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Author: Nikola Maodus Boris Agarski Tatjana Kocetov
Misulic Igor Budak Miroslava Radeka



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LIFE CYCLE AND ENERGY PERFORMANCE ASSESSMENT OF THREE WALL TYPES IN SOUTH-EASTERN EUROPE REGION

*Nikola Maodus**, Boris Agarski, Tatjana Kocetov Misulic, Igor Budak, Miroslava Radeka

University of Novi Sad, Faculty of Technical Sciences, Trg Dositeja Obradovica 6, 21000 Novi Sad, Serbia

*Corresponding author. Tel.: +381 21 485 2439; fax: +381 21 455 672. E-mail address: nikolamaodus@uns.ac.rs (N. Maodus)

Highlights

- Energy efficiency and life cycle assessment of 3 wall types in South-eastern Europe
- Aerated autoclaved concrete wall performed the best under chosen system boundaries
- Brick wall performed well in energy-efficiency assessment in discontinuous heating
- Better use of thermal mass may improve energy performance of timber-frame wall

Abstract

Energy-efficient buildings, made of ecologically acceptable materials, are result of a worldwide ecological awareness induced by ever growing concern in regard to climate changes and economic aspects of long term energy savings. Complexities regarding energy-efficiency, economy and traditional construction of residential family homes led to acceptance of new building materials and forming of several typical wall types in south-eastern European region. This paper offers an energy performance analysis and a life cycle assessment of three common outer wall types: prefabricated timber-frame, an aerated autoclaved concrete and a solid brick wall with two model heating regimes. In order to verify energy and environmental performance of each wall type in a complete building, a detached house model was determined with the same parameters used for comparison. Model performances were determined for the selected life cycle stages and system boundaries during an eighty year period taken as a service life of family houses and compared to conventional and passive houses performances found in literature. Analysis results show that the model with aerated autoclaved concrete wall has the best environmental performance and that model with masonry brick walls has the best thermal performance in discontinuous heating mode of the three analysed walls.

Keywords: *Wall type, energy-efficiency, life cycle assessment, light timber frame, aerated autoclaved concrete, masonry brick*

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