ABSTRACT

Currently, building energy efficiency is higher construction cost than general structure because the building is designed for passive energy consumption, which will be used as qualified insulation, or using more complicated techniques. As a result of the reasons, it is made by higher construction materials and requires expertise in the special construction, as well as increased construction period. In terms of the conditions, most people do not give priority to investment in any architecture for energy savings.

This research is aimed to support and point out the effects of energy-efficiency in buildings by comparing the cost of the construction of double layer roofs and single layer roofs that influencing to energy use in architecture. The heat was transferred into the building through both the double and single layer roofs by OTTVEE program in order to calculate the breakeven point for the electrical and construction costs of the building. Case studies were used by two locations; 1) Nakhon Ratchasima province and 2) Bangkok, both of the cases were designed as double layer roofs. The top layer was constructed by corrugated iron and another was used concrete roof. In each case, the buildings were analyzed into four types; 1) singer layer roofs with out insulation 2) single layer roofs with insulation (thickness of 3 inches) 3) double layer roofs with out insulation, and 4) double layer roofs with insulation (thickness of 3 inches). This research focused on the study of the Roof Thermal Transfer Value (RTTV) that analyzed with the criteria used for the heat transfer system program.

The results showed that the double layer roofs reduced more temperature than single layer roofs. In particular, the double layer roofs with insulation (thickness of 3 inches) reduced the heat transfer from the roofs more efficiency by RTTV were 3.14 W / m² (Nakhon Ratchasima Province) and 4.28 W / m² (Bangkok). In terms of RTTV of single layer roofs with insulation were 7.18 W / m². These two case studies (Nakhon Ratchasima Province and Bangkok), the RTTV of double layer roofs with out insulation were 11.51 watts / sqm., and 10.70 W / m² respectively. Meanwhile, a single layer roofs which were made by concrete have the highest RTTV up to 3.29 W / sqm., and 24.94 W / sqm. respectively. When we calculated breakeven by compared to single layer roofs without insulation as a general buildings we found that single layer roofs with insulation are able to payback within 2.1 years in Nakhon Ratchasima Province and 2.5 years in Bangkok. In the other hand, doulble layer roofs with out insulation are able to payback up to 10.8 and 13.2 years in Nakhon Ratchasima Province and Bangkok respectively. Meanwhile, double layer roofs with insulation are able to payback within 07.09 and 15.48 years, respectively. Although, the constructions of double layer roofs have higher costs, if we concern about the environment in the long terms, it will be very rewarding. Moreover, double layer roofs can be designed by increase higher space up to 2 meters for more functions as well.