

# SuFiQuaD

## Sustainability, Financial and Quality evaluation of Dwelling types

### DURATION OF THE PROJECT

Phase 1: 01/01/2007 – 31/01/2009  
Phase 2: 01/02/2009 – 31/01/2011

### BUDGET

790.292 €

### KEYWORDS

Housing sector, LCA, LCC, ROI, optimisation, standardisation

### CONTEXT

In Belgium, as in other countries, the construction sector is responsible for an important part of the total environmental impact, of which housing represents a significant fraction. Current approaches aiming at a sustainable development of the (building and) housing sector, are focusing on the different aspects separately (materials suppliers, energy use of end users, etc.), abstracting the complex interrelations. This allows for a detailed analysis but misses a global objective by losing the overall picture. Strategies are needed to evolve to a sustainable development of the construction and housing sector in Belgium.

By using optimization techniques the total cost will be evaluated. The total cost represents the financial cost as well as the environmental cost, for both the investment and the cost-in-use. During this optimization the qualities will be taken into account. Quality evaluation is seen as an essential part of the 'integrated approach' since on the building level no identical 'functional units' are definable. Different typologies represent different qualities, but also within a certain typology different qualities can be obtained depending on the design, size, choice of building materials, etc.

The elaborated approach will be translated into a work instrument and applied to extreme housing types in a first test phase. Based on this implementation both the methodology and the work instrument will be evaluated and adapted.

### PROJECT DESCRIPTION

#### Objectives

The aim of the research is to strive for more sustainable dwellings. The research departs from the need for an integrated approach aiming at a typology-specific analysis of the sustainability of the dwellings in all aspects. Within the research the complex interaction will be analysed between housing typology, lifestyle, spatial characteristics, technical solutions for building elements on the one hand and the qualities, the financial and the environmental consequences on the other hand.

After this evaluation, the work instrument will be used to analyse representative housing types in the Belgian context. Housing type, location and technical choices for building elements are interrelated. Each type will generate other requirements: acoustical and thermal insulation, fire-resistance, maintenance, structural safety, etc. Each type will also result in other qualities: access to garden, expandability, thermal compactness, floor/terrain ratio, requirements for public infrastructure, etc.

In order to address the continuing absence of any action by the stakeholders in the building sector, the proposal wants to produce 'identifiable' results instead of general statements. Therefore the research will focus on different building typologies such as apartments, freestanding houses, row-houses.

Typology specific recommendations are expected to lead to recognizable actions since these are more directly linked to one's personal situation. This holds for the (future) users of the building, as well as for those who design and build it and for the interrelation between all. To make the results more meaningful for the stakeholders, a reference case will be defined for each typology. This allows comparing one's own situation with a reference situation, which stimulates actions of improvement.

#### Methodology

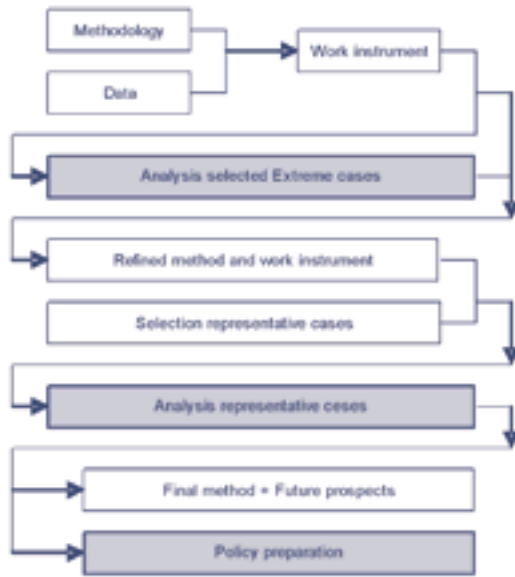
To elaborate the aimed integrated approach, different techniques will be combined: classic financial evaluation techniques (investment evaluation, cost-in-use simulations, ...), traditional environmental evaluation methods (Life Cycle Assessment, environmental shadow prices,...) and a quality evaluation based on a Multi-Criteria Analysis.

The elaborated methodology and analysis of the housing typologies should allow answering the following question: 'starting from a basic solution, how can the limited budget best be spent taking into account environmental effects and qualities?' Translating the insights into an operational policy is the next step. Current policy measures in Belgium and the European context will be evaluated in relation to the findings of the analysis in this research.



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## INTERACTION BETWEEN THE DIFFERENT PARTNERS

The K.U.Leuven is responsible for the coordination of the project. The three partners (K.U.Leuven, VITO and BBRI) will work simultaneously on the different aspects of the research. On a regular base they will meet to discuss their findings and to guarantee the coordination. When required, partners will work together more intensively.

## EXPECTED RESULTS AND/OR PRODUCTS

- Conceptual model to optimize the total costs (financial and environmental during the whole life cycle) and benefits (qualities).
- Operational work instrument (translation of elaborated methodology) for the partners.
- Analysis of sustainability of the representative housing types for the Belgian context.
- Document with policy recommendations based on the findings of the analysis.

## PARTNERS - ACTIVITIES

K.U.Leuven, dept. ASRO, is mainly experienced in the domain of LCC (Life Cycle Costing), quality evaluation and optimization techniques at the building level. Concerning environmental impact calculations of buildings, a number of researches and PhD's have been carried out as well.

VITO, is experienced in LCA (Life Cycle Assessment) studies, among others of buildings and housing. A method to translate environmental effects into environmental costs has

yet been developed. Moreover sustainable energy systems and rational energy use have been studied for both the transport and building sector.

BBRI, is experienced in the state-of-the-art of the European context, as well concerning methodological aspects as policy measures of this research theme. They also gathered a lot of data for the Belgian context, for both the building sector in general as for end-of-life phase of buildings in specific.

## CONTACT INFORMATION

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### Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting <http://www.belspo.be/fedra> or <http://www.belspo.be/ssd>

