Determination of Investment and Reconditioning Cost as well as the Embodied Grey Energy at Time of Realization Decision in particular for each REAL ESTATE Type

Motivation
According to Zimmermann, the life cycle costs of a property are defined as the totality of all cost incurred during the lifetime of a building ([LCC] = [EIK] + [ZIK] + [BK] + [Z]). They are generally divided into total investment cost [GIK] consisting of initial investment cost [EIK] and future investment cost [ZIK], working cost [BK] and interest accrued [Z].

The client or the investor determines the requirements for a real estate project and defines all required services on the basis of these target definitions. At the time of the decision for realization ideally not only the EIK should be known, but, in the sense of a sustainable real estate development, also future investment cost and working cost need to be surely prognosticated.

The future investment cost are needed to determine the net income in particular in the context of real estate valuation in the "Bewirtschaftungskosten" (below as operating cost) according to ImmoWertV. The initial investment cost represents a function of the real estate type with a corresponding type of use. As an example, office, hotel, logistics, housing, retail, and hospital can be distinguished. The amount of the operating cost depends on the usage and thus also on the type of property. The Grey Energy, as a non-renewable primary energy content inherent to each component on the object, also differs depending on the type of real estate, since the reconditioning cycles are different due to the different intensity of use.
State of Research
Greitemann and Kornblum have developed the methodology of “Standardraumstrukturen”. This makes it possible to completely depict a property with the help of standardized rooms. At the top level, real estate is unique; but the individual components of the types of use are in no way unique. This can be used to standardize the rooms or the structures (elements) as virtual rooms. For this purpose, the planning specifications of the preliminary planning (LPH2) are required.

Fig. 1: Requirements for the planning of components for the realization decision.

Research methodology
By means of the investigation methodology of the “Standardraumstrukturen” according to Kornblum and Greitemann for the real estate type office, “Standardraumstrukturen” are worked out for the real estate types hotel, logistics, residential, retail, and hospital. In terms of cost estimates, Sirados data and empirically collected project values are used. The basis for the determination of the technical lifetimes are the data sources "Lebensdauer von Bauteilen, Zeitwerte" of the Federal Technical Experts eV, the BBSR table "Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB" and the VDI Guideline 2067. The lifetimes are used taking into account the intensity of the use, depending on the type of usage. Grey Energy parameters are taken from the ÖKOBaudat and the KBOB-LIST.

Objectives
The aim is to provide a model for determining initial investment cost and future investment cost for the real estate types hotel, logistics, residential, retail and hospital. The specific differences of the individual types of real estate are identified. On this basis, approaches for reconditioning costs of property valuation are provided.

References
