

Compliance of U-values in new residential buildings in Cyprus



MARINA KYPRIANOUDRACOU
The Cyprus Institute
m.kdracou@cyi.ac.cy

This study examines whether the minimum requirements regarding the U-values of the new residential buildings in Cyprus comply with the decrees issued by the MCIT, both as they were declared in the buildings' EPCs, and as they were built on site.

Keywords: energy, performance, certificate, EPC, U-values, compliance.

Introduction

Buildings have a significant contribution in the overall energy consumption in the European Union ("EU") by about 40%. For this reason, the EU has issued specific directives to member states related to the Energy Performance of Buildings and the use of renewable energy in buildings. Cyprus has embedded into national law the aforementioned directives, by taking various measures, such as issuing relevant decrees. The latest decrees by the Cypriot Ministry of Energy, Commerce, Industry and Tourism ("MCIT"), came into effect on 11 December 2013, according to which the new maximum specified heat transmission coefficients ("U-values") for the building envelope are as follows: U_{max} external walls/ columns/ beams = $0.72 \text{ W/m}^2\text{K}$, U_{max} external exposed floors/ roofs =

$0.63 \text{ W/m}^2\text{K}$, U_{max} floors above spaces without air-conditioning = $2.00 \text{ W/m}^2\text{K}$, U_{max} external openings = $3.23 \text{ W/m}^2\text{K}$, U_{mean} max. = $1.30 \text{ W/m}^2\text{K}$.

Compliance with the decrees issued by MCIT is both essential and crucial. That is why this study examines whether the minimum requirements regarding the U-values for the building envelope, as well as the average U-value, of the new residential buildings in Cyprus are according to the decrees issued by the MCIT, both as they were declared in the buildings' Energy Performance Certificates ("EPCs"), and as they were built on site.

Type of information collected and analyses conducted

The present study focuses on the U-values of 22 new residential buildings, located in the southern part of Cyprus (see **Figure 1**). During the study, photographs of the examined buildings during construction phase and documents from suppliers regarding the U-values of specific elements were collected, site visits and inspections took place in order to gather information regarding their real construction, and communications with architects, constructors, and tenants, where possible, were conducted in order to verify the as built situation of the examined construction elements that were declared in the EPCs. Moreover, a calculation of their U-values was conducted taking account of the as built situation in order to check whether the buildings were built as designed, specified and declared regarding those specific elements.

EPCs input data compliance

Non-compliance with the input data in the EPC of a building leads to wrong reporting, which in most cases means that the reported performance is better than the actual performance. Reported U-values may vary from actual U-values due to various reasons. For example

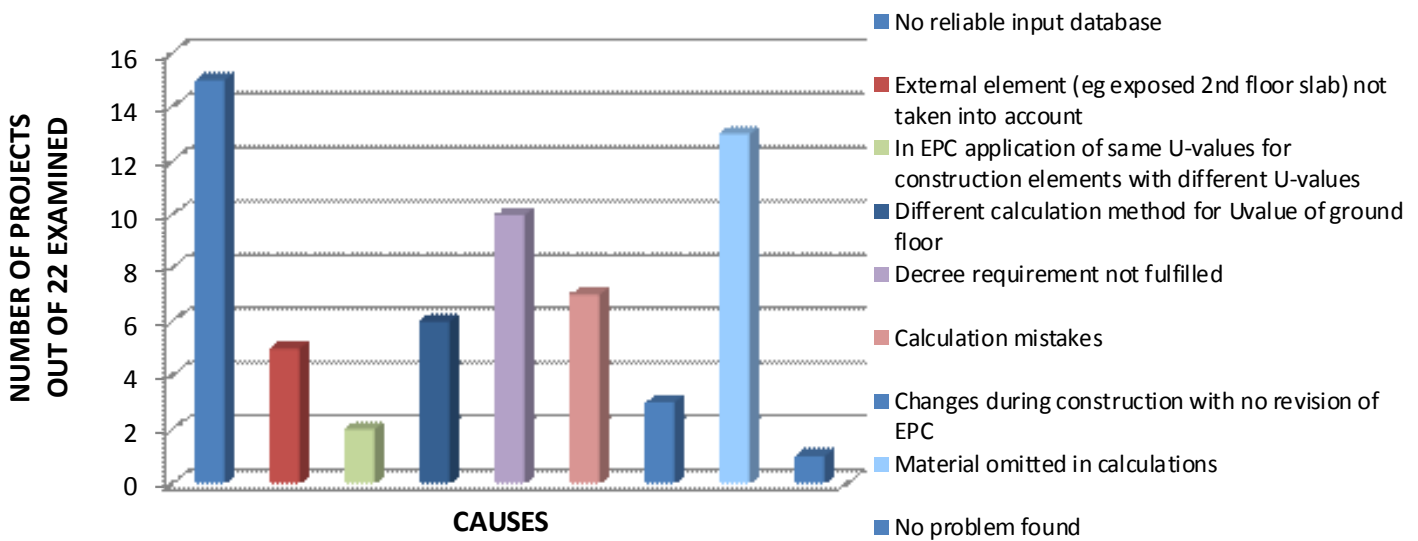


Figure 2. Causes for deviations between calculated in EPC U-values and in actual U-values.

during EPC calculation the qualified building energy assessors (QE) may be applying same U-values for construction elements with different U-values, or during construction there may be use of different products with worse U-values than the ones specified during the EPC calculation, or there may be mistakes or omissions of building elements during construction which lead to a different U-value than the one stated, or there may be missing or unclear definition regarding input data (e.g. windows, doors). Also, in Cyprus, although there is a control framework regarding the calculations in the EPCs in order to submit to authorities for building permit, there is no control framework on site, which means that there is no procedure to control energy performance issues related to the quality of the works.

Conclusions of Cyprus new data collection study

In the 22 new residential buildings, which were examined in the present study, there are deviations between reported and actual U-values, which sometimes are not so important, for example during calculation a construction element like the coat cement being omitted, but which sometimes are very important, for example there may be no reliable input data, or a construction element like part of an exposed slab or a single glazed window may not be taken into account, or there may be changes during construction without the required EPC revision (see **Figure 2**).¹

The study also showed that only 54.5% of the examined new residential buildings fully comply with the new requirements regarding maximum U-values and maximum average U-Value, whereas in the cases that they do not comply, there are specific construction elements that do not comply, which are the exposed floor slabs and the external openings. As for the pattern of causes for non-compliance, the study revealed that in most cases the causes ■

¹ Important note: Requested information was not provided by some QE and the main reason, as was reported by them, was that the reported in EPCs U-values vary from actual U-values due to either lack of a supervising engineer on site, or alterations made during construction without the required revision of the EPC due to time/budget reasons, or engineers giving wrong and/or deficient information to QE due to lack of knowledge or appreciation of the value of EPC.

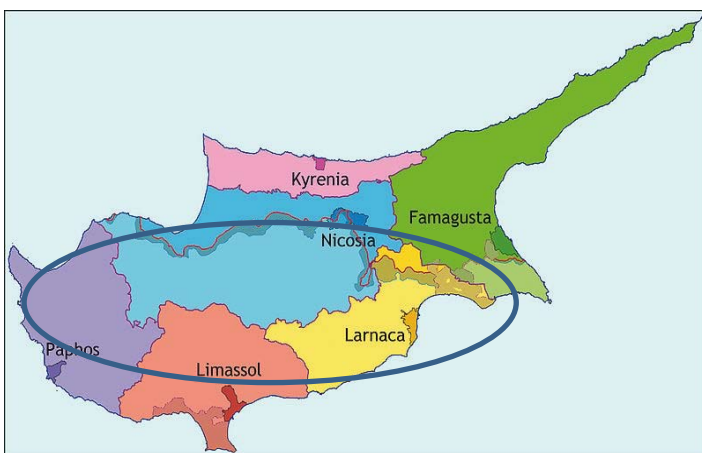


Figure 1. Study conducted in the southern part of Cyprus.