

Kyrgyz Republic

**Reconstruction of the heat power plant of
Bishkek city with the introduction of a boiler
unit with a steam output of 420 tons per hour**

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Bishkek city



Ratification of the UNFCCC, KP to the UNFCCC by the Kyrgyz Republic

Understanding the importance of the climate change, the need to globally join the efforts of states in mitigating negative consequences of this process, in January of 2000 the Kyrgyz Republic joined the UN Framework Convention on the Climate Change, as well as ratified the Kyoto Protocol.

The Law of the Kyrgyz Republic on Ratification of the UNFCCC was signed as of January 14, 2000.

The Kyoto Protocol was ratified by the Law of the Kyrgyz Republic as of January 15, 2003.



National Notice

As a party to the UN Framework Convention on Climate Change the Kyrgyz Republic shall periodically submit the results of the inventory of greenhouse gas emissions in its territory, as well as other useful information.

The first National Notice was submitted by Kyrgyzstan in 2002. At present the second National Notice is under preparation.



National Body on CDM

One of the major requirements specifying the conditions and procedure for participation in CDM projects is the establishment of the National Body on CDM.

The National Committee on Climate Change Consequences with the functions of the National Body on the Clean Development Mechanism in compliance with the requirements of the Kyoto Protocol was established by the Kyrgyz Republic on July 18, 2005.



The Kyrgyz Republic, as a developing country, does not have any commitments on reducing GHG emissions and is a potential country – seller of quotas on GHG emissions. Therefore it is important to prepare mechanisms for receiving and spending funds envisaged by implementation of the UNFCCC.



Greenhouse gas (GHG) emissions from energy generation in the Kyrgyz Republic make up about 35% of total GHG emissions. This sector has a significant potential for reducing GHG emissions (*the first National Notice of the Kyrgyz Republic*).



HPP of Bishkek city

The HPP of Bishkek city is the major power plant in the north of the Kyrgyz Republic and the key producer of thermal power for the capital of Kyrgyzstan.

The HPP of Bishkek city is an affiliate of the OJSC “Power Plants”.



HPP of Bishkek city

The major facilities consist of 24 boiler units of the drum types and 11 turbine sets,
of which:

- *BKZ-160-100 – 13 units.*
- *BKZ-220-100 – 11 units.*



HPP of Bishkek city

At present the installed capacity of the Bishkek HPP is:

- electricity – 666 thous. kWh;
- thermal power – 1,443.9 GCal/h.



Emissions of CO2 by the Bishkek HPP, /thous. tons/

2002	2003	2004	2005	2006
1,515.5 (35.5%)	1,644.5 (55.4%)	1,686.1 (54.9%)	1,681.9 (65.8%)	1,585.4 (69.7%)

* in parenthesis – the share of coal in the fuel structure



HPP of Bishkek city

Project idea:

- *Replacement of three boilers BKZ-160 with one boiler with a steam output of 420 tons per hour with an automated control system and a relevant turbine.*



HPP of Bishkek city

The replacement of three boilers BKZ-160 for one boiler with a capacity of 420 tons of steam per hour

The service life of the boilers № 1-3 of the HPP of Bishkek city exceeded the operational life time, reached the maximum physical depreciation, they are of little efficiency, unreliable in operations. The reconstruction and the introduction of new equipment and technologies are needed.



Fuel saving and reduction of CO₂ emissions as a result of the replacement of three boilers BKZ-160 for one boiler with the steam output of 420 tons per hour

Fuel, (thous. tons of coal equivalent/year)	CO ₂ emissions, (mln. tons/year)
166,7	0,405



Indicators of the Bishkek HPP

Indicator	Measuring unit	Baseline (actual 2006)	Project line
Electricity output	thous. kWth	658,602	658,602
Thermal power output	thous. GCal	2,053.1	2,053.1
Total electricity and thermal power output	thous. kWth	3,046,330.6	3,046,330.6
Consumption of natural fuel, of which:			
Local coal	thous. ton	13.9	20.0
Imported coal	thous. ton	654	520.8
Total coal	thous. ton	667.9	540.8
Heavy oil	thous. ton	0.15	0
Natural gas	Mln. m3	143.5	64.1
Consumption of coal equivalent	thous. ton equiv. coal	554.3	387.6
COs emissions	thous. ton	1,585.5	1,180.3
Specific emission of CO2 for electricity and thermal power output	Kg CO2/kWth	0.52	0.39
Reduction of CO2 emissions/year	thous.T		405,12

Project budget

Total project costs	US\$ 67.5 million
Costs for development of the FS	US\$ 0.3 million
Cost of equipment	US\$ 43 million: Of which: Boiler – US\$ 28 million; turbine – US\$ 15 million
Construction and installation and pre-commissioning works	US\$ 17.5 million
Administrative costs, working capital, preparatory works, training of staff	US\$ 0.6 million
Contingencies	US\$ 6.1 million

External economic environment

Re-financing rate

FOREX	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 and so on
US\$	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00	10,00

Inflation (US\$)

Object	1 year	2 year	3 year	4 year	5 year
Sales	3,00	3,00	3,00	3,00	3,00
Direct costs	3,00	3,00	3,00	3,00	3,00
General costs	3,00	3,00	3,00	3,00	3,00
Salary	3,00	3,00	3,00	3,00	3,00
Real estate	3,00	3,00	3,00	3,00	3,00

Taxes

Tax name	Base	Period	Rate
Profit tax	Profit	month	20%
VAT	Value added	month	20%

Project savings forecast

Planned volume of supply

№	Product/ Option	Meas. unit	4/07	5/07	6/07	7/07	8/07	9/07	10/07	11/07	12/07	1/08	2/08	3/08
1	Economy 1	Thou s. US\$	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

№	Product/ Option	4/08	5/08	6/08	7/08	8/08	9/08	10/08	11/08	12/08	Q1/09	Q2/09	Q3/09
1	Economy 1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1250,0

№	Product/ Option	Q 4/09	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	1-3 2022
1	Economy 1	3750,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	15000,0	3750,0



Financing sources

Equity

Shareholder	Date	Amount (thous. US\$)	Amount (thous. US\$)
Advance payment	01.04.2007	17 000,00	
Own equity	01.04.2007	6 172,80	

Credits

Name	Date	Amount (th. US\$)	Amount (th. US\$)	Time period	Rate, %
Credit	01.03.2008	50 500,00		120 months	10,00

Cash flow

Discounted cash flow (thous. US\$)

No	Item	4.2007	5.2007	6.2007	7.2007	8.2007
1	Receipts from sales					
2	Taxes					
3	Cash flow from operational activities					
4	Expenses for procurement of assets	75,20	74,68	74,16	73,64	73,13
5	Cash flow from investment activities	-75,20	-74,68	-74,16	-73,64	-73,13
6	Equity (paid-in capital)	17151,9				
7	Loans					
8	Loan repayments					
9	Repayment of loan interest					
10	Cash flow from financial activities	17151,9				
11	Cash balance, as of the beginning of the period		16916,18	16842,21	16768,74	16695,79
12	Cash balance, as of the end of the period	17076,7	17002,02	16917,86	16854,22	16781,08

Cash flow

Discounted cash flow (thous. US\$)

No	Item	9.2007	10.2007	11.2007	12.2007	1.2008	2.2008
1	Receipts from sales						
2	Taxes						
3	Cash flow from operational activities						
4	Expenses for procurement of assets	72,62	72,12	71,62	4504,61	4473,28	4442,16
5	Cash flow from investment activities	-72,62	-72,12	-71,62	-4504,61	-4473,28	-4442,16
6	Equity (paid-in capital)						
7	Loans						
8	Loan repayments						
9	Repayment of loan interest						
10	Cash flow from financial activities						
11	Cash balance, as of the beginning of the period	16623,35	16551,41	16479,97	16409,03	11946,76	7515,53
12	Cash balance, as of the end of the period	16708,46	16636,34	16564,73	12060,12	7586,84	3144,68

Cash flow

Discounted cash flow (thous. US\$)

No	Item	3.2008	4.2008	5.2008	6.2008	7.2008	8.2008
1	Receipts from sales						
2	Taxes						
3	Cash flow from operational activities						
4	Expenses for procurement of assets	4409,01	4311,41	4281,42	5783,48	5743,48	5703,52
5	Cash flow from investment activities	-4409,01	-4311,41	-4281,42	-5783,48	-5743,48	-5703,52
6	Equity (paid-in capital)	19,92	54,62	88,66	134,39	179,25	223,26
7	Loans	2390,82	4185,84	4146,49	5587,66	5535,14	5483,11
8	Loan repayments						
9	Repayment of loan interest	19,92	54,62	88,66	134,39	179,25	223,26
10	Cash flow from financial activities	2390,82	4185,84	4146,49	5587,67	5535,14	5483,11
11	Cash balance, as of the beginning of the period	3115,12	1115,9	991,51	857,85	663,64	457,26
12	Cash balance, as of the end of the period	1126,49	1000,91	865,99	669,94	461,60	241,19

Cash flow

Discounted cash flow (thous. US\$)

No	Item	9.2008	10.2008	11.2008	12.2008	Q 1, 2009
1	Receipts from sales					
2	Taxes					
3	Cash flow from operational activities					
4	Expenses for procurement of assets	4969,93	1489,89	1479,53	1469,23	4418,02
5	Cash flow from investment activities	-4969,93	-1489,89	-1479,53	-1469,23	-4418,02
6	Equity (paid-in capital)	362,81	371,54	379,82	288,56	1080,18
7	Loans	4766,11	1425,27	1411,87	1398,6	4184,86
8	Loan repayments					
9	Repayment of loan interest	260,88	270,3	279,53	288,56	918,47
10	Cash flow from financial activities	4868,04	1526,51	1512,16	1398,61	4346,57
11	Cash balance, as of the beginning of the period	238,92	137,99	174,27	206,6	136,64
12	Cash balance, as of the end of the period	139,3	175,92	208,56	137,93	66,48

Cash flow

Discounted cash flow (thous. US\$)

No	Item	Q 2, 2009	Q 3, 2009	Q 4, 2009	2010	2011	2012
1	Receipts from sales		1020,92	3020,33	11468,21	10546,66	9699,16
2	Taxes			502,15	1906,67	1753,45	1612,55
3	Cash flow from operational activities		1020,92	2518,18	9561,54	8793,21	8086,61
4	Expenses for procurement of assets	2829,87	136,08				
5	Cash flow from investment activities	-2829,87	-136,08				
6	Equity (paid-in capital)	1207,96	531,56				
7	Loans	2664,18	127,16				
8	Loan repayments				4230,51	3777,24	3372,54
9	Repayment of loan interest	982,69	968,65	942,10	3205,48	2493,08	1896,54
10	Cash flow from financial activities	2889,44	-309,92	-942,10	-7435,99	-6270,32	-5269,07
11	Cash balance, as of the beginning of the period	65,86	124,87	694,38	2255,65	4361,22	6860,39
12	Cash balance, as of the end of the period	126,06	700,97	2277,05	4402,6	6925,49	9743,02

Cash flow

Discounted cash flow (thous. US\$)

No	Item	2013	2014	2015	2016	2017	2018
1	Receipts from sales	8919,76	8202,99	7543,83	6937,63	6380,14	5867,45
2	Taxes	1907,73	1907,31	1822,91	1736,66	1649,76	1602,27
3	Cash flow from operational activities	7012,03	6295,69	5720,92	5200,97	4730,37	4265,18
4	Expenses for procurement of assets						
5	Cash flow from investment activities						
6	Equity (paid-in capital)						
7	Loans						
8	Loan repayments	3011,19	2688,57	2400,50	2143,31	1913,67	878,51
9	Repayment of loan interest	1399,21	986,67	646,48	367,86	141,52	0,00
10	Cash flow from financial activities	-4410,4	-3675,24	-3046,98	-2511,16	-2055,19	-878,51
11	Cash balance, as of the beginning of the period	9651,44	12228,62	14824,43	17473,23	20137,75	22787,79
12	Cash balance, as of the end of the period	12344,65	14965,1	17639,03	20328,83	23004,02	26390,68

Cash flow

Discounted cash flow (thous. US\$)

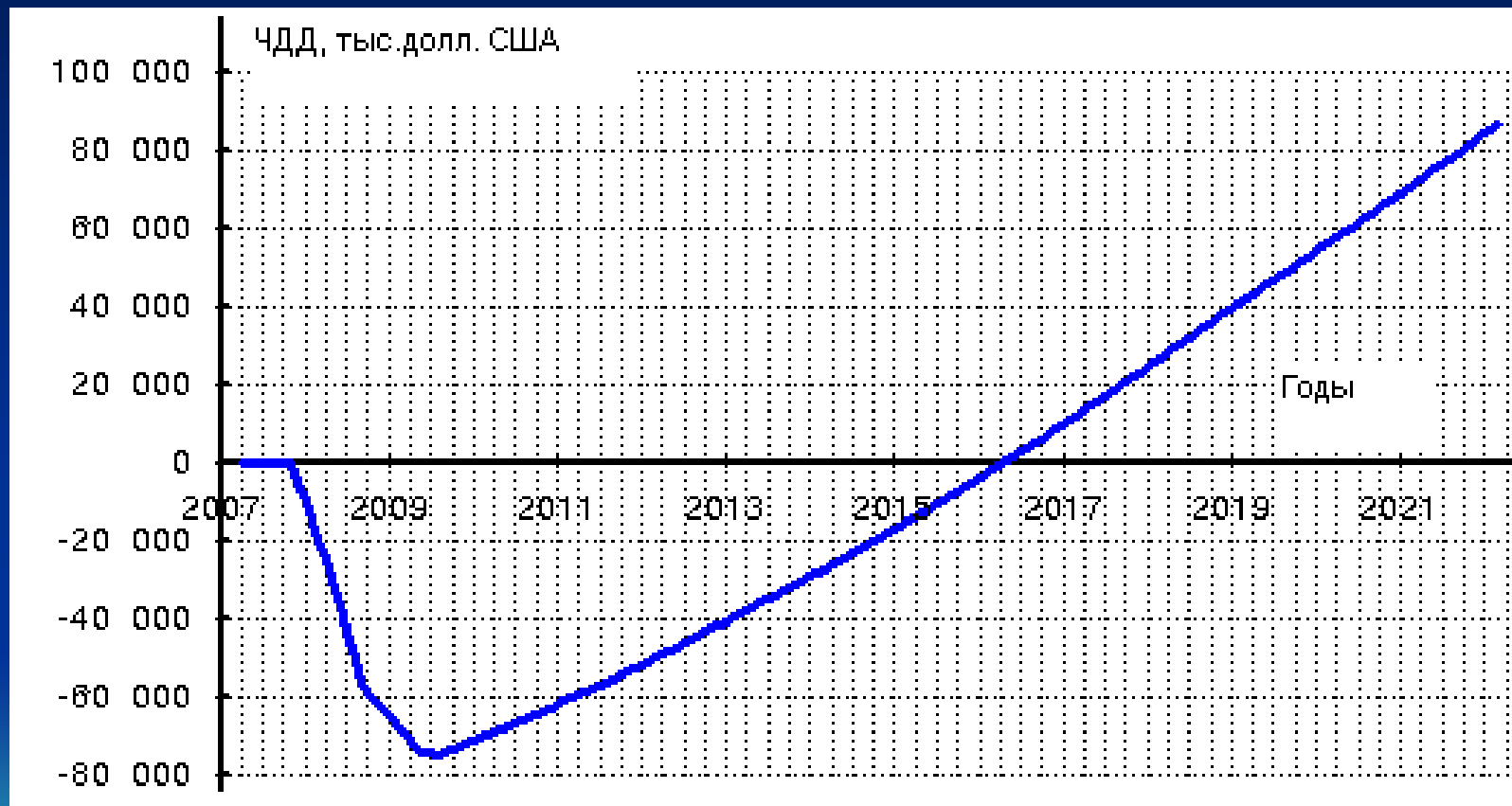
No	Item	2019	2020	2021	1-3 2022
1	Receipts from sales	5395,96	4962,35	4563,59	1082,41
2	Taxes	1738,08	1650,05	1517,46	359,91
3	Cash flow from operational activities	3657,88	3312,3	3046,14	722,49
4	Expenses for procurement of assets				
5	Cash flow from investment activities				
6	Equity (paid-in capital)				
7	Loans				
8	Loan repayments				
9	Repayment of loan interest				
10	Cash flow from financial activities				
11	Cash balance, as of the beginning of the period	26142,62	29766,11	3304,28	36064,79
12	Cash balance, as of the end of the period	30048,56	33360,86	36407,00	37129,49

Indicators of Project Merits

US\$

Discount rate	12.00	%
Pay-Back period – PB	89	Month
Discounted pay-back period – DPB	135	Month
Average rate of return – ARR	17.50	%
Net present value –NPV	12,912	
Profitability index – PI	1.21	
Internal rate of return – IRR	15.69	%

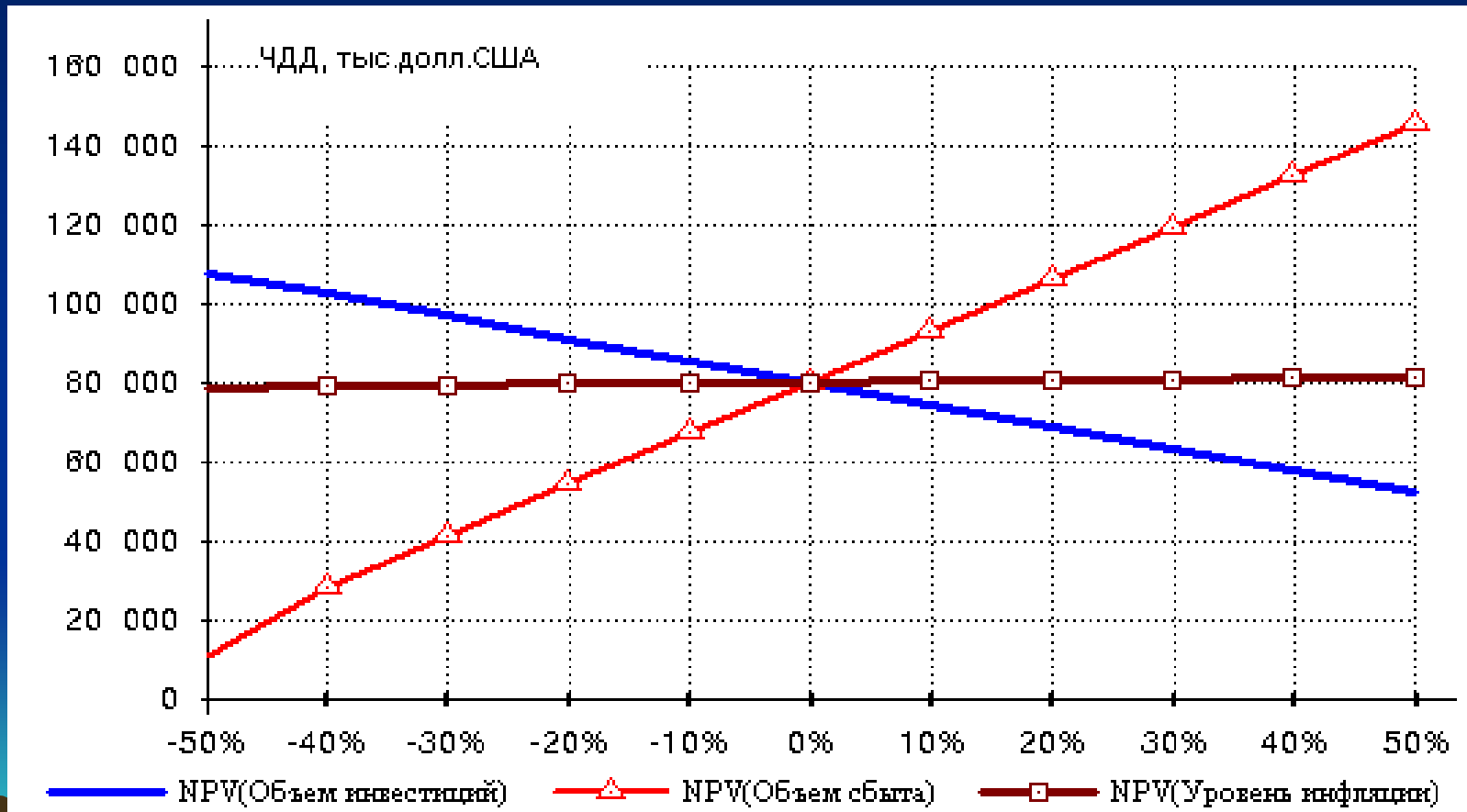
Discounted schedule of project pay-back period



Project Sensitivity Analysis

NDR, thous/ US\$ –

- NPV (Volume of investments)
- NPV (Volume of sales)
- NPV (Inflation rate)



• **THANK YOU !**

