

SUSTAINABILITY CRITERIA'S TO IMPROVE THE QUALITY OF DWELLING HOUSES OVER THE LIFECYCLE

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Summary

The sustainability is based on three dimensions – the ecology, the economy and the social culture. The priority aim is to minimize the consumption of the resources for developable areas, materials, energy and capital, referred to the total lifecycle of the building. The overcoming of this challenge opens a new step in building quality. The success or non-success of this ambitious venture depends on the early decisions, which were made in the frame of the preliminary planning. The following information's and experiences shall make a contribution, to show off the principal planning instruments to realize the quality requirements of constructing sustainable dwelling houses.

Keywords: dwelling houses, lifecycle, constructional quality, climate protection, saving energy, sustainability, ecology, economy, social culture

1 Introduction

The term sustainability stems originally from the forestry. It denotes the amount of the trees which were cut without affecting the growing back of the forest. This requirement can be transferred on any kind of system. Nowadays it is mostly referred to as a „Three-Pillars-Model“. The ecology, the economy and the social culture (compare table 1).

Tab. 1 „Three-Pillars-Model“

„Three-Pillars-Model“	
ecology	Protection of climate and resources, Save of the biological diversity, Save of the culture and landscaping areas
economy	Permanent possibility to operate economically with having prosperity, Save of the economic resources
social culture	Health and satisfaction, Participation of all community members in an permanent liveable association

With the globalization the perception to the term sustainability has changed. Climate protection has a clear comprehensible global dimension. The questions are: Why in a great extent we are not constructing more sustainable buildings? How can sustainable buildings be constructed? The assessment of the sustainability comprises always the total life cycle of the building (compare fig. 1)

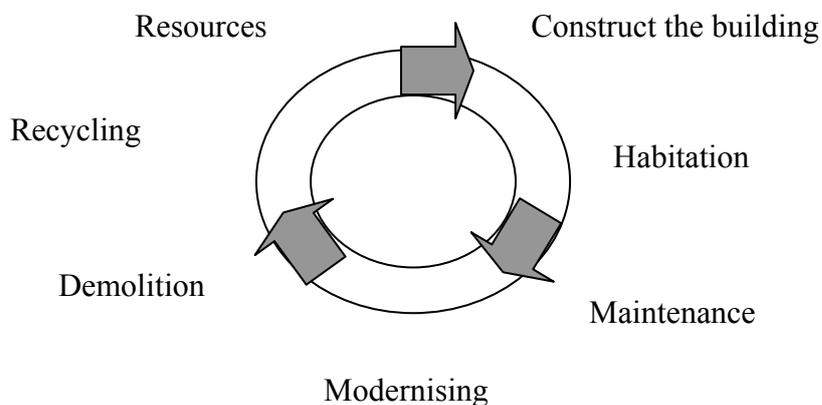


Fig. 1 Life cycle

Sustainability can only be reached if already all main criteria's in the preliminary planning (see table 1) are carefully attended and optimized. It is still the same that with the construction of a building the *soft factors* like ecology and social culture, step into the background. Mostly the strong factor *money* and the building time pressure disable the consideration of life cycle (compare fig. 2) to a progressive and permanent economic building. In contrast, we know that in the life cycle of the building, two thirds of the costs must be spent for the building operation and only one third for the construction [4]. The following information's and experiences shall make a contribution, to show off the principal planning instruments to realize the quality requirements of constructing sustainable dwelling houses.

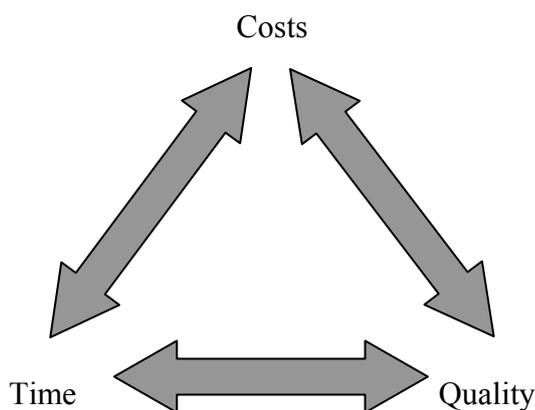


Fig. 2 Conflicts for sustainable built

2 Saving energy and object planning

For example, in Germany the government regulates the standard of energy saving buildings. The last novella of this law was in October 2009 [1]. Every new house must fulfil a number of energy saving criteria's, using solar power and install high efficiency insulating glass windows, thermal insulation for the walls, roof and floor, use of an progressive heating system like pellets as an regrowing material, etc. E.g., a normal standard house must not spend more energy then converted 5 to 7 litre oil per square meter floor space. With an intelligent integral planning between the building service-engineering and the construction, together with the use of innovative technologies, it's already possible to construct a house which uses only regenerative "green energy" and no resources.

But one of the biggest influences lies in the construction shape of the building. Dissected building forms with porches, balconies, extensions, roof extensions etc., can increase the energy consumption and the building costs about 50 % [2]. The experience has shown, that the simple cube form with a flat or little leaned roof is the favourite shape (compare fig 3 and 4).

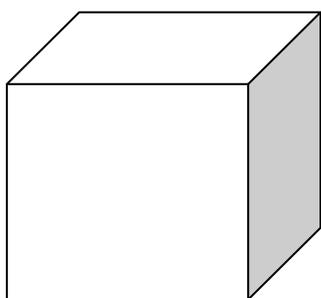


Fig. 3 Favourite building form

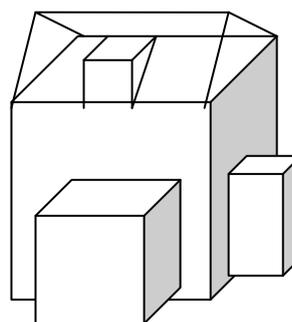


Fig. 4 Disadvantage Building form

3 Sound proof

A sufficient sound proof is one of the most important requirements for comfortable living. Researches [3] have found out that too much and perpetual noise can make the people sick. In this case, massive and heavy materials for the exterior walls plus sound proofed doors and windows should be preferred. The sound proof has to be already well calculated in the planning stage and detailed considered in the construction plans.

4 Using of regrowing materials and recycling products

The usage of antipollution and healthy uncritical natural materials can contribute to a comfortable well dwelling and save the environment. In Germany, different serious labels for uncritical materials, e.g. "Blauer Engel" gives a guidance to choose the right material. Equivalent recycling materials should be preferred. The used materials should be documented in a Building passport.

5 Conclusions

Sustainable solutions for the total life cycle of an object are composed of

- the usage of regrowing materials and recycling products
- architecture with flexibility for change of use
- less complex systems, visible installations, high building quality
- optimization of the living conditions for the habitants
- Reducing the efforts for maintenance, cleaning and building operation, etc.
- minimizing the energy consumption and usage of intelligent multiple heat and cold systems
- developing and usage of sound proofed conceptions
- usage of concepts for handicapped and seniors
- traffic concept for the habitants
- creation of local easy short traffic connections

References

- [1] Energieeinsparverordnung 2009,
- [2] Institut Fortbildung Bau e.V., Architektenkammer Stuttgart, Ausbildungsreihe Energieberatung, Ausgabe 02.2002
- [3] Bauforschung Deutscher Bundestag Drucksache 14/2300, 14. Wahlperiode, 15. 12. 1999 Unterrichtung durch die Bundesregierung Sondergutachten des Rates von Sachverständigen für Umweltfragen Umwelt und Gesundheit Risiken richtig einschätzen ISSN 0722-8333, Ausgabe 1999
http://www.umweltrat.de/cae/servlet/contentblob/467530/publicationFile/34323/1999_SG_UmweltundGesundheit.pdf
- [4] Leitfaden Nachhaltiges Bauen, Herausgeber: Bundesamt für Bauwesen und Raumordnung im Auftrag des Bundesministeriums für Verkehr, Bau- und Wohnungswesen Stand: Januar 2001, 2. Nachdruck
http://www.bmvbs.de/Anlage/original_8183/Leitfaden-Nachhaltiges-Bauen.pdf