الآية

قال تعالي

بسم الله الرحمن الرحيم

(وَاللَّهُ جَعَلَ لَكُمْ مِمَّا خَلَقَ ظِلَالًا وَجَعَلَ لَكُمْ مِنَ الْجِبَالِ أَكْنَانًا وَجَعَلَ لَكُمْ سَرَابِيلَ تَقِيكُمُ الْحَرَّ وَسَرَابِيلَ تَقِيكُمْ بَأْسَكُمْ ۚ كَذَٰلِكَ يُتِمُّ نِعْمَتَهُ عَلَيْكُمْ لَعَلَّكُمْ تُسْلِمُونَ (٨١)

صدق الله العظيم

سورة النحل الاية ٨١

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Dedication

To……

My Father

To……

My Mother

To……

My Brothers

and

My Sisters

To……

Anyone Who Helped Me and Encouraged to Achieve This Research

Researcher

Abstract

This study was carried out at Elobied City which has a continental climate, hot in the diurnal and cold in the night, so which is ideal for the use of heat energy accumulation. This research investigate the possibility and availability of using energy accumulation to save power, in the field of air-conditioning. In this study, Cooling Load Temperature Difference/Cooling Load Factor (CLTD/CLF) has been used to estimate the cooling load profile for the building based in Elobied weather data conditions.

After comparison between the consumed power with the accumulation system and without it, the unit with accumulation is better which provides 34.1% from the total cooling load required by (kWh) compared with a conventional system. It is clear from the amount of available solar energy in Elobied that accumulation can be used for different applications and with different substances.

المستخلص

تم تنفيذ هذه الدراسة في مدينة الأبيض والتي تمتاز بالمناخ القاري ،ساخن في النهار وبارد في الليل والذي يعتبر مثاليا لاستخدام تخزين الطاقة الحرارية. تهدف الدراسة الي التحقق من إمكانية استعمال تخزين الطاقة لتوفيرها والاستفادة منها من خلال تطبيقها في مجال تكييف الهواء.

استخدمت طريقة فرق درجة حرارة حمل التبريد/ عامل حمل التبريد لحساب حمل التبريد الكلي للمبني وفقا لبيانات طقس الأبيض.وبعد المقارنة بين الطاقة المستهلكة عند استخدام نظام التخزين وعدم استخدامه وجد ان نظام التخزين يوفر 34.1% من إجمالي حمل التبريد المطلوب بالكيلو وات ساعة مقارنة مع النظام التقليدي. ويتضح من كمية الطاقة الشمسية المتاحة في الأبيض أن عملية تخزين الطاقة يمكن إستخدامها لتطبيقات مختلفة وبمواد مختلفة.

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Abbreviations

TES	Thermal Energy Storage
ASHRAE	American society for Heating Refrigeration and Air-conditioning Engineer
COP	Coefficient Of Performance
HVAC	Heating Ventilation and Air Conditioning
PCM	Phase Change Material
DHW	Domestic Hot Water
CTES	Cooling Thermal Energy Storage
AC	Air Conditioning
HAP	Hourly Analysis Program
ES	Energy storage
TFM	Transfer Function Method
CLTD	Cooling Load Temperature Difference
CLF	Cooling Load Factor
SC	Shading coefficient
SCL	Solar Cooling Load
SHGF	Solar Heat Gain Factor
ITES	Ice Thermal Energy Storage

Notations

Ti	Indoor room temperature	(ºC)
Tm	Mean outdoor temperature	(ºC)
Tmax	Maximum outdoor temperature	(ºC)
λ	Thermal conductivity	(W/m ºC)
U	Over all heat transfer coefficient	(W/m² ºC)
Fo	External thermal conductivity coefficient,	(W/m² ºC)
Fi	Internal thermal conductivity coefficient	(W/ m² C)
S	Thickness	(m)
A	Area	(m^2)
Q	Heat transfer	(W)
$Q_{Conductive}$	Conductive load through the glass in	(W)
Q_{Solar}	Solar transmission load through the glass	(W)
m_r	Refrigerant mass flow rate	(kg/s)
Q	Amount of energy supplied by the chiller	(W)
h	Enthalpy	(kJ/kg)
W_{comp}	Compressor power consumption	(kW)