

2.Hager I., Golonka A., Putanowicz R. 3D Printing of Buildings and Building Components as the Future of Sustainable Construction? // Procedia Engineering. 2016. № 151. C.292-299 URL: <https://www.sciencedirect.com/science/article/pii/S1877705816317453>

3.Allouzi R., Al-Azhari W., Allouzi R. Conventional Construction and 3D Printing: A Comparison Study on Material Cost in Jordan // Hindawi. 2020. URL: <https://www.hindawi.com/journals/je/2020/1424682/>

D. Cherenkov (PSACEA, Dnipro)

Scientific supervisor: T. Danylova. Cand. Sc.(Tech), Assoc. Prof.

Language consultant: K. Shabanova, English lecturer

SUSTAINABLE MATERIALS IN CONSTRUCTION IN THE 21ST CENTURY

Sustainable materials in construction have gained significant attention in the 21st century due to the need for environmentally friendly and resource-efficient building practices. These materials aim to reduce the environmental impact of construction, conserve natural resources, minimize waste, and promote energy efficiency. Here are some key sustainable materials that have revolutionized home construction:

Straw bale construction is an ancient technique that has been updated for the 21st century. Straw bales, made from agricultural waste, serve as a substitute for lumber and have excellent insulation properties. Despite their thickness, straw bale homes are resistant to fire and can provide a high R-value for energy efficiency [1].

Bamboo is considered one of the best eco-friendly building materials. It is a fast-growing plant with a high self-generation rate, making it a sustainable alternative to traditional timber. Bamboo is lightweight, strong, and flexible, making it suitable for various construction applications [2].

Biocomposites are materials made from natural fibers, such as hemp, flax, or jute, combined with a matrix material, often a bio-based polymer. These materials offer a sustainable alternative to conventional composites and can be used in various construction applications.

Earth bricks and adobe are sustainable materials made from a mixture of earth, clay, straw, and other organic materials. These materials have been used for centuries and provide excellent thermal properties. They are cheap, easily available, and environmentally friendly [3].

Using recycled steel in construction helps reduce the demand for virgin steel production, which has a significant environmental impact. Recycled steel retains its strength and durability and can be used in various structural applications.

Hempcrete is a sustainable construction material made from the stalks of the hemp plant, lime, and water. It offers excellent insulation properties, is fire-resistant, and has a low carbon footprint. Hempcrete is increasingly being used in building homes and other structures [4].

These sustainable materials offer numerous benefits, including reduced environmental impact, improved energy efficiency, and the conservation of natural resources. Incorporating these materials into construction practices can contribute to a greener and more sustainable future.

It should be noted that the search results provided valuable insights into the topic of sustainable materials in construction. However, for a more comprehensive understanding, it is recommended to consult additional sources.

REFERENCES

1.Elemental Green. 10 Eco Building Materials Revolutionizing Home Construction. Elemental Green. 2022. URL: https://en.wikipedia.org/wiki/Trade_and_development

2.Rinkesh . 17+ Sustainable and Green Building Construction Materials. Conserve energy future. 2021. URL: <https://www.conserve-energy-future.com/sustainable-construction-materials.php>

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>

D. Chorna (PSACEA, Dnipro)

Scientific supervisor: O. Nesterova, Cand. Sc. (Tech.), Assoc. Prof.

Language consultant: N. Shashkina, Cand. Sc. (Phil), Assoc. Prof.

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