



Design support for circular buildings: a guiding methodology for architects in early design

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ABSTRACT

Develop a methodology to guide architects during early design within the circular design paradigm and empower Belgian architects to embrace and integrate the principles of circular design in an innovative way in their design practice and facilitate their leadership towards the European sustainability targets and set the foundation for future development in education, research and practice within a new paradigm and for knowledge know-how in relation to the circular economy.

The research expected outcome visualizations will be a guide which is setting standards of circular building design for scientific researchers, students, and architects with designing software for this purpose.

KEYWORDS

design support, renewable resources, sustainable building, circular design, energy, materials

PROBLEM

The main principles of circular design are not new [1,2,3,4,5,6], but There are no clear criteria, indicators, and no hands-on guide to support architects when designing buildings within a circular paradigm so far [7]. There are problems related to:

- Calculation of material quantities (average 3 weeks for a mid-size project 2000 m2)
- Life Cycle Assessment LCA for materials.
- Use of very complicated software.

OBJECTIVES

- Development of a carrying framework for circular design.
- Providing an overview and recommendations for circular building design in Belgium.
- Translation of this framework into a methodology that will guide architects during early design within a circular design paradigm.
- Validation and dissemination of the guiding methodology in education.

AUDIENCE

Scientific researchers, Students, Architects, Experts, and Government departments.

RESEARCH QUESTIONS

- How to promote life cycle thinking during design?
- How to design energy-efficient and material-efficient buildings?
- How to inform designers about the different design options based on a life thinking approach during early design phase?
- How to maintain comfort?

METHODOLOGY

In this PhD, literature review, case study analysis, quantitative research (energy performance simulation, LCC, and LCA), qualitative research (interviews, workshops) and research by design are the main research methods. The framework and methodology that will be developed within this PhD will be used as input for both the Design Studio and the Research Seminar. It will allow and guide students to explore circular designs, therefore, on the other hand, as input for the PhD. In addition, the usability and effectiveness of the developed methodology will be tested in the Design Studio and the Research Seminar and will be iteratively improved.

RESULTS

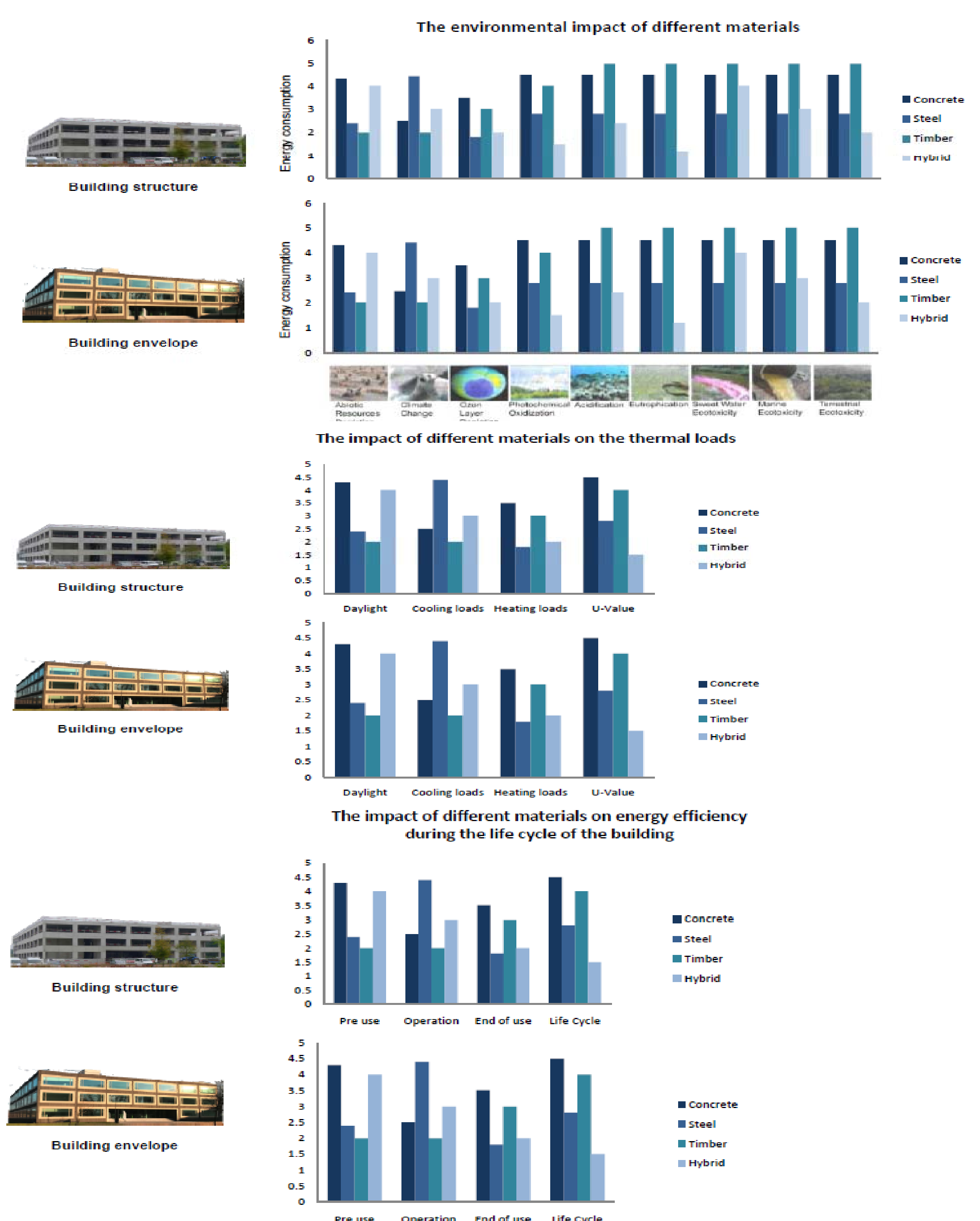


Fig. 1: Expected outcome (Examples).

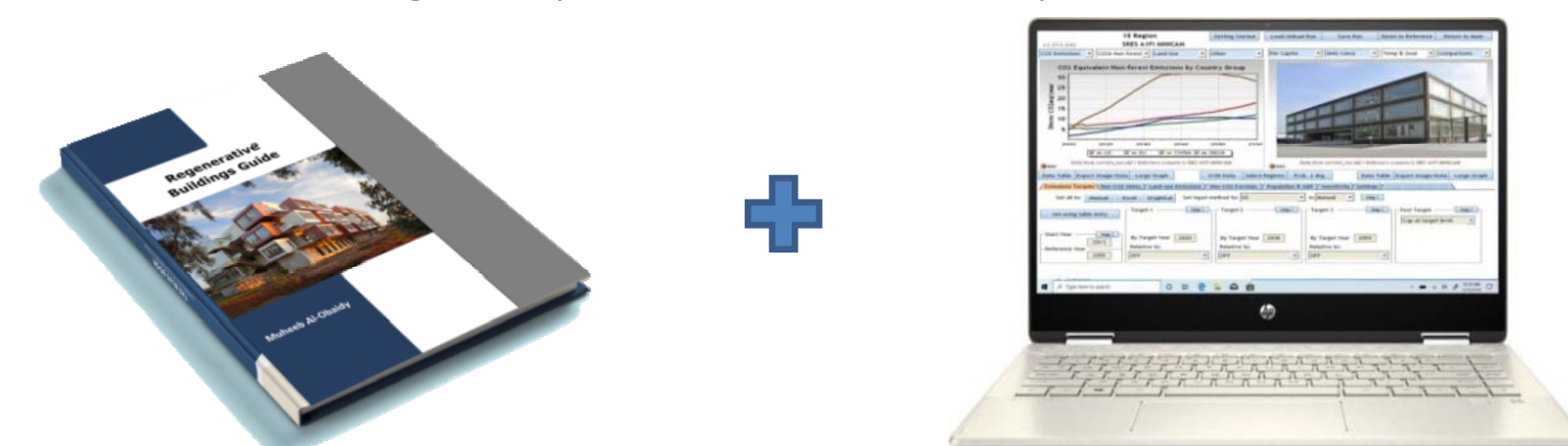


Fig. 2: Expected Outcome Visualizations.

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