SIAM WHITE CEMENT COMPANY LIMITED

COMPANY DESCRIPTION

Siam White Cement Co., Ltd (SWCC) is located the Saraburi, Thailand, and is the largest white cement producer in Thailand with a production capacity of 160,000 tons of white cement, which is equivalent to US$ 12 million per year. The company was established in 1985 under Siam Cement Public Company Limited, and in 2000 changed to Siam Cement Industry Limited, after the economic crisis of the late nineties. The company employs 60 permanent staff who work in three 8-hours work shifts. The company's products are recognized and used widely by domestic and international customers due to the consistent high quality of the products.

SWCC participated in the GERIAP project in order to increase its production efficiency by applying the *Company Energy Efficiency Methodology* as a more effective alternative to traditional energy audits. Company management established and supported the Team to cooperate with TISTR (the agency implementing the GERIAP project in Thailand) and approved the implementation of several energy efficiency options that balanced financial, environmental and social benefits.

PROCESS DESCRIPTION

The company's simplified production process is described below:

- ***Raw Mill:*** A variety of materials are used to produce white cement, e.g. sand, pyrophyllite, crushed limestone, etc., and are ground into small particles by milling machines
- ***Blending and Storage:*** Ground materials are blended to enhance homogeneity and then kept in storage silos
- ***Kilns and cooler*****:** Raw materials (i.e. pre-selected sizes of limestone (CaCO3), pyrophyllite and sand) are fed through the 4-stages suspension pre-heater system for removing CO_2 (i.e. pre-calcinations process), which uses the combustion gas recovered from the kiln. Pre-calcinated limestone from the pre-heater is fed into the (rotary) kiln for complete calcination at 1450 ° C and it becomes clinker. The clinker is then quenched immediately and transported to storage silos
- ***Cement Mill*****:** Clinker is mixed with additives such as gypsum and some chemicals and then milled
- ***Packaging*****:** White cement is then conveyed to the packaging department and subsequently transported to customers

METHODOLOGY APPLICATION

The draft *Company Energy Efficiency Methodology* was used as a basis for the plant assessment to identify and implement options to reduce energy and other materials and wastes. Some of the interesting experiences are:

- **Task 1a – Meeting with top management**

This company approached TISTR, the Thai facilitating organization, to participate in the GERIAP project rather than the other way around. This reflected top management's attitude towards environmental management: they want to grasp every opportunity to further improve their environmental performance.

Lesson learnt: Even companies that are already advanced in environmental management can be open to participate in external projects because top management considers that there is always room for further improvement.

- **Task 1d – Select focus areas**

Because this is such a large and complex company with already several internal environmental and energy programs in place, it was important to select focus areas that had not been covered yet and that were small enough to make it possible to go through all the Methodology steps within the project's timeframe. The focus areas selected were therefore at the Power Supply System, Raw Mill, Cement Mill, and Kilns. Consequently, energy consumption reductions via varieties of equipment modifications or replacements in such areas were selected.

Lesson learnt: For very large companies it is important to select focus areas that are manageable in size and complexity.

- **Task 3b – Identify options**

Several other cement companies participating in the project mentioned that they consider SWCC as a best-practice company in their sector. This became obvious when energy losses and options to further improve energy efficiency had to be identified, because opportunities were a lot less than for most other companies. To confirm this, an international industry expert was sent to the plant to evaluate the energy saving potential. This expert concluded that the plant is very modern, highly automated, well managed, and has already implemented most of the standard and low cost energy efficiency measures. For this reason, major improvements in energy efficiency could only be achieved through highly technical options that require large investments. As a result, the Team focused on relatively simple options that would still save the company money although they would not significantly reduce the company's total energy costs and GHG emissions.

Lesson learnt: For modern and well managed plants that already have exploited the obvious and low cost options to improve energy efficiency, major improvements can often only be achieved through technically complex and high cost options.

- **Task 4a – Implement options and monitor results**

The most interesting option implemented at the company was a V-separator to separate crushed limestone of different sizes. What was interesting about this option is that the V-separator was designed, constructed and installed entirely by company staff. This made it possible to make a separator that entirely meets the company requirements, as compared to standard separators that are offered by external suppliers.

Lesson learnt: Large companies often have in-house capacity to design equipment needed for new options, whereas smaller companies will more likely have to look for outside suppliers of new equipment.

- **Step 6 – Continuous improvement**

The company adopted its own methodology called *SIAMWHITE* (i.e. Sense of urgency, Innovative, Agility, Market-oriented, Willingness to learn, Hands-on, Internal skill, Teamwork and Entrepreneur). These practices and management concepts combine all the strengths and highlights of various management methods that proved to be effective. It focuses on the company's vision of sustainable growth by means of *Concept* (e.g. management based on facts and standardization), *Means* (e.g. strategic planning, continual improvement) and *Tool* (e.g. Innovation, Award and Brainstorming). The *Company Energy*

Efficiency Methodology is therefore not applied in full but rather the strong elements are adopted in the company's own methodology to ensure continuous improvement.

OPTIONS

Although SWCC's production process is considered as the most efficient white cement production process in the country, the Team identified and implemented several options with potential energy savings and greenhouse gas emission reductions through the methodology as shown in Table 1 below.

The main results include:

- The focus areas selected were power supply, kiln, raw mill and cement mill.
- Of the options identified, 5 options were investigated for feasibility, and 2 options were implemented, 2 options were being implemented at time of writing, and one option is pending implementation
- Financial results for the 4 options implemented are US$ 78,750 investment costs, US$ 58,931 annual savings, and a combined payback period of 1.3 years
- Annual environmental savings for the 4 options implemented are 962,642 kWh electricity savings per year, which equals to 595 tons CO_2 emission reductions.

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED AND INVESTIGATED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRON MENTAL BENEFITS	COMMENTS
Power supply system /Installation of capacitor bank to improve the power factor *(see case study)*	New technology/ equipment	▪ Investment: US$ 3,750 ▪ Cost savings: US$ 2,750/yr ▪ Payback period: 16 months	No direct energy and GHG emission reductions	Annual savings result from reduced fines charged when the power factor of the company's electrical system is less than 0.85
Kiln /Airflow controls by installing inverters *(see case study)*	New technology/ equipment	▪ Investment: US$ 25,000 ▪ Cost savings: US$ 22,250/yr ▪ Payback period: 14 months	▪ Electricity savings: 380,342 kWh/yr ▪ GHG emission reductions: 235 tCO_2/yr	Three inverters replaced the dampers for controlling air flow of the secondary air fan, cooler fan, and electrostatic precipitator fan
Cement Mill/ Installation of high efficiency fan at Cement Mill Department	New technology/ equipment	▪ Investment: US$ 30,000 ▪ Cost savings: US$ 25,000/yr ▪ Payback period: 1.2 years	▪ Electricity savings: 427,300 kWh/yr ▪ GHG emission reductions: 264 tCO_2/yr	Implementation in progress at time of writing

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRON MENTAL BENEFITS	COMMENTS
Raw Mill/ Installation of a separator using air stream and gravity for separating materials *(see case study)*	New technology/ equipment	▪ Investment: US$ 20,000 ▪ Cost savings: US$ 8,913/yr ▪ Payback period: 2.2 years	▪ Electricity savings: 155,000 kWh/yr ▪ GHG emission reduction: 96 tCO_2/yr	Implementation in progress at time of writing
Kiln/ Reduction of pressure drop across the cyclone system	New technology/ equipment	No information/data available	No information/data available	The company plans to install a 5-stage cyclone system in which tilt ducts will be included to reduce pressure drop

FOR MORE INFORMATION

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