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【摘要】

本研究對一量販店案例進行全年度電力與環境監測，且由電腦逐時動態耗能模擬解析，以探討量販店建築設備耗電販店之節能潛力分析。

經由實際案例耗電與溫溼度監測及模擬的解析結果，分析量、照明、空調、以及其他設備之單位面積耗電情況，訂相關系統設計值的耗能模擬，探討不同節能設計手法之節能潛力與成效。本研究探討之節能設計手法包含降低照明量系統(VAV)、外氣需量控制及冷凍系統節能技術應用等手法。實測結果顯示賣場照明用電密度相當高，照明佔建度降為20 W/m²時，量販店全年總耗電約可下降38.33%、全年空調總耗電約可下降27.62%。空調節能手法以變壓統、改善冰水主機效率COP值、外氣需量控制。冷凍系統以展示櫃做除霜電熱控制節能潛力最高，展示櫃防汗電熱間相對溼度控制，再搭配上除霜與防汗電熱絲做需量控制，其冷凍系統節能效果顯著，且存在最佳相對溼度控制點年冷凍系統量總耗電約可下降25.23%。

【英文摘要】

This research is to monitor electricity and indoor environmental conditions of a wholesale store for a year, analyzing simulation to find out the electricity using characteristic of the wholesale store's equipment and evaluate the energy-conservation concepts.

The monitoring results show that the lighting power consumption of the wholesale store is quite high, accounting biggest electricity consumption sector. The HVAC system accounts for 21% of the total electricity usage and is the hand, the refrigeration accounts for 13% of the total electricity usage.

The simulation results through the DOE-2 computer program reveal that reducing lighting power density to 20 W/m² year could drop about 38.33% and that of air-conditioning is about 27.62%. Among the energy-conservation retrofit adoption of VAV system is the most effective. The display cases with demand defrost control is the most effective and the second is the anti-sweat heater of refrigerated showcase with demand control depending on indoor humidity. Using the solid-desiccant dehumidifying system which is regenerated by the wasted heat from the refrigeration system, the energy-efficient showcases which are incorporated with the demand defrost control and the anti-sweat heater have the greatest energy-saving effect. Moreover, according to the simulation result, the optimum set-point of the indoor relative humidity is 55%. The electricity consumption by refrigeration system could reduce about 25.23% and the total building electricity consumption could reduce about 25.23% if the store adopts the solid-desiccant dehumidifying system and the energy-efficient showcases.

【論文目次】

摘要 i

ABSTRACT ii

誌謝	iv
目錄	v
表目錄	vii
圖目錄	viii
第一章 緒論	1
1.1 研究動機與目的	1
1.2 文獻回顧	2
1.3 研究步驟與方法	3
第二章 動態耗能模擬程式	5
2.1 eQUEST耗能模擬程式簡介	5
2.2 eQUEST之架構	5
2.2.1 eQUEST之驅動程式	5
2.2.2 eQUEST設計精靈	6
2.3 DOE-2.2簡介	7
2.4 DOE-2.2空調設備設定	10
第三章 建築環境與耗能監測分析	25
3.1 賣場電力耗能監測	25
3.3.1 監測案例概況	25
3.3.2 電力監測解析	27
3.2 賣場環境監測	31
3.2.1 濕空氣性質簡介	31
3.2.2 溫濕度監測設備	32
3.2.3 溫溼度監測結果	34
第四章 耗能因子解析	38
4.1 前言	38
4.2 模擬案例與實際現況解析	38
4.3 照明節能潛力分析	45
4.4 空調節能潛力分析	46
4.4.1 改善主機效率COP對耗能之影響	46
4.4.2 空調VAV系統對耗能之影響	47
4.4.3 空調VWV系統對耗能之影響	48
4.4.4 空調外氣需量控制對耗能之影響	49
4.4.5 綜合照明與空調節能手法對總耗電之影響	50
4.5 開放式展示櫃耗能因子	51
4.5.1 除霜方式	51
4.5.2 防汗電熱	53
4.5.3 展示櫃洩漏氣流	53
4.5.4 開放式展示櫃之風扇及照明	55
4.6 相對溼度控制對空調與冷凍系統效應	56
4.6.1 空調除濕方式	56
4.6.2 吸附除濕原理	62
4.6.3 不同溼度控制模式之分析	63
4.7 蒸發式冷凝器	75
第五章 結果與討論	76
參考文獻	78

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