,817 | 132,307 | 13,319 | 34,747 | 48,066 | 41,225 | 221,598 | | | 445,745 | 445,745 | 224,147 |
| 11 | 2011 | | 84,353 | 47,954 | 132,307 | 9,497 | 38,038 | 47,534 | 41,225 | 221,067 | | | 472,410 | 472,410 | 251,343 |
| 12 | 2012 | | 80,996 | 51,311 | 132,307 | 5,312 | 31,554 | 36,867 | 41,225 | 210,399 | | | 499,797 | 499,797 | 289,398 |
| 13 | 2013 | | 77,404 | 54,903 | 132,307 | 1,841 | 16,741 | 18,582 | 41,225 | 192,115 | | | 521,918 | 521,918 | 329,804 |
| 14 | 2014 | | 73,561 | 58,746 | 132,307 | 0 | 0 | 0 | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 15 | 2015 | | 69,449 | 62,858 | 132,307 | 0 | 0 | 0 | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 16 | 2016 | | 65,049 | 67,258 | 132,307 | 0 | 0 | 0 | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 17 | 2017 | | 60,341 | 71,966 | 132,307 | 0 | 0 | 0 | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 18 | 2018 | | 55,303 | 77,004 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 19 | 2019 | | 49,913 | 82,394 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 20 | 2020 | | 44,145 | 88,162 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 21 | 2021 | | 37,974 | 94,333 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 22 | 2022 | | 31,371 | 100,936 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 23 | 2023 | | 24,305 | 108,002 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 24 | 2024 | | 16,745 | 115,562 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 25 | 2025 | | 8,656 | 123,651 | 132,307 | | | | 41,225 | 173,532 | | | 544,167 | 544,167 | 370,635 |
| 26 | 2026 | | | | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 27 | 2027 | | | | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 28 | 2028 | | | | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 29 | 2029 | | | | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 30 | 2030 | | | | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 31 | 2031 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 32 | 2032 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 33 | 2033 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 34 | 2034 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 35 | 2035 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 36 | 2036 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| Total | | 1,649,013 | 1,426,722 | 1,401,661 | | 164,382 | 247,352 | | | | 1,401,661 | 247,352 | | | |

(Note)

| | | Foreign borrow | | Local borrow |
|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | 132,307 | For 1st year | 531 |
| | Repayment period: 25 years | | For 2nd year | 10,668 |
| | Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 18,284 |
| | | | For 4th year | 18,582 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.9-1 Fund Repayability Analysis for the Whole Project without Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 47,393 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47,393 | 40,284 | 7,109 | 0 | 47,393 | 0 |
| 2 | 2002 | 1,096,260 | 3,424 | 0 | 3,424 | 782 | 0 | 782 | 0 | 1,100,466 | 931,821 | 164,439 | 0 | 1,096,260 | -4,206 |
| 3 | 2003 | 1,605,649 | 82,629 | 3,719 | 86,348 | 18,870 | 599 | 19,470 | 28,591 | 1,740,058 | 1,364,801 | 240,847 | 147,595 | 1,753,243 | 13,185 |
| 4 | 2004 | 1,527,252 | 198,321 | 90,071 | 288,392 | 45,298 | 14,531 | 59,829 | 68,733 | 1,944,206 | 1,298,165 | 229,088 | 378,437 | 1,905,690 | -38,516 |
| 5 | 2005 | 0 | 301,009 | 223,740 | 524,749 | 68,899 | 36,438 | 105,337 | 106,914 | 737,000 | 0 | 0 | 863,127 | 863,127 | 126,127 |
| 6 | 2006 | | 281,991 | 362,619 | 644,609 | 64,891 | 59,763 | 124,654 | 106,914 | 876,177 | | | 956,163 | 956,163 | 79,986 |
| 7 | 2007 | | 251,168 | 393,441 | 644,609 | 58,317 | 66,337 | 124,654 | 106,914 | 876,177 | | | 1,047,847 | 1,047,847 | 171,670 |
| 8 | 2008 | | 217,726 | 426,884 | 644,609 | 51,020 | 73,634 | 124,654 | 106,914 | 876,177 | | | 1,144,950 | 1,144,950 | 268,773 |
| 9 | 2009 | | 181,441 | 463,169 | 644,609 | 42,920 | 81,734 | 124,654 | 106,914 | 876,177 | | | 1,233,020 | 1,233,020 | 356,843 |
| 10 | 2010 | | 142,071 | 502,538 | 644,609 | 33,929 | 90,725 | 124,654 | 106,914 | 876,177 | | | 1,311,852 | 1,311,852 | 435,675 |
| 11 | 2011 | | 99,356 | 538,110 | 637,466 | 23,949 | 99,323 | 123,272 | 106,914 | 867,652 | | | 1,390,275 | 1,390,275 | 522,622 |
| 12 | 2012 | | 53,616 | 418,609 | 472,226 | 13,024 | 78,294 | 91,318 | 106,914 | 670,458 | | | 1,470,953 | 1,470,953 | 800,495 |
| 13 | 2013 | | 18,034 | 212,170 | 230,204 | 4,412 | 40,105 | 44,517 | 106,914 | 381,635 | | | 1,535,321 | 1,535,321 | 1,153,686 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 27 | 2027 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 28 | 2028 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 29 | 2029 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 30 | 2030 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 31 | 2031 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 32 | 2032 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 33 | 2033 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 34 | 2034 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 35 | 2035 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| 36 | 2036 | | | | | | | | 106,914 | 106,914 | | | 1,593,498 | 1,593,498 | 1,486,584 |
| Total | | 4,276,554 | 1,830,786 | 3,635,071 | | 426,309 | 641,483 | | | | 3,635,071 | 641,483 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign and local loans:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 7,144 | 1,381 |
| For 2nd year | 165,240 | 31,954 |
| For 3rd year | 242,021 | 46,802 |
| For 4th year | 230,204 | 44,517 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.9-2 Fund Repayability Analysis for EDCO's Works without Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 17,136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,136 | 14,566 | 2,570 | 0 | 17,136 | 0 |
| 2 | 2002 | 527,739 | 1,238 | 0 | 1,238 | 283 | 0 | 283 | 0 | 529,260 | 448,578 | 79,161 | 0 | 527,739 | -1,521 |
| 3 | 2003 | 548,892 | 39,367 | 1,345 | 40,712 | 8,990 | 217 | 9,207 | 13,622 | 612,433 | 466,558 | 82,334 | 67,841 | 616,733 | 4,300 |
| 4 | 2004 | 443,019 | 78,910 | 42,877 | 121,787 | 18,023 | 6,916 | 24,939 | 27,344 | 617,089 | 376,566 | 66,453 | 196,730 | 639,749 | 22,660 |
| 5 | 2005 | 0 | 107,274 | 89,599 | 196,873 | 24,572 | 14,619 | 39,191 | 38,420 | 274,484 | 0 | 0 | 302,068 | 302,068 | 27,584 |
| 6 | 2006 | | 99,658 | 131,983 | 231,641 | 22,964 | 21,830 | 44,794 | 38,420 | 314,856 | | | 334,662 | 334,662 | 19,807 |
| 7 | 2007 | | 88,439 | 143,202 | 231,641 | 20,563 | 24,231 | 44,794 | 38,420 | 314,856 | | | 366,734 | 366,734 | 51,878 |
| 8 | 2008 | | 76,267 | 155,374 | 231,641 | 17,898 | 26,897 | 44,794 | 38,420 | 314,856 | | | 400,734 | 400,734 | 85,879 |
| 9 | 2009 | | 63,061 | 168,581 | 231,641 | 14,939 | 29,856 | 44,794 | 38,420 | 314,856 | | | 431,560 | 431,560 | 116,705 |
| 10 | 2010 | | 48,731 | 182,910 | 231,641 | 11,655 | 33,140 | 44,794 | 38,420 | 314,856 | | | 459,131 | 459,131 | 144,275 |
| 11 | 2011 | | 33,184 | 195,875 | 229,058 | 8,009 | 36,286 | 44,295 | 38,420 | 311,773 | | | 486,580 | 486,580 | 174,807 |
| 12 | 2012 | | 16,534 | 132,977 | 149,512 | 4,018 | 24,894 | 28,912 | 38,420 | 216,844 | | | 514,834 | 514,834 | 297,990 |
| 13 | 2013 | | 5,231 | 61,545 | 66,777 | 1,280 | 11,633 | 12,913 | 38,420 | 118,110 | | | 535,492 | 535,492 | 417,382 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 27 | 2027 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 28 | 2028 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 29 | 2029 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 30 | 2030 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 31 | 2031 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 32 | 2032 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 33 | 2033 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 34 | 2034 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 35 | 2035 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| 36 | 2036 | | | | | | | | 38,420 | 38,420 | | | 546,463 | 546,463 | 508,044 |
| Total | | 1,536,786 | 657,896 | 1,306,268 | | 153,195 | 230,518 | | | | 1,306,268 | 230,518 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign loan:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 2,583 | 499 |
| For 2nd year | 79,547 | 15,383 |
| For 3rd year | 82,735 | 15,999 |
| For 4th year | 66,777 | 12,913 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.9-3 Fund Repayability Analysis for JEPCO's Works without Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 12,030 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,030 | 10,225 | 1,804 | 0 | 12,030 | 0 |
| 2 | 2002 | 202,534 | 869 | 0 | 869 | 198 | 0 | 198 | 0 | 203,601 | 172,154 | 30,380 | 0 | 202,534 | -1,068 |
| 3 | 2003 | 429,471 | 15,502 | 944 | 16,446 | 3,540 | 152 | 3,692 | 5,364 | 454,974 | 365,051 | 64,421 | 31,774 | 461,245 | 6,271 |
| 4 | 2004 | 446,720 | 46,451 | 16,919 | 63,371 | 10,610 | 2,731 | 13,340 | 16,101 | 539,532 | 379,712 | 67,008 | 70,122 | 516,842 | -22,690 |
| 5 | 2005 | 0 | 77,289 | 52,063 | 129,352 | 17,680 | 8,463 | 26,143 | 27,269 | 182,764 | 0 | 0 | 267,787 | 267,787 | 85,024 |
| 6 | 2006 | | 72,863 | 91,547 | 164,411 | 16,749 | 15,044 | 31,793 | 27,269 | 223,473 | | | 296,640 | 296,640 | 73,167 |
| 7 | 2007 | | 65,082 | 99,329 | 164,411 | 15,095 | 16,699 | 31,793 | 27,269 | 223,473 | | | 325,086 | 325,086 | 101,613 |
| 8 | 2008 | | 56,639 | 107,772 | 164,411 | 13,258 | 18,536 | 31,793 | 27,269 | 223,473 | | | 355,197 | 355,197 | 131,724 |
| 9 | 2009 | | 47,478 | 116,932 | 164,411 | 11,219 | 20,575 | 31,793 | 27,269 | 223,473 | | | 382,507 | 382,507 | 159,034 |
| 10 | 2010 | | 37,539 | 126,872 | 164,411 | 8,956 | 22,838 | 31,793 | 27,269 | 223,473 | | | 406,977 | 406,977 | 183,504 |
| 11 | 2011 | | 26,755 | 135,843 | 162,597 | 6,443 | 24,999 | 31,443 | 27,269 | 221,309 | | | 431,284 | 431,284 | 209,975 |
| 12 | 2012 | | 15,208 | 116,861 | 132,069 | 3,693 | 21,846 | 25,539 | 27,269 | 184,878 | | | 456,322 | 456,322 | 271,445 |
| 13 | 2013 | | 5,275 | 62,060 | 67,335 | 1,290 | 11,731 | 13,021 | 27,269 | 107,625 | | | 477,911 | 477,911 | 370,286 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 27 | 2027 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 28 | 2028 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 29 | 2029 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 30 | 2030 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 31 | 2031 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 32 | 2032 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 33 | 2033 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 34 | 2034 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 35 | 2035 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| 36 | 2036 | | | | | | | | 27,269 | 27,269 | | | 502,867 | 502,867 | 475,598 |
| Total | | 1,090,755 | 466,951 | 927,142 | | 108,732 | 163,613 | | | | 927,142 | 163,613 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign loan:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 1,813 | 351 |
| For 2nd year | 30,528 | 5,903 |
| For 3rd year | 64,735 | 12,518 |
| For 4th year | 67,335 | 13,021 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.9-4 Fund Repayability Analysis for IDECO's Works without Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 18,227 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,227 | 15,493 | 2,734 | 0 | 18,227 | 0 |
| 2 | 2002 | 365,987 | 1,317 | 0 | 1,317 | 301 | 0 | 301 | 0 | 367,605 | 311,089 | 54,898 | 0 | 365,987 | -1,618 |
| 3 | 2003 | 627,285 | 27,759 | 1,430 | 29,190 | 6,340 | 231 | 6,570 | 9,605 | 672,651 | 533,192 | 94,093 | 47,980 | 675,265 | 2,614 |
| 4 | 2004 | 637,514 | 72,959 | 30,275 | 103,234 | 16,664 | 4,885 | 21,549 | 25,287 | 787,585 | 541,886 | 95,627 | 111,585 | 749,098 | -38,486 |
| 5 | 2005 | 0 | 116,446 | 82,078 | 198,525 | 26,646 | 13,356 | 40,002 | 41,225 | 279,752 | 0 | 0 | 293,271 | 293,271 | 13,519 |
| 6 | 2006 | | 109,470 | 139,088 | 248,557 | 25,177 | 22,889 | 48,066 | 41,225 | 337,848 | | | 324,861 | 324,861 | -12,987 |
| 7 | 2007 | | 97,647 | 150,910 | 248,557 | 22,659 | 25,407 | 48,066 | 41,225 | 337,848 | | | 356,027 | 356,027 | 18,179 |
| 8 | 2008 | | 84,820 | 163,738 | 248,557 | 19,864 | 28,201 | 48,066 | 41,225 | 337,848 | | | 389,019 | 389,019 | 51,170 |
| 9 | 2009 | | 70,902 | 177,655 | 248,557 | 16,762 | 31,304 | 48,066 | 41,225 | 337,848 | | | 418,953 | 418,953 | 81,104 |
| 10 | 2010 | | 55,801 | 192,756 | 248,557 | 13,319 | 34,747 | 48,066 | 41,225 | 337,848 | | | 445,745 | 445,745 | 107,897 |
| 11 | 2011 | | 39,417 | 206,393 | 245,810 | 9,497 | 38,038 | 47,534 | 41,225 | 334,570 | | | 472,410 | 472,410 | 137,840 |
| 12 | 2012 | | 21,874 | 168,771 | 190,644 | 5,312 | 31,554 | 36,867 | 41,225 | 268,736 | | | 499,797 | 499,797 | 231,060 |
| 13 | 2013 | | 7,528 | 88,565 | 96,093 | 1,841 | 16,741 | 18,582 | 41,225 | 155,901 | | | 521,918 | 521,918 | 366,018 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 27 | 2027 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 28 | 2028 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 29 | 2029 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 30 | 2030 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 31 | 2031 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 32 | 2032 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 33 | 2033 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 34 | 2034 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 35 | 2035 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| 36 | 2036 | | | | | | | | 41,225 | 41,225 | | | 544,167 | 544,167 | 502,942 |
| Total | | 1,649,013 | 705,940 | 1,401,661 | | 164,382 | 247,352 | | | | 1,401,661 | 247,352 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign loan:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 2,747 | 531 |
| For 2nd year | 55,166 | 10,668 |
| For 3rd year | 94,551 | 18,284 |
| For 4th year | 96,093 | 18,582 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.10-1 Fund Repayability Analysis for the Whole Project with Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 49,700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49,700 | 42,245 | 7,455 | 0 | 49,700 | 0 |
| 2 | 2002 | 1,161,579 | 2,323 | 0 | 2,323 | 820 | 0 | 820 | 0 | 1,164,723 | 987,342 | 174,237 | 0 | 1,161,579 | -3,144 |
| 3 | 2003 | 1,696,069 | 56,627 | 0 | 56,627 | 19,986 | 629 | 20,615 | 30,282 | 1,803,593 | 1,441,658 | 254,410 | 232,535 | 1,928,604 | 125,011 |
| 4 | 2004 | 1,575,698 | 135,919 | 0 | 135,919 | 47,902 | 15,390 | 63,292 | 72,684 | 1,847,592 | 1,339,343 | 236,355 | 715,890 | 2,291,587 | 443,996 |
| 5 | 2005 | 0 | 209,582 | 0 | 209,582 | 72,208 | 38,535 | 110,743 | 112,076 | 432,401 | 0 | 0 | 1,582,551 | 1,582,551 | 1,150,150 |
| 6 | 2006 | | 209,582 | 0 | 209,582 | 67,969 | 62,703 | 130,673 | 112,076 | 452,331 | | | 1,753,176 | 1,753,176 | 1,300,845 |
| 7 | 2007 | | 209,582 | 109,285 | 318,868 | 61,072 | 69,600 | 130,673 | 112,076 | 561,616 | | | 1,921,292 | 1,921,292 | 1,359,675 |
| 8 | 2008 | | 203,572 | 115,296 | 318,868 | 53,416 | 77,256 | 130,673 | 112,076 | 561,616 | | | 2,099,359 | 2,099,359 | 1,537,743 |
| 9 | 2009 | | 197,230 | 121,637 | 318,868 | 44,918 | 85,755 | 130,673 | 112,076 | 561,616 | | | 2,260,773 | 2,260,773 | 1,699,157 |
| 10 | 2010 | | 190,540 | 128,327 | 318,868 | 35,485 | 95,188 | 130,673 | 112,076 | 561,616 | | | 2,405,286 | 2,405,286 | 1,843,670 |
| 11 | 2011 | | 183,482 | 135,385 | 318,868 | 25,014 | 104,210 | 129,224 | 112,076 | 560,168 | | | 2,549,100 | 2,549,100 | 1,988,932 |
| 12 | 2012 | | 176,036 | 142,831 | 318,868 | 13,551 | 81,815 | 95,366 | 112,076 | 526,310 | | | 2,697,021 | 2,697,021 | 2,170,712 |
| 13 | 2013 | | 168,180 | 150,687 | 318,868 | 4,551 | 41,377 | 45,929 | 112,076 | 476,872 | | | 2,819,456 | 2,819,456 | 2,342,584 |
| 14 | 2014 | | 159,893 | 158,975 | 318,868 | 0 | 0 | 0 | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 15 | 2015 | | 151,149 | 167,718 | 318,868 | 0 | 0 | 0 | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 16 | 2016 | | 141,925 | 176,943 | 318,868 | 0 | 0 | 0 | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 17 | 2017 | | 132,193 | 186,675 | 318,868 | 0 | 0 | 0 | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 18 | 2018 | | 121,926 | 196,942 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 19 | 2019 | | 111,094 | 207,774 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 20 | 2020 | | 99,666 | 219,201 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 21 | 2021 | | 87,610 | 231,257 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 22 | 2022 | | 74,891 | 243,976 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 23 | 2023 | | 61,472 | 257,395 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 24 | 2024 | | 47,316 | 271,552 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 25 | 2025 | | 32,380 | 286,487 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 26 | 2026 | | 16,623 | 302,244 | 318,868 | | | | 112,076 | 430,944 | | | 2,922,940 | 2,922,940 | 2,491,996 |
| 27 | 2027 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 28 | 2028 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 29 | 2029 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 30 | 2030 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 31 | 2031 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 32 | 2032 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 33 | 2033 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 34 | 2034 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 35 | 2035 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 36 | 2036 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| Total | | 4,483,046 | 3,180,796 | 3,810,589 | | 446,894 | 672,457 | | | | 3,810,589 | 672,457 | | | |

(Note)

| | | | | | |
|---|---|---|---|---|---|
| | | Foreign borrow | | Local borrow | |
| (1) Interest rate of foreign loan: | | 5.50% | | 11.00% | |
| (2) Equal annual repayment amount of capital for foreign loan: | | 318,868 | For 1st year | 1,449 | |
| Repayment period: | 20 years | | For 2nd year | 33,858 | |
| Grace period: | 6 years (excluded in the repayment period) | | For 3rd year | 49,437 | |
| | | | For 4th year | 45,929 | |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.10-2 Fund Repayability Analysis for EDCO's Works with Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 17,872 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,872 | 15,191 | 2,681 | 0 | 17,872 | 0 |
| 2 | 2002 | 554,949 | 835 | 0 | 835 | 295 | 0 | 295 | 0 | 556,079 | 471,706 | 83,242 | 0 | 554,949 | -1,130 |
| 3 | 2003 | 577,178 | 26,779 | 0 | 26,779 | 9,452 | 226 | 9,678 | 14,321 | 627,956 | 490,602 | 86,577 | 107,830 | 685,008 | 57,052 |
| 4 | 2004 | 452,109 | 53,762 | 0 | 53,762 | 18,950 | 7,270 | 26,220 | 28,750 | 560,842 | 384,293 | 67,816 | 372,642 | 824,751 | 263,909 |
| 5 | 2005 | 0 | 74,899 | 0 | 74,899 | 25,610 | 15,370 | 40,980 | 40,053 | 155,931 | 0 | 0 | 546,825 | 546,825 | 390,894 |
| 6 | 2006 | | 74,899 | 0 | 74,899 | 23,920 | 22,779 | 46,698 | 40,053 | 161,650 | | | 605,824 | 605,824 | 444,174 |
| 7 | 2007 | | 74,899 | 39,055 | 113,954 | 21,414 | 25,285 | 46,698 | 40,053 | 200,705 | | | 663,939 | 663,939 | 463,234 |
| 8 | 2008 | | 72,751 | 41,203 | 113,954 | 18,633 | 28,066 | 46,698 | 40,053 | 200,705 | | | 725,470 | 725,470 | 524,765 |
| 9 | 2009 | | 70,484 | 43,469 | 113,954 | 15,545 | 31,153 | 46,698 | 40,053 | 200,705 | | | 781,253 | 781,253 | 580,548 |
| 10 | 2010 | | 68,094 | 45,860 | 113,954 | 12,118 | 34,580 | 46,698 | 40,053 | 200,705 | | | 831,169 | 831,169 | 630,464 |
| 11 | 2011 | | 65,571 | 48,383 | 113,954 | 8,315 | 37,863 | 46,178 | 40,053 | 200,184 | | | 880,844 | 880,844 | 680,660 |
| 12 | 2012 | | 62,910 | 51,044 | 113,954 | 4,150 | 25,852 | 30,002 | 40,053 | 184,008 | | | 932,006 | 932,006 | 747,998 |
| 13 | 2013 | | 60,103 | 53,851 | 113,954 | 1,306 | 11,872 | 13,178 | 40,053 | 167,185 | | | 971,111 | 971,111 | 803,926 |
| 14 | 2014 | | 57,141 | 56,813 | 113,954 | 0 | 0 | 0 | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 15 | 2015 | | 54,016 | 59,938 | 113,954 | 0 | 0 | 0 | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 16 | 2016 | | 50,720 | 63,234 | 113,954 | 0 | 0 | 0 | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 17 | 2017 | | 47,242 | 66,712 | 113,954 | 0 | 0 | 0 | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 18 | 2018 | | 43,573 | 70,381 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 19 | 2019 | | 39,702 | 74,252 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 20 | 2020 | | 35,618 | 78,336 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 21 | 2021 | | 31,309 | 82,645 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 22 | 2022 | | 26,764 | 87,190 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 23 | 2023 | | 21,968 | 91,985 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 24 | 2024 | | 16,909 | 97,045 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 25 | 2025 | | 11,572 | 102,382 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 26 | 2026 | | 5,941 | 108,013 | 113,954 | | | | 40,053 | 154,007 | | | 988,553 | 988,553 | 834,547 |
| 27 | 2027 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 28 | 2028 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 29 | 2029 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 30 | 2030 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 31 | 2031 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 32 | 2032 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 33 | 2033 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 34 | 2034 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 35 | 2035 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 36 | 2036 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| Total | | 1,602,108 | 1,148,459 | 1,361,792 | | 159,707 | 240,316 | | | | 1,361,792 | 240,316 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 5.50% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 113,954 | For 1st year | 521 |
| Repayment period: 20 years | | For 2nd year | 16,176 |
| Grace period: 6 years (excluded in the repayment period) | | For 3rd year | 16,824 |
| | | For 4th year | 13,178 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.10-3 Fund Repayability Analysis for JEPCO's Works with Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 12,739 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,739 | 10,828 | 1,911 | 0 | 12,739 | 0 |
| 2 | 2002 | 219,320 | 596 | 0 | 596 | 210 | 0 | 210 | 0 | 220,125 | 186,422 | 32,898 | 0 | 219,320 | -806 |
| 3 | 2003 | 457,587 | 10,849 | 0 | 10,849 | 3,829 | 161 | 3,990 | 5,801 | 478,227 | 388,949 | 68,638 | 48,574 | 506,161 | 27,934 |
| 4 | 2004 | 464,868 | 32,241 | 0 | 32,241 | 11,361 | 2,953 | 14,314 | 17,241 | 528,665 | 395,138 | 69,730 | 131,033 | 595,901 | 67,236 |
| 5 | 2005 | 0 | 53,974 | 0 | 53,974 | 18,707 | 9,065 | 27,772 | 28,863 | 110,609 | 0 | 0 | 442,687 | 442,687 | 332,079 |
| 6 | 2006 | | 53,974 | 0 | 53,974 | 17,710 | 15,942 | 33,652 | 28,863 | 116,488 | | | 490,369 | 490,369 | 373,880 |
| 7 | 2007 | | 53,974 | 28,144 | 82,118 | 15,956 | 17,696 | 33,652 | 28,863 | 144,632 | | | 537,401 | 537,401 | 392,768 |
| 8 | 2008 | | 52,426 | 29,692 | 82,118 | 14,010 | 19,642 | 33,652 | 28,863 | 144,632 | | | 587,233 | 587,233 | 442,601 |
| 9 | 2009 | | 50,793 | 31,325 | 82,118 | 11,849 | 21,803 | 33,652 | 28,863 | 144,632 | | | 632,358 | 632,358 | 487,726 |
| 10 | 2010 | | 49,070 | 33,048 | 82,118 | 9,451 | 24,201 | 33,652 | 28,863 | 144,632 | | | 672,776 | 672,776 | 528,143 |
| 11 | 2011 | | 47,252 | 34,866 | 82,118 | 6,788 | 26,492 | 33,281 | 28,863 | 144,261 | | | 712,991 | 712,991 | 568,729 |
| 12 | 2012 | | 45,334 | 36,783 | 82,118 | 3,874 | 23,014 | 26,888 | 28,863 | 137,868 | | | 754,382 | 754,382 | 616,514 |
| 13 | 2013 | | 43,311 | 38,806 | 82,118 | 1,343 | 12,207 | 13,550 | 28,863 | 124,531 | | | 790,539 | 790,539 | 666,008 |
| 14 | 2014 | | 41,177 | 40,941 | 82,118 | 0 | 0 | 0 | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 15 | 2015 | | 38,925 | 43,192 | 82,118 | 0 | 0 | 0 | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 16 | 2016 | | 36,550 | 45,568 | 82,118 | 0 | 0 | 0 | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 17 | 2017 | | 34,043 | 48,074 | 82,118 | 0 | 0 | 0 | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 18 | 2018 | | 31,399 | 50,718 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 19 | 2019 | | 28,610 | 53,508 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 20 | 2020 | | 25,667 | 56,451 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 21 | 2021 | | 22,562 | 59,555 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 22 | 2022 | | 19,287 | 62,831 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 23 | 2023 | | 15,831 | 66,287 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 24 | 2024 | | 12,185 | 69,933 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 25 | 2025 | | 8,339 | 73,779 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 26 | 2026 | | 4,281 | 77,837 | 82,118 | | | | 28,863 | 110,980 | | | 829,577 | 829,577 | 718,596 |
| 27 | 2027 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 28 | 2028 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 29 | 2029 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 30 | 2030 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 31 | 2031 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 32 | 2032 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 33 | 2033 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 34 | 2034 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 35 | 2035 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 36 | 2036 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| Total | | 1,154,514 | 812,648 | 981,337 | | 115,088 | 173,177 | | | | 981,337 | 173,177 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 5.50% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 82,118 | For 1st year | 371 |
| Repayment period: 20 years | | For 2nd year | 6,393 |
| Grace period: 6 years (excluded in the repayment period) | | For 3rd year | 13,338 |
| | | For 4th year | 13,550 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.10-4 Fund Repayability Analysis for IDECO's Works with Capacitors in Case of Using the Arab Fund Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Principal | Total | Local borrow: Interest | Principal | Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 19,089 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,089 | 16,226 | 2,863 | 0 | 19,089 | 0 |
| 2 | 2002 | 387,311 | 892 | 0 | 892 | 315 | 0 | 315 | 0 | 388,518 | 329,214 | 58,097 | 0 | 387,311 | -1,207 |
| 3 | 2003 | 661,303 | 18,999 | 0 | 18,999 | 6,706 | 241 | 6,947 | 10,160 | 697,410 | 562,108 | 99,196 | 76,131 | 737,434 | 40,025 |
| 4 | 2004 | 658,720 | 49,915 | 0 | 49,915 | 17,591 | 5,167 | 22,757 | 26,693 | 758,085 | 559,912 | 98,808 | 212,215 | 870,935 | 112,850 |
| 5 | 2005 | 0 | 80,710 | 0 | 80,710 | 27,891 | 14,099 | 41,990 | 43,161 | 165,861 | 0 | 0 | 593,039 | 593,039 | 427,177 |
| 6 | 2006 | | 80,710 | 0 | 80,710 | 26,340 | 23,982 | 50,322 | 43,161 | 174,193 | | | 656,984 | 656,984 | 482,791 |
| 7 | 2007 | | 80,710 | 42,086 | 122,796 | 23,702 | 26,620 | 50,322 | 43,161 | 216,279 | | | 719,952 | 719,952 | 503,673 |
| 8 | 2008 | | 78,396 | 44,400 | 122,796 | 20,774 | 29,548 | 50,322 | 43,161 | 216,279 | | | 786,656 | 786,656 | 570,378 |
| 9 | 2009 | | 75,954 | 46,843 | 122,796 | 17,524 | 32,798 | 50,322 | 43,161 | 216,279 | | | 847,162 | 847,162 | 630,883 |
| 10 | 2010 | | 73,377 | 49,419 | 122,796 | 13,916 | 36,406 | 50,322 | 43,161 | 216,279 | | | 901,341 | 901,341 | 685,062 |
| 11 | 2011 | | 70,659 | 52,137 | 122,796 | 9,911 | 39,854 | 49,766 | 43,161 | 215,722 | | | 955,265 | 955,265 | 739,543 |
| 12 | 2012 | | 67,792 | 55,004 | 122,796 | 5,527 | 32,949 | 38,476 | 43,161 | 204,433 | | | 1,010,633 | 1,010,633 | 806,200 |
| 13 | 2013 | | 64,766 | 58,030 | 122,796 | 1,903 | 17,298 | 19,200 | 43,161 | 185,157 | | | 1,057,806 | 1,057,806 | 872,649 |
| 14 | 2014 | | 61,575 | 61,221 | 122,796 | 0 | 0 | 0 | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 15 | 2015 | | 58,208 | 64,588 | 122,796 | 0 | 0 | 0 | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 16 | 2016 | | 54,655 | 68,141 | 122,796 | 0 | 0 | 0 | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 17 | 2017 | | 50,907 | 71,889 | 122,796 | 0 | 0 | 0 | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 18 | 2018 | | 46,954 | 75,842 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 19 | 2019 | | 42,782 | 80,014 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 20 | 2020 | | 38,382 | 84,415 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 21 | 2021 | | 33,739 | 89,057 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 22 | 2022 | | 28,841 | 93,955 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 23 | 2023 | | 23,673 | 99,123 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 24 | 2024 | | 18,221 | 104,575 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 25 | 2025 | | 12,470 | 110,326 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 26 | 2026 | | 6,402 | 116,394 | 122,796 | | | | 43,161 | 165,957 | | | 1,104,809 | 1,104,809 | 938,853 |
| 27 | 2027 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 28 | 2028 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 29 | 2029 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 30 | 2030 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 31 | 2031 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 32 | 2032 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 33 | 2033 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 34 | 2034 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 35 | 2035 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 36 | 2036 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| Total | | 1,726,423 | 1,219,689 | 1,467,460 | | 172,099 | 258,963 | | | | 1,467,460 | 258,963 | | | |

(Note)

| | Foreign borrow | | Local borrow |
|---|---|---|---|
| (1) Interest rate of foreign loan: | 5.50% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | 122,796 | For 1st year | 556 |
| Repayment period: 20 years | | For 2nd year | 11,289 |
| Grace period: 6 years (excluded in the repayment period) | | For 3rd year | 19,276 |
| | | For 4th year | 19,200 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.11-1 Fund Repayability Analysis for the Whole Project with Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 49,700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49,700 | 42,245 | 7,455 | 0 | 49,700 | 0 |
| 2 | 2002 | 1,161,579 | 2,957 | 0 | 2,957 | 820 | 0 | 820 | 0 | 1,165,356 | 987,342 | 174,237 | 0 | 1,161,579 | -3,777 |
| 3 | 2003 | 1,696,069 | 72,071 | 0 | 72,071 | 19,986 | 629 | 20,615 | 30,282 | 1,819,037 | 1,441,658 | 254,410 | 232,535 | 1,928,604 | 109,567 |
| 4 | 2004 | 1,575,698 | 172,987 | 0 | 172,987 | 47,902 | 15,390 | 63,292 | 72,684 | 1,884,660 | 1,339,343 | 236,355 | 715,890 | 2,291,587 | 406,927 |
| 5 | 2005 | 0 | 266,741 | 0 | 266,741 | 72,208 | 38,535 | 110,743 | 112,076 | 489,560 | 0 | 0 | 1,582,551 | 1,582,551 | 1,092,991 |
| 6 | 2006 | | 266,741 | 92,951 | 359,693 | 67,969 | 62,703 | 130,673 | 112,076 | 602,441 | | | 1,753,176 | 1,753,176 | 1,150,735 |
| 7 | 2007 | | 260,235 | 99,458 | 359,693 | 61,072 | 69,600 | 130,673 | 112,076 | 602,441 | | | 1,921,292 | 1,921,292 | 1,318,850 |
| 8 | 2008 | | 253,273 | 106,420 | 359,693 | 53,416 | 77,256 | 130,673 | 112,076 | 602,441 | | | 2,099,359 | 2,099,359 | 1,496,918 |
| 9 | 2009 | | 245,823 | 113,869 | 359,693 | 44,918 | 85,755 | 130,673 | 112,076 | 602,441 | | | 2,260,773 | 2,260,773 | 1,658,332 |
| 10 | 2010 | | 237,852 | 121,840 | 359,693 | 35,485 | 95,188 | 130,673 | 112,076 | 602,441 | | | 2,405,286 | 2,405,286 | 1,802,845 |
| 11 | 2011 | | 229,323 | 130,369 | 359,693 | 25,014 | 104,210 | 129,224 | 112,076 | 600,993 | | | 2,549,100 | 2,549,100 | 1,948,107 |
| 12 | 2012 | | 220,198 | 139,495 | 359,693 | 13,551 | 81,815 | 95,366 | 112,076 | 567,135 | | | 2,697,021 | 2,697,021 | 2,129,886 |
| 13 | 2013 | | 210,433 | 149,260 | 359,693 | 4,551 | 41,377 | 45,929 | 112,076 | 517,697 | | | 2,819,456 | 2,819,456 | 2,301,758 |
| 14 | 2014 | | 199,985 | 159,708 | 359,693 | 0 | 0 | 0 | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 15 | 2015 | | 188,805 | 170,887 | 359,693 | 0 | 0 | 0 | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 16 | 2016 | | 176,843 | 182,849 | 359,693 | 0 | 0 | 0 | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 17 | 2017 | | 164,044 | 195,649 | 359,693 | 0 | 0 | 0 | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 18 | 2018 | | 150,348 | 209,344 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 19 | 2019 | | 135,694 | 223,998 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 20 | 2020 | | 120,014 | 239,678 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 21 | 2021 | | 103,237 | 256,456 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 22 | 2022 | | 85,285 | 274,408 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 23 | 2023 | | 66,076 | 293,616 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 24 | 2024 | | 45,523 | 314,169 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 25 | 2025 | | 23,531 | 336,161 | 359,693 | | | | 112,076 | 471,769 | | | 2,922,940 | 2,922,940 | 2,451,171 |
| 26 | 2026 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 27 | 2027 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 28 | 2028 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 29 | 2029 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 30 | 2030 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 31 | 2031 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 32 | 2032 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 33 | 2033 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 34 | 2034 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 35 | 2035 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 36 | 2036 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| Total | | 4,483,046 | 3,898,020 | 3,810,589 | | 446,894 | 672,457 | | | | 3,810,589 | 672,457 | | | |

(Note)

| | | | | |
|---|---|---|---|---|
| | | Foreign borrow | | Local borrow |
| (1) Interest rate of foreign loan: | | 7.00% | | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | | 359,693 | For 1st year | 1,449 |
| Repayment period: | 25 years | | For 2nd year | 33,858 |
| Grace period: | 5 years (excluded in the repayment period) | | For 3rd year | 49,437 |
| | | | For 4th year | 45,929 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.11-2 Fund Repayability Analysis for EDCO's Works with Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | In flow: Local borrow | In flow: Revenue (operating expense to be saved) | In flow: Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Interest for international loan to be paid | | | | | | | | | | | | |
| 1 | 2001 | 17,872 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,872 | 15,191 | 2,681 | 0 | 17,872 | 0 |
| 2 | 2002 | 554,949 | 1,063 | 0 | 1,063 | 295 | 0 | 295 | 0 | 556,307 | 471,706 | 83,242 | 0 | 554,949 | -1,358 |
| 3 | 2003 | 577,178 | 34,083 | 0 | 34,083 | 9,452 | 226 | 9,678 | 14,321 | 635,259 | 490,602 | 86,577 | 107,830 | 685,008 | 49,749 |
| 4 | 2004 | 452,109 | 68,425 | 0 | 68,425 | 18,950 | 7,270 | 26,220 | 28,750 | 575,504 | 384,293 | 67,816 | 372,642 | 824,751 | 249,247 |
| 5 | 2005 | 0 | 95,325 | 0 | 95,325 | 25,610 | 15,370 | 40,980 | 40,053 | 176,358 | 0 | 0 | 546,825 | 546,825 | 370,467 |
| 6 | 2006 | | 95,325 | 33,218 | 128,544 | 23,920 | 22,779 | 46,698 | 40,053 | 215,295 | | | 605,824 | 605,824 | 390,529 |
| 7 | 2007 | | 93,000 | 35,543 | 128,544 | 21,414 | 25,285 | 46,698 | 40,053 | 215,295 | | | 663,939 | 663,939 | 448,644 |
| 8 | 2008 | | 90,512 | 38,031 | 128,544 | 18,633 | 28,066 | 46,698 | 40,053 | 215,295 | | | 725,470 | 725,470 | 510,175 |
| 9 | 2009 | | 87,850 | 40,694 | 128,544 | 15,545 | 31,153 | 46,698 | 40,053 | 215,295 | | | 781,253 | 781,253 | 565,959 |
| 10 | 2010 | | 85,001 | 43,542 | 128,544 | 12,118 | 34,580 | 46,698 | 40,053 | 215,295 | | | 831,169 | 831,169 | 615,875 |
| 11 | 2011 | | 81,953 | 46,590 | 128,544 | 8,315 | 37,863 | 46,178 | 40,053 | 214,774 | | | 880,844 | 880,844 | 666,070 |
| 12 | 2012 | | 78,692 | 49,851 | 128,544 | 4,150 | 25,852 | 30,002 | 40,053 | 198,598 | | | 932,006 | 932,006 | 733,408 |
| 13 | 2013 | | 75,203 | 53,341 | 128,544 | 1,306 | 11,872 | 13,178 | 40,053 | 181,774 | | | 971,111 | 971,111 | 789,337 |
| 14 | 2014 | | 71,469 | 57,075 | 128,544 | 0 | 0 | 0 | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 15 | 2015 | | 67,473 | 61,070 | 128,544 | 0 | 0 | 0 | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 16 | 2016 | | 63,199 | 65,345 | 128,544 | 0 | 0 | 0 | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 17 | 2017 | | 58,624 | 69,919 | 128,544 | 0 | 0 | 0 | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 18 | 2018 | | 53,730 | 74,813 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 19 | 2019 | | 48,493 | 80,050 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 20 | 2020 | | 42,890 | 85,654 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 21 | 2021 | | 36,894 | 91,650 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 22 | 2022 | | 30,478 | 98,065 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 23 | 2023 | | 23,614 | 104,930 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 24 | 2024 | | 16,269 | 112,275 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 25 | 2025 | | 8,409 | 120,134 | 128,544 | | | | 40,053 | 168,596 | | | 988,553 | 988,553 | 819,957 |
| 26 | 2026 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 27 | 2027 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 28 | 2028 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 29 | 2029 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 30 | 2030 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 31 | 2031 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 32 | 2032 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 33 | 2033 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 34 | 2034 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 35 | 2035 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 36 | 2036 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| Total | | 1,602,108 | 1,407,975 | 1,361,792 | | 159,707 | 240,316 | | | | 1,361,792 | 240,316 | | | |

(Note)

| | | Foreign borrow | | Local borrow |
|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | 128,544 | For 1st year | 521 |
| | Repayment period: 25 years | | For 2nd year | 16,176 |
| | Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 16,824 |
| | | | For 4th year | 13,178 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.11-3 Fund Repayability Analysis for JEPCO's Works with Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 12,739 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,739 | 10,828 | 1,911 | 0 | 12,739 | 0 |
| 2 | 2002 | 219,320 | 758 | 0 | 758 | 210 | 0 | 210 | 0 | 220,288 | 186,422 | 32,898 | 0 | 219,320 | -968 |
| 3 | 2003 | 457,587 | 13,808 | 0 | 13,808 | 3,829 | 161 | 3,990 | 5,801 | 481,186 | 388,949 | 68,638 | 48,574 | 506,161 | 24,975 |
| 4 | 2004 | 464,868 | 41,034 | 0 | 41,034 | 11,361 | 2,953 | 14,314 | 17,241 | 537,458 | 395,138 | 69,730 | 131,033 | 595,901 | 58,443 |
| 5 | 2005 | 0 | 68,694 | 0 | 68,694 | 18,707 | 9,065 | 27,772 | 28,863 | 125,329 | 0 | 0 | 442,687 | 442,687 | 317,359 |
| 6 | 2006 | | 68,694 | 23,938 | 92,631 | 17,710 | 15,942 | 33,652 | 40,053 | 166,336 | | | 490,369 | 490,369 | 324,033 |
| 7 | 2007 | | 67,018 | 25,613 | 92,631 | 15,956 | 17,696 | 33,652 | 40,053 | 166,336 | | | 537,401 | 537,401 | 371,065 |
| 8 | 2008 | | 65,225 | 27,406 | 92,631 | 14,010 | 19,642 | 33,652 | 40,053 | 166,336 | | | 587,233 | 587,233 | 420,897 |
| 9 | 2009 | | 63,307 | 29,325 | 92,631 | 11,849 | 21,803 | 33,652 | 40,053 | 166,336 | | | 632,358 | 632,358 | 466,022 |
| 10 | 2010 | | 61,254 | 31,377 | 92,631 | 9,451 | 24,201 | 33,652 | 40,053 | 166,336 | | | 672,776 | 672,776 | 506,440 |
| 11 | 2011 | | 59,057 | 33,574 | 92,631 | 6,788 | 26,492 | 33,281 | 40,053 | 165,965 | | | 712,991 | 712,991 | 547,026 |
| 12 | 2012 | | 56,707 | 35,924 | 92,631 | 3,874 | 23,014 | 26,888 | 40,053 | 159,572 | | | 754,382 | 754,382 | 594,810 |
| 13 | 2013 | | 54,193 | 38,439 | 92,631 | 1,343 | 12,207 | 13,550 | 40,053 | 146,234 | | | 790,539 | 790,539 | 644,305 |
| 14 | 2014 | | 51,502 | 41,129 | 92,631 | 0 | 0 | 0 | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 15 | 2015 | | 48,623 | 44,008 | 92,631 | 0 | 0 | 0 | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 16 | 2016 | | 45,542 | 47,089 | 92,631 | 0 | 0 | 0 | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 17 | 2017 | | 42,246 | 50,385 | 92,631 | 0 | 0 | 0 | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 18 | 2018 | | 38,719 | 53,912 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 19 | 2019 | | 34,945 | 57,686 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 20 | 2020 | | 30,907 | 61,724 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 21 | 2021 | | 26,586 | 66,045 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 22 | 2022 | | 21,963 | 70,668 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 23 | 2023 | | 17,017 | 75,615 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 24 | 2024 | | 11,724 | 80,908 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 25 | 2025 | | 6,060 | 86,571 | 92,631 | | | | 40,053 | 132,684 | | | 829,577 | 829,577 | 696,893 |
| 26 | 2026 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 27 | 2027 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 28 | 2028 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 29 | 2029 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 30 | 2030 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 31 | 2031 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 32 | 2032 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 33 | 2033 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 34 | 2034 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 35 | 2035 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| 36 | 2036 | | | | | | | | 40,053 | 40,053 | | | 829,577 | 829,577 | 789,524 |
| Total | | 1,154,514 | 995,582 | 981,337 | | 115,088 | 173,177 | | | | 981,337 | 173,177 | | | |

(Note)

| | | | | Foreign borrow | | Local borrow |
|---|---|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | | | 7.00% | | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | | | 92,631 | For 1st year | 371 |
| | Repayment period: | 25 | years | | For 2nd year | 6,393 |
| | Grace period: | 5 | years (excluded in the repayment period) | | For 3rd year | 13,338 |
| | | | | | For 4th year | 13,550 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.11-4 Fund Repayability Analysis for IDECO's Works with Capacitors in Case of Using the International Commercial Loan of Public Financing Institution

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 19,089 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,089 | 16,226 | 2,863 | 0 | 19,089 | 0 |
| 2 | 2002 | 387,311 | 1,136 | 0 | 1,136 | 315 | 0 | 315 | 0 | 388,762 | 329,214 | 58,097 | 0 | 387,311 | -1,451 |
| 3 | 2003 | 661,303 | 24,181 | 0 | 24,181 | 6,706 | 241 | 6,947 | 10,160 | 702,591 | 562,108 | 99,196 | 76,131 | 737,434 | 34,843 |
| 4 | 2004 | 658,720 | 63,528 | 0 | 63,528 | 17,591 | 5,167 | 22,757 | 26,693 | 771,698 | 559,912 | 98,808 | 212,215 | 870,935 | 99,237 |
| 5 | 2005 | 0 | 102,722 | 0 | 102,722 | 27,891 | 14,099 | 41,990 | 43,161 | 187,873 | 0 | 0 | 593,039 | 593,039 | 405,166 |
| 6 | 2006 | | 102,722 | 35,796 | 138,518 | 26,340 | 23,982 | 50,322 | 43,161 | 232,000 | | | 656,984 | 656,984 | 424,983 |
| 7 | 2007 | | 100,216 | 38,301 | 138,518 | 23,702 | 26,620 | 50,322 | 43,161 | 232,000 | | | 719,952 | 719,952 | 487,951 |
| 8 | 2008 | | 97,535 | 40,982 | 138,518 | 20,774 | 29,548 | 50,322 | 43,161 | 232,000 | | | 786,656 | 786,656 | 554,656 |
| 9 | 2009 | | 94,667 | 43,851 | 138,518 | 17,524 | 32,798 | 50,322 | 43,161 | 232,000 | | | 847,162 | 847,162 | 615,161 |
| 10 | 2010 | | 91,597 | 46,921 | 138,518 | 13,916 | 36,406 | 50,322 | 43,161 | 232,000 | | | 901,341 | 901,341 | 669,340 |
| 11 | 2011 | | 88,313 | 50,205 | 138,518 | 9,911 | 39,854 | 49,766 | 43,161 | 231,444 | | | 955,265 | 955,265 | 723,821 |
| 12 | 2012 | | 84,798 | 53,720 | 138,518 | 5,527 | 32,949 | 38,476 | 43,161 | 220,155 | | | 1,010,633 | 1,010,633 | 790,478 |
| 13 | 2013 | | 81,038 | 57,480 | 138,518 | 1,903 | 17,298 | 19,200 | 43,161 | 200,879 | | | 1,057,806 | 1,057,806 | 856,927 |
| 14 | 2014 | | 77,014 | 61,504 | 138,518 | 0 | 0 | 0 | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 15 | 2015 | | 72,709 | 65,809 | 138,518 | 0 | 0 | 0 | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 16 | 2016 | | 68,102 | 70,415 | 138,518 | 0 | 0 | 0 | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 17 | 2017 | | 63,173 | 75,345 | 138,518 | 0 | 0 | 0 | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 18 | 2018 | | 57,899 | 80,619 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 19 | 2019 | | 52,256 | 86,262 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 20 | 2020 | | 46,218 | 92,300 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 21 | 2021 | | 39,757 | 98,761 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 22 | 2022 | | 32,843 | 105,675 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 23 | 2023 | | 25,446 | 113,072 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 24 | 2024 | | 17,531 | 120,987 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 25 | 2025 | | 9,062 | 129,456 | 138,518 | | | | 43,161 | 181,678 | | | 1,104,809 | 1,104,809 | 923,131 |
| 26 | 2026 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 27 | 2027 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 28 | 2028 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 29 | 2029 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 30 | 2030 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 31 | 2031 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 32 | 2032 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 33 | 2033 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 34 | 2034 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 35 | 2035 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 36 | 2036 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| Total | | 1,726,423 | 1,494,464 | 1,467,460 | | 172,099 | 258,963 | | | | 1,467,460 | 258,963 | | | |

(Note)

| | | Foreign borrow | | Local borrow |
|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | 7.00% | | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | 138,518 | For 1st year | 556 |
| | Repayment period: 25 years | | For 2nd year | 11,289 |
| | Grace period: 5 years (excluded in the repayment period) | | For 3rd year | 19,276 |
| | | | For 4th year | 19,200 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

## Appendix 10.12-1 Fund Repayability Analysis for the Whole Project with Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 49,700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49,700 | 42,245 | 7,455 | 0 | 49,700 | 0 |
| 2 | 2002 | 1,161,579 | 3,591 | 0 | 3,591 | 820 | 0 | 820 | 0 | 1,165,990 | 987,342 | 174,237 | 0 | 1,161,579 | -4,411 |
| 3 | 2003 | 1,696,069 | 87,515 | 3,901 | 91,415 | 19,986 | 629 | 20,615 | 30,282 | 1,838,381 | 1,441,658 | 254,410 | 232,535 | 1,928,604 | 90,223 |
| 4 | 2004 | 1,575,698 | 209,724 | 95,394 | 305,118 | 47,902 | 15,390 | 63,292 | 72,684 | 2,016,791 | 1,339,343 | 236,355 | 715,890 | 2,291,587 | 274,796 |
| 5 | 2005 | 0 | 315,460 | 236,612 | 552,072 | 72,208 | 38,535 | 110,743 | 112,076 | 774,891 | 0 | 0 | 1,582,551 | 1,582,551 | 807,660 |
| 6 | 2006 | | 295,348 | 380,386 | 675,734 | 67,969 | 62,703 | 130,673 | 112,076 | 918,483 | | | 1,753,176 | 1,753,176 | 834,694 |
| 7 | 2007 | | 263,015 | 412,719 | 675,734 | 61,072 | 69,600 | 130,673 | 112,076 | 918,483 | | | 1,921,292 | 1,921,292 | 1,002,809 |
| 8 | 2008 | | 227,934 | 447,800 | 675,734 | 53,416 | 77,256 | 130,673 | 112,076 | 918,483 | | | 2,099,359 | 2,099,359 | 1,180,876 |
| 9 | 2009 | | 189,871 | 485,863 | 675,734 | 44,918 | 85,755 | 130,673 | 112,076 | 918,483 | | | 2,260,773 | 2,260,773 | 1,342,291 |
| 10 | 2010 | | 148,573 | 527,161 | 675,734 | 35,485 | 95,188 | 130,673 | 112,076 | 918,483 | | | 2,405,286 | 2,405,286 | 1,486,803 |
| 11 | 2011 | | 103,764 | 564,479 | 668,243 | 25,014 | 104,210 | 129,224 | 112,076 | 909,543 | | | 2,549,100 | 2,549,100 | 1,639,557 |
| 12 | 2012 | | 55,783 | 437,374 | 493,157 | 13,551 | 81,815 | 95,366 | 112,076 | 700,599 | | | 2,697,021 | 2,697,021 | 1,996,422 |
| 13 | 2013 | | 18,607 | 218,900 | 237,507 | 4,551 | 41,377 | 45,929 | 112,076 | 395,511 | | | 2,819,456 | 2,819,456 | 2,423,945 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 27 | 2027 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 28 | 2028 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 29 | 2029 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 30 | 2030 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 31 | 2031 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 32 | 2032 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 33 | 2033 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 34 | 2034 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 35 | 2035 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| 36 | 2036 | | | | | | | | 112,076 | 112,076 | | | 2,922,940 | 2,922,940 | 2,810,863 |
| Total | | 4,483,046 | 1,919,185 | 3,810,589 | | 446,894 | 672,457 | | | | 3,810,589 | 672,457 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign and local loans:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 7,491 | 1,449 |
| For 2nd year | 175,086 | 33,858 |
| For 3rd year | 255,650 | 49,437 |
| For 4th year | 237,507 | 45,929 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

(4) Operation and maintenance cost: 1,232

## Appendix 10.12-2 Fund Repayability Analysis for EDCO's Works with Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 17,872 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,872 | 15,191 | 2,681 | 0 | 17,872 | 0 |
| 2 | 2002 | 554,949 | 1,291 | 0 | 1,291 | 295 | 0 | 295 | 0 | 556,535 | 471,706 | 83,242 | 0 | 554,949 | -1,586 |
| 3 | 2003 | 577,178 | 41,386 | 1,403 | 42,789 | 9,452 | 226 | 9,678 | 14,321 | 643,965 | 490,602 | 86,577 | 107,830 | 685,008 | 41,043 |
| 4 | 2004 | 452,109 | 82,968 | 45,075 | 128,043 | 18,950 | 7,270 | 26,220 | 28,750 | 635,122 | 384,293 | 67,816 | 372,642 | 824,751 | 189,629 |
| 5 | 2005 | 0 | 111,802 | 94,204 | 206,005 | 25,610 | 15,370 | 40,980 | 40,053 | 287,038 | 0 | 0 | 546,825 | 546,825 | 259,787 |
| 6 | 2006 | | 103,794 | 137,693 | 241,487 | 23,920 | 22,779 | 46,698 | 40,053 | 328,239 | | | 605,824 | 605,824 | 277,585 |
| 7 | 2007 | | 92,091 | 149,397 | 241,487 | 21,414 | 25,285 | 46,698 | 40,053 | 328,239 | | | 663,939 | 663,939 | 335,700 |
| 8 | 2008 | | 79,392 | 162,096 | 241,487 | 18,633 | 28,066 | 46,698 | 40,053 | 328,239 | | | 725,470 | 725,470 | 397,231 |
| 9 | 2009 | | 65,614 | 175,874 | 241,487 | 15,545 | 31,153 | 46,698 | 40,053 | 328,239 | | | 781,253 | 781,253 | 453,015 |
| 10 | 2010 | | 50,664 | 190,823 | 241,487 | 12,118 | 34,580 | 46,698 | 40,053 | 328,239 | | | 831,169 | 831,169 | 502,931 |
| 11 | 2011 | | 34,444 | 204,349 | 238,794 | 8,315 | 37,863 | 46,178 | 40,053 | 325,024 | | | 880,844 | 880,844 | 555,820 |
| 12 | 2012 | | 17,075 | 138,071 | 155,146 | 4,150 | 25,852 | 30,002 | 40,053 | 225,200 | | | 932,006 | 932,006 | 706,806 |
| 13 | 2013 | | 5,339 | 62,808 | 68,147 | 1,306 | 11,872 | 13,178 | 40,053 | 121,378 | | | 971,111 | 971,111 | 849,733 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 27 | 2027 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 28 | 2028 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 29 | 2029 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 30 | 2030 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 31 | 2031 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 32 | 2032 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 33 | 2033 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 34 | 2034 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 35 | 2035 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| 36 | 2036 | | | | | | | | 40,053 | 40,053 | | | 988,553 | 988,553 | 948,501 |
| Total | | 1,602,108 | 685,860 | 1,361,792 | | 159,707 | 240,316 | | | | 1,361,792 | 240,316 | | | |

(Note)

| | | | | Foreign borrow | Local borrow |
|---|---|---|---|---|---|
| (1) | Interest rate of foreign loan: | | | 8.50% | 11.00% |
| (2) | Equal annual repayment amount of capital for foreign loan: | | For 1st year | 2,694 | 521 |
| | Repayment period: | 10 years | For 2nd year | 83,648 | 16,176 |
| | Grace period: | 2 years (included in the repayment period) | For 3rd year | 86,999 | 16,824 |
| | | | For 4th year | 68,147 | 13,178 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

(4) Operation and maintenance cost: 1,232

## Appendix 10.12-3 Fund Repayability Analysis for JEPCO's Works with Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow: Const-ruction cost | Repayment for foreign borrow: Interest | Repayment for foreign borrow: Principal | Repayment for foreign borrow: Total | Local borrow: Interest | Local borrow: Principal | Local borrow: Total | O/M cost 2.50% | Total out flow | In flow: Foreign borrow | Local borrow | Revenue (operating expense to be saved) | Total in flow | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2001 | 12,739 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,739 | 10,828 | 1,911 | 0 | 12,739 | 0 |
| 2 | 2002 | 219,320 | 920 | 0 | 920 | 210 | 0 | 210 | 0 | 220,450 | 186,422 | 32,898 | 0 | 219,320 | -1,131 |
| 3 | 2003 | 457,587 | 16,766 | 1,000 | 17,766 | 3,829 | 161 | 3,990 | 5,801 | 485,145 | 388,949 | 68,638 | 48,574 | 506,161 | 21,017 |
| 4 | 2004 | 464,868 | 49,742 | 18,297 | 68,039 | 11,361 | 2,953 | 14,314 | 17,241 | 564,463 | 395,138 | 69,730 | 131,033 | 595,901 | 31,438 |
| 5 | 2005 | 0 | 81,773 | 55,764 | 137,538 | 18,707 | 9,065 | 27,772 | 28,863 | 194,173 | 0 | 0 | 442,687 | 442,687 | 248,514 |
| 6 | 2006 | | 77,033 | 96,988 | 174,021 | 17,710 | 15,942 | 33,652 | 28,863 | 236,536 | | | 490,369 | 490,369 | 253,833 |
| 7 | 2007 | | 68,789 | 105,232 | 174,021 | 15,956 | 17,696 | 33,652 | 28,863 | 236,536 | | | 537,401 | 537,401 | 300,865 |
| 8 | 2008 | | 59,845 | 114,176 | 174,021 | 14,010 | 19,642 | 33,652 | 28,863 | 236,536 | | | 587,233 | 587,233 | 350,697 |
| 9 | 2009 | | 50,140 | 123,881 | 174,021 | 11,849 | 21,803 | 33,652 | 28,863 | 236,536 | | | 632,358 | 632,358 | 395,822 |
| 10 | 2010 | | 39,610 | 134,411 | 174,021 | 9,451 | 24,201 | 33,652 | 28,863 | 236,536 | | | 672,776 | 672,776 | 436,240 |
| 11 | 2011 | | 28,185 | 143,916 | 172,101 | 6,788 | 26,492 | 33,281 | 28,863 | 234,244 | | | 712,991 | 712,991 | 478,746 |
| 12 | 2012 | | 15,952 | 123,091 | 139,043 | 3,874 | 23,014 | 26,888 | 28,863 | 194,793 | | | 754,382 | 754,382 | 559,589 |
| 13 | 2013 | | 5,489 | 64,581 | 70,070 | 1,343 | 12,207 | 13,550 | 28,863 | 112,483 | | | 790,539 | 790,539 | 678,056 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 27 | 2027 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 28 | 2028 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 29 | 2029 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 30 | 2030 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 31 | 2031 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 32 | 2032 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 33 | 2033 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 34 | 2034 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 35 | 2035 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| 36 | 2036 | | | | | | | | 28,863 | 28,863 | | | 829,577 | 829,577 | 800,714 |
| Total | | 1,154,514 | 494,246 | 981,337 | | 115,088 | 173,177 | | | | 981,337 | 173,177 | | | |

(Note)

(1) Interest rate of foreign loan:

| | Foreign borrow | Local borrow |
|---|---|---|
| | 8.50% | 11.00% |

(2) Equal annual repayment amount of capital for foreign loan:

Repayment period: 10 years

Grace period: 2 years (included in the repayment period)

| | Foreign borrow | Local borrow |
|---|---|---|
| For 1st year | 1,920 | 371 |
| For 2nd year | 33,058 | 6,393 |
| For 3rd year | 68,973 | 13,338 |
| For 4th year | 70,070 | 13,550 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

(4) Operation and maintenance cost: 1,232

## Appendix 10.12-4 Fund Repayability Analysis for IDECO's Works with Capacitors in Case of Using the International Private Commercial Loan

(JDs.)

| Year in order | Year | Outflow | | | | | | | | | In flow | | | | Cash balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Repayment for foreign borrow | | | Local borrow | | | | | | | Revenue | | |
| | | Const-ruction cost | Interest | Principal | Total | Interest | Principal | Total | O/M cost 2.50% | Total out flow | Foreign borrow | Local borrow | (operating expense to be saved) | Total in flow | |
| 1 | 2001 | 19,089 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19,089 | 16,226 | 2,863 | 0 | 19,089 | 0 |
| 2 | 2002 | 387,311 | 1,379 | 0 | 1,379 | 315 | 0 | 315 | 0 | 389,005 | 329,214 | 58,097 | 0 | 387,311 | -1,694 |
| 3 | 2003 | 661,303 | 29,362 | 1,498 | 30,861 | 6,706 | 241 | 6,947 | 10,160 | 709,271 | 562,108 | 99,196 | 76,131 | 737,434 | 28,163 |
| 4 | 2004 | 658,720 | 77,014 | 32,022 | 109,036 | 17,591 | 5,167 | 22,757 | 26,693 | 817,206 | 559,912 | 98,808 | 212,215 | 870,935 | 53,729 |
| 5 | 2005 | 0 | 121,885 | 86,644 | 208,529 | 27,891 | 14,099 | 41,990 | 43,161 | 293,680 | 0 | 0 | 593,039 | 593,039 | 299,359 |
| 6 | 2006 | | 114,520 | 145,705 | 260,226 | 26,340 | 23,982 | 50,322 | 43,161 | 353,708 | | | 656,984 | 656,984 | 303,275 |
| 7 | 2007 | | 102,135 | 158,090 | 260,226 | 23,702 | 26,620 | 50,322 | 43,161 | 353,708 | | | 719,952 | 719,952 | 366,244 |
| 8 | 2008 | | 88,698 | 171,528 | 260,226 | 20,774 | 29,548 | 50,322 | 43,161 | 353,708 | | | 786,656 | 786,656 | 432,948 |
| 9 | 2009 | | 74,118 | 186,108 | 260,226 | 17,524 | 32,798 | 50,322 | 43,161 | 353,708 | | | 847,162 | 847,162 | 493,454 |
| 10 | 2010 | | 58,298 | 201,927 | 260,226 | 13,916 | 36,406 | 50,322 | 43,161 | 353,708 | | | 901,341 | 901,341 | 547,633 |
| 11 | 2011 | | 41,135 | 216,214 | 257,348 | 9,911 | 39,854 | 49,766 | 43,161 | 350,275 | | | 955,265 | 955,265 | 604,991 |
| 12 | 2012 | | 22,756 | 176,212 | 198,969 | 5,527 | 32,949 | 38,476 | 43,161 | 280,605 | | | 1,010,633 | 1,010,633 | 730,028 |
| 13 | 2013 | | 7,778 | 91,511 | 99,290 | 1,903 | 17,298 | 19,200 | 43,161 | 161,651 | | | 1,057,806 | 1,057,806 | 896,155 |
| 14 | 2014 | | 0 | 0 | 0 | 0 | 0 | 0 | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 15 | 2015 | | 0 | 0 | 0 | 0 | 0 | 0 | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 16 | 2016 | | 0 | 0 | 0 | 0 | 0 | 0 | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 17 | 2017 | | 0 | 0 | 0 | 0 | 0 | 0 | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 18 | 2018 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 19 | 2019 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 20 | 2020 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 21 | 2021 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 22 | 2022 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 23 | 2023 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 24 | 2024 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 25 | 2025 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 26 | 2026 | | 0 | 0 | 0 | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 27 | 2027 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 28 | 2028 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 29 | 2029 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 30 | 2030 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 31 | 2031 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 32 | 2032 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 33 | 2033 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 34 | 2034 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 35 | 2035 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| 36 | 2036 | | | | | | | | 43,161 | 43,161 | | | 1,104,809 | 1,104,809 | 1,061,649 |
| Total | | 1,726,423 | 739,079 | 1,467,460 | | 172,099 | 258,963 | | | | 1,467,460 | 258,963 | | | |

(Note)

| | | | Foreign borrow | Local borrow |
|---|---|---|---|---|
| (1) Interest rate of foreign loan: | | | 8.50% | 11.00% |
| (2) Equal annual repayment amount of capital for foreign loan: | | For 1st year | 2,877 | 556 |
| Repayment period: | 10 years | For 2nd year | 58,380 | 11,289 |
| Grace period: | 2 years (included in the repayment period) | For 3rd year | 99,679 | 19,276 |
| | | For 4th year | 99,290 | 19,200 |

(3) Coverage ratio of loan amount to the total Project cost: 85.00%

(4) Operation and maintenance cost: 1,232

# *CHAPTER XI*

# *RECOMMENDATION*

# Chapter 11 Recommendation

The result of the study and recommendation for distribution loss reduction are summarized in this chapter. The result of the study briefly summarized including features of target feeders studied, policy of the selection of respective alternatives, effect on environment in terms of emission of gases such as $CO_2$ and economic and financial analysis.

## 11.1 Summary of the Study

Target LV feeders have been selected based on the load current of more than 100 amps and total length. of the feeder. MV target feeders have been chosen based on the request of Jordanian counterparts. Features and situation of respective MV and LV target feeders are summarized in the table 11.1-1 and 11.1-2 as shown below.

**Table 11.1-1 Currents, Lengths and Power factors of LV target feeders (1999yr)**

| | The Number of LV Target Feeders in Peak Current | | | | | | | | | | Current | | Line Length | | Ave. p.f |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ～75 (A) | ～100 (A) | ～125 (A) | ～150 (A) | ～175 (A) | ～200 (A) | ～225 (A) | ～250 (A) | Over 250(A) | Total | Total (kA) | Ave. (A) | Total (km) | Ave. (km) | |
| EDCO | 1 | 5 | 31 | 39 | 32 | 13 | 5 | 11 | 11 | 148 | 24.2 | 163 | 262.4 | 1.77 | 0.817 |
| JEPCO | 3 | 10 | 9 | 18 | 15 | 12 | 9 | 4 | 20 | 100 | 18.5 | 185 | 105.6 | 1.06 | 0.820 |
| IDECO | 11 | 16 | 22 | 21 | 37 | 13 | 9 | 13 | 8 | 150 | 23.2 | 155 | 313.7 | 2.09 | 0.820 |
| Total | 15 | 31 | 62 | 78 | 84 | 38 | 23 | 28 | 39 | 398 | 65.9 | 166 | 681.7 | 1.71 | 0.819 |

**Table 11.1-2 MV Target Feeder (1999yr)**

| Distribution Company | Name of Line | Main Substation | Total Line Length (km) | Capacity (MVA) [A] | Load (A) | Power Factor |
|---|---|---|---|---|---|---|
| EDCO | Wadi Musa | Ma'an | 156 | 15.5 (271) | 157 | 0.84 |
| | Tafila | Rashada | 28 | 15.5 (271) | 92 | 0.82 |
| | JV2 | Subeih | 125 | 15.9 (278) | 194 | 0.80 |
| JEPCO | Duleel | Zarka | 48 | 19.4 (340) | 167 | 0.80 |
| | Madaba | QAIA | 156 | 19.4 (340) | 283 | 0.88 |
| IDECO | Jarash | Rihab | 155 | 15.5 (271) | 246 | 0.83 |
| | Emrawa | Irbid | 163 | 20.0 (350) | 250 | 0.82 |
| | Samma | Irbid | 182 | 20.0 (350) | 367 | 0.84 |

Installation of capacitors for power factor correction was not included in the items of the study for distribution power loss reduction. Taking into effectiveness of power factor correction to reduce investment in reinforcement of distribution system itself and by strong request from Jordanian side, power factor correction has been studied as a base case, and reinforcement or improvement on distribution system such as new line installation and higher voltage introduction have been examined in combination with capacitors.

The objective of the study is to obtain maximum benefit from power loss reduction though; maintaining operating voltage within permissible level is also important quality of distribution service. The selection of improvement measures for respective feeders has been carried out based on the criteria: The most net-beneficial measure among alternatives should be selected that can maintain system voltage within 10% in the initial year of the commissioning of the remedy. As the investment in MV system for loss reduction is relatively larger, remedy has been selected based on the recovery period of investment by comparison of I.E factor in case the difference of the amount of net-benefit is less than several percent, seeking the efficiency of the project.

Studies have been conducted based on the above conditions, result of the study and remedies for distribution power loss reduction is tabulated in the table 11.1-3 and table 11.1-4.

**Table 11.1-3 : Summary of Study Result on LV Target Feeders**

| | | EDCO | JEPCO | IDECO | Total |
|---|---|---|---|---|---|
| Countermeasure | Capacitor Inst. & MV Introduction | 43 | 14 | 37 | 94 |
| | Capacitor Inst. & LV Reinforcement | 96 | 78 | 92 | 266 |
| | Capacitor Installation | 9 | 8 | 21 | 38 |
| | Total | 148 | 100 | 150 | 398 |
| Initial Investment (×1,000JD) | On Capacitor Installation | 20 | 15 | 19 | 55 |
| | On Network Reinforcement | 1,029 | 500 | 876 | 2,405 |
| | Total | 1,049 | 515 | 895 | 2,460 |
| Energy Loss Reduction (MWh/10yr.) | From Capacitor Installation | 39,204 | 16,296 | 26,130 | 81,630 |
| | From Network Reinforcement | 66,494 | 30,851 | 44,514 | 141,859 |
| | Total | 105,698 | 47,147 | 70,644 | 223,489 |
| Net Benefit (×1,000JD/10yr.) | From Capacitor Installation | 1,099 | 451 | 728 | 2,278 |
| | From Network Reinforcement | 1,071 | 480 | 568 | 2,120 |
| | Total | 2,170 | 931 | 1,297 | 4,398 |
| I.E. Factor | Capacitor Installation | 54.7 | 29.7 | 37.8 | 41.8 |
| | Network Reinforcement | 1.04 | 0.96 | 0.65 | 0.88 |
| | Total | 2.07 | 1.81 | 1.45 | 1.79 |

Based on the result of the distribution power loss reduction due to remedies, annual reduction of power losses and emission of CO2, SOX and NOX have been estimated. The result is tabulated in table 11.1-5 and table 11.1-6 as shown below. Total amount of reduction in emitted gases until 2014 are approximately two hundred fifty thousand tons of CO2, six thousand forty hundred tons of SOx and three hundred tons of Nox, respectively.

**Table11.1-4 Summary of the Study on MV Target Feeders (JD)**

| Co. | Target Feeder | | Capacitors | Re-con-ductoring | New Line | Rerouting | Total |
|---|---|---|---|---|---|---|---|
| EDCO | Wadi Musa | | 12,000 | 101,790 | - | - | 113,790 |
| | Tafila | | 7,000 | - | - | - | 7,000 |
| | JV2 | A | 7,000 | 63,037 | - | - | 70,037 |
| | | B | 7,000 | 42,369 | - | - | 49,369 |
| | Sub total | | 33,000 | 207,196 | - | - | 240,196 |
| JEPCO | Duleel | | 18,000 | - | - | - | 18,000 |
| | Madaba | | 18,000 | - | 368,600 | - | 386,600 |
| | Sub total | | 36,000 | - | 368,600 | - | 404,600 |
| IDECO | Jerash | | 20,000 | - | - | 415,400 | 435,400 |
| | Emrawa & Samma | A | 10,000 | 24,285 | - | - | 34,285 |
| | | B | 10,000 | - | - | - | 10,000 |
| | | C | 3,000 | - | - | - | 3,000 |
| | Sub total | | 43,000 | 24,285 | - | 415,400 | 482,685 |
| Total | | | 112,000 (10%) | 231,481 (20%) | 368,600 (33%) | 415,400 (37%) | 1,127,481 (100%) |

**Table 11.1-5 Annual Reduction of Power Losses due to Remedies**

| Year | Whole Project | | | EDCO's Work | | | JEPCO's Work | | | IDECO's Work | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ | $SO_x$ | $No_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ | $CO_2$ | $SO_x$ | $NO_x$ |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 2,806 | 72 | 3 | 1,315 | 34 | 2 | 610 | 16 | 1 | 880 | 23 | 1 |
| 2004 | 7,208 | 185 | 9 | 3,814 | 98 | 5 | 1,346 | 35 | 2 | 2,048 | 53 | 2 |
| 2005 | 16,380 | 420 | 20 | 5,856 | 150 | 7 | 5,142 | 132 | 6 | 5,382 | 138 | 7 |
| 2006 | 18,145 | 466 | 22 | 6,488 | 167 | 8 | 5,696 | 146 | 7 | 5,961 | 153 | 7 |
| 2007 | 19,885 | 510 | 24 | 7,110 | 183 | 9 | 6,242 | 160 | 8 | 6,533 | 168 | 8 |
| 2008 | 21,728 | 558 | 26 | 7,769 | 199 | 9 | 6,820 | 175 | 8 | 7,139 | 183 | 9 |
| 2009 | 23,399 | 601 | 29 | 8,367 | 215 | 10 | 7,344 | 189 | 9 | 7,688 | 197 | 9 |
| 2010 | 24,895 | 639 | 30 | 8,901 | 228 | 11 | 7,814 | 201 | 10 | 8,180 | 210 | 10 |
| 2011 | 26,383 | 677 | 32 | 9,433 | 242 | 12 | 8,281 | 213 | 10 | 8,669 | 223 | 11 |
| 2012 | 27,915 | 717 | 34 | 9,981 | 256 | 12 | 8,762 | 225 | 11 | 9,172 | 235 | 11 |
| 2013 | 29,136 | 748 | 36 | 10,382 | 266 | 13 | 9,176 | 236 | 11 | 9,578 | 246 | 12 |
| 2014 | 30,236 | 776 | 37 | 10,594 | 272 | 13 | 9,655 | 248 | 12 | 9,986 | 256 | 12 |
| Total | 248,116 | 6,369 | 302 | 90,010 | 2,310 | 111 | 76,888 | 1,976 | 95 | 81,216 | 2,085 | 99 |

Economic and financial analysis have been conducted based on the identification of the cost, economic and financial benefit due to implementation of the remedy such as installation of new feeders and re-conductoring and higher voltage introduction. Effect of capacitor is excluded in the base case of the economic, financial

and repayablity analysis. Annual project cost allocation and loss reduction in monetary terms are summarized in Table 11.1-6 and Table 11.1-7, respectively. Amount of probable revenue and the results of economic and financial evaluation are summarized in Table 11.1-8 and Table 11.1-9, respectively. EIRR and FIRR show good performance of the project compared with other electricity projects. The result of the repayability analysis also shows the same feature.

**Table 11.1-6 Annual Cost Allocation without Capacitors**

(JDs.)

| By Distribution companies | | 2001 | 2002 | 2003 | 2004 | Total |
|---|---|---|---|---|---|---|
| Whole Project | Financial cost[1)] | 47,393 | 1,096,260 | 1,605,649 | 1,527,252 | 4,276,554 |
| | Financial cost[2)] | 45,136 | 1,013,586 | 1,427,440 | 1,305,246 | 3,791,408 |
| | Economic cost[3)] | 40.750 | 946,113 | 1,332,012 | 1,218,072 | 3,536,948 |
| EDCO's Works | Financial cost[1)] | 17,136 | 527,739 | 548,892 | 443,019 | 1,536,786 |
| | Financial cost[2)] | 16,320 | 487,983 | 487,983 | 378,609 | 1,370,895 |
| | Economic cost[3)] | 14,735 | 455,426 | 455,426 | 353,440 | 1,279,027 |
| JEPCO's Works | Financial cost[1)] | 12,030 | 202,534 | 429,471 | 446,720 | 1,090,755 |
| | Financial cost[2)] | 11,457 | 187,256 | 381,831 | 381,831 | 962,375 |
| | Economic cost[3)] | 10,344 | 174,910 | 356,342 | 356,342 | 897,938 |
| IDECO's Works | Financial cost[1)] | 18,227 | 186,442 | 627,285 | 637,514 | 1,649,013 |
| | Financial cost[2)] | 17,359 | 169,108 | 557,626 | 544,806 | 1,458,138 |
| | Economic cost[3)] | 15,672 | 146,538 | 520,244 | 508,290 | 1,359,982 |

*(Note) 1) Incl. Price contingency for execution of the Project*
*2) Excl. price contingency for financial evaluation*
*3) Excl. price contingency for economic evaluation*

**Table 11.1-7 Amount of Electricity Loss Reduction by Year without Capacitor**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 162 | 76 | 35 | 51 |
| 2004 | 407 | 212 | 78 | 117 |
| 2005 | 891 | 329 | 271 | 291 |
| 2006 | 987 | 364 | 300 | 323 |
| 2007 | 1,081 | 399 | 329 | 354 |
| 2008 | 1,182 | 436 | 359 | 386 |
| 2009 | 1,273 | 470 | 387 | 416 |
| 2010 | 1,354 | 500 | 411 | 443 |
| 2011 | 1,435 | 530 | 436 | 469 |
| 2012 | 1,518 | 561 | 461 | 496 |
| 2013 | 1,584 | 583 | 483 | 518 |
| 2014 | 1,641 | 595 | 507 | 539 |

**Table 11.1-8 Amount of Probable Revenue by Year without Capacitor**

(JDs.1,000)

| Year | Whole Project | EDCO's Works | JEPCO's Works | IDECO's Works |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 |
| 2003 | 148 | 68 | 32 | 48 |
| 2004 | 378 | 197 | 70 | 112 |
| 2005 | 863 | 302 | 268 | 293 |
| 2006 | 956 | 335 | 297 | 325 |
| 2007 | 1,048 | 367 | 325 | 356 |
| 2008 | 1,145 | 401 | 355 | 389 |
| 2009 | 1,233 | 432 | 383 | 419 |
| 2010 | 1,312 | 459 | 407 | 446 |
| 2011 | 1,390 | 487 | 431 | 472 |
| 2012 | 1,471 | 515 | 456 | 500 |
| 2013 | 1,535 | 535 | 478 | 522 |
| 2014 | 1,593 | 546 | 503 | 544 |

**Table 11.1-9 Result of Economic and Financial Evaluation of the Project**

| Whole Project/ by companies | Economic evaluation | | | Financial evaluation | | |
|---|---|---|---|---|---|---|
| | NPV(JDs.$10^3$) | EIRR(%) | B/C | NPV(JDs.$10^3$) | FIRR(%) | B/C |
| Whole Project | 7,161 | 32.99 | 3.42 | 4,604 | 24.83 | 2.45 |
| EDCO's works | 2,076 | 29.19 | 2.91 | 1,584 | 24.27 | 2.36 |
| JEPCO's works | 2,615 | 40.92 | 4.52 | 1,596 | 29.18 | 3.00 |
| IDECO's works | 2,470 | 31.18 | 3.18 | 1,423 | 22.34 | 2.17 |

## 11.2 Recommendation

In this study, power factor correction with capacitor has been requested strongly by the Jordanian side and taken into account as the base means for distribution power loss reduction. As it is recommend in the Master Plan that power factor correction with capacitor should be propelled, installation of capacitors on LV and MV target distribution feeders should be conducted as the inexpensive and cost-effective measures.

It is also recommended that alternatives with shorter payback period of investment (with larger IE factor) have the priority of implementation. As the result of the study shows, the remedy with larger IE factor results in swift recovery of investment and larger benefit. The remedies for power loss reduction in distribution system should be implemented in accordance with the value of IE factor of the respective remedies.

Studies on respective remedies for LV feeders have been conducted by using the soft were PLOPT in order to seek optimal solutions for respective target feeders within the restricted of time, remedies for respective LV feeders may have some room for improvement by farther study or investigation such on actual distribution or location of existing facilities. Prior to implementation of respective measures, brush-up of remedies with human intelligence is recommended.

The FS manual for the study on power loss reduction has been compiled based on lectures or explanations in the site investigation period in Jordan as one of the important objectives for technology transfer. For the succeeding study of the second project of the power loss reduction by more Jordanian engineers, utilization of this manual is highly recommend as the instruction manual.

As results of economic and financial evaluation, both the resulted EIRR and FIRR in all cases seem to be too much high comparing with those in the other projects in electricity sector. But from the viewpoint of design criteria, only the most economical countermeasures in terms of cost performance are adopted for the Project. So, the said results are quite logical and the Project is sound economically and financially.

And according to the results of repayability analyses, all companies have capabilities to execute their works by using any financing resources as (1) the Arab Fund, (2) international commercial loan of public financing institution as the World Bank, and (3) some international private commercial loan. However, there will register some deficits in all cases at an early stage after commencement of the works. These deficits are negligible small comparing with their probable revenue (saving amount of electricity sales). Nevertheless, from the viewpoint of deficit to be a minimum amount, the case using the Arab Fund is the best case for electricity enterprises.

The JICA Team would like to recommend starting procedures for commencement of the Project as soon as possible.

It is not originated from the result of this FS study but is on the issue of the electricity tariff system that discount rate of capacitor portion of electricity tariff should be taken into account. Recommendation of capacitor installation to relatively large customers can be taken into account to swiftly improve power factor of distribution system for power loss reduction as Japanese electric power companies have encouraged and propelled for many years. The study in the light of electricity tariff system should be suggested.