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# Analysis of Energy Utilization Index in Thailand Sanitary Ceramics Sector

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## Abstract

The growth in Thailand industrial sector energy use is particularly significant increased. In 2015, this sector accounts for a 36% of the total final energy consumption. The ceramic sanitary industries, which is one of these industrial sectors, consume much energy. It also has the potential and readiness to reduce energy consumption, both electricity and thermal. Therefore, this research aims to evaluate the energy utilization index of ceramic sanitary industries in Thailand from 2014 to 2015. The results of the studies will be identifying energy conservation opportunities at a sanitary ceramics sector through energy baseline compared with that of same industrial sector. The energy consumption data of the ceramics sanitary production would be applied by multiple linear regression to analyze factors, which affect the energy consumption of these industries. The result is a linear equation consistency with energy consumption and major factors is electricity energy used in the production system and minor factors also influence but less than the major factors include thermal energy used in a production system, number of employees and quantity of product.

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## 1. Introduction

Thailand's policy measure on energy conservation in a controlled factory (designated factory) is constituted by the Ministerial Regulation issued under the Energy Conservation Promotion Act (ECP Act), Due to the target of

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energy consumption reduction for the designated factories and designated buildings (DF&B). One of important factors to develop and drive the growth of Thailand economy and social is the sufficient and sustainable energy that has been increasing continuously, hence creating a greater burden on Thai government. Therefore, energy efficiency improvement and conservation is the main focus of Thailand's energy policy. Operational structure of controlled factory and building in figure 1

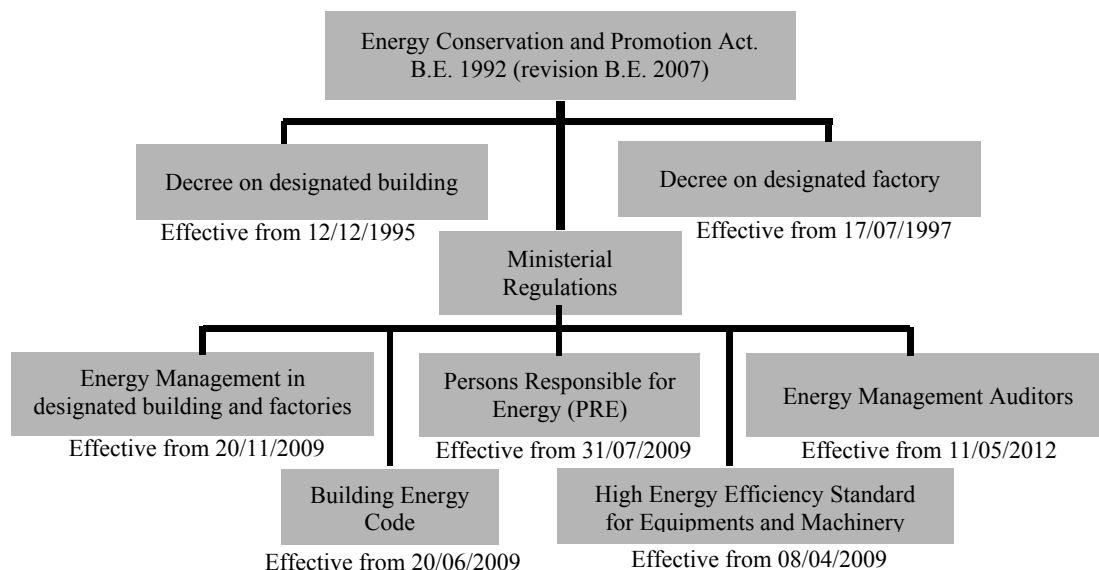


Fig.1. Structure of Energy Conservation and Promotion Act [1]

According to the statistical report on Thailand's energy and energy efficiency situation in 2015 from Department of Alternative Energy Development and Efficiency (DEDE), the total final energy consumption by economic sectors amounted to 77,881 ktoe, rising up 2.7% from the previous year. The industrial sector, which has brought about a large demand for energy, totally consumed about 27,951 ktoe, accounting for 36% of total energy consumption [2]. Thailand is an industrialized country. Its economy is heavily export-dependent. There are 3,401 designated factories in 2015, which 27 are ceramic factories (non-metallic). The ceramic industry consumes much energy there are the potential and readiness to reduce energy consumption, both electricity and thermal need to be analyzed to understand energy usage within the facility and to identify energy saving opportunities. Developing suitable baseline energy models is essential to understanding current energy use and exploring energy-saving alternatives. [3]

## 2. Designated Factory

### 2.1. Background of Sanitary Ceramics

From Thailand's energy management database in 2015, there are 10 sanitary ware factories, which is main type of the ceramic industry. Energy consumption amounted to 2,759 TJ, accounting for 12% approximately of ceramics sector. The ceramic sanitary industry is one of high-energy consumption industries. The ceramic sanitary ware industry's rapid growth has brought about a large demand for electricity and thermal energy. As a result, the total energy consumption in the ceramic industry is increased. This figure 2 shows the proportion of electricity and the thermal energy consumption of sanitary ceramic industry that affect to the total energy consumption in 2015. This study was evaluate factors that affect the largest energy consumption, which are thermal (accounting for 100%) and electricity (accounting for 59.34%) energy used in the production system.

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