Energy efficient research in regional architecture

F.Bal Koçyigit [(1)], M.A. Zinkçi [(2)], M. Shayestehnam , E.Dinç

[(1)] Atilim University, Faculty of Fine Art Design and Architecture, Department of Architecture, Kizilcasar M. Incek, Ankara 06380. +90 312 5868900 filiz.kocyigit@atilim.edu.tr

[(2)(3)(4)] Atilim University, Faculty of Fine Art Design and Architecture, Department of Architecture, Kizilcasar M. Incek, Ankara 06380. +90 5372239449 merteracar@hotmail.com. , [(3)]+90 5452105813 omid.shayestehnam@gmail.com. [(4)] +90 5364740447 mimecedinç@gmail.com.

1. Introduction – Ankara was founded during the Roman and Galatians in the 2nd century BC and named "Anchor". Anchor comes from the term maritime of a ship-anchor. It is also known that there are many underground and surface water resources that are left out of use which are buried underground in Ankara today. In Ankara, where the Bağlar region is densely populated by Gordion and Midas, Ankara, Çankaya region is named as "Engür" which is the equivalent of Persian "grape" because of its wetlands and the presence of vineyards. Nowadays, Ankara is known as a dry zone, but it is known to be a wetland and vineyard region in the history. It is located in inner-cold region with cold and rainy winter and hot and arid climatic conditions in summer. Local and historical Ankara houses have architectural design and local materials for protection from cold winter and hot summer months. In the research, the historical and local houses in Kale, built by the King of Phrygian Midas (8th century BC), are now being restored and transformed into commercial buildings by changing their functions. Today, the transformation of structures from a residential to a workplace necessitates the doubling of energy requirements and the use of natural energy resources. The housing architecture limited the need for fossil energy and other energies and did not lead to new searches. However, due to Ankara's landforms, its structure in the form of a bowl leads to serious environmental problems as it causes the collapse of waste gases and necessitates the use of sustainable clean energy resources. In our study; In order to use the groundwater and surface waters effectively and to convert the energy into the energy by using the velocity and flow rates of the waters, field surveys and very analyzes have been made and the measures that can be taken in effective usage ways and structures have been evaluated.

2. Experimental - In this research, in addition to the solar and wind energy used in the local architecture, a field survey was conducted in order to convert the underground waters into energy in buildings. In line with the field analysis, the flow of groundwater was measured and the capacity to be converted to energy was investigated. Measures that can be taken in the local and historical buildings of Kaleiçi region, which are planned to be analyzed experimentally, were determined and the energy gains that could be obtained by the calculation method were analyzed.

3. Results and Discussion - As a result of the study, height between 1000-1200 meters in Ankara and in some periods from valleys, high flow streams have been identified. It has been determined that electricity can be produced from these types. In addition to solar energy and wind energy, it is believed that energy can be obtained by converting the water that can be supplied to electricity, and that this method can be an effective measure against air pollution reaching dangerous dimensions in winter months.

4. Conclusions - We have two important goals in this study; 1. To contribute to new measures that can be taken with passive methods and clean energy by determining the energy sources and usage patterns used in the local houses. 2.To determine the measures to be taken for the effective use of natural clean energy sources to meet the increasing energy needs with additional functions.

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).

SVT No	Akarsu Adı	İstasyon Adı	Koordinatlar (Derece:dakika:saniye) Enlem	Koordinatlar (Derece:dakika:saniye) Boylam	Toplam Uzunluğu (km)	İl Sınırları İçindeki Uzunluğu (km)	Debi (m^3/sn)	Kolu Olduğu Akarsu	Kullanım Amacı
D12A017	Kızılcahamam Deresi	Mandıra	40:25:57	32 :38:58	51,30	37,20	4,503		
D12A075	Sirkeli Çayı	Karşıyaka	40:08:30	32 :53:20	12,00	12,00	0,234		
D12A083	Ravlı Deresi	Ravlı	40:08:04	33 :06:30	14,30	14,30	0,172		
D12A099	Sey Deresi	Güvem	40:35:32	32 :39:31	22,50	22,50	1,493		
D12A118	Eymir Gölü	Çıkışı	39:50:00	32:51:00	65,70	65,70	0,768		
D12A126	Mera Çayı	Pazar Yol Ayrımı	40:20:02	32 :42:02	24,20	24,20	2,993		
D12A129	Çubuk Çayı	Yenice	40:07:37	32 :58:28	44,80	44,80	1,537		
D12A138	Sarçasaray Deresi	Yeşilöz	39:08:39	32 :20:13	40,90	40,90	0,265		
D12A147	Pazar Çayı	Pazar	40:19:43	32 :45:05	14,30	14,30	0,291		
D12A188	Nal Deresi	Yukapınar	40:14:23	31:20:32	38,10	31,90	1,555		
D12A189	Sövari Çayı	Zeyde	40:17:40	32:05:55	24,30	24,30	1,960		
D12A211	Mogan Gölü	Çıkışı	39:48:00	32:47:50	58,00	58,00	-		
D12A238	Ankara Çayı	Esenkent	39:53:22	32:27:52	109,70	109,70	15,164		

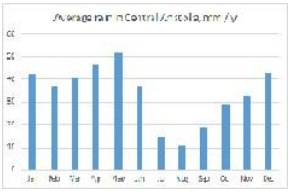

Figure 1.
Average rain in Central Anatolia, mm / y

http://dergipark.gov.tr/download/articlefile/481729. http://dergipark.gov.tr/gujs, 2018