An experimental study of impact of cool roof to reduce Urban heat island effect

Abstract:

The roof is the section of a building that encounters the most extreme measure of solar radiation, and its shading is not easy. Moreover, due to the building roof's thermal conductivity and capacity, heat gets stored during the daytime and emitted at night, causing the indoor environment to be uncomfortable. Therefore, the inhabitants increase indoor electrical cooling appliances to make the indoor temperature comfortable and spend more electricity, producing excessive outdoor heat. Hence, a study is required to readdress the conventional/very generalized roofing practice and adapt system-oriented contextualized roof cooling treatments, which can render a naturally comfortable indoor and outdoor environment and an economical solution. Therefore, the measures of mitigating the urban heat island effect need to be paid attention to immediately, and, in that case, we need sustainable, cost-effective, and energyefficient technology not only for today but also for the future. Hence, while designing a building in an urban context, one must be cautious about choosing the appropriate material for its rooftop to guarantee better living conditions. A Roof with high solar reflection and high thermal emittance can reduce the heat transmission from roof to building. Likewise, a roof with low thermal emittance and exceptionally high solar reflectance acts the same. These roofs are termed cool roofs, a broadly acknowledged and globally accepted effective and cost-efficient technique that can keep urban areas cooler and alleviate the urban heat island effect. Therefore, this research aims to explore the potentiality of efficient measures that can be employed on different roofing types to reduce the urban heat island effect in Bangladesh and compare the performance of different cool roof treatments to promote the most suitable option people can utilize.

Objectives:

This research work will be done accomplishing three main objectives such as_

- Conduct an experimental study to compare thermal performance of bare roof vs cool roof in terms of heat gain reduction of surface of roofs made of RCC and Ferro-cement channel.
- Compare the thermal analysis of before and after the installation of cool roof treatments for reduction of surface temperature of roofs made of RCC and Ferro-cement channel.
- Observing the thermal performance and overall cost analysis to promote suitable roofing treatment.

Study area:

Four study roof areas have been selected for the mentioned study. The areas identified for this study, are selected based upon its roofing type. Two of these study locations have roof of Ferrocement channel and another two have roof made of RCC.

Name	Roof type	Site Image
Study area 1	Ferrocement channel	 Fig. Model house-1
Study area 2	Ferrocement channel	 Fig. Model house-2
Study area 3	RCC	 Fig. Eco house 1
Study area 4	RCC roof	 Fig. Server Room

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