Minimization of energy and water cost for the main building of Suranaree University of Technology Hospital (SUTH)

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Abstract. Hospitals consume a significant amount of energy and water. Energy and water are intertwined that an improvement of one can worsen the other one. However, as the water price was relatively cheaper in comparison to energy, several studies paid their attention to the minimization of energy usage of the building only. In this study, study of energy and water for the main building of Suranaree University of Technology Hospital (SUTH) was conducted in order to find minimum cost of energy and water of the building using proposed a new method namely variables pair. The investigation showed that a single meter of electricity usage as the only energy consumption of the building was applied. Meanwhile, the water usage was composed of tap water, flush water, and distilled water. Therefore, a method to determine the cost of energy and water was proposed. A variables pair in a form of (water usage, electricity consumption) was used in the proposed method to determine cost of energy and water for the main building. Several water saving options were proposed and examined. It was found that the water and electricity consumptions in the form of variables pair were (82.9 m^3/day, 26.3 kWh/day) for a current system, while they were (82.9 m^3/day, 21.2 kWh/day) for an option without a water regeneration with minimum energy. Meanwhile, they were (82.9 m^3/day, 24.4 kWh/day) for a system with water supply tanks allocated at roof top and 8th floor of the main building, instead of using only one supply tank installed at the roof top as in the current system. A system that collects the condensed vapor of the HVAC system and then uses it, had consumptions of (77.3 m^3/day, 16.3 kWh/day). Applying the current cost of energy and water at 4.5 Baht/kWh and 10 Baht/m^3 respectively it was found that the cost of water could be reduced up to 10.2% with water regeneration. The water cost contributed 7.1% cost reduction, while the energy part was 38.2%. It shows water volume saving is more significant than energy of water processing saving. The proposed method could separate process and cost parts, therefore it is easy to handle and provides boarder perspective of the saving strategy.

Keywords: Energy and water nexus, energy cost, water cost, energy and water conservation.