

Every Drop Counts: Greywater Procurement and Distribution System Dalin Tzu Chi Hospital, Taiwan

GGHH Agenda Goals

- Water

Hospital Goal

- Reduce the amount of water consumed by the hospital for their various activities and needs
- Recycle used fresh water to be used for non – critical water need of the hospital.

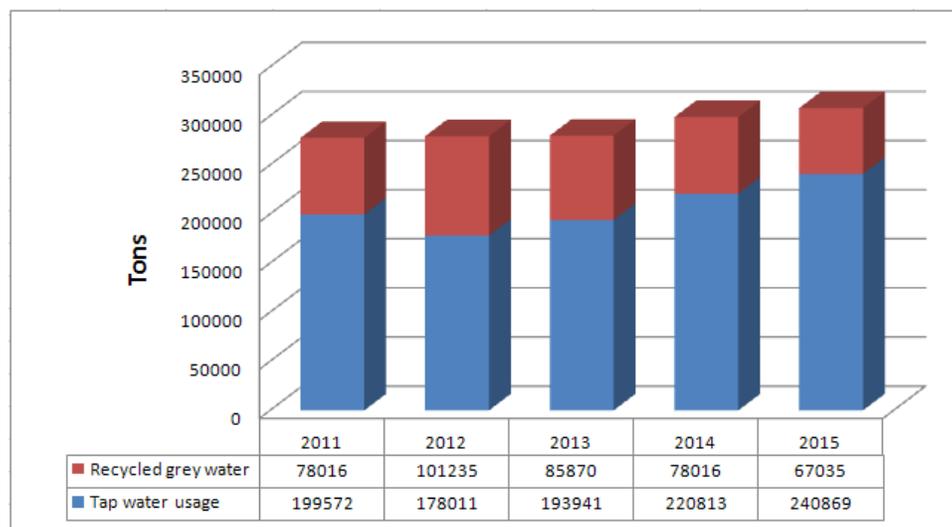
Progress Achieved

Presently, the hospital is outsourcing treatment of approximately 371,304 tons of used water annually. Used water is obtained both from tap water and recycled water sources. Out of this processed used water, the hospital is able to purchase and utilize an average of 82,369 tons of recycled water. In year 2014 and 2015 the hospital acquired 78,016 and 67,035 tons of water respectively, from their partner Water Recycling Facility. The hospital only obtains the volume of recycle water that they need preventing wastage of recycled water.

The water treatment costs NT 3.9 – 4.5/ton. The volume of recycled water required by the hospital is purchased by the hospital at NT 2-3/ton. This enables them to save USD \$26,275 (NTD 127,682) in a year if recycled water is used instead of freshwater which is procured at NT 12-13/ton. It is a NT 4.5 – 5.5/ton saving. Moreover, utilization of freshwater from tap water sources is reduced because recycled water is used instead.

Monthly, around 6,864 tons recycled grey water is used in watering plants and toilet flushing. Recycled water is being used in 631 toilets, including 168 toilets in dormitory areas. The table below presents the amount of fresh water and recycled water used annually.

Table 1.0 Tapwater and Recycled Water Utilized Annually by Dalin Tzu Chi Hospital



Total water cost saved 2011-2014 = USD \$105,59

Greywater Circulation System

Implementation	After Intervention
Grey water used as toilet flushing	<ol style="list-style-type: none"> 1. Annual average recycled grey water used by the hospital is 82,369 tons 2. Electricity used in usage and circulation of greywater is 39KWH/ton 3. Saved electricity is 4415KWH/year
<p>Waste Water Blower:</p> <p>The Waste Water Blower is being controlled automatically. They are opened alternately for 16 hours. Intelligent Building Energy Management System (IBEMS) is used to monitor and control these processes according to the needs of the hospital. IBEMS is a system which controls optimal energy consumption through smart analysis, implement initiatives and intelligent controls. The system also monitors the consumption which aids the hospital to build baseline energy consumption data.</p>	Blower 27.36KW * 2 sets, both operates 16 hours per day and total saved 80227KWH electricity yearly

The Issue

More can be done in environmental protection by hospitals just from saving electricity, which is greatly beneficial in reducing carbon dioxide emissions and costs.

Hospital initiative may greatly contribute in environmental protection. Hospitals are resource intensive in terms of water and electricity consumed. Although Taiwan is an island surrounded by sea, it is ranked 18th in countries with water shortage issues. According to the data from the Water Resources Agency, Ministry of Economic Affairs, toilet water usage is the highest among hotels, hospitals and department stores.

Currently, water consumption in hospitals is 742 liters per person per day. Adopting water-saving equipment in bathrooms and cooling tower will reduce utilization to 459 liters per day. Moreover, saving on electricity will aid immensely on reducing carbon dioxide emission and acquired costs.

Sustainability Strategy Implemented

Water permeable bricks use to allow water to penetrate the ground and revitalized water reserve. Specially designed plumbing systems are installed to circulate and distribute recycled water and conserve water, a precious natural resource.

People in Taiwan have grown more ecologically conscious after suffering several severe droughts and other natural disasters. We seem to be more conscientious in using water. This practice is also closely tied with the mission of Tzu Chi Foundation. To strengthen the program, we have formed an environmental protection committee to appeal and promote to the public water conservation habits.

Implementation Process

The hospital quantifies electricity and water consumption regularly. It is through this monitoring method that we are able to initiate and adopt efficient ways to conserve them. Initially, we installed water saving devices such as electronic sensor water taps and dual flush toilets. Later on, the water pressures were reduced. We have also adjusted the volume of flow on each tap to reduce consumption. Collection of greywater, sending out for treatment and purchased of needed recycled water for toilets and non-critical hospital water need is also applied.

To ensure and monitor these activities, Dalin Tzu Chi Hospital formed an Environmental Management Committee chaired by the superintendent. All the information is cascaded to employees of Dalin Tzu Chi Hospital through visual material (eg. Posters), trainings and orientations. The hospital management acknowledges that through these activities every employee of Dalin Tzu Chi Hospital has developed green habits to protect the environment.

Education Signs in Toilets for User:

Toilet cubicle has informative signs in them. In the sign the following text may be read:

[Is the water looking slightly yellowish? It is normal, because we are using recycled water. Please gently lift the flush for us to save water together.]



Permeable pavement to reserve water



Grey water reclamation used for plants watering.



Tracking Progress

The hospital monitors purchased recycled water's quality through its smell and color. They also asks the partner Water Recycling Facility to submit water sampling results conducted by an eligible water quality auditor or testing firm. The indicators monitored are temperature, pH, chemical oxygen demand (COD), biological oxygen demand (BOD), suspended solids (SS) and coliform level. The Department of General Affairs also monitors the water consumption of the hospital.

Challenges and Lessons Learned

The lack of water quality standards of grey water have led to limited use in daily life. Employees learned about green initiatives during the orientation or on-job training programs. In implementing the programs and activities we often ensure that there is a consensus among the management, department and employees. More importantly we see to it that awareness is created in everyone within the hospital. It is very fortunate that we did not encounter much difficulty.

Next Steps

Looking forward, we plan to maintain the current water consumption of the hospital in spite of the increasing number of patients being served. Under safety regulation, grey water quality will be monitored daily and tested twice every year by a certified company. We will continue to abide by the set policy and standard.

In addition, we will remain adamant in increasing volume of grey water recycled and exploring further use of recycled grey water. It is our vision to provide nearby communities with water and adapt a higher energy efficiency waste water treatment process and facility.

Demographic Information

The first Tzu Chi General Hospital was inaugurated on August 17, 1986 The Hospital practices the respect for life and patient – oriented medical care principles in Eastern Taiwan.

Dalin Tzu Chi General Hospital, a hospital established in a land with an area of 137,800 sq. m, was inaugurated on August 13, 2000. The hospital is serving the people in the area of Yunlin and Chiayi County, a place with disproportionate medical resources. Hospital provides consultative service, in-patient care unit (acute hospital) and hospice home care service. The hospital has 957 beds, 20 operating rooms and 1756 employees. With the present facilities and manpower the hospital is able to serve an average of 78,742 outpatients per month (944,904 annually) with an estimated 17,578 days of stay per month.

Links

<http://dalin.tzuchi.com.tw>

Quotes:

“Water is a resource that has no substitute. It is a necessity to place great deal of attention to water conservation and put them to practice despite the increasing need and demand for water.

-Vice Superintendent of Dalin Tzu Chi Hospital, Dr. Ming-Nan Lin.”

Keywords / Topics

grey water, permeable bricks,

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