Developing two benchmark models for post-world war residential buildings

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ABSTRACT

This study reports the results of a recent field survey of Belgian residential buildings constructed between 1945-1990. Simulation models of the energetic performance of these buildings are created with DesignBuilder, reflecting the characteristics of the average energy consumption of heated detached residential houses in Belgium. For future evaluation to improve energy efficiency., this study establishes two detailed models describing the energy consumption profiles for heating, lighting, domestic hot water and appliances of buildings from this period.

KEYWORDS

Simulation model – Post-world war – Survey – Energy - Residential building – Detached house– Typology

PROBLEM

Buildings constructed after the Second World War account for a large part of the Belgian residential sector. Their PEB : E, F or G index combined with Europe's desire to reduce the energy bill of the residential sector makes these buildings ideal candidates for future renovation projects. However, there are almost no precise studies or models characterizing these buildings on which the best energy renovation process can be estimated.

OBJECTIVE/HYPOTHESIS

- Characterize and understand the performance of residential buildings constructed between 1945-1969 and those between 1970-1990 in Belgium.
- Develop representative data sets for building energy simulation.
- Develop two reference models for the Belgian residential sector between 1945 and 1990.
- Create two simulation models that best represent the energy consumption patterns of these detached houses.

AUDIENCE

Journal of Energy & Buildings readers

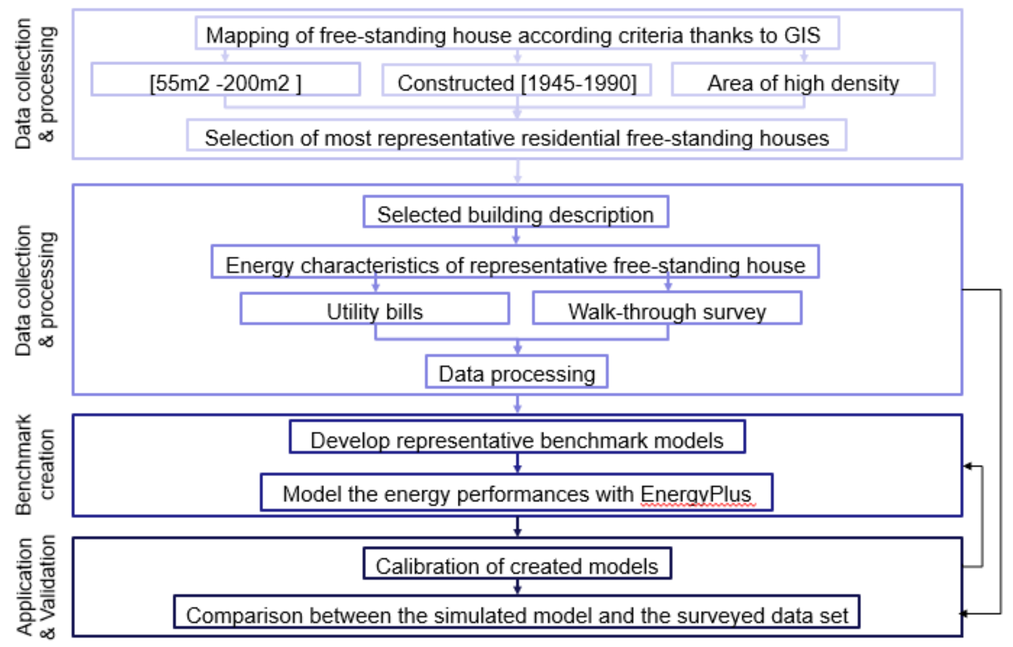
RESEARCH QUESTION

What is the best method for renovating houses built between 1945 and 1990 in Belgium, in order to reduce the energy consumption of the old housing stock at a lower cost?

ORIGINALITY

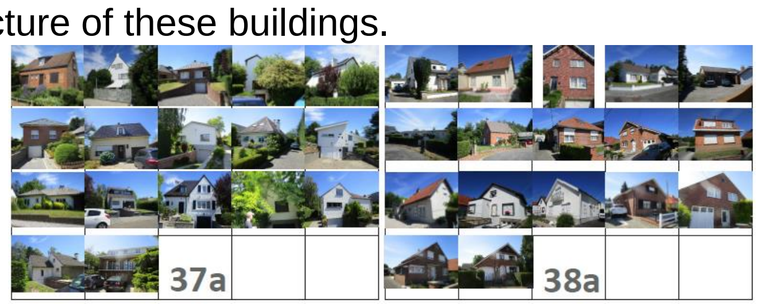
- One of the first in-depth studies allowing to precisely characterize the buildings of these periods in two equivalent models.
- Strong field study to study in depth the behavior of the occupants and the characteristics of the building to create a representative model.
- Strong potential impact on the sphere of renovation companies as it allows to establish a hierarchy of works to be carried out in priority.

METHODOLOGY

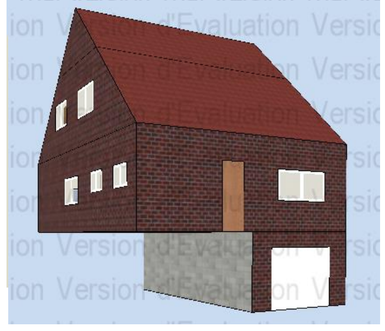


RESULTS

- Continued creation of the database aimed at characterizing the buildings constructed between 1945-69 & 1970-90.
- Layout of the results in order to have a global view of the architecture of these buildings.



- Design of the simulation model corresponding to the first type of architecture (1945-69) using DesignBuilder.
- Calibration of the model to match the energy data of the real buildings.



CONCLUSION

This work provides a better understanding of the energy behavior of the many detached houses built between 1945&90 in Belgium.

We understand that there is a great potential for renovation of these houses. Indeed, these buildings are often poorly insulated, and this study will allow their occupants who have the will and the means of payment to renovate them, to better anticipate and plan the work.

RESOURCES

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