



Development of Benchmark Models for the Belgian Residential Buildings Sector

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ABSTRACT

This study reports the results of a recent field survey for residential buildings in Belgium. Building performance simulation models are created with DesignBuilder reflecting the average energy consumption characteristics of heated residential free-standing houses in Belgium. Aiming for future evaluation energy efficiency improvements this study established detailed models describing the energy use profiles for heating, lighting, domestic hot water and appliances in respect to buildings layout and construction.

KEYWORDS

Simulation model – Survey – Energy - Residential building – Free-standing house – Typology

PROBLEM

The residential sector in Belgium is mainly composed of old constructions that consume a lot (bad or no insulation). Combined with climate change and the inevitable decrease of fossil energy, there is a real need to reduce the energy consumption in the residential sector which moreover has great renovation potential.

OBJECTIVE/HYPOTHESIS

- Characterize & Understand the performances of residential building built between 1945-1990 in Belgium.
- Develop representative simulation building energy data sets.
- Develop benchmark models for the Belgian residential sector.
- Create simulation models that represent energy consumption patterns of free-standing houses.
- Develop a field survey.

AUDIENCE

Journal of Energy & Buildings readers

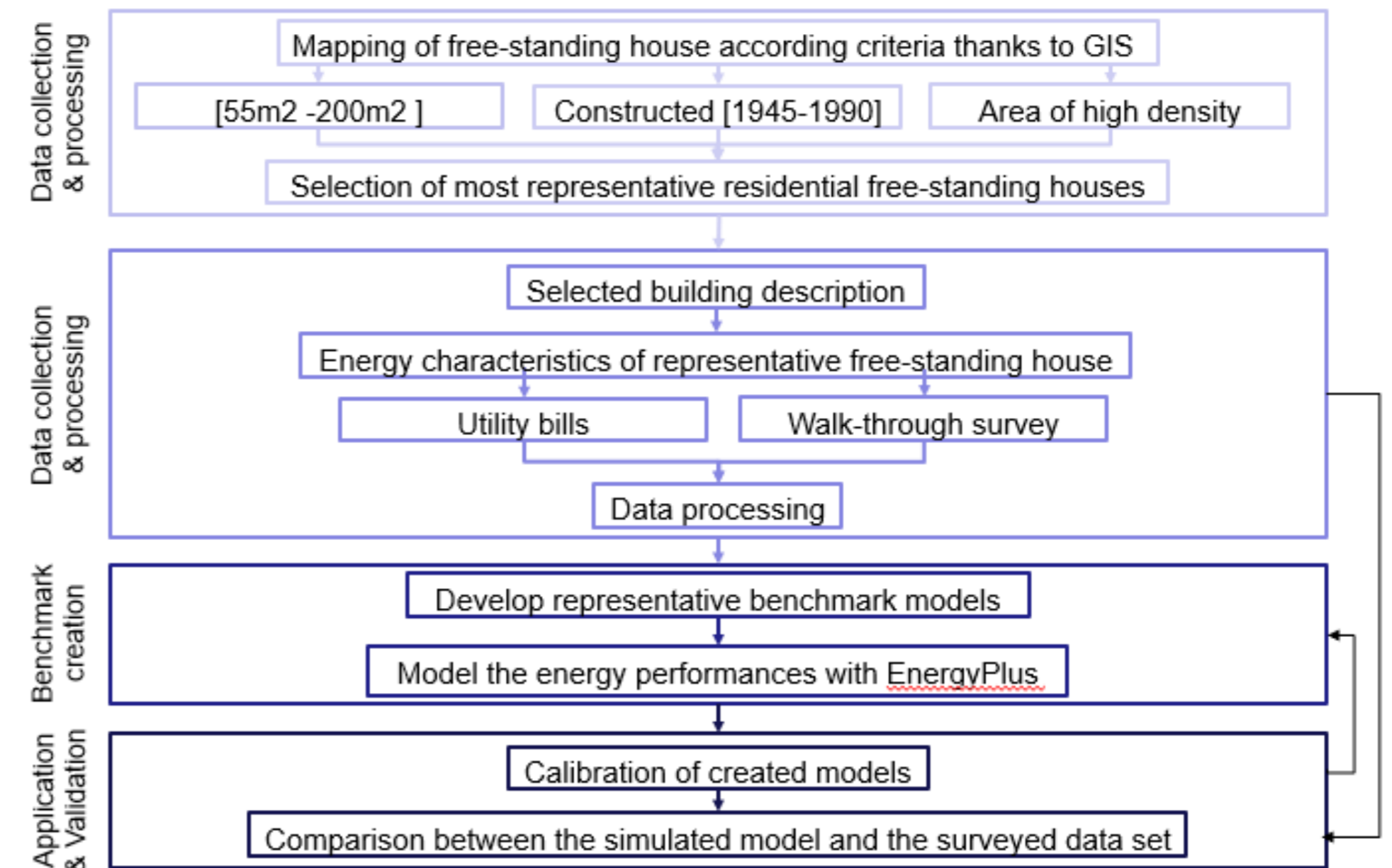
RESEARCH QUESTION

Is there a real renovation potential for the old residential park in Belgium, with houses constructed between 1945 & 1990, which can highly decrease the energy consumption ?

ORIGINALITY

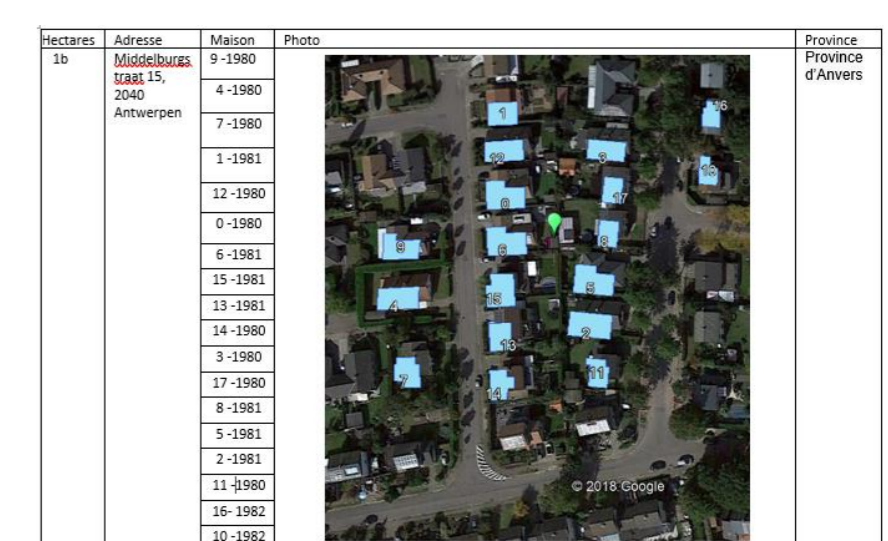
- This work aims to combine both the occupants behavior and the building characteristics deeply to create a representative model.
- The study focus on detached houses constructed between 1945 & 1970 to highlight the renovation potential.

METHODOLOGY



RESULTS

- A sample of 1000 detached houses distributed over all the Belgium thanks to the GIS.
- Creation of the survey is also an important result and the data collected through it are essential.
- Thanks to survey data : development of two different models for the construction's periods of 1945-70 & 1970-90 .



2018 Typ.2	Member	1	2	3
Season 1*	Employment	Full-Time	Full-Time	Student
03 Sept - 2 July	Occupancy	18:00-08:00	16:00-09:00	16:00-09:00
Season 2*	Employment	Full-Time	Holidays	Holidays
1 August - 31 Aug	Occupancy	18:00-08:00	24/7	24/7
Weekend	Employment	Day off	Day off	Day off
Saturday - Sunday	Occupancy	24/24	24/24	24/24



- Simulation of the two typologies which are representative for detached houses in Belgium : energy consumption with occupants behavior & building characteristics.

CONCLUSION

- This work permit to better understand the energy behavior of detached houses constructed between 1945&90 in Belgium, through the occupants habits and the building characteristics.
- We discover that big renovation potential concerning houses constructed between 1945&70 are existing to increase the energy efficiency of the building. Indeed those buildings are often not insulated. Otherwise, houses constructed between 1970&90 are more often insulated and this potential is smaller.

Resources

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