Development of a Benchmark Model for Nursing Homes in Liège

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ABSTRACT

The aim of this study is to develop an energy performance data set and a building performance simulation benchmark model for nursing homes in Liège, Belgium. An analysis of energy consumption, data collection and visits were conducted. One building performance simulation model was created in EnergyPlus to benchmark the average energy consumption and building characteristics. The validity of the estimate has been further checked against the public statistics and verified through model calibration and utility bill comparison. The study provides a timely opportunity to evaluate the real performance of nursing home in Liège. The findings on energy needs and use intensity are useful in temperate and continental climates.

KEYWORDS

Assessment – Living conditions – Elderly – Overheating
Indoor Environmental Quality – HVAC – Thermal comfort

PROBLEM

Nursing homes in Belgium are mainly composed of old constructions that do not posses HVAC systems. Combined with climate change, there is a real need to act on indoor environment quality in nursing homes, for the elderly's sake.

OBJECTIVE / HYPOTHESIS

• Characterize & Understand the performances of Liège's nursing homes
• Develop representative simulation building energy data sets.
• Develop benchmark models for nursing homes in Liège
• Create simulation models that represent energy consumption patterns of nursing homes

AUDIENCE

Wallonie santé, the European Federation of Retired and Elderly People, Orpea, the nursing homes directors
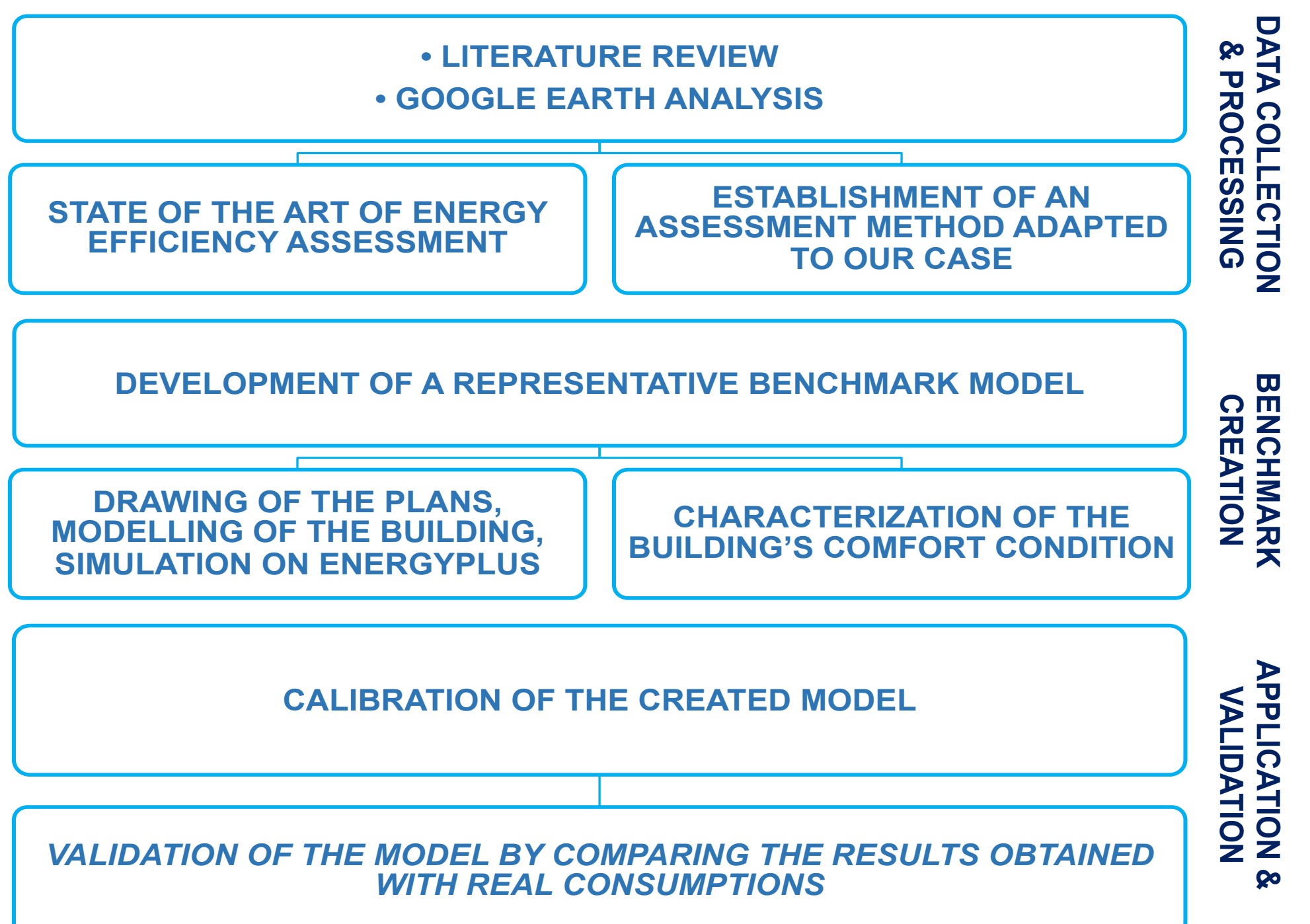
RESEARCH QUESTION

How is it possible to enhance the elderly's comfort conditions and air quality in nursing homes?

ORIGINALITY

• First time a study on comfort monitoring in nursing homes is done in Belgium
• Different categories of comfort

METHODOLOGY

DATA COLLECTION & PROCESSING
- • LITERATURE REVIEW
- • GOOGLE EARTH ANALYSIS
- STATE OF THE ART OF ENERGY EFFICIENCY ASSESSMENT
- ESTABLISHMENT OF AN ASSESSMENT METHOD ADAPTED TO OUR CASE

BENCHMARK CREATION
- DEVELOPMENT OF A REPRESENTATIVE BENCHMARK MODEL
- DRAWING OF THE PLANS, MODELLING OF THE BUILDING, SIMULATION ON ENERGYPLUS
- CHARACTERIZATION OF THE BUILDING'S COMFORT CONDITION

APPLICATION & VALIDATION
- CALIBRATION OF THE CREATED MODEL
- *VALIDATION OF THE MODEL BY COMPARING THE RESULTS OBTAINED WITH REAL CONSUMPTIONS*

RESULTS

• Drafting of a literature review grouping together articles on the theme
• Drawing of the plans and the thermal zoning of the Résidence de Bavière on AutoCad
• Modelling of the building on Design Builder
• Running of simulations on the Building
• Validation of the model by comparing the results with real consumptions

Ground floor

Basement

Floors 1 to 8

9th floor

0m   5m   10m

CONCLUSION

• This work has permitted a better understanding of the energy behavior of nursing homes in Liège, through the occupants' habits and the building characteristics.
• We validated the model thanks to the real consumption data.

RESOURCES

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