

8th International Conference on **Environmental Chemistry and Engineering**
&
7th Edition of International Conference on
Green Energy, Green Engineering and Technology

September 20-22, 2018 Berlin, Germany

Development of green technologies and complex analysis of the green and blue roof systems**Natalia Shushunova and Elena Korol**

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This study has the purpose to offer the most effective technology with the smart-energy devices that connected challenges hindering sustainable development for both urban environment and infrastructure for the economic growth. Total reduction of greenhouse gas emissions by 52.3 million tons eq. CO₂ by 2020 characterizes the increase in the level of environmental safety of the urban environment. The aim of this research is to analyze the systems of green roofing, the study of technical and technological parameters, as well as the design of green roof systems. In the study, problems in the design of green roofs are solved, taking into account the operational loads from the roofing pie systems, as well as the influence of climatic conditions in the construction. For comparison, various versions of green roofs were chosen, including the innovative modular green roof construction system with the integration of renewable energy sources for favorable environmental protection. The representative facilities for research and evaluation of the efficiency of technological parameters for the period of green roof installation is balanced by the comparability of such technical and economic indicators as the construction volume, the area of the constructed facilities, the duration of construction, including the operating time of machines and mechanisms, labor intensity and energy consumption of technological processes, which is carried out according to the technologies considered. The technical result of the proposed innovative solution of green and blue roofing system is the reduction of labor input of up to 20%, the possibility of placing with interconnecting hi-tech devices that accumulate and convert energy-solar panels, micro-wind turbines, elements of water irrigation control-hydroponics and the design provides a system of vertical landscaping, which allows the use of variety of modules for the installation of green and blue vertical covering systems on buildings.

**Green and blue roof systems**

The invention is to be solved various problems of planting roof covering by making inexpensive, easier and waste-free assembling. The unique green and blue roof system with an unusual combination of architectural and aesthetic design solutions gives a beautiful appearance in the urban space.

Recent Publications

1. Elena Korol and Natalia Shushunova (2016) Benefits of a modular green roof technology. *Procedia Engineering* 161:1820-1826.
2. Elena Korol and Natalia Shushunova (2016) Research and development for the international standardization of green roof systems. *Procedia Engineering* 153:287-291.
3. Valery Telichenko, Andrey Benuzh, Guy Eames, Ekaterina Orenburova and Natalia Shushunova (2016) Development of green standards for construction in Russia. *Procedia Engineering* 153:726-730.

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Biography

Shushunova Natalia is a Post-graduate student of Department of Housing and Communal Utility; Research Scientist of National Standards of Green Construction Laboratory and; Assistant of the Department of Environmental Engineering of National Research Moscow State University of Civil Engineering. She had been awarded the medal "For merits in construction science and education", III degree, holdered of a scholarship of the President of the Russian Federation. She has the first national patent of invention in the field of green roof technologies and the multiplicity publications in the International scientific journals, she is active in high-tech educational platform for scientists in Skolkovo as a member of the delegation of the Ministry of Education and Science. Research interests are focused on green building technologies and innovative engineering systems, the work of certification projects in Laboratory of National Standards of Green Construction, MSUCE - development of the Russian standard GOST "Green roofs", Green standards for Rosnano, and other projects. The main areas of scientific activity are the green construction and green roof technologies with energy-efficiency devices.

Elena Korol - Doctor of Technical Sciences, Professor, RAASN Correspondent, Head of the Department of Housing and Utility Complex of National Research Moscow State University of Civil Engineering. The main areas of scientific activity are the construction and construction technologies for the construction of buildings and structures, including the development of underground space, taking into account the requirements of energy minimization and the formation of a comfortable living environment. Author and co-author of more than 150 scientific and methodical works, including 9 monographs, 3 manuals and a textbook. Scientific projects have been successfully implemented within the framework of federal targeted programs: Research and Development in Priority Areas for the Development of Science and Technology, Development of the Scientific Potential of Higher Education, Scientific and Scientific Pedagogical Cadres of Innovative Russia, and others. Awards: an honorary diploma of the Ministry of Education and Science of the Russian Federation, a RAASN medal for a series of monographs on building technologies for the development of underground space.

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