

Increasing Energy Effectiveness by Management Methods Taiwan Regional Hospital

GGHH Agenda Goals

- Energy

Hospital Goal

- Reduce energy costs
- Reduce carbon dioxide emissions

Progress Achieved

Hospitals are responsible for providing round-the-clock and uninterrupted service to ensure safety and maintain quality health care for the patients they are servicing. Despite the increase in volume of patients being cared for and number of equipment and facilities in the hospital from 2011 -2013; there was no substantial increase in the energy use intensity (EUI) recorded. EDA hospital has successfully maintained energy consumption at 175 kW/m². The promising outcome gained may be attributed to timely equipment maintenance and utilization of energy conserving devices. The table below presents EDA Hospital's EUI annually from 2010 – 2013.

Table 1.0 E – DA Hospital Annual Energy Use Intensity from 2010 to 2013

Year	2010	2011	2012	2013
Area (m ²)	169,813.53	169,813.53	169,813.53	169,813.53
Power (kWh)	27,461,000	28,082,916	29,050,200	29,401,968
EUI (kW/m ²)	161.71	165.4	171.1	173.14

The Issue

E- Da Hospital aims to promote healthcare in natural environment, bringing together the concept of healthcare and environmental friendliness. The hospital is looking at achieving this aim by establishing a first class international medical center in a preserved natural, healthy, and comfortable environment.

Moreover, the population of in – patient and out – patient and out – patient has been servicing has been continually increasing. It is the priority of E-Da Hospital to continue bringing quality services while keeping the hospital's EUI low through efficient usage of energy resources.

Sustainability Strategy Implemented

In addition to the environmental-friendly architectural design and the choice of energy-conserving equipment, E- Da Hospital has sustained efforts to maximize energy efficiency and minimize carbon emissions in recent years. For instance, the Occupational Safety and Health Office proposed the strategy of five R's: *Replace, Reuse, Reduce, Recycle, and Resource management* to further improve environmental friendliness of the hospital.

Moreover, different strategies have been implemented, including close monitoring of power, water, and diesel consumption. Quantity of produced waste and volume of diverted waste through recycling were also recorded. Special efforts to digitalized medical records, administration documents and integrate laboratory checklists into the information system were conducted. This has resulted to reduced paper and manpower utilized.

Implementation process

Replace

1. Illumination system

In compliance with the power conservation policy of the hospital, high energy efficiency lighting devices were used to replace currently installed lights. Newly installed lights provided suitable illumination intensities and reduced both energy used and carbon emission (Table 2.0).

Table 2.0 Strategies Implemented to Improve Illumination System and Energy Reduction Outcome

Improvement Strategy	Specific Activities	Outcome
Improvement of lighting condition over the passages in wards	Replacement of 408 projection lamps (50W) with 136 pot lights (23W) and removal of lampshades from 204 pot lights.	Reduction of power consumption by 17.272kW per hour with improved illumination.
Progressive replacement of incandescent lamps with light-emitting diode (LED) devices (Figure 1.0)	Totally 2,783 incandescent lamps in the hospital have been replaced with LED lamps since 2012.	Curtailling of daily power consumption from 1,756.22 kWh to 778.58 kWh, equivalent to a total reduction of 276,932.16 kWh and 148.44 tons of carbon dioxide emissions per year.



Figure 1.0 Replacing Incandescent Lamps with Light – Emitting Diode (LED) Devices

2. Power system

(a,) Power Source for Boilers:

Natural gas was used instead of diesel. Diesel consumption is reduced by 143,231.34 liters while carbon dioxide emissions were decreased by 304 tons, annually.

(b.) Heat Pump System:

Gas, diesel, and electricity-generated hot water were replaced by the heat pump system. Integration of the hot water to water heat pump and into the air-conditioning system reduces CO₂ emissions by 360 tons/ year (Figure 2.0).



Figure 2.0 Hot Water Produced from Heat Pump System

3. Water system

Water saving restrictors were installed in tap water sources such as faucets and showers. This has heightened water usage efficiency (Table 3.0 and Figure 3.0)

Table 3.0 Comparison of Water Consumption Before and After Installation of Water –Saving Restrictor

Item (number)	Rate of water flow (L/min)		Amount of water saved (L/min) (percentage)
	Before	After	
Automatic infrared sensor tap (n = 622)	6.9	2.4	4.5 (65.2%)
Manual tap (n = 359)	9.0	3.4	5.6 (65.2%)
Shower head (n = 510)	9.2	5.6	3.6 (39.1%)



Figure 3.0 Installation of Water – saving Restrictors on the Taps and Showers of the Hospital

Tracking Progress

There are a number of departments in EDA Hospital which work together to implement the program. This committee is headed by the Superintendent in collaboration with Administration Center, Nursing Department and other units. This committee is also in – charge of monitoring and evaluating implementation outcomes and impacts.

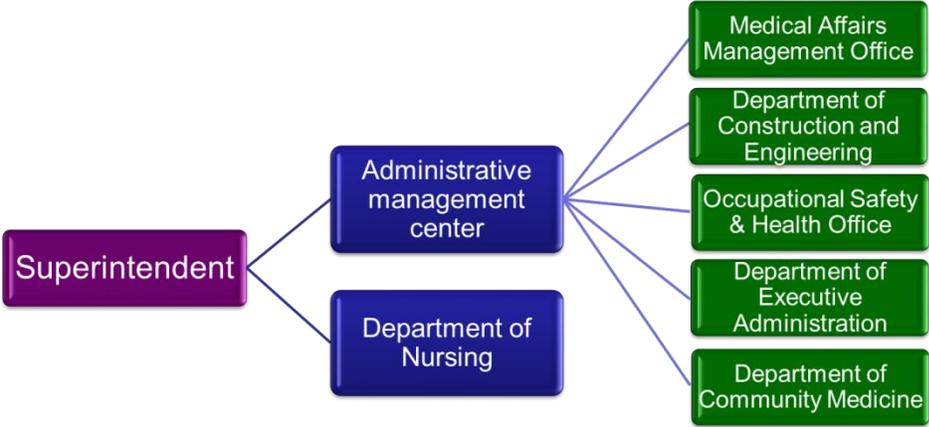


Figure 4.0 The Administrative Framework of Environment and Resource

Management at E-Da Hospital

Demographic information

Since its foundation in 2004, E-Da Hospital has always been adhering to the vision of “to be a world-class medical center internationally”. Its elite teams in various medical centers have been serving patients with professional medical knowledge, techniques, a patient-centered diagnosis and treatment mode. E-DA Hospital has received the Joint Commission International (JCI) Accreditation in 2008, 2011, and 2014.

The total number of employees are 2761 people, including physicians, nurses, and technicians. The numbers of beds in E-Da Hospital are 1251 beds. We specialize in Total Hip Replacement & Total Knee Replacement, Brachial Plexus Injury Treatment, Laparoscopic Bariatric Surgery, Hyperhidrosis Treatment, Gamma Knife Radiosurgery, Prostate Laser Surgery, Polysomnography and Cardiac Catheterization Examination with intervention.

E-Da Hospital features a 24-hour Trauma & Emergency Center, 29 operating rooms and 6 types of intensive care units including MICU, NSICU, CVSICU, GSICU, PICU and PSICU. We are equipped with state-of-the-art equipment including PET/CT, Gamma Knife, CT, MRI and RapidArc and provide patients with high quality medical services.

E-Da Hospital is located in Yan-Chao district over the northern part of Kaohsiung City. Based on the concept of health care reinforcement and environmental friendliness, the hospital was built with the aim of providing an excellent healing environment for our patients at a first-class international medical center in a well-preserved natural, healthy, and comfortable hospital environment.

Accordingly, in compliance with the government policy on energy efficiency and environmental protection, the hospital not only has incorporated the concept of environmental preservation into architectural designs, but it has also promoted greenery for environmental improvement, adopted energy-saving illumination designs, used toilet & shower utilities with proven water efficiency, established a central monitoring system for overseeing air-conditioning & other power use inside the hospital, digitalized documents to reduce paper use as well as set an energy efficiency goal with “energy use intensity” (EUI) which is an assessment of energy use per unit area in a building in order to be an environmental-friendly medical institute that can provide safe and high-quality patient care.

Links

With the continuous collaborative effort of all devoted personnel of E-Da Hospital, the institute was given a number of awards (Figure 5.0) in recognition of its contributions to enhancing energy efficiency and reducing carbon emissions after its establishment in 2004:

- (1) First prize in “Waste Recycling and Reduction” by the Environmental Protection Administration, Executive Yuan, Taiwan, R.O.C. in 2006
- (2) First prize in “Outstanding Energy Conservation” by the Bureau of Energy, Ministry of Economic Affairs, R.O.C. in 2007
- (3) First prize in water conservation by the Bureau of Energy, Ministry of Economic Affairs, R.O.C. in 2007
- (4) Bronze medal of Symbol of National Quality (SNQ) in hospital information management for the submitted project “Sentry of Disaster Prevention: Central Control Management System” given by the Institute for Biotechnology and Medicine Industry in 2012
- (5) “Award of Outstanding Energy Conservation” by the Bureau of Energy, Ministry of Economic Affairs, R.O.C. in 2013

- (6) First prize of “Environment Friendly Health Care Facility” by the Ministry of Internal Affairs in two successive years of 2013 and 2014
- (7) Participation in the project of “Saving the Earth through Reduction of Carbon Emissions: Role of Health Care Institutes” organized by the Health Promotion Administration, Ministry of Health and Welfare, R.O.C. in 2013, emphasizing on establishment of solid plans on water, power, oil, and waste reduction and recycling.
- (8) Award of “Outstanding Public Architecture” by the Kaohsiung City Government in 2014
- (9) Award of “Environment Friendly Health Care Architecture” in 2014 by the Kaohsiung City Government
- (10) Silver medal for successful creation of a tobacco-free environment by the Global Network for Tobacco Free Health Care Services in 2014



Figure 5.0 Awards Received by E-Da Hospital in Acknowledgement of Its Contributions to Environmental Protection

Quotes:

Keywords / topics: Energy Conservation, Contracted Demand, Power Factor, Time Rate

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