

New system of natural resources management

“All the developed countries increase the investments into the alternative and “green” energy technologies. As early as by 2050 its implementation will allow generating up to 50% of all energy consumption”.

“It is evident that the epoch of hydrocarbon economy is gradually coming to its end. The new era, wherein the human activity will be based on not only and not so much on the oil and gas, as on renewable energy sources, comes around”.

The search of alternative forms of energy resources in recent decades has become one of the crucial tasks of many countries governments. At the present times more than 15 mln tons of synthetic petrol and diesel fuel, which is obtained on basis of coal or natural gas, is produced worldwide, the construction projects of the whole series of factories in appropriate field are prepared. Annually the huge amount are spent for the research and development in this area, except that all these events are carried out within the frames of government programs in a range of countries.

This is conditioned by the variety of causes, the most challenging among which are the necessity of energy preparedness maintenance, notable depletion of the world supply of oil and appreciation of energy carriers, as well as the solution of environmental issues. In recent times, the economic aspect becomes increasingly ponderable. In particular, according to the foreign experts' data, the capital expenditures for the oil refineries modernization for the petroleum refinery products quality adjustment to the level of ecological standards are commensurable with the creation of new capacities on alternative fuels production.

Besides, the free market prices and oil products, which are the main engines of technical progress, beast off. The oil extraction in Kazakhstan, to which the deep bedding, high concentration of mercaptans, hydrogen sulfide, sulfur oxides are inherent, requires the solution of numerous problems, associated with the additional charges on extraction, preparation (purifying), ecological problems, etc.

The tendency of permanent ramp up of oil extraction in various regions of the world and the use of its considerable part as energy sources leads to the change of ecological situation almost in all countries, what today becomes the persuasive threat for a humanity.

The petroleum transport fuels are traditional. Its real alternative may serve:

- liquefied petroleum gas (propane-butane);
- liquefied natural gas (methane);
- spirits and oils, extracted from the vegetable feed, including as a result of biochemical processing;
- synthetic liquid fuels out of coal, schist and gas.

The international scientific community has reached a verdict that the carbon dioxide buildup which is sequent of carbon fuel (oil, gas, coal) firing is the primary reason of a greenhouse effect appearance.

In connection with the adoption of State program on the accelerated industrial innovative development of the Republic of Kazakhstan for 2010-2014 the fundamentally new tasks are set before the public investment policy. In the current context, it should provide the capital cross-flow in favor of the non-resource economy sectors development and, in particular, the high-tech and science absorbing industries.

The nonconventional power resources are one of such production. The feasibility of several-sorted nonconventional power sources using exists today in Kazakhstan. Among these are: hydro energy, solar energy, wind power, biomass energy.

The data on the potential of renewable energy resources of Kazakhstan per capita are given in table 1.

Table 1 – The potential of renewable energy resources of Kazakhstan

Water resources	Energy resources		
	Solar	Wind	
The large HPP more than 10 milliwatt	The small HPP, less than 10 milliwatt		
Utilized existing, bln. kWh	7,0	0,4	
Economic potential, bln. kWh	22,5	7,5	250 megawatt/0,82 bln. kWh
Technically feasible potential, bln. kWh	41	21	1000-2000 megawatt/3,3-3,6 bln. kWh
Theoretically feasible potential, bln. kWh	105	65	1300-1800 1820

Note – The table is compiled based on the source: Mussabekov K. The economic feasibility of the wind stations distribution/ The development problems of industrial innovative economy in the region. The materials of international research and training conference. – Shymkent. – 2009. – P.11-15.

The Kazakhstan water resources potential is estimated at 170 bln kWh per year, in the wind power engineering the potential of 1,8 bln. kWh may be implemented, potentially-enable generation of solar energy is estimated at 2,5 bln. kWh per year. The possible reserves of these resources use in Kazakhstan are estimated at 12 bln USD. According to the experts' opinion the resources of non-renewable natural resources in the republic can be depleted during the short period – from 50 years on oil to 85 years –on the natural gas. Up to date, the use of renewable resources in the economy of Kazakhstan composes a mere 0,02%. By 2024, it is planned to boost the level of alternative energy sources use up to 10%.

As distinct from the traditional large-scale hydropower engineering with its apparent disadvantages so-called “small energy” with the objects capacity not exceeding 10 megawatt, is relegated to the promising unconventional technologies of renewable energy receiving. The hydroelectric power plants on headwaters are able in a great measure solve a problem of

diversification of energy supply sources at the growing demand, especially in the distant and hard-to-reach places for the population habitation.

The pilot projects on the use of nonconventional energy types in Kazakhstan are already started. Thus at the end of 2006 the Ministry of energy and mineral resources has suggested that perhaps by 2030 46 wind farms with the total capacity of more than 1 mln kW will be constructed in the republic.

The construction of a pilot wind farm with a capacity of 5 megawatt in the region of Junggar gates- between the arms of Dzungarian Alatau and Tarbagatai, wherein the average daily wind speed composes 15-20 meters per second, is started.

In whole about 11000 wind-power units with a capacity of 100-250 kW is possible to distribute in this region, the generation of one installation per annum will approximately compose 600 thousand kW, and the whole complex – more than 6 bln. kW. It is important to note that the great part of electric power will be generated in the cold season, i.e. when the demand for it grows up. The implementation of this project will require the expenses with an account of worldwide average prices for 1 kW of installed capacity of 1300-1400 USD in the amount of 3850 mln USD. But at the present time primarily for lack of both the financial opportunities and experience in the massive assimilation of wind energy resources the gradual expansion of wind energy capacities is more expedient.

The widespread development of the wind-power stations in the republic as yet refrains by the cheap rates on electric energy, the relative cheapness of coal and a high level of required investments per unit of the end product. Meanwhile, the potential of only wind energy of Kazakhstan is estimated at 1820 bln kWh per year.

The potential of Kazakhstan's wind energy manifold exceeds the present-day electric energy consumption. By experts' estimations, the economically feasible for use potential of wind power at the present time is estimated at more than 3 bln kWh per year. Kazakhstan is a worldwide leader on the quantity of accessible wind energy per capita. Its potential is 30-40 times bigger than the electric power, generated in the country.

Kazakhstan possesses the significant helio resources. The overall annual potential of solar energy within Kazakhstan territory is estimated at 340 bln tons of fuel oil equivalent at the potential level of energy flow at 1 trillion kWh. Thanks to the geographic location of the republic and favorable climatic conditions the solar energy resources are sustainable and allowable to the technical application. The number of solar hours composes 2200-3000 hours per year, and the solar radiation energy is 1300-1800 kW for sq.m. per year, what makes possible the panel design of solar batteries in rural localities, in particular portable systems of photoelectric sources. The technologies on the basis of solar water heaters in certain selected areas, which do not have access to the gas piping, possess the good prospects.

The potentially enable generation on the basis of photoconverters at the solar power stations, the total capacity of 2500 megawatt composes 2,5 bln kWh per year. The existing market in Kazakhstan is capable of acceptance of up to 40 000 small portable batteries on photocells, each with a capacity of 20W (on the basis of a five-year period). Such batteries will provide the demand for electricity for approximately 200000 families of nomadic stockbreeders. The initial cost of the photovoltaic power systems at the present time is too high for the rural population. However, it must be taken into consideration that 1 lumen-hour of photoelectricity costs on 30% less than the costs of petroleum lamps use.

The preferable location areas of solar power stations in Kazakhstan are in the Aral Sea region, Kyzylordinskaya and Shymkentskaya oblasts. Now the solar energy is used basically in rural localities for the heat generation by way of primitive water heaters. The production of solar collecting panels is mastered in the republic (in Shymkent and Almaty). The first in the country combined solar-wind system is built near Bakanas village, the center of Balkhashskiy district of Almatinskaya oblast.

The technologies of a solar energy use in the RK have a promising outlook. Its implementation to the existing electric power system of the country will prevent the growth of production and transportation costs on the conventional fuels, provide the environmentally friendly way of energy generation and will provide the access to energy for the remote regions residents.

The desalination of water by way of solar radiance is one more upcoming trends of a Sun energy use. The relevance of its development in Kazakhstan is conditioned by the reason that in many regions of a country there is a lack of pure water, what significantly makes difficult to use it. But there are reserves of salty water in many of them. The desalination plants as he other solar engineering have a big useful life.

The big opportunities in the proper power supply of agricultural enterprises and savings of fuel and power resources are in the use of agricultural production and vegetal biomass wastes energy. In the agricultural industry, it is possible to accept the plant bypass, unsuitable for use for the intended purpose or which did not find other economic use as the heat sources.

The bioenergetic resources are divided into two categories:

- 1) traditional biomass (basically the timber and straw);
- 2) the new biomass– animal, agricultural industry waste, solid domestic waste and waste water mud.

In the process of biomass processing into the ethanol the by-products are formed, primarily-flushing water and distillation residue. The last one is a serious source of ecologic environment contamination. The technologies permitting in the process of these wastes purification to receive a mineral substance used in chemical industry as well as apply them for the fertilizer production are of interest.

From all existing bioenergetic technologies the most perspective for the Republic of Kazakhstan are the technologies, based on the anaerobic fermentation of organic wastes of cattle breeding and municipal household wastes with subsequent biogas transformation into the electricity and heat. The biogas is a fuel with the calorific capacity of 20-25 mJ/m³, consisting of methane (30-75%) and carbon dioxide, originates in consequence of methane digestion of various organic wastes.

The nonconventional kinds of energy may be widely used in Kazakhstan upon the condition of detailed legislation presence. At that, the main objective of the same wind power plant project for 5 megawatt will become the provision of the legal framework for reforms in this area. Taking into account the fact that the conventional fuels are yet cheaper at value, in the context of ecology it is necessary to create the most favorable conditions for nonconventional kinds of energy.

For the incitement of alternative energetics development the following measures can be recommended:

- redistribute the taxes, by which the enterprises are imposed, inflicting the damage to the environment, redirect to the support of renewable energy development;
- establish the tax system, declining temporally, for the generation of alternative energy; introduce the preferential tax treatment and customs rates for the equipment, associated with the creation and use of alternative energy sources;
- elaborate the strategic programs of a top-priority implementation of alternative energy sources;
- bring in the practice of low percent credits arrangement for the acquisition by the population of equipment for the alternative energy sources;
- establish the amount of public reimbursement for the construction costs on facilities of alternative energetics in the amount of 30% of capital investment.

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