臺北市立聯合醫院 TAIPEI CITY HOSPITAL

ID: 26560

Analysis of Indoor Sustainable Energy Management Strategy After Core HVAC Replacement in a Health Promoting Hospital

Hsin-Yi, Lien [1*] , Chen-Ting, Chang [2], Ching-Yao, Tsai [3]

[1]Department of Administration Center, [2] Engineering Department,[3] Superintendent Office, Taipei-City Hospital, Zhongxing Branch, Taipei, Taiwan.

1.Background and objective

Hospitals are critical to net-zero goals due to high, 24/7 energy demand. With HVAC systems using **40%–50%** of power, hardware upgrades aren't enough. Maximizing efficiency needs Demand-Side Management (DSM) integrating operational norms and smart controls. Taipei City Hospital Zhongxing Branch applied precise indoor HVAC and lighting strategies to deepen governance after hardware replacements.

2. Method

Following the replacement of HVAC chillers (achieving an annual saving of **3,657,359 kWh**), the hospital focused on three micro-level indoor measures:

Measure	Core Action	Impact & Objective
26°C Regulation	Enforced a mandatory minimum indoor temperature of 26°C across clinical and administrative areas to reduce cooling loads.	**Optimizes Coefficient of Performance** (COP); effectively stabilizes power demand and prevents consumption peaks.
Precise Scheduling	Customized HVAC operational schedules based on unit occupancy; implemented strategic shutdowns (00:00–06:00) during cold seasons.	**Eliminates** unnecessary energy **waste** during non-operational hours; significantly lowers operational expenses (OPEX).
Smart Lighting & LED	Executed a comprehensive upgrade to high-efficiency LEDs integrated with motion sensors and daylight harvesting controls.	Achieves a **structural decline** in base load energy consumption through automated, demand-driven lighting efficiency.

ESG Environmental Sustainability Commitments

Annual Energy Savings	**3,657,359 kWh (1,733.59 CO2e)**
HVAC Energy Consumption Ratio	**40% – 50%**
Electricity Rates	**24.87% → 4.25%**
Key Strategies	✓ **26°C Regulation** ✓ **Precise Scheduling** ✓ **Smart LED Upgrades**

3.Results

Stabilized Loads: The 26°C standard effectively prevented peak consumption caused by rapid cooling, proving to be a high-value, low-cost management strategy. Reduced Waste: Individualized scheduling improved the synchronization of energy supply and demand. The strategic nighttime shutdown eliminated ineffective operations, directly lowering electricity costs Structural Optimization: The integration of LEDs and smart automation reduced base loads and ensured lighting operated only when necessary, achieving a structural decline in energy consumption.

4. Conclusion

This case demonstrates that pairing core HVAC upgrades with rigorous micro-strategies—temperature regulation, precise scheduling, and smart lighting—constructs a robust energy governance architecture. These composite measures not only enhance efficiency and lower costs but also embody the hospital's commitment to ESG. Integrating hardware upgrades with micro-level management is a vital strategy for hospitals moving toward net-zero emissions.

5. Relevance to health promoting hospitals and health services

It shows commitment to Environmental Stewardship and Sustainable Governance. Optimizing resource use DSM and maintaining a stable indoor environment supports the HPH mandate for efficient, quality patient care.

6. Keywords

- Sustainable Development
- Net-Zero Carbon Hospital
- Precision Energy Management