

## THE ROLE OF «GREEN BUILDINGS» IN LIFE OF CITIZENS IN METROPOLISES.

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Landscaping of roofs and internal walls of houses are widespread in the world and is considered as a popular innovative technology in modern architecture and urban planning. Buildings, covered with vegetation, not only purify air and save citizens from hot weather conditions, but also help them save their costs.

Vertical landscaping decorates a building and emphasizes its architectural expressiveness, in particular, is useful for distinction of buildings among typical ones. In fact, walls and roofs are considered to be an important resource for city's development which is of low demand. For instance, if there is no place for trees near a new building, then future green massifs may easily be carried onto its surface.

Blank developed an identical concept in 2006, designing a building of museum in Paris. For its external design, he used 15 thousand plants from 170 species. According to the author's idea, the vegetation changes outlines, relief and color shades depending on the time of day and natural lighting.

The fewer green spaces in the city, the less shade, coolness, and clean air there will be, the more dirt and suffocation there will be on the streets. Therefore, a building covered with grass or trees has obvious advantages over its "naked" neighbours — it produces additional oxygen, necessary for comfortable life in a metropolis, and also helps to clean the air from gas exhaust pollution. According to separate calculations, one small lawn with an area of 150 square meters produces a volume of oxygen that can be consumed by 100 people throughout the year. And such an indicator is very important at the current level of urban pollution. After all, it is in the cities that the bulk of road transport is concentrated, which provides 70% of all toxic emissions into the atmosphere. This means that for each new car city dwellers pay with oxygen, and therefore with their own health.

In addition, vines plants on facades and roofs, due to natural evaporation, seriously increase relative air humidity and this positive effect has long been paid much attention to in administrations of many of the world cities. For today the largest in the world area of green roofs is in Basel (Switzerland), which in 2006 constituted 23% from the total area of cities' roofs. The similar situation took place in Stuttgart (Germany), where there is almost a quarter of local roofs. In London green roofs cover almost one and a half million square feet, and in the cities of Japan the separate resolution

works: trees, flowers and lawns must grow on all flat areas more than 100 square meters. However, such roofs must be properly looked after. Since gardens need a lot watering, roofing must be provided with high-quality waterproofing. Also, every 20 years green roofs fall under mandatory overhaul.

In many cities, the noise level exceeds the normative indicators. This causes irritation among the townspeople, interferes with their peace and rest. But if ordinary houses with bare walls let in noise from city transport, repair works or public festivities, then vegetation can seriously reduce the level of noise pollution. Birds often start nesting on green surfaces, creating a natural sound environment around. Psychologists note that all this has a positive effect on the daily well-being of city residents. In addition, vertical landscaping traps dust that settles on the leaves of facade plants, after which it is washed away by rain.

It is not surprising that such favourable opportunities of green facades are used in modern medical institutions. For example, we can mention the main Singapore hospital Ng Teng Fong. This complex is one of the winners of the 2017 Green Building Award from the American Institute of Architects and the Environmental Protection Committee. The hospital boasts natural ventilation, windows are placed opposite each patient's bed, green roofs and plantings along all facades of the building. As a result, the facility uses 38% less energy than any other medical centre in Singapore and 69% less energy than a typical American hospital.

Residents of countries with hot climate use facade landscaping to protect the walls of houses from overheating. Plants that are tightly woven around the walls of the house can reduce the temperature inside by 10-30% . At the same time, they protect the building from the cold, creating additional thermal insulation for the house. The air gap between the wall and the landscaping reduces heat loss and prevents cold air from entering the building.

In hot weather, a roof covered with plants significantly saves electricity. Yes, the living covering on the roof is an excellent natural conditioner that heats up three times less than a conventional roof and allows you to save on cooling the premises. This also solves another serious problem — growing volumes of greenhouse gas emissions into the atmosphere.

The facade landscaping system also has a positive effect on energy consumption indicators. Green facades protect building residents from solar radiation, increase thermal insulation, and reduce heat loss. For example, we can mention the 16-story office building Edificio Consorcio in the Chilean capital of Santiago. The architect Enrique Braun designed a vertical garden for it with an area of about 3,000 square meters. In fact, this house has a double facade: an external one, covered with vegetation, and an internal one,

with the usual thermal insulation. Thanks to this design solution, the owners of the house save 48% of the energy used.

If you choose plants correctly, the house can additionally be protected from dampness and wind. This architectural technique is often used by the famous Vietnamese architect Vo Chong Ngia, adding plant elements to each of his projects. For example, the building of a commercial bank in the Vietnamese city of Da Nang is densely planted with elegant trees that protect the roof from overheating, and the front windows from gusts of wind. In addition, such a green roof retains up to 80% of rainwater, which significantly reduces the load on the local sewage system.

**Conclusions:** from the above-mentioned it can be concluded that greening of roofs and external walls of buildings will significantly reduce the cost of utility bills, save energy and reduce environmental losses. Landscaping of buildings and surrounding areas will make it possible to clean the air of gases, exhaust and other harmful substances, produce more oxygen and, in this way, have a positive impact on the life and health of citizens.

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## ІННОВАЦІЙНІ ПІДХОДИ ДО УПРАВЛІННЯ ВІДХОДАМИ

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В світі дуже гостро стоїть питання управління відходами. Це безпосередньо зв'язано з екологічною міст, країн та планети взагалом. *Відходами* називаються будь-які речовини, матеріали і предмети, що утворюються в процесі людської діяльності та не мають подальшого використання за місцем утворення чи виявлення, та яких їх власник позбувається, має намір або повинен позбутися шляхом утилізації чи видалення (згідно ст. 1 ЗУ «Про Відходи»).