THAI KRAFT PAPER INDUSTRY COMPANY LIMITED

COMPANY DESCRIPTION

Thai Kraft Paper Industry Company Limited (TKIC) was founded in 1991, is located in Kanchanaburi in Thailand and produces more than 550,000 ton of paper per year. The company has 643 employees working in three 8-hours shifts. TKIC is just one of the pulp and paper manufacturing companies located at the Wang-Sala complex. Some of these produce a variety of paper products, whereas others produce pulp for paper making companies. As one of the companies under the Siam Cement Group, one of the biggest multi-business companies in Thailand, it has a strong record in energy and environmental efficiency activities. Participating in the GERIAP project is a must for TKIC. The company adopted energy efficiency options not only to reduce GHG emissions, but also to enhance the company's image as an environmentally responsible company.

PROCESS DESCRIPTION

The company's production process consists of two main lines. One is the pulp preparation, and the other is to convert the pulp to kraft paper as shown in Figure 1.

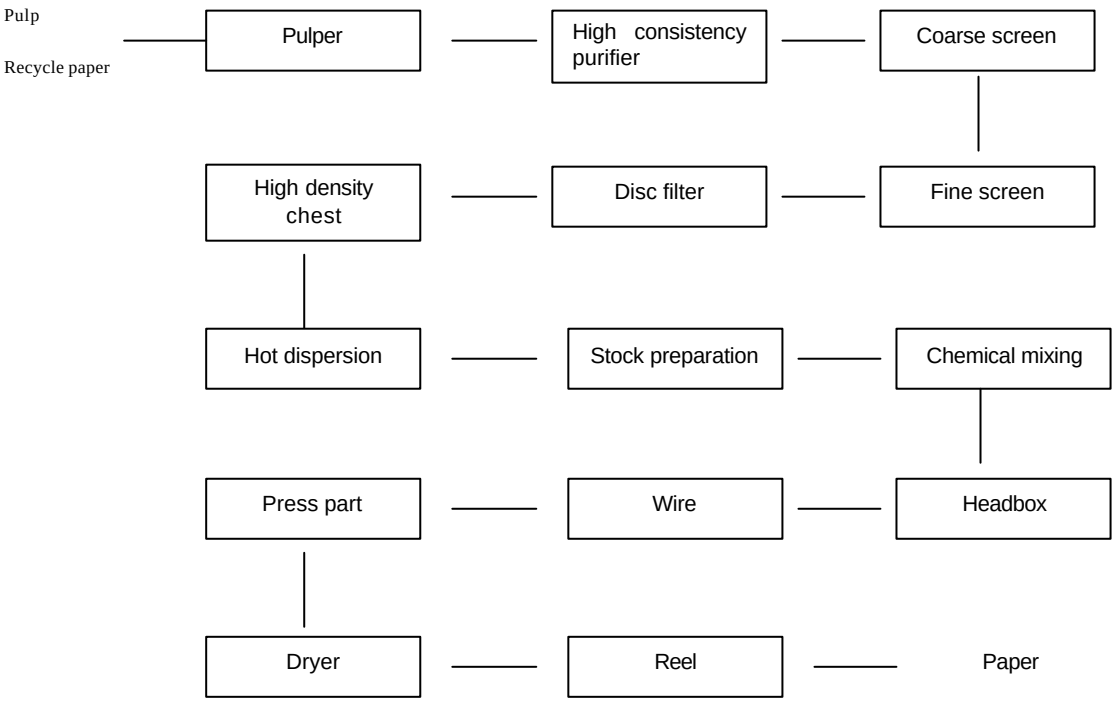

Figure 1: Diagram of TKIC production process

A brief description of the production process is as follows:

- TKIC produces many grades of paper. Some products require imported pulp and others require recycled paper and mixed pulp. Hence, raw materials such as imported pulp and recycle papers are collected separately. First impurities are removed from the recycle paper.
- Next, the pulp goes through a series of filtration steps, then through the chest and finally to the stock preparation unit where the chemicals are added.
- The stock is fed into the head box, then to the wire unit and finally partially pressed before drying at the dryer section until the required moisture content is reached.

- Finally, the paper is rolled, cut and wound to the required width. After quality checks, the rolls are re-wrapped, strapped and stored for dispatch 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 1b – Form a team and inform staff**

A new Team was formed for the GERIAP project, without building on existing committees or work groups. Several junior staff members were included in the Team and this was a success because they were very enthusiastic and motivated to learn about Cleaner Production and energy efficiency from the more senior Team members, external facilitators and the international consultant. Junior staff may be working at the company for many years to come, so they will be important for the continuation of energy efficiency in the future.
Lesson learnt: Include some junior staff in the Team because although they do not have many years of experience, they are often keen to learn and contribute to improving energy efficiency and will be working at the company for many years to come, which is important for the continuation of energy efficiency in the long run.

- **Task 3b – Identify options:**

The assessment was coordinated by the Energy Department of the company. However, during the brainstorm session to identify energy efficiency options, several staff from different production departments were asked to participate, which resulted in a much longer list of possible options.
Lesson learnt: Inviting production staff who are not part of the Team to participate in the brainstorm session to identify energy efficiency options, many more possible options will be identified.

- **Task 2e – Quantify losses through a material balance**

Paper sludge is one of the main wastes or "losses" for this company, and it is an important one because it is expensive to get rid of this waste stream. When options were identified an obvious option was to use paper sludge as an alternative fuel at the plant.
Lesson learnt: Identifying losses is also useful because sometimes a waste stream can be reused to improve energy efficiency, for example the reuse of waste paper sludge as alternative fuel.

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

Energy data were mostly available. However, some other data was more difficult to obtain because the company does not have meters installed or monitoring equipment to measure resources, such as water and compressed air use. In addition, the company does not record many data in an information system. The Team asked suppliers to assist with making estimations.
Lesson learnt: When meters and recorded data are not available, the Team can approach suppliers of resources or equipment to assist with estimating quantities of resources.

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

Although top management was interested in many identified options at first, when approval for implementation was requested, a lot of options were rejected or suspended for consideration. The reasons given were (1) lack of financial incentive to invest in these options, (2) lack of staff resources to implement options because they were needed in production, and (3) lack of data to show the potential energy and financial savings.
Lesson learnt: The Team can recommend options for implementation but in the end it is top management who decide whether options will be implemented or not.

- **Step 6 - Continuous improvement**

The company will continue with energy efficiency and cleaner production in the following ways:

- Work will continue on the option to reduce the moisture content of biomass fuel since the efficiency is not as good as expected. Steam traps surveys will continue to be carried out as part of regular maintenance programs.
- It is part of the regular duties of the Team from the energy department to minimize energy loss while supporting the production process. Therefore they will continue to be involved with GHG emission reduction and energy conservation related activities.
- The environmental and financial benefits from the implemented options are an inspiration to do more. However, it also requires encouragement and a positive attitude from top management too to initiate further implementation of options.

OPTIONS

- The focus areas selected for the projects were categorized into three areas: (1) Steam boilers, (2) Humidity control for paper machine No.5 and (3) Compressed air leakage.
- The Team identified a total of eight options as shown in Table 1. Three options were implemented and the other five options were not to be implemented.
- The total investment for the three implemented options was US$ 14760 with annual saving of US$ 26853. The combined payback period is approximately 7 months.
- For the three implemented options, the total energy reductions were 14,618 tons of coal, and as a result, the plant's GHG emissions were reduced by 1898 tons CO_2 per year or 0.3% of the total plant's emissions between the start of the project in 2003 and the end of the project in 2005.

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED AND INVESTIGATED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Boiler No.10/ Repair or replace desuperheating station valves to reduce the amount of steam condensate discharged *(see case study)*	Production process/ equipment modification	▪ Investment: US$ 400 ▪ Cost savings: not provided ▪ Payback period: not provided	▪ Coal and lignite savings: 56 tons/yr ▪ GHG emission reduction: 104 tCO_2/yr	Implemented during a maintenance period
Boiler No.10/ Repair or replacement of leaking steam traps *(see case study)*	Production process/ equipment modification	▪ Investment: US$ 8900 ▪ Cost savings: 13217 ▪ Payback period: 8 months	▪ Coal and lignite savings: 14121 tons/yr ▪ GHG emission reduction: 978 tCO_2/yr	Assumes that all 20 identified leaking steam traps were repaired in last maintenance period
Boiler No.10/ Waste heat reuse from flash tank to reduce the moisture content in the bark and sludge before it is used as boiler fuel *(see case study)*	Onsite recovery and reuse	▪ Investment: US$ 5460 ▪ Cost savings: US$ 13636 ▪ Payback period: 6 months	▪ Coal and lignite savings: 441 ▪ GHG emission reduction: 816 tCO_2/yr	Implemented but requires further improvement
Boiler No.10/ Cooling tower cleaning	Good housekeeping	▪ Investment: US$ 375 ▪ Cost savings:	▪ Not available	Cleaning should be included in maintenance program

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
		not provided		Reduction of algae growth will prevent health risks through legionella bacteria growth
Boilers/ Reduction of excess air in Boilers no. 9 and no.10	Production process/ equipment modification	▪ Not available	▪ Coal savings ▪ GHG emission reduction	Boiler specialist is needed to further study if oxygen levels can be reduced
Paper machine / Installation of more effective and energy efficient Approach Flow Screen *(see case study)*	New technology / equipment	▪ Investment: US$ 175,00 ▪ Cost savings: US$ 75,000 ▪ Payback period: 2.3 years	▪ Electricity savings: 3000 MWh/yr ▪ GHG emission reductions: 1854 tCO_2/yr	High investment costs are barrier for implementation
Humidity control for paper machine No.5/ Humidity control in paper machine no.5	Production process/ equipment modification	▪ Not available	▪ Less energy consumed beside of more pleasant working environment	Option is cancelled and considered as not beneficial enough since some sort of these projects as a whole package were rejected by executive committee before.
Paper machine/ Cooling water consumption management	Good housekeeping	▪ Not available	▪ Water and energy savings ▪ GHG emission reductions	Option is suspended due to lack of water monitoring equipment that is needed to measure water leakage and over use
Paper machine / Humidity sensor and control equipment in machine no.5 to improve working atmosphere	Production process / equipment modification	▪ Not available	▪ Coal savings through reduced steam production ▪ GHG emission reductions	Option was not approved for implementation
Compressed air/ Compressed air leak repair	Good housekeeping	▪ Not available	▪ Coal savings ▪ GHG emission reduction	Lack of monitoring equipment for quantify leaks Leak repair to be included in next maintenance period

FOR MORE INFORMATION

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