3.Sahni E. 10 Sustainable Materials Every Architect Must Know. Rethinking the future. 2022. URL: https://www.re-thinkingthefuture.com/rtf-fresh-perspectives/a1322-10-sustainable-materials-every-architect-must-know/

4.BigRentz. 20 Sustainable Building Materials for a Greener Future. BigRentz. 2023. URL: https://www.bigrentz.com/blog/sustainable-construction

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BENEFITS OF USING TREATED WATER IN CIVIL ENGINEERING

Today, water is at the centre of economic and social development, and its role is important in many areas of life. It is a precious and scarce resource that needs to be conserved and reused as much as possible. However, most of the water used for domestic and industrial purposes ends up as wastewater, which is often released into the environment without proper treatment. As humanity pays more and more attention to environmental issues and sustainable development, the use of treated water in civil engineering is becoming increasingly important. Purified water obtained from renewable sources or after wastewater treatment has a number of advantages that should be taken into account when planning and implementing construction projects. [1]

Therefore, let us consider the main advantages to understand the importance of the water purification process as one of the factors that will preserve the planet's water resources. The main idea of this process is to conserve freshwater resources. This will be most relevant in regions with limited or nonexistent water supply networks. Additionally, the use of purified water contributes to the reduction of emissions and environmental pollution. Instead of discharging wastewater directly into rivers or oceans, purified water can be reused for irrigation, road cleaning, or other industrial purposes. It should be noted that the use of purified water helps to reduce expenses for water supply and wastewater services. Instead of using precious freshwater from municipal water supply systems, construction projects can utilize purified water, which is advantageous from a financial standpoint. [4]

Concrete is one of the most common materials in the construction industry, but it also consumes a lot of water during its production and application. According to some estimates, approximately 150 liters of water are required to produce one cubic meter of concrete. Additionally, concrete curing requires constant surface moisture for several days to ensure its strength and durability. This can result in a significant amount of water consumption and wastage in the construction sector. [1]

Several studies have shown that treated wastewater can be used as a substitute for potable water in concrete production, without affecting its workability, compressive strength, or durability. Moreover, using treated wastewater can also reduce the cement content and improve the sustainability of concrete. Compared to conventional tap water, the incorporation of recycled water enhances the consistency and workability of reclaimed water concrete by 12–14%, and it increases concrete viscosity by 11% and yield stress by 25%. [1]

Having considered the benefits of using purified water, a logical question arises: "What is the best method of water purification?"

Reverse osmosis (RO) is a water purification technology that has gained widespread attention due to its effectiveness in removing impurities from water. In an RO system, water is forced through a semi-permeable membrane, which allows only water molecules to pass through while blocking contaminants such as salts, minerals, and other particles. This process produces clean, purified water suitable for various applications. One of the primary advantages of reverse osmosis is its ability to remove a wide range of impurities from water, including bacteria, viruses, heavy metals, and dissolved solids. As a result, RO systems are commonly used in residential, commercial, and industrial settings to provide clean

and safe drinking water. In residential applications, RO systems are often installed under the sink or connected to the household water supply to provide purified water for drinking and cooking. These systems typically consist of multiple filtration stages, including pre-filters to remove sediment and activated carbon filters to remove chlorine and other organic compounds, followed by the RO membrane for final purification. In commercial and industrial settings, RO systems are used for various purposes, including desalination of seawater, production of ultrapure water for pharmaceutical and electronics manufacturing, and treatment of wastewater for reuse or disposal. Despite its effectiveness, the use of reverse osmosis systems has some environmental implications. RO systems require energy to operate, and the production of purified water generates a significant amount of wastewater, known as brine, which contains concentrated levels of contaminants removed from the water. Proper disposal of brine is essential to minimize its environmental impact. [2, 3]

In conclusion, the advantages of using purified water in civil construction are manifold and significant. Firstly, purified water helps preserve freshwater resources, especially in regions with limited or absent municipal water supplies. Secondly, it contributes to environmental conservation by reducing wastewater discharge and pollution. Furthermore, it promotes sustainable construction practices by minimizing the environmental footprint associated with water consumption. Overall, incorporating purified water into civil construction projects offers numerous benefits for both the environment and the economy, making it a valuable investment for the future of sustainable development. In terms of purification, reverse osmosis systems offer an efficient and reliable solution for water purification, providing clean and safe drinking water for residential, commercial, and industrial applications. However, it is essential to consider the environmental consequences and implement proper management practices to ensure sustainable use of this technology.

REFERENCES

1. Chen, L., Chen, Z., Liu, Y. et al. Benefits and limitations of recycled water systems in the building sector: a review. Environ Chem Lett 22, 785–814 (2024).

2.Moslehyani A., Goh P.S. Membrane Separation Principles and Applications. Elsevier; Amsterdam, The Netherlands: 2019. Recent Progresses of Ultrafiltration (UF) Membranes and Processes in Water Treatment; pp. 85–110.

3. Puretetec Industrial Water | Deionized Water Services and Reverse Osmosis Systems.
URL: https://puretecwater.com/reverse-osmosis/what-is-reverse-osmosis

4. Shetty P. The Hidden Power of Treated Water: Fueling Construction and Domestic Activities using MBR STP like Huliot Clear Black STP [Електронний ресурс] / Prasanna Shetty. 2023.
URL: https://www.linkedin.com/pulse/hidden-power-treated-water-fueling-construction-domestic-shetty.

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ASSESSMENT OF THE EFFECTIVENESS OF TRENCH FASTENING USE WHEN PERFORMING CONSTRUCTION AND RECONSTRUCTION WORKS

The growth of civil and industrial construction in Ukraine depends not least on the works completed in advance to provide water supply and drainage to construction sites. For the construction and reconstruction of water management networks and hydrotechnical structures it is necessary to use safe and cost-effective methods, taking into account all possible requirements for environmental protection.