SAI SON CEMENT

COMPANY DESCRIPTION

SAI SON CEMENT, a joint-stock company, was established in 1958 and located in Ha Tay province, west of Hanoi. Due to strong competition and market pressures in the domestic market, the company replaced main equipments in 1998. The company is a certified ISO 9001 (Version 2000) as well as a certified ISO 14000 company. Today, the company employs 515 staff members and has an annual turnover of approximately US $ million 5.4. The total annual production from two vertical kilns is 165.000 tons cement. The company decided to participate in the project because they were convinced that UNEP'S methodology as experienced during the National Awareness Seminar would benefit the company and would add to the company's in-house initiatives of cost reduction, which is crucial to the it's survival in the present competitive market environment. The audit focus areas were selected based on equipment consuming high quantity of coal and electricity.

PROCESS DESCRIPTION

- ***Raw materials***: The main raw material for the manufacture of clinker is a limestone. The excavated material is transported to a crusher. Normally first a jaw crusher, followed by a roller mill and gyratory crusher is used to crush the limestone. Other raw materials such as soil, clay and sand are delivered to the rotary drier. The collected materials are proportioned so that the resulting mixture has the desired fineness and chemical composition.
- ***Kiln feed preparation:*** The raw materials are further processed and ground. The materials are ground into a flowable powder in ball mills. In ball mill, steel balls in are responsible for decreasing the size of the raw material pieces in a rotating tube. The raw materials need to be further added water to form pellets.
- ***Kiln***: The kiln used in the company is the vertical kiln. The pellets, fed in to the top of the kiln
- ***Finish grinding:*** After cooling, the clinker is stored in the silo. To produce powdered cement, the nodules of cement clinker are ground. Grinding of cement clinker, together with additives to control the properties of the cement (gypsum) can be done in ball mills. Coarse material is separated in a classifier to be returned for additional grinding. Finished cement is stored in silos, tested and filled into bags.

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 company had very satisfying experiences with the ISO 9001 and ISO 14001 certification process. The ISO 14001 management system provided the basis for a proposal to systematically analyze the company's energy situation, uncover the hidden potential to improve energy efficiency, and screen possible options for feasibility analysis.
<u>Lesson learnt: An ISO 14001 environmental management system can provide the framework for planning and carrying out the energy assessment</u>.

- ***Task 4a – Technical, economic and environmental evaluation of options***

Before the GERIAP project the company was considering installing a variable speed drive (VSD) to control the motor speed of the FD blower but was not certain if this would impact the operation of the vertical kiln. An international expert assisted with the technical feasibility analysis and enabled top management to make an informed decision to approve the option.
Lesson learnt: Knowledge and experience of an external consultant can be useful in assessing the feasibility analysis of some technical options that require specific industry and equipment expertise.

- ***Task 4c – Prepare implementation and monitoring plan for management approval***

Although the company had experience with Cleaner Production it had less experience with energy assessments and was therefore skeptical about the potential of energy efficiency options, especially relating to electricity consumption. The external facilitators put a lot of effort in providing descriptions and illustrations of energy consumption by different production processes and equipments, and assisted with preparing detailed calculations of investments and savings for the proposed options. The plant's Team now understood the technical background of energy use and options, which resulted in them feeling confident about recommending the options to top management. Top management was very satisfied with the report and approved the implementation of options without hesitation.
Lesson learnt: It is important for external facilitators to make sure that the plant's Team thoroughly understands the technical background of energy use and options, because only then they will take ownership of the options and feel confident to recommend them to top management and implement them.

- ***Task 5b – Evaluation meeting with management***

Top management indicated that the energy assessment has made the company more conscious about energy efficiency and made the company realize that energy efficiency can result in quick financial savings. However, management was not certain about whether to continue with energy efficiency, because they do not know what the improvement potential is. Benchmark figures to compare the company's specific energy consumption with similar companies or compare the performance of their equipments with standards would help to convince management. Lesson learnt: An indication of future improvement potential in energy efficiency based on benchmark figures would help to convince top management to commit to more energy assessments.

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

The company has an ISO 14001 certified environmental management system that should ensure continuation with energy efficiency. The company has allocated energy responsibilities, but it is important that this comes together with an energy-minded company culture, top management support, increased communication about energy consumption, rewards for good suggestions by staff, and sufficient resources. Otherwise there is the risk that only superficial changes will be made without much real action and impact. During the project it was found that staff participated well, but that more involvement of relevant staff members is needed in the planning and implementation of energy efficiency measures when it concerns behavioral changes (e.g. energy management, good housekeeping) because only then internal resistance to energy efficiency is overcome.
Lesson learnt: Formal changes to energy management must be accompanied with changes in company culture and involvement of staff on the work floor to ensure that they are really supporting improving energy efficiency. Top management support is crucial to achieve this.

OPTIONS

- For selected audit focus areas, the Team has identified a total of 10 energy efficiency options and six of them are already implemented and summarized in the table 1.

- The implementation of these options can generate considerable economical benefits and greatly reduce the emission of greenhouse gas.
- Total investments for the implemented options were over US$ 40,000, financed by the company own resources and generate net annual savings of US$ 98,124. The overall payback at the company was therefore five months.

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA AND OPTION	TYPE OPTION	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Installation of variable speed drive (VSD) to control speed of the existing forced draft (FD) blower	New technology/ equipment	Investment: US$ 20,000 Cost saving: US$ 7,611/yr Payback period: 32 months	Electricity savings: 122,758 kWh/yr GHG emission reduction: 84 tCO2/yr	Reduce noise in the workshop and prolong the life of FD fan
Kiln 1/ Insulation of the kiln burning zone area	Good house keeping	Investment: US$ 740 Cost saving: US$ 338/yr Payback period: 27 months	Coal saving: 13 t/yr GHG emission reduction: 33 tCO2/yr	Reduce heat loss of the kiln
Kiln 2/ Install a variable speed drive to control the motor speed of the FD blower	New technology/ equipment	Investment: US$ 20,000 Cost savings: US$ 11,030/yr Payback period: 22 months	Electricity savings: 177,903 kWh/yr GHG emissions reduction: 121 tCO2/yr	After successful installation of VSD for Kiln 1 the company management decided to invest VSD for Kiln 2.
Other/ Expose clay to the sun in dry season	Good house keeping	Investment: negligible Cost savings & payback period: calculated in overall benefits	Reduction of GHG emissions	This option reduces the drying time which in turn reduces coals for drier furnace
Other/ Increase awareness of energy saving for employees	Good house keeping	Investment: negligible Cost savings & payback period: calculated in overall benefits	Reduction of GHG emissions	
Other/ Install an additional rotary drier and rearrange production plans to make use of maximum capacity of production line	Good house keeping	Investment: To be determined Cost savings & payback period: calculated in overall benefits	Reduction of GHG emissions	

For the six implemented options, the total annual energy reductions were 1,521 tons of coal and 944,806 kWh. The company's GHG emissions were reduced by 4,460 tons CO_2 between the start of the project in 2003 and the end of the project in 2005.

Table 2: EXAMPLE OF OPTION NOT IMPLEMENTED

FOCUS AREA AND OPTION	TYPE OPTION	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Kiln 1/ Recovery of heat from hot exit clinker and reuse to preheat combustion air supplied by forced draft fan.	New technology/ equipment	Investment: US$ 9,500 Cost savings: US$ 11,570/yr Payback period: 10 months	Coal saving potential: 445 t/yr	The option is under consideration

Table 3. The main results from the GERIAP project

Material/ Energy	Savings	Annual energy savings	Annual GHG emission reductions	Annual financial savings
Coal	11.4 kg/ ton of clinker	1,521 tons of coal	3,818 tons of CO_2	US$ 39,546
Electricity	6.61 kwh/ ton of cement	944,806 kwh	642 tons of CO_2	US$ 58,578
TOTAL			**4,460 tCO_2**	**US$ 98,124**

Notes:

- *Total amount of clinker produced in 2004: 133,431.61 tons*
- *Total amount of cement produced in 2004:142,784.7 tons*
- *Electricity: US$ 0.062 /kwh*
- *Coal: US$ 26 /ton*
- *Emission factor: 2.51 tons CO_2/ton of coal; 0.00068 tons CO_2/kWh*

FOR MORE INFORMATION

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