HANOI CERAMIC TILES

COMPANY DESCRIPTION

HANOI CERAMIC TILES, a state-owned company, was established in 1995 and located in Hanoi. It is a medium size company with 800 employees and a member of Vietnam Glass and Ceramics for Construction Corporation (Viglacera) under the Ministry of Construction. It is the first manufacturer in production of high quality wall tiles and floor tiles in Vietnam. Total annual output is 4 million sqm, equivalent to 12,700 sqm/day. The company's products output are distributed all over the country through distribution network of more than 100 agents and 5000 retailers of building materials and annual turnover is around 19 billions US $. The company decided to participate in the project because he realized that energy efficiency projects would yield immediately benefits and that methodology would help them continuously improve energy use and thus continuously increase profits.

PROCESS DESCRIPTION

- ***Material preparation***: Nature raw materials (clay, feldspar, chemical) are processed in the batches and brought to ball mills. Carefully determined proportions of ingredients are run into a large central vat – the "mixing ark "– in which powerful "agitators" mix them thoroughly together. The mixture thus formed, known as "slip" or "body slip," is next passed through screen and then over a bed of powerful electro magnets, by which latter any particles of iron – which would be liable to cause dark specks in the finished tiles – are extracted. From the magnet bed the slip flows into the "finished ark," where further agitators are at work to keep the mixture homogeneous by preventing the heavier materials from settling to the bottom.
- ***Spray drier***: The mixture is pumped under pressure into spraying driers, which convert the wet pasty mixture to granules.
- ***Pressing/former***: Raw tiles are formed by pressing granules and then they go into the vertical drier. After their firing, raw tiles destined for glazing.
- ***Printing:*** The next stage involves adding the colour, which you see on the top of the tile. This is done using a number of (usually very expensive) screens. New screen making developments are constantly taking place with properties and designs now possible that were only dreamed about a short number of years ago.
- ***Kilning:*** The tiles have been fired in the kiln at temperatures around 1200 degrees, the final desired colors and design have been achieved.
- ***Finishing:*** Having tested the composition of the finished product and determining the correct tone, shade the tiles are then boxed and packaged.

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 1e – Prepare assessment proposal for top management approval***

The Vice Director and the Head of the Technical Department attended a one week technical training (step 2a, which in this case was carried out before most of step 1). This ensured that middle and top management were trained on energy efficiency and the Cleaner Production

methodology. For these reasons, it was easier to obtain management commitment, establish a Team, and prepare and get approval for the proposal for the energy assessment.
Lesson learnt: It is useful to also include top and middle management at the energy efficiency training in order to get support later on in the process. The Team leader should be a well technical knowledge person and have the right to make decisions.

- ***Task 2d - Quantify inputs and outputs and costs to establish a baseline***

Daily oil consumption data were not available separately for the kiln and vertical drier because one flow meter is used for the two equipments together. To find out the consumption for each equipment separately, the Team asked the Vice Director to stop operation of the kiln for one hour. The oil consumption during this hour was how much the vertical drier uses per hour. This amount was subtracted from the normal oil consumption for hour to obtain the oil consumption for the kiln. These two figures were then used as baseline data for the kiln and vertical drier.
Lesson learnt: In certain cases, establishing the fuel consumption for a specific equipment can be made by a short-time shut down of the equipment.

- ***Task 3c – Screen options for feasibility analysis***

This company plans to move to a new industrial zone in the near future. For this reason only low cost options were selected for feasibility analysis and implementation, despite some options that would bring great energy and cost savings such as a heat recovery project. Other options selected for immediate implementation related to improved operational control and awareness, because this would also benefit the plant in its new location. Other options will be investigated and implemented when the company has moved.
Lesson learnt: In case the company plans a move its facility to another location, then only the low cost options are likely to be selected for implementation.

- ***Step 6 – Continuous improvement***

To sustain energy efficiency improvements, measures have been taken by top management and by staff. Top management has issued new rules on material and energy uses. Middle management and production staff have taken their own initiative to identify additional energy efficiency options as a result of increased awareness of energy efficiency through the GERIAP project and the perception that top management is more committed.
Lesson learnt: Measures at top management and staff level are both needed to ensure continuation of energy efficiency. Active involvement of top management and relevant staff members into planning and implementation options are important to improve energy efficiency.

OPTIONS

- For three selected audit focus areas, Kiln 1, spay dryer 1, vertical dryer 1, the Team identified a total of nine energy and wasted minimization options in which seven options are already implemented and summarized in Table 1.
- The implementation of these options can generate considerable finanicial benefits and greatly reduce the emission of greenhouse gases.
- Total investments for the implemented options were approximately US$ 26,753, financed by the company own resources and generate net annual savings of US$ 153,423. The overall payback at the company was therefore two months.

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Vertical Dryer 1/Use of waste hot air from the rapid and final cooling in the vertical drier	Onsite recovery/ Reuse	▪ Investment: US$ 21,500 ▪ Operating cost: US$ 9,642 ▪ Cost saving: US$ 36,720 ▪ Payback period: 10 months	▪ Fuel (DO) savings: 136 tons/year ▪ GHG emission reductions: 328 tCO2/yr	
Reuse waste water and sludge	Onsite recovery/ Reuse	▪ Investment: US$ 1,853 ▪ Operating cost: US$ 76 ▪ Cost savings: US$ 17,764/yr ▪ Payback period: 3 months	▪ Electricity savings: 2000 kWh/yr ▪ Reduced wastewater 12,000 m^3/yr ▪ Reduced sludge: 1,000 t/yr ▪ GHG emissions reduction: 1.2 t CO_2/yr	The 1,000 tons sludge is used as body slip
Kiln/Install VSD in drive system of Kiln 2	Production process/ equipment modification	▪ Investment: US$ 3,400 ▪ Cost savings: US$ 7,508/yr ▪ Payback period: 6 months	▪ Electricity savings: 14,400 kWh/yr ▪ Fuel (DO) savings: 24.5 t/yr ▪ GHG emission reductions: 88 tCO2/yr	
Reduce heat of tiles before passing to the package machine	Good housekeeping	▪ Investment: negligible ▪ Cost savings: US$ 10,603/yr ▪ Payback period: immediate	▪ Reduction of plastic (PP) by 6.3 tons/year	
Change of the recipe materials Increase awareness and knowledge of operating staff regarding recovery of spilled granules on the floor	Input material substitution Good housekeeping	▪ Investment: negligible ▪ Cost saving: US$ 40,202/yr ▪ Payback period: negligible	▪ Electricity savings: 130,200 kWh/yr ▪ Fuel (DO) savings: 119 t/yr ▪ GHG emissions reduction: 468 tCO2/yr	Defect rate of raw tiles reduced by 1%
Use larger number of smaller and lower density grinding balls in Ball Mill to reduce grinding time	Good housekeeping	▪ Investment: n*egligible* ▪ Cost savings: US$ 48,881 ▪ Payback period: immediate	▪ Electricity savings: 788,400 kWh/yr ▪ GHG emission reduction: 536 tCO2/yr	

For the seven options implemented, the total annual energy reductions were 280 tons of DO and 935,000 kWh. As a result of options implemented, the company's GHG emissions were reduced by 1,528 tons between the start of the project in 2003 and the end of the project in 2005. Besides costs and energy savings, it also contributed to a decrease in wastewater consumption and sludge disposal, to an improvement in product quality and working conditions. The main results from the GERIAP project are given below in table 2.

Table 2. The main results from the GERIAP project

Material/ Energy	Annual energy savings	Annual GHG emission reduction	Annual financial savings
Diesel oil (DO)	279.5 tons DO	892 tons of CO_2	US$ 75,465
Electricity	935,000 kwh	636 tons of CO_2	US$ 57,970
Water	12,000 m^3	12,000 m^3 wastewater	US$ 2,640
Other savings (materials, disposal costs)		1000 tons sludge	US$ 15,000
	6.3 tons plastic (PP)		US$10,603
Operating Cost		increase of 106.8 tons CO_2	(US $ 8,255)
Total		**1,421.2 tons CO_2 and 12,000 m^3 wastewater**	**US$ 153,423**

Notes:

- *Electricity: US$ 0.062 /kWh*
- *DO oil: US$ 0.27/kg*
- *Water: US$ 0.22/m^3*
- *Emission factor: 3.19 tons CO_2/ton of DO; 0.00068 tons CO_2/kWh*

FOR MORE INFORMATION

GERIAP National Focal Point (NFP) of Vietnam
Dr. Tran van Nahn, Director VNCPC
Center for Environmental Science and Technology (CEST)/
Vietnam National Cleaner Production Center (VNCPC)
Hi-tech Building, Dai Co Viet Road, Hanoi, Vietnam
Tel: +84-4 8681 686-7
Fax: +84-4 8681 618
Email: vncpc@vncpc.org

GERIAP Company in Vietnam
Pham Van Minh, Vice Director
Hanoi Ceramic Tiles Company Trung Hoa
Cau Giay District, Hanoi, Vietnam
Tel: +84-4 8543043
Fax: 84-240 8542889
Email: ceramichn@hn.vnn.vn
Website: www.ceramichn.com