

Case study

Advocating Energy Saving and Emission Reduction through Efficient Energy Utilization

Taoyuan Chang Gung Memorial Hospital, Taiwan

GGHH Agenda

- Energy

Hospital Goal

As an Environment – Friendly Hospital advocating for Energy Saving and Waste Reduction, The Hospital and Ministry of Economic Affairs agreed to voluntarily target a 5% energy saving for the next three years (2009 – 2011) last July 2, 2008. In addition, the hospital is also aiming to increase energy saving by 0.1% in succeeding years (2012 – 2016) and not incur increase in energy consumption from 2017 – 2020. (Target reduction will be based from 2011 energy consumption).

Progress Achieved

- A total of 1,171 sets of lights were altered. Instead of having two 28W light tubes, they were replaced with just one 28W light tube. The change allowed the hospital to save 287,222 KWH/ year of electricity and reduce carbon emissions by 149.9 tons/year in B3 – B5 parking lots
- Bollard lamps in situated in outdoor trails in South and North part of the hospital were replaced. Bollard lamps using 26W of electricity were changed to LED light which utilizes just 8W. Annually, due to changing bollard lights the hospital was able to bring down electricity consumption to 6,070 KWH and their carbon footprint by 3.2 tons
- In public areas (entrance lobby, cashier, and dispensation waiting areas), installed 2 26W recessed lamps were replaced with one 12W LED lights. This has allowed the hospital to decrease electric consumption by 710,377 KWh per annum and reduce emission 370.8 tons/yr
- Guide lamps located in the driveway of B1 – B5 and F1 such as the HPS, halogen and metal halide lamps were change to LED lights. In B1 – B5 single 70W HPS lamps and 35W halogen lights were replaced with single 10W LED lights. In F1, single 250W metal halides were changed with single 100W LED lights. This action enabled the hospital to only utilize 206,736 KWH/ annum of electricity and cut back their carbon emission to 107.9 tons/year
- Installed 14W T5 fluorescent lamps in 160 wards with individual switches for independent control saves as much as 16,352 KWh/ year and decrease emissions by 8.5 tons/yr
- Installation of new control circuit reduced the number of lights that are left turned on by half. The new control circuits manages light in 28 elevator lobbies which has twenty – four (24) 28W fluorescent lamps and twelve 12W down lamps. Due to the installation of the new control circuit, the hospital was able to save 100,074 KWH/year of electricity and decrease emission by 52.2 tons/ annum
- The energy-saving measure implemented in water, electricity and oil consumed led to a decrease of 26.9 KLOE (-0.39%) and carbon emission by 701 tons in contrast to figures acquired in year 2010
- In 2011-2013 the following achievements were observed 3.23% waste reduction, 41% of water reused, NT\$98.189598 million saved in green procurement and 622,580 kg wastes were recycled

		
<p>All 26W*2 PL recessed lamps altered to 12W*1 LED ones</p>	<p>All 35W*1 driveway halogen lamps altered to 10W*1 LED ones</p>	<p>All 70W*1 driveway guide HPS lamps in B1-5 and F1 altered to 10W*1 LED ones</p>

The Issues

- Energy prices increases continually
- High cost of energy-saving equipment
- The climate has a strong effect on the energy-saving effectiveness of air conditioners
- Energy consumption affects individuals

Sustainability Strategy Implemented

- Energy saving and emissions reduction employed a sound organizational structure employing a top – down management approach. Departments from the hospital including the nursing department, pharmacy, clinical laboratory and administration have set of responsibilities to carry out the program. Efficient and highly skilled Task Force was place in charge to guide the implementation of the project
- A separate Task Force was also created to promote and orient the hospital community of the program. Although departments have autonomy in managing the program within their jurisdiction, a common goal was set. Identifying a common goal assist in achieving benchmarks in air condition, illumination, electricity management and other pursuant to existing medical requirements
- A project for energy-saving and emissions reduction improvement is submitted on a yearly basis, progress is traced on a monthly basis, and implementation status is reported on a yearly basis
- The operational administration covers and improves total quantity control, unit cost control, controllable cost control, irregularity improvement analysis, operational performance assessment. They are also facilitating discard and replacement of energy-consuming equipment, time interval and automated control
- The energy-saving measures developed by engineering department include energy-saving design in the planning phase of buildings and electromechanical systems. Moreover, they also take charge of the introduction of new energy-saving equipment, adoption of devices and materials with high efficiency, opting of accurate engineering, introduction of automated facilities and simplified manual operation
- The promotional campaigns for energy saving include hospital-wide lecture E – learning, webpage promotion, and posters.
- An autonomous energy-saving audit during off-work time is documented

- A regularly-sponsored energy – saving and waste minimization meeting reviews the measures and executive status of improvements.

Implementation process

In the initial phase of hospital construction, the blueprint included green concepts. These concepts provided framework for instituting energy saving ideas and mechanism such as:

- central monitoring system
- ice storage air conditioning system
- off-peak electricity
- large illumination windows using micro-mirror glass
- inverter air conditioning system
- joint washing by tunnel washer
- T5 LED lamps

In spite of the efficient and environmentally friendly mechanisms installed, Taoyuan Chang Gung Memorial Hospital still maintains a comfortable and patient – centered hospital environment.

Tracking Progress

A central monitoring system controls energy management of water, electricity, air conditioning and steaming systems which reduces energy wasted. An air conditioning mainframe equipped with a certain capacity presets for workloads, automatically increases or decreases actual loads. This system prevents overconsumption and reduces electricity expenditures. In addition, a schedule control program manipulating air conditioning chambers, ventilators and exhausters through temporal requirements further reduces electricity consumed. As for water control, the water reservoirs managed through peak/off-peak level controls (during holidays water and electricity is not controlled for water source safety) makes more room available for water supply quantity during off-peak hours.

A holistic management mechanism consisting of operation management, total amount control and cost control were employed. Training and auditing for energy saving, regular energy-saving and waste minimization meetings which monitors the effects and results of the strategies carried out are conducted.

Challenges and Lessons Learned

- The biggest challenge in energy saving is to change users' habits. To address this concern, a compulsory participation of employees in an online learning to develop energy saving habit was mandated; implemented by audit institution
- In addition to proactive promotion for energy saving at the supply end, the Hospital identifies the user end as its most significant concern. It is difficult to know exactly how the user end consumes energy, preventing a sound analysis and assessment for improvement. Given that ISO 50001:2011 (Energy Management System) was used as guide because of the benchmarks it has set. Energy Saving Systems are applied in each department encouraging employees to act on energy saving and emission reduction program.

Next Steps

- The waste minimization project is promoted constantly with the objective of energy saving by 0.1% per annum in 2012-2016 based on the 2011 baseline. The hospital is also aiming to maintain energy consumption by 2017-2020
- Besides the respective energy-saving programs that have been initiated, the enactment and promotion of ISO 50001:2011 (Energy Management System) further shows the Hospital's commitment. The Hospitals aim to maintain and enhance its Eco –

Friendliness and fulfill its corporate social responsibility through influencing employees to save energy and reduce emissions.

Demographic Information

Taoyuan Chang Gung Memorial Hospital, founded in Dec. 2003, is committed to the enhancement of domestic medical care of chronic diseases, the integration of traditional Chinese and Western medicine. The hospital also aspires for the establishment of a system of preventive medicine and holistic medical treatment for acute and chronic diseases.

The Hospital is situated on the hill of Guishan District, Taoyuan City, Taiwan Province, secluded among green hills, is one of the top three (3) magnificent architectural works in Taiwan. The structure has an innovative, elegant windmill shape connected by a paired-line cross, making blue sky and green land visible at each corner of the Hospital, making it indeed a Garden Hospital.

Links

<https://www.cgmh.org.tw/>

Quotes:

Energy saving and emissions reduction achieved by me
In pursuit of the best through self-examination
Ongoing improvement with unceasing commitment

Keywords / topics:

Central monitoring , ISO 50001 , CGMH

Submission date: 2015/06/12