

# MED GREEN FORUM

7th edition

## Getting to Zero

Beyond energy transitions towards carbon-neutral Mediterranean cities

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Master thesis:

## ARCHITECTURAL ASPECTS OF THE RENOVATION OF PUBLIC BUILDINGS IN PODGORICA IN ACCORDANCE WITH THE PRINCIPLES OF ENERGY EFFICIENCY

Case Study: Technical Faculties Building in Podgorica

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### CONFERENCE SESSION

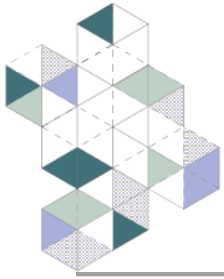
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1. Landscape and cities in transition
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### KEYWORDS

Energy efficiency; Building envelope; Public buildings; Refurbishment strategies; Thermal performance.



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### ABSTRACT

Considering the significant share of the building sector in total energy consumption and global CO<sub>2</sub> emissions, the renovation of existing buildings plays a major role in meeting the energy and climate goals of EU member states and candidates, both in the period up to 2020 and in the upcoming period up to 2050. The reason for this is architecture that does not meet the current regulations concerning energy consumption, thermal comfort and environmental impact. In this paper, a special review is given to public buildings from the second half of the 20th century, which, in addition to not being designed to meet thermal comfort requirements, are an example of inappropriate conservation, maintenance and improvement of architectural heritage.

The public buildings sector includes buildings that are accessible to the widest range of the public (child and social protection, health, education, culture, sports and other buildings of public and social standard), and therefore enables the public to be informed about modern technologies, new approaches in designing and obtaining feedback from users of energy-renovated buildings. On the other hand, state and local authorities, as owners and managers of these facilities, provide energy and investment-optimized solutions with such demonstrative examples of efficient rehabilitation.

In order to improve future practice and formulate specific guidelines for further development in the field of energy efficiency of public buildings, as part of this paper, the existing legal and regulatory frameworks of the European Union and Montenegro, the general influencing factors of energy efficiency in buildings, as well as the principles of renovation of buildings in order to meet the requirements of energy efficiency, have been analysed in the theoretical part of thesis.

As part of the practical research, the theoretical assumptions and guidelines of energy retrofitting are implemented on the specific example of an educational building in Podgorica, Montenegro, in terms of a proposal for the appropriate renovation, with an energy efficiency study which refers to the energy needs of the building generated by architectural aspects. This primarily refers to the improvement of the performance of the building envelope as the key to the overall energy balance, considering the cultural, historical, aesthetic, social and technological values of the aforementioned building.

This research shows that appropriate renovation measures related to the building envelope, technical systems and their management, with the use of renewable and alternative energy sources, can fully meet the energy efficiency requirements of existing public buildings. Differences in the application of restoration measures arise from opportunities and limitations related to conservation instructions, available technologies and materials, financial resources, etc. Given that this project is about the restoration of a building of exceptional importance for the Montenegrin architecture of 20th century and which is in the process of valorisation and protection, the proposed architectural measures aim to preserve key features and elements of architecture, while certain modifications resulted from the necessity of applying the concept of passive strategies. Contemporary buildings and initiatives can serve as examples (case studies) of widespread energy retrofitting efforts in existing buildings.

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