

Energy efficient service buildings with ecofacility: support for planners and building developers

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SUMMARY

The construction of a building with an optimized thermal and energy performance and an accordingly low energy demand does not necessarily require higher investment costs. The decisive factor is an interdisciplinary and foresighted – an Integrated Energy Design. Although this integrated approach prolongs the design process and increases the planning budget, in return the construction time and the subsequent costs such as energy and operating costs are significantly reduced. A qualitative (using checklists) and quantitative assessment (calculation of heating and cooling demand, building energy simulation) is essential for the identification of flaws in the design. In order to ensure the longevity of the quality of design beyond the realisation of the project, guarantee models can be applied. This is a model of a “slim” integrated planning process, but applying this concept step by step should help to overcome the introduction barriers. The ecofacility consulting services should be the first step.

INTRODUCTION

Newly built service buildings - such as office buildings, shops, hotels or schools - with a final energy consumption exceeding 400 kWh/m²/yr are still common. However, several examples exist which prove that service buildings with a final energy consumption of less than 40 kWh/m²/yr are equally feasible [1].

What is the reason for this considerable disparity in energy consumption levels? Although the use of innovative technologies certainly plays an important role, an even more decisive factor is the choice of an integrated design approach. An approach that focuses not only on the appearance and functionality of the building, but also accounts for its energy performance during the utilisation period. Decisions made at an early design stage, such as those concerning the shape and orientation of a building, have a crucial impact on the building's future energy consumption [2]. Only an integrated design process at this early stage allows for optimisation in as many areas as possible (architecture, function, building code, comfort, investment costs and operating costs). For a timely identification of areas for possible improvements, a regular assessment of the draft according to certain criteria becomes necessary at the end of every planning stage. At the first design stage – the predesign stage – the main assessment criterion is the net energy demand; later – when the installations have been chosen – the final energy demand becomes relevant. Additionally, an analysis of total investment and running costs is possible with the help of a life-cycle cost estimation.

Concerning life-cycle costs, it is widely recognised that 80% of operating, maintenance and repair costs of a building are already determined during the first 20% of the entire planning process – i.e. during the predesign and design stage [3] (see Figure 1). In the subsequent stages, the chance to lower these costs decreases.

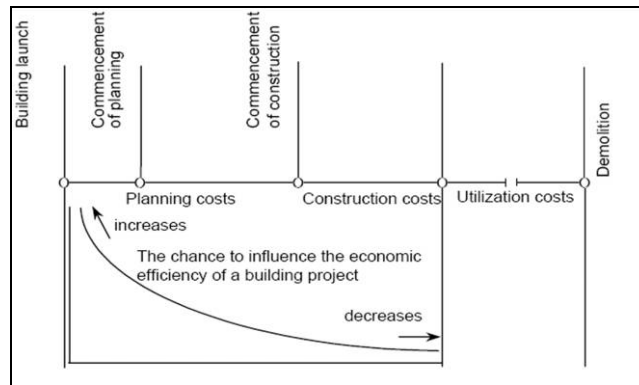


Figure 1: Chance to influence the economic efficiency of a building [3]

The same concept applies to the energy demand of a building: the earlier the energy demand of the building is taken into account and optimised during the design stage, the bigger the chances for success. Due to the fact that at this stage of the design process the amount of time and money invested is still relatively low, redesign is still feasible and financially insignificant. An integrated energy design process and regular assessment provide the basis for a quick and efficient completion of the project, less construction defects and lower repair costs – and therefore help maintaining low investment and repair costs [4].

In the course of implementing the Energy Performance of Buildings Directive (EPBD) on a national level, every member state incorporates minimum standards for the energy performance of buildings in their national building codes. As soon as the implementation process is completed, new buildings as well as existing buildings that are subject to major renovation will have to comply with certain thermal and energy performance criteria. Thus, building developers have to take low energy demand for buildings into account in future.

How can the construction of an energy efficient building be realised? How can real estate developers be supported to fulfil the requirements of national implementation of EPBD? How can the theoretical concepts of integrated energy design, life-cycle cost analysis and optimisation of thermal and energy performance of new buildings be put into practice and become part of the standardised construction process of building developers? How can clients make sure – especially at the project initiation stage and during predesign – that an energy efficient service building is built in the end?

ecofacility, the programme of the Austrian Climate Protection Initiative “klima:aktiv” aims at increasing energy efficiency in private service buildings, has developed a standardised consulting process to achieve these goals. The ecofacility consulting services help building developers to incorporate energy efficiency as a key factor into the planning process right from the beginning. The aim is to design buildings that can operate with minimal energy consumption, i.e. with minimal heating and cooling demand. The better the building envelope is adapted to climatic conditions and the function of the building, the lower the energy demand [5]. The choice of installations should be based on the estimated energy demand. This way, it is guaranteed that the installations fit the building and that investment costs are not increased by the installation of unnecessary and oversized equipment. In addition, indoor environmental quality must not be neglected; simple measures such as allowing for individual indoor temperature regulation by opening the windows raise the comfort level of the building occupants.

