



«Approved»  
Al-Farabi Kazakh National University  
Member of the Board – Vice Rector for the  
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2024 y.

**UNIVERSITY POLICY TO ENSURE THE AVAILABILITY AND RATIONAL USE OF  
WATER RESOURCES AND SANITATION**

Almaty, 2024



## Water Consumption Assessment and Efficient Reuse Framework: Policy Framework and Practical Approaches

The University's Water Consumption Assessment and Water Reuse Efficiency Improvement Policy aims to promote the rational and sustainable use of water in the educational process and administrative activities. The objective of this policy is to reduce the volume of water consumed, reduce water supply costs and minimize the negative impact on the environment. Regular assessment of water consumption volumes will be carried out based on data on the number of students and teachers, as well as water consumption rates for different categories of users. These calculations will help identify the main sources of water consumption and identify potential opportunities for reduction. The University will implement systems for collecting and treating greywater, rainwater and wastewater for reuse for technical needs. Activities include the installation of aeration nozzles and water-saving devices, as well as the development of infrastructure for efficient rainwater collection. The policy will be supported by educational initiatives, including information campaigns and training programs for students and staff aimed at raising awareness of the importance of rational use of water resources and methods of saving them. Regular monitoring of water consumption indicators and the effectiveness of the implemented measures will be carried out for continuous improvement of the water management system. All structural divisions are required to submit reports on the implementation of activities related to water conservation and reuse. This policy creates a basis for sustainable water management at the university, which helps reduce water supply costs and strengthens the university's reputation as a responsible and environmentally oriented institution.



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To assess water consumption in Kazakhstan, several regulatory documents and legislative acts governing the use of water resources and their accounting are used. The main ones include:

1. The Water Code of the Republic of Kazakhstan is the main regulatory act governing the use and protection of water resources. It establishes the rules for water use, as well as the rights and obligations of water users.

2. Sanitary norms and rules - establish maximum permissible water consumption rates for various categories of users, including educational institutions, healthcare and other organizations. These standards serve as the basis for calculating water consumption at the level of individual institutions.

3. Methodological recommendations for water consumption accounting - documents developed by the Ministry of Ecology, Geology and Natural Resources, which describe the procedure for accounting and reporting on the use of water resources, as well as methods for calculating water consumption rates depending on the type of activity.

4. The Order of the Ministry of Health of the Republic of Kazakhstan - regulates the standards of water supply and sanitation depending on the category of consumers, as well as the conditions for ensuring the quality of drinking water.

5. Industry standards - contain standards for water consumption for various buildings and structures, taking into account their functional purpose and operating features.

These regulatory documents and laws ensure uniformity in approaches to assessing water consumption and allow for the organization of effective control over the use of water resources in the country.

The water consumption indicator is formed in accordance with the "Methodology for the formation of environmental statistics indicators", approved by the order of the Acting



Chairman of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan dated December 25, 2015 No. 223.

The responsible government agency for the formation of data on freshwater intake is the Ministry of Water Resources and Irrigation of the Republic of Kazakhstan on the basis of the departmental statistical form 2-TP vodkhoz "Report on the intake, use and sanitation of water". The report is submitted by water users using water for agricultural needs and other water users.

The total volume of water consumption and the volume of water consumption by types of economic activity are measured in millions of cubic meters per year; the total volume of water consumption per unit of GDP is expressed in cubic meters per international dollar (in constant 2017 purchasing power parity prices).

This indicator provides a measurement of the pressure on the environment in terms of water withdrawal from various sources (including the amount of fresh water withdrawn, desalinated water, reused water, taking into account water losses). The indicator is formed in accordance with the "Methodology for the formation of environmental statistics indicators", approved by the order of the Acting Chairman of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan dated December 25, 2015 No. 223.

Information on the population with access to municipal water supply is generated by the Committee for Quality Control and Safety of Goods and Services of the Ministry of Health of the Republic of Kazakhstan, as well as the Committee for Construction and Housing and Public Utilities of the Ministry of Industry and Construction of the Republic of Kazakhstan within the framework of the target indicators of the Regional Development Program.

### **Assessment of water consumption and calculation of water resources use at Al-Farabi Kazakh National University**

To assess the water consumption of the Al-Farabi Kazakh National University, a calculation was carried out according to the standards specified in SNiP, using data on the number of students and teachers.

Table 1 – Data for calculating the use of water resources

Number of teachers	Number of students	Total number of water users (teachers and students)	Water consumption rates on average per day per person	On the day of greatest water consumption	At the hour of greatest water consumption
2224	29058	31282	17.2 l/day (of which 6 l is hot water)	20 l/person	2.7 l/person



## Calculation of water consumption in Farabi university

### 1. Average daily water consumption

Average daily water consumption can be calculated using the formula:

$$\text{Total water consumption (average per day)} = \text{Number of people} \times \text{Water consumption rate per person}$$

$$\text{Total water consumption (average per day)} = 31282 \times 17.2 = 537.2504 \text{ l/day} \approx 537.3 \text{ m}^3/\text{day}$$

$$\text{Hot water (average per day)} = 31282 \times 6 = 187.692 \text{ l/day} \approx 187.7 \text{ m}^3/\text{day}$$

### 2. Water consumption during the day of greatest

$$\text{Total water consumption during the hour of greatest water consumption} = 31282 \times 2.7 = 84461.4 \text{ l/hour} \approx 84.5 \text{ m}^3/\text{hour}$$

$$\text{Hot water during the hour of greatest water consumption} = 31282 \times 1.2 = 37538.4 \text{ l/hour} \approx 37.5 \text{ m}^3/\text{hour}$$

Analyzing the data on water consumption at the university, we can say that the volume of water used is significant. Daily consumption is 537.3 m<sup>3</sup>, of which 187.7 m<sup>3</sup> is hot water. For clarity, this volume can be compared with the water consumption in an average-sized residential complex, which shows the high load on the university's water supply system.

The total water consumption per student per day is approximately 17.2 liters of cold water and 6 liters of hot water. At first glance, the consumption rates comply with the standards, but due to the large number of users, the total consumption is high. Such a volume of water consumption can be considered optimal if the university actively uses measures for the efficient and rational use of water. Otherwise, this may indicate the need to implement water-saving technologies. In general, water use at the university can be called high, which is explained not only by the number of people but also by the specifics of the infrastructure. To reduce water consumption, the university is currently considering measures such as reusing gray water, collecting rainwater for technical needs, as well as conducting regular monitoring and raising awareness of rational water use among staff and students.

To reduce water consumption and rational use of water resources, Farabi University is introducing advanced water reuse methods that will help reduce water consumption, reduce the load on water supply systems and improve the environmental sustainability of the campus, such as:

1. Aeration nozzles and water-saving devices on taps and showers in academic buildings and dormitories are installed in the university buildings. This can reduce water consumption by 30-40%.

2. Sensor faucets and automatic equipment for sanitary facilities in common areas to prevent unauthorized water consumption.
3. Awareness programs among students and teachers to increase responsibility for water consumption and inform them about ways to save water.

3. Real-time monitoring and control of water consumption using sensors and smart meters to detect leaks early.

## Implementation plan for reducing water consumption

Al-Farabi Kazakh National University plans to implement a large-scale system of greywater and rainwater collection and reuse, drip irrigation, rainwater storage tanks and



comprehensive environmental awareness programs in the next 10 years. These initiatives are aimed at significantly reducing water consumption and reducing the environmental impact, such as:

✓ Greywater collection and reuse. Greywater is relatively clean wastewater from showers, sinks and washbasins that can be used for non-potable purposes:

1. Use for flushing toilets: Greywater filtration technologies can clean it to a level that is safe for use in toilets. This is one of the most effective methods for university campuses, as water consumption for toilets is significant.

2. Irrigation of green spaces: Grey water after filtration can be used to irrigate lawns and green areas on the university campus. This will reduce the consumption of fresh water, especially during dry seasons.

✓ Rainwater harvesting. Collecting water from the roofs of buildings and using it for technical needs. This is a simple and economical solution that can be used for cleaning areas, paths and building facades. In regions with seasonal rains, this can provide a significant amount of water for secondary use.

✓ Rainwater storage tanks. Creating a rainwater accumulation system will allow the university to use it as needed and reduce the amount of water consumed during periods of intensive water use.

✓ Creating a drip irrigation system for green spaces:

1. Drip irrigation: A drip irrigation system can be implemented for watering university green spaces, which allows using water as economically as possible. This is especially effective when combined with grey water or rainwater that has been purified to safe levels.

2. Using mulch and slow evaporation systems to retain moisture in the soil, which will reduce the amount of water needed for irrigation and use it more efficiently.