



Resource Efficient Multifunctional Commercial Buildings

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Abstract

Rising cost pressures and the prospect of quick returns led to an increase in mono-functional buildings since the 1970s. The lack of marketability, increasing vacancy and an early demolition are often the consequences. The objective of the AIF/FOSTA research project P1118 [1] is to develop planning recommendations for multifunctional multi-storey buildings. Firstly, the paper explains the ecological and economic requirements for modern buildings. In this context, the expected lifetime of primary and secondary building components are also addressed. Subsequently, relevant types of use as well as requirements for essential building parameters are presented. The investigations show that variable-use buildings with a long service life lead to a better sustainability.

Keywords: multifunctional buildings, composite floor systems, sustainability, life cycle assessment.

1 Introduction

The real estate industry is facing new challenges. The consequences of the demographic change of our society, the structural development of cities and the need to reduce the climate change require more suitable solutions. Key objectives for the life cycle of buildings are the reduction of energy consumption, emissions and waste. This can be achieved by optimised building constructions and the extension of lifetime. The buildings must be designed in such a way so that they not only meet current user requirements, but also future ones. A survey by the European Commission found that office buildings undergo a change in use every 11.6 years [2], [3]. Experience of recent decades shows that the construction of low-cost mono-functional building structures and neighbourhoods, as they have been implemented in many places of Europe since the 1970s, often lead to premature vacancy and up to demolition because the adaptability of the primary structure was insufficient. Future buildings should be designed in such a way, that

they allow a change in use with little monetary and time expenditure. Thus, it is necessary to create buildings with a primary structure that meets the requirements of different types of use, relevant for the location. If change of use occurs, adjustments should be limited to the secondary structures.

In the AIF/FOSTA research project P881 [2], the development of design recommendations for sustainable office buildings in steel and composite construction was conducted by the interdisciplinary cooperation of architects, structural engineers, ergonomists and economists. In this context, the analysis of rating systems for sustainability, the development of methods for evaluating building constructions, structural optimisations for flexible office layouts and the compilation of databases for the assessment of the economy and ecology of buildings were carried out.

Based on the results of P881 the AIF/FOSTA project P1118 followed to develop multifunctional office and commercial buildings. In addition to the focus