Approved by the
Resolution of the Jogorku Kenesh
of the Kyrgyz Republic
dated April 24, 2008 N 346 -IV

NATIONAL ENERGY PROGRAM
of the Kyrgyz Republic for 2008-2010
and the fuel and energy complex development until 2025

1. Priorities of FEC development and the basis of the state Energy policy
2. Condition and main directions of perspective development of FEC sectors of the Kyrgyz Republic
3. Fuel and energy balance of the Kyrgyz Republic for 2008-2010 and a long-term perspective till 2025
4. Strategic objectives of the tariff policy and financial and economic recovery of the sector
5. Strategic objectives of institutional and structural reforms of fuel and energy complex management of the Kyrgyz Republic
6. Strategic objectives of inter-state cooperation in creation of the single market of energy resources and external Energy policy development
7. Main directions of energy saving policy
8. Strategic objectives of preservation of environment and rational use of natural resources in FEC
9. Scientific and technical innovation policy, personnel capacity building
10. Investment policy for the development of FEC

Kyrgyz Republic has sufficient fuel and energy resources. But fuel and energy complex (hereinafter - FEC) potential capacity is being used inadequately and the sector is experiencing certain economic difficulties. The country dependence on import of energy carriers, the share of which is about 50% of the total energy consumption, negatively impacts the condition of FEC and other sectors of economy.

In order to increase FEC efficiency, re-equip the technology, and develop the Energy sector , the Government of the Kyrgyz Republic made a decision on development of the National Energy Program of the Kyrgyz Republic for 2008-2010 and FEC development strategy till 2025 (hereinafter - NEP).

NEP has been developed in accordance with the laws of the Kyrgyz Republic, regulating country FEC development, based on resolutions of the Government of the Kyrgyz Republic dated February 15, 2006 N 71-p and dated June 10, 2006 N 310-p and provides complete and reliable energy supply for consumers based on a raise of own energy base, introduction of innovative technologies, considerable increase of functioning efficiency and achievement of a qualitatively new FEC status.

NEP is a document, specifying goals, objectives and main directions of a mid-term and a long-term energy policy of the state and establishing mechanisms of its implementation.

NEP goals include the following:

- scientific justification of conditions of efficient, safe, and sustainable FEC functioning;

-formation of the system of relations among FEC subjects, consumers, and the state in conditions of establishment of market relations;

- formation of a role and place of energy sector in creation of prerequisites for bringing the country economy into the path of sustainable development and social stability of the state.

Implementation of the NEP's main goals shall be carried out in coordination of functioning of all sectors of economy, with regard to resource and scientific and technical capacity of the country, possible negative consequences of project's implementation, in combination of macro-

economic and geopolitical factors, influencing development of relationships of bodies of state power, financial and business structures.

Formation of a civilized energy market and economic relationships of its subjects based on improvement of the normative legal basis is the main means for accomplishing the goals and implementing the NEP priorities.

1. Priorities of strategic FEC development and the basis of the state Energy Policy

The top priority of the Energy strategy of the Kyrgyz Republic is a rational and effective use of natural fuel and energy resources, available FEC scientific and other personnel capacity to ensure energy safety of the country, sustainable economic development and improving the standards of life of the population.

Implementation of main objectives shall be based on a mid-term and long-term state energy policy.

The main goal of a mid-term energy policy is financial enhancement and technological re-equipment of FEC.

Main components of the Energy policy for 2008-2010 include the following blocs of tasks:

- ensuring reliable and uninterrupted energy supply, first of all, for internal consumers;
- Implementation of fundamental reforms of the management system through creation of institutional market frameworks, relevant normative and legal basis, and completion of the structural FEC reform;
- enabling realization of a balanced tariff and price policy to ensure energy companies real costs coverage and excluding cross-cut subsidizing of consumers;
- reduction of losses and termination of energy theft;
- development of a rule on access to networks and sale of energy from alternative sources of energy and mechanisms of subsidizing;
- improvement of financial and corporate management of FEC, strengthening of commercial and financial discipline, and reaching the profitability of the sector's subjects;
- development of the program on technical re-equipment of the sector;
- Improvement of conditions for attracting the investments into FEC development;
- Implementation of measures aimed at development of competitiveness of the Kyrgyz Republic on the regional electricity market;
- development of a program on Energy efficiency and energy saving with regard to obligations of the agreements with CIS states;
- development of a program on replacement of hydrocarbon fuel with local alternative sources of energy to reduce the dependence on imported energy resources and greenhouse gas emissions;
- ensuring monitoring of financial situation in the electric power sector to reduce annually by 1-2% of the gross domestic product (hereinafter - GDP) targeted index of a quasi-fiscal deficit (hereinafter - QFD).

Long-term energy policy of the Kyrgyz Republic is aimed at protection of rights and legal interests of citizens and businesses, ensuring defense and safety of the state, efficient state property management, reaching the qualitively new FEC status and its implementation based on the principles of continuous actions of the state in realization of the most important strategic targets of energy sector development and the issues of energy sector objects privatization.

Strategic targets of a long-term Energy policy include energy and ecological safety and also energy and budget efficiency. Reaching the specified targets, increasing energy development process management requires formation of main components of the state Energy policy. This is, first of all, ensuring effective use of the state fund of energy resources, development of internal fuel and energy markets, formation of a rational fuel and energy balance.

The main Energy policy implementation instrument is a set of measures of state economic regulation such as price (tariff), tax, customs and anti-monopoly.

In pursuing Energy policy the state shall, in a full extent, use its ownership rights over resources and FEC assets and, at the same time, carry out re-structuring of state property with preservation of the effective state control, mainly in the system of FEC branches and objects representing high risk (hydro power and others).

Energy safety is the most important component of the National security of the Kyrgyz Republic, which must ensure reliable fuel and energy supply.

The current situation in FEC illustrates that these threats are quite realistic. There is a considerable technical and technological outdating in fuel generating sectors, accompanied by a sharp decline in mining of coal, oil and gas and constant dependency on import of hydrocarbon fuel. In power sector there is a disproportion in the structure and placement of generating facilities, inadequate development of system establishing grids, what restricts their carrying capacity and increases risks of limiting the consumers. The situation is aggravated with a financial and economic crisis as a result of non-payments and power theft, ineffective sector management and also absence of an alternative to the existing heat and energy saving methods.

The goal of Energy safety policy is continuous improvement of its following points:

- ability of FEC to safely supply with economically sound internal and external demands in energy carriers of a relevant quality and acceptable cost;
- ability of a consumer sector of economy to effectively use energy resources preventing irrational public costs on energy supply;
- energy sector resistance to external and internal economic, man-caused and natural threats and also its ability to minimize the damage, caused by emerging various destabilizing factors.

The main principles of guaranteeing the energy safety include the following:

- guaranteed and reliable energy supply of economy and the population of the country in a full capacity under common conditions and in a minimum necessary capacity if there is a risk of emergency situations;
- control by state bodies and local governments over reliable energy supply objects ensuring security of state;
- diversification of the used types of fuel and energy;
- taking into account requirements of ecological safety, environmental protection and use of renewable sources of energy (hereinafter - RSE);
- prevention of irrational use of energy resources (interconnection with the Energy efficiency policy);
- creation of economic conditions (first, by means of tax and customs measures), enabling equal profit from deliveries of energy resources to internal and external markets and rationalization of the structure of exporting;
- invention and production of a competitive energy equipment at home, attraction of ecologically safe and economically effective technologies to FEC.

In order to ensure Energy security, it is necessary to carry out modernization of morally outdated and physically depreciated technological FEC base and ensure restoration of exploited resource base and change the structure of consumption and placement of generation of fuel and energy resources. In doing so, the increase in use of hydro-power resources and RSE is anticipated.

The main principles of the state Energy policy in budget efficiency sector include the following:

- sustainable perspective of the state defining necessary forecast volumes of direct budget receipts from energy sector companies;
- comprehensive assessment of current and perspective results of changes of the state property structure and cost (state assets in FEC);
- balancing the growth of capitalization of energy sector and the volume of its provided budget receipts/ inflows;

- consistent and targeted use of state funds and also investments under the state control.

State energy policy and mechanisms of its implementation shall meet the requirements of social protection and shall be carried out based on the following principles:

- ensuring the equal accessibility of energy carriers for consumers;
- support of price (tariffs) parity of energy carriers in conducting of a price reform at an adequate for consumers level;
- providing the targeted support of the vulnerable layers of the population during the price increases (tariff rates);
- ensuring social protection to FEC employees during the company reforms (such as company closures, reduction of personnel);
- providing compensations for the caused damage to the population connected with construction of energy objects in accordance with the legislation of the Kyrgyz Republic.

2. FEC branches status and main directions of perspective development in the Kyrgyz Republic

2.1. Power sector

Electric-power sector (hereinafter - EPS) of FEC structurally consists of seven joint stock energy companies with the state owned control packet of shares, including one generating company (JSC "Power Plants"), one electric grid transmission (JSC "Kyrgyzstan National grid"), four electric grid distribution companies (JSC "Severelectro", JSC "Vostokelectro", JSC "Oshelectro," and JSC "Jalalabatelectro") and one heating company (JSC "Bishkekteploset"), and also joint stock companies with private capital - JSC "Chakan HPP", Bistrovskaya and Kalininskaya HPP.

EPS production basis includes 17 power stations with the total installation capacity of 3680 MWt, including., 15 HPP (2950 MWt) and two Central heating plant (730 MWt), more than 70 thousand km of transmission facilities with the voltage of 0,4-500 kilovolt, out of them 546 km - 500 kilovolt, 1714 km - 220 kilovolt and 4380 km - 110 kilovolt transmission lines, and also about 490 transformer substations with the voltage 35-500 kilovolt, with total capacity more than 8000 mega-volt-ampere.

Currently EPS, having the system of generation, transmission and distribution, in general meets the needs of the country in electricity and centralized heating of Bishkek and Osh, preserving stable volumes of electricity generation at the level of 14.486 billion. K.W.H in 2006 and up to 14.601 billion. K.W.H - in 2007.

EPS makes the major impact on the condition and perspectives of development of the national economy: it amounts about 3.9% of the GDP and 16% of the volume of industrial production, 10% of revenues in the state budget. Developed electricity grid enables access to electricity virtually for the prevailing majority of the population. At the same time, by per capita electricity consumption (1351 K.W.H), the Kyrgyz Republic is behind the world parameter (2343 K.W.H/per capita.), and also parameters of the neighboring states: Kazakhstan (3312 K.W.H/per capita), Tajikistan (2172 K.W.H/per capita.) and Uzbekistan (1796 K.W.H/per capita).

During the recent years the Kyrgyz Republic initiated some activities aimed at strengthening of energy independence of the country by means of developing the internal main electric grids and generating sources. Considerable volume of work aimed at technical re-equipment and development of a system of commercial recording of electricity was done to enable formation of the wholesale market of electric power and energy. Reforming the EPS production structures on a functional basis was undertaken to adjust them to the market management methods. Corporatization and partial privatization were also done to some enterprises. State regulation leverages, appropriate to the market economy conditions, were established for EPS regulation,

when joint stock companies' transferred their corporate management functions to the State Property Management Committee of the Kyrgyz Republic and a regulatory body was established in 2007 being the State department for regulation of fuel and energy complex under the Ministry of Industry, Energy and Fuel Resources of the Kyrgyz Republic.

Some normative and legal acts were adopted to regulate relationships in EPS. Establishing the normative legal basis for implementation of the energy saving policy has begun.

However, all these actions were not enough and currently the sector is facing the following problems:

- restructuring of the vertically integrated monopoly power company that was carried out in 2001 did not bring expected positive results due to a lack of necessary market mechanisms and adequate legislation;
- financial condition of power companies remains to be difficult, especially of distribution companies: in 2007, percentage of the payment collection for the consumed electricity, according to the distribution companies bills, was 85.7%; the accumulated consumers' accounts receivable to REC amounted - 3528 million soms, which restricts the power companies' activities and their relationships with other businesses. It also creates problems with regulating the credit and tax obligations before the budget of the Republic;
- failure to ensure reduction of electricity system losses in distribution grids, which steadily exceed the level of 40% of the generated electricity and considerable losses take place in distribution companies. In 2007, the losses amounted 36.2% of its total entry in RECs;
- failure to take resolute actions to improve management and technical equipment of commercial recording systems, insufficient attention is paid to the creation of an automatic electricity commercial recording system (AECRS);
- state bodies and energy companies do not undertake targeted and continuous actions aimed at the creation of the energy market and introduction of market mechanisms;
- situation is aggravated by low tariffs for electricity, which do not cover costs for its generation, transmission, and distribution;
- inadequate recording of actual electricity consumption and the practice of cross-cut subsidizing in JSC "Power Plants" makes it difficult to attract investments and develop competition in the energy sector;
- continuous growth of electricity consumption and keeping low tariffs lead to overloading and mass damages of equipment in distribution grids; electricity generation deficit amounts about 10 million K.W.H., and only for the northern part of the Republic - 200-300 MWt;
- during the last 15 years the energy sector of the Kyrgyz Republic has been experiencing constant decline in financing allocated for modernization of the sector and technical re-equipment, currently the depreciation level of the major equipment of power plants and grids reaches 50%;
- the construction of perspective generating sources (Kambarata HPPs, CHP-2 of Bishkek) that started more than 15 years ago remains incomplete, as there are no investments made in it;
- current financial and economic instability of energy companies makes a negative impact on the macroeconomic security of the country on the whole;
- main internal reasons that undermine energy security are: low level of financial management and commercial record devices supply; electricity theft, consumers' low level of discipline in paying for the electricity, lack of attention and reliable sources of financing the equipment restoration and reconstruction costs;
- inadequately balanced policy in developing the international energy relations and integration of EPS countries into one formulated market of electricity and energy for the Central Asian countries does not ensure uncompromising distribution of water and electricity resources in the region and can lead to the extrusion of the Kyrgyz Republic out of the regional electricity export market;
- attempts to attract investments into the power sector to launch new capacities do not bring expected results with an exception of small volumes of capital investments within the framework

of the state investments program and companies' own funds invested into development of the production basis.

The main goals of power energy development for the period up to 2025 are as follows:

- formation of the structure and placement of generating capacities and transmission main grids guaranteeing energy security and sustainability of the Kyrgyz Republic with energy resources;
- ensuring reliable electricity and heating supply to meet the domestic economy and population needs;
- completion of EPS reforming as a full-fledged element of the market economy in accordance with the new provisions of the energy policy with adoption of necessary legislative and normative acts aimed at regulation of the current processes in the sector;
- approaching the main world parameters of efficiency indicators of electricity and heat generation, transmission and distribution, negative impact on the environment;
- modernization and increasing the EPS production capacity and increasing its efficiency based on the application of new technologies, introduction of an automatic system of management and optimal regulation of load patterns;
- creation of complexes of generating capacities and transmission lines based on use of hydro-power resources and coal deposits of the country, oriented mainly at electricity export and electricity supply of energy-consuming industries that can promote the efficiency of the sector and sustainable development of economy of the Kyrgyz Republic;
- active participation in interstate integration in the power sector within the framework of EuroAsiaCooperation organization and bilaterally, in preparation and creation of the single competitive electric energy and capacity market.

The pace of implementation of strategic goals and resolution of the related tasks in EPS are determined by the country's economic development one the whole, available investment opportunities, efficiency in overcoming imbalances in the sector, which had been in the sector before 2005, and relatively high inertness and capital intensity of processes in the energy sector.

The first stage (approximately 2008-2010) will be focused on the extension of structural reforms and strengthening of the market fundamentals in financial and business activities that serve as a basis for the consistent development of the sector. This period will involve balanced price and tariff policies for energy carriers, limited investment capacities, necessity of using available industrial, technological and personnel capacity and relatively low paces of structural transformation and growth of efficiency parameters. This time period should be concentrated on resolving mainly such problems as attraction of investments and managerial "know how" in distribution energy companies by means of private capital.

In subsequent years (from 2011 till 2025), upon completion of structural and market reforms in joint stock energy companies, there will be a possibility of formation of investment capacity, which will be directed at technical re-equipment of production and reconstruction as well as development of the sector.

Radical change of the growth pace of the EPS industrial base will be connected with arrival of big external investors and can take place both during the first stage and subsequent years.

The primary objectives in EPS economy for 2008-2010 include:

- reforming the energy sector's management system, creation of necessary institutional frameworks and normative legal basis, and completion of the structural reform of the sector;
- development and conducting the tariff policy that is balanced and stimulating growth of the real sector of economy, enabling coverage of actual costs of energy companies for generation, transmission and distribution of electric and heating energy and excluding consumers' cross-cut subsidizing; development and implementation of practical measures aimed at reduction of losses and energy theft;
- improvement of the financial status and corporate management of energy sector subjects, strengthening of commercial and financial discipline in the sector and reaching the profitability

of sector subjects; strengthening of financial status in EPS through an annual decreasing of quasi-fiscal deficit in energy sector by 1.3% of the GDP;

- fundamental improvement of the management and commercial recording technical equipment with the transfer to AECRS creation;
- completion of construction of Kambarata HPP-2 with allocation of the planned till the end of 2009 budget funds in the amount of 3.5 billion soms;
- creation of a full-fledged internal energy market and ensuring a competitive environment in the area of electricity generation and sale through construction of mini HPP and other alternative sources;
- adoption of measures aimed at maintaining the competitively beneficial position of Kyrgyzstan at the regional electricity exporting market and development of export capacity based on introduction of an open regional energy market;
- development of scientific and technical basis for sector development and creation of a database of feasibility studies (hereinafter - FS) of perspective power sector objects;
- improvement of conditions for attraction of private investments into the development of the sector.

Increase in electricity generation through rehabilitation of the existing generation capacities and, first of all, Bishkek CHP -1 , Uch-Kurgan HPP and At-Bashi HPP, with attracted investments in the amount of 3.08 billion soms or 75 million USD will be considered as a basis for realization of the objectives. Hydro-power capacity of the river Naryn shall be utilized through construction in 2008-2012 of Kambarata HPP-2 with the installed capacity of 360 MWt, launching of the first aggregate by the end of 2009 and construction in 2012-2020 of Kambarata HPP-1 - 1900 MWt, construction in 2010-2020 of stations of Upper Naryn HPP cascade, and also increase in the capacity growth and electricity generation at Bishkek CHP. The designated objects, approximate timeframes for capacities setting into operation, and electricity generation are demonstrated in tables 2.1 and 2.2. In addition, during the forecast period small HPP, the generation of which will increase from 85 to 1.6 billion K.W.H., will be constructed

Table 2.1

FORECAST
for setting the generating sources into operation for a period to 2025

Name	Inst.capacity MWt	Construction deadlines (years)	2009	2015	2020	2025
Kambarata	1900	2013-2023				
HPP # 1, 2	360	2007-2011	120	240		
Upper Naryn HPP # 1, 2, 3	180	2012-2020			180	
Ak- Bulun	200	2016-2024				200
Sary-Djas HPP	1200	2012-2025				
Kara-Keche TEPP	1200	2016-2015				
Total			120	240	655	1625

Table 2.2

FORECAST

For electricity generation in the Kyrgyz Republic
by existing and perspective power plants for a period to 2025 (billion K.W.H)

	2000	2005	2006	2010	2015	2020	2025
Lower Naryn HPP cascade	13.557	13.88	13.642	12.294	14.547	14.547	14.547
CHP	1.164	1.367	0.890	1.007	2.350	2.350	2.350
Mini HPPs		0.0846	0.0846	0.18	0.78	1.1	1.6
NRSE		0.015	0.015	0.02	0.025	0.03	0.045
Kambarata HPP #1						1.2	5.6
N 2				0.7	1.1	1.1	1.1
Upper Naryn # 1,2,3						0.75	0.75
Ak-Bulun							0.75
Total generated electricity	14.721	15.3466	14.6316	14.271	18.60	21.075	26.742

|

The construction of Sary-Djaz HPP is possible with the aggregate installed capacity of 1200 MWt under favorable investment conditions by years 2020-2025. Construction of Bishkek CHP-2 with the capacity of 400 MWt and construction of Kara-Keche thermoelectric power plant with the capacity of 1200 MWt (hereinafter - TEPP) at the coal deposit Kara-Keche are alternative options for strengthening the primary power of the energy system.

Delivery of power and energy in perspective will require adequate development of main electric grids 220-500 kW by means of solving the problem of strengthening of 500 kW South-North connection of the country's energy system. In order to increase electricity transmission to the north of the Republic, it is necessary to establish a new feeding center 500 kW – a sub-station 500/220 kW Kemin with electricity transmission lines 500 kW South–North, which will allow making the connection in future and enabling power of Kambarata HPP. To develop main electricity grid in the south of the Republic and remove electricity dependency on the neighboring countries, the construction of a sub-station 500/220 kW "Datka" is planned. Together with the construction of a sub-station "Datka," reconstruction of 220 kW grids with the total length of 360 km is assumed. In 2008-2010 it is planned to complete the project on improvement of power supply of Batken oblast (construction of HVL -110 kW Aigultash-Samat). Besides, construction of 500 kW electricity transmission lines "Datka-Khodjant" (Tajikistan) is planned for electricity export and energy systems of countries of South Asia.

Delivery of the electricity to consumers assumes reconstruction of the existing and construction of new distribution grids and, therefore, it is necessary, first of all, to find a solution for the current critical financial and economic situation caused by non-payments and electricity theft. This situation forces to take immediate measures aimed at rapid recoveries of the distribution companies through comprehensive restructuring and privatization by engaging the private sector and investments, which should ultimately lead to the upgrading the level of management capacity and efficiency of their activities.

Anticipated assessments of the electricity balance for 2008-2010 and to 2025 (table 3.2) demonstrate that the planned development strategies of the power sector will be able to meet the perspective electricity consumption growth by the sectors of economy. It corresponds to the country's strategic development program and will allow increasing sector's potential to export 4.2 billion K.W.H. by 2025.

Due to the real possibility of increase in export capacity of the republic's power sector and with regard to the perspective of implementation of a project on importation of the electricity to Afghanistan and Pakistan from Tajikistan and the Kyrgyz Republic, JSC "Power Plants" and

JSC *National Electric Grid of Kyrgyzstan* shall undertake specific measures to participate in the project.

2.2. Coal industry

The forecast deposits of 70 main coal fields of the Kyrgyz Republic are assessed as exceeding 2.2 billion tons with balance resources being 1317 million tons.

The existing structure of coal industry includes 23 coal mining companies (united under the management of the state company *Komur*, being joint stock companies of an open type and also 7 small companies, performing seasonal coal mining in the fall and winter periods, production is controlled by the State Agency for Geology and Mineral Resources under the Government of the Kyrgyz Republic, being a body that issues licenses for carrying out activities within the limits of the licensed areas, and the National Statistics Committee of the Kyrgyz Republic.

During the mining works in the coal industry, the maximum level of mining was 4508000 ton, reached in 1979. Starting from 1980 a gradual decrease in mining took place up to 3148000 tons in 1991. There is a sharp decline in mining starting from 1992: from 1942000 tons to 321.1000 tons in 2006, with an expected growth of mining volume to 402.5 thousand tons in 2009. Simultaneously, during 1991-2006 the importation of coal has been decreased three times, amounting 907.4 thousand tons in 2006.

Such a situation is explained by the high costs of coal transportation, outdated mining technology, depreciation of the basic production assets, which reached 95%, ineffectiveness of the majority of coal companies during the decreasing demand for coal and consumers' inability to pay. Many coal mines and open pits were put into operation 40-50 years ago. Today they are mining coal deposits, which are non-technological, according to the universally accepted criteria (small capacity, steep gradient, high ash level and others). Mine assets are depreciated and the used equipment largely does not meet current technological requirements. Sharp increase of railway tariffs and decline of demand for coal led to decrease of coal mining, and as a result of it, it also led to the growth of cost per unit for its production.

The main reasons for a critical condition of coal industry are the lack of competent owners and low level of management.

The population and economics sectors' demand for coal is suggested to meet by increase of mining in 2010 to 460 thousand tons with a subsequent growth by 2025 to 1700 thousand tons. In case of putting *Kara-Keche* TEPP into operation, the coal mining will increase to 3 thousand tons by 2025 (table 3.3).

The main goals of reforming the coal mining industry are the following:

- formation of competitive coal companies, ensuring sustainability in long-term perspective;
- creation of a competitive coal market;
- improvement of labor conditions and safety of work in coal industry;
- social, economic, and ecological improvement of coal mining regions.

For further development of the sector the following prerequisites are in place:

- considerable industrial coal deposits;
- availability of a prepared base for the development of coal fields;
- industrial personnel;
- increase of energy generation at thermal power plants with the use of coal from coal field *Kara-Keche*;
- broader use of coal for industrial purposes, communal consumers, and the population.

Increase of coal mining volumes is supposed to be carried out by means of supporting and increasing by 30% the level of its mining at the existing coal companies of lignite filed *Kara-Keche,* mines *Besh-Burkhan, Jergalan, Sulyukta* and *Tash-Kumyr.*

In the long-term, expanding the capacity of *Kara-Keche* open pit to the planned production level from 1500 to 3000 thousand tons per year will provide with an opportunity to ensure fuel supply of the planned construction of *Kara-Keche,* supplying the north of the Republic with

basic electricity, removing part of electric load from Bishkek CHP, and limiting the import of expensive gas and coal. Implementation of these activities is possible with attraction of foreign investments.

Kara-Keche TEPP with a capacity of 1200 MWt is planned to be built in Djumgal rayon of Naryn oblast, near the coal mining companies, developing Kavak lignite basin.

Explored coal deposits in Kavak basin amount 279.3 million tons, including coal field *Kara-Keche* for open mountain activities - 192.5 million tons.

Supply of *Kara-Keche* TEPP with coal will require mining of not less than 2.5 million tons of coal per year. The issues of placement of refuse heaps, construction of pit roads and water and mudflow constructions, carrying out recultivation and nature preservation measures will be addressed within the frameworks of the Coal Industry Development Program to 2015. At the meantime, an issue of establishing single coal mining company on the basis of the coal companies, which are currently mining *Kara-Keche* coal field, is being discussed. Taking into consideration the fact that coal mining companies must supply population, industrial companies and organizations of Naryn, Issyk-Kul, Talas and Chui oblasts with coal, the total coal mining volume shall be not less than 3 million tons of coal per year.

First of all, it is planned to increase coal mining in existing coal mining companies with a subsequent engagement in development of other coal-fields after their detailed exploration.

At the moment of *Kara-Keche* TEPP reaching its full productive capacity, the distribution of coal mining volumes will look like this: *Kara-Keche* coal field - 2 million toms, *Min-Kush* coal field 900 thousand tons, other coal fields - 300 thousand tons.

Need in mining equipment for coal pits of Kavak lignite basin to ensure mining volume of 3 million tons per year amounts 3.22 billion soms (78.420 million USD).

In order to increase coal mining volumes in Kavak coal field, it is necessary to reconstruct the existing grounds roads, bridges in *Dyikan -Kara-Keche* with the length of 39 km, Aral village to the settlement Min-Kush with the length of 35 km and also parts of technological access roads from settlements to the open works parts. Approximate cost of work is 139.43 million soms (3.4 million USD).

2.3. Oil and gas industry and oil and gas supply

According to estimated assessments, deposits of nonexplored resources of gas and oil in the Kyrgyz Republic amount approximately 289 million tons of standard units. On the territory of Djalal-Abad, Osh and Batken oblasts 15 oil and gas fields are being developed with extracted 11.6 million tons of natural gas and extracted industrial oil reserves in the amount of 4.9 billion cubic meters. Oil and natural gas extraction has small volumes and for the period of 1991-2007 it has been decreased 2.2 times for oil and 6.4 times for gas.

JSC *Kyrgyz Oil and Gas* represents oil and gas industry of the Kyrgyz Republic.

All oil and gas fields were discovered more than 70 years ago. Today they are in the last stage of development and are mined for almost 70%. Out of the remaining oil deposits 80% is difficult to extract. Their development requires additional costs and application of special technologies. The fund of operating boreholes of JSC *Kyrgyz Oil and Gas* was formed mainly out of boreholes of 1960s and 1970s. The newest boreholes holed in 1992 are already depreciated for 30 percent. The annual natural decrease of extraction volumes amounts 5 thousand tons due to all these factors. The extraction volume decreased from 142.7 thousand tons in 1991to 68.2 thousand tons in 2007. Relevant technical activities are being intensively undertaken to stop further decline in oil extraction. Up to 5 new boreholes are planned to be commissioned every year, which will allow to increase the volume of oil production along with the use of new technologies, and afterwards to stabilize it at the level of 80 thousand tons per year, with a perspective production up to 95 thousand tons after 2010.

The level production of natural gas is decreasing due to the fields development, equipment depreciation, and lack of financing. In 2006, 19.4 million cubic meters of gas was produced, in

2007 – 14.9 million cubic meters. It is anticipated that in 2010 and hereafter 25 million cubic meters of gas are planned to be produced every year.

In a long-term perspective further growth is possible only by means of exploration of new fields on perspective areas, estimated resource of which is 109 million tons of standard coal in the Fergana valley, in Alay valley – 50 million tons of standard coal, in Naryn basin - 75 million tons of standard coal, in the Issyk-Kul basin - 25 million tons of standard coal, in Eastern Chui basin - 30 million tons of standard coal. For the time period up to 2010, it is planned to have new operating boreholes with deep-well drilling.

868.7 million soms will be needed to increase petroleum and gas production up to the planned volumes. Attraction of foreign investors is assumed for implementation of these works. At the same time, JSC *Kyrgyz Oil and Gas* intends to make contribution of 120 million soms annually.

The total oil and gas consumption for 1991-2006 reduced 2.2 times from 2778 thousand tons to 1156 thousand toms, natural gas for this period - from 2.08 billion cubic meters to 648 million cubic meters, more than 3 times. In general, self-sufficiency of the Kyrgyz Republic in petroleum products and natural gas is less than 5% and completely depends on external supply of petroleum products and natural gas.

Joint Kyrgyz Petroleum Company is the only company that *actually* works in oil refining industry, which mainly refines Kyrgyz petroleum extracted by JSC *Kyrgyz Oil and Gas,* with the supply volume that does not meet the plant productive capacity.

For the last three years 84 thousand tons of petroleum, 76.1 thousand tons of diesel fuel and 122.8 thousand tons of mazut were produced with an average annual petroleum decrease by 4% and mazut - by 3%. Diesel fuel production remains to be more stable.

Imported raw materials and components are being used, in order to have a stable production of petroleum products that meets market needs of the Kyrgyz Republic. This importation is connected with high rates of tax for petroleum, gas condensate, and petroleum. This makes production of petroleum products in the Kyrgyz Republic problematic and noncompetitive. Thereby, on May 14, 2007 “Agreement on General Principles of Performing a Geological Exploration of Bowels on the Petroleum and Gas Promising Areas of Kyrgyz Republic” was signed between the Government of the Kyrgyz Republic and JSC Gasprom (the Russian Federation) to do the geological research on bowels on the petroleum and gas promising areas of Kyrgyz Republic.

Currently with the sanction of a joint stock company of a closed type (hereinafter - CJSC) *Zarubezhneftegaz* (authorized representative of JSC Gasprom in the Kyrgyz Republic), a limited liability company *National Russian scientific and research institute Gas* has prepared a feasibility geological study on promising petroleum and gas areas in the Kyrgyz Republic and a stage by stage geological prospecting program. After studying the materials presented by the limited liability company *National Russian scientific and research institute Gas,* the Agency for Mineral Resources and Geology under the Government of the Kyrgyz Republic issued a license to JSC *Gasprom* for carrying out geological prospecting works on the *Kugart* and *Mailisu* IV fields.

The structural policy in petroleum and gas industry to the large extent will be connected with improvement of the tax policy on regulation of bowels use, attraction of direct investments into development and extraction of new gas and oil fields by using full capacity oil refinery companies in the Kyrgyz Republic. In oil processing it is necessary to ensure use of the joint venture *Kyrgyz Petroleum Company* in full capacity up to 500 thousand tons and to recover the joint venture *Vostok* and reach its production up to 180 thousand tons per year.

Development strategy of gas supply will be directed at creation of conditions to ensure reliable gas supply, denationalization and privatization of the national gas industry, reconstruction and development of gas transport grid.

Supply of natural gas to the consumers of the Kyrgyz Republic in the volume of about 500 million cubic meters per year and transportation services of the Kazakh transit natural gas

through the main gas pipeline (MGP), located in the Chui valley, are carried out by JSC *Kyrgyzgas*. Natural gas is transited to consumers of the Fergana valley of the Republic of Uzbekistan through the pipelines located in the southern part of the Kyrgyz Republic. Based on direct agreements about 300 million cubic meters of gas comes to the Kyrgyz Republic.

JSC *Kyrgyzgas* is a natural monopolist in implementation of the entire set of tasks on supplying consumers of the Kyrgyz Republic with natural and liquefied gas, exploiting 708. 3 km of low pressure gas pipelines; 13.9 km of high pressure gas pipelines; 203 gas distribution units (GDU) and 717 cabinet gas distribution units (CGDU).

Currently exploited part of the main gas pipelines in the north of the country is put in a single and double line execution with a diameter 720 мм. Due to a bad technical condition of a double line part of the MGP actually 112 km of a gas pipeline is being exploited in the single line execution. In accordance with the exploitation requirements, which specify the essential double line execution of main gas pipelines, therefore, it is necessary to complete putting and equipping the second line.

Main assets of JSC *Kyrgyzgas* have been utilized for 30-35 years and are very much depreciated (for more than 70%). Analysis of gas pipelines and the nature of their damage demonstrate that their main part cannot be restored and must be replaced. Poor technical condition of gas pipelines leads to the losses of natural gas, which annually reaches to 14-15% of the volume exported to the Republic.

Financial and economic condition of JSC *Kyrgyzgas* is characterized with big volumes of accounts receivables to natural gas suppliers (Uzbekistan, Kazakhstan) and at the same time account payable of JSC *Power Plants*, budget organizations, and the population. Due to these factors, there are no funds to restore complete functioning of the main gas pipelines, distribution network with middle and low pressure, which require considerable investments. The current prices for natural gas and their consistent growth do not give a possibility to do repairing works and restoration in full extent. 24.4 billion soms (595 million USD) is the amount of investments necessary for modernization, repairs, restoration, and complete replacement of equipment.

To organize the commercial recording of consumed gas metering devices are being installed. First of all, gas metering devices are being installed at the largest natural gas consumers' houses, where there are no central heating and hot water supply and apartment complexes. Currently about 80% of the population of the Kyrgyz Republic have the gas measuring devices installed.

In order to speed up carrying out repairs, restoration, and modernization of gas transportation system, and invest funds into creation of new gas transportation capacities in the territory of the Kyrgyz Republic and ensure continuous gas supply to the north of the country, the assets of the main gas pipeline of Bukhara gas area – Tashkent- Bishkek-Almaty (BGA-TBA), located on the territory of the Kyrgyz Republic, were transferred to the trust-based management of the joint Kyrgyz -Kazakh company *KyrgyzKazGas.* This will allow to receive interest free investments into a joint company from JSC *KazTransGas* to repair and modernize the gas transportation systems up 2008 in the volume of 717.68 million soms (17.5 million USD) with repayment of a credit received during 2008-2025.

Simultaneously with the project of JSC *KazTransGas* perspectives of cooperation with JSC *Gas prom* are being considered. "Agreement on General Principles of Performing a Geological Exploration of Bowels on the Petroleum and Gas Promising Areas of Kyrgyz Republic" has been signed between the Government of the Kyrgyz Republic and JSC *Gas prom,* stipulating a possibility of establishing a joint Kyrgyz-Russian company to ensure natural, liquefied gas and petroleum products supply into the Kyrgyz Republic and also investment of 3280.8 million soms (80 million USD) into JSC *KyrgyzOilGas.* The issue of the founder's contribution by Kyrgyz party into a statutory capital of a joint stock company in the form of a state packet of shares of a JSC *KyrgyzOilGas* or funds in the amount of 82. 02 million soms (2 million USD) has also been discussed.

Kazakh party is working on the project on transportation of Turkmen and Uzbek gas in the volume up to 10 billion cubic meters to the Chinese People's Republic – through Almaty along

the existing main pipeline BGA-TBA. In case of a gas pipeline is put through the northern territory of the Kyrgyz Republic, there is a possibility of participation in the project by receiving a payment for transit about 615.15 million soms (15 million USD) a year.

In order to increase efficiency of JSC *Kyrgyz gas's* functioning, development and implementation of certain measures are necessary:

- creation of conditions for attraction of domestic and foreign investments and advanced technologies in a maximum volume;
- development of an effective tariff policy with the state program of protection of poor layers of the population as a result of price increase for energy carriers;
- doing the feasibility study for construction of gas pipelines through the territory of the Kyrgyz Republic; creation of a stabilization fund of technical re-equipment of JSC *Kyrgyz gas* grid.

Completion of the construction of the second line of the main pipeline on the territory from Chaldovar station to the Chui river will ensure reliable gas supply to consumers in the north of the Kyrgyz Republic and southern areas of the Republic of Kazakhstan, with an annual amount of revenues from transit up to 135.34-143.54 mullion soms (3.3-3.5 million USD); expand the gas supply grid; increase the number of natural gas consumers both among the population and industrial consumers; improve the system of recording through constant renewal of technical devices. Project on construction of a main pipeline through the territory of the Kyrgyz Republic to China can become especially promising, as it will ensure considerable currency receiving for gas transit.

Insufficiently high level of collection of payments for natural gas and framework conditions of Uzbekistan on natural gas payment are leading to a deficit of funds and restriction of financial JSC *Kyrgyz gas* opportunities to do repairs and restoration activities and also modernization of fixed production assets. Therefore, JSC *Kyrgyz gas* prepared some investment projects for replacement and modernization of main and distribution pipelines, equipping gas distribution plants with modern measuring devices, measuring nodes, gas regulatory units and the population, procurement of mobile laboratories and inspection, and many other devices. These projects have been sent to potential investors. The total amount for those projects is 295.3 million soms (7.2 million USD).

High economic dependency on exported gas supplies sets up a task of generation of gas out of a non carbonic origin (biogas) and development of an adequate program.

2.4. Heat supply

Annually the Kyrgyz Republic generates more than 2.5 million Gcal of thermal energy for the purpose of heating and hot water supply, including the one generated by JSC *Power Plants* giving up to 60% of the total generated amount. In comparison with 1990, in 2006 generation of heat energy had decreased 3.1 times and amounted 2 794 million Gcal in 2007 – up to 2162 million Gcal, which was caused by shutting down of industrial boiler shops and decrease of heat and power capacity of Bishkek CHP.

For generation of heat energy with all heat generating sources about 600 thousand tons of standard units, including 53% of the natural gas, 29% of coal, and 18% of fuel oil are used. The established structure of fuel consumption, when about 80% of fuel is imported with prices close to the world ones, is very costly and economically nonprofitable. Currently the central heating supply exists in 4 cities of the Kyrgyz Republic: in Bishkek, it covers 85% of the housing resources, in Osh 35-40%, in Kyzyl-Kyia - 60%, and in Karakol - 26%.

City thermal grids were constructed and put into operation together with launching of heat capacities. Currently many of pipelines reached their depreciation period and need to be replaced. Their obsolensce leads to a decrease of safety of work, which results in a growth of heat losses and water leakages in grids.

Changes in consumption of thermal energy in industry, communal-general sector and by the population took place due to reduction of the number of consumers, transfer of its parts to heat and power supply with an increase of tariffs for heat energy.

Besides heating plants and big boiler shops, departmental boiler shops and boiler shops of industrial companies as well as boiler shops of *Kyrgyzzhylcommunsoyuz* department, the structure of which includes 6 oblast departments, generate heat energy (mainly for heating).

The prime cost of 1 Gcal of thermal energy generated by boiler shops is about 800-1000 soms (depending on the type of fuel). The differences between low selling price for thermal energy and high costs of its production for the *Kyrgyzzhylcommunsoyuz* boiler shops is covered by the state in the form of subsidies.

Electric boiler shops play a considerable role in production of thermal energy (about 3000) with the total heat power of 4200 Gcal /h, which is 3.5 times more than the thermal power of Bishkek CHP N 1. The average prime cost of generation of thermal power for electric boiler shops is 700-800 soms/Gcal.

Once adopted by the Government of the Kyrgyz Republic decision on the transfer of electric boiler shops to local organic fuel was too early and economically insufficiently justified because it did not take into account the complexity of consumers' fuel supply and sharp decline in local coal mining industry.

The current tariffs for thermal energy are lower than actual cost of its production 2-4 times. The main supplier, JSC *Power Plants*, covers losses from the consumption of thermal energy by the population by means of cross-subsidies from revenues received from exportation of electricity and partially out of budget funds.

The existing boiler shops are not equipped sufficiently with measuring devices on generation of thermal energy. Thermal energy recording is made by calculation of the thermal energy demand and the amount of fuel spent on its production, which leads to big errors. The current status with measuring devices of thermal energy does not exceed 20%, which is several times lower than in developed industrial countries. Only in a JSC *Bishkekteploset* a planned activity is carried out to provide with thermal energy metering devices the consumers and also replacement of outdated devices with more modern ones.

The increase of costs for thermal energy, planned for heating and hot water supply, has led to a fact that about 80% of consumers (mainly the population and budget organizations) cannot pay for it. Because of that many consumers of thermal energy refuse the heating during winter time, which leads to de-regulation of the centralized heat supply system.

One of the serious factors, which aggravate the situation, is imbalanced use of energy resources by regions (for instance: introduction of electricity heating supply in regions with cheap local coal). If during the transition period to the market economy (1990-1995) wide use of electricity was justified, today such an approach is unviable both in technical and economic sense because generation of heat based on electricity is several times more expensive than the one based on the use of organic fuel, and thus, leads to the increase of electricity deficit in the Kyrgyz Republic.

Heat supply in the Kyrgyz Republic has a big social and economic importance. Any failure in supply the population and other consumers with heat negatively impacts the economy of the country and increases social tension in the society.

Anticipated growth of thermal energy production in the Kyrgyz Republic, compared with 2005 will be 9-13% in 2010 and 22-34% in 2020. And a growth of real thermal energy consumption is anticipated 1.4-1.5 times due to reduction of losses and use of high capacity of energy saving in this part of energy sector.

In order to accomplish the specified goals it is necessary to:

- create a system of heat supply management in the regions with specification of organizational and economic mechanisms, enabling its reliable functioning;

- expand the normative and legal base on heat supply. organizational, legal, and economic mechanisms shall be created to develop and implement new comprehensive master plans on electricity, gas and heat supply of cities and settlements with regard to an optimal structure of energy resources, level of centralization of heat supply, and introduction of heating system;

- develop tariff policy enabling coverage of actual costs for heat generation and stage by stage introduction of a new system of tariffs for heat energy with a possible introduction of differentiated tariffs based on consumption volumes, time of the year, number of hours when maximum load is used, separately by cities (and possibly by separate sources) with the purpose of exclusion of a cross-cut subsidies of economically inefficient sources of heat out of highly profitable ones;

- create an information and analytical database for determination of volumes of energy resources, spent on heat supply with a subsequent adjustment of directions of heat supply development in cities, regions, and the country as a whole;

- ensure increase of energy efficiency and technical modernization of the sector.

Implementation of the mentioned tasks is possible, if the following activities are undertaken successfully:

- optimization of the level of centralization of the heat supply systems (CHP, mini-CHP, central and rayon boiler shops) with regard to concentration of demand, change of structure of heat energy prime cost and its transportation, market conditions of management and ownership structure of energy consumers;

- Improvement of the schemes and heat supply equipment systems (in particular: general transfer to modern, preliminarily insulated pipes on heating mains);

- general introduction of automatic and handmade regulation of heating systems, equipping them with measuring and regulating instrumental devices;

- upgrading the efficiency of functioning of energy sources and heating grid by means of reducing heating supply system costs as a whole, and attraction of private investments;

- ensuring thermal energy demand management using efforts and funds of consumers (but not heat suppliers), which will require mass introduction of automatic regulation systems at final consumers' heat units with a gradual transfer to independent schemes to joining grid and introduction of a qualitative and quantitative regulation of heat energy discharge, which can be supplied (delivered) to a grid from various sources;

- wide use of solar energy in heating and hot water supply systems;

- development of market relations and change of ownership structure, which will impact th e structure of generation of the thermal energy in the direction of decentralization and lower dependence on joint stock energy companies.

Development of heat supply of Bishkek shall be carried out in accordance with the Resolution of the Government of the Kyrgyz Republic dated November 21, 2006 N 805 on "The Master Plan of Bishkek for a Period up to 2025" and dated April 27, 2004 N 300 "The Plan of Actions for Further Reorganization of a Consolidated Credit of the World Bank for Structural Transformations (CSAC) in the Area of Centralized Heating in the Kyrgyz Republic."

2.5. Non-traditional renewable sources of energy and small HPP

Decrease of mining of hydrocarbon raw material in the Kyrgyz Republic, import restriction, and increase of prices for energy carriers create favorable conditions for development of non-traditional renewable sources of energy (NRSE) and small HPP.

Potential NRSE energy resources of the Kyrgyz Republic, actually available with the current level of development of engineering and technologies, amounts 840 million of standard units per year. Currently practical NRSE use is inconsiderable and constitutes only 0.17% in the energy balance of the country.

Developments on heat supply by means of solar energy and bio gas technology and electricity supply by means of wind energy, small water streams, and solar photovoltaic power plants are the most technically prepared for a wide practical use.

Development of small hydro power energy sector shall be carried out by restoration and construction of small HPP. The total hydro power capacity of the surveyed 172 rivers and streams on the territory of the Kyrgyz Republic with water discharge from 0.5 to 50 cubic м/s. exceeds 80 billion K.W.H per annum, out of which 5-8 billion K.W.H per annum is technically acceptable for development.

According to experts' proposals even now there is a possibility of construction of 92 new small HPP with the total capacity of 178 MWt and average annual electricity generation up to 1.0 billion. K.W.H. 39 small HPP that existed before can be restored with the total capacity of 22 MWt and an average annual electricity generation up to 100 million K.W.H. There have been suggestions worked out to construct 7 HPP on irrigation water reservoirs with the installed capacity of 75 MWt and an average annual electricity generation of about 220 million. K.W.H.

All those plants can play particularly important role for supply of electricity for scattered objects in mountainous areas with the developed hydro-geographic network, where construction of big transmission lines is economically unprofitable.

Construction cost per unit of new small HPP mainly depends on the location of power plants and equipment producers, and its amounts 32.8-61.5 thousand soms (800-1500 USD). The electricity generation prime cost at small HPP that are under reconstruction can amount 8.1-28.1 tyin/K.W.H, at new small HPP that are in the process of construction - 13.1-13.6 tyin/K.W.H, at small HPP on irrigation water reservoirs - 22-44.9 tyin/K.W.H. According to calculations, the pay off period of small HPPs that have effective exploitation indicators with the tariffs for electricity within the limits of 41-62 tyin/K.W.H is 7-10 years, which does not attract potential investors. New tariff policy for NRSE is necessary, which will allow reducing pay off period and increasing investment attractiveness of small HPPs.

One of the ways of increasing the economic effectiveness of small HPPs is a reduction of the construction costs by means of using of uniformed projects, sequential order of the same time of equipment, and attraction of local construction organizations.

For determination of technically and economically feasible scales of small hydro power sector development in the Kyrgyz Republic, it is necessary to:

1. Adopt the Law of the Kyrgyz Republic "On the Use of Renewable Sources of Energy."
2. Establish a foundation for NRSE and small hydro power sector development.
3. Development of a national scientific and technical program for NRSE use and development of small hydro power energy sector, and its support by the state.

To implement the development of small hydro power energy sector, it is necessary to attract local enterprises and companies that have preserved technological lines and where electric technical equipment and material, components will be produced, as well as direct investments and grants of international financial institutions.

Small hydro power sector will decrease a load on the power system and create conditions for electricity generation process and distribution systems management, especially in remote mountainous and agricultural rayons and also supply agricultural businesses and pump stations with electricity.

3. Fuel and energy balance of the Kyrgyz Republic for 2008-2010 and long-term perspective up to 2025

Formation of a fuel and energy balance structure (FEB) was carried out under an impact of processes of construction of our state and transfer to the market economy (figure 3.1.).

Fig. 3.1. FER generation and consumption for a period of 1990-2006 in comparison with 1990.

Note of the IC "Toktom": The hardcopy of the Fig.3.1. FER generation and consumption for a period of 1990-2006 in comparison with 1990 is located in the IC "Toktom."

In a perspective reliable and continuous energy supply of domestic consumers requires a estimations of energy carriers and their balancing with generation volumes with regard to capital intensity and inertia of energy production and tendencies of social and economic country development for a mid-term and long-term perspective.

The most important resource policy principles in working on the estimations of demand for energy carriers are:

- reduction of importation of hydrocarbon by means of replacement of organic types of energy carriers with renewable energy sources (HPP and NRSE);
- restraining of energy consumption growth paces by means of conducting of an active energy saving policy by 2010 at the level of 10% with a subsequent adjustment of the index in a long-term perspective at the level of the existing capacity, which is assessed at the level of 45-50%;
- ensuring growth paces of energy resources consumption at the level of 0.5-0.4 of the GDP growth by 2010-2025;
- diversification of energy carriers at the domestic market, based on the optimal prices, tariffs regulation, and development of competition at the energy resources market.

3.1. Forecast for energy carriers demand for 2008-2010 and a long-term perspective to 2025

Forecast for energy carriers demand was conducted based on adopted program documents on economic development of the Kyrgyz Republic and National Statistics Committee of the Kyrgyz Republic publications on tendencies of macro-economic indicators of energy consumption and forecast of price growth on imported energy carriers (natural gas and petroleum products) and resource policy principles (table 3.2) impact on them.

2 options of fuel and energy resources (FER) consumption development are considered in NEP in accordance with average annual GDP growth paces for the following periods:

- 2008-2010 - 108.1% in compliance with the country's development strategy to 2010 (hereinafter - CDS);
- 2011-2014 - 106%, 2015-2020 (according to the 1st scenario - 104%, according to the 2nd scenario - 105%), 2021-2025 - (according to the 1st scenario - 103%, according to the 2nd scenario - 104%), according to the forecast of the Economic Strategies Center (hereinafter - ESC) Of the Ministry of Economic Development and Trade of the Kyrgyz Republic.

Analysis of tendencies of social and economic development and energy consumption demonstrates that during the period of 1990-2006 with the growth of the real GDP paces (in prices of 1990) up to 82% in 2006 and paces of energy consumption to 45%, GDP power intensity decreased in 2006 to 55%, energy consumption to - 37%. Electricity consumption per capita, if compared with the level of 1990, increased to 105%, at the same time, GDP power density increased to 155%, which demonstrates the hydrocarbon fuel diversification process, as 85% of them are imported from neighboring states.

Energy consumption forecast according to the according to the 1st and 2nd scenarios by types of energy resources is provided in the table 3.1, based on which FEB forecast of the Kyrgyz Republic was developed.

3.2. Fuel and energy balance of the Kyrgyz Republic for 2008-2010 and a perspective to 2025

Electrobalance, coal balance, balance of natural gas, balance of petroleum and petroleum products is a basis for FEB formation.

In accordance with an electrobalance forecast of the Kyrgyz Republic for 2008-2010 and a period up to 2025, and according to the first scenario, the following is expected (table 3.2):

- decrease of electricity generation to 13.57 billion K.W.H by 2010 due to the decline of the volumes of water in the Toktogul waterworks facility caused by climatic conditions and shallow water of the last years, which will result in reduction of electricity export to 1.07 billion. K.W.H;

- growth of electricity production is anticipated by 2015 to 18.4 billion. K.W.H., and with launching the Kambarata HPP-2 with a full capacity by 2025 - to 26.7 billion. K.W.H and with launching with a full capacity of Kambarata HPP-1. And increase of electricity export is possible by 2015 to 2.16 billion K.W.H, by 2025 - to 4.26 billion K.W.H;

- decrease of electricity losses in grids, including losses during the transportation by grids of a JSC *National Electric Grid of Kyrgyzstan* by 2010-2025 - to 5.5%, and losses in distribution in distribution companies grids (hereinafter DEC) – technical losses by 2010 - to 15% and by 2025 - to 12%, commercial losses by 2010 – to 3% and by 2025 - to 0%;

- increase of electricity consumption in accordance with the average paces of GDP growth in compliance with the CDS to 10.1 billion K.W.H к 2010 and up to 18 billion K.W.H - by 2025.

According to the first scenario (table 3.2), a possibility of increase of electricity generation at Bishkek CHP shall be explored. In this case by 2010 electricity generation increase can reach to 14.8 billion. K.W.H. Upon construction and launching into operation the Kara-Keche FEP by 2015 electricity generation will increase to 19.7 billion. K.W.H, with launching into operation Upper-Naryn HPP cascade, Ak-Bulun HPP, Kambarata HPP-1, and HPP on the Sary-Djaz river electricity generation growth is anticipated by 2025 - to 33.89 billion K.W.H.

Simultaneously, export increase is also possible by 2015 up to 3.3 billion K.W.H. and by 2025 – up to 6.4 billion K.W.H.

According to the second, acceleration of paces of the growth of domestic electricity consumption is estimated up to 22.64 billion K.W.H by 2025 by means of anticipated launching of big electricity aluminum production with electricity consumption from 2 up to 4 billion. K.W.H per annum, and also modernization and launching with a full capacity of a plant *Crystal* in the town of Tash-Kumyr.

Reduction of electricity losses in grid is expected, including the losses occurring during the transportation through grid of a JSC *National Electric Grid of Kyrgyzstan,* by 2010-2025 to the level of 5.0%. In distributing the energy to the final consumer in DEC grid, the following losses shall be reduced - technical losses by 2010 to 15% and by 2025 - to 10%, and also commercial losses by 2010 - to 3% and to zero by 2025.

In accordance with the coal balance forecast for the period to 2025 (table 3.3), it is expected:

- that, according to the first scenario, coal extraction will increase by 2015 to 1 million, by 2025 - to 1.7 million tons;

- that, according to the second scenario, in construction of Kara-Keche HEP with a capacity of 1200 MWt, it becomes necessary to prepare the speedy development of *Kara-Keche* field by means of which growth of coal extraction is anticipated by 2015 up to 4.1 million tons and by 2025 – to 4.7 million tons. At the meantime it is anticipated to reduce gradually the importation of coal to 750 thousand tons by 2025;

- to increase the coal exportation by 2025 to 200 thousand tons to China and inconsiderable volumes to neighboring states –Tajikistan and Uzbekistan.

According to natural gas balance forecast for 2008-2010 and to 2025, (table. 3.5) the first scenario gives the following anticipations:

- gas extraction by 2010 to 20 million cubic м and by 2025 – to 30 million cubic meters;

- consumption (without taking into account losses) of natural gas by 2010 to 804 million cubic м and by 2025 - to 880 million cubic м;

- import receipt by 2025 to 850 million cubic m.

According to the second scenario, gas extraction is expected to increase by 2010 up to 30 million cubic м and by 2025 – to 70 million cubic m and natural gas import is expected to be reduced up to 355 million cubic m by 2025 because of the tendency of price growth in the world and CIS countries.

According to the oil balance forecast for 2008-2010 and until 2025 (table 3.6), it is expected to have:

- growth of oil extraction by 2010 up to 82 thousand tons and by 2025 up to 90 thousand tons;
- growth of oil consumption inside of the Kyrgyz Republic up to 99 thousand tons by 2010, and 112 thousand tons – by 2025;
- import receipt by 2025 up to 17 thousand tons.

The above mentioned inconsiderable volumes of oil extraction, import, and refining cannot meet the growing demand of the Kyrgyz Republic in petroleum products due to the growth of traffic flow and turnover of goods of various types of transportation. Thus, it justifies demand for petroleum products (table 3.6; 3.7; 3.8). In order to meet the petroleum products demand, it is necessary to increase import volume: gasoline - to 420 thousand tons by 2025; diesel - to 340 thousand tons by 2025; mazut - to 25 thousand tons by 2025; and also increase of oil extraction in the Kyrgyz Republic and, subsequently, its refining with a gasoline outcome to 35 thousand tons by 2025, diesel to 55 thousand tons by 2025.

Comparison of the considered FEB options with regard to self supply with own resources demonstrates that ,according to the first scenario, needs in importing the energy resources will reach the level of 45% of the total demand by 2025. In FEB formation, according to the second scenario, decrease of import share to 30% will take place by 2025.

The main mechanisms for implementation of the country FEB improvement goals shall become:

- regulation of demand for energy carriers at the state level through monitoring of sustainable energy use indicators –GDP energy intensity and an established energy consumption index for real sectors of economy based on resource supply opportunities and FEC branches development and also energy carrier import and export;
- development and implementation of the state energy efficiency and sustainable development program of the Kyrgyz Republic;
- development of a healthy competition in the energy sector, elimination of trade barriers, liquidation of disconnection of energy companies.

Formation of a forecast FEB can face the following barriers and risks of non-accomplishment of the goals:

1. Limited availability of new technologies, lack of measuring devices and difficulties in a quantitative measurement of energy saving, slow introduction of innovative suggestions to the market due to the insufficient investments to NRW and OKP, as a result of having no economic mechanisms incentives.
2. Lack of funds and limited access to them, insufficiently clear mechanisms of soft credit terms for energy saving technologies and equipment.
3. Unclearly defined property rights, insufficient information on the condition and perspectives for formation of an optimal structure of the fuel and power balance of the country.
4. Difficulties in establishment of market relationships and creation of an energy carriers market at the national and regional levels, lack of executives' discipline at the inter-state level, weak application of market mechanisms due to the drawbacks of normative and legal basis and energy legislation.
5. Lack of qualified personnel, especially in small and medium scale companies, farms and households, difficulties with installation of energy saving equipment, lack of adequate information programs.
6. Lack of officials' responsibility, lack of public and entrepreneurs' culture of energy carriers consumption, leverages of impact in theft and their irrational their use.
7. Lack of forecast assessments on the impact of price increases of the world energy carriers on the economic development and service sector of the Kyrgyz Republic.

Table 3.1

FER consumption inside of the Kyrgyz Republic:
Report for 2001-2005 (*) forecast
for 2006-2010 (**) and until 2025

					1st scenario
	Measuring unit	2001	2005	2006	2010
1	2	3	4	5	6
Electric Energy	Million kWt.h	6780	7095	7185	10104
Natural gas	Million cubic m	675.5	626.9	666	700
Coal	thousand tons	1123	1254.2	1208.5	1770
Oil	thousand tons	75.5	80.2	80	99
Diesel	thousand tons	160	130.3	136.4	176
Gasoline	thousand tons	194	271	322	350
Mazut	thousand tons	77	56.6	60.8	68

				2nd scenario		
2015	2020	2025	2010	2015	2020	2025
7	8	9	10	11	12	13
13074	15280	18030	10262	13074	18230	22640
710	730	750	525	465	425	375
2060	2190	2405	3270	5060	5190	5405
99.6	105.6	112	99	99.6	105.6	112
220	280	340	176	272	320	390
360	380	420	320	360	410	680
70	80	90	68	70	80	90

(*) National Statistics Committee of the Kyrgyz Republic, FEB of the Kyrgyz Republic for 1990-2001 and FEB (1999, 2001, 2005).

(**) Growth of petroleum products consumption is justified by a traffic growth in the Kyrgyz Republic.

Table 3.2

Electricity balance in the Kyrgyz Republic:
Report for 1990-2006 (*) and a forecast for 2010-2025
according to the scenarios (million. kWт.h)

	FEB reports			**-**		**1st scenario forecast**
	1990	1995	2001	2005	2006	2010
1	2	3	4	5	6	7

Resources	16590	19337	20013	14891.8	14486	13571
Generation	13370	12349	13660	14891.8	14486	13571
Received as import	3220	6987	6353	0.2	0	0
Distribution	16590	19336	20013	14891.8	14486	13571
Domestic consumption	8357	7525	6780	7095.5	7185	10104
Losses in common use grids	1035	3457	4802	5135	4841	2551
Export	7198	8354	8431	2661.3	2460	1020

				2nd scenario forecast		
2015	2020	2025	2010	2015	2020	2025
8	9	10	11	12	13	14
18437	21075	26742	14814	19720	26376	33890
18437	21075	26742	14814	19720	26376	33890
0	0					
18437	21075	26742	14814	19720	26376	33890
13074	15280	18030	10262	13074	18230	22640
3198	3703	4450	2837	3382	4272	4874
2165	2092	4262	1715	3264	3874	6376

Table 3.3

Coal balance in the Kyrgyz Republic:
Report for 1990-2006 (*) and forecast
for 2010-2025 according to the scenarios (thousand tons)

						1st scenario
	1990	1995	2001	2005	2006	2010
1	2	3	4	5	6	7
Resources	7660	1816.3	1645.1	1912.8	1828.6	2466
Mining	3742	463.2	512.6	335.8	321.1	462
Received as import	2911	499.8	344	981.3	907.5	1120
Balance at the beginning of the year	1007	853.3	788.5	596.2	600	640
Distribution	7660	1816.3	1645.1	1912.8	1828.6	2406
Domestic consumption	4765	1162.8	1123	1254.2	1208.5	1770

Losses	21	16.3	0.2			
Sent for export	1917	170.6	28.5	8.8	10	100
Balance at the end of year	957	466.6	493.4	619.7	620	536

			2nd scenario			
2015	2020	2025	2010	2015	2020	2025
8	9	10	11	12	13	14
2700	2850	3050	3900	5700	5850	6050
1000	1350	1700	1960	4100	4350	4700
1010	900	750	1180	1010	900	750
690	600	600	560	590	600	600
2700	2850	3050	3900	5700	5850	6050
2060	2190	2405	3270	5060	5190	5405
200	200	200	100	200	200	200
437	460	440	528	437	457	441

(*) National Statistics Committee Kyrgyz Republic, FEB of the Kyrgyz Republic for 1990-2001 (1999, 2001-2005), Bishkek – 2002, 2006.

Table 3.4

Gas balance: Report for 1990-2006 (*)
and forecast for 2010-2025 (**) according to scenarios
(million cubic.м)

						1st scenario
	1990	1995	2001	2005	2006	2010
1	2	3	4	5	6	7
Resources	2174	882.3	698.5	736.2	766.3	804
Extraction	96	35.7	32.8	25.1	19.4	20
Received as import	2078	846.6	665.7	711	746.9	784
Balance at the beginning of the year	-	-	-			
Distribution	2174	882.3	698.5	736.2	766.3	804
Domestic consumption	2076	856.2	675.5	626.9	666	700
Losses	38	26.1	23	109.3	100.2	104
Sent for export	60	-	-			
Balance at the end of year	-	-	-			

				2nd scenario		
2015	2020	2025	2010	2015	2020	2025
8	9	10	11	12	13	14

825	850	880	585	535	485	425
30	30	30	30	50	60	70
795	820	850	555	485	425	355
825	850	880	585	535	485	425
710	730	750	525	465	425	375
115	120	130	80	70	60	50

(*) National Statistics Committee Kyrgyz Republic, FEB of the Kyrgyz Republic for 1990-2001 (1999, 2001-2005), Bishkek for 2002, 2006.

(**) Forecast figures for gas extraction will be adjusted upon completion of prospecting activities by JSC *Gas prom* and JSC *Kyrgyz Oil and Gas*.

Table 3.5

Oil balance: report for 1990-2006 (*) and
a forecast(**) for 2008-2010 and a period up to 2025 (thousand tons)

	1990	2001	2005	2006 -	2007	2008 -	2009 -	2010 -	2015 -	2020 -	2025 -
Resources	162	87.5	90.4	84.1	95.2	103	111	118	118	120	126
Extraction	155	75.5	77.9	70.6	68.2	78	80	82	82	85	90
Received as import	-	-	5.1	6.1	17	17	17	17	17	17	17
Balance at the beginning of the year	7	12	7.4	7.4	10.2	8	14	19	19	18	19
Distribution	162	87.5	90.4	84.1	95.2	103	111	118	118	120	126
Domestic consumption	3	75.5	80.2	80	85.2	95	97	99	99.6	105.6	112
Losses	2	-			2	2	2	2	1.4	2.4	2
Sent for export	151	-									
Balance at the end of the year	6	12	10.2	4.1	102	103	111	118	17	12	12

(*) National Statistics Committee of the Kyrgyz Republic, FEB of the Kyrgyz Republic for 1990-2001, (1999, 2001-2005), Bishkek for 2002, 2006

(**)Forecast figures for gas extraction will be adjusted upon completion of prospecting activities by JSC *Gas prom* and JSC *Kyrgyz Oil and Gas*

Table 3.6

Diesel fuel balance: report for 1990-2006 (*)
and forecast for 2008-2010 and a period
up to 2025 (thousand tons)

1	1990 2	2001 3	2005 4	2006 5
Resources	696	178	173.9	181.4
Production	-	43.4	31.43	31.2
Received as import	616	95	128.9	136.2
Balance at the beginning of the year	80	39.6	13.6	14
Distribution	696	178	173.9	181.4
Domestic consumption	622	160	130.3	136.4
Losses	-	0	0.7	0.8
Sent for export	24	0.6	19.1	19.1
Balance at the end of the year	50	17.4	23.7	26.1

2007 6	2008 7	2009 8	2010 9	2015 10	2020 11	2025 12
199.9	192	193	194	293	350	420
51.9	33	34	36	40	45	55
135	145	145	145	230	280	340
13	14	14	14	23	25	25
199.9	192	193	194	293	350	420
175.9	170	173	176	272	320	390
0.7	0.7	0.7	0.7	1	2	3
1.63	1.63	1.63	1.63	3	4	5
21.67	19.67	17.67	15.67	17	24	22

(*) National Statistics Committee of the Kyrgyz Republic, FEB of the Kyrgyz Republic 1990-2001 (1999, 2001-2005), Bishkek for 2002, 2006

Table 3.7

Gasoline balance: Report for 1990-2006 (*) and a forecast for 2008-2010 and a period up to 2025 (thousand tons)

	1990	2001	2005	2006	2007	2008	2009	2010	2015	2020	2025
Resources	737	200.1	305.8	355.5	352	388	390	390	405	430	475
Production	-	45.2	13 january	11.4	12	18	20	20	25	30	35
Received as import	713	101.9	273.6	324.1	320	350	350	350	360	380	420
Balance at the beginning of the year	24	53	19	20	20	20	20	20	20	20	20
Distribution	737	200.1	305.8	355.5	352	388	390	390	405	430	475

Domestic consumption	682	194	271	322.5	327	340	345	350	360	380	420
Losses	-	0	6.7	7							
Sent for export	20	0	5.4	6	5	5	5	5	5	10	15
Balance at the end of the year	35	6.1	22.7	20	20	48	30	35	30	40	40

Table 3.8

Fuel mazut balance: Report for 1990-2006 and a forecast for 2008-2010 and a period up to 2025 (thousand tons)

1	1990 2	2001 3	2005 4	2006 5
Resources	1184	125.8	100.1	76.8
Production	-	42.2	41.7	42.1
Received as import	1006	20.4	14	1.7
Balance at the beginning of the year	178	63.2	44.4	33
Distribution	1184	125.8	100.1	76.8
Domestic consumption	1027	77	56.6	60.8
Losses	1	-	0	0
Sent for export	-	2.1	10.2	0
Balance at the end of the year	156	46.7	33.3	16

2007	2008	2009	2010	2015	2020	2025
6	7	8	9	10	11	12
91.88	81.08	82.288	83.288	90	100	105
54.1	48	50	52	54	57	60
20	18	17	16	16	20	25
17.788	15.08	15.288	15.288	20	23	20
92.88	81.08	82.288	83.288	90	100	105
74.1	66	67	68	70	80	90
2.78	0	0	0	0	0	0
15.08	15.08	15.288	14.788	20	20	15

(*) National Statistics Committee of the Kyrgyz Republic, FEB of the Kyrgyz Republic for 1990-2001 (1999, 2001-2005), Bishkek for 2002, 2006.

4. Strategic objectives of the tariff policy and financial and economic recovery of the sector

One of the main objectives of taking the Energy sector out of the difficult financial and economic situation is establishment of economically valid tariffs for electricity, heat and natural gas.

Economically invalid tariffs, high level of losses, and repayments brought losses to energy transmitting and generating companies. In 2006 heating generation losses at CHP reached 795.87 million soms and are partially covered with electricity export and losses of distribution companies amounted to 940 million soms.

The total amount of accounts payable of energy companies in 2006 was 3.42 billion soms. In 100 percent payment to creditors for fuel and Social Fund of the Kyrgyz Republic, customs and tax obligations were only covered for 45%.

Strategic objectives of price setting and tariff policy improvement in the energy complex must be based on introduction of the principles of energy sector's sustainability and stage by stage elimination of cross-cut subsidies in tariff setting area.

Tariffs must cover all costs for generation, transmission, distribution and sale of electric and heating energy, and reflect all the costs for electricity supply of each category of consumers. Social support (subsidies) must be targeted at consumers with low level of income through the system of social protection.

Currently a regulatory body in the energy sector, being the State department for regulation of fuel and energy complex under the Ministry of Industry, Energy and Fuel Resources of the Kyrgyz Republic develops drafts of Mid-term tariff policy for electricity for 2008-2012 (hereinafter - MTTP) and Mid-term tariff policy for heating energy for 2008-2010, which is planned to gradually increase tariffs for energy carriers till the level covering the energy companies costs.

Upper and lower electricity tariff limits shall be established in such a way that an average tariff growth in the country does not exceed upper limits of (expected) inflation and does not go below the lower (planned) inflation level.

Increase of tariffs, mentioned above, can considerably affect inflation growth rates for the period of 2008-2012. Analysis of actual data on the population income, inflation and tariff for electricity for 1998-2007 and their forecasts of the Country Development Strategy until 2010 (CDS) shows that there are risks in exceeding of targeted inflation rates. In case of accelerative trend of the development, it is expected that inflation will not exceed 10% and will be put up mainly from the food prices and tariffs for services. As a result of increase of prices for food by 35.3% (including bread and bakery products by 80.7%, for meat and fat by 48.7%. for butterfat by 25.6%) population income growth rates decreased comparison with CDS.

According to the report of the Ministry of Economic Development and Trade of Kyrgyz Republic, in 2007 average annual inflation growth rates amounted to 110.2% in comparison with planned rate 105%, but population income increase decreased till 9.5%, in comparison with 15.7% in 2006. In 2008 inflation growth rates are planned at the level of 108.0%, increase in the real income of population is 109.9%.

Surveys conducted on impact assessment of world tendencies of increases on energy carriers price (oil, gas) and a tariff for electricity in Kyrgyz Republic on social and economic development of the country confirm the high correlation between the energy carriers prices, tariff and macroeconomic indicators (consumer price index and growth rates of GDP).

Taking into account all the issues mentioned above, it is necessary to change the methodology of tariff policy development through substantiation of energy companies' costs and take into consideration tendencies of inflation growth and income of the population with establishment of tariff corridor for the next three years.

Key directions of cost reduction issue are: reduction of expenditures for CHP heat supply; decrease of energy losses, lower spending on repairs activities, optimization of the personnel and salaries; effective utilization of raw materials and inventory, release from non-profile commercial structures and non profitable assets. From a new tariff policy, macro economy shall

receive an effective instrument of inflation control, and energy consuming sectors could better plan their costs and rationalize business-projects.

Following actions that should be taken are an important economic mechanism (macroeconomic indicator) of the financial and economic recovery of the branch:

- conducting a strict policy on reduction of electricity losses till the level, which is close to the level of normal technical losses (15-12%);
- reduction of commercial losses and electricity theft till 3% by 2010 with a full liquidation in a long-term perspective;
- increase of cash repayments for the discharged electricity till 98-100%;
- conducting of re-assessment and capitalization of energy companies assets to enable their normal functioning under the market conditions;
- elimination of a big payment debt existing in energy companies and fiscal bodies through restructuring and development of mechanisms preventing such problems in the future;
- rationalization of energy companies costs for generation, transmission, distribution and sale of electricity, enabling their transparency for the society and also development of ways to reduction;
- development of measure to reduce the negative impact of tariff increase on real sector of economy and also target support on vulnerable layers of the nation;
- development and adoption, in accordance with the legislative procedure, of methodology of tariff calculation for electricity, heat energy, and natural gas;
- further improvement of tariff policy, stipulating regulation of load demand in order to decrease capacity and energy shortage and also electric grid losses through introduction of a differentiated seasonal (day) tariff;
- differentiation of tariffs by categories of consumers with setting mandatory advance payment for consumed electricity for commercial consumers;
- gradual elimination of a cross-cut subsidy between producers' group and energy consumers;
- establishment of a parity on tariffs for domestic consumption of energy, export and supplies to big consumers, manufacturing production for export;
- development and approval of a methodology of implementation of tariff payment for newly connected capacities.

Methodology for establishment and calculation of tariffs for electricity shall affect energy saving policy. In accordance with the Law of Kyrgyz Republic On Energy Saving it is important to make a decision on the creation of the energy saving fund and establish norms of deductions into the fund out of the amount of sold products with their inclusion into tariffs for energy carriers.

5. Strategic objectives of institutional and structural management reform in fuel and energy complex of the Kyrgyz Republic

For the last 10 years considerable changes took place in the structure of management and regulation of the FEC of Kyrgyz Republic, Laws of Kyrgyz Republic On Energy Sector, On Electricity, On gas and oil, On coal, On energy supply were adopted. According to the program on denationalization and privatization of a JSC Kyrgyz energy in newly created joint stock companies *Elektricheskie stancii, NEG of Kyrgyzstan, Severelectro, Vostokelectro, Jalalabatelectro, Oshelectro and Bishkekteploset* the state share of capital amounts to 93.65%, out of which: 80.49% belongs to the State property fund, 13.6% - to Social fund and 4.035% - to legal entities and 2.32% - to the population. Capital was divided and the nominal value of shares for all joint stock companies was divided in the following way:

Table 5.1

Capital distribution among joint stock companies created on the basis of a JSC Kyrgyz energy

Company	Capital, thousand soms	Nominal price of 1 stock, soms
OJSC Severelectro	454,574.5	0.4709
OJSC Oshelectro	182,501.2	0.1891
OJSC Jalalabatelectro	212,618.0	0.2203
OJSC Vostokelectro	182,706.0	0.1893
OJSC Bishkekteploset	366,841.8	0.3800
OJSC Elektricheskie stancii	4,428,282.9	4.5878
OJSC NEG of Kyrgyzstan	1,597,377.3	1.6549

Figure 5.1. Structure of capital distribution of joint stock companies, which were established through privatization of JSC *Kyrgyzenergo*

Note of the IC "Toktom": The hard copy of the structure of capital distribution of joint stock companies, which were established through privatization of JSC *Kyrgyzenergo,* can be found at the IC "Toktom."

The diagram analysis demonstrates that the largest part of the capital of a JSC "Kyrgyzenergo" was transferred to JSC Power plants - 60%, 22% was transferred to JSC NEG of Kyrgyzstan, 6% - to JSC Severelectro, 5% - JSC Bishkekteploset, 3% - JSC Jalalabatelectro and 2% was transferred to JSC Oshelectro as well as to JSC Vostokelectro. In accordance with the Law of Kyrgyz Republic On Energy sector, the Government of Kyrgyz Republic in the name of the Ministry of Industry, Energy and Fuel Resources of the Kyrgyz Republic, determines energy and tariff policy and control over its implementation. It is necessary to admit that the restructure of Energy sector with separation of the single Energy system into separate companies did not bring the expected positive results, the financial status of energy companies considerably worsened. One of the main reasons is a low level of management, especially in distribution companies, and also the gap in conducting reforms.

The main factor, which slows down a privatization process, is transfer of energy objects into private ownership, which immediately leads to tariff increase and dissatisfaction of the society. Further denationalization and privatization program requires improvement of the normative basis for attraction of private investments to reconstruct the existing and to construct new energy objects and also emerge state-private energy companies.

Radical administrative and financial management reforms of energy companies are necessary.

For management improvement energy company officials and board of directors shall be selected based on business and professional skills on a tender basis. Managers' activity assessment shall be carried out based on: costs reduction criteria and profit growth, assets increase, losses reduction, increase of collection, etc. One of the most important institutional policy measures will be a transfer into concession or privatization of distribution companies and a property complex of Bishkek CHP and JSC Bishkekteploset.

Regulation of the activity of natural monopolies in the energy sector of economy and tariff policy realization is the most important state function in perspective. In order to increase energy sector state regulation efficiency, it is necessary to address an issue of strengthening of regulatory body functions and introduce necessary amendments into the Laws of the Kyrgyz Republic On Energy sector and On natural and allowed monopolies in the Kyrgyz Republic.

In power industry structural reform has a goal to increase production and energy consumption efficiency, ensuring reliable and continuous energy carries supply to consumers.

One of the main results of power industry reform shall be transformation of the existing wholesale electricity market into a full-fledged retail market, enabling reliable and economically effective energy supply with regard to objective interests of producers and consumers. The

development and introduction of a set of normative and legal rules and stages of transfer to such a market are necessary.

With the energy companies transfer to commercial basis of business activity relationships among them shall be built in such a way that distribution companies, where the main volume of commercial losses took place up to now, will have to struggle more resolutely against them and increase efficiency of their work, increase collection of funds for discharged energy and ensure contracts execution.

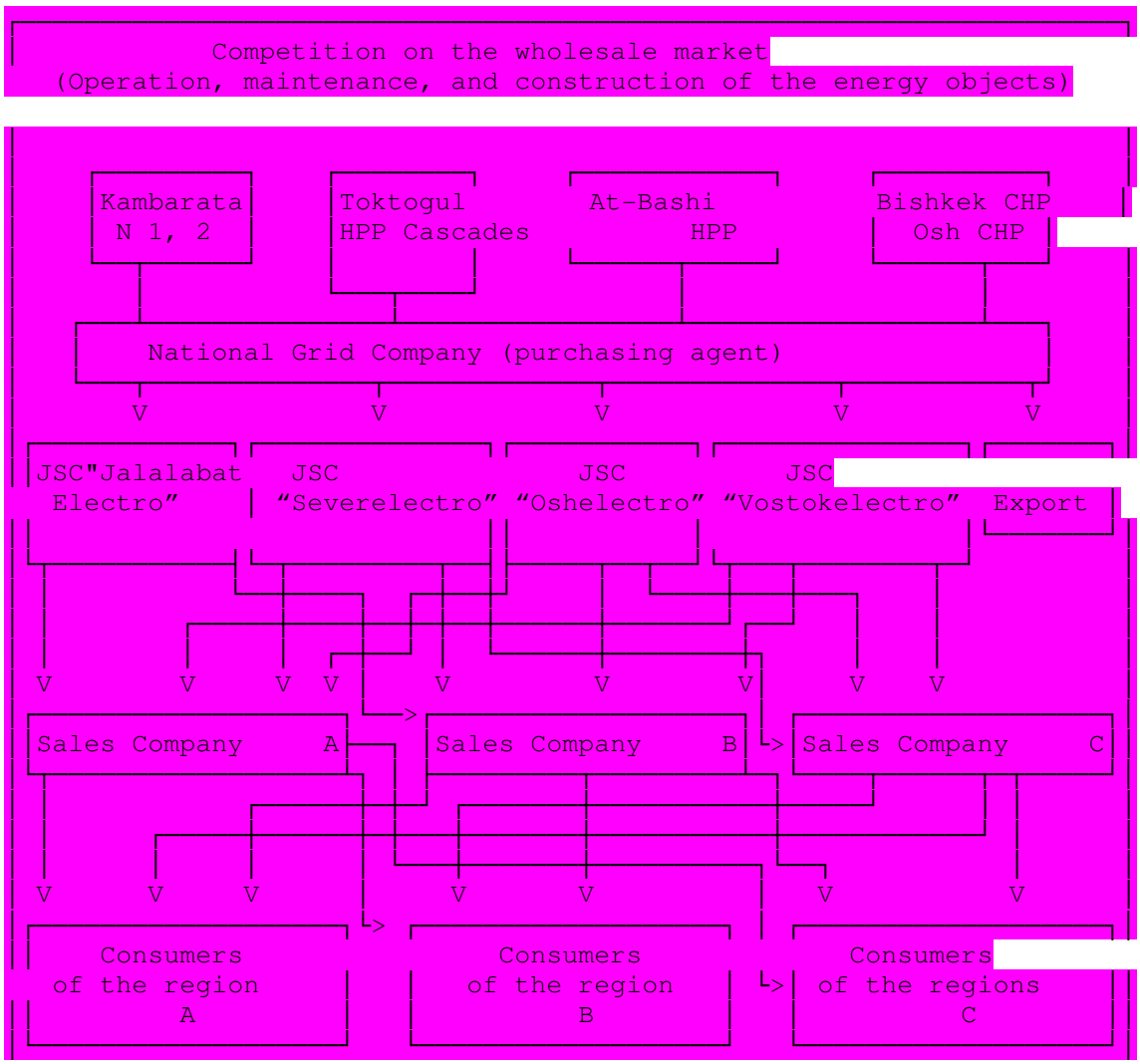
Under the current technological connections a consumer cannot select electricity supplier, as well as its generator. Consumer buys electricity from a distribution company of its region. With such organization of electricity market there is no competition among distribution companies.

The state shall introduce such market mechanisms, which could provoke distribution companies to improve their economic activity. It is necessary to develop such a subsidizing scheme of distribution companies, which could help bringing it to a higher level of profitability and make it more attractive for investments. And it is necessary to domestic commercial banks for energy companies crediting, i.e. initiate creation of targeted loans and deposits for EPS funding.

Competition in the area of energy trade among energy suppliers (sellers) can be ensured by new market subjects - selling companies, being legal market agents of electricity and capacity.

The suggested competitive market model and sales companies functioning in EPS is provided in the figure 5.2.

Figure 5.2. Competitive model of electricity model in the Kyrgyz Republic



As the diagram illustrates, there is a competition among sales companies for conducting negotiations between an electricity purchaser and seller. Sales companies can sign agreements with distributing companies for supply of electricity to consumers or reject the services of these companies at all. Thus, signed bilateral agreements will guarantee the distributing companies that consumers will pay for the consumed energy. Simultaneously, consumers will present their claims not to the distributing companies but to the sales companies, which, in its own turn, is required to track supply of good quality electricity supply to consumers. Good performance will help the sales companies to improve their financial positions and find additional funds for reconstruction of their equipment and for introduction of new technologies for electricity metering. Thus, distributing companies can pay off their debts to JSC *NRG of Kyrgyzstan* and JSC *Power Plants*. Realization of this plan will require conducting of an open tender to select top managers with the qualified team that will be able to extricate the distributing companies and JSC *Power Plants* out of the financial and economic crises as well as to improve indices of JSC *NEG of Kyrgyzstan*.

Construction of new HPPs by attracting the private capital, cost reductions, and their optimization with the purpose of receiving profit will enhance development of a direct competition among energy generating companies. With the new opportunities of participation in creating the single electricity market both with country members of Eurasia Economic Cooperation organization and countries of South Asia Kyrgyzstan, it is necessary to seek for investors to construct the next stages of Middle and Upper Naryn HPP cascade and small HPPs. Only in this case, the Kyrgyz Republic can ensure the competition among electricity producers and take its place in the regional CAR market.

The structural policy in gas supply will be directed at creation of conditions for ensuring reliable gas supply for the country and implementation of specific measures for its liberalization. Development of the gas supply system will be carried out based on the program of denationalization and privatization of the gas industry in the country, reconstruction and development of gas transportation grid in accordance with the planned volumes of gas consumption and strengthening of state regulation.

The structural policy in oil and gas industry is largely connected with the improvement of the tax policy on regulation of use of bowels, support of oil business, attraction of direct investments for development of new fields of oil and gas, and launching the oil refineries to their full capacity. It is necessary to ensure development of competition of petroleum and petroleum products supplies to the domestic markets by providing equal conditions for business activities for all market subjects.

The structural policy in coal industry will be connected with a reduction and termination of state support by the state budget, increase the competitiveness of the sector, and increase the investment attractiveness of companies. The full privatization of coal industry will be completed. Policy measures will be directed at increase of efficiency of not-profitable mines and support of the related social expenses, including re-profiling and training of miners, development of investment projects of the sector.

The structural policy in heat energy shall be connected with privatization of small urban and rural boiler shops, improvement of tariff policies for heat energy and ubiquitous introduction of new heat generation technologies, including solar heat supply.

In order to ensure NEP monitoring, the Ministry of Industry, Energy and Fuel resources of the Kyrgyz Republic shall:

- formulate the mechanism and information and analytical support of the NEP monitoring system;
- carry out NEP monitoring to oversee actual state of affairs in the FEC and implementation of the state long-term Energy policy;
- develop a system of efficiency indices of the state Energy policy;
- to do the analysis of the occurring changes to identify and prevent on time the negative tendencies, impacting energy safety of the country;

- to identify the most important targets in order to implement the social and economic development of the country at every stage of realization of the energy program for a corresponding period of time;

- to submit an annual report to the Government of the Kyrgyz Republic on the course of NEP implementation based on the results of monitoring.

6. Strategic objectives of inter-state cooperation aimed at creation of the single market of energy resources and development of external energy policy

Strategic objectives of inter-state cooperation aimed at creation of the single market of energy resources are the following:

- maintenance and further expansion of the existing energy connections within the CIS, EuroAsiaCooperation, Shangai Cooperation Organization etc.;
- participation in development of integration processes in the area of exploration and development of water, fuel and energy resources, and upgrading the efficiency of their use;
- participation in creation and improvement of the normative legal basis on the joint exploration of water and fuel and energy resources, joint use of water and energy objects, including oil and gas pipelines;
- ensuring energy and ecological security of CAR.

Implementation of the set goals will require development of the external energy policy in the following directions:

- strengthening the position of the Kyrgyz Republic in formation of the regional energy market and maximum effective realization of export opportunities of the energy sector;
- ensuring non-discriminatory regime for external economic activities in the energy sector, access for energy companies to the market of energy carriers, foreign financial markets, and advanced energy generation technologies;
- attraction of investments of international financial organizations on mutually advantageous conditions;
- promotion of principles of energy effectiveness, sustainable development, and signed international conventions, protocols and ДЭХ;
- receiving the highest benefit for the Kyrgyz Republic from external economic activities;
- support of new forms of international energy business in the FEC.

Strengthening the position of Kyrgyzstan at the regional market of electricity and power is strategically important, in order to implement to the maximum level the export capacity of the hydro power sector of the Kyrgyz Republic for the forecast period of 2011-2025 and contribute to ensuring energy security.

To reach this goal, it is necessary to restore the scheme for cooperation on exchange of energy resources: Kyrgyzstan- Kazakhstan - Tajikistan - Uzbekistan, which was created within the framework of Central Asian Economic Cooperation (hereinafter - CAEC), when in 1998 the heads of the Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan, and Republic of Uzbekistan signed inter-state agreements:

- on parallel work of energy systems in OEC of Central Asia;
- on the use of water resources of the basin of rivers Naryn-Sarydaria.

According to these agreements, in exchange for water discharge from Toktogul water reservoir during vegetation period and simultaneously generated and exported electricity to Uzbekistan and Kazakhstan, Kyrgyzstan received natural gas, coal, and mazut for Bishkek CHP. But development of integration processes in CAR did not achieve the expected results. The main reason is that the competent bodies of Central Asian states did not develop on time the specific mechanisms for implementation of the made decisions in full scale. Since 2002 Uzbekistan has implemented a series of water projects on its territory aimed at improvement of the use of water resources and re-regulation of the water flow, including facilities in the Arnaisai hollow. Thus, it

has reduced its dependence on water resources from Naryn river and doest not export electricity from the Kyrgyz Republic anymore.

As a result of breaching the interactive system of energy resource exchange, Kyrgyzstan was forced to make bilateral agreements separately with the Republic of Kazakhstan, Republic of Tajikistan, and Republic of Uzbekistan. The terms and conditions of inter-state energy resource exchange for water discharge during vegetation period began to be protocolized.

Due to the merging of the Central Asian Cooperation (CAC) and EuroAsiaCooperation organizations, the drafts of the following inter-state documents were developed for consideration and development of cooperation mechanisms on the issues of water and energy regulation in CA within the frameworks of the EuroAsiaCooperation's state members. These drafts require urgent consideration and adoption of:

- concepts of effective use of water and energy resources of CA;
- road map of the mechanisms of interaction of the EuroAsiaCooperation's state members in water and energy regulation in CA;
- updating of a long-term inter-state agreement on the use of water resources of the Syrdaria river basin based on norms of international water law with regard to specific conditions of Central Asia.

Concept of an effective use of water and energy resources of CA, developed according to the decision of the EuroAsiaCooperation International Council dated August 16, 2006 N 315, is a combination of coordinated points of view and approaches to the principles of cooperation of EuroAsiaCooperation state members in a joint use of hydro power capacity and effective use of water and energy resources of Naryn and Syrdaria river basins with regard to the interests of all states. It also determines favorable economic and legal conditions for businesses of state-members. The concept is a basis for development of inter-state agreements. It specifies principles and objectives of relationships of states in effective use of water and energy resources (hereinafter - WER) of CAR. It involves:

- the development and implementation of coordinated activities in rational and effective use of WER of the region;
- ensuring optimal ratio of irrigation and energy work regimes of water reservoir cascades with regard to annual and multi-year cycles of fluctuation of water flow and a balance of water and energy resources and others.

The road map specifies main principles and requirements of mechanisms of relations of the EuroAsiaCooperation state members in water and energy regulation in CA with regard to international water law. Relation and interaction mechanisms involve a system of economic, technical, institutional, and political measures. The document is a plan of the gradual creation of joint market conditions in the process of integration of the water and energy sectors. It has three stages from the initial position. Each stage corresponds to the higher level of integration in the in joint use and exploration of WER of Syrdaria transboundary rivers. In the process of development of the road map, provisions and conclusions of the Regional Strategy on rational and effective use of water and energy resources of CA (SPECA program, 2003), Concepts of establishment of the International water and energy consortium, and the Concept of creation of the common electricity market of the CIS states-participants were taken into account. For development of energy resource market pointed out in the draft of the Agreement on Naryn-Syrdaria basin, the state- members of EuroAsiaCooperation established a multi-year perspective of the document, and Uzbekistan and Kazakhstan directly acknowledged their payment obligations for every year and multi-year water accumulation services, which are provided by Kyrgyzstan with considerable losses for its economy. Agreement also provides more effective mechanism for disputes and disagreement resolution with application of international arbitrage procedures. Reaching the agreements on principles and procedure of water distribution, measures on the level of compensation for water regulation costs among the states, and optimization of regimes of use of inter-state water objects are vital tasks.

According to the data of the World Bank, 44 out of 145 agreements signed in the XX century specify payments in the form of money transfers, or include the payment into the future payment for water and services for regulation and water supply to independent states situated in the upstream of the transboundary basin. This mechanism was applied in the inter-governmental agreement on the Chui and Talas river basins dated 2001, according to which the Republic of Kazakhstan accepts share holding in reimbursement of costs related to exploitation and technical maintenance of water facilities on those rivers. This mechanism was secured by establishing the joint inter-government commission of Kyrgyzstan and Kazakhstan on management of water resources Chui and Talas river basins.

According to the strategic plan, in the basins of Naryn and Syrdaria rivers Kyrgyzstan should try to secure that all water objects of inter-state significance, which provide seasonal and yearly and multi-year regulation, would work both in irrigation and energy regimes. It has become possible as a result of the work with Kazakhstan aimed at increasing the carrying capacity of the Syrdaria river that provides water release into the Aral sea in winter time up to 4.5 billion cubic м. for power generation in winter time. Simultaneously, it should not put the water supply during the summer time under the risk. In future, with launching into operation the Kambarata HPP, there is a possibility to ensure the double-regime work of Lower Naryn cascade completely, since the main advantage of it is not depending on the restrictions of Kambarata HPP in winter time. This is because water released from the HPPs will be accumulated in the Toktogul water reservoir.

In order to implement a plan of joint actions of the EuroAsiaCooperation state-members aimed at formation of common energy market, confirmed by the decision of members of the Inter-state EuroAsiaCooperation Council dated February 28, 2003, a Strategy for fuel and Energy Complex of the EuroAsiaCooperation state-members for a period up to 2020 was developed. The final result of preparation of this draft will be substantiated suggestions on priority directions, stages, and targets of formation of the single energy EuroAsiaCooperation space. This document reflects scientific, technical, social, economic, and other aspects of formation of the common energy market, the rational use of fuel and energy potentials, and energy security of the Cooperation countries and their further development. It also reflects WER CAR regulation in general and improvement of the normative and legal basis of inter-state relations.

According to the decision of the Inter-state EuroAsiaCooperation Council dated January 25 2006 N 103, the concept of formation of the common energy market of the EuroAsiaCooperation state –members was developed, which specifies goals, main objectives, principles, and main directions for formation of the common energy market, including the conditions for creation of a common market for electricity, coal, oil, and gas. Concept provisions are the basis for development of international agreements, legal acts, and inter-state targeted programs on the issues of formation of a common energy market of the EuroAsiaCooperation state-members.

In accordance with the decision of the Inter-state EuroAsiaCooperation Council dated August 16, 2006 N 314, the FEB of states – participants of the EuroAsiaCooperation for the period up to 2010 was developed, which will define main trade flows of energy carriers among the states to create a single energy resource market.

Principles of creating the electricity market are reflected in the most important international documents: the European Energy Charter dated 1991 and an Agreement to Energy Charter dated December 17, 1994 enacted in 1997. It had established the main principles of development of energy trade, cooperation in the area of development of the energy sector, and environmental protection. Those international documents were signed by all five CA states and ratified by three countries - Kazakhstan, Kyrgyzstan, and Uzbekistan.

Following the main principles of the development of energy trade and cooperation in developing the energy sector in future can promote implementation of the energy strategies of the CA states in the direction of development of heat plants in Kazakhstan, Uzbekistan, large HPP in Kyrgyzstan and Tajikistan. It can also promote the creation of conditions for energy pool

or formation of energy stock exchange. ODC *Energy* could perform a function of an independent system operator, which could carry out an objective policy and become the core of the energy in future.

Important mechanism for establishing cooperation is the formation of full-fledged inter-state subjects that can use rationally the fuel, energy, and water resources of the region. They should also be able to ensure reliable energy and water supply of all consumers and carry out a long-term investment policy. During the Dushanbe Summit in November 2004 the heads of the states signed an Agreement on Establishment of International Water and Energy Consortium (hereinafter - IWEC) of countries of Central Asia and Russia. IWEC can be helpful for the Kyrgyz Republic in addressing of issues related with the construction of Kambarata HPP-1 and putting into operation in the energy regime by ensuring the coordinated irrigation regime of work of the water facilities. Russia has an intention to fund certain parts of construction of Kambarata HPPs and is interested in supplying the hydro technical equipment to the Kyrgyz Republic.

IWEC must become a financial and insurance mechanism to guarantee a sustainable water and energy exchange stipulated in the agreements. It must have in its disposal the funds and instruments to substantiate the correctness of the made decisions. Water releases from water reservoirs as well as FER supplies shall be made in the form of settlement payments based on functioning of the structure "state-consortium-bank." Organization of settlement payments and financial control can guarantee efficiency of implementation of the made decisions on resource supplies.

Cooperation with countries of South Asia within the framework of SPECA program should e seen as an important direction of the inter-state work in the energy sector. Electricity market for South Asia is promising because of the highest consumption of electricity during the summer time, when Lower Naryn cascade HPP works in an irrigational regime and simultaneously generated power, which is a surplus for Kyrgyzstan, can be transferred through Tajikistan to Pakistan. However, in this case, a problem of non-discriminatory electricity transit through the territory of neighboring states to third countries should be addressed.

Therefore, it is necessary to participate actively in the work of such inter-state organizations as CIS and EuroAsiaCooperation in preparing the normative legal documents, regulating access to national electricity grid, and transit and tariff policies in the energy sector. In a bilateral procedure, it is necessary to promote continuously the issue of unification and simplification of customs formalities and procedures of the electricity transmitted between state - members of EuroAsiaCooperation and CIS state-participants. This is because their decisions may allow creating the favorable conditions for carrying out electricity flow and transit. The second important problem is the installation of 500 kW electricity transmission line for generating the energy and electricity from promising HPPs for South Asia.

For today and long-term perspective, the countries that most likely will participate in the integration processes of cooperation on the development of hydro power and electricity export of Kyrgyzstan are the Russian Federation, helping with the construction of Kambarata HPP-1 and Chinese People's Democratic Republic, helping with the construction of HPP on the upper and middle flow of the river Naryn, Sary – Zhaz river, and Kara-Keche HEP.

Completion of these constructions within the deadlines and the interests of investors will allow increasing volumes of electricity export. It is also anticipated that the electricity supplies will be exported to Kazakhstan and Uzbekistan with simultaneous water releases as well as to Russia, China, and Pakistan. Exportation of electricity during the summertime of 2003-2004 from Kyrgyzstan to Russia as a transit through electric grids of Kazakhstan had demonstrated perspectiveness of this route. In perspective, Russia is not only a supplier of the equipment to hydro power objects, but it is also a potential electricity importer. Therefore, development of inter-state cooperation in the energy sector must become one of the main priorities of Kyrgyzstan's external energy policy.

Based on the research undertaken within the frameworks of SPECA EEC and ESCATO UN, agreements on the electricity export from Central Asia to Pakistan for 1000 MWt per year at the

rate of 5-6 cents per K.W.H. can be reached, as well as the agreement with Tajikistan on electricity transit through 500 kW electricity transmission lines that will be constructed in future for supply of South Asia. According to the first scenario, it is estimated that the possible volumes of the electricity export can reach 4.2 billion. K.W.H, and up to 6.4 billion. K.W.H per year by 2025, according to the second scenario (table. 3.2).

In the last years prices for export of electricity were low. According to experts' assessments, losses from electricity exports are millions of U.S. dollars. The policies on the measures for the mid-term period will directed at the development of mechanisms for the transparency of export tariffs, which must be lower than electricity prime cost at the energy market of the country and region on the day of signing the agreement.

Cooperation in supplying the economy of the Kyrgyz Republic with imported natural gas in the volume up to 850-900 million. cubic м per year is possible in future with the assistance of JSC *Gasprom* in compliance with the "Memorandum on Intentions to Create Russian-Kyrgyz Joint Company in Oil and Gas Industry Together with JSC *Kyrgyzgas* and JSC *Kyrgyz oil and gas*."

Export of coal to Chinese People's Republic and neighboring Central Asian republics is possible in the volume from 100 to 200 thousand tons in accordance with the agreements with the coal mining companies of the Kyrgyz Republic.

Realization of strategic tasks requires improvement of the negotiation processes and multi-lateral and bi-lateral inter-state negotiations on the use of WER and trade with energy resources.

7. Main directions of energy saving policy

Advancing the efficiency of use of FER and creating necessary conditions for transition of the country's economy to the energy-saving path of developing are the top priorities of the state's energy policy. Finding solutions for these tasks will allow to guarantee sustainable supply of the population and country's economy with energy carriers at the anticipated paces of growth.

Ineffective use of fuel and energy is connected with malfunctioning technologies and financial and economic mechanisms. They do not stimulate producers and consumers of energy resources to reduce the costs for energy carriers.

Three categories of energy-saving activities can be identified in realization of the technological potentials of energy saving:

- low cost activities, which lead to the increase of effectiveness of use of fuel and energy (elimination of losses in transportation and storage of energy carriers, applying energy-efficient and technological regimes, replacement of energy equipment with excessive capacity, equipping the consumers with metering devices of the energy carriers etc.);
- high cost activities that require considerable targeted investments and are implementable, if effects from energy saving can cover the costs during the adequate timeframes;
- concomitant activities undertaken in the process of technical re-equipment of the sectors of economy, when energy-saving is a concurrent factor.

According to experts' assessments, the total energy consumption in sectors of economy of the Kyrgyz Republic can be reduced by 13% by means of technical and organizational activities, which do not require considerable capital investments and can help to save up to 550 thousand tons of standard units for a period up to 2010. By reconstructing and modernizing the existing energy equipment and by introducing the energy saving technologies, 25% of electricity and about 15% of heat energy can be saved, which corresponds to more than 2000 million. K.W.H and 800 thousand Gcal respectively.

In the mid-term perspective (2008-2010), it is necessary to use parts of energy saving potentials by means of implementation of low cost activities.

The Law of the Kyrgyz Republic on saving the energy is currently the main document, regulating relations in energy saving with the purpose of creating the economic and organizational conditions for an effective use of energy resources.

In accordance with this Law, the priority for the short-term is the adoption of the targeted program on energy saving in the Kyrgyz Republic for 2008-2010 (hereinafter – the Program) together with the mid-term tariff policies.

The goals and objectives of the Program:

- implementing the main provisions of the energy saving policy in accordance with the requirements of the Law of the Kyrgyz Republic on Energy Saving;
- ensuring the shift of economy to the energy saving path of development by improving the living conditions of the population;
- utilizing the set of market mechanisms and measures of the state regulation;
- reducing the budget subsidies to regions for fuel and power supply.

Programs of activities consist of three blocs:

1. Normative, organizational, methodological, and personnel support of energy saving.

1.1. To create a set of normative and legal acts, ensuring the development and realization of energy saving programs and projects in the shortest timeframes.

1.2. To develop financial and economic mechanisms for implementation of the national, sectoral, and regional programs to create a self-regulatory system of energy saving with the use of the following sources of financing:

- funds of enterprises implementing energy saving activities and programs;
- budgets of rayons and cities implementing energy saving programs;
- funds of the Republican budget allocated for implementation of energy saving projects and programs;
- funds of extrabudgetary foundations and investments.

The state financial support for energy saving shall be provided mainly on the pay-back basis, concessionary terms, and for limited time period based on the importance and projects' pay-off periods.

It is necessary to introduce the following mechanisms that would allow the financing the projects under conditions of insufficient funds:

- use of pay-back schemes of funding the energy saving projects;
- use of concessionary crediting to increase the energy efficiency;
- granting the rights for the saved energy resources to the state enterprises and organizations that are the consumers of energy carriers;
- stimulation of energy saving with the use of subsidies to the population.

Measures of the state support for energy saving projects of companies and administrative and territorial units of the Kyrgyz Republic shall be carried out with regard to results of energy examination, availability of an energy passport, and energy saving programs.

1.3. Organize the trainings and re-trainings of personnel on energy-saving and introduction of energy-saving technologies, having studied:

- the formation of ecological and energy saving thinking of the young generation in pre-school and high school education;
- re-training the experts with higher education in the field of technological aspects of energy saving;
- the preparation of experts for conducting of energy-saving research of companies and organizations;
- providing the courses for advancing the professional qualifications of officials and experts of companies and organizations, who are engaged in energy supply and energy saving.

1.4. Develop the state regulation system and control over program's execution.

2. Increase the efficiency of production and consumption of FER.

2.1. Based on the detailed research and analysis of energy saving resources, it is necessary to develop and adopt an energy saving program for 2008-2010 and for a perspective up to 2025 by the sectors of economy, housing and public utilities field, and regions of the Kyrgyz Republic. Develop concepts of regional energy saving policy and determine principles of inter-regional cooperation in energy-saving.

2.2. Introduce energy-saving equipment, regulation devices, and energy resource metering devices.

3. Develop completely new energy saving technologies, equipment, devices and material, and improve the existing ones. Create alternative sources of energy.

3.1. Determine the efficient conditions and stages of introduction of advanced, energy saving high technologies, reduction of FER rate of use in FEC, industry, housing sector, agriculture, construction, transport, and other sectors of economy.

3.2. Create a database on effective energy saving technologies in the Kyrgyz Republic and abroad.

3.3. Determine possibilities of importing and producing the small and non-conventional energy objects in the Kyrgyz Republic with a reduced investment cycle, enabling more even distribution of energy companies on the territory of the Kyrgyz Republic.

3.4. Conduct an active information policy, disseminate the computer, advertising, and information programs on energy saving as well as the information bulletins and printed information and commercial publications.

8. Strategic objectives of the environmental protection and rational nature management in FEC

FEC brings huge benefits for the economy of the country. At the same time it is one of the biggest sources of negative impact on the environment. Negative impact of FEC is traced in all sectors of it:

- in extraction and processing of hydrocarbon raw materials;
- in transportation and storage of energy carriers;
- in generation of electricity at thermoelectric power plants and hydro power plants;
- in transmission and distribution of electricity through air and cable lines.

Especially adverse ecological situation remains in coal and oil and gas industries of the Kyrgyz Republic. Coal mining and open-pit works are being done with serious violations of technological requirements. After mines are exploited, recultivation of land is virtually not being done. There is no comprehensive engineering consideration of locating the wastes. Every year dozens of hectares of new land are being occupied with waste piles. Air purification facilities and drainage systems are outdated and must be replaced. Due to the poor condition of equipment, the ecological situation in mines and pits continue worsening, and it is creating a threat for miners and the population.

Thermoelectric power plants and boiler shops are insufficiently equipped with modern devices for control of emission of harmful substances into the atmosphere and discharge of waste to the water. It does not allow exercising reliable control over the quantitative and qualitative composition of wastes. There is a tendency of deterioration of the qualitative composition of burnt coal, which leads to the additional increase of hazardous emissions.

There is a little research done on the ecological consequences of the construction of HPPs, mail transmission lines, and sub-stations. Environmental protection activities in constructing the electricity transmission lines are virtually not carried out. Normative criteria for their implementation are insufficient. Harmful effects of electromagnetic fields of high voltage electricity transmission lines and sub-stations on people in high mountains have not been studied enough.

In order to improve ecological situation in FEC, the following set of activities shall be undertaken:

1. Improvement of the normative and legal basis on the environmental protection and development of mechanisms of its implementation with regard to international agreements ratified by the Kyrgyz Republic, first of all, by the UN Framework Convention On Climate Changes (New York, 1992) and Kioto Protocol to the UN Framework Convention (Kioto, 2001). Therefore, it is necessary:

- to develop normative documents, regulating organization of construction and assembling activities, and subsequent recultivation upon construction of mountain electricity transmission lines and sub-stations;

- to develop draft of the law on the use of RSE;

- to develop plan and schedule for carrying out recultivation activities of previously polluted land in oil, gas, and coal mining sectors.

2. Increase the energy efficiency of economic growth and also use of all types of fuel and energy by means of introduction of advanced energy saving technologies and activities aimed at saving of FER and reduction of their losses.

3. Broad use ecologically pure NRSE on the territory of the Kyrgyz Republic of, first of all, in resort areas, national parks, and areas, where conventional energy construction leads to degradation of agricultural land, pastures, and forests.

4. Improvement of technological processes and equipment of the existing energy companies, and other companies in coal, oil and gas industries to reduce pollution and other environmental violations.

The priority objectives in this direction are:

- completion of leading out kiln gasses at Bishkek CHP N 1 from all boilers to a 300 meter chimney, which will allow reducing contamination of the surface layer from CHP emissions by 25-30%;

- installation of a boiler БКЗ-420-ЦКС instead of three boilers БКЗ-160 in the first place, which will reduce emissions of greenhouse gases 10 times as well as the nitric oxide in kiln gases will be reduced 3-3.5 times;

- development and introduction of effective ways of industrial use of ashes and slag with the subsequent recultivation of ash dumps;

- resolution of the issue of shifting the boilers of Osh CHP to burning of coalmazut-(petroleum) water compositions as ecologically pure and economically efficient type of fuel with the use of local coal and petroleum products. Reconstruction of the entire system of transportation and storage of mazut in Osh;

- development of suggestions on equipping FEC companies with modern devices for controlling emissions of effluent gases, waste water, and other harmful substances as well as the replacement of outdated and depreciated equipment for purification of air and water;

- development of activities aimed at introduction of new technology for burning of Kara-Keche coal with its preliminary gasification in furnace extensions -gas generators. Introduction of this technology will allow reducing ashes and gases emissions by not less than 60-80%;

- having compulsory, preliminary geological and hydro-geological prospecting in selection of plots for placement of ash dumps at coal mining companies.

5. Development of measures aimed at reduction of vulnerability of natural ecosystems in constructing new hydro power facilities in the basin of Naryn river, Kambarata HPP with requisitioning of land with the total area of 8455 hectares, including 3302 hectares of agricultural land, 3297 hectares of pastures, 36.8 hectares of forest, 428.2 hectares of shrubs, and also flooding of 96 km of road used by cattle, which come under the flooding zone of hydro power water reservoirs.

Solving the problem of ecological security becomes one of the priority tasks within the framework of energy efficiency in building the economy in the direction of stable growth. In the Kyrgyz Republic with an intensive RSE development and carrying out energy saving policy in all sectors of economy and in service sector, there is an opportunity of participating in the hydrocarbon market through the mechanism of the Kioto protocol called “МЧР projects” and aimed at reduction, using as a benchmark the level of 1990 - 23202.53 Gc(*), of greenhouse gas emissions, in "CO2 - equivalent" 2 times or up to 12000 Gc by 2025, which can ensure receipt of revenue in the amount of 2.05-24.6 billion soms (50-60 million USD) at the world hydrocarbon market. With regard to the fact that prices for greenhouse gas emissions will grow in the future, there is an opportunity created for the growth of revenues, which can be used as a

source of investments into upgrading energy efficiency of economy and into energy sector of the country.

9. Scientific and technical and innovation policy and development of human resources

Successful FEC development and implementation of tasks set up by NEP are impossible without having a relevant scientific and technical innovation policy.

In contemporary conditions, one of the main tasks for successful management of the innovation activities in FEC and in its sectors is a rational combination of state and market forms of management of scientific and technical policy, which enables the coordination of NEP goals with commercial interests of organizations and companies implementing the same goals.

The main goals of scientific and technical policy are support of the Kyrgyz Government of the scientific and research activities in energy sector and introduction of science and technology novelties with the purpose of increasing considerably the efficiency of functioning of FEC sectors. Therefore, the following priorities of the state scientific and technical innovation policy are necessary:

- reconstruction and technical re-equipment of the existing FEC objects;
- restoration and development of scientific and technical capacity, including applied developments and modernization of experimental basis of scientific organizations and the system of scientific and technical information;
- creation of favorable conditions for development of innovation activities aimed at radical upgrading of production and technological basis of FEC , resource saving, and improvement of consumer qualities of produce;
- improvement of all stages of innovation process, increasing the demand and effectiveness of the use of the results of scientific activities;
- use of potentials of the international cooperation to utilize the world's best achievements and to advance the domestically designed products to the higher level;
- maintaining and developing the human resources.

In order to achieve the specified priorities of scientific and technical and innovation policy, it is necessary: to identify and provide economic support to promising directions of scientific and technical and innovative activities through state targeted scientific and technical and innovation programs and projects; to organize systems of state recording and control over implementation of the results of scientific research and experimental developments in the energy sector, creation of efficient information infrastructure in science, education and technologies in FEC sectors; to finance science in the energy sector; to promote development and introduction of new, efficient, ecologically safe technologies of extraction, generation, transformation, transportation, and comprehensive use of FER with the priority use of own sources.

For the given period of time, the main directions and tasks of the scientific and technical and economic developments are the following:

- ensuring and increasing reliability of work of the existing energy objects in the entire FEC chain: from generation, delivery and storage of energy carriers until the distribution of power and thermal energy;
- upgrading the efficiency of the existing FEC by means of decreasing the losses and improving the production basis, technology, and ecological protection;
- industrial development of hydro-transport systems of fuel supply and ecologically pure and highly efficient technologies of burning the Kyrgyz coal;
- development and introduction of state norms ensuring protection of interests of the Kyrgyz Republic in development of projects and construction of FEC objects;
- development of legislative and normative documents relevant to the conditions of the Kyrgyz Republic for designing, construction, and exploitation of electric and heating grid, power plants, oil and gas pipelines, and other FEC objects;

- substantiating and making amendments and changes into the existing construction norms and rules (CNR), rules of electroinstallation devices, and other norms, so they could apply better to the local conditions and modern international standards;

- carrying out activities in standardizing the equipment and electro technical products;

- development of legislative and normative documents and other measures aimed at reduction of coal, oil and gas losses during the process of their extraction, transportation, and storage;

- development of norms for preserving the nature in fuel industry;

- development of measures guaranteeing mandatory execution of norms and rules, which are approved in accordance with the established procedures, in all types of designing, construction and procurement of equipment with recognition of the priority of standards of the Kyrgyz Republic, if they have higher requirements than the international standards do.

Implementation mechanisms of the state regulation of scientific, scientific and technical, and innovative activity in FEC include the following:

- creation of economic conditions for development of new technologies and equipment by means of all sources of financing;

- formation of targeted scientific and technical and innovative programs;

- development of the determination and control system for the realization of priority directions of innovative activities and new technologies in FEC, including the application of the sector maps of technological development, which are widely used in various countries;

- strengthening and developing the consolidated sector sources of financing of scientific, research, experimental, and engineering projects; concentrating budget and extra-budgetary funds on implementation of major innovative projects;

- organization of republican science and high technologies centers in the FEC system, which are connected with development and introduction of the most promising technologies;

- development of the system of engaging the objects of intellectual property and other results of scientific and technical activity in FEC into business activity.

In order to implement priorities of the scientific and technical policy in FEC, the following is necessary:

- reinforcing the state financial support and control over the adherence to the state interests in development and implementation of the targeted programs of the Republic; their re-profiling for supporting strategic development tasks of FEC;

- development of economic stimulation principles for introduction of new progressive high technologies, materials, and equipment;

- taking inventory of science organizations in the energy sector;

- creation of a comprehensive normative and legal basis for innovative activities in the energy sector, including the issues of protection of copyrights and intellectual property rights as well as attraction of foreign investments into the national innovations field;

- creation and development of objects of innovative infrastructure.

Maintaining and developing the human resources is a crucial factor for implementation of the specified directions of the scientific and technical policy in FEC sectors. For this purpose, it is essential to enhance the prestige and attractiveness of scientific and technical field, to create conditions for attracting and keeping the new cadres in the field of science, to have interrelation of preparing scientific personnel in implementation of the most important innovation projects of the state significance, to increase quality of preparation of high qualification scientists, to impove systematically the professional skills of the administrative personnel and engineering and technical employees of all FEC units.

In contemporary and constantly changing conditions of the market economy, leaders of the sector, its enterprises, and structural sub-divisions face difficulties in providing leadership of a necessary level without mastering new things and honing skills in marketing, management, and high tech of the sector. The current system of re-training of managerial personnel, including the assistance of various programs and funds, are insufficient. In order to improve the situation, systematic re-training of managerial personnel shall be made mandatory. Therefore, it is

essential to organize ongoing courses for re-training and improving the professional skills of the FEC managerial personnel by engaging the leading experts of the Kyrgyz Republic and other countries as trainers.

The re-training process shall include the following main directions:

- training of top-managers for energy and industrial enterprises to develop, execute, and increase the efficiency of energy saving programs and control over adherence to standards;
- economic analysis of FEC companies in market conditions;
- pricing in conditions of denationalization and privatization of the sector's companies;
- innovation in a competitive market economy;
- methodology of licensing at FEC companies
- economy and methods of management in new forms and structures of companies;
- modern information technologies and computer training;
- improvement of professional skills, new achievements in thermal and power industry;
- teaching foreign languages.

Financing of scientific and technical policy is mainly done by means of allocations of the sectoral structures on the contract basis with scientific structures. Partial financing of technical and ecological security, development of normative and legal acts, and other issues of the state importance shall be made by means of the state allocations through the relevant state structures. The total amount of the minimum necessary costs for scientific and technical developments in FEC for the given time period estimates 6 million soms a year, including 1 million soms – out of the budget. The issue of including the amounts of financing the applied scientific works into a prime cost of FEC products shall be resolved by adopting normative acts.

10. Investment policy for developing FEC

The possibilities to ensure sustainable development of FEC sectors, reliable fuel and energy supply of consumers, and overcoming the crisis of the energy sector shall be determined by the rigid investment policy carried out within the frameworks of structural transformation of sectors of the complex and entire economy of the country. Main factors impacting investment policy are rigidities and capital intensity of the FEC sectors, which determine impossibility of undertaking one time and short-term activities to preserve and increase the production potential of the complex.

Threat of destruction of the production potential is becoming more and more visible, which is confirmed by the dynamics of use of capital investments into the energy sector of the country. The volume of capital investments of all sources of financing in comparable prices has reduced several times for the last 5 years, repair and restoration activities in energy companies are done only for 60%, and capital investments are at the level of 35%.

Attempts to attract investments to EPS to launch new capacities have not brought the expected results, with an exception for small amounts of capital investments within the frameworks of the SIP (State Investment Programs), companies' own funds oriented at developing the production basis, and annual budget allocations designed for the support of construction of Kambarata HPP-2.

The main reasons for investment crises in FEC are the following: acute deficit in own financial resources and loan capitals; reduction of funding of capital construction by the state budget; absence of economic mechanisms stimulating companies to develop with their own funds and attract foreign investments; increasing account receivables of energy consumers and, as a result of it, there is crises in settlements between generating, transmitting and distribution energy companies; increasing energy companies debts in payment of taxes to the budget of the country and inability to pay back credits, including those provided by international financial organizations and private foreign investors.

According to the first scenario, the demand for investments to develop the energy sector is estimated as 3.02 billion USD including for:

- launching of new capacities during the given time period:
  - 2008-2010 - 280 million USD;
  - 2011-2015 - 720 million USD;
  - 2016-2020 - 1620 million USD;
- reconstruction:
  - in 2008-2010 - 75 million USD;

development of grids and sub-stations:
- in 2008-2010 - 325 million USD;

According to the second scenario, 5.570 billion USD are needed:

- launching of new capacities during the period:
  - 2011-2015 - 1620 million USD;
  - 2016-2020 - 2120 million USD;
  - 2021-2025 - 1000 million USD;
- development of grid and sub-stations:
  - 2011-2015 - 300 million USD;
  - 2016-2025 - 250 million USD;
- development of small HPP and NRSE: 315 million USD:
  - 2008-2010 - 45 million USD;
  - 2011-2015 - 80 million USD;
  - 2016-2020 - 90 million USD;
  - 2021-2025 - 100 million USD.

The budget of the Kyrgyz Republic with the current GDP little above 100 billion soms cannot allocate such considerable funds.

In order to improve the situation, it is necessary to:

- eliminate mutual non-payment and carry out restructuring of debts among energy companies based on the taxes owed to fiscal bodies and debts for credits;
- elimination of energy carriers' price skewing and shift to prices and tariffs to cover costs of energy companies and other enterprises for generating, transmitting, and supplying consumers with energy resources;
- reassessment of fixed funds of energy companies with introduction of a practice of an accelerated depreciation;
- expansion of the number of investment projects with a tender placement of private and foreign investment resources or in accordance with reached inter-state agreements;
- immediate implementation of measures aimed at the accelerated financial and economic enhancement of energy companies through a full-scale restructuring, liquidation of barter settlements for the consumed electricity, reduction of costs, losses, and theft;
- development of the secondary market of securities and of the infrastructure of capital markets;
- active participation in the development of inter-state wholesale electricity market in EuroAsiaCooperation and Central and South Asia with timely construction of objects of infrastructure for electricity export from existing HPP the to prospective HPP;
- use of intermediary participation of international financial institutions such as WB, IMF, ADB, EBRD, and others for attraction of private investments into the energy sector.

The primary measures for attraction of private investments shall become:

- making changes into the legislation on privatization of some existing and prospective generating capacities;
- adoption of the 4th stage of the Program on EPS privatization;
- development and adoption of the Mid-term tariff policy of the Kyrgyz Republic for 2008-2011;

- creation of the list of promising investment projects for private investors;
- ensuring transparency of financial and economic indices of energy companies to work with investors.

The most acute problem is the issue of attracting the private investments, including strategic ones (Inter RAO UES; Aga-Khan Foundation; Corporation AES (USA); group of companies from China; group of companies *Renova* (Russian Federation); group of companies from the Republic of Tatarstan (Russian Federation) and others).

In the mid-term period (2008-2010), investments will be necessary for rehabilitation of the existing and construction of new generating capacities. The priority objects of new construction include Kambarata HPP-2 with the cost of 11.48 billion soms (280 million USD); rehabilitation objects include Bishkek CHP-1, Uch-Korgon HPP, and At-Bashi HPP. Estimated investments amount: for CHP-1 2.05 billion soms (50 million USD), FOR Uch-Korgon HPP - 615 million soms (15 million USD), and for At-Bashi HPP - 410 million soms (10 million USD). With regard to those objects capital investments must be ensured out of own funds, grants, and investments within the frameworks of the SIP (State Investment Programs). With regard to thermal power plants Bishkek CHP-1 and Bishkek CHP-2, an alternative approach should be considered with attraction of a strategic investor, having united both plants part of a coal pit *Kara-Keche,* which belongs to the state, and the heat energy distribution company in Bishkek.

In a long-term prospective (2011-2025), investments will be needed for construction of Kambarata HPP-1, which will cost about 83.2 billion soms (1.9 billion USD); Upper -Naryn HPP: Ak-Bulun HPP - about 8.2 billion soms (200 million USD), Djilan-Aryk HPP – about 90.2 billion soms (220 million USD). The volume of investments for construction of Kara-Keche HEP is estimated in the amount of 45.1 billion soms (1.1 billion USD).

The volume of planned investments for development of national supergrid for the time period until 2010 amounts about 13.74 billion soms (335 million USD), including: for construction of Kemin 500/220 kW sub-station with a high voltage 500 kW North-South - 10.5-10.25 billion soms (245-250 million USD); for development of southern grid (sub-station 500/220 Datka and high voltage lines 220 kW) 2.05-2.25 billion soms (50-55 million USD), high voltage lines 500 kW *Datka-Khudjand* with the cost of about 20 billion soms (570 million USD); and for the project called *Improvement of Electricity Supply of Batken Oblast* - 410 million soms (10 million USD).

In order to prevent threats of natural disasters and man-caused impacts, it is necessary to take a set of protective measures for strengthening and raising the electricity transmission lines with the investments of 300 million soms. The amount of investments necessary for technical re-equipment of high voltage electric grid is estimated as 2.1 billion soms. The total volume of investments intended for modernization and technical re-equipment of distribution grid is estimated as 10.25 billion soms (250 million USD). Stage by stage reconstruction will allow decreasing of an annual investment load.

Small HPPs and NRSE. It is expected to re-equip the technology and restore the preserved small HPPs until 2010. It is also anticipated to construct small HPPs in various regions of the Kyrgyz Republic with the total capacity of 178 MWt and average annual generation in the amount of 1 billion. K.W.H. 8.36-11.02 billion soms (220-290 million USD) are needed to implement these activities. For attracting investments for the development of NRSE, it is important to use the possibilities of increasing the annual production of solar collectos by the industrial companies up to 100-150 thousand kW.м, wind using facilities - up to 250 MWt, micro-HPPs – up to 2-2.5 MWt, photoelectric transducers – up to 2-3 MWt per year for the total amount of about 520-950 million soms (13-25 million USD). The planned growth of tariffs for electricity will increase the competitiveness and efficiency of prospective small HPPs and NRSE. Acceleration of investment recoupment will stimulate attraction of domestic and foreign investors.

868.7 million soms will be required in the oil and gas industry to implement planned oil and gas extraction increase for 2008-2010, and 315 million som (90 million USD) will be needed

additionally for doing geophysical research. For implementation of these activities attraction of foreign investments is planned, and JSC *Kyrgyzoilgas* will allocate annually capital investments up to 120 million soms.

Investments for re-equipment with modern technologies, metering and control devices in gas supply are estimated up to 20 million USD. Construction of new gas distribution nets by JSC *Kyrgyz gas* will need 70 million USD; repairs and modernization of gas transmission systems by JSC *Kaztran gas* will need 10 million USD; construction of the second line of the gas pipelines will need 200 million USD.

70 million soms of investments are necessary in coal industry per year to support the mining activities of the current companies, and 210 million soms will be needed for the period of 2008-2010. The development of Kara-Keche pit needs investments in the volume of 81.4 million USD.

In general, the demand for investments for the development of fuel industry in 2008-2010, specifically for maintenance and increase of extraction is the following:

- coal at the functional mines and pits - 210 million som;
- oil and gas - 868.7 million som, including own funds of JSC *Kyrgyzoilgas* - 360 million som;
- geophysical research of oil and gas - 90 million USD;
- repairs and modernization of gas transporting system - 10 million USD (joint venture *KyrKazGas*);
- modernization and new construction of gas supply systems - 20 million USD (JSC *Kyrgyz gas*).

For 2011-2025:

- State company *Komur* and development of Kara-Keche coal field - 81.4 million USD;
- JSC *Kyrgyz gas*, joint venture KyrKazGas, construction of the second gas pipe line- 130 million USD;
- JSC *Kyrgyzgas* modernization and new construction of gas supply systems - 70 million USD.

Volumes of necessary investments for financing the development of the energy objects for the period of 2008-2010, 2011-2015, 2016-2020, 2021-2025 are provided in table. 10.1.

Table 10.1

Needed investments (*) for funding the construction and reconstruction of new objects in FEC of the Kyrgyz Republic for the period of 2008-2025

Name	Installed Capacity MWt	Construction Periods	Budget Costs, million USD	2008-2010	2001-2015	2016-2020	2021-2025
Power Industry							
New Construction							
Kambarata HPP-2	360	2007-2010	280	280			
Kambarata HPP-1	1900	2011-2020	1900	-	500	1400	
Upper Naryn HPP	200	2011-2015	220		220		

Ak-Bulun HPP	200	2010-2015	220			220	
Total: 1st scenario		2008-2025	2620	280	720	1620	
Sary-Djaz HPP	1200	2010-2025	1200			200	1000
Kara-Keche HEP	1200	2008-2015	1200		900	300	
Total: 2nd scenario		2008-2025	5020	280	1620	2120	1000
Small HPPs	176	2008-2020	290	40	70	80	100
NRSE		2008-2020	25	5	10	10	
Total		2008-2025	5335	325	1700	2210	1100
			Reconstruction				
Bishkek CHP-1	688	2007-2010	50	50			
Uch-Kurgan HPP		2007-2010	15	15			
At-Bashi HPP sub-station		2007-2010	10	10			
Kemin with electricity transmission lines 500 kW sub-station		2007-2012	250	120	130		
Datka with electricity transmission lines 220 kW	360 km	2007-2012	55	55			
Power supply of Batken oblast		2007-2010	10	10			
			Technical Re-equipment				
High voltage electricity transmission lines		2007-2010	60	60			
Distribution electric grid		2008-2015	250	80	80	90	
			Fuel Industry				
Oil and gas: Support of oil extraction		2008-2010	15	15			
Geophysical research		2008-2015	90	45	45		
Kyrgyzgas: Modernization and new construction		2008-2020	600	150	150	150	150
Total			705	210	195	150	150
			Coal Industry				
Support of							

coal mining Development of Kara-Keche pit, million USD	2008-2015	81.4	40	41.4

(*) Required investments forecast will be adjusted upon the FS preparation for the suggested objects.

Attachment to NEP draft

LIST
of abbreviations and terms used in the NEP text

CAR – Central Asian region;
EuroAsiaCom – Euro Asian Economic community;
CAEC – Central Asian economic community;
FEC – fuel and energy complex;
FER – fuel and energy resources;
FEB - fuel and energy balance;
SES – single energy system;
NEP – national energy program;
CDS – country development strategy
CIS – Community of Independent States;
QFD – quazi-fiscal deficit;
CLT – covering losses tariff
EPS – electric power sector;
JSC PP – open joint stock company *Power Plant;*
JSC NEG Kyrgyzstan - open joint stock company *National Electric Grid of Kyrgyzstan*;
SC Komur – state company *Komur*;
JV – joint venture;
Llc – limited liability company;
GDP – Gross Domestic Product;
SRW and PDW – scientific research work and pilot designing work;
AECRS – automatic electric energy control and recording system и;
CGDU – cabinet gas distribution unit;
BGA-TBA – Bukhara gas area - Tashkent - Bishkek - Almaty;
IWEC – International water and energy consortium;
NRSE – non-conventional renewable sources of energy;
BIC – big industrial consumers;
ETL- electricity transmission line;
SNIP – construction norms and rules;
REDA – Rules for electricity devices arrangement;
WB – World Bank;
IMF – International Monetary Fund;
ADB – Asian Development Bank;
EBRD European Bank for Reconstruction and Development;
KSRC Energy – Kyrgyz science and research center *Energy*.