

Effects of Different Climate Zones, Building Types, and Primary Fuel Sources for Energy Production on Environmental Damage from Four External Wall Technologies for Residential Buildings in Israel

Authors : Svetlana Pushkar, Oleg Verbitsky

Abstract : The goal of the present study is to evaluate environmental damage from four wall technologies under the following conditions: four climate zones in Israel, two building (conventional vs. low-energy) types, and two types of fuel source [natural gas vs. photovoltaic (PV)]. The hierarchical ReCiPe method with a two-stage nested (hierarchical) ANOVA test is applied. It was revealed that in a hot climate in Israel in a conventional building fueled by natural gas, OE is dominant (90 %) over the P&C stage (10 %); in a mild climate in Israel in a low-energy building with PV, the P&C stage is dominant (85 %) over the OE stage (15 %). It is concluded that if PV is used in the building sector in Israel, (i) the P&C stage becomes a significant factor that influences the environment, (ii) autoclaved aerated block is the best external wall technology, and (iii) a two-stage nested mixed ANOVA can be used to evaluate environmental damage via ReCiPe when wall technologies are compared.

Keywords : life cycle assessment (LCA), photovoltaic, ReCiPe method, residential buildings

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