PRESS RELEASE

PhD Stijn Verbeke – Thermal inertia in dwellings

Stijn Verbeke has successfully defended his Ph.D. in Applied Engineering on Tuesday October 31 at UAntwerpen. Professor Amaryllis Audenaert was his supervisor. His PhD thesis is titled “Thermal Inertia in Dwellings: quantifying the relative effects of building thermal mass on energy use and overheating risk in a temperate climate”.

Using significant quantities of thermal insulation has become evident in today’s building practice. Apart from insulation, the thermal capacity of building materials can also affect the building performance. A lightweight timber frame construction will for example display distinct behaviour from a massive construction comprising of masonry and concrete; even when thermal insulation properties are kept identical.

The time-shifting and damping effect manifested by some constructions, is referred to as thermal inertia. In this PhD dissertation, Stijn Verbeke sets out to investigate the relative impact of thermal inertia on heating energy demand and thermal comfort of dwellings. Dynamic building simulation software is deployed to assess the performance of several building designs and construction types. The work focusses especially on the moderate Belgian climatic conditions. Attention was given to model occupant behaviour in great detail, as well as analyse the sensitivity of the simulation outcomes to many of the modelling assumptions.

Overall, the net effect of thermal inertia appears to be relatively limited and strongly dependent on other features such as the occupant behaviour. In a moderate climate, a well-balanced building design should be able to meet the energy efficiency as well as thermal comfort requirements, irrespective of the thermal mass of the constructions.