

ABSTRACT

Increasing energy demand, rising energy prices, and concerns regarding impacts of fossil fuel emissions on the environment necessitated the definition of energy savings strategies.

This thesis focused on the study of the energy performance and the potential of energy upgrading of single family houses in Cyprus. The main objective was to monitor and study representative single family houses in Cyprus, analyze their energy performance and their final energy consumption in order to investigate the application of various refurbishment scenarios, including a scenario for nearly Zero Energy Buildings (nZEB).

Six building units from two different chronological periods acted as model buildings and were used as showcase for demonstrating the energy performance and the potential of energy savings incurring from the application of various refurbishment scenarios. Three of the buildings belonged to the chronological period 1981-2006 and the other three to the chronological period 2007-2013. The buildings of each chronological period varied in construction characteristics, energy consumption demand and electromechanical systems.

The energy analysis of the buildings was conducted before and after the application of two refurbishment scenarios, one Typical and one Ambitious. The simulation of the energy performance of the buildings was carried out with iSBEM-cy which is the official tool for the certification of the energy performance of buildings in Cyprus. Comparative studies of buildings simulations and analysis of the cost effectiveness of the refurbishment scenarios strategies were performed.

Furthermore the energy efficiency and the cost viability of each refurbishment measure were analyzed in order to determine which measure leads to the greatest reduction of energy consumption and CO₂ emissions and the same time is mostly cost effective.

Keywords: Energy performance, Single Family Houses, Refurbishment scenarios, nearly Zero Energy Buildings (nZEB)