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«FUTURE HOUSE» OR ZERO-ENERGY HOUSE

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Let's figure out what the "house of the future" is, we will also explore the concepts of eco-house and a house with zero energy consumption.

Ecological house (ecohouse) is a house, which repeatedly, reduced the negative impact on the environment and on its residents, without loss of quality of human living. A building that is highly energy efficient, able to generate energy from renewable sources on site and consume an equal amount of it during the year is called an energy-positive or zero-energy house. These types of modern buildings are called houses of the future [1].

Eco-houses are equipped with their own heating system, which uses solar heating of the house and solar water heating for household needs, in addition to the usual heating system. But an energy-positive building does not just provide its own energy needs - it produces more than twice of the amount of electricity it needs on its own. It is worth to mention that eco-houses are houses for permanent residence, as opposed to zero-energy houses, which are mainly used as office buildings [6].

"Energy-positive buildings are the architecture of the future," said Kjetil Tredal Thorsen, founder of Snøhetta. - "The mantra of the design industry should not be function determines form, but environment determines form". Modern architecture must first and foremost reduce the carbon footprint, including through design, Tredal pointed out [5].

Today, Snøhetta is a company with a wide range of business including architecture, landscape design, and interior design and branding. Their work strives to enhance people's sense of surroundings, identity and relationship to others and the physical spaces we inhabit, whether feral or human-made.

A major advantage of "houses of the future" over traditional houses is an absolute comfort. Comfort is when it is warm in winter and cool in summer, light at any time of the year and easy to breathe at any time of day. A comfortable house is an energy efficient house, designed to conserve all the resources we consume, including not disturbing the balance between man and nature. The most cost-effective steps to reduce a building's energy consumption usually occur during the design process. To achieve energy efficiency, a zero-energy design differs significantly from traditional building practices. Successful zero-energy building designers typically combine time-tested passive solar or artificial air conditioning principles. Sunlight and solar heat, breeze and the coolness of the ground beneath the building can provide daylighting and stable indoor temperatures with minimal mechanical means.

Eco-friendly materials used for construction and insulation contribute a lot to this. In the process of design and construction of eco-house, its negative impact on the natural environment is minimized. The distinguishing factor of an eco-house from our conventional houses is the materials used in its construction; they must be of biogenic origin, such as clay bricks, soft sedimentary stones, wood, etc. Some countries have subsidies and fiscal incentives for the installation of heat pumps, solar panels, triple glazed windows and insulation that significantly reduce the cost of access to a building with zero energy consumption for the building owner. For example, in the U.S. there are fiscal incentives and benefits for solar panels and heat pumps. Some states, such as Massachusetts, also offer low-interest loans to allow building owners to purchase heat pumps, solar panels and triple glazed windows. The cost of bringing an existing home to zero energy is reportedly 5-10% of the cost of the home. A 15% return on investment has been reported [3].

The first such homes appeared in the late eighties. The concept of a "passive" house was developed by Professor Bo Adamson in 1988 while conducting research at the University of Lund in Sweden. The first requirement for such a house was that it could do with minimal heating in the harsh Scandinavian winters. As time went by, other requirements for a passive house appeared. It was

found that the conservation of heat is not enough: the house should have minimum energy consumption [4].

There are many examples of houses of the future from the same company Snohetta, such as the most energy-efficient office center in Trondheim or Norwegian National Opera and Ballet, or ZEB Pilot House - house that serves both the living and energy needs of a family house, in addition to generating enough energy surpluses to power an electric car year-round [2].

At the moment in Belarus there are only a couple of energy-efficient homes, but they are only prototypes. It is much more profitable for developers to put only solar panels or use wood in the construction, but it does not make an ordinary house into an energy-efficient one. And many people don't even think about building energy-efficient homes, but the problem can and should be solved. Although energy-efficient homes are more expensive to build, they will not only pay for their cost in the future, but they will also contribute to the environment. That's why zero-energy homes are our future today.

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