Improving the Life Cycle Assessment by Improving the Indoor Air Quality (IAQ)

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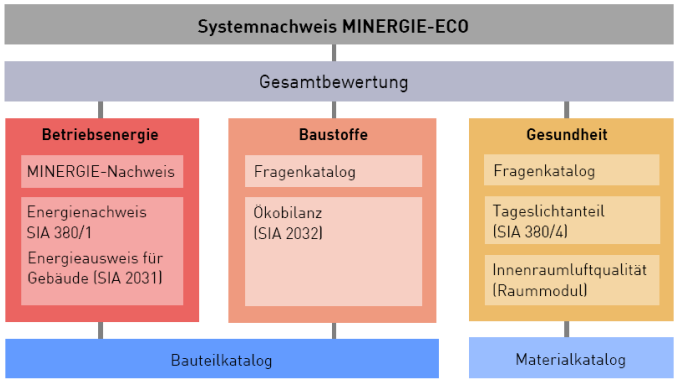
The life cycle of a building is assumed to be 80 years. A number of factors influence the selection of building materials and components, as for example cost, design, performance, and availability. Sustainable design seeks to minimize environmental health impacts caused by building materials. The selection of materials must focus on primary materials with the least impact. Preference must be given to primary materials with the least negative impact. For each stage of building, life cycle sustainable design aims not only at reducing the output of energy and re sources, but also at minimizing the impacts on ecosystems and health. This leads to fewer costs.

As an important aspect of the life cycle assessment you have to consider what is needed to improve the indoor air quality (IAQ). A mathematical model allows to predict the future indoor air quality during the design phase. Based on this model, a tool was developed that architects and other consultants can make use of to optimize the construction and surfaces during the design phase. This calculation tool will be part of MINERGIE-ECOplus, a Swiss sustainability evaluation method. MINERGIE is a building label for ecological design, high energy efficiency, and comfort.



Starting Position

People spend 80% of their lives in buildings. Indoor air quality is one of the major factors effecting their well-being. The increase of air pollution caused by various effects of 'traditional' building methods leeds to fogging effects, MCS Syndrom (Multi Chemical Sensitivity Syndrom), sick building syndrom and general discomfort. If one does not take into account the requirements for well-being and health, one reduces the life cycle assessment of buildings. The Swiss building label, MINERGIE-ECO, evaluates energy efficiency, environmental impact, and the ecological quality of buildings. LESOSAI, an energy simulation software, has been improved by tools for IAQ to make predictions regarding future indoor air quality and ecobalance calculation.

Implementation

User-friendly, accurate, and reliable calculation tools are our aim. The qualitative criteria ('comfort' for example) have already been developed in the form of a questionnaire. The indoor air quality criteria can be evaluated quantitatively. Therefore the emission data of building materials for VOC, formaldehyd, and other substances are collected in a catalogue of materials. This catalogue is based on existing emission data from different sources. Further information is necessary, like, for example, room capacity, air change rate, quantity and consistence of surface materials. In order to evaluate data and make predictions regarding future indoor air quality, reference values have to be taken into account. By this process, a classification system ranging from 'very good' to 'bad' quality becomes possible. The results are combined with those received from the questionnaire. For the application of the label, a software tool will be developed by the help of which the user can change and optimize the building design and the building materials and simultaneously observe the results of the changes.