

Energy Saving and Carbon Reduction Policies at the Taiwan National Cheng Kung University Hospital

GGHH Agenda Goals *Waste, Energy, Water*

Hospital Goal

Please state what Action Items the hospital hoped to accomplish. For example:

- Reduce energy costs

Progress Achieved:

1. **Lighting system renovation: sensor controlled lighting scheme, coupled with more efficient T5 fluorescent tubes; received subsidies from the Bureau of Energy, Ministry of Economic Affairs to engage the ESCO (energy service company) service to design, renovate and test the proposed energy saving schemes. Results: luminosity increased 30%, energy saving rate was 46.53%, with a cost-recovery period of 2.6 years. The annual power saving was NTD \$3,852,700; lowered air-conditioning loads by 82.9 RT/year; reduced 1,362 tons of CO2 emission per year; the total energy saving rate is 52.1%**
2. **Adopted heat pump/hot water system: utilizes water-water and hybrid heat pump systems to replace conventional gas boiler; increases energy efficiency; cold water from the heat pump can be recovered to use in cooling, reduces the power load of the air conditioner. The annual power saving was NTD\$ 4,688,176; annual CO2 emission reduction was 1,228.9 tons/year; energy saving rate was 64.6%.**
3. **NCKU hospital conducted air conditioning system renovation from 2008 to 2012, replacing aging equipment and installing new central monitoring systems. Results: achieved energy saving rate of 33.56%; estimated annual cost saving from 2012 and on is NTD\$ 10,181,378; estimated annual CO2 emission reduction is 2,668 tons.**



Efficient lighting
(Photos by NCKU)



Heat pump hot water system

The Issue

Hospitals are complex structures that need provide a comfortable, reliable and safe healing environment. As such, hospitals invest heavily in environment-control measures such as

energy HVAC and lighting. However, this places a heavy burden on operation costs; for example, the annual energy expenditure (power, water, gas, fuel) of the NCKU is estimated to be at least 250 million NTD. To ensure that safety and quality of the medical care are not compromised by the rising electricity costs, NCKU is working hard to increase energy efficiency through effective energy management.

Sustainability Strategy Implemented

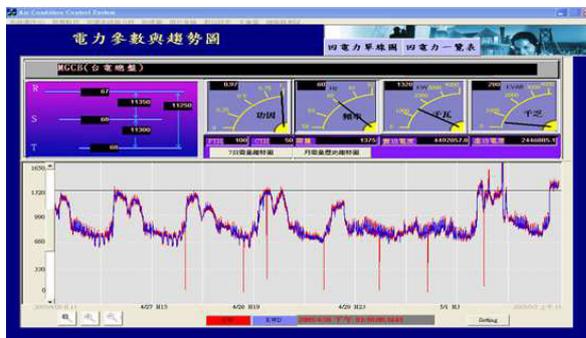
Electrical system: implement SCADA (supervisory control and data acquisition) power monitoring system; annual replacement of high voltage transformers to ensure power safety; off-peak hour elevator regulation; improve equipment power rating.

HVAC: selects more energy efficient equipment; optimizes number of HVAC units; implement central monitoring system; installs Air Handling Unit (AHU); time-schedule control of ventilators; zonal temperature control for administrative and medical areas; recover cooled water from heat pumps for cooling purposes.

Lighting: select more energy efficient lighting fixtures; sensor control lighting; reduced lighting in public areas during off-hours.

Hot water: implements heat pump systems; install tubular boilers to produce steam for localized steam demands.

Water: use water-saving toilets and faucets.



Energy and power monitoring systems
(Photos by NCKU)

Implementation process

Leadership from hospital executives is paramount in pushing forward the initiatives for hospital wide energy saving and carbon reduction. To cease the growing energy expenditure and ultimately decrease the costs altogether, we need a sound environment-friendly policy, coupled with good planning, systemic promotion, implementation and an effective management and auditing mechanism.

We have established a team that is tasked with energy management and saving, with our administrative vice superintendent as its leader and high level executives as its core members. We sought the services of external specialists as additional members and hold regular meetings, discussing energy usage, planning energy saving policies, and analyze the results. We also established working groups that are comprised of members from building operations and engineering departments. They meet monthly to discuss progress, devise

energy saving policies, analyze usage, and publish the energy usage results to all staff of the hospital. Finally, the primary energy saving efforts are fronted by secondary executives who lead their respective staff members on implementing the devised energy saving measures, based on areas of responsibility.

Tracking Progress

The Energy Saving Promotion group meets regularly to review the progress.

Challenges and lessons learned

Current issues to be resolved:

1. Air-conditioning units in the staff residence are old and prone to malfunctions, requiring immediate replacement.
2. The medical building requires an updated HVAC and energy management system to better regulate power loading in the building and the staff residence. In the future, a more robust and effective energy saving strategy will be implemented.



**Medical Care building
(Photo by NCKU)**

Next Steps

We have an energy saving incentive program which encourages our staff to be creative and submit constructive ideas to improve energy efficiency and service quality. We hope to also improve our image and operational performance. The results of the program will be reviewed in 2 years of implementation.

Demographic information

NCKU Hospital was established on June 12, 1988, and was accredited as a Medical Center on July 1st, 1993. The hospital has 1234 beds and approximately 3500 outstanding staffs. There are a total 23 medical departments, 3 departments of allied health and 4 mission-oriented centers. Almost 60% of attending physicians are qualified as faculties of College of Medicine. Based on the patient-center principle, we provide professional, safe and friendly health care services to the public.

Main contact person information:

Quotes:

Please share a few key quotes from stakeholders involved in this process.

Please, list all contacts named in this case study.

Keywords / topics:

Energy efficiency, HVAC, lighting, leadership, hospital management, Taiwan, NCKU, National Cheng Kung University