3) improving the ecology of big cities by meeting the requirements environmental legislation, application of world practice in the organization of zones with a low-emission zone (LEZ) and zero-emissions zones (ZEZ);

4) the use of alternative eco-friendly types of vehicles such as electric scooters, electric bikes, monocycles, or principles co-ownership of cars. Such vehicles have several advantages – they are compact, easy to use, eco-friendly and available;

5) the use of mobile applications for carsharing, which allow owning a car together with other people and owning a car share with the right to use it. The model of carsharing is intended to satisfy the traditional desire of people to move quickly and conveniently from one place to another, and it also allows to save time and money.

Thus, we can admit that road transport is one of the main sources of the environmental pollution. The existing level of ecological safety of the automobile transport complex as a whole and its main elements determined by the level of energy and resource consumption, environmental pollution by emissions and waste in the process of vehicle operation. To conclude, we consider that only a comprehensive approach, and the application of innovative methods for reducing negative impact will allow to ensure environmentally sustainable development of the road transport safety.

References:

1. Гутаревич Ю. Ф. Екологія та автомобільний транспорт: навч. посібник / Ю. Ф. Гутаревич, Д. В. Зеркалов, А. Г. Говорун, О. А. Корпач, Л. П. Мержиєвська. – Київ: Арістей, 2008. – 296 с.

2. World Health Organization Regional Office for Europe. Transport, environment and health. – WHO regional publications. European series ; № 89. – 86 p.

3. Гутаревич Ю. Ф. Шляхи підвищення екологічної безпеки дорожніх транспортних засобів / Ю. Ф. Гутаревич, В. П. Матейчик, А. О. Копач // Вісник східноукраїнського НУ ім. Володимира Даля. – Луганськ, 2004, № 7(77), ч 1. – С. 11–15.

4. European Commission. Developing and implementing a sustainable urban mobility plans: Guidelines. – European Platform on Sustainable Urban Mobility Plans, 2013. – 151 p.

PRINCIPLES OF BIONICS IN MODERN ARCHITECTURE

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Bionics is an applied science connected with the usage of organization principles, peculiarities and functions of living organisms during the creation of new technologies. In other words, it is the studying of natural forms and shapes and imitating them in the process of engineering.

Bionic designs are a relatively new tendency in the science and practice of architecture. Its main aims are to learn the laws of natural tissue formation and analyze the structure of different living beings concerning their material and energy saving methods. The term "organic architecture" is closely connected with this branch of studying. Its biggest concern is to make rational and stable constructions with the help of natural technologies and then make them eco-friendly by using such things as plants, gardens and alternative sources of energy. In recent years, bionics has proven that the majority of human inventions were already "patented" by nature.

An unofficial title of "the father of bionics" belongs to Leonardo da Vinci who was the first to use the principles of living organisms in his schemes. For instance, he studied the process of flying and the structure of a bird wing to make a draft of his flying machine. However, all these ideas had not received much attention until the end of the twentieth century, when scientists became interested in them due to the development of cybernetics. In 1960, during the international scientific conference, the main principles of bionics were formulated.

Speaking about architecture, the first person who applied these natural principles to engineering is considered to be Antonio Gaudi, a famous Spanish architect. Not only did he use the elements of nature as decorations, but he also tried to adjust the buildings to the natural environment. A vivid example of this approach is Park Guell where Gaudi created a colonnade looking like tree trunks spliced together.

In the beginning of the 1920s, Rudolph Steiner, an architect from Austria, started applying these principles, and soon more and more people paid attention to bionic architecture. A group of American architects was the first to use the idea of a shellfish construction to the building. They created a spiral-like school where it is easy to get to different rooms like laboratories and classrooms from the central part of a building. Moreover, the structure of clam mantle void inspired engineers to design a system of treatment facilities on the coasts, which are still in the process of improvement. There exist different structures and methods of creating stable formations that modern architects are applying to their projects. Apart from shells, the toughness of bones has also become a point of studying. As an example of this, tubular bones have lots of empty spaces inside, and they become thicker on both ends. A head of this bone is filled with spongy substance, and its bone plates are placed according to directions of the strongest material deformation. As a result, this type of construction makes them both strong and light at the same time. These principles were used while creating a metal carcass of the Eiffel Tower, a well-known symbol of Paris, as its form and structure correlates with the structure of femur, a bone which is able to carry the weight of the whole human body.

A stem of a plant is another example of durability invented by nature. Due to its structure, the height of any stem is 200-300 times bigger that its diameter.

Moreover, they can withstand strong winds without getting bent and broken because of their flexibility. The secret is that the space between plant knots is empty, and knots themselves are filled with tissue. This technology enables to create multi-story buildings in areas prone to earthquakes. A lot of Asian skyscrapers resembling ears of corn can be considered a vivid example of it.

Nowadays biologists and architects continue their cooperative work on introducing bionic approaches to architecture. One of the most ambitious projects connected with bionic is being built now in Shanghai. It is called "the Cyprus City", a giant tower 1 km high which design was inspired by a tree of the same name. The idea appeared in the beginning of the 1990s, but it took more than fifteen years to begin the building process. "The Lilipad City", a project by Vincent Callebaut, is another way to deal with lack of space for growing population. The architect believes that they will become reality by 2100, and also help to overcome a problem of the rising sea level.

In Ukraine there are still not much examples of bionic buildings. "The Wave House" in Odessa is an example of this. It is a private building designed by an architect Mykola Matiushenko which has become a tourist attraction since 2017. The structure of a house resembles a grapevine and is full of round and irregular shapes.

The main principles of bionic architecture are to use natural technology in engineering and design and to combine them with principles of eco-friendliness. Concerning growing ecological problems, this approach is one of current interest to modern architects.

References:

1. Cervera M. R. Bionic Architecture: Learning by Nature. Berkeley: Ginkgo Press, 2017. – 240 p.
2. Lazarev O. I. Modern Experience of Theory and Practice of Bionical Architecture and Design. Kyiv, 2015
3. Bila Z. Unusual Buildings in Ukraine. Ternopil, 2019

MAIN RISKS OF THE OIL AND GAS GROUP OF UKRAINE

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An independent risk management service was established at the Oil and Gas group Naftogaz in May 2016. The purpose of the office is to ensure that an effective risk management process and controls are in place to achieve strategic