

**In the framework of the Project
"NGO cooperation on energy and climate change in the
REPUBLIC OF KAZAKHSTAN"**

**“The Results of a Critical Analysis of the Current Situation with the Use of Renewable
Energy Sources in the Republic of Kazakhstan”**

KEY FINDINGS

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ОО «СОЦИАЛЬНО-ЭКОЛОГИЧЕСКИЙ ФОНД»

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Key Findings

As a result of current situation on the energy issues in Republic of Kazakhstan, weaknesses in the use of renewable energy are identified because:

- demand for renewable energy market in Kazakhstan remains low due to the supply of equipment from abroad through multiple intermediaries, its transport over long distances (requiring up to 30% of the factory equipment costs) and payment of customs duties (from 12.5 to 20%), which makes the selling price of the equipment incredibly high, and it is in the absence of the own repair facilities to perform warranty and post-warranty services on the use of renewable energy sources in the fields of the low level of population's ability to pay due to the deficit of working places and high level of unemployment;

- former factory areas, which could produce equipment for the use of RES, are idle due to lack of orders, depriving people of working places;

- domestic production of high-quality hydraulic turbines with a unit capacity of 5 mW (functioning also in a pump regime), and hydraulic valves for the construction of small HESs and Pumped Storage Power Plants is not organized;

- domestic production of high-quality cement for the foundations of wind turbines, diversion canals, dams, and buildings of small hydroelectric plants and Pumped Storage Power Plants is not organized;

- own production of hydraulic equipment (turbines and generators), and hydraulic valves for small hydropower plants in Kazakhstan is absent;

- need to recreate the color and black metallurgical industry in the Republic of Kazakhstan for the smelting of high-alloyed and special steels basing on country's available ore and coal (chark) deposits for the subsequent production of high-quality bearings, cold-rolled electrical steel, setting up the production of permanent magnets with high coercive force (for release of synchronical and asynchronical electric motors and generators of various sizes with unwinding rotor) and smelting copper and aluminum from local raw materials and production of isolated and bare wires and cables from stitched polypropylene;

- cable products of local manufacturers is produced using outdated techniques and technologies that are not capable of producing advanced insulated wires and cables with insulation from stitched polypropylene;

- absence of the production of electrical insulators and other products for the construction of high-voltage electrical transmission lines. Linear valves and insulators for ETLs are imported from Russia, and transformers are imported from Russia and Ukraine. There is a low-powered Kentau transformer plant in the RK, which produces power transformers for substations of 110 kW;

- production of electrical equipment and electrical products for substations in Kazakhstan is not established yet. Electrical equipment is also imported from abroad;

- there is no modern production of lightweight fiberglass r/c pillars for transmission lines with voltage of 35 - 110 - 220 - 500 and 1150 kW;

- production of domestic switchgear DCs and reliable and energy-efficient LED lamps for indoor lighting at 12 V (24 V and 48 V DC) and 220 V AC is not adjusted ;

- there is a shortage of highly trained and qualified technical specialists and managers for the construction, installation and subsequent maintenance of the equipment in the field of use of RES;

- there are no updated inventory of solar, hydro, wind, thermal, and other resources in the states of the Republic of Kazakhstan (although in Kazakhstan construction of wind atlas on the modern level was held in 2009 - but with inadequate resolution of 9 * 9 km instead of the required 3 * 3 km);
- there is no legal framework to encourage the widespread use of RES in the Republic of Kazakhstan;
- guaranteed supply of electricity from renewable energy sources (taking into consideration total dependence of wind turbines on natural factors) is implemented due to the capability of its accumulation by chemical means – other means are still required, more effective methods and devices on the accumulation of generated electric energy (for example, ultracapacitors);
- relatively high cost of electricity produced by using wind turbines in comparison with remaining cheap electric energy generated by valid thermal (burning brown coal deposits of Ekibastuz) and powerful hydraulic power stations;
- there has not been any governmental funding and conducting own research and development activities on renewable energy sources over the last 20 years;
- own power engineering is absent in the country;
- most of the household electrical instruments and industrial mechanisms are powered by an AC voltage of 220 V with frequency of 50 Hz, but in common usage among the villagers there are energy-saving lamps, freezers, televisions, radios, players, etc., powered by 12 V DC. It forces them to use the inverters to convert DC to AC for powering such loads. In times of mass production of devices (DC) and switching equipment there is no need for an inverter, which would reduce the conversion loss of energy by an average of 12% -15;
- economic policy focused on extensive exploitation of natural resources;
- absence of environmental policy in the Republic of Kazakhstan for the duration of their independence;
- the destruction of the state apparatus under the pretext of decentralization of power;
- violation of the principle of separation of powers, which generates legal, administrative and economic chaos in all spheres of society;
- high levels of corruption in all public organs, in particular, in those responsible for decision-making;
- sharp increase in the influence of clans (kins) in the socio-political life of the society, which paralyzes state activities;
- weakening of environmental laws and its unsatisfactory implementation by all branches of government and commercial organizations;
- unsatisfactory implementation of legislation to keep green development;
- actual absence of market mechanisms to encourage energy conservation, development and introduction of advanced environmental technologies based on the use of renewable energy sources;
- high degree of monopolization of the economy;
- neglect and failure to comply with the international commitments made by countries in the field of environmental protection;
- legislative framework in Kazakhstan does not refer devices of kilowatt class, which are used to generate electricity and heat of renewable energy, to renewable sources, and thus serves as one of the main institutional barriers.
- sharp shortage of financing renewable energy sources;

- absence of appropriate infrastructure and technical expertise in the Republic of Kazakhstan to implement renewable energy projects;
- for Kazakhstan the realization of projects on the use of RES mainly in rural areas is the most important, but people in those areas lack the education (technical) ability to use modern technology;
- respondents from RK require the use of RES to benefit ordinary people with greater return rather than to accept the help from Government, which in turn helps only big companies in their countries;
- some NGOs in countries such as Kazakhstan and Uzbekistan, are against of construction of large hydroelectric power stations as a result of the creation of water shortage in the irrigation periods and arising problems in the agricultural sector;
- non-governmental organizations of Tajikistan and Kyrgyzstan, located in the upper reaches of rivers, claim that the construction of small hydro power plants would create a surplus in electricity and would serve as an excellent source of alternative energy. The effectiveness of small hydropower plants can be achieved by the construction of a power plant next to an entity (in Kazakhstan mainly agricultural entities);
- respondents of the Republic of Kazakhstan would like to have the increase in World Bank's funding and loans share without intermediaries specially for small local projects that help people survive in rural areas. The bank must also pursue provision of technical assistance in the supply of new technology used in renewable energy projects. In this case, various consultations and expertise provided by the World Bank would be preferred. All respondents with one accord agree that the work of the World Bank in the next decade should focus on primary investment in projects with the use of renewable energy sources and the establishment of corresponding national infrastructures for the production of such plants;
- the problem is the presence of low tariffs for centrally generated electricity at power stations of the Republic of Kazakhstan (cheap hydropower in Tajikistan and Kyrgyzstan, Turkmenistan and Uzbekistan on account of large gas reserves, and in Kazakhstan on account of the presence of huge reserves of cheap brown coal mined by open-pit and burned with huge emissions of hazardous substances and greenhouse gases).

Analysis of foreign legal acts in the field of energy conservation

Looking through recent legislation in the field of energy conservation, excluding already obsolete law on energy efficiency of 1996, **we can conclude that regional laws were written by the same people, since the same provisions pass from one section to another.**

Below is the foreign experience and features of lawmaking in terms of energy conservation, compared to the development and implementation process of parallel Russian laws.

We associate Russian laws and similar to them Kazakhstani laws with the laws of energy conservation in other countries. For example, let's consider the 2005 “Energy” law of the United States of America. This is an extensive document, which occupies 654 pages and covers almost the entire sphere. The law begins with energy conservation. We can identify the distinctive features (common to all foreign laws) from our parallel laws.

Firstly, the laws of direct action - they **do not require the adoption of any additional laws.** But Russian laws require even writing a lot of other additional concepts, resolutions of the Government and the like.

Second, foreign law indicates the specific executor. As a rule, the US Minister of Energy, or federal authorities, are responsible for the law implementation.

The third feature is the allocation of funds for its implementation. The amount and which programs are covered over what period of time are concretely specified.

And the fourth is the full report to the legislature showing how objectives are being carried out.

Let us consider an example of American energy law. The first section is devoted to energy efficiency and includes a number of sub-sections, which are the following programs (only selected moments are considered):

- measures on energy and water conservation in the Congress building (noting that the program began exactly from the Congress building). It is necessary to ensure the efficient use of fuel and energy resources in buildings where Congressmen and other lawmakers work. And the architect (in Russia - chief constructor) has to report to them on how to energy resources are being used in Congress building. And every 5 years he should conduct an appropriate audit, evaluate the costs and report them. In Russia and Kazakhstan there is no such thing;

- purchase of energy-efficient products. In the U.S. a whole system of the purchase of energy-efficient products, labeling, creating catalogs of energy efficient products, etc is developed. In addition, in the U.S. there is so-called "Energy Star" program. The authorities oblige the municipal and local institutions to purchase only goods with "Energy Star" sign. If someone does not buy the product with this label, he/she must provide an explanation of the reason for the negative attitude to the goods in this category. In Russia and RK this is not the case;

- contracts for energy conservation. Minister establishes contracts for energy conservation. It has to be saved annually about 2.5% of the fuel and energy resources. If the savings are achieved within the specified period of time (according to law it is 2007-2016 years), **the person/entity, who obtained it, is entitled to receive the subsidies and support at the federal level;**

- rationing. The process of rationing of buildings in the United States is on the responsibility of the American Engineers Association of Heating, Refrigerating and Air Conditioning - ASHRAE. In Russia there is such an organization - OP "AVOK", and in Kazakhstan it is absent. Rules (standards) ASHRAE are basic and laid in the legal framework of the United States of America. These standards are of voluntary use, but rejecting them when designing indirectly points to the specialists' low qualification. A similar situation exists in the UK and Germany - that is, it is self-regulatory organizations that are engaged in this business and are responsible for effectiveness;

- voluntary commitment to reduce energy capacity of industry. When there is a mutual interest of the consumer and producer in the saving of fuel and energy resources, it is reflected in the legal framework; wherein there is no protectionist lobbying legislative provisions;

- transition to summertime. In the U.S. transition to summertime is a must, and U.S. Secretary of Energy is required to determine the economic impact and benefits of the transition to summertime, and report it to Congress.

In Russia transition to summertime is carried out, but no one determines its effectiveness.

In the RK this step was refused.

Perhaps here Mosenergo plays a decisive role. On the last “Energy of major cities” symposium it was said about the offset of starting and ending times of work in order to maximally mitigate the electrical load schedule. The mayor of Moscow Yuri Luzhkov agrees with this decision. Other countries already have such experience: in Germany it is concluded

that it is beneficial for reducing the time spent by employees in traffic jams start to start working very early and finish, for example, at 2 p.m. What prevents us to do this? In Moscow load peak of 2000 MW usually happens at 6-8 p.m. If we start to work at a different time, there will be no traffic jam and crowding in the subway. But in Russian these research are not used;

- training program of population in the energy sector. \$ 500 thousand were allocated to the U.S. Secretary of Energy just for writing these programs, their preparation, etc. The public should be informed about energy, energy efficiency, renewable energy sources and the problems associated with the environment. In Russia and Kazakhstan there is no such program;

- the study of energy-efficient enterprises, energy and gas supply. There is a special program in which the experience of enterprises that have achieved the best results in this matter, is promoted: a special books and booklets to inform the general public are published;

- repair of buildings (this issue is being actively discussed in Russia - as well as in the RK). The legislators of the U.S. Congress allocated for the pressurization of buildings (heat loss reduce on account of uncontrolled infiltration), the following amounts (municipal funds): \$ 600 million for 2007, \$ 700 million for 2008. In Moscow repairs of buildings is going to be held.

If we leave everything the same, and the focus will be on how to paint porches, change light bulbs or something else, then the building will remain "leaky" and will be using heat on account of heating devices, while decrease in temperature causes sharp increase in power consumption. There should be a all-inclusive approach to this problem: it is necessary to check the state of buildings, see what heat losses or where the system is adjusted incorrectly and achieve the minimum cost of electricity for heating these buildings - to conduct energy audits;

- report of noncompliance on implementation time of new or revised standards on energy efficiency. This is due to ASHRAE in the efficiency of use of this or that document;

- separate section in the law of the U.S. Energy sector is dedicated to campaigning. Today, the streets of the Russian Federation and the Republic of Kazakhstan are covered with posters, where it says that we need to save energy, and energy saving and LED bulbs, and heating device are shown.

Let us note the difference in approaches – Russian, Kazakhstani and foreign. In Moscow many people saw that poster says that using energy-saving light bulbs saves certain percentage of energy and increases the lifetime of the bulb. It is said abroad that within a month the consumer saves about \$ 4 and contributes to the improvement of the environment by using energy-saving light bulb. Influence is, ultimately, is made on the mind through money – be it ruble or tenge, but not the abstract kilowatt-hours or Watts. These bulbs are bought by women for whom all these kilowatts thing is not very clear. We need to make our visual campaign so that it was not seen in physical units, but in particular bank notes for everyone felt the savings he will get from it.

Visual campaign that we see on the radiators is not admissible as well. It shows that we have to buy those electric heating devices, but at the same time increase the load on the power grid? And what saving heating devices should we use?

- in the legal framework the education of children, environment, and economy are paid much attention. They are entirely interconnected processes. And when we speak about saving energy resources, first we say is about environment;

- any standards, for example, ASHRAE, must undergo energy audits. The issue of auditing is treated very seriously. It is not easy for a document to pass. There must be energetic examination which confirms that this product or standard will be directed to reduce the costs. In

addition, the specified time, when it should be revised to ensure that all new items have been reflected in the updated documentation, is indicated.

There are a lot of interesting examples of the laws in different countries. For example, in the UK the responsibility of supplying organizations for poor power supply is affirmed in the legal framework. In Kazakhstan this is not in sight

In Russia and Kazakhstan for the implementation of real, but not declared and on-paper, energy conservation programs power engineers, who produce energy power, consumers and the administration of the cities need to conduct a serious analysis and identify conditions of motivation under which it would be beneficial for all to be engaged in energy conservation activities, which are needed to be affirmed in the legal framework on the federal level, having developed in advance each position, taking into account the legislative experience of the countries in which these laws are working well.

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Appendix

Comparative data on RES, small hydro / thermal power plants and pumped storage

Name	Measure unit	Dzungarian Gates	Shelek Corridor	Pumped Storage/ Hydro Power plants	Coal Power Plant
The unit cost of the installed capacity of the power station	\$/kW	1 100	1 100	1 000 – 1 500	1 200
The annual production capacity of 1 kW electric	kW*h	4 400	3 200	6 000	6 000
The construction period	years	1 – 2	2 - 3	3	7 - 9
The repayment term for bank interest rate of 10% and an internal rate of return	Years	10	10	10	10
Unit operating costs	Cent/kW*h	0,36	0,36	0,35 - 5	1,5
The cost of electricity produced at the tire plant	Cent/kW*h	4	5	3,5 - 5	4,5
carbon credit	Cent/kW*h	1	1	1	-

Hydropower potential

Kind of RES	Hydropower Plants	Small Hydropower Plants	Wind Power Plants
Existing capacity, billion kW*h	170	10,7	18 656,5
Economic potential, billion kW*h	23,5	6,3	3 344
Input capacity of the Program of development of the energy sector, mW	428	600	500

“Social-Ecological Fund” Non-Governmental Fund

Annual output of electric energy, billion kW*h	1,5	2,7	1,7
Required investment, U.S. \$ million	740	800 - 900	500
Unit cost in \$/kW of installed capacity	1 700	1 000 – 1 500	1 100 - 1 200
Reduction emissions of pollutants intp atmosphere, thousand tons	22	40	25
Reduction of greenhouse gas emissions, million tonnes of CO 2	1,5	2,7	1,7