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Industry Report

WATER MANAGEMENT IN KAZAKHSTAN

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WATER MANAGEMENT IN KAZAKHSTAN

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Contents

1. Foreword

This analytical report gives a detailed assessment of the water resources state in the Republic of Kazakhstan, describes the state policy in the sphere of water resources and water use, and provides recommendations on the possible business spheres for Swiss companies.

This report will be interesting to companies working in the sphere of construction and construction consulting for modernization of hydrotechnical facilities and urban water supply and sewerage systems, companies dealing with ecological purification of rivers, water reservoirs and waste water, having water conversion technologies, and working in the sphere of equipment manufacturing for the systems of individual and main water lines, pumping equipment, water filtration units, metering devices, and others.

This report was prepared by the Trade Point of the Swiss Embassy in Kazakhstan together with an industry expert, economic geographer Mr. Marat Shibutov from Almaty/Kazakhstan.

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Mr. Marat Shibutov was born on January 14, 1977 in Almaty, Kazakhstan. In 1998 he completed the Bachelor's programme of the Geography Department at Kazakh State National University named after Al-Farabi. In 2000 he completed the Master's degree programme of the Geography Department at KazSNU. 2001 to 2004 he worked as a project manager on elaboration of ecological projects of Kazecology Republic Scientific-Production and Information Centre (Almaty). 2004 to 2012 he worked as a head of the industrial facility safety evaluation department at Kazakh Agency of Applied Ecology CJSC (www.kape.kz). Since 2006 he is a Member of the Near-Border Cooperation Association (Russia), Representative in Kazakhstan; since 2012 – Leading Expert at Centre of Military and Strategic Research JSC. In November 2016 he was elected as a Chairman of the Board of Guardians of „Transparency Kazakhstan" Civic Foundation.

Besides, Mr. Shibutov is a Member of the Public Council at Astana EXPO-2017 National Company, Joint-Stick Company, and Public Council of the largest megalopolis of the country Almaty.
He is an author of many educational books and methods for ecology, environmental safety and politics, ethnical policy and military geography, one of the co-authors of the Synergetic Atlas of Kazakhstan.

2. Executive Summary

2.1. CURRENT SITUATION WITH WATER RESOURCES

Before getting to the water management in Kazakhstan, the current state of water resources in the country should be characterized.

2.1.1. General Situation

Total estimated fresh water resources make up 524 cubic kilometers in average, including:

- 80 cubic kilometers falling at glaciers,
- 190 cubic kilometers concentrated in lakes,
- river resources containing 100.58 cubic kilometers, of which 55.94 cubic kilometers (55.6 %) are generated in the territory of the Republic and remaining 44.64 cubic kilometers (44.4%) are generated outside.

Groundwater resources make up 15.6 km3, including:

- utility and drinking water supply – 5.6;
- utility and drinking water supply, technical and industrial water supply – 0.8;
- utility and drinking water supply together with irrigation of lands – 0.08;
- utility and drinking water supply, technical and industrial water supply, irrigation of lands – 0.006.

There are about 39 thousand rivers and temporary streams in the Republic, among them over 7 thousand are more than 10 km long. Most of the rivers in Kazakhstan belong to the internal closed drainage basins of the Caspian and Aral Seas and Balkhash, Alakol and Tengiz Lakes. Only Irtysh relates to the Arctic Ocean basin. According to the Water Law of the Republic of Kazakhstan water bodies of special state significance are the Caspian Sea, Balkhash, Zaisan, and Alakol Lakes, and Irtysh River. In total Kazakhstan counts over 48 thousand lakes with the total water surface area 4500 km² and capacity about 190 km m³/s. Most of the lakes are located in the forest-steppe zone and northern part of the steppe zone. As for the water exchange conditions undrained lakes prevail in the Republic.

The following problems should be emphasized in the water management:

- most efforts on deficit prevention are mainly aimed at the infrastructure development, and not at the water demand reduction;
- low efficiency of water resources utilization (performance) in Kazakhstan as compared to the other states: the national economy requires three times more water per dollar of the Gross Domestic Product (the “GDP”) than in Russia or USA, and six times more than in Australia;
- existing tariffication system and approved tariffs, especially in the agriculture, do not cover the required operational costs and depreciation charges;
- insufficient water saving stimulation in all sectors, especially in the agriculture, where losses reach 66%;
- scarce investments in the infrastructure both in construction of new facilities to provide water access and in maintenance of the existing infrastructure facilities;
- severe wear of the whole water management infrastructure;
- uptrend in the recent years of material damage from the adverse water effect as a result of high waters, floods, change of the water body banks, territory flooding with groundwater, swamping and land salinification, and water erosion;
- lack of the complete governmental record-keeping of water facilities and lack of the common information database of water bodies (state water cadastre) to provide access thereto to all interested persons.

2.1.2. Stream Flow Situation

Since the main water source in Kazakhstan is rivers, they deserve special attention.
Today the territory of the country is divided into 11 river basins, 8 of which are major basins and 3 are minor basins (flow size difference):

2.1.2.1. Main Basins

1. Aral-Syr-Darya Basin. The main artery is the Syr-Darya. The Syr-Darya River regime is regulated by the Shardara reservoir, Koksarai counter-regulator, and a number of other smaller hydrosystems. The mean long-term flow is 17 900 million cubic meters per annum. The river sources and its upstream are in the territory of Kyrgyzstan and Uzbekistan, and it always depends on flashes from their reservoirs. A problem is long-term contamination of bottom deposits with pesticides.
2. Balkhash-Alakol Basin. The main artery is the Ili, the most important rivers are the Karatal, Aksu, Lepsy, Ayaguz, Bakanas, and others. As for the basin assignment the territory under review is divided into two natural basins – the Balkhash lake basin (Ili) and Alakol lakes basin. Over 90% of all rivers relate to the Balkhash Lake basin, others to the basin of the Alakol group of lakes. The mean long-term flow is 27 850 million cubic meters per annum. The Ili River has upper reaches in the People's Republic of China. There is an ongoing issue of water supply intake on the Chinese side. Also, there is the Kapshagai reservoir on the Ili River.
3. Irtysh Basin. The central point in the hydrograpbic system of East-Kazakhstan and Pavlodar Regions is the transboundary Irtysh River, a water body of special state significance. The river flow is regulated by the reservoir cascade – Bukhtarma (design capacity 49.6 km^3), Ust-Kamenogorsk (0.66 km^3) and Shulba (2.39 km^3). The mean long-term flow is 33 500 million cubic meters per annum. The Irtysh begins in China, and then, passing Kazakhstan, it goes to Russia. Thus, Kazakhstan has two types of disputes here – with China because they take a lot of water to the Black Irtysh-Karamai canal and with Russia because Kazakhstan collects too much water in its reservoirs.
4. Ishim Basin. The main artery is the Ishim, its regime is regulated by 4 reservoirs: Ishim, Astana (Vyacheslavskoye), Petropavlovsk, and Sergeevskoye. The mean long-term flow is 2 230 million cubic meters per annum. Ishim downstream is flush in the territory of the Russian Federation.
5. Nura-Sarysu Basin. The base streams are the Nura and Sarysu. The basin rivers' regime is regulated by 4 reservoirs: Samarkand, Sherubainura, Karakengir and Fyodorovskoye. The mean long-term flow is 1 240 million cubic meters per annum.
6. Tobol-Torgai Basin. The base streams of the basin are the Tobyl, Torgai, and Irgiz. The basin rivers are mainly regulated by the Upper-Tobol and Karatomar reservoirs. The mean long-term flow is 2 000 million cubic meters per annum. The Tobol downstream is flush in the Russian Federation.
7. Ural-Caspian Basin. The main basin artery is the Ural, as well as the Emba, Sagiz and Uil. The mean long-term flow is 10 870 million cubic meters per annum. The greater part of the Ural and Uil flow comes from the Russian Federation.
8. Shu-Talas Basin. The main rivers are the Shu, Talas, and Assa. The mean long-term flow is 4 093 million cubic meters per annum. The greater part of surface water resources of the Shu and Talas Rivers basins is concentrated in the territory of Kyrgyz Republic.

2.1.2.2. Minor Basins

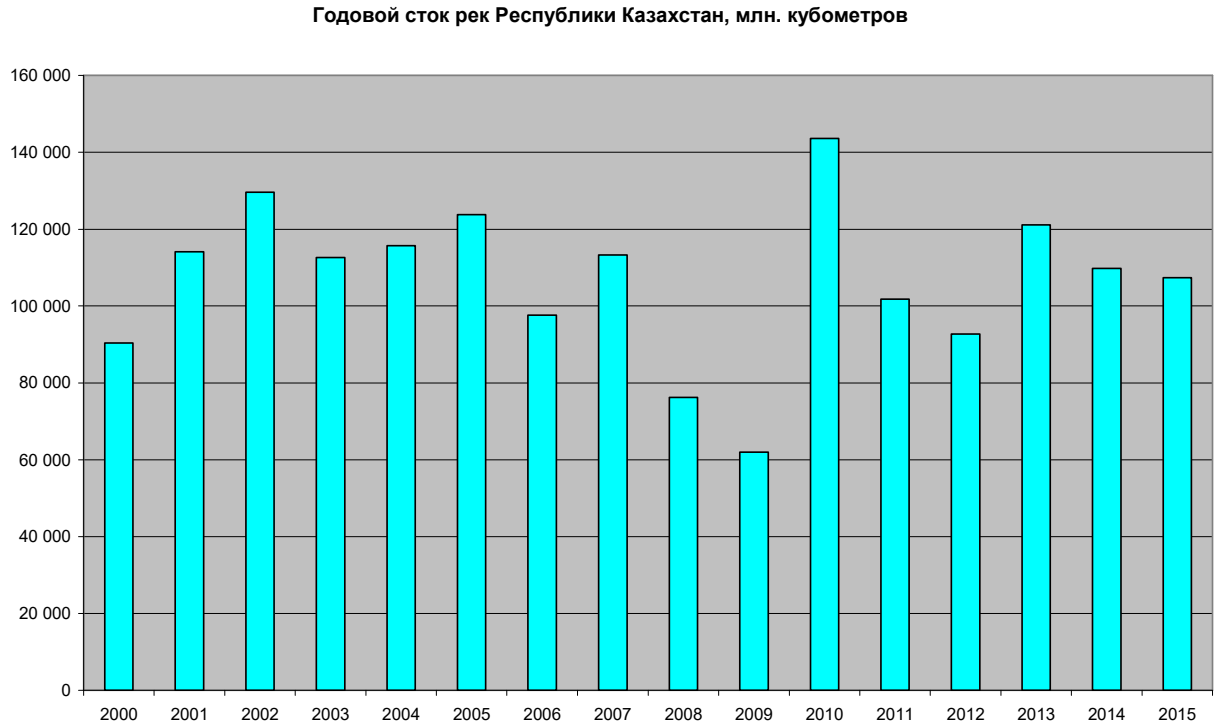
1. Irtysh-Ishim interstream area. The mean long-term flow is 350 million cubic meters per annum
2. River basin of the northern slope of Karatau range. The mean long-term flow is 140 million cubic meters per annum.
3. Ural right bank basin (Big and Small Uzen, Saratov Canal and others). The mean long-term flow is 350 million cubic meters per annum.

Flow fluctuations should be pointed out – they are quite wide and can have two-fold difference from year to year. It is connected with the specificity of Kazakhstan rivers – most of them belong to the so called Kazakhstan type characterized by the following features:

- Mainly snowmelt feeding – almost 80-90% of the flow, notably from the flatlands
- Most annual flow is during the high-water season in spring – about 80%
- In summer and autumn the consumption is very low, the river can even dry up, and in winter it gets frozen to the bottom.

Therefore it is quite difficult to predict the stream flow volume, which will be in the territory of the country – it all depends on the year cycles. Currently, it is a high-water period in Kazakhstan, at this it looks like a general trend to flow increase.

Annual River Flow in the Republic of Kazakhstan, in Mln Cubic Meters



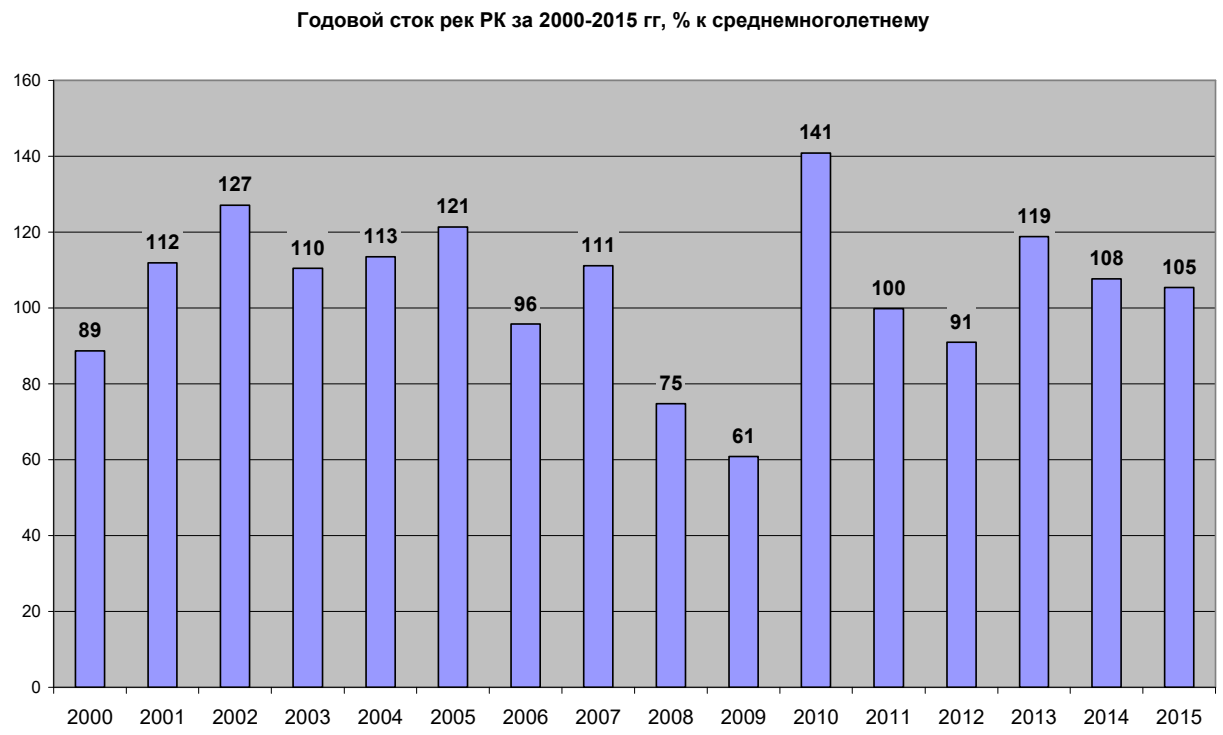
This is evidenced by distribution of the flow from the country and that coming from the other countries. General dependence on other countries is going down.

Table 1.2.1.: River Flow Resources in Kazakhstan, Million Cubic Meters

		River flow generating in rk		River flow coming from neighbouring states	
YEAR	TOTAL	VOLUME	%	VOLUME	%
2010	143 600	77 200	53.8	66 400	46.2
2011	101 800	57 300	56.3	44 500	43.7
2012	92 700	49 200	53.1	43 500	46.9
2013	121 100	75 000	61.9	46 100	38.1
2014	109 800	63 500	57.8	46 300	42.2
2015	107 400	67 700	63.0	39 700	37.0

The graph below shows the annual flow relation to the mean long-term flow equal to 100.5 cubic kilometres per annum.

Annual River Flow in RK, 2000 - 2015, % to the Mean Long-Term Flow



2.2. MYTHS AND REAL WATER SITUATION

While working in the water management sphere in Kazakhstan, it is necessary to keep in mind the fact that apart from the real situation, there is an alternative one consisting of myths. These myths are quite longstanding, being constantly discussed in the Mass Media and public sites, however, they have nothing to do with the reality and will never be materialized. Businesses should avoid being involved in such ideas – they will take time and money, only.

2.2.1. Need for Canals

In the Soviet times there was a very popular project on water transfer from the Ob river in Siberia to South Kazakhstan area, namely to the Aral Sea, to expand the areas of irrigated cropping. In 2011 plans on development of canals from the Irtysh to Astana and South Kazakhstan appeared.

Weaknesses of the above projects:

1. The necessity to lay canals uphill, either in stony or in brackish soils, which is increasing the cost significantly.
2. An unlined canal will lose over 40% of water and contribute to salination of dozens of kilometres of the soil, and a concrete one will cost a lot.
3. There is no real need for water because of the high-water years. Besides, huge losses could be reduced, and less water demanding crops could be used.
4. Another problem is the issue of the Irtysh water apportioning – Russia will have a hostile position.

Thus, there is no need for canals right now.

2.2.2. Transboundary Rivers

Table 1.2.1. shows what part of the flow is received by Kazakhstan from the rivers heading from outside. As we can see this share and total volume of the flow are decreasing – therefore the problem of transboundary rivers is reducing.

Although the media and expert attention is paid to the large rivers flush from China – the Irtysh and Ili - this problem is not that big. The thing is that at the moment Kazakhstan has political and economic leverage over China – gas and uranium supplies, transit projects, which make China more cooperative.

The issue of the Ural, where Russia has built several reservoirs, is more topical. Besides that it is one of the few sources of fresh water for the Western Kazakhstan, it is the only place for the sturgeons spawning.

Also, there are problems with the Syr-Darya, Shu and Talas flush from Kyrgyzstan. It is a problem with annual water apportioning due to the fault of Kyrgyzstan, which often does not observe agreements.

2.2.3. Available Water Supply in Different Regions

Available water supply in Kazakhstan varies significantly. Thus, 34.5% of all water resources fall at the eastern region (East-Kazakhstan and Pavlodar Regions), north – 4.2 % (Kostanai, North-Kazakhstan, and Akmola Regions), central (Karaganda Region) – 2.6 %, south-east (Almaty Region) – 24.1 %, south (Zhambyl, South-Kazakhstan, Kyzylorda Region) – 21.2 %, west (West-Kazakhstan, Atyrau, Aktobe, and Mangystau Regions) – 13.4 %.

In other words, although many of them say that there is a water deficit in South Kazakhstan, but in fact it means that there is not enough water to grow such water demanding crops as rice and cotton, there is enough water for all other purposes. The real water deficit, including fresh water, is observed in the northern and central regions. The reasons are as mentioned below:

- Small volume of river flows mainly falling at the spring floods
- Small quantity of fresh groundwater – mostly saline water and salt brines prevail
- Small quantity of precipitation

Therefore, in these regions water is consumed from the main pipelines (fed from rivers), Irtysh-Karaganda canals, small reservoirs with earth dams, and from the tanks brought. It results in bad quality and problems with volume. Also, the risk of reservoir dams failure should be noted. That is why there will be high investments in water management infrastructure in these regions.

2.2.4. Major Water Consumers

Mainly water is used from the surface sources – approximately 96% from surface and 4% from underground. The losses make up about 10% of the water used.

However, volumes of the recycled clean water are growing with a weak dynamics – water consumers are not really interested in creation of the new treatment systems.

Table 2.4.1. Core Indicators Characterizing Water Resources Conservation and Use million cubic meters per annum

	2011	2012	2013	2014	2015
Water abstraction from natural water sources – total	21 948	21 389	22 530	23 266	22 852
including: from underground levels	1 137	1 133	1 075	1 051	1 056
Water losses at transportation	2 716	2 986	2 467	2 854	2 490
Water consumption (water use) – total	19 232	18 403	20 063	20 411	20 352
including: for production needs	5 173	5 240	5 477	5 592	5 385
Volume of recycling and successive water use	7 657	8 308	8 355	8 415	8 620
Percentage of reused and recycling water in total volume of water used	40	45	42	42	42
Discharge volume of water treated to standard quality	259	247	242	271	227
Discharge volume of polluted effluents (untreated and after insufficient treatment)	215	190	174	153	197
including: untreated	171	154	136	152	131

Bulk of the water consumed – approximately 70% - is used for agriculture, about 20% is used for the industry, 4% for the domestic, household and practical needs, and the rest is used for the other branches of industry. It should be noted that there is a problem with introduction of the water saving technologies in agriculture.

Table 2.4.2. Freshwater Abstraction

million cubic meters per annum

	2011	2012	2013	2014	2015
Total volume of abstracted canal fresh water	21 948	21 389	22 530	23 266	22 852
abstraction by:					
water supply industry	946	884	884	860	840
farming, forestry and fishery	14 770	14 688	15 069	14 887	15 522
industrial production, except water supply	4 380	4 164	4 443	5 638	5 410
for other purposes of economic activities	1 852	1 653	2 134	1 881	1 080
including:					
volume of abstracted surface fresh water	*20 811*	*20 256*	*21 455*	*22 214*	*20 606*
abstraction by:					
water supply industry	496	458	437	442	444
farming, forestry and fishery	14 532	14 464	14 847	14 977	15 278
industrial production, except water supply	4 109	3 910	4 199	4 291	4 089
for other purposes of economic activities	1 674	1 424	1 972	2 504	795
volume of abstracted ground fresh water	*1 137*	*1 133*	*1 075*	*1 052*	*1 056*
abstraction by:					
water supply industry	450	426	447	417	393
farming, forestry and fishery	238	224	222	224	220
industrial production, except water supply	271	254	244	267	231
for other purposes of economic activities	178	229	162	144	212

3. Key Players in Water Management

The water management sphere is divided among different state stakeholders, all of which should be taken into account. At that, these are not only different agencies, but also different control levels.

The main specialized agency is the Water Resources Committee, but it is involved in water distribution from the surface sources only. The Committee of Geology and Subsurface Use is dealing with ground waters. Water quality and discharge of treated and untreated water is managed by the Committee of Environmental Regulation and Control. At that, the main water management infrastructure belongs to Akimats (mayor's offices).

3.1. WATER RESOURCES COMMITTEE OF THE MINISTRY OF AGRICULTURE

Water Resources Committee of the Ministry of Agriculture, Republic State Enterprise, is a governmental body and agency within the competence of the Ministry of Agriculture of the Republic of Kazakhstan performing strategic, regulatory, realization, control and supervision functions in the sphere of water recourses use and conservation entrusted by the Constitution, laws and other regulatory legal acts of the Republic of Kazakhstan, and Regulation on the Committee for Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan.

Committee Objectives: ensure coordination of the issues of state policy implementation, execution of strategic, regulatory, realization, control and supervision functions in the sphere of water resources management.

Main functions of the Committee (90 in total) relating to water resources:

- approval of permissions for special water use
- participation in approval of basin schemes of complex use and conservation of water bodies, preparation of basin agreements, and implementation of the basin principle of water management within its competence;
- state control of water resources use and conservation in accordance with its competence;
- state control of compliance with requirements to the economic activity regime in the water conservation zones and belts within its competence;
- establishing volumes of conservation and sanitation-and-epidemiological passes for water bodies basins;
- developing target indicators of the condition and criteria of water quality for the basin of each water body together with the authorized body for subsurface study and use;
- specifying annual water use limits taking into account dryness of the year, ecological and sanitary-and-epidemiological state of water bodies;
- creation of the republic information analysis system of water resources use together with the interested government bodies;
- participation in the work on acceptance and commissioning of the water management facilities, approval of projects of the water management facilities and execution of construction, dredging and other works effecting the state of water bodies;
- approval of provision of water bodies for joint use;
- approval of fish-breeding and improvement measures to improve the state of water bodies and water management facilities and reproduction of fish resources;
- issue, suspension and cancellation of permits for special water use in the manner and on the bases provided for by the laws of the Republic of Kazakhstan;
- preparation and implementation of investment projects in water management;

- performing state administration of water resources use and conservation, water supply and abstraction (except water management and water abstraction systems located in the populated localities);
- organizing operation of water bodies and water management facilities in the republic ownership;
- state recording of water and its use, keeping the state water cadastre and state monitoring of water bodies;
- approval of specific water consumption rates in branches of economy;
- taking measures to eliminate violations of the water laws of the Republic of Kazakhstan.

3.2. COMMITTEE OF GEOLOGY AND SUBSURFACE USE OF THE MINISTRY OF INVESTMENTS AND DEVELOPMENT

Committee of Geology and Subsurface Use of the Ministry of Investments and Development, State Enterprise, is an agency of the Ministry of Investments and Development of the Republic of Kazakhstan performing regulatory, realization and control functions and participating in execution of the strategic functions of the Ministry in the spheres of state geological survey, rehabilitation of the mineral resources base, rational and complex subsurface use, state administration of subsurface use.

Objectives: state policy implementation in the sphere of state geological survey, rehabilitation of the mineral resources base, rational and complex subsurface use, state administration of subsurface use.

Functions relating to ground waters:

- state recording of ground waters on the basis of the data recording of the ground water use provided by the water consumers and hydrometeorogical service;
- keeping the state ground water cadastre;
- approval of the permissions to use ground water of drinking quality for the purposes not connected with drinking and public water supply in the territories without surface water bodies, but with the sufficient reserves of ground waters of drinking quality;
- approval of the permissions for water conservation events aimed at prevention from ground water depletion;
- approval of water use limits for ground water bodies on the basis of basin schemes and limits of maximum permissible negative impact on water bodies;
- approval of the conditions of location, design, construction, reconstruction and commissioning of enterprises and other facilities on water bodies, water conservation zones and belts;
- approval of the design documentation for drilling and other mining operations and projects for communications construction through underground water bodies;
- issuing the report for construction, reconstruction, operation, conservation, and liquidation of enterprises and other facilities effecting the state of the underground water bodies and ground water abstraction directly from the underground water bodies at non-centralized drinking water supply.

3.3. COMMITTEE OF ENVIRONMENTAL REGULATION AND CONTROL OF THE MINISTRY OF ENERGY

Committee of Environmental Regulation and Control of the Ministry of Energy of the Republic of Kazakhstan, Republic State Enterprise, is an agency of the Ministry of Energy of the Republic of Kazakhstan performing the functions of environmental regulation and control.

Main objectives of the Committee:

- improving the environment quality, environmental safety, natural resources conservation, and achievement of the favourable level of environmentally sustainable development of society;
- improving the system of state regulation in the sphere of environment protection and state environmental control within its competence;
- organization and execution of the state environmental expertise in accordance with requirements of the applicable laws of the Republic of Kazakhstan;
- organization, coordination and regulation of emissions and issue of environmental permits.

Functions of the Committee relating specifically to the water resources (apart from general environmental functions):

- state environmental control of compliance with the environmental laws of the Republic of Kazakhstan, environmental quality standards and environmental requirements, including:
    - burial of hazardous substances, radioactive wastes, and effluents discharge in subsurface;
    - compliance with the burial rules for wastes and other materials, well and equipment conservation and decommissioning on the continental shelve of the Republic of Kazakhstan;
    - compliance with water quality regulations;
    - compliance with standard operating procedures of treatment facilities;
    - compliance with environmental requirements while carrying out marine scientific research on the continental shelve of the Republic of Kazakhstan;
- state control in the sphere of water resources use and conservation in the Republic of Kazakhstan in accordance with its competence;
- state control of compliance with requirements to the economic activity regime in the water conservation zones and belts within its competence.

3.4. AKIMATS

At the local level a part of water management facilities is managed and owned by the Akimats – local executive bodies. Below are their functions in the sphere of water resources:

1. At the level of a region or city of republic subordinance
   - organization of contraction and operation of water supply lines, treatment facilities, heating and electricity grids as a community property and other facilities of transport and engineering infrastructure of the city of republic subordinance, capital
   - organization and execution of exploration works to find ground waters for populated localities;
   - regulation of water relations in accordance with the laws of the Republic of Kazakhstan
   - organization within its competence of state environmental expertise of facilities of categories II, III and IV, issue of permissions to the subsurface users for environmental emissions for the facilities of categories II, III and IV, execution of environmental protection measures, regulation of natural resources use
   - approval or the utility service consumption limits for gas, electricity, water and heat supply, water disposal and heating for the consumers who have no metering gages.
2. At the level of a district and city of region subordinance
   - organization of contraction and operation of water supply lines, treatment facilities, heating and electricity grids and other facilities of transport and engineering infrastructure of the district (city of region subordinance)
3. At the level of a district in the city, city of district subordinance, settlement, village, rural district
   - organization within its competence of water supply of populated localities and regulation of water use issues

As we can see, the higher is the level, the more authorities they have. However, Akimats are mostly involved in provision of water supply and sewerage for populated localities, all beyond that is the area of influence of the national agencies.

3.5. LARGEST COMPANIES IN THE SPHERE OF WATER RESOURCES

In this sphere, predominating structures are state subordinate organizations having control over sewerage systems, water lines and water conducts, pumping and filtering stations, and sewage treatment facilities.

There are 2016 such companies. 9 of them are state-owned, 16 companies are controlled by state holdings, 11 companies are controlled by regional municipal authorities, and 180 companies are controlled by municipal authorities of districts and cities (of region subordinance).

It turns out that the key actors in this area are district and regional Akimats.

4. Contradictions between Different Sectors in the Sphere of Water Resources

It should be noted that, like in other spheres, internal contradictions always existed in the water use sphere which complicates implementation of projects. Such contradictions include:

- Hydraulic power development and irrigated cropping. Water reservoir management makes efforts to ensure as stable water consumption as possible for generation of electric power, which means that in spring they reduce the water flow thus worsening conditions for planting where water is required for emergence of seedlings. If Kazakhstani farmers can always reach an agreement with water reservoir managers in Kazakhstan, the situation is different when it comes to water reservoirs in Uzbekistan, Kyrgyzstan, Russia and China – in such cases they need governmental assistance.
- Hydraulic power industry and fisheries/haylands. Water reservoirs usually reduce the spring flood scope and accumulate water for their own needs. As a result water does not flow to bottom-land meadows and former river-beds, i.e. there are no conditions for spawning and grass growing at haylands. Therefore fish farms and hayland owners are always in opposition to water reservoir owners demanding for increase in water discharge every year.
- Industry and other spheres. Industry may interfere with other water users for the following reasons – it may take the major part of water from water supply systems, service water (industry may be a single to have a waste treatment facility), it may only transfer water to its water treatment plants and it will set an exclusive price. I.e. the industry may also act as a material factor for any water use relating projects.

It means in any case that if a farming facility is located at a river with a water reservoir or a large industrial water user, it will have to interact with them in some manner or other.

5. National Water Management Policy

The state governs the sphere of water resources using the following tools:

- laws and regulations – codes and laws governing relations and responsibilities;
- state and government programmes designed to develop this area in some way or other;
- recommended technologies for water users.

These three constituents should be always considered because they may pose both risks and opportunities for any investor.

It should be noted that the key problems in the sphere of water resource management are:

- absence of adequate coordination between different functions of the state authorities concerned, and transparency in the system of compliance with the regulatory requirements by organizations engaged in operation of infrastructure facilities, public utilities, industrial enterprises, water users, and adequate monitoring and control system;
- fragmented ownership of the water infrastructure facilities and ill-defined scheme for making investment-related decisions. Fragmented ownership and asset management has resulted in a number of problems connected with management and development of the facilities of the republican and community water sector infrastructure, including:
    - absence of a system and integrated approach to the interests of all sectors in planning and designing activities in the water area;
    - time consuming, complex, and possibly non-transparent decision-making processes hindering implementation of large-scale programmes at sector or region levels;
    - improper inventory of the infrastructure facilities at all levels and inadequate understanding of the current state of the assets result in the absence of proper substantiation of decision-making on planning and investments, and limited understanding of risks in the sphere of water supply and quality of water resources arising due to wear of water facilities;
    - there are no well-defined performance targets for asset managers, therefore efficiency of the measures aimed to achieve operational efficiency is severely restricted;
    - shortage of personnel properly skilled and trained in water resource management, and personnel in the inspection services.

5.1. GENERAL REGULATION

All water resources related affairs are regulated by certain codes and other provisions of law:

1. The Water Code of the Republic of Kazakhstan. The goals of the Water Code of the Republic of Kazakhstan are aimed to achieve and maintain environmentally safe and economic optimum level of water use and conservation of the water resources, water supply and disposal in order to maintain and improve living conditions of the population and the environment. The objectives of the water laws of the Republic of Kazakhstan are:
    - to pursue the national policy in the sphere of use and conservation of the water resources, water supply and disposal;
    - to regulate water relations and relations in the sphere of water supply and disposal;
    - to provide for a legal framework for maintenance and development of sustainable water use and conservation of the water resources, water supply and disposal;
    - to determine basic principles and directions for the use and protection of the water resources, water supply and disposal;

- to manage relations in the sphere of studying, surveying, rational and integrated use and protection of the water resources, hydrotechnical melioration systems and water facilities;
- to determine the courses for development of land hydrotechnical melioration;
- to protect population and business entities from emergency situations at water facilities and associated consequences.

2. The Environmental Code. The Code regulates relations in the sphere of protection, rehabilitation and conservation of the environment, use and restoration of natural resources in the course of business and other activities connected with the use of natural resources and impact on the environment in the territory of the Republic of Kazakhstan. The basic principles of the environmental laws of the Republic of Kazakhstan are:
    - to ensure sustainable development of the Republic of Kazakhstan;
    - to ensure environmental security;
    - to use the ecosystems approach in regulation of environment relations;
    - government regulation in the sphere of conservation of the environment and government control of the use of natural resources;
    - obligation to take preventive measures to prevent contamination of the environment and any other forms of environmental damage;
    - inevitability of punishment for violation of the environmental laws of the Republic of Kazakhstan;
    - liability for environmental damage;
    - payment and authorization-based procedure for approval of activities connected with environmental intervention;
    - application of the best ecologically safe and resource-saving technologies for the use of natural resources and impact on the environmental;
    - cooperation, coordination and transparency of the activities of the state environmental authorities;
    - encouraging natural resource users to prevent, minimize and liquidate contamination of the environment, and to minimize waste;
    - priority of using industrial and consumption waste as recyclable resources;
    - availability of ecological information;
    - securing national interests in connection with the use of natural resources and environmental intervention;
    - harmonization of the environmental laws of the Republic of Kazakhstan with the principles and norms of the international law;
    - presumption of environmental hazard of planned business and other activities and binding nature of assessment of impact on the environment and health of population when making decision on such activities.
3. Law on Mineral Resources and Subsurface Use. The Law regulates public relations in the sphere of subsurface use and is aimed to protect interests of the Republic of Kazakhstan, rational and integrated exploration and use of mineral resources. In the sphere of water resources the law regulates relations connected with the use and protection of underground water. The laws of the Republic of Kazakhstan on mineral resources and subsurface use is intended to ensure:
    - implementing state policy in the sphere of subsurface use;
    - regulation of relations connected with subsurface use operations;
    - harmonizing the republic and region-level interests;
    - development and recovery of mineral resources;
    - a legal framework for subsurface use operations;
    - creating favourable environment for attracting investments in subsurface use related operations.
4. Sanitary Rules and Regulations include several tens of documents governing quality of water for various purposes, water quality monitoring methods and other parameters.

5. Construction Norms and Regulations. These documents regulate the rules for construction of various forms of water facilities. They will be soon replaced with eurocodes. However, it is not clear, which of the eurocodes will be introduced.

In general, there is a well-structured and comprehensive laws system regulating water resources in Kazakhstan. It must be thoroughly studied prior to starting any projects – because legislative risks are generally too high and may close any project.

5.2. STATE AND GOVERNMENT PROGRAMMES

There are two state and one government programmes currently operating in Kazakhstan, which address to a different degree water resources and water utilization issues.

Such programmes include:

- State Programme for Water Resources Management in Kazakhstan 2014-2020
- Nurly Zhol State Programme for Infrastructure Development 2015–2019
- Nurly Zher Government Housing Construction Program 2017-2021

Below, we consider each of the above programmes and programme impact on water resources and utilization of water resources.

State Programme for Management of Water Resources

The programme provides for the following priorities:

1. Transition to economically sustainable distribution of water resources to enhance water resources management efficiency:

- to increase average tariffs for water supply and disposal to at least 200 tenge (USD 0,63 cent) per m3 for industrial entities and to at least 300 tenge (USD 0,94 cent) per м3 of water for population on a stepwise basis by 2040; in agriculture the average tariff for water supply should be increased ten-fold to 58 tenge (USD 0,18 cent) per m3 of water;
- to revise the cropping structure and zoning in order to optimize the use of water resources in agriculture.

2. Transition to the use of least expensive methods for conservation of water resources:

- to enhance efficiency of water consumption which is the main and self-sustaining lever to overcome deficiency of water resources;
- to increase using underground water resources which are potential sources of freshwater resources, provided that such sources are renewable, and subject to proper control over quality and scope of use of the sources.

3. Transition from inefficient operation of infrastructure to maintenance of the infrastructure in a proper condition:

- to enhance efficiency of infrastructure management by creating environment for development of operating water supply organizations;
- to invest in maintenance and modernization of the infrastructure to ensure its safe operation and proper quality and quantity of water resources.

4. Transition from overlapping and ill-defined areas of responsibility in management of water resources to a well-defined management pyramid:

- to establish an interagency council in order to accelerate implementation of the measures for enhancement of water consumption efficiency;
- to develop water resources monitoring, forecasting and management, to develop virtual model river basins;
- to address issues of water quality management and control over management activities.

Sources and scope of financing - state budget and non-budgetary funding in accordance with the laws of the Republic of Kazakhstan. The estimated amount of financing for the period from 2014 to 2040 is 8.2 tln tenge (USD 25,8 bln). It is planned to allocate 5.4 tln tenge (USD 17 bln) out of the republic and local budgets and 2.8 tln tenge (USD 8,8 bln) out of non-budgetary funds. The estimated financing out of the republic and local budgets to 2020 amounts to 3.3 tln tenge (USD 10 bln) and will be specified in the process respective budgeting for the planned period.

Nurly Zhol State Programme for Infrastructure Development

In the sphere of water resources this programme is focused on the following community infrastructure activities:

- development and approval of efficient heating schemes for cities and populated localities;
- financing development of pre-design, design and estimate documentation out of the republic budget for highly technical projects of heating, water supply and water disposal systems, as well as standard projects and design solutions;
- introduction of effective tariffs to ensure profitable work of operating enterprises, to cover investments for implementation of mid- and long-term investment programmes;
- development of standard designs of boiler facilities for different fuel types, mandatory technological inspection of the boiler facilities for further transition to energy-saving boiler equipment, and addressing the issue of the use of cogeneration systems and establishment of a single organization in the regions to coordinate the issues and activities connected with support and maintenance of boiler stations with a capacity to 100 Gcal-hr, and water supply and disposal (a single operator).

The main goal in this area is to ensure reduction of wear of the heating, water supply and disposal systems from 67% to 53% and to improve quality of the services provided to consumers.

Sources and volume of financing – the activities and investment projects provided for Nurly Zhol State Programme will be financed out of the National Fund of the Republic of Kazakhstan, republic and local budgets, international financial institutions and organizations, internal resources of the national companies and institutes for development, and out of private investments to the total indicative amount of 7.8 tln tenge (USD 25,8 bln), including:

- total expenditures under the Programme - 7 751.9 billion tenge (USD 25,8 bln)
- republic budget – 429.4 billion tenge (USD 1,3 bln)
- National Fund - 2 355.9 billion tenge (USD 7,4 bln)
- Local budget – 299.4 billion tenge (USD 944 mln)
- international financial institutes and organizations - 3 954.2 billion tenge (USD 12.4 bln)
- internal resources of the national companies and institutes for development – 673.7 billion tenge (USD 2,1 bln)
- Private investments and public-private partnership – 39.3 billion tenge (USD 124 mln)

Nurly Zher Government Housing Construction Program

The Programme goal is to improve housing access for population. It is planned to develop 10 mln m2 per year, including 5 mln allocated for individual housing construction.

The programme will be implemented in the following focus areas:

- improving access to mortgage lending;
- support of housing construction by private developers;
- mortgage housing construction through the system of housing construction savings;
- establishment of a rental housing fund for socially vulnerable population groups;
- development of private housing construction;
- implementation of the housing construction priorities provided for by earlier approved state and government programmes

Sources and volume of financing - financial expenditures for programme implementation are provided for by the republic budget and private investments, including quasi-public sector entities.

The Programme funding will consist of:

- 2017 – 168.8 billion tenge (USD 532 million)
- 2018 – 459 billion tenge (USD 1,5 billion)
- 2019 – 263 billion tenge (USD 830 million)
- 2020 – 422.2 billion tenge (USD 1,3 billion)
- 2021 – 228.5 billion tenge (USD 719 million)
- Total – 1541.5 billion tenge (USD 4,8 billion)

5.3. RECOMMENDED TECHNOLOGIES AND TECHNOLOGY SUPPLIERS

It should be noted that the Ministry of Energy recommends specific technologies to be used by private and public companies. Engineering or ecological projects without such technologies may remain unapproved.

For a company promoting its own technologies to the market of Kazakhstan it is critical to ensure that their technologies are included into the below register and then recommended to water consumers.

Table 5.3.1. Register of the Best "Green" Water Resources Technologies

NO.	PROBLEMS	PROBLEM SOLVING METHODS AND TECHNOLOGIES	APPROVAL
1	Contamination of ground water and underground sources with sewage water	Water treatment using water hyacinth, duckweed, and chlorellain in bioponds with production of biogas, local sewage-disposal systems, sterilizing using selected fly larvae and vermiculture, biofuel production from water hyacinth	
2	Ablation of mountain glaciers and reduction of water content of mountain rivers, increase in the mountain moisture retaining capacity	Cultivation of mountain rumex K-1 (Kyrgyzstan) for strengthening slopes. Artificial inducing precipitation using Russian Urania 2M and Lidar plants (ASKOR-EMI OOO)	RF, RK
3	Cleaning up water and soil from radionuclides	A technology of clean-up using sunflower germ plants was successfully demonstrated in the territory of former uranium enrichment plant in Ohio (the USA), and in the Ukraine in a small water reservoir located a kilometre from the 4th reactor of Chernobyl Nuclear Power Plant.	USA, Ukraine
4	Soil and water contamination with heptyl and mercury	Reduction of concentration in water for water hyacinth with production of biogas.	RF
5	Unfitness of water reservoirs for swimming and fish breeding. Contamination of water in large basins of the Irtysh, Balkhash, Ili, Ural, and other rivers.	Buoys-net fenced-off plantations of water hyacinth, duckweed and other water phyto-mediators enriching water with oxygen. Decontamination and clearing the water and bottom mud from heavy metals, hydrocarbons, organic solvents, herbicides, polychlorinated biphenyls, nitrates, phosphates, radioactive isotopes, etc.	
6	Organic pollutants	Myriophyllum, Elodea	
7	Shallowing of the Ili-Balkhash and Irtysh basins	Removal and clean-up the bottom deposits for deepening and obtaining biogas, fertilizers, and soil-mixtures. Renewal of transborder navigation with China.	

8	Growing deficit of pure drinking water	Shifting from water chlorination to UV-sterilization. Solar distillation units allow cost-efficient production of distilled water from practically any salted and dirty source through vaporization and condensation.	
9	Expensive water supply	Mechanical solar and wind-powered water pumps. Hydraulic ram pumps for fast-flowing rivers and streams.	
10	Reduction of irrigation rates in greenhouses and glasshouses	Automated drip and wick irrigation. Wick irrigation allows saving up to 90% of water and time. Air irrigation and microclimate for plants and humans using mist irrigation systems. It allows reducing air temperature to 15°C in hot weather, controlling dust and mosquito. Air irrigation using Shokhin mist irrigation systems allows saving up to 99% of water, 2-4-fold increasing the crop productivity. Development of agricultural technologies for planting vegetables and fruits without watering using technologies of moisture self-condensation from air on special ground.	
11	Overgrowth of canals	Regular clearance of bulrush to improve water passages and production of paper. Breeding herbivorous grass carp in water reservoirs to enable clearance of water vegetation	
12	Water loss in canals	Production of low-cost concrete surrogate - silicalcite, sulphur concrete, cortex concrete for lining water canals aimed to reduce water losses	
13	River bank flooding during high water periods	Siphon drainage for liquidation of flooding on discharge basis Reforestation of coastal zones of water reservoirs with rapidly growing willows and poplars	
14	Reduction of water consumption in rivers in irrigated cropping areas	Replacement of irrigated cropping, primarily rice, with rainfed crops. Switching from irrigation using long irrigating canals and improper collection and drainage networks. Transfer of irrigated cropping to coastal areas in order to enable irrigation using hydraulic ram pumps and hydraulic wheels powered by river flow energy and damless mini hydro power plants.	
15	Water deficiency	Production of ultrapure water from sewage and salt water by distillation using solar concentrators made of mirror foil, collectors or biogas Equipment for moisture condensing from air (solar energy powered structures and mobile equipment).	

6. Prospects for Development in Water Resources

In general, as to the investors who want to enter the market of Kazakhstan in the sphere of water resources, it is necessary to keep in mind the following rules:

1. To consider major risks associated with investments and withstand involvement in myth-based projects or projects ignoring challenges in the water economics.
2. The major customer in Kazakhstan is the government in the form of republican or local executive bodies.
3. The second important customer in Kazakhstan are development banks which allocated funds for projects.
4. It is necessary to work in the areas recognized as priority areas by the governmental programmes.

6.1. PROSPECTS IN THE SPHERE OF HYDRAULIC ENGINEERING STRUCTURES

Currently the problem of hydraulic engineering structures is very urgent:

1. There are 27 hydraulic engineering structures in disrepair in the regions which require repair: 11 in Akmola Region, 4 in Almaty and Kyzylorda Regions, 2 in East Kazakhstan, North Kazakhstan and West Kazakhstan Regions, 1 in South Kazakhstan and Mangistau Regions. Furthermore, there are more than 380 functioning hydraulic engineering structures which have not been recognized as dangerous, but they are in unsatisfactory condition and need repair. The maximum number of such structures is located in Almaty Region (102), Karaganda Region (48), Kostanai Region (46), South Kazakhstan Region (42), Dzhambul Region (32), Aktobe Region (30), and East Kazakhstan Region (22).
2. There is a problem of orphan water reservoirs and dams. 20 of such water objects are located in Akmola, 7 in Pavlodar, 6 in Aktobe, 4 in West Kazakhstan, and 1 in Kostanai Regions.
3. In February 2017, Bukhtarma Water Reservoir in East Kazakhstan Region was 85% full, Ust-Kamenogorsk Water Reservoir was 97% full, Shulba Water Reservoir was 86% full. Kengir Water Reservoir in Karaganda Region was 84% full, Fyodorovskoye Water Reservoir was 97% full, and Samarkand Water Reservoir was 75% full. That was well before the beginning of the flood period. It is apparent that it will be necessary to draw down water constantly in the future, what will result in flooding.
4. Due to increase in the water flow in 2016-2017, 918 settlements are in the flood zone now, including 53 settlements which were considered safe before. Strong floods are expected in Akmola, Aktobe, East Kazakhstan, Karaganda, Kostanai, and North Kazakhstan Regions.
5. Critical condition of the hydraulic engineering structures coupled with high-water years and construction at the flood plains may result in dam failures and fatalities in the flooded populated localities, as it happened in Kyzylagash village, Almaty Region, in 2010, when 43 lives were lost.

Therefore, the main areas of interest for foreign companies will be as follows:

1. inspection of the state of hydraulic engineering structures and sale of relevant equipment for that purposes;
2. fortification of hydraulic engineering earthworks;
3. bank strengthening;
4. supply of new equipment for flood-gates of large hydraulic engineering structures;
5. sale of equipment for cleaning up river, lake and water reservoir bed;
6. sale of technologies for stacking and treating sludge removed from the reservoir bed.

6.2. PROSPECTS IN AGRICULTURE

Despite the moratorium imposed on privatization of agricultural lands, agriculture in Kazakhstan will develop rapidly in any case.

To ensure water supply the following directions are promising in this sector:

1. drip and mist irrigation systems;
2. use of hydroponics in greenhouses;
3. technology of restoration of already functioning wells, drilling new wells, equipping wells with wind or solar powered water supply systems;
4. low cost technologies for lining canal walls with concrete or other materials;
5. water injection and water pumping station systems;
6. irrigation and fertiliser feed systems with the use of low cost equipment;
7. demineralized water generator system using solar energy.

6.3. PROSPECTS IN THE HOUSING AND UTILITY SECTOR

Since the housing construction program provides for construction of entire living microdistricts consisting of multifamily and individual houses, this fact should be duly considered by the potential market participants.

They will need:

- equipment for small artesian wells together with drinking and technical water treatment plants – filtering, purifying, decontamination and chlorination of water, etc.
- equipment for small plants for purifying sewage and storm drain water;
- piping and pumping stations for heating and water supply systems designed for long-term service and small microdistricts;
- storm sewage technologies;
- technologies for autonomous supply for multifamily and individual houses – different standard sets;
- technologies for water and heat leak detection.

6.4. PROSPECTS IN INDUSTRY

The opportunities in industry are limited as there are many suppliers there. However there are some prospects:

1. new engineering plants for preparation of water of technical grade;
2. new treatment plants;
3. closed water supply cycle equipment;
4. technologies for detection of water leaks, in general, and hot water, specifically.

7. Important events 2017

7.1. ECOTECH EXHIBITION 2017

Event dates: 26-27 April 2017
Location: Astana

EcoTech Exhibition 2017 in Astana is the main specialized exhibition in Kazakhstan and Central Asia, which will present international and domestic companies engaged in collection, utilisation, processing and disposal of industrial and domestic wastes, water treatment and waste water treatment, recycling, gas, air and soil purification, resource-saving technologies etc.

http://www.ecotech.kz/en

7.2. SU ARNASY 2017

Event dates: 31 May - 02 June 2017
Location: Astana

Water Expo Central Asia 2017. VIII International exhibition and conference "SU ARNASY 2017" water consumption: reality, problems and prospects.

Exhibiton sections

- Water and wastewater treatment
- Materials and equipment for construction, repair and maintenance of water facilities
- Installations for the production of drinking water for rural communities
- Compact systems for wastewater treatment
- Instruments, measuring equipment, automatic systems, teleautomatics
- Chemical-bacteriological laboratory equipment and supplies
- Chemicals for drinking water treatment and wastewater treatment
- Bottling and bottled water
- Information Technology
- Equipment for trenchless pipe laying

www.suarnasy.kz

7.3. EXPO-2017 "FUTURE ENERGY"

Event dates: 19-20 June 2017
Location: Astana

Planned Basel follow-up conference on IWRM during EXPO-2017 "Future Energy" taking place in Astana with a pavilion focusing on the Water-Energy Nexus. This conference will be organized and financed by Swiss government.

Topics of the Conference

- Exchange of views on cooperation initiatives and cooperation models of resp. for the region;
- Risk assessment and risk management with adequate adaptation (e.g. climate, natural hazards, infrastructure, hydrometeorology/climate data);
- Future energy – forecasting, energy policy, infrastructure;
- Water quality and standards.

8. References

1. Draft National Report on the state of environment and use of Natural Resources 2015 // http://ecodoklad.kz
2. Regulation on the Committee for Water Resources of the Ministry of Agriculture of the Republic of Kazakhstan. Approved by Order of the Deputy Prime-Minister of the Republic of Kazakhstan – Minister of Agriculture of the Republic of Kazakhstan dated November 11, 2016 No. 475 // http://adilet.zan.kz/rus/docs/G16F0000475
3. Regulation of the Committee for Geology and Subsurface Use of the Ministry of Investments and Development of the Republic of Kazakhstan State Institution. Approved by Order of the Acting Minister of Investments and Development of the Republic of Kazakhstan dated October 15, 2014 No. 67 // http://adilet.zan.kz/rus/docs/V1400009806#z0
4. Regulation of the Committee for Environmental Regulation and Control of the Ministry of Energy of the Republic of Kazakhstan Republican State Enterprise. Approved by Order of the Ministry of Energy of the Republic of Kazakhstan dated July 25, 2016 No. 341 // http://cerc.energo.gov.kz/index.php?id=3471
5. Law of the Republic of Kazakhstan on Local Government and Self-government in the Republic of Kazakhstan dated January 23, 2001 No.148 // http://adilet.zan.kz/rus/docs/Z010000148
6. Committee for Statistics of the Ministry of National Economy of the Republic of Kazakhstan. Environmental Protection and Sustainable Development of Kazakhstan/ Statistical digest/in Kazakh and Russian/ Astana. 125 p.
7. The Water Code of the Republic of Kazakhstan. Code of the Republic of Kazakhstan dated July 9, 2003 No. 481 // http://adilet.zan.kz/rus/docs/K030000481
8. The Environmental Code of the Republic of Kazakhstan. Code of the Republic of Kazakhstan dated January 9, 2007 No. 212 // http://adilet.zan.kz/rus/docs/K070000212
9. Law of the Republic of Kazakhstan on Mineral Resources and Subsurface Use dated June 24, 2010 No. 291-IV // http://adilet.zan.kz/rus/docs/Z100000291 #z1872
10. 39 orphan water reservoirs and dams were found in Kazakhstan before river flooding. 21.02.2017 // https://regnum.ru/news/accidents/2241623.html
11. Law of the Republic of Kazakhstan on Local Government and Self-government in the Republic of Kazakhstan dated January 23, 2001 No. 148. // http://adilet.zan.kz/rus/docs/Z010000148
12. Decree of the President of the Republic of Kazakhstan dated April 6, 2015 No. 1030 Concerning Approval of Nurly Zhol Government Infrastructure Development Programme for 2015-2019 and amendments to Decree of the President of the Republic of dated March 19, 2010 No. 957 Concerning Approval of the List of Governmental Programmes // http://adilet.zan.kz/rus/docs/U1500001030#z10
13. Decree of the President of the Republic of Kazakhstan dated April 4, 2014 No. 786 Concerning the Governmental Programme of Water Resource Management of Kazakhstan and Amendments to Decree of the President of the Republic of Kazakhstan dated March 19, 2010 No. 957 Concerning Approval of the List of Governmental Programmes // http://adilet.zan.kz/rus/docs/U1400000786
14. Decree of the Government of the Republic of Kazakhstan dated December 31, 2016 No. 922 Concerning Approval of Nurly Zher Housing Construction Program and Amendments to Some Resolutions of the Government of the Republic of Kazakhstan // http://adilet.zan.kz/rus/docs/P1600000922#z58

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