

## **ABSTRACT**

Living in a contemporary world, the rapid tempo of development associated with demands for a better way of living, increased the consumption of energy and consequently the establishment of energy crisis. The necessity for conserving energy is perceived in a global spectrum, impelling energy carriers to assemble actions and impulse the development of technologies for the attainment in decreasing consumptions of energy. In Europe, there is a coordination of the whole process with the creation of a series of directives: legislations seeking to coordinate the member states with common aims and methodologies.

The building sector constitutes the focal point of legislative frameworks, a sector which is, on the one hand, fundamental for the large percentage of waste of energy, while on the second hand upholds the largest potentials of meliorating the energy crisis. The instructions include various points for the upgrade and improvement of the building sector, whereas, the ultimate aim is to ensure the creation of new buildings with zero consumption. In other words, buildings that are capable of being energy autonomous play a vital role towards the global diminution of consumption of energy.

The path for the achievement of zero energy buildings is long and rough, and therefore frameworks were established for the gradual achievement of the final goals; one of them is the conversion of existing buildings as well as new, to nearly zero energy, through harmonizing directives of European Union. Within the framework of the present work thesis, the energy behaviours in the climate of Cyprus residence are analyzed, and specifically the behaviours of the envelope of the buildings, driven by the techniques which are defined through the guidance of the Cypriot enactment.

Subsequently, there is an implementation of various forms of insulation to improve the external envelope and additionally the upgrade; aims to harmonize the envelope with a building model of nearly zero energy consumption. Thereafter there is quelling of techno-economic analysis of the improvements.

On the latter there is a comparison of the results, from the affection on the upgrade of the building envelope and their premature conditions, illustrating their differences.