PT SEMEN CIBINONG TBK

COMPANY DESCRIPTION

PT Semen Cibinong Tbk is one of the largest cement plant in Indonesia and was established in 1975. The company's annual installed capacity is 7 million tons of cement, which is produced in four kilns at two different locations: a 2-line production in Desa Narogong, Bogor, and a 2-line production in Cilacap, Central Java. The company produces five types of cement for the domestic and international markets: Type I - Ordinary Portland Cement (OPC), Type II - Moderate Heat of Hydration Cement, Type III - High Early Strength Cement, Type V - Sulphate Resistant Cement, and Class G - Oil Well Cement. The number of employees is 3,216 and annual revenue was Rp. 153,742 billion (about US$ 18 million) in 2002. The GERIAP project is in line with the company's target to lower production cost and improve the energy efficiency of its operation. Because of the size of the plant, the GERIAP project focused on the production line NR#4 in Narogong Bogor only.

PROCESS DESCRIPTION

Cement is manufactured by three basic steps: pyro-processing, preparing raw materials and finish grinding of the produced clinker (see Figure 1). The most common cement, Portland cement, requires four major chemical components to achieve the proper chemical composition. These are lime (limestone), silica (sand), alumina (clay) and iron oxide (iron ore). Small quantity of gypsum is normally added during grinding to retard setting.

The cement factory operates quarries for the supply of limestone and clay as main raw materials. All raw materials are crushed, ground and homogenized to fine powder prior to entering the burning process. Pre-drying of raw materials is required for dry process raw grinding. The most complex stage in manufacturing Portland Cement is the burning process. It encompasses the conversion of a chemically designed and physically prepared raw material mixture into cement clinker. This is done in rotary kilns through controlled combustion of primary fossil fuels as solid (coal), liquid (diesel oil), or alternative fuels. Coal is by far the most common fuel due to cost considerations.

The last step in the process of manufacturing Portland Cement is the finish grinding of clinker together with a small amount of gypsum, less than 4%, to produce Ordinary Portland Cement type I. Other cement types result from introducing additive pozzuolana materials or limestone in cement grinding. Then cement storage, packaging, handling and shipping facilities are essential elements of a cement plant. These facilities appear insignificant compared to other portions of a cement plant, but their capita cost account for a significant share of the total plant.

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 1b – Form a team and inform staff**

A team was established at the beginning of the project, but due to reorganization at the plant this team was almost entirely replaced with new members. The same happened with the external facilitators, and therefore only one or two people knew about the options that had been identified

and investigated for feasibility. It was quite a challenge for the new team to complete the implementation of options and monitoring the results without prior involvement in the assessment and this caused a delay in the completion of the project.
Lesson learnt: it is preferable if at least some of the team members are involved from the beginning until the end of the methodology steps to avoid delays.

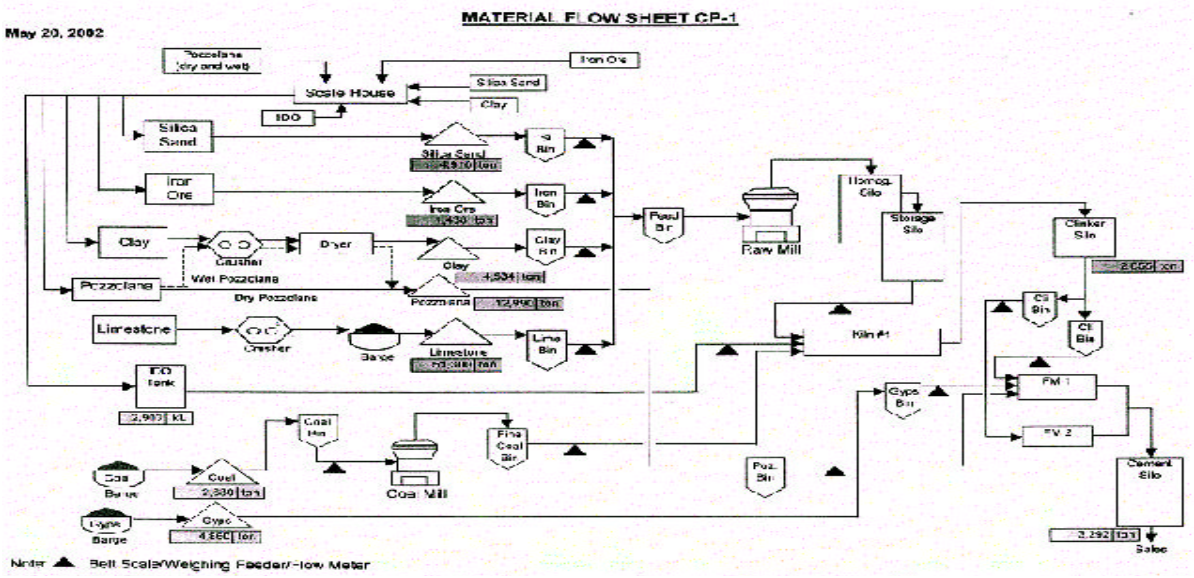

Figure 1: Cement production process at PT Semen Cibinong TBK

- **Task 2b – Walkthrough of focus areas**

Many observations were made at this company during the walkthrough of the focus areas that the Team could not have found out from data alone. High energy consumption and inefficient operations were observed at all focus areas. For example, low loading and unloading of compressors (requiring immediate attention), leakages leading to false air (at the kiln, pre-heater, man holes, pipelines, flap gate and roof), and frequent replacement of fire brick lining (4 times per year). For the compressed air system, there appeared to be no flow meters, which made it impossible to quantify compressed air losses. However, because several leaks could be seen and heard, which resulted in the Team recommending a detailed compressed air leak survey.
Lesson learnt: The walkthrough of focus areas is an effective way to make observations on energy losses that are no readily visible in the reading of data.

- **Task 3b – Identify options**

In addition to options that would improve energy efficiency and reduce greenhouse gas emissions and costs directly, the Team also recommended the installation of flow meters. Measured data with the flow meter would allow the Team to identify losses and additional options to improve energy efficiency in the future.
Lesson learnt: Remember that the lack of monitoring and measuring equipment can also be an option to recommend to management.

- **Task 4c - Prepare implementation and monitoring proposal for top management approval**

Although top management approved all recommended options, several options were not implemented in that same year because there were several other projects planned that would improve the overall company performance and production output, which were given priority.
Lesson learnt: If and when options are implemented also depends on other projects the company has planned, therefore the Team should find out about these when writing the proposal to top management.

- **Task 5a – Implement options and monitor results**

One of the main options identified was to conduct a compressed air leak survey and repair leaks. However, there was no leak detection equipment available at the plant and limited in-house knowledge on how to detect and quantify leaks in any other ways. The external facilitators made use of the anemometer provided through the GERIAP project to measure leaks and an external consultant trained company staff on how to identify leaks using the "soapy method" and quantify leaks using standard tables.

Lesson learnt: attention also needs to be given to how the option should be implemented.

- **Step 6 – Continuous improvement**

The assessment focused on one production line only. Several options can be applied to other production lines, as they are very similar and do not require a lot of time because success was already proven for the first production line.

Lessons learnt: Big and fast improvements can be made in large plants by repeating the options implemented in one production line at other production lines.

- **Step 6 – Continuous improvement**

The company established targets for increasing profits by improving various aspects of the production process, including energy efficiency. All staff have been given a "guidance book" that explains the targets and the programme framework to achieve these.

Lesson learnt: Energy efficiency improvements can also be incorporated in programmes that aim to improve the overall production output and profits, which will increase the chance that energy conservation is continued.

OPTIONS

- The focus areas in the NR#4 production line were the compressed air, false air, and the kiln
- Many options were identified and three options were implemented. For these three options the investment costs were US$ 16,667 for one option but the investment costs for the other two options could not be determined. Annual cost savings were US$ 487,587. As the investment costs for the other two options is not high, the total estimated payback period is only a few months
- Total energy reduction for electricity 901,660 kWh/yr per year, 253,830 liters IDO (Industrial Diesel Oil) per year, and 12,210 tons coal per year. Estimated GHG emission reductions are 32,159.18 tons CO_2 per year.

Table: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY*	ENVIRONMENTAL BENEFITS	COMMENTS
Compressed Air/ Compressed Air Leak survey and leak repair	Good housekeeping	▪ Investment: US$ 16667 ▪ Cost savings: US$ 50092 ▪ Payback period: 2 months	▪ Electricity savings: 901,660 kWh/yr ▪ GHG emission reduction**: 805 tCO2/yr	This calculation is based on BPPT's method, and not on loading and unloading the compressor before and after repair

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY*	ENVIRONMENTAL BENEFITS	COMMENTS
Kiln And Cooler Area/ False air leak survey and repair, and installation of mechanical seal on kiln	Good housekeeping	▪ Investment: not determined ▪ Annual cost savings: up to US$ 339,166 ▪ Payback period: almost immediate	▪ Coal savings: 12,210 tons/yr ▪ Electricity savings: data not yet available ▪ GHG emission reduction**: 30,674 tCO_2 /yr for coal reductions only	Savings are potential savings based on calculated coal losses prior to option implementation
Kiln and cooler area/ Kiln refractory lining with better quality chrome-free fire bricks to reduce number of kiln shut downs	Good housekeeping	▪ Investment: not determined ▪ Cost savings: US$ 52,421 ▪ Payback period: almost immediate	• Industrial Diesel Oil (IDO) savings: 253,830 l/yr ▪ GHG emission reduction**: 680 tCO_2/yr ▪ Improved health conditions for employees and nearby communities because new bricks are free of chrome	▪ A new kiln lining procedure was introduced ▪ Employees were trained by a Holcim expert on refractory installation techniques

*US$ 1 = Rp 9,000
** Emission factors are taken from www.uneptie.org/energy/tools/ghgin/

FOR MORE INFORMATION

GERIAP National Focal Point for Indonesia
Dr. Ir. Tusy A. Adibroto Msc or Ms. Widiatmini Sih Winanti
BPPT - Jl. MH Thamrin 8
BPPT II building 20th floor
Jakarta, Indonesia
Tel: + 62 21 316 9758/68
Fax: + 62 21 316 9760
E-mail: tusyaa@ceo.bppt.go.id, widiatmini@yahoo.com

GERIAP Company in Indonesia
Lilik Rendra
Enviroment Superintendent
PT. Semen Cibinong, Bogor, Indonesia
Tel: +62 (21) 8231260
E-mail: lilik.rendra@semen-cibinong.com