

5.5 Financial and Economical Analysis of the New Power Plant

5.5.1 Cost Estimation of the New Power Plant for construction and operation

The new power plant at DC "TASHTPP" will become the first unit for SJSC "Uzbekenergo" of a gas turbine combined cycle power plant. The combined cycle power plant is superior in fuel consumption. The plant construction cost is generally cheaper than that of conventional boiler steam turbine plant, and on the other hand the plant maintenance will generally require larger cost in purchasing high tech parts for maintenance. The first sub-paragraph mentions about construction cost and the second about operation and maintenance cost.

(1) Construction Cost of the New Power Plant

Main performances of the new power plant to be built at DC "TASHTPP" are expected to be as shown in Table 5.5-1.

Table 5.5-1 Main Performance of the New Power Plant

Items	Expected Performances
<u>Net Plant Electrical Output Capacity</u> at high tension side of main transformer	370 MW
<u>Fuel Consumption</u>	
Heat Rate	1,536 kcal/kWh
Thermal Efficiency	56.0 %
Plant Fuel Consumption per Hour	568,320 Mcal/hour
<u>Operation at Combined Mode of Electricity Generation and Heat Supply</u>	
<u>Net Plant Output Capacity</u>	
● Net Plant Electrical Output Capacity at high tension side of main transformer	● 363 MW
● Heat Supply Capacity	● 35 Gcal/hour
<u>Fuel Consumption</u>	
Plant Fuel Consumption per Hour	568,320 Mcal/hour
Total Combined Thermal Efficiency of Generation and Heat Supply	61.0 %
Construction Period	34 months

The construction cost of the plant is estimated roughly at US\$226,500,000 excluding VAT being broken down into those at Table 5.5-2. Import taxes are assumed to be exempted.

Table 5.5-2 Construction Cost Estimate

Unit: Thousand US Dollars

Item	Cost Estimation
Gas turbine & auxiliaries	55,000
HRSG & auxiliaries	26,000
Steam turbine & auxiliaries	18,000
Generator & auxiliaries	15,000
Hot water supply system & auxiliaries	7,000
Other auxiliaries	48,000
Civil and architectural works	28,000
Transportation	8,500
Contingency	16,400
Consulting Services	4,600
Total	226,500

(Note) Import tax and VAT is not included in the above cost estimation.

(2) Operation and Maintenance Cost

Gas turbine unit to be incorporated to the new power plant is a machine to incorporate advanced high technology. Reliable spare parts for hot parts of gas turbine cannot be obtained from other source than from the original manufacturer. The hot parts of gas turbine, which are exposed to very high temperature, have to be replaced at intervals, because erosion, corrosion and fatigue arise due to stress under such high temperature conditions. The material is special. The price is high.

Typical example of gas turbine maintenance is to make combustion inspection, hot gas parts inspection and major overhaul periodically to inspect those hot parts and to make necessary replacement. Maintenance cost of gas turbine is higher than that of conventional boiler and steam turbine plant because those hot parts are kinds of consumables.

It is not easy to forecast purchase cost of spare parts for maintenance replacement. Though it is too rough, annual average parts purchase cost might be 5% of the gas turbine price being equivalent to US\$ 2,750,000 and annual average purchase cost of other parts of the plant might be 1% of the construction cost, being equivalent to US\$ 1,420,000. The total parts purchase cost estimation in this method provides US\$ 4.170,000. A rough estimation of annual maintenance costs is around in a range between US\$ 4 million and US\$ 4.5 million.

In addition to parts purchase, it will be necessary to have presence of manufacturer's engineer(s) in gas turbine overhaul and important inspections so that the maintenance of high tech gas turbine can be made adequately. A cost to receive such engineer(s) will be involved. The payment which manufacturer will request will be US\$ 1,000 - US\$ 1,500/day for an engineer. If three engineers stay for 30 days per year, it makes US\$ 90,000 – US\$ 135,000. Total costs for receiving engineers will be US\$ 110,000 – US\$ 180,000 after adding traveling and lodging expenses.

Present plan of DC "TASHTPP" is to operate and maintain the new power plant by existing staff, and to make two units outage for stand-by or maintenance among the existing 12 units. DC "TASHTPP" will provide training for some of the existing operation and maintenance staff on the new power plant. The staff already having good experience will be able to operate and to maintain the new power plant. It is considered that there would be no cost increase for operation and maintenance except for the spare parts purchase and the engineers support service.

The annual spare parts purchase and engineer support service cost would be US\$4 million – US\$4.7 million in total.

5.5.2 Financial Analysis of the New Power Plant

Subparagraph (1) explains about assumptions for financial analysis, and about how those assumptions were obtained. In subparagraph (2) calculation of financial rate of return is made on the project.

(1) Assumptions for Financial Analysis

a. Plant Construction

Plant construction cost is assumed to be US\$226,500,000 as per the Table 5.5-2. Construction period is estimated as 34 months during 2004, 2005 and 2006.

Payments to the plant construction contractor are expected to be made in accordance with Article 4.39 Terms of Payment of the General Conditions in the Tender Documents, which provide that 10% to be paid after signing contract and approval by the government of Republic of Uzbekistan, 70% to be paid upon arrival of equipment or progress of the works, and remaining 20% to be paid upon completion after passing necessary tests successfully. The largest portion in the construction cost payments will be payment to the plant construction contractor.

In assumption that construction contract would start in March 2004 and the plant would be completed in December 31, 2006 for commencing operation on January 1, 2007, payments of construction cost were assumed to be made in each year as in Table 5.5-3 for purpose in making financial analysis.

Table 5.5-3 Plant Construction Payment Assumption

Year	2004	2005	2006	Total
Construction Cost Payment Amount	US\$ 50 million	US\$ 88 million	US\$ 88.5 million	US\$ 226.5 million

b. Operation Mode Assumption

Fuel consumption of the new power plant is good. In the operation to generate only electricity, the fuel consumption is estimated as 1,536 kcal/kWh at new and clean conditions under the

maximum continuous output shown in the Table 5.5-1. Average fuel consumption in actual operation will be worse, because performance of machines deteriorate in use, pressure drop at inlet air filter during use is becomes larger in average than under the brand new conditions, heat exchange efficiency at heat recovery steam generator and other heat exchangers will become worse than new clean conditions. These may cause the fuel consumption to increase 2 %– 3 %.

Even in such performance deterioration, fuel consumption is expected to be 1,567 kcal/kWh – 1,582 kcal/kWh being 2%-3% higher of 1,536 kcal/kWh, and is still good. The average fuel consumption of existing units was 2,728 kcal/kWh as indicated in the Table 5.3-7. The new power plant is expected to generate power at 56% of fuel consumption rate of the existing units.

The good fuel consumption means that the plant will be operated more frequently than other units in the whole generation system so as to seek the lowest fuel cost. The other thermal power plants in Uzbekistan are conventional boiler steam turbine plants. The fuel consumption of units in other power plants is not considered to be better than that of the new power plant. Therefore, it is considered that the new power plant will be operated almost at its full maximum load during its available period as far as gas is available at DC "TASHTPP".

The new power plant has also good capability of start-up and shut-down and of dispatch compliance. This characteristic can contribute to electric system stability and safety. Fortunately some hydro power plants of SJSC "Uzbekenergo" have a good capability to secure system stability and safety. One of such hydro power plants is the combination of Charvak power plant of 620MW with large Charvak reservoir as regulating pond and Khodzhikent power plant of 165MW situated at the next Charvak downstream having a function to re-regulate water flow from Charvak. Those hydro power plants will continue to provide the function, and the new power plant is considered to be operated almost at the full capacity.

The plant capacity is considered also to deteriorate in use. The plant needs a maintenance outage.

As a result to take the abovementioned factors into consideration, this study was made on assumptions described in Table 5.5-4.

Table 5.5-4 Operation Mode Assumptions in Financial Analysis

1	Long Term Average Plant Availability	88.5% equivalent to 326.7 days
2	Long Term Average Plant Output Capacity	96.0 % of the rated maximum capacity
3	Long Term Production Plant Factor (1. Plant Availability x 2. Average Output Capacity)	85.0%
4	Average Plant Fuel Consumption	1,597 kcal/kWh (590,890 Mcal/hour)

Long term average plant availability of 88.5% being high availability, allows maintenance outage and forced outage 42 days per year only including partial capacity decreasing due to maintenance or trouble at equivalent day base. Long term average plant output may be also relatively high. In financial analysis, plant factor, being production factor of the plant, was assumed as 85% as the product of the plant availability 88.5% and the plant output average level 96.0% throughout the plant life. Average plant fuel consumption was assumed as 1,597 kcal/kWh at operation of electric generation mode being 4% higher level than that in the Table 5.5-1, since conservative figures are considered better to be applied for financial analysis.

c. Operation Revenue Assumption

DC "TASHTPP" is planning to operate the new power plant in supplying heat energy in addition to electricity. The planning operation hours of electricity generation mode are 4,900 hours per year and those of combined heat and electricity are 2,540 hours per year. Electricity and heat energy tariff notified as applicable on and after April 1, 2003 is as per Table 5.5-5.

Table 5.5-5 Electricity and Heat Energy Tariff in Uzbekistan applicable on and after April 1, 2003

Group	Electricity Tariff (Sum/kWh)	Group	Heat Energy Tariff (Sum/Gcal)
I	Industrial user not less than 750kVA	I	All Users except II and III
		II	Wholesale Users
II	Industrial user less than 750kVA	III	Energy System Use
III	Agriculture		
IV	Transport and City Transport		
V	Public Organization		
VI	Commercial User		
VII	Residential		
	Residential for Electric Stove		
VIII	Heating and Air conditioning		
IX	Advertisement		
X	Energy System Use		

(Note) Sum 22,690 for industrial user not less than 750kVA is payable per kW contract per year.

All tariffs are inclusive of VAT.

Weighted average electricity tariff including VAT is calculated as Sum 15.83/kWh at the same method applied at Table 5.3-12.

Revenue calculated for electricity generation value at full capacity of 370MW for a hour at 58.5% of the weighted average tariff is Sum 2,855,336 excluding VAT. 58.5% on assumption that 65% revenue belongs to generation and 10% of energy is lost for transmission and distribution¹.

In calculation of monthly revenue for combined operation of generation at 363MW and heat supply at 35 Gcal, electricity revenue per hour is expected at Sum 2,801,316 excluding VAT and heat supply revenue at Sum 162,021 excluding VAT in application of heat revenue rate of Sum 5,555/Gcal in case of all retail sales or Sum 137,375 excluding VAT at heat revenue rate Sum 4,710/Gcal in case of all wholesales. The revenue per hour of combined electricity

¹ Transmission and distribution loss in 2002 is supposed to be 12.9%. It assumes that 12.9% loss would be improved to 10% in average for periods which the analysis is being made.

generation and heat supply is supposed to be Sum 2,963,524 or Sum 2,938,691.

It seems that combined electric generation and heat supply operation mode will produce larger revenue to DC "TASHTPP". However, heat supply loss has to be taken into consideration. If the loss is 20%, the revenue decreases to Sum 2,931,082 and Sum 2,911,216, differences of which from electric generation mode are equivalent to 4.6% and 3.9%. Annual operation hours of combined electricity generation and heat supply are estimated by DC "TASHTPP" as 2,540 hours and of generation without supplying heat energy as 4,900 hours. In application of the operation hours, annual revenue increase due to combine operation is calculated at 1.57% increase and 1.33% increase compared to generation mode without heat supply. It will not happen that the plant continues to supply heat energy at full capacity during the planned 2,540 hours. Data to make such analysis as determining reasonable revenue increase was not obtained, and the revenue increase seems around 1%. For a conservative analysis, the combined mode revenue increase is ignored in this analysis.

Revenue is calculated at assumed annual generation of 2,755,020MWh based on capacity 370MW, plant factor 85% and 8,760 hours operation per year as aforementioned. Annual revenue of the new power plant for generation is obtained as Sum 21,261 million (excluding VAT) as at price April 2003 at the plant outgoing substation based on 58.5% of the retail tariff Sum 15.83/kWh (including VAT) after taking consideration of transmission and distribution energy loss 10% and 65% revenue allocation to generation.

As shown in the Table 5.3-12 of paragraph 5.3, electricity tariff in April 2002 was Sum 10.75/kWh, and it increased in April 2003 to Sum 15.83/kWh corresponding to 47% increase in a year. The increase from October 2001, Sum 9.45/kWh to April 2003, Sum 15.83/kWh is equivalent to annual increase of 41%. GDP deflator applicable to 2002 was 1.456 from calculation based statistical data of ADB. Energy price level in Uzbekistan is very low if compared in international market. The Sum 15.83/kWh including VAT is equivalent to US\$1.3/kWh. Gas price Sum 15.52/m³ including VAT referred at d. below is equivalent to US\$0.40/mmbtu. In many countries the price of electricity is higher than US\$5/kWh and the price of gas is higher than US\$2.0/mmbtu in many countries producing gas. The Government of Uzbekistan has an intention to attract private investments under energy sector reform policy. An adjustment for reasonable tariff in energy sector will be one of the important measures for reformation to achieve sustainable operation and to invite private investments. Therefore, for financial analysis it assumes that electricity price and gas/oil price would be increased 3.5% per year.

Recent weighted average electricity movement since October 2001 is shown as graph in Figure 5.5-1.

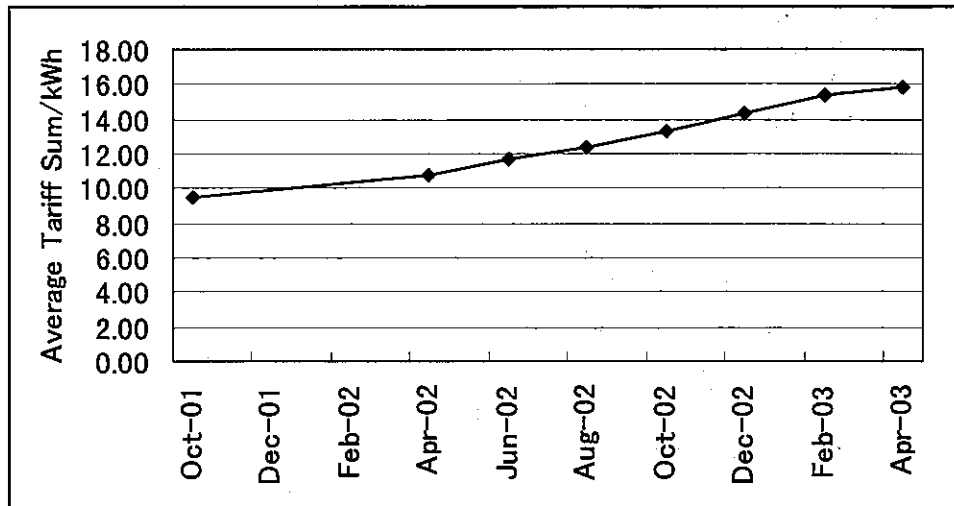


Figure 5.5-1 Weighted Average Electricity Tariff in Uzbekistan

Annual revenue is Sum 21,261 million at 2003 price based on generation value 58.5% of the retail tariff Sum 15.83/kWh.

d. Operation Cost Assumption

Fuel consumption rate is assumed at 1,597kcal/kWh on net energy base as in the Table 5.5-4. In application of natural gas energy assumption of 8,181 kcal/m³ of the same energy content as mentioned in 5.3.1 (4) of paragraph 5.3, the annual fuel consumption is calculated as 37,803,000 m³ for annual generation of 2,755,020MWh.

Natural gas price applicable on and after February 1, 2003 was Sum 15.00/m³ including VAT. Gas price in 2002 is mentioned in the Table 5.3-11 of paragraph 5.3. Figure 5.5-2 shows indexed price of electricity and gas on the conditions that prices as applicable on and after October 1, 2001 equal to 100.

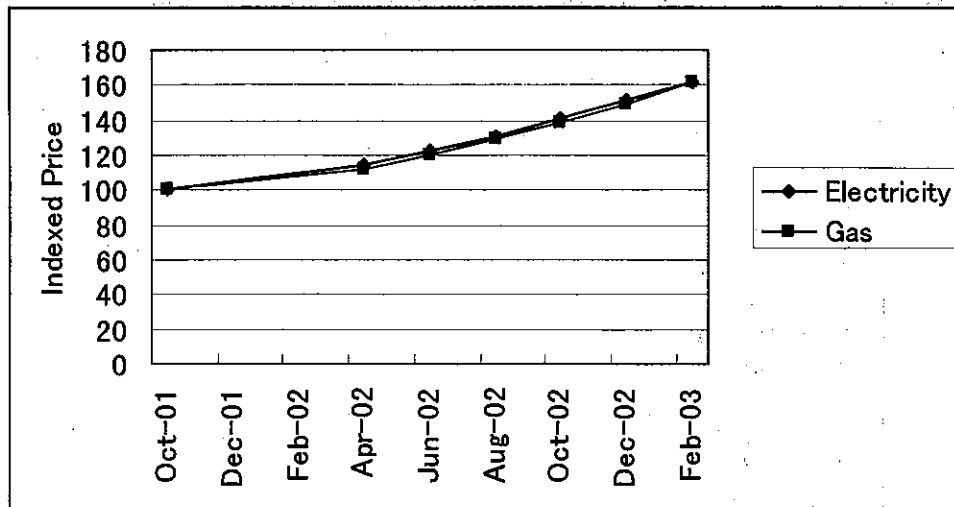


Figure 5.5-2 Indexed Price Tariff of Electricity and Gas in Uzbekistan

From Figure 5.5-2 it is understood that electricity price and gas price are regulated on the same price policy. For financial analysis, gas price Sum 15.52/m³ including VAT (Sum 12.93/m³ excluding VAT), is used as a price at March 2003 increased at the same rate applied to electricity increase from Sum 15.00 on and after 1 February 2003 and is increased at 3.5% per year at the same rate for electricity.

Annual fuel cost at the price of 2003 is calculated as Sum 6,954 million excluding VAT.

Additional annual maintenance cost for the new power plant is examined in 5.5.1 (2) as US\$4 million – US\$4.7 million. DC “TASHTPP” will operate the new power plant by the present staff. No other costs will be increased. However, some operation staff will be engaged to work for the new power plant, and maintenance staff and administration staff will also take care for the new power plant. It is necessary to allocate some costs to the new power plant.

Total staff salary in 2002 at DC “TASHTPP” was Sum 1,376 million for existing 12 units operation. DC “TASHTPP” is planning to cease two units operation of the existing 12 units, when the new power plant is operated. In this operation the new power plant is considered to be equivalent to 2 existing units in terms of staffing and other fees and expenses for operation and maintenance. Sum 230 million is obtained by dividing 12 and multiplying 2 for staff salary cost for the new plant. The table 5.3-8 of paragraph 5.3 tells that salary increase from 2001 to 2002 was 46% and that from 2000 to 2001 was 39%. Salary cost in 2003 is assumed to be Sum 336 million multiplied by 1.46 on Sum 230 million.

Insurance premium is assumed to be Sum 680 million at exchange rate Sum 1000/US\$, which is obtained at assumption that insurance premium would be 0.3 percent of the plant cost US\$226,500,000.

Summary of operation cost assumption including other costs is shown in Table 5.5-6.

Table 5.5-6 Operation and Maintenance Cost Summary

Item	Operation Cost at 2003
Fuel Cost	6,954million Sum
Spare Parts Purchase	4,350 thousand US\$
Salary	336 million Sum
Insurance Premium	680 million Sum
Consumables	250 million Sum
Other Costs	200 million Sum
Total	7,947 million Sum + 4,350 thousand US\$

e. Exchange Rate Overview

Official exchange rates in recent period since January 2001 are shown in Figure 5.5-3.

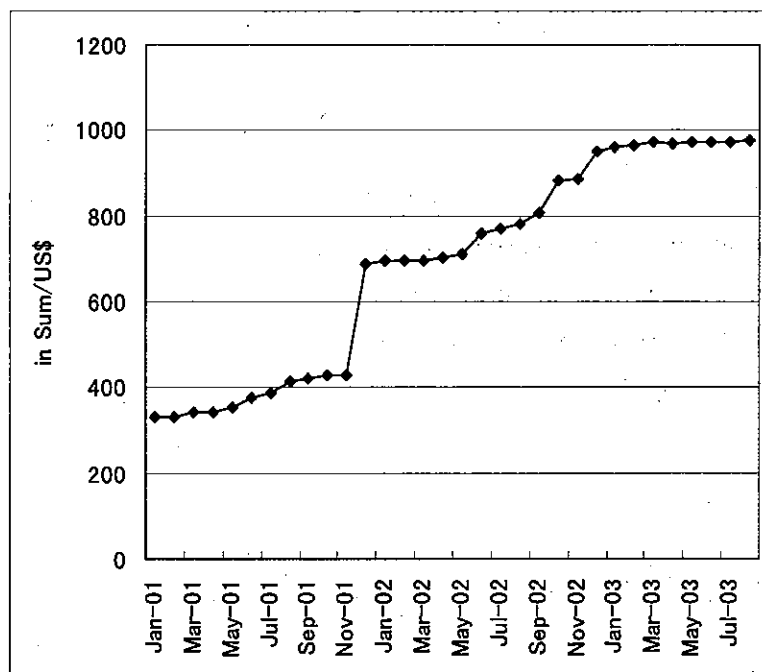


Figure 5.5-3 Recent Sum Official Exchange Rate

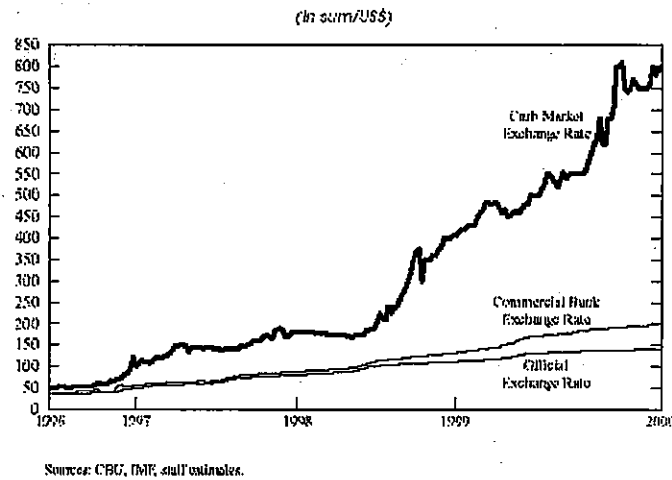


Figure 5.5-4 Sum Exchange Rates, April 30, 1995 – January 1, 2000 (Source IMF)

The exchange rates after January 2003 till January 2004 are stable at around Sum 970/US\$ under the government currency liberalization policy. There is not so much difference during that period between official rate, commercial bank rate and curb market rate, which had been larger as shown in Figure 5.5-4.

Future estimation of currency exchange rate is not easy. In financial analysis, exchange rate of Sum 1,000/US\$ is used and fixed during the period.

f. Plant life

A life of gas turbine combined cycle power plant is considered to be shorter than it of conventional boiler steam turbine plant, because combustion temperature of gas turbine is higher. A life depends on maintenance. In this study the plant life 25 years which are commonly used for financial calculation of combined cycle power plant and little bit shorter than conventional plant were used.

(2) Calculation of Financial Rate of Return

a. Financial Analysis at 2003 price

Table 5.5-7 shows financial analysis at 2003 price. Financial rate of return was 5.41 % per year.

b. Revenue Decrease and Operation and Maintenance Cost Increase

The plant factor in this financial analysis is assumed at 85% as mentioned in 5.5.2, b, and is relatively high. If actual plant capacity is decreased or actual availability is decreased than those mentioned in the Table 5.5-4, revenue will decrease. Table 5.5-8 is a calculation for a case that financial rate of return becomes zero. In this case it was assumed that a part of operation cost corresponding to fuel cost would decrease by lower generation volume, and there will be no change in other operation cost.

Calculation is made to changing revenue and fuel cost portion from the numbers in the Table 5.5-7 to obtain revenue reduction to make zero financial return due to lower plant factor. The calculation result is shown as Table 5.5-8, which shows revenue being 58.2 % of the revenue in the Table 5.5-7. The case in Table 5.5-8 corresponds to operation at plant factor 49.4%, which will happen if the plant outage is larger for additional 130 days per year. Zero financial return means that the project does not making any financial contribution, and is calculated as a reference point to evaluate maintenance against outage loss

Other calculation is to obtain a case that makes equivalent case corresponding to zero financial rate of return due to additional operation and maintenance cost. The calculation is made at Table 5.5-9 showing that this happens when Sum 10,702 million of additional cost occurred per year. Zero financial return means that the project does not making any financial contribution, and is calculated as a reference point to evaluate maintenance against outage loss

Revenue decrease may happen due to outage caused by poor maintenance. Operation and maintenance cost increase may happen if accident occurs. If possibility of accident relates to poor maintenance, maintenance is the most important. Spare parts purchase was assumed as US\$ 4,350,000. At exchange rate Sum 1,000/US\$, it corresponds to Sum 4,350 million. Sum 10,702 million is 2.46 times of Sum 4,350 million. At the same calculation, 10 days outage per year is equivalent to operation and maintenance cost increase of Sum 824 million. Though there is no need to make over maintenance, it is important to keep the plant reliable and available by proper maintenance.

Table 5.5-7 Calculation of Financial Rate of Return

Year		Construction Payment	Revenue	Operation Maintenance Expenses	Balance
-3	2004	-50,000			-50,000
-2	2005	-88,000			-88,000
-1	2006	-88,500			-88,500
1	2007		24,397	-13,796	10,602
2	2008		25,251	-14,075	11,176
3	2009		26,135	-14,364	11,771
4	2010		27,050	-14,663	12,386
5	2011		27,997	-14,973	13,024
6	2012		28,977	-15,294	13,683
7	2013		29,991	-15,625	14,365
8	2014		31,040	-15,969	15,072
9	2015		32,127	-16,324	15,803
10	2016		33,251	-16,692	16,560
11	2017		34,415	-17,072	17,343
12	2018		35,620	-17,466	18,153
13	2019		36,866	-17,874	18,992
14	2020		38,157	-18,296	19,860
15	2021		39,492	-18,733	20,759
16	2022		40,874	-19,185	21,689
17	2023		42,305	-19,653	22,652
18	2024		43,786	-20,137	23,648
19	2025		45,318	-20,639	24,680
20	2026		46,904	-21,157	25,747
21	2027		48,546	-21,694	26,852
22	2028		50,245	-22,250	27,995
23	2029		52,004	-22,825	29,178
24	2030		53,824	-23,421	30,403
25	2031		55,707	-24,037	31,671
	Total	-226,500	950,279	-456,215	267,564

FIRR = 5.41% per year

Table 5.5-8 Calculation of Revenue to make Zero FIRR due to Revenue Decrease

Year		Construction Payment	Revenue	Operation Maintenance Expenses	Balance
-3	2004	-50,000			-50,000
-2	2005	-88,000			-88,000
-1	2006	-88,500			-88,500
1	2007		14,189	-10,457	3,732
2	2008		14,686	-10,619	4,066
3	2009		15,200	-10,787	4,412
4	2010		15,732	-10,961	4,770
5	2011		16,282	-11,142	5,141
6	2012		16,852	-11,328	5,524
7	2013		17,442	-11,521	5,921
8	2014		18,053	-11,721	6,332
9	2015		18,684	-11,927	6,757
10	2016		19,338	-12,141	7,197
11	2017		20,015	-12,363	7,653
12	2018		20,716	-12,592	8,124
13	2019		21,441	-12,829	8,612
14	2020		22,191	-13,074	9,117
15	2021		22,968	-13,328	9,640
16	2022		23,772	-13,591	10,181
17	2023		24,604	-13,863	10,740
18	2024		25,465	-14,145	11,320
19	2025		26,356	-14,437	11,920
20	2026		27,279	-14,738	12,540
21	2027		28,233	-15,051	13,183
22	2028		29,222	-15,374	13,848
23	2029		30,244	-15,708	14,536
24	2030		31,303	-16,054	15,248
25	2031		32,398	-16,413	15,986
	Total	-226,500	552,664	-326,164	0

FIRR = 0.00% per year

Table 5.5-9 Calculation of Revenue to make Zero FIRR due to Higher O&M Cost

Year		Construction Payment	Revenue	Operation Maintenance Expenses	Balance
-3	2004	-50,000			-50,000
-2	2005	-88,000			-88,000
-1	2006	-88,500			-88,500
1	2007		24,397	-24,498	-101
2	2008		25,251	-24,778	474
3	2009		26,135	-25,067	1,068
4	2010		27,050	-25,366	1,684
5	2011		27,997	-25,676	2,321
6	2012		28,977	-25,996	2,980
7	2013		29,991	-26,328	3,663
8	2014		31,040	-26,671	4,369
9	2015		32,127	-27,027	5,100
10	2016		33,251	-27,394	5,857
11	2017		34,415	-27,775	6,640
12	2018		35,620	-28,169	7,451
13	2019		36,866	-28,577	8,290
14	2020		38,157	-28,999	9,158
15	2021		39,492	-29,436	10,057
16	2022		40,874	-29,888	10,987
17	2023		42,305	-30,356	11,949
18	2024		43,786	-30,840	12,946
19	2025		45,318	-31,341	13,977
20	2026		46,904	-31,860	15,044
21	2027		48,546	-32,397	16,149
22	2028		50,245	-32,953	17,292
23	2029		52,004	-33,528	18,476
24	2030		53,824	-34,123	19,701
25	2031		55,707	-34,739	20,968
	Total	-226,500	950,279	-723,779	0

FIRR = 0.00% per year

5.5.3 Economical Analysis of the New Power Plant

In the first subparagraph difference of economic analysis from financial analysis is briefly mentioned to make the subject in this paragraph clear. Economic analysis is focus on the project from view point of Republic of Uzbekistan. When dealing such point in this project, issues to be studied were value of gas, value of electricity, and foreign exchange. These points are discussed in second and third subparagraph. The fourth subparagraph shows value of benefit and cost to be dealt in economic analysis, and the fifth subparagraph shows calculations of economic rate of return.

(1) Economic Analysis

Difference of economic analysis from financial analysis is that economic analysis is to analyze project from a view point of society, while financial analysis is to analyze project from a view point of entity. Benefit in economic analysis is an increase in resources available for society and cost is opportunity cost for society, while benefit in financial analysis is cash inflow to the entity and cost is cash outflow.

Financial analysis made in the foregoing paragraph 3.5.2 focused on DC "TASHTPP" as an entity. This economic analysis is conducted in a view of Republic of Uzbekistan. The object is the New Power Plant as the financial analysis has been made.

(2) Gas

Natural gas is one of the important natural resources of Uzbekistan. Table 5.5-10 shows the top 20 countries having the largest natural gas reserve and production. Uzbekistan is the 16th largest natural gas reserve country and the 8th in production in 2001. Uzbekistan exports 20% - 25% of natural gas produced to Kazakhstan, Kyrgyzstan, Russia, Ukraine and Tajikistan.

Table 5.5-10 World Natural Gas Reserve and Gas Production Top 20 Countries

	Natural Gas Reserve (Tcf)		Natural Gas Production in 2001 (Tcf)	
1	Russia	1680.000	Russia	20.51
2	Iran	812.300	United States	19.36
3	Qatar	508.540	Canada	6.60
4	Saudi Arabia ⁴	224.700	United Kingdom	3.74
5	United Arab Emirates	212.100	Algeria	2.84
6	United States	183.460	Netherlands	2.75
7	Algeria	159.700	Indonesia	2.44
8	Venezuela	148.000	Uzbekistan	2.23
9	Nigeria	124.000	Iran	2.17
10	Iraq	109.800	Norway	1.93
11	Indonesia	92.500	Saudi Arabia	1.90
12	Australia	90.000	Malaysia	1.90
13	Norway	77.300	Turkmenistan	1.70
14	Malaysia	75.000	United Arab Emirates	1.59
15	Turkmenistan	71.000	Argentina	1.31
16	Uzbekistan	66.200	Mexico	1.30
17	Kazakhstan	65.000	Australia	1.17
18	Netherlands	62.000	Qatar	1.14
19	Canada	60.118	Venezuela	1.12
20	Egypt	58.500	China	1.07

Source: National Energy Information Center, USA

Figure 5.5-3 shows market price US\$/mmbtu of natural gas at Henry Hub market price from December 2002 to December 2003 from January 2000 to July 2003 in the United States, and Figure 5.5-4 shows US well head natural gas price US\$/thousand cft from January 2000 to July 2003 according to US Energy Information Administration.

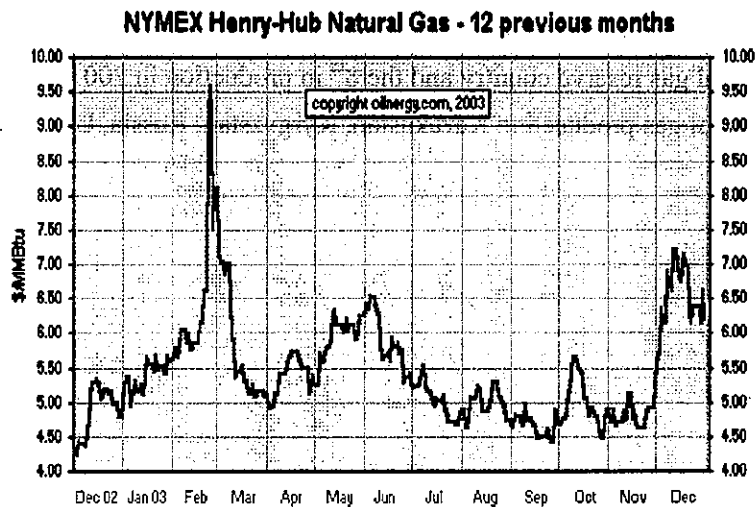


Figure 5.5-5 Henry Hub Natural Gas Price US\$/mmbtu.

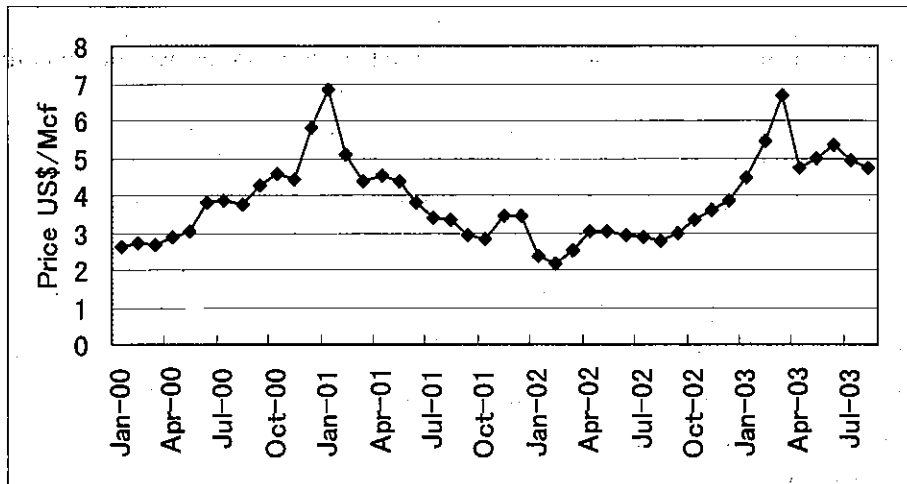


Figure 5.5-6 US Natural Gas Wellhead Price US\$/thousand cft

(Source : US Energy Information Administration)

Figure 5.5-5 shows that the prices in 2003 have been always higher than US\$4.5/mmbtu and Figure 5.5-6 shows that the wellhead prices have been also higher than US\$4.5/thousand cubic feet. These prices are equivalent to about US\$159 per 1000 m³, which is equivalent to roughly US\$17.9 per million calories.

Gas price in Uzbekistan as on March 2003 was Sum 12,930 excluding VAT per 1000 m³, which was US\$13 per 1000 m³ converted at Sum 1000/US\$. The Uzbekistani price was 8.9% of US price.

Figure 5.5-7 shows OPEC Basket Prices of crude oil. The crude oil price is equivalent to roughly US\$17.7 per million calories. Both of the price is almost the same level at present moment.

OPEC Basket Prices, January 2, 2001 - December 2, 2003

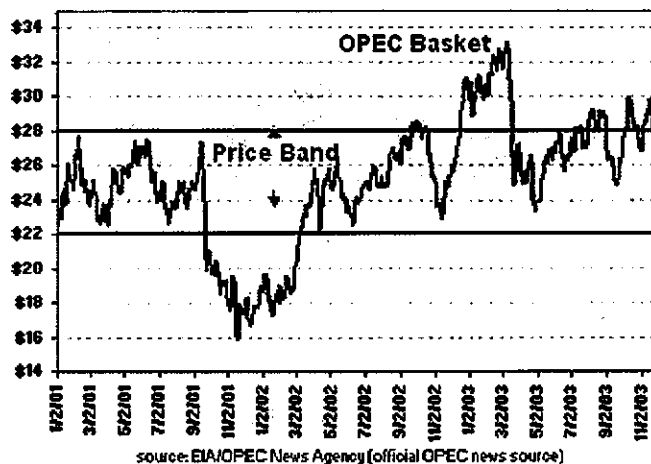


Figure 5.5-7 OPEC Basket Prices of crude oil US\$/bbl

Comparison of energy is not easy. Gas cannot be transported without pipeline. Gas storage needs bigger costs than that of oil or coal.

In foregoing paragraph (1), it is mentioned that in economic analysis cost is opportunity cost for society. Taking it into consideration that excess gas could be exported, it is considered that in economic analysis a reasonable opportunity cost for Uzbekistan should be used. The cost of gas can be lower than US market price. There is no facility to export to US. One method is to use gas price which utilities in other countries purchase gas produced in their own country for electricity generation. It is understood that utilities in South-Eastern Asian countries purchase gas at US\$ 2.5 – US\$ 3 per mmbtu.

US\$ 2.5- US\$ 3 per mmbtu is lower than US market price and also cheaper than oil price at energy equivalent comparison. Therefore, for economic analysis it assumes that gas price is US\$ 2.5 per mmbtu, which is 6.75 times of the current price in Uzbekistan as of March 1, 2003.

(3) Exchange Rate and Cost and Value of Electricity

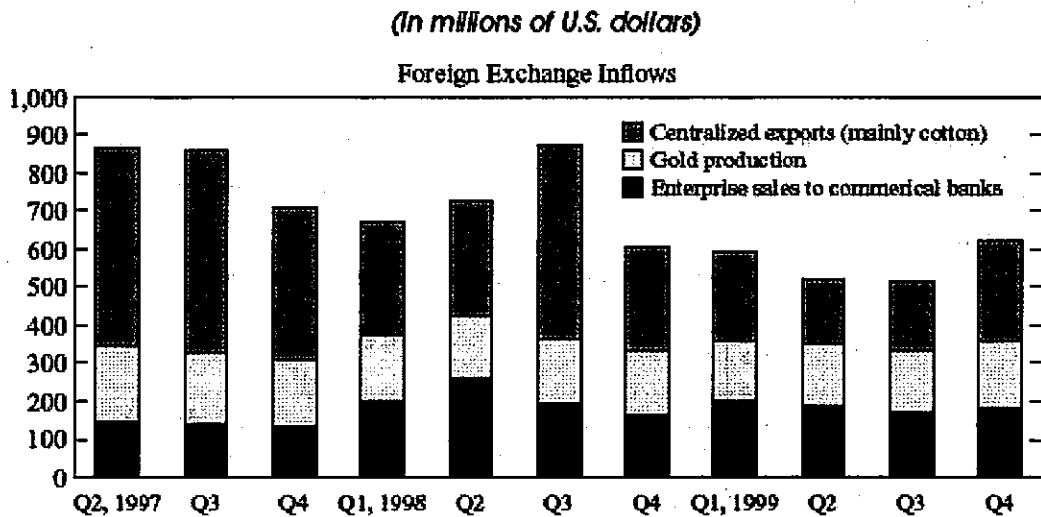


Figure 5.5-8 Foreign Exchange Inflows through the Banking System in Uzbekistan

(Source: IMF Staff Papers Vol. 48. No.1)

As shown in Figure 5.5-8, share of cotton and gold export is very high in foreign currency

inflow. The foreign exchange and export of cotton and gold have been controlled by the government. It is difficult to talk on exchange rate to be applied for economic analysis. However, fortunately both gas and electricity are energy. Foreign currency portion is big in construction and additional maintenance costs. Effect of foreign currency exchange rate is considered small in economic analysis. Therefore, calculation is made at Sum 1000/US\$.

In the foregoing subparagraph (2) gas cost was dealt. On the other side electricity being benefit of the project to the society is also energy. Though 6.28 times of current gas price is being applied for economic analysis, multiplying the same rate is not adequate, because;

- a. Current price of gas and of electricity, is equivalent to Sum 1,612/Gcal and 15,337/Gcal respectively.
- b. a.means that electricity price in terms of energy is 9.5 times of gas price. It may not be adequate to keep the price difference even at high gas price conditions.
- c. The difference between gas and electricity price at equivalent energy is an ad-value by energy conversion from gas to electricity. For the conversion ad-value, 6.28 times higher is not considered reasonable.

The 6.28 times of Sum13.19/kWh being average current electricity tariff excluding VAT as of March 1, 2003, is Sum 82.83, which is equivalent to US cents 8.93/kWh. In South Eastern Asian countries where natural gas is purchased by utility at around US\$2.5 – US\$3.5/mmbtu, electricity retail price is around US cents 6/kWh. Application of US cents 8.3/kWh seems too high.

Therefore, as one method in making economic analysis, Sum 35.1/kWh (generation value excluding VAT) being 58.5% of Sum 60/kWh (retail price excluding VAT) as equivalent to US cent 6/kWh is used, and as other method Sum 21.04/kWh (generation value excluding VAT) obtained by formula below is used.

$$\text{Sum}21.04/\text{kWh} = \text{Sum}13.19/\text{kWh}(\text{Current Price}) \times 58.5\% - [\text{Sum}12.93/\text{m}^3(\text{Current Gas Price}) / 8181\text{kcal}/\text{m}^3 (\text{Gas Energy Content}) \times 1597\text{Kcal}/\text{kWh}(\text{Fuel Consumption Ratio})] + [\text{Sum}12.93/\text{m}^3 \times 6.28\text{times} / 8181\text{kcal}/\text{m}^3 \times 1597\text{kcal}/\text{kWh}].$$

(Note) Second term is electricity price converted from the present gas price to be deducted, and the third term is electricity price converted from gas which price is 6.28 times higher to be added.

(4) Benefit and Cost

a. Benefit

When the new plant is operational, 2 units of existing 12 units would be not operating. Generation of 1,666,667 MWh per year ($10,000,000\text{MWh} \times 2/12$) is assumed to be replaced by generation by the new plant 2,755,020 MWh. Fuel consumption 4,419,540 Gcal per year (26,517,242 Gcal for 12 units as mentioned in the Table 5.3-7) is assumed to be replaced by consumption 4,399,763 Gcal ($537,803,000\text{m}^3 \times 8181\text{kcal/m}^3$ – refer to Para 5.5.2 (1),d.).

Above brings a benefit of additional electricity 1,088,353MWh/year and fuel saving 19,777Gcal/year, which is Sum38,201 million + US\$196,200 or Sum22,899 million + US\$196,200 million.

b. Cost

Costs in foreign currencies can be used as they are used in financial analysis for economic analysis, and local currency cost may be able to be reviewed. However, difference in costs between the present operation and future one with additional new power plant is considered to be plant construction cost and increased maintenance replacement parts purchase cost. Major portion of construction and spare parts purchase would be paid in foreign currency. Both construction and maintenance are estimated in US Dollars in Paragraph 5.5.2. It is considered that calculation of economic analysis can be made without changing local currency costs.

Construction cost US\$ 226,500,000 and additional maintenance parts and service purchase cost US\$4,350,000 are applied for economic analysis.

For reference, some review on local costs in maintenance is made as below:

In construction cost of US\$ 226,500,000, foreign currency costs are estimated as US\$37,500,000 equivalent being 16.5%.

In spare parts replacement, foreign cost ratio would be higher than the ratio in the construction, since this issue has the factors below:

- (a) typical local currency portions in construction cost are civil and structural works, which require less maintenance costs in comparison with machines and equipment.
 - (b) high tech gas turbine requires replacement parts in foreign currency.
 - (c) local procurement would increase at step by step for such parts as they are manufactured locally.
- (5) Calculation of Economic Rate of Return

Table 5.5-11 shows calculation of economic rate of return based on generation value Sum35.1/kWh. In this case economic internal rate of return is 12.88% per year.

Table 5.5-12 shows calculation of economic rate of return based on generation value Sum21.04/kWh. In this case economic internal rate of return is 6.07% per year.

In both cases economic internal rate of return shows positive rate. The new power plant at DC "TASHTPP" is to bring gas saving. If gas value is high or electricity value is high, the project shows higher economic return.

Table 5.5-11 Calculation of Economic Rate of Return for Generation Value at Sum 35.1/kWh

Year		Construction Cost	Benefit	Additional Maintenance Expenses	Balance
-3	2004	-50,000			-50,000
-2	2005	-88,000			-88,000
-1	2006	-88,500			-88,500
1	2007		38,397	-4,350	34,047
2	2008		38,397	-4,350	34,047
3	2009		38,397	-4,350	34,047
4	2010		38,397	-4,350	34,047
5	2011		38,397	-4,350	34,047
6	2012		38,397	-4,350	34,047
7	2013		38,397	-4,350	34,047
8	2014		38,397	-4,350	34,047
9	2015		38,397	-4,350	34,047
10	2016		38,397	-4,350	34,047
11	2017		38,397	-4,350	34,047
12	2018		38,397	-4,350	34,047
13	2019		38,397	-4,350	34,047
14	2020		38,397	-4,350	34,047
15	2021		38,397	-4,350	34,047
16	2022		38,397	-4,350	34,047
17	2023		38,397	-4,350	34,047
18	2024		38,397	-4,350	34,047
19	2025		38,397	-4,350	34,047
20	2026		38,397	-4,350	34,047
21	2027		38,397	-4,350	34,047
22	2028		38,397	-4,350	34,047
23	2029		38,397	-4,350	34,047
24	2030		38,397	-4,350	34,047
25	2031		38,397	-4,350	34,047
	Total	-226,500	959,925	-108,750	624,675

EIRR =12.88% per year

Table 5.5-12 Calculation of Economic Rate of Return for Generation Value at Sum 21.04/kWh

Year		Construction Cost	Benefit	Additional Maintenance Expenses	Balance
-3	2004	-50,000			-50,000
-2	2005	-88,000			-88,000
-1	2006	-88,500			-88,500
1	2007		23,095	-4,350	18,745
2	2008		23,095	-4,350	18,745
3	2009		23,095	-4,350	18,745
4	2010		23,095	-4,350	18,745
5	2011		23,095	-4,350	18,745
6	2012		23,095	-4,350	18,745
7	2013		23,095	-4,350	18,745
8	2014		23,095	-4,350	18,745
9	2015		23,095	-4,350	18,745
10	2016		23,095	-4,350	18,745
11	2017		23,095	-4,350	18,745
12	2018		23,095	-4,350	18,745
13	2019		23,095	-4,350	18,745
14	2020		23,095	-4,350	18,745
15	2021		23,095	-4,350	18,745
16	2022		23,095	-4,350	18,745
17	2023		23,095	-4,350	18,745
18	2024		23,095	-4,350	18,745
19	2025		23,095	-4,350	18,745
20	2026		23,095	-4,350	18,745
21	2027		23,095	-4,350	18,745
22	2028		23,095	-4,350	18,745
23	2029		23,095	-4,350	18,745
24	2030		23,095	-4,350	18,745
25	2031		23,095	-4,350	18,745
	Total	-226,500	577,375	-108,750	242,125

EIRR = 6.07% per year

5.5.4. Generation Cost at the New Power Plant

Financial analysis and economic analysis evaluated the project in a point whether the project would be sound or not. Both did not touch from business view point. Uzbekenergo is a state joint stock company, who provides services under market oriented efficient business rules. Analysis of the project on an effect to financial position including revenue, cashflow, cost etc. of Uzbekenergo is also important.

This paragraph deals with those analyses on effect to financial position. For financial projection additional factors have to be taken into consideration. The first paragraph mentions about those additional factors. The second paragraph mentions about presentation base on financial statements. The third paragraph is projected calculations.

(1) Additional Factors

The purpose of financial analysis and economic analysis was to evaluate the project itself. Following factors not involved in financial and economic analysis have to be taken into consideration for generation cost evaluation.

a. Funding cost

Financial internal rate of return (FIRR) is a reference rate to funding cost. If funding cost is less than FIRR, a project profit is expected and if higher, a loss is predicted. However, effects to financial statements are not studied. For financial projection it assumes that 1.9% p.a. of loan interest and handling charge would be charged as financing cost, 85% of the construction payment would be financed by the loan, and repayment would be made at equal installments from year 2012 until year 2031.

b. Plant Depreciation

The Notice No. 7 dated February 27, 1997 from Ministry of Finance stipulates that annual depreciate rate for building is 5% and for turbines and equipments is 8%. 14% of construction cost is depreciated at 5% and 86% is depreciated at 8% in proportion to the cost breakdown estimate for civil and architectural works and for other portions in the Table 5.5-2.

c. Corporate Income Tax

It is assumed that the project will pay corporate income tax at 35% of profit, if net income is positive in the year. 5 years loss carrying over is also assumed to be allowed.

d. Price Escalation

Price escalation as below is assumed in US Dollar during whole life of the project.

Gas : 4 % per year

Salary	: 5% per year
Electricity	: 3.8% per year
Others	: 3% per year

Other factors remain unchanged from those in 5.5.1 and 5.5.2.

(2) US Dollars Projection and Sum Presentation

Projection is made to produce financial statements for the project. VAT is not included, because it is assumed that balance of input VAT and output VAT would be paid or refunded fully.

In making projections, accounts receivables and accounts payables are ignored as all fees, expenses and costs are assumed to be paid when accrued, and all revenues are assumed to be paid immediately.

In the foregoing subparagraph 5.5.4 (1) (d), it is assumed to make projection at escalation percentages in US Dollars. Financial statements of the project are prepared in US Dollars, and also another projected statements in Sum are prepared, because book of Uzbekenergo is being kept in Sum and effects are brought to such Sum financial statements. In Sum calculation, Sum devaluation against US Dollar is assumed at 10% per year, and the project recognizes exchange loss. Exchange loss is assumed to be deductible in calculation of taxable income.

(3) Projection Calculation

Tables from 5.5-13 to 5.5-16 show;

Table 5.5-13	projection of generation cost,
Table 5.5-14	projection of income statement
Table 5.5-15	projection of cashflow statement
Table 5.5-16	projection of balance sheet

Return on Equity at Discount Cashflow Method (ROE) in this projection was 2.05% per year. Equity IRR corresponding to 5% and 10% per year was obtained by changing tariff increase rate. The calculation result is as follows;

Tariff increase in US\$ per 3.88% per year	ROE	2.05 % per year
Tariff increase in US\$ per 4.25% per year	ROE	5.03 % per year

Tariff increase in US\$ per 5.46% per year ROE 10.00 % per year

The base case assumed that electricity tariff in US\$ base would increase at 3.8% per year, which is little higher than general price inflation and gas at 4.0% further little higher than electricity and salary at 5.0% as mentioned in above (1) (d). In this case, expected ROE was small and higher ROE is desired not less than interest rate. In case of 4.25% increase per year of electricity, ROE 5.03% is expected, and 5.34% per year increase would produce 10% ROE. Present electricity tariff is low for conducting sound generation business with the New Power Plant, and a study on tariff increase is suggested.

Table 5.5-13 Projection of Generation Cost of the New Power Plant (Unit: thousand US\$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total										
Gas Purchase	8,137	8,463	8,801	9,153	9,519	9,900	10,296	10,708	11,136	11,582	12,045	12,527	13,028																																						
Annual Replacement Parts Cost	4,896	5,043	5,194	5,350	5,510	5,676	5,846	6,021	6,202	6,388	6,580	6,777	6,980																																						
Salary Cost	408	429	450	473	496	521	547	575	603	634	665	699	733																																						
Insurance Premium	680	680	680	680	680	680	680	680	680	680	680	680	680																																						
Cost of Consumables	281	290	299	307	317	326	336	346	356	367	378	389	401																																						
Other Costs	225	232	239	246	253	261	269	277	285	294	303	312	321																																						
Depreciation Cost Civil/Build	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620																																						
Depreciation Cost Plant/Equip	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918																																						
Generation Cost	32,165	32,673	33,200	33,747	34,314	34,902	35,512	36,144	36,801	37,482	38,188	38,921	39,689																																						
(Excluding Financing Cost)																																																			
Ave. Generation Cost cent/kWh (Excluding Interest)	1.17	1.19	1.21	1.22	1.25	1.27	1.29	1.31	1.34	1.36	1.39	1.41	1.45																																						
Interest	3,658	3,658	3,658	3,658	3,658	3,567	3,384	3,201	3,018	2,835	2,652	2,469	2,286																																						
Total Generation Cost	35,823	36,331	36,858	37,405	37,972	38,468	38,895	39,345	39,818	40,317	40,840	41,390	42,008																																						
Average Generation Cost	1.30	1.32	1.34	1.36	1.38	1.40	1.41	1.43	1.45	1.46	1.48	1.50	1.53																																						
Gas Purchase	13,549	14,091	14,654	15,241	15,850	16,484	17,144	17,829	18,542	19,284	20,056	20,858	21,687																																						
Annual Replacement Parts Cost	7,190	7,406	7,628	7,857	8,092	8,335	8,585	8,843	9,108	9,381	9,663	9,952	10,254																																						
Salary Cost	770	809	849	892	936	983	1,032	1,084	1,138	1,195	1,254	1,317	1,383																																						
Insurance Premium	680	680	680	680	680	680	680	680	680	680	680	680	680																																						
Cost of Consumables	413	426	438	452	465	479	493	508	523	539	555	572	589																																						
Other Costs	331	340	351	361	372	383	395	407	419	431	444	458	472																																						
Depreciation Cost Civil/Build	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620																																						
Depreciation Cost Plant/Equip	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918	15,918																																						
Generation Cost (Excluding Financing Cost)	24,552	25,371	26,220	27,101	28,015	28,964	29,948	29,948	29,948	29,948	29,948	29,948	29,948																																						
Ave. Generation Cost cent/kWh (Excluding Interest)	0.89	0.92	0.95	0.98	1.02	1.05	1.08	1.07	1.05	1.02	1.00	1.00	1.00																																						
Interest	2,103	1,920	1,738	1,555	1,372	1,189	1,006	823	640	457	274	91	54,870																																						
Total Generation Cost	26,655	27,291	27,957	28,656	29,387	30,153	30,954	30,173	31,051	31,968	32,926	33,928	34,972																																						
Average Generation Cost	0.97	0.99	1.01	1.04	1.07	1.09	1.12	1.10	1.13	1.16	1.20	1.23	1.26																																						

Table 5.5-14 Projection of Income Statement of the New Power Plant (Unit: thousand US\$)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total		
Revenue	24,681	25,619	26,593	27,603	28,652	29,741	30,871	32,044	33,262	34,526	35,838	37,200	38,613															
Generation Cost without Interest	32,165	32,673	33,200	33,747	34,314	34,902	35,512	36,144	36,801	37,482	38,188	38,921	31,722															
Interest	3,658	3,658	3,658	3,658	3,658	3,567	3,384	3,201	3,018	2,835	2,652	2,469	2,286															
Profit before Tax	-11,142	-10,712	-10,265	-9,801	-9,319	-8,727	-8,024	-7,301	-6,556	-5,791	-5,002	-4,190	4,605															
Corporate Income Tax	0	0	0	0	0	0	0	0	0	0	0	0	0															
Profit after Tax	-11,142	-10,712	-10,265	-9,801	-9,319	-8,727	-8,024	-7,301	-6,556	-5,791	-5,002	-4,190	4,605															
Retained Profit in Beginning	0	-11,142	-21,854	-32,119	-41,921	-51,240	-59,967	-67,991	-75,292	-81,848	-87,639	-92,641	-96,831															
Undistributed Profit	-11,142	-21,854	-32,119	-41,921	-51,240	-59,967	-67,991	-75,292	-81,848	-87,639	-92,641	-96,831	-92,226															
Dividend	0	0	0	0	0	0	0	0	0	0	0	0	0															
Retained Profit at Ending	-11,142	-21,854	-32,119	-41,921	-51,240	-59,967	-67,991	-75,292	-81,848	-87,639	-92,641	-96,831	-92,226															
Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total															
Revenue	40,081	41,604	43,185	44,826	46,529	48,297	50,133	52,038	54,015	56,068	58,198	60,410	1,000,626															
Generation Cost without Interest	24,552	25,371	26,220	27,101	28,015	28,964	29,948	29,350	30,410	31,510	32,652	33,837	803,701															
Interest	2,103	1,920	1,738	1,555	1,372	1,189	1,006	823	640	457	274	91	54,870															
Profit before Tax	13,425	14,313	15,227	16,170	17,142	18,144	19,178	21,864	22,964	24,100	25,272	26,481	142,055															
Corporate Income Tax	0	6,076	5,330	5,660	6,000	6,351	6,712	7,652	8,038	8,435	8,845	9,268	78,366															
Profit after Tax	13,425	8,237	9,898	10,511	11,142	11,794	12,466	14,212	14,927	15,665	16,427	17,213	63,689															
Retained Profit in Beginning	-92,226	-78,801	-70,564	-60,666	-50,156	-39,013	-27,220	-14,754	-542	0	0	0																
Undistributed Profit	-78,801	-70,564	-60,666	-50,156	-39,013	-27,220	-14,754	-542	14,385	15,665	16,427	17,213																
Dividend	0	0	0	0	0	0	0	0	14,385	15,665	16,427	17,213																
Retained Profit at Ending	-78,801	-70,564	-60,666	-50,156	-39,013	-27,220	-14,754	-542	0	0	0	0																

Table 5.5-15 Projection of Cashflow Statement of the New Power Plant (Unit: thousand US\$)

Year	ROE/DCF = 2.05% per year																																
	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12																		
2004	-3	2005	-2	2006	-1	2007	1	2008	2	2009	3	2010	4	2011	5	2012	6	2013	7	2014	8	2015	9	2016	10	2017	11	2018	12				
Generation Revenue	24,681	25,619	26,593	27,603	28,652	29,741	30,871	32,044	33,262	34,526	35,838	37,200	38,611	40,064	41,568	43,122	44,726	46,380	48,084	49,838	51,642	53,496	55,300	57,154	59,008	60,862	62,716	64,570	66,424	68,278	70,132		
Cash Inflow	24,681	25,619	26,593	27,603	28,652	29,741	30,871	32,044	33,262	34,526	35,838	37,200	38,611	40,064	41,568	43,122	44,726	46,380	48,084	49,838	51,642	53,496	55,300	57,154	59,008	60,862	62,716	64,570	66,424	68,278	70,132		
Operating Cost	-32,165	-32,873	-33,200	-33,747	-34,314	-34,902	-35,512	-36,144	-36,801	-37,482	-38,188	-38,921	-39,679	-40,461	-41,267	-42,097	-42,951	-43,829	-44,732	-45,660	-46,613	-47,591	-48,594	-49,622	-50,675	-51,752	-52,854	-53,981	-55,134	-56,312	-57,515		
Less Depreciation	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	17,537	
Payment of Tax	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	0	0	0	0	0	0	0	
Cash Outflow from Operation	-14,628	-15,136	-15,663	-16,209	-16,776	-17,364	-17,974	-18,607	-19,263	-19,944	-20,651	-21,383	-22,141	-22,925	-23,735	-24,571	-25,433	-26,321	-27,235	-28,175	-29,141	-30,133	-31,151	-32,195	-33,265	-34,361	-35,483	-36,631	-37,805	-38,995	-40,211	-41,453	
Cashflow from Operation	10,053	10,483	10,930	11,394	11,876	12,377	12,897	13,438	13,999	14,582	15,187	15,816	16,465	17,135	17,826	18,538	19,271	20,025	20,799	21,594	22,410	23,247	24,105	24,984	25,884	26,805	27,747	28,711	29,696	30,702	31,729	32,777	
Construction	-50,000	-88,000	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	
Cashflow from Investment	-50,000	-88,000	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	-88,500	
Principal Repayment (Borrowing)	42,500	74,800	75,225	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	0	0	0	0	
Loan Interest	-404	-1,518	-2,943	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	
Capital Injection (Dividend)	7,904	14,718	16,718	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	0	0	0	0	
Cashflow from Financing	50,000	88,000	88,500	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	-3,658	
Net Cash Increase	0	0	0	6,396	6,825	7,272	7,736	8,218	8,726	9,259	9,817	10,399	11,006	11,638	12,295	12,977	13,684	14,416	15,174	15,957	16,766	17,601	18,463	19,353	20,271	21,218	22,194	23,199	24,234	25,299	26,394	27,519	
Cash at Beginning	0	0	0	6,396	13,221	20,493	28,229	36,447	45,165	54,483	64,401	74,920	86,049	97,787	110,134	123,191	136,959	151,437	166,625	182,524	199,133	216,452	234,481	253,220	272,669	292,828	313,697	335,276	357,565	380,564	404,273	428,692	
Cash at Ending	0	0	0	6,396	13,221	20,493	28,229	36,447	45,165	54,483	64,401	74,920	86,049	97,787	110,134	123,191	136,959	151,437	166,625	182,524	199,133	216,452	234,481	253,220	272,669	292,828	313,697	335,276	357,565	380,564	404,273		
Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total																			
Generation Revenue	38,613	40,081	41,604	43,185	44,826	46,529	48,297	50,133	52,038	54,015	56,068	58,198	60,410	1,000,626																			
Cash Inflow	38,613	40,081	41,604	43,185	44,826	46,529	48,297	50,133	52,038	54,015	56,068	58,198	60,410	1,000,626																			
Operating Cost	-31,722	-24,552	-25,371	-26,220	-27,101	-28,015	-28,964	-29,948	-30,966	-32,018	-33,104	-34,224	-35,378	-803,701																			
Less Depreciation	9,579	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	1,620	231,365																			
Payment of Tax	0	0	-6,076	-5,830	-5,660	-6,000	-6,351	-6,712	-7,082	-7,452	-7,831	-8,219	-8,617	-803,701																			
Cash Outflow from Operation	-22,144	-22,933	-29,827	-29,830	-31,141	-32,395	-33,695	-35,041	-36,448	-37,900	-39,352	-40,904	-42,456	-803,701																			
Cashflow from Operation	16,470	17,148	11,777	13,255	13,685	14,134	14,602	15,091	15,605	16,144	16,707	17,294	17,904	349,924																			
Construction																																	
Cashflow from Investment																																	
Principal Repayment (Borrowing)	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626	-9,626																			
Loan Interest	-2,286	-2,103	-1,920	-1,738	-1,555	-1,372	-1,189	-1,006	-823	-640	-457	-274	-91	-58,735																			
Capital Injection (Dividend)	0	0	0	0	0	0	0	0	0	0	0	0	0	-14,385																			
Cashflow from Financing	-11,912	-11,730	-11,547	-11,364	-11,181	-10,998	-10,815	-10,632	-10,449	-10,266	-10,083	-9,900	-9,717	-9,534																			
Net Cash Increase	4,557	5,419	230	1,891	2,504	3,136	3,787	4,459	5,151	5,863	6,595	7,347	8,119	8,901																			
Cash at Beginning	46,235	50,792	56,211	56,441	56,332	60,836	63,971	67,759	72,218	76,803	81,512	86,345	91,304	96,385																			
Cash at Ending	50,792	56,211	56,441	58,332	60,836	63,971	67,759	72,218	76,803	81,512	86,345	91,304	96,385	101,586																			

Table 5.5-16 Projection of Balance Sheet of the New Power Plant (Unit: thousand US\$)

Year	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cash	0	0	0	6,396	13,221	20,493	28,229	36,447	35,631	35,519	36,129	37,484	39,605	42,514
Civil & Building	7,057	19,589	32,391	30,772	29,152	27,532	25,913	24,293	22,674	21,054	19,435	17,815	16,196	14,576
Plant & Machinery	43,347	120,333	198,974	183,056	167,138	151,220	135,302	119,384	103,467	87,549	71,631	55,713	39,795	23,877
Asset Total	50,404	139,922	231,365	220,223	209,511	199,246	189,444	180,125	161,772	144,122	127,195	111,012	95,595	80,967
Loan	42,500	117,300	192,525	192,525	192,525	192,525	192,525	192,525	182,899	173,273	163,646	154,020	144,394	134,768
Retained Profit (Loss)	0	0	0	-11,142	-21,854	-32,119	-41,921	-51,240	-59,967	-67,991	-75,292	-81,848	-87,639	-92,841
Capital	7,904	22,622	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840
Debt & Equity Total	50,404	139,922	231,365	220,223	209,511	199,246	189,444	180,125	161,772	144,122	127,195	111,012	95,595	80,967

Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Cash	46,235	50,792	56,211	56,441	58,332	60,836	63,971	67,759	72,218	76,803	67,719	58,093	48,466	38,840
Civil & Building	12,956	11,337	9,717	8,098	6,478	4,859	3,239	1,620	0	0	0	0	0	0
Plant & Machinery	7,959	0	0	0	0	0	0	0	0	0	0	0	0	0
Asset Total	67,150	62,129	65,928	64,538	64,810	65,694	67,210	69,378	72,218	76,803	67,719	58,093	48,466	38,840
Loan	125,141	115,515	105,889	96,263	86,636	77,010	67,384	57,758	48,131	38,505	28,879	19,253	9,626	0
Retained Profit (Loss)	-96,831	-92,226	-78,801	-70,564	-60,666	-50,156	-39,013	-27,220	-14,754	-542	0	0	0	0
Capital	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840	38,840
Debt & Equity Total	67,150	62,129	65,928	64,538	64,810	65,694	67,210	69,378	72,218	76,803	67,719	58,093	48,466	38,840

As a reference Table 5.5-17 is prepared to show generation cost at the existing units of DC "TASHTPP" on assumption that

- (i) existing units will be available for 25 years
- (ii) salary costs will be increased at 5% per year
- (iii) other operation and maintenance costs including other costs will be increased at 3% per year
- (iv) Fuel is limited to gas only without burning oil for comparison purpose at the same level. The same fuel price is applied as to the new power plant generation projection.

The projection of generation cost by the existing units at average of 25 years at 0.94 US cents/kWh is lower than the new power plant average generation cost of 1.17 cents/kWh. The cost by the existing units is supposed to be less than 60% of the new one for the first 10 years until 2016. The reason is that cost by the existing units does not involve depreciation and interest costs, though higher fuel cost is required. It is not realistic that the existing units work until year 2031. Larger amount of maintenance cost will be required, and it may be probable that actual generation cost would be higher than this projection. The projection at the Table 5.5-17 shows that the existing units have a good value.

The existing units are important generating assets. It is necessary to continue good maintenance and to make available.

Tables from 5.5-18 to 5.5-21 show projections of financial statement in Uzbekistani Sum on assumption that Sum would be devaluated against US Dollar at 10% per year and also at the same 10% against Japanese Yen, which is the currency denominated the loan. The projection is made for the case at annual tariff increase 4.25% to produce ROE 5.03% per year. Other assumptions are same as for the case in 5.5.4 (1).

Table 5.5-18	projection of generation cost in Sum
Table 5.5-19	projection of income statement in Sum
Table 5.5-20	projection of cashflow statement in Sum
Table 5.5-21	projection of balance sheet in Sum

Sum devaluation brings exchange fluctuation loss to financial statements of the project in Sum. Generation cost in early years are higher than US\$ base due to large amount of exchange loss. The projection is made for the case that the project shows 5% per year equity return at US\$ base and at Sum base 14.5% per year, however, income statement shows that loss will be recognized until 12th year 2018.

Table 5.5-17 Projection of Generation Cost at Existing Units and Difference from the New Plant (Unit: thousand US\$)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fuel Cost	50,452	52,470	54,569	56,752	59,022	61,383	63,838	66,392	69,048	71,809	74,682	77,669	80,776
Consumables	1,074	1,106	1,140	1,174	1,209	1,245	1,283	1,321	1,361	1,402	1,444	1,487	1,532
Maintenance	1,081	1,113	1,147	1,181	1,217	1,253	1,291	1,329	1,369	1,410	1,453	1,496	1,541
Staff Salary	1,756	1,844	1,936	2,033	2,135	2,241	2,353	2,471	2,595	2,724	2,861	3,004	3,154
Insurance Premium	622	641	660	680	700	721	743	765	788	812	836	861	887
Other Costs	991	1,021	1,052	1,083	1,116	1,149	1,184	1,219	1,256	1,293	1,332	1,372	1,413
Depreciation	424	437	450	463	477	491	506	521	537	553	570	587	604
Total	56,401	58,633	60,953	63,366	65,875	68,485	71,198	74,019	76,953	80,004	83,177	86,476	89,907
Ave. Gene Cost	0.56	0.59	0.61	0.63	0.66	0.68	0.71	0.74	0.77	0.80	0.83	0.86	0.90
Ditto of New Plant	1.17	1.19	1.21	1.22	1.25	1.27	1.29	1.31	1.34	1.36	1.39	1.41	1.15
Balance	0.60	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.57	0.56	0.55	0.55	0.25

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total
Fuel Cost	84,007	87,367	90,862	94,496	98,276	102,207	106,296	110,547	114,969	119,568	124,351	129,325	2,101,136
Consumables	1,577	1,625	1,674	1,724	1,775	1,829	1,884	1,940	1,998	2,058	2,120	2,184	39,164
Maintenance	1,587	1,635	1,684	1,735	1,787	1,840	1,895	1,952	2,011	2,071	2,133	2,197	39,411
Staff Salary	3,312	3,477	3,651	3,834	4,025	4,226	4,438	4,660	4,893	5,137	5,394	5,664	83,817
Insurance Premium	913	941	969	998	1,028	1,059	1,091	1,123	1,157	1,192	1,227	1,264	22,676
Other Costs	1,456	1,500	1,545	1,591	1,639	1,688	1,738	1,791	1,844	1,900	1,957	2,015	36,144
Depreciation	623	641	660	680	701	722	743	766	789	812	837	862	15,457
Total	93,475	97,186	101,045	105,057	109,231	113,571	118,095	122,779	127,661	132,738	138,019	143,511	2,337,805
Ave. Gene Cost	0.93	0.97	1.01	1.05	1.09	1.14	1.18	1.23	1.28	1.33	1.38	1.44	0.94
Ditto of New Plant	0.89	0.92	0.95	0.98	1.02	1.05	1.09	1.07	1.10	1.14	1.19	1.23	1.17
Balance	-0.04	-0.05	-0.06	-0.07	-0.08	-0.08	-0.09	-0.16	-0.17	-0.18	-0.20	-0.21	0.23

Table 5.5-18 Projection of Generation Cost of the New Power Plant (Unit: million Sum)

(10% per year Sum currency devaluation is assumed)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total		
Exchange Rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019															
Devaluation per year	1,464	1,611	1,772	1,949	2,144	2,358	2,594	2,853	3,138	3,452	3,797	4,177	4,595															
Gas Purchase	11,913	13,629	15,592	17,837	20,405	23,344	26,705	30,551	34,950	39,983	45,740	52,327	59,862															
Annual Replacement Parts Cost	7,168	8,122	9,202	10,428	11,812	13,363	15,163	17,180	19,465	22,054	24,987	28,310	32,075															
Salary Cost	588	691	798	921	1,064	1,229	1,420	1,640	1,894	2,187	2,526	2,918	3,370															
Insurance Premium	996	1,095	1,205	1,325	1,458	1,603	1,764	1,940	2,134	2,348	2,582	2,841	3,125															
Cost of Consumables	412	467	529	599	679	769	871	987	1,119	1,267	1,436	1,627	1,843															
Other Costs	330	373	423	479	543	615	697	790	895	1,014	1,149	1,302	1,475															
Depreciation Cost Civil/Build	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998															
Depreciation Cost Plant/Equip	19,540	19,640	19,640	19,640	19,640	19,640	19,640	19,640	19,640	19,640	19,640	19,640	19,640															
Generation Cost	43,056	46,015	49,386	53,226	57,600	62,582	68,259	74,726	82,095	90,491	100,059	110,962	113,568															
(Excluding Financing Cost)																												
Ave. Generation Cost Sum/kWh	15,653	16,700	17,930	19,320	20,910	22,720	24,780	27,120	29,800	32,850	36,320	40,220	41,220															
(Excluding Interest) cent/kWh	1,070	1,040	1,010	990	980	990	990	990	990	990	990	990	990															
Interest	5,356	5,891	6,480	7,128	7,841	8,410	8,776	9,132	9,471	9,787	10,071	10,314	10,505															
Exchange Loss	25,625	28,188	31,006	34,107	37,518	41,269	43,127	44,942	46,690	48,338	49,849	51,178	52,275															
Total Generation Cost	74,036	80,094	86,873	94,461	102,959	112,262	120,162	128,801	138,256	148,616	159,979	172,455	176,346															
Average Gene. Cost Sum/kWh	26,870	29,070	31,530	34,290	37,370	40,750	43,620	46,750	50,180	53,940	58,070	62,600	64,010															
Average Gene. Cost cents/kWh	1,840	1,810	1,780	1,760	1,740	1,730	1,680	1,640	1,600	1,560	1,530	1,500	1,390															
Exchange Rate																												
Devaluation per year																												
Gas Purchase																												
Annual Replacement Parts Cost																												
Salary Cost																												
Insurance Premium																												
Cost of Consumables																												
Other Costs																												
Depreciation Cost Civil/Build																												
Depreciation Cost Plant/Equip																												
Generation Cost																												
(Excluding Financing Cost)																												
Ave. Generation Cost Sum/kWh																												
(Excluding Interest) cent/kWh																												
Interest																												
Exchange Loss																												
Total Generation Cost																												
Average Gene. Cost Sum/kWh																												
Average Gene. Cost cents/kWh																												

Table 5.5-19 Projection of Income Statement of the New Power Plant (Unit: million Sum)

(10% per year Sum currency devaluation is assumed)

	1	2	3	4	5	6	7	8	9	10	11	12	13
Exchange Rate	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Devaluation per year	1.464	1.611	1.772	1.949	2.144	2.358	2.594	2.853	3.138	3.452	3.797	4.177	4.595
Revenue	36,767	42,162	48,350	55,445	63,581	72,912	83,612	95,882	109,953	126,088	144,592	165,810	190,143
Gene. Cost without Int. & Exch	43,056	46,015	49,386	53,226	57,600	62,582	68,259	74,726	82,095	90,491	100,059	110,962	113,568
Interest	5,356	5,891	6,480	7,128	7,841	8,410	8,776	9,132	9,471	9,787	10,071	10,314	10,505
Exchange Loss	25,025	28,188	31,006	34,107	37,518	41,269	43,127	44,942	46,690	48,338	49,849	51,178	52,275
Profit before Tax	-37,269	-37,932	-38,523	-39,016	-39,377	-39,350	-36,550	-32,919	-28,304	-22,528	-15,387	-6,644	13,795
Corporate Income Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Profit after Tax	-37,269	-37,932	-38,523	-39,016	-39,377	-39,350	-36,550	-32,919	-28,304	-22,528	-15,387	-6,644	13,795
Retained Profit in Beginning	-18,868	-56,138	-94,070	-132,593	-171,609	-210,987	-250,336	-286,886	-319,805	-348,109	-370,637	-386,024	-392,669
Undistributed Profit	-56,138	-94,070	-132,593	-171,609	-210,987	-250,336	-286,886	-319,805	-348,109	-370,637	-386,024	-392,669	-378,874
Dividend	0	0	0	0	0	0	0	0	0	0	0	0	0
Retained Profit at Ending	-56,138	-94,070	-132,593	-171,609	-210,987	-250,336	-286,886	-319,805	-348,109	-370,637	-386,024	-392,669	-378,874
Exchange Rate	Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031 Total
Devaluation per year	10.0%	5,054	5,560	6,116	6,727	7,400	8,140	8,954	9,850	10,835	11,918	13,110	14,421
Revenue	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344	7,433,611
Gene. Cost without Int. & Exch	117,910	134,052	152,451	173,424	197,333	224,589	255,663	289,093	329,488	375,548	428,069	487,963	4,117,610
Interest	10,631	10,677	10,627	10,459	10,151	9,677	9,008	8,107	6,936	5,450	3,597	1,319	205,801
Exchange Loss	53,079	53,521	53,521	52,986	51,808	49,866	47,016	43,098	37,926	31,289	22,945	12,620	1,043,788
Profit before Tax	36,426	51,794	70,140	91,949	117,779	148,275	184,176	228,333	277,727	335,483	402,893	481,442	2,066,412
Corporate Income Tax	0	20,109	24,549	32,182	41,223	51,896	64,462	79,916	97,205	117,419	141,013	168,505	838,478
Profit after Tax	36,426	31,685	45,591	59,767	76,557	96,379	119,715	148,416	180,523	218,064	261,880	312,937	1,227,933
Retained Profit in Beginning	-378,874	-342,448	-310,763	-265,172	-205,405	-128,849	-32,470	0	0	0	0	0	0
Undistributed Profit	-342,448	-310,763	-265,172	-205,405	-128,849	-32,470	87,244	148,416	180,523	218,064	261,880	312,937	1,209,065
Dividend	0	0	0	0	0	0	87,244	148,416	180,523	218,064	261,880	312,937	1,209,065
Retained Profit at Ending	-342,448	-310,763	-265,172	-205,405	-128,849	-32,470	0	0	0	0	0	0	0

Table 5.5-20 Projection of Cashflow Statement of the New Power Plant (Unit: million Sum)

(10% per year Sum currency devaluation is assumed) ROE/DCF = 14.59% per year

Year	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
Exchange Rate	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015	2,016	2,017
Devaluation per year	1,100	1,210	1,331	1,464	1,611	1,772	1,949	2,144	2,358	2,594	2,853	3,138	3,452	3,797
Generation Revenue				36,767	42,162	48,350	55,445	63,581	72,912	83,612	95,882	109,953	126,088	144,592
Cash Inflow				36,767	42,162	48,350	55,445	63,581	72,912	83,612	95,882	109,953	126,088	144,592
Operating Cost				-43,056	-46,015	-49,386	-53,226	-57,600	-62,582	-68,259	-74,726	-82,095	-90,491	-100,059
Less Depreciation				21,839	21,839	21,839	21,839	21,839	21,839	21,839	21,839	21,839	21,839	21,839
Payment of Tax				0	0	0	0	0	0	0	0	0	0	0
Cash Outflow from Operation				-21,417	-24,376	-27,748	-31,587	-35,961	-40,944	-46,820	-53,087	-60,458	-68,852	-78,420
Cashflow from Operation				15,350	17,786	20,602	23,858	27,620	31,968	36,992	42,794	49,498	57,236	66,171
Construction				-55,000	-106,480	-117,794								
Cashflow from Investment				-55,000	-106,480	-117,794								
Principal Repayment (Borrowing)				46,750	90,508	100,124	0	0	-22,698	-24,968	-27,465	-30,211	-33,232	-36,558
Loan Interest				-444	-1,837	-3,918	-6,480	-7,841	-8,410	-8,776	-9,132	-9,471	-9,787	-10,071
Capital Injection (Dividend)				8,894	17,809	21,587	0	0	0	0	0	0	0	0
Cashflow from Financing				55,000	108,480	117,794	-6,480	-7,841	-8,410	-8,776	-9,132	-9,471	-9,787	-10,071
Net Cash Increase				0	0	0	0	0	0	0	0	0	0	0
Cash at Beginning				0	0	0	0	0	0	0	0	0	0	0
Cash at Ending				0	0	0	0	0	0	0	0	0	0	0
Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Exchange Rate	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030	2,031
Devaluation per year	4,177	4,595	5,054	5,560	6,116	6,727	7,400	8,140	8,954	9,850	10,835	11,918	13,110	14,421
Generation Revenue	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Cash Inflow	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Operating Cost				-110,862	-113,568	-117,910	-124,424	-132,333	-141,734	-152,451	-164,244	-177,333	-191,093	-205,863
Less Depreciation				21,639	11,819	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998
Payment of Tax				0	0	0	0	0	0	0	0	0	0	0
Cash Outflow from Operation				-89,324	-101,750	-115,912	-132,426	-151,244	-172,736	-197,453	-224,246	-254,335	-291,095	-333,865
Cashflow from Operation				76,487	88,393	102,134	97,882	111,737	125,210	140,515	157,920	177,737	199,621	225,385
Construction														
Cashflow from Investment														
Principal Repayment (Borrowing)				-40,211	-44,232	-48,656	-53,521	-58,873	-64,761	-71,237	-78,360	-86,196	-94,816	-104,298
Loan Interest				-10,314	-10,505	-10,631	-10,677	-10,687	-10,659	-10,511	-9,877	-9,008	-8,107	-6,938
Capital Injection (Dividend)				0	0	0	0	0	0	0	0	0	0	0
Cashflow from Financing				-50,525	-54,738	-59,287	-64,199	-69,500	-75,219	-81,388	-88,038	-95,244	-103,031	-111,472
Net Cash Increase				25,961	33,656	42,848	33,663	42,237	49,990	59,127	69,882	81,712	93,438	106,200
Cash at Beginning				126,399	152,380	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146
Cash at Ending				152,360	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146	764,346
Year	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Exchange Rate	2,038	2,039	2,040	2,041	2,042	2,043	2,044	2,045	2,046	2,047	2,048	2,049	2,050	2,051
Devaluation per year	4,231	4,649	5,118	5,640	6,218	6,854	7,550	8,310	9,138	10,038	11,015	12,074	13,221	14,464
Generation Revenue	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Cash Inflow	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Operating Cost				-110,862	-113,568	-117,910	-124,424	-132,333	-141,734	-152,451	-164,244	-177,333	-191,093	-205,863
Less Depreciation				21,639	11,819	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998
Payment of Tax				0	0	0	0	0	0	0	0	0	0	0
Cash Outflow from Operation				-89,324	-101,750	-115,912	-132,426	-151,244	-172,736	-197,453	-224,246	-254,335	-291,095	-333,865
Cashflow from Operation				76,487	88,393	102,134	97,882	111,737	125,210	140,515	157,920	177,737	199,621	225,385
Construction														
Cashflow from Investment														
Principal Repayment (Borrowing)				-40,211	-44,232	-48,656	-53,521	-58,873	-64,761	-71,237	-78,360	-86,196	-94,816	-104,298
Loan Interest				-10,314	-10,505	-10,631	-10,677	-10,687	-10,659	-10,511	-9,877	-9,008	-8,107	-6,938
Capital Injection (Dividend)				0	0	0	0	0	0	0	0	0	0	0
Cashflow from Financing				-50,525	-54,738	-59,287	-64,199	-69,500	-75,219	-81,388	-88,038	-95,244	-103,031	-111,472
Net Cash Increase				25,961	33,656	42,848	33,663	42,237	49,990	59,127	69,882	81,712	93,438	106,200
Cash at Beginning				126,399	152,380	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146
Cash at Ending				152,360	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146	764,346
Year	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Exchange Rate	2,058	2,059	2,060	2,061	2,062	2,063	2,064	2,065	2,066	2,067	2,068	2,069	2,070	2,071
Devaluation per year	4,271	4,689	5,158	5,680	6,258	6,894	7,590	8,350	9,178	10,078	11,055	12,114	13,261	14,504
Generation Revenue	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Cash Inflow	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Operating Cost				-110,862	-113,568	-117,910	-124,424	-132,333	-141,734	-152,451	-164,244	-177,333	-191,093	-205,863
Less Depreciation				21,639	11,819	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998
Payment of Tax				0	0	0	0	0	0	0	0	0	0	0
Cash Outflow from Operation				-89,324	-101,750	-115,912	-132,426	-151,244	-172,736	-197,453	-224,246	-254,335	-291,095	-333,865
Cashflow from Operation				76,487	88,393	102,134	97,882	111,737	125,210	140,515	157,920	177,737	199,621	225,385
Construction														
Cashflow from Investment														
Principal Repayment (Borrowing)				-40,211	-44,232	-48,656	-53,521	-58,873	-64,761	-71,237	-78,360	-86,196	-94,816	-104,298
Loan Interest				-10,314	-10,505	-10,631	-10,677	-10,687	-10,659	-10,511	-9,877	-9,008	-8,107	-6,938
Capital Injection (Dividend)				0	0	0	0	0	0	0	0	0	0	0
Cashflow from Financing				-50,525	-54,738	-59,287	-64,199	-69,500	-75,219	-81,388	-88,038	-95,244	-103,031	-111,472
Net Cash Increase				25,961	33,656	42,848	33,663	42,237	49,990	59,127	69,882	81,712	93,438	106,200
Cash at Beginning				126,399	152,380	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146
Cash at Ending				152,360	186,016	228,864	262,547	304,784	354,774	413,901	483,783	565,071	658,146	764,346
Year	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Exchange Rate	2,078	2,079	2,080	2,081	2,082	2,083	2,084	2,085	2,086	2,087	2,088	2,089	2,090	2,091
Devaluation per year	4,304	4,722	5,191	5,713	6,291	6,927	7,623	8,383	9,201	10,080	11,021	12,024	13,090	14,321
Generation Revenue	165,810	190,143	218,046	250,045	286,739	328,818	377,072	432,407	495,863	568,631	652,077	747,770	857,505	983,344
Cash Inflow	165,810	190,143	218,046	250,045										

Table 5.5-21 Projection of Balance Sheet of the New Power Plant (Unit: million Sum)

(10% per year Sum currency devaluation is assumed)

Year	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11
Exchange Rate	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Devaluation per year	10.0%	1,210	1,331	1,464	1,611	1,772	1,949	2,144	2,358	2,594	2,853	3,138	3,452	3,797
Cash	0	0	0	9,994	21,889	36,011	52,740	72,519	73,380	76,627	82,825	92,639	106,855	126,399
Civil & Building	7,762	22,927	39,966	37,968	35,969	33,971	31,973	29,975	27,976	25,978	23,980	21,981	19,983	17,985
Plant & Machinery	47,682	140,834	245,506	225,866	206,225	186,585	166,944	147,304	127,663	108,023	88,382	68,742	49,101	29,461
Asset Total	55,444	163,761	285,472	273,828	264,084	256,566	251,657	249,797	229,019	210,628	195,186	183,362	175,939	173,845
Loan	46,750	141,933	256,251	281,876	310,063	341,070	375,177	412,694	431,266	449,424	466,902	483,381	498,486	511,779
Retained Profit (Loss)	0	-4,675	-18,868	-56,138	-94,070	-132,593	-171,609	-210,987	-250,336	-286,886	-319,805	-348,109	-370,637	-386,024
Capital	8,694	26,503	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090
Debt & Equity Total	55,444	163,761	285,472	273,828	264,084	256,566	251,657	249,797	229,019	210,628	195,186	183,362	175,939	173,845

Year	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Exchange Rate	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Devaluation per year	10.0%	4,177	4,595	5,054	5,560	6,116	6,727	7,400	8,954	9,850	10,835	11,918	13,110	14,421
Cash	152,360	186,016	228,864	262,547	304,784	354,774	413,901	483,783	479,071	427,354	360,982	277,544	174,290	48,090
Civil & Building	15,986	13,988	11,990	9,992	7,993	5,995	3,997	1,998	0	0	0	0	0	0
Plant & Machinery	9,820	0	0	0	0	0	0	0	0	0	0	0	0	0
Asset Total	178,167	200,004	240,853	272,538	312,777	360,769	417,897	485,781	479,071	427,354	360,982	277,544	174,290	48,090
Loan	522,746	530,788	535,212	535,212	529,859	518,085	498,657	470,162	430,982	379,264	312,893	229,455	126,200	0
Retained Profit (Loss)	-392,669	-378,874	-342,448	-310,763	-265,172	-205,405	-128,849	-32,470	0	0	0	0	0	0
Capital	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090	48,090
Debt & Equity Total	178,167	200,004	240,853	272,538	312,777	360,769	417,897	485,781	479,071	427,354	360,982	277,544	174,290	48,090

5.5.5 Issues and Suggestions from Financial and Economical Analysis

(1) Tariff Increase

Financial analysis at paragraph 5.5.2 and projection of financial statements at paragraph 5.5.4 show that current electricity tariff would not provide enough revenue for the project. Electricity is one of the most important infrastructures for people and industry. The tariff increase will cause big impact to people and industry, and is better to be made at reasonable span.

On the other hand, the existing units may produce financial gain. However, all plants have life, and will become not operative in some day. For this reason, investments to new project is necessary, and financial aspects of the new project would be basically the same.

The Tables from 5.5-18 to 5.5-21 of the financial projection in Sum at 4.25% per year tariff increase show that the project in early years will be still loss but cashflow is positive during the full period of the operation period. ROE/DCF of this case was 14.56% per year at Sum base being considered to be equivalent to 4.18% per year at US Dollar base because of the assumption that Sum would be devaluated at 10% per year against US Dollar. This case may be one of the minimum levels to produce the sound financial position, though continuous reviews and studies are necessary on the case involving many assumptions so as to reflect further developments and movements. The financial projection is only made for the New Power Plant, and a study on tariff increase should be made for the financial projection of the whole SJSC "Uzbekenergo".

(2) Maintenance of the Existing Units

The existing units are considered providing financial contribution. As far as they are making contribution, maintenance of them should be made so that they would be able to work. For the purpose that the existing will function well, it is considered that more maintenance fee can be allowed.

The table 5.5-17 shows that difference of generation cost between in the new power plant and in the existing units would be more than US Cents 0.5/kWh. If generation by one existing unit is 800 GWh per year, the difference is equivalent to US\$ 4 million being equivalent to Sum 4 billion per year. A maintenance plan of the existing units is better to be studied to have longer life.

In this relation, there might be a plan that two units out of the existing 12 units would be demolished. This plan is considered to be re-studied, because;

- a. it is difficult to determine which unit will become broken,
- b. it is better to continue to operate the existing units until they becomes non operative or generation cost including maintenance fee becomes larger than a marginal point on which generation cost is higher than value of generation, and
- c. units being not operated can be stand-by and can work, when necessary on some occasion that accident happen in any other units in DC "TASHTPP" or in other units in Uzbekistan.

(3) Fuel Arrangement

In winter gas use ratio in fuel becomes low. This ratio was 28.2% in December 2002, in which 91,000,000 m³ was received. The new power plant will consume 50,000,000 m³ in month under a full operation. If the new plant is operated, gas available to the existing units might be decreased in winter, and half of gas might be burnt at the new power plant.

It is necessary to study what is the minimum requirement of gas for safe and stable operation of the existing units, and also what amount of gas will be available to DC "TASHTPP".

(4) Future Expansion

Gas combined cycle power plant is superior in fuel consumption. However, operation in use of heavy fuel oil is not suitable. Therefore, it is necessary to make study on fuel production and supply plan in Uzbekistan what will be the best combination of gas and oil. There is a relation with hydro reservoir operation in Uzbekistan and neighbor countries.

If the study results show that a power plant to be able to burn both or either of gas and oil, conventional boiler steam turbine plant equipped with flue gas desulfurization facility may be better. If gas is available to make gas burning plant operative during the whole of year, selection of gas turbine combine cycle will bring a good merit to produce more electricity with less gas consumption.

(5) Maintenance of Gas Turbine Combined Cycle

Maintenance of gas turbine combined cycle requires to spend much money for purchasing replacement parts, and the parts purchase is import. The situation is very different from that for the existing units on which maintenance work can be taken in DC "TASHTPP" or in SJSC

“Uzbekenergo” without purchasing many spare parts from outside.

The superiority of good fuel consumption provides merits when the plant is working. For purpose to make the plant available, procurement of spare parts is necessary. A good system to procure spare parts and to manage inventory of them is better to be developed.