How Green Building Passive Design Techniques Can Enhance the Lighting and Thermal Indoor Environment in Museums

كيف يمكن لتقنيات البناء الخضراء السلبية تعزيز الأنارة و البيئة الحرارية في المتاحف

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ABSTRACT

There is a need for global environmental sustainable development involving upgrading the built environment with green initiatives to conserve energy. museums has relatively extra electricity usages as it needs provide suitable internal environmental conditions 24 hours a day, It must retain lighting quality for all displays, so if museum buildings were designed in a sustainable manner, they can become electricity efficient and conserve energy .

This paper focuses on explaining how museum buildings can become sustainable for the future, through using passive design technologies that enhance the indoor environment and reduces energy consumption in museums. It explains the background of how passive technologies are significant for museum buildings in hot climates, and how they can be implemented. It includes a comprehensive academic literature review related to energy consumption, passive cooling strategies to reduce energy consumption.

The paper also includes a study that is conducted on a proposed museum building in United Arab emirate; this study will contain computer simulations for the building thermal behavior, lighting and design modification of building components. The study will show how applying design strategies like orientation, insulation, thermal mass, glazing and shading can affect the overall indoor environment inside the museum, it will contain a case study that demonstrate how applying these design strategies can minimize the cooling loads by 56% and as a consequence reduce energy use. This study suggests using architectural passive design scheme for museum buildings especially in hot climates. It is an effort to emphasize the importance of preserving our environment to all architects involved in the field of conservation and more specifically to the culture sector, expecting that it would motivate new ideas for museum design as a measure of sustainable conservation.

الملخص

هناك حاجة لتحقيق التنمية العالمية المستدامة للبيئية والتي تشمل تطوير البيئة المبنية بالمبادرات الخضراء للحفاظ على الطاقة. من المعروف ان المتاحف لديها استخدامات اضافية للكهرباء فهي تحتاج الى توفير ظروف بيئية مناسبة طوال اليوم، كما انها يجب أن تحافظ على جودة الإضاءة لحاجة العرض ، لذلك إذا تم تصميم مباني المتاحف بطريقة مستدامة، فإنها يمكن أن تقلل من استخدام الطاقة الكهربائية و تحافظ على الطاقة . تركز هذه الورقة على توضيح كيف يمكن أن تصبح مباني المتاحف مستدامة من أجل المستقبل، من خلال استخدام تقنيات التصميم السلبي التي من شأنها تعزيز البيئة الداخلية و تقلل من استهلاك الطاقة في المتاحف. هذه الورقة تشرح كيفية تكنولوجيا الطاقة السلبية هامة للمتاحف في المناخ الحار، وكيف يمكن استخدامها. و تشتمل على استعراض شامل للكتابات الأكاديمية المتعلقة باستهلاك الطاقة، والاستراتيجيات الخاصة بخفض الاستهلاك. .

وتشمل الورقة أيضا على دراسة أجريت على مبنى مقترح لمتحف في الإمارات العربية المتحدة، هذه الدراسة تحتوي على محاكاة حاسوبية لسلوك المبنى الحراري والإضاءة الداخلية مع تعديل تصميم المبنى بحيث يظهر كيفية ان تطبيق استراتيجيات التصميم مثل توجه المبنى، والعزل، والكتلة الحرارية، الواجهات الزجاجية والتظليل يمكن أن تؤثر على البيئة الداخلية في المتحف. وسوف تحتوي على مثال لمبنى مقترح يوضح كيفية ان تطبيق هذه الاستراتيجيات يمكن ان يقلل من أحمال التبريد بنسبة 56٪ ونتيجة لذلك للحد من استخدام الطاقة. هذه الدراسة تشير إلى اهمية استخدام نظام التصميم المعماري السلبي للمباني للمتاحف وخاصة في المناخات الحارة. هو مجهود يستفيد منه المهندسين المعماريين المشاركين في مجال حفظ الطاقة وبشكل أكثر تحديدا هو مجهود لقطاع الثقافة ,هو مجهود للحفاظ على بيئتنا ، ونتوقع أنه سوف يحفز أفكار جديدة لتصميم المتاحف بطريقة مستدامة.

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