ACATIS FAIR VALUE SPECIAL

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Sustainability in construction: Opportunities for the industry

The life cycle of a building consists of the construction, use and dismantling/disposal phases. The environmental burden during the use phase has declined as buildings have become better insulated and more energy efficient. As a result, the relative impact of the construction and disposal phase has increased. For example, the average home, which is built with conventional materials, requires approximately 100-150 GJ (Gigajoules) for the construction phase. By comparison, the heating system of the average conventional house consumes around 65 GJ per year, while a Minergie house only uses 11 GJ per year. And passive houses do not use any energy, which makes the contribution of the construction phase even more dominant. The dismantling phase either consumes or produces energy. For example, lumber can be burnt to produce electricity, which leads to a negative consumption of energy during the disposal phase.

The high energy requirements for the construction process are due to the various materials that are used during this phase. Concrete, for example, has an energy content of 4.8 GJ, while the energy content of glass can be as high as 19.2 GJ per m^3. With regard to the third phase, there are limits when it comes to conventional materials. Concrete, for example, cannot be returned to its original form, and there are only limited recycling options, such as filler materials.
At this time, there are several initiatives under way to improve the ecological profile of building materials. The Dutch ASN Bank focuses on so-called bio-based construction:
These houses have a much higher proportion of renewable materials. WUR (Wageningen University and Research) has developed a catalogue of bio-based building materials. Evidently, wood is an ideal building material that can (partially) replace concrete for most applications. Wood has a CO2-neutral environmental profile and a small total CO2 footprint, particularly when it is produced locally. Other bio-based materials include fibreboards such as MDF, HDF and OSB.

Traditionally, straw and reed have been used as insulation materials. However, other renewable materials such as coconut fibre, cellulose fibre, cotton or sheep wool can also be used. Straw can also be used to produce ash, which is suitable as a replacement for concrete. There are also different plastics that can be made of renewable materials, e.g. polyurethane and polyester, which makes their environmental profile more sustainable.
Besides building materials, the lifetime of buildings is also a very important factor. The effects of the building phase are "amortised" over the lifetime, so that the annual effects of the building phase decline over the lifetime. In most cases, buildings are torn down when their purpose changes. Therefore, it is important that future buildings are designed for multiple purposes, and that they can be converted with limited materials and labour. Modular building concepts can be helpful in this context since parts of the building or structure can be re-used for other purposes.

Many construction firms already have divisions that specialise in "ecological" or "sustainable" construction. The wood processing industry is also taking advantage of this opportunity. Even large chemical industries know that they cannot afford to miss this trend. Recognising the big impact of concrete on the environmental profile of buildings, BASF has initiated the development of more sustainable concrete ingredients using ecological balance sheet tools. Such efforts should lead to an even brighter future for buildings.

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