Effect of architectural solutions for clean energy in Healthcare Buildings

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1. Introduction – Interdisciplinary integrated studies in scientific research are becoming necessary to increase the efficiency of energy converters produced with new technologies and to reduce consumption of usage. Architectural design methods should be used efficiently to reduce energy consumption and to prevent harmful wastes. Today, some of the health structures where energy is of vital importance cannot provide energy from municipalities due to their location. For these reasons, the trend towards sustainable energy resources is increasing. In order to create a prototype in this study, in a land selected in Ankara Incek, a health structure has been designed as a low carbon building for optimum use of solar, wind and water energy. In the case study, an internal and shell design has been made using the energy efficient architectural design for the building, enabling electric and heat energy requirements to be met in a minimum cost and environmentally friendly manner.

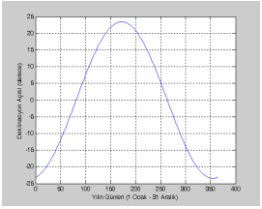

Image 1. Change of Declination Angle within a Year.

2. Experimental – In this study, simulation algorithms consisting of energy balances according to the northern façade of the health building, which is designed for radiation, diffusion and conduction heat transfer equations and characteristics of layers, have been written and solved for four different options. Unsteady state heat transfer calculations that are written for these algorithms, 2017 in Ankara was performed using hourly solar radiation and temperature data. [1,2].

3. Results and Discussion - The global hourly solar radiation values for January 2012 are shown in Figure 1(10). It is seen that the maximum solar radiation occurs between the hours of 9.00-12.00 UTC (Coordinated Universal Time) and also in Figure 2(11) the external temperatures reach the highest values in accordance with these time limits. On January 31, 2012, solar radiation was 35730.7 W / m2 (total solar radiation per hour).

Tabla I. Ankara region at 12:00, the sun's height angle (altitude) approximate values

City	Jan.	Feb.	March	Apr.	May.	June.	July	Aug.	Sep.	Oct.	Nov.	Dec.
Ankara	28	32	41,94	53	58	72	68	55	40	32	25	20

4. Conclusions - Three important results were obtained in these studies. 1) to evaluate the interdisciplinary study and data analysis because it is effective and fast. The advantage of the result obtained in the architectural design process is to extend the life of the building. 2) Based on the data obtained during the design phase, energy loss can be kept to a minimum with the help of comparison and analysis, while increasing the efficiency of the win / loss ratio and lowering the cost of earnings. Besides, it is possible to increase the efficiency of existing natural renewable energy sources with different solutions. 3) The design of buildings in an energy efficient architectural form ensures that the electrical and heat energy requirements are minimized and these requirements are met at minimum cost and environmentally friendly. This is possible only when different disciplines work together.

5. References

[1] Türkiye Orman ve Su İşleri Bakanlığı), Meteoroloji Genel Müdürlüğü, Güneş Işınımı ve Sıcaklık Ölçümleri, 2012.

[2] F. Bal Koçyiğit, *Zero Consumption Monotype Education Buildings*, GUJSci, 31(2). http://dergipark.gov.tr/download/articlefile/481729. http://dergipark.gov.tr/gujs, 2018