ADDRESSING THE PROBLEM OF UZBEKISTAN'S NEW ENERGY POLICY FORMULATION

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Elaboration of a long-term energy policy is one of the state's main strategic goals in its efforts to maintain the country's socioeconomic development. Such a policy can be formed first by examining and analyzing the recent trends in the country's fuel and energy complex (FEC) evolvement, and then by defining and evaluating the tasks to be solved in the near future. As for scientific investigations in this sphere, we strongly believe that at the present stage of economic development they should primarily address the problems the industry is currently facing and should focus on searching for appropriate ways for resolving them. Therefore, in this paper we shall try to designate the most urgent problems the country's FEC will have to deal with in the next few years.

When elaborating Uzbekistan's new energy policy for the period until 2020, the following factors should be taken into consideration:

- reduction in gross domestic product (GDP) energy intensity;
- FEC technical modernization and priority development as compared to the national economy in general;
- creation of conditions facilitating full transition from command and administrative management methods to a system of market relations;
- protection of socially vulnerable strata of the population during FEC restructuring;
- reduction of thermal contamination of the environment.

GDP Energy Intensity Reduction

Energy intensity of the national economy and specific energy consumption are normally viewed as universal indicators showing the level of development of this or that state. First of all, they reflect the maturity and completeness of the legal acts regulating generation, transmission, and use of energy. They also define the degree of perfection of the power-generating and technological equipment used both for manufacturing purposes and in private life.

According to per capita energy consumption figures, Uzbekistan surpasses the average world level by 23%, while in per capita electricity consumption we are 20% below the average world level. Hence, Uzbekistan occupies a somewhat average position in the world as far as these parameters are concerned. However, in energy efficiency the situation is completely different. Tables 1-3 below contain some statistical data (they have been calculated by the author based on International Energy Agency

data)[1] describing fuel and energy efficiency in Uzbekistan. From these tables we can see that the energy efficiency ratio in our country is extremely low. By the way, a similar situation has developed in practically all the republics of the former U.S.S.R. For reference: in such technically advanced countries as Austria, Switzerland, and Japan, 136-170 kg of oil equivalent is used (based on purchasing power parity) to manufacture products worth 1,000 USD, and the amount of energy required to manufacture the same amount of products varies from between 280 and 340 kWh.

Table 1

General Information on the Power System of Uzbekistan in 2002

Population	25.27 million people
GDP at the current exchange rate	17.51 billion dollars
GDP at the purchasing power parity	36.57 billion dollars
Primary energy resource consumption	51.74 million tons of oil equivalent
Energy consumption	46,570 billion kWh

Thus, the energy intensity of Uzbekistan's national economy is almost 8-9-fold higher than the highest world level, and its specific energy consumption per GDP unit surpasses the highest world level 3.7-4.5-fold. Such an adverse situation is the result of underestimated domestic prices for energy resources in the U.S.S.R., which has been hampering the development of energy saving technologies. At the same time, Western countries have succeeded in reducing energy intensity in their economies, which was caused by the energy crisis of 1973-1974. In this regard, particular mention should be made of the success achieved by Austria, Denmark, Germany, Norway, Sweden, Switzerland, and Japan. Not one of these countries produced considerable volumes of oil and gas at that time, and even today nearly all of them (except for Norway) still depend entirely on energy resource imports.

Table 2

Specific Energy Consumption in 2002

Ranking in the world	Country	Specific energy consumption per GDP unit at purchasing power parity, toe/$1,000
1	Uzbekistan	1.41
2	Iraq	1.00
3	Nigeria	0.94
4	Zambia	0.84
5	Trinidad and Tobago	0.82

[1] See: *Key World Energy Statistics from IEA*, 2004 Edition, International Energy Agency, Paris, 2004, 74 pp.

Table 3

Specific Electricity Consumption in 2002

Ranking in the world	Country	Specific energy consumption per GDP unit at purchasing power parity, kWh/$
1	Tajikistan	9.58
2	Taiwan	1.83
3	Uzbekistan	1.27
4	Kuwait	1.14
5	Iceland	1.04

The national economy energy intensity level could be lowered through wide application of energy-saving technologies, on the one hand, and through priority development of small-capacity plants and factories with low energy consumption and high surplus value (the pharmaceutical industry, instrument-making industry, machine-building industry, etc.), on the other. However, extensive introduction of energy-saving technologies is hardly possible in the short-term perspective unless domestic prices for energy resources are brought into conformity with world prices.

FEC Technical Modernization and Priority Development as Compared to the National Economy in General

Now, taking into account the above-stated factors, we shall forecast the electric power industry growth rates for the period until 2020. World experience has shown that gross domestic product (GDP) growth rates directly depend on electricity consumption growth rates. As an illustration, let us have a look at Fig. 1, which shows the dynamics of the said indicators in Turkey[2] over the last 50 years. Similar causalities are also typical of some other countries where there were no economic or political crises. For instance, Table 4 shows energy consumption growth rates and GDP growth rates for several states of the world. From these figures it expressly follows that energy consumption growth rates must surpass GDP growth rates by at least 1-2%.

While planning the development of Uzbekistan's electric power industry for the period until 2020, several scenarios of the country's socio-economic evolution during this period should be taken into consideration. In our opinion, it would be expedient to consider three possible evolution scenarios:

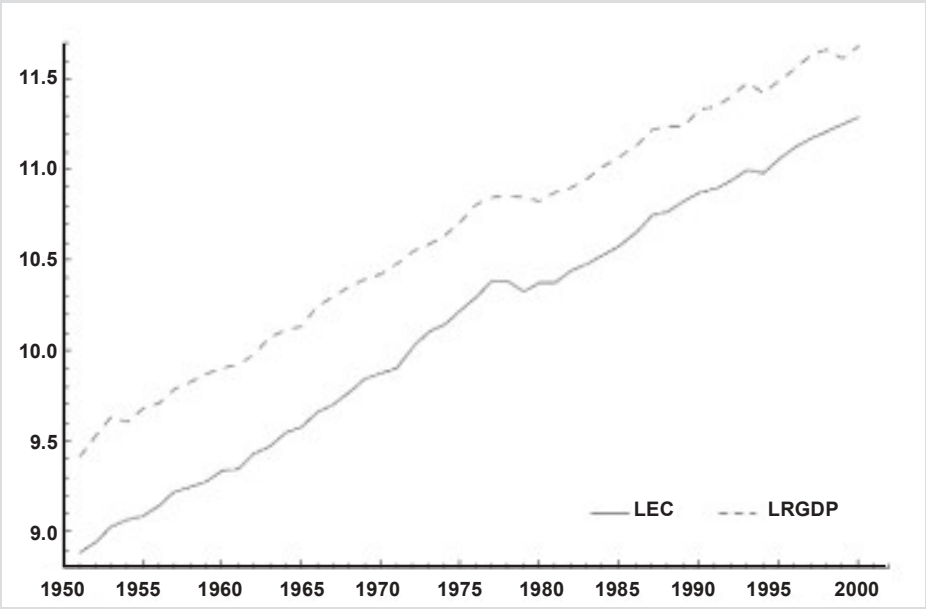
- Scenario A—moderate growth of real GDP by 4% per annum on average;

[2] See: G. Altinay, E. Karagol, "Electricity Consumption and Economic Growth: Evidence from Turkey," *Energy Economics*, Vol. 27, No. 6, 2005, pp. 849-856; *idem*, "Structural Break, Unit Root, and the Causality between Energy Consumption and GDP in Turkey," *Energy Economics*, Vol. 26, No. 6, 2004, pp. 985-994.

- Scenario B—medium growth of real GDP by 6% per annum on average;
- Scenario C—high growth of real GDP by 8% per annum on average.

Figure 1

Causalities between Energy Consumption and GDP Dynamics in Turkey



Note: LEC—Energy Consumption; LRGDP—Real GDP.

Source: G. Altinay, E. Karagol, "Electricity Consumption and Economic Growth: Evidence from Turkey," *Energy Economics*, Vol. 27, No. 6, 2005, pp. 849-856.

Based on the assumption that electricity consumption growth rates must surpass GDP growth rates by 1.5%, we obtain electricity generation growth rates of 5.5%, 7.55%, and 9.55%, respectively, for the three above scenarios during the period under consideration.

Electricity generation dynamics in Uzbekistan for the last 20 years is shown in Table 5 below. The overall installed capacity of the country's power stations amounts to 11,750 MW, with only 8,380 MW being currently enabled. In fact, this table shows that the U.S.S.R. disintegration-related energy sector crisis has never been overcome. According to the available information,[3] by 2010 it is planned to commission 1,748 MW of new capacities and to modernize 905 MW of the old ones with simultaneous retirement of 1,274 MW. Hence, the expected gain will amount to 1,379 MW.

Thus, even if the national economy continues to develop at moderate rates (Scenario A—real GDP average growth of 4% per annum) and its current capacity factor is retained, the overall incre-

[3] See: R. Sharma, L. Brefort, M. Isakov, P. Thomson, *Uzbekistan Energy Sector: Issues, Analysis, and Agenda for Reform*, The World Bank, New York, 2003, 43 pp.

Table 4

Electricity Consumption and GDP Dynamics in Some States of the World

Country	Index	1960	2000	Average annual growth, %	Electricity consumption average annual increase surplus as compared to GDP growth, %
Turkey	Electricity consumption, TWh	2.54	104.52	9.7	4.10
	GDP, $ billion	69.05	420.95	4.6	
Japan	Electricity consumption, TWh	102.70	1,057.33	6.0	1. 0
	GDP, $ billion	790.25	5,680.57	5.0	
Australia	Electricity consumption, TWh	18.76	192.58	6.0	2.3
	GDP, $ billion	104.52	451.61	3.7	
U.S.S.R.	Electricity consumption, TWh			6.9	1.5
	GDP, $ billion			5.4	
France	Electricity consumption, TWh	68.19	441.25	4.8	1.5
	GDP, $ billion	484.74	1,755.62	3.3	
Italy	Electricity consumption, TWh	48.95	301.79	4.7	1.4
	GDP, $ billion	333.65	1,204.87	3.3	
Canada	Electricity consumption, TWh	100.84	521.75	4.2	0.5
	GDP, $ billion	164.11	704.88	3.7	
Germany	Electricity consumption, TWh	115.54	549.21	4.0	1.2
	GDP, $ billion	906.21	2,686.5	2.8	
U.S.	Electricity consumption, TWh				
	GDP, $ billion				

Note: The calculation is based on 1955 and 1990 data, respectively.

Source: E.P. Volkov, V.A. Barinov, A.S. Manevich, *Problemy i perspektivy razvitia elektroenergetiki Rossii,* Energoatomizdat Publishers, Moscow, 2001, 432 pp.

Table 5

Electric Power Generation in the Republic,
billion kWh

Year	1980	1985	1990	1995	2000	2004
Electric Power Generation	33.6	47.9	56.3	47.5	46.8	49.6

Table 6

Required Increase in Generating Capacities in Various Scenarios of National Economy Development,
MW

2004	Development Scenario	2010	2015	2020
8,380	A—5.5% per annum	3,176	6,721	11,355
8,380	B—7.5% per annum	4,550	10,190	18,277
8,380	C—9.5% per annum	6,067	14,355	27,419

ment of newly commissioned capacities will produce 3,176 MW by 2010, which is equal to the total capacity of two power stations like TashGRES. However, even if the plans developed by the UZBEKENERGO State Joint-Stock Company are implemented by that time, the country's generating capacities will increase by only 1,379 MW. In this case, the average annual growth of the capacities will amount to about 2.6%, which is equivalent to real GDP average growth of 1-1.5% per annum. And with the existing population growth of 1.5-1.6% per year, there will be no real GDP per capita growth. In fact, this course of events in the national economy is unlikely to suit anyone in the country.

Now we shall calculate the amount of required capital expenses for generating capacity build-up only. According to international experts, construction of a new power station is estimated at $1 million per 1 MW on average. This means that to secure a 3,176 MW increase, at least $3.176 billion will be required. During the same period, no less than 2,000 MW of the existing capacities should be modernized. Modernization-oriented efforts will presumably cost half of what it would take to construct new capacities. So this means that we need another $1 billion.

Along with the construction of new generating capacities and the modernization of old ones, we also need to transmit the produced capacities to the consumer. It means that certain capital investments will be required to build new backbone high-voltage transmission lines and substations and to modernize the old ones. We also need investments in the regional distribution networks providing electric power supplies to the consumer. In view of prospective growth in electricity capacities, all these capital investments are at any rate estimated at 50% of the cost of the expenses required to ensure growth and retention of the existing capacities, which comes to approximately $2 billion.

In the event that capacity growth is achieved by building power stations fueled by natural gas, we should provide its production increase in a volume sufficient to ensure full loading of these capaci-

ties. According to the data presented by IEA, in 2000, thermal stations fueled by natural gas (they account for 72%) consumed about 12.5 Bcm of blue fuel (i.e. 2.17 Bcm per 1,000 MW of generating capacities). Full loading of the newly commissioned capacities will require an additional $2.17 \times 3.76 = 6.89$ Bcm. Based on the assumption that $200 million must be invested to increase gas production by 1 Bcm, we will receive $1.4 billion. Thus, to ensure a 4% GDP annual increase, we will have to invest 3.176 + 1.0 + 2.0 + 1.4 = $7.576 billion in FEC until 2010. To obtain more accurate figures, we will need to conduct a more detailed study regarding each block of the fuel and energy complex. What is more, it would be appropriate to perform feasibility studies regarding the possible use of such alternative kinds of fuel as coal, atomic energy, or hydro-resources of the neighboring countries—Kyrgyzstan and Tajikistan.

If we consider other desirable scenarios of national economy development for the period until 2020, more substantial figures could be obtained. Disclaiming absolute accuracy of the above calculations (as compared to potential real capital investments), we can expressly define the dramatic challenges the country's fuel and energy complex is currently facing, and to what extent real economic growth of the state depends on the FEC development level. During the years of independence, hardly any power unit of a large power station was put into operation, and the total volume of foreign direct investments as of 1 January 2003 equaled as little as $1.331 billion.[4] It is quite obvious that the required amount of investments to maintain sustainable development of FEC cannot be provided using the country's domestic resources alone. Therefore, when elaborating a new energy policy, it is essential that the above factors should be taken into consideration.

Full Transition from Command and Administrative Management Methods to the Market Relations System

The experience of the industrialized countries of Europe, the U.S., Japan, etc. shows that state ownership retention in the fuel and energy sector of the economy makes it impossible to attract sufficient investments to ensure the development and expansion of this branch (here we are referring to large long-term investments). In this connection, over the last 20 years, many countries have started restructuring their FEC management systems.

Analysis of the existing management mechanisms and control systems in Uzbekistan and foreign countries is a subject of separate research. The limited scope of this article makes it impossible for the author to dwell upon this problem. Nevertheless, there are some basic conclusions that can be made in this respect:

1. Despite the numerous transformations within various public management structures in the fuel and energy sector, the existing public administration system fails to meet their goals and objectives to be able to operate under market conditions. Based on the experience of previous years, it can be said for sure that the present-day administration system is incapable of developing and pursuing an energy sector development program in market economy circumstances. Under these conditions, a government agency, such as the Ministry of Energy and Mineral Resources, should implement the following measures:

[4] See: *World Investment Report 2005*, UNCTAD. New York, 366 pp.

- ensure the formation of a long-term national policy in the given area, develop its strategic and tactical restructuring-related guidelines, work out different laws covering such areas as oil and gas, electric power industry, oil-product market, thermal energy, as well as second-tier legislative acts regulating the activities of power companies and organizations;
- abandon immediate interference in the economic activities of state-owned and private companies operating in the electric power sphere;
- ensure transparency in the activities of the government body itself, including transparency in financial and economic activities of all the energy companies participating in stock market operations;
- provide for the gathering, primary processing, and publication of statistical data at all stages of electricity generation, transmission, distribution, and consumption under standards accepted in industrialized countries, in the European Union in particular;
- reorganize the energy sector and accomplish corporatization and privatization of the business entities operating in the energy sphere;
- maintain constant examination and propagation of foreign experience in order to attract foreign direct investments and create appropriate conditions promoting their attraction into the energy sector;
- develop a well-defined policy aimed at eliminating situations where national economy and population are subsidized at the expense of the fuel and energy complex;
- organize efficient and credible international cooperation with industrialized countries aimed at rapid energy sector restructuring and stimulating energy-saving technologies.
- ensure the use of scientific expertise to elaborate and implement national policy on fuel and energy complex development. Nowadays, scientific potential in this sphere is frequently used to solve local tasks and objectives which cannot have a serious impact on the problems discussed herein.

2. It is highly important that a government regulating body independent of state executive bodies should be established. This government regulating body could be represented, for example, by the National Energy Agency. It could develop energy rate regulation principles and process technical norms and standards regulating energy generation, transmission, distribution, and consumption. This agency would be primarily focused on asserting the interests of energy generators and consumers based on a transparent mechanism providing the development and adoption of statutory acts and its annual progress reports and statements open to the public. Its independence could be provided by arranging for certain deductions to be made by the business entities supervised by this agency. And issues related to its management nominations and dismissals could be handled by the parliament of the Republic. For instance, its management could be nominated for a 5-6 year term with possible extension of its functions for another term.
3. The pressing need to further increase electricity tariffs will lead to aggravation of the problem related to non-payments both by the population and by budgetary organizations. In this connection the government will have to establish social protection mechanisms to be targeted at the population with the lowest incomes. At the same time, the government should develop a program aimed at cutting state budget spending on energy resource consumption. This can be achieved by privatizing a certain number of state-owned infant schools, secondary schools, colleges, high schools, medical institutions so that in the foreseeable future their share can be

brought into conformity with the level existing in many countries with market economies. Another way to reduce these expenses involves regulating and rationing the floor space appropriated to each employee of state budgetary organizations depending on his activity status. The third way to reduce energy consumption-related expenses involves systematic enhancement of the efficiency of energy used in the buildings and facilities of budgetary organizations. In addition to the above-stated measures, respective changes should also be made in the country's criminal code. Such changes should contemplate consumers' criminal responsibility or material liability for non-authorized connection to electric, gas, and other pipeline networks. What is more, the consumers and employees of distribution and sales enterprises should be brought to account for unauthorized changes in indications, for switching off meters, or using bypass line connections.

4. To establish a real energy market in the country, all power stations should be removed from SJSC UZBEKENERGO, and the state-owned stake should be transferred to the State Property Committee. All generating enterprises should enjoy full economic freedom and be free of any direct interference by government bodies. Thus, the state will only possess backbone transmission lines and a uniform dispatch center. The latter will provide equal access conditions for generating enterprises, ensure day-to-day management of the entire power system, and maintain synchronized operations with the power systems of neighboring states. All the regional distribution and sales energy companies should also gain full independence, and large electricity consumers should be able to make contracts directly with the power stations.

5. To ensure a competitive environment in the sphere of petrochemicals and natural gas production and distribution, it would be expedient to set up a couple of vertically integrated companies competing both between themselves and with foreign firms that have expressed their desire to operate in Uzbekistan's oil and gas sector. These companies should be economically independent and they should not be controlled by executive bodies, apart from their founders. The state-owned stake should also belong to the State Property Committee. The country's gas main pipelines should be under the government's control. This will ensure equal and free access of gas companies and consumers to the pipelines. All the regional gas supply enterprises should also have full economic independence, and their activities should not depend on higher-level authorities.

6. To stimulate foreign direct investments in the country's fuel and energy sector, it is necessary (along with other measures) to develop relevant legislative instruments authorizing full sale of companies and control stocks to foreign investors. This practice has allowed Hungary, China, and Kazakhstan to attract significant foreign direct investments into their energy sectors. Another crucial issue for the investors consists of bringing energy tariffs into conformity with a level that would provide full coverage of long-term production costs. In this respect, the most significant are tariffs for products manufactured by oil, gas, and coal-mining companies. Gradual and consistent increase of these tariffs up to the average world level will allow the producers to receive sufficient profits to sophisticate and maintain their extraction technologies, on the one hand, and to increase rent payments to the budget, on the other. Bringing hydrocarbon prices into conformity with the world level prices will undoubtedly increase the appeal of this branch for foreign investments.

7. The most immediate and effective measures should be taken so that reliable measurement and control devices can be applied at all stages related to production, transmission, distribution, and consumption of energy resources. In addition to the above, a legislative amendment should be adopted so that obligatory energy audit of the largest energy consumers can be brought into practice.

Protection of Socially Vulnerable Strata of the Population during FEC Restructuring

During the transition period, it is highly important to prevent a situation where the national economy and population are subsidized by the country's fuel and energy complex. Under these circumstances, the state will have to apply its best efforts to protect the socially vulnerable strata of the population. First of all, these population strata must be defined from legislative point of view in order to arrange their registration, maintain constant monitoring, and outline possible protection mechanisms.

Over the last 10 years, the country's leadership has repeatedly raised the minimum subsistence wage and pension taking the account of the change in prices for goods and services. However, in budgetary institutions and organizations, salaries have been increased by essentially the same amount (about 20%) in relation to the tariff scale. What is more, a rather small group of high-paid employees in the budgetary sphere has the possibility of receiving monthly premiums which tend to exceed the tariff itself. All this has led to significant stratification of a large part of the population with fixed low incomes. At the same time, the increase in prices for consumer goods and public services (in absolute values) was equal for all the inhabitants of the country, which directly promotes the absolute growth of non-payments for electric and thermal energy, hot and cold water, public services, etc.

In connection with the above-said, the country's leadership should establish (on a legislative basis) a subsistence minimum and develop a government program for bringing the minimum wage into conformity with the subsistence level through a priority increase in the incomes of the underpaid part of the population compared with the well-paid part. In addition to this, it is necessary to determine (on a legislative basis) the maximum share of a family's expenses on housing and public services, and to create mechanisms for subsidizing all the expenses of the socially vulnerable part of population exceeding the maximum share, as is done in Russia today.

The measures described above will undoubtedly contribute to solving the problems of non-payments by the population for FEC services.

Reduction of Thermal Contamination of the Environment

In the last century, there was dramatic growth in energy resource consumption: whereas in 1900, the Earth's population used 560 million tons of oil equivalent, in 2000, approximately 10 billion tons were used.[5] The world population has reached 6 billion. According to the latest research, during the last century, the average air temperature near the Earth's surface increased by 0.6°C. According to other researchers, if current trends in energy resource use are retained, in the 21st century global warming of 1.4-5.8°C is expected. The main reason for this is the increase in greenhouse gases in the atmosphere, especially carbonic gas (CO_2), which is generated by fossil fuel combustion.

In view of the catastrophic consequences of the current trends in the use of traditional combustible minerals and thermal contamination of the environment, in December 1997, the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was signed. According to this document, each signatory country shall take adequate measures to reduce greenhouse gas emis-

[5] See: R. Zakhidov, "Energetika stran mira i Uzbekistana v XX veke," *Problemy informatiki i energetiki* (Uzbekistan), Nos. 5-6, 2001, pp. 27-37.

sions and make more efficient use of energy in all the sectors of the national economy in the established volumes and at the stated time. By its decree of 20 August, 1999, Oli Majlis of the Republic of Uzbekistan ratified the Kyoto Protocol.

In this century, Uzbekistan's sustainable social and economic development, as well as of other countries of the world, will depend on its ability to adapt to the rigid restrictions in volumes of fossil fuels to be used. Keeping all the above in mind, the following measures appear to be required: comprehensive study of the energy consumption situation in all the branches of the national economy; constant supervision and tracking of energy consumption levels, study of the impact of national tax and price policies on power engineering and energy consumption long-term development programs; and forecasting the impact of a further rise in the environmental temperature on energy consumption in the country in 20, 30, and 50 years.