

PROMOTION OF CLEANER PRODUCTION IN THE PULP AND PAPER INDUSTRY: A TECHNOLOGY FACT SHEETS APPROACH

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Summary

The Asian Institute of Technology and United Nations Environmental Programme carried out a joint project to compile the Technology Fact Sheets derived out of the implemented cleaner production technologies in the pulp and paper industry. This project differentiated the conventional cleaner production management practices against the cleaner production technologies, which have been implemented in the Pulp and Paper industry. This paper highlights the outcome of this project and summarizes newer cleaner technologies and their implementation status and benefits in the pulp and paper industry. This paper also looks at the available databases on the cleaner production technologies, which can be used by different mills for access to newer technologies.

These technology implementations were classified in different mill sections ranging from raw material preparation through the pulping section upto the papermaking section. The benefits derived out of such implementations are evaluated in comparison with the existing production requirements towards utilities and consumables and accrued reductions in the same after the cleaner technology implementation. This benchmarking was done in relation to the reduction in the pollution generation, reduction in the energy requirements and the requirements of utilities. Since this study is intended to be useful to the operating mills, a detailed block diagram or the pictorial representation of the implemented technology has been included to ensure a proper understanding of the processes involved. The responses received from suppliers and mills were classified in different mill sections with respect to the implementation and the benefits in the pollution reduction and energy savings after technology implementation. This benchmarking and results compilation is useful in understanding the potential of technology implementation and benefits.

Keywords

Cleaner Production, Technology Factsheets, Pulp and Paper Industry, Database.

1. INTRODUCTION

1.1 Introduction to Cleaner Production in the Industry

As the industrialization in the world grew, the challenges were uphill and there came the need to look at different possible ways to curb the environmental pollution caused by the industry. The awareness towards the environmental problems caused by the industry grew and the developing world started looking at the different approaches to curb the pollution levels. Conventional end of pipe solutions changed to proactive ways in the production processes. As a matter of fact, it must be noted that the operating industry cannot always talk of the cleaner processes due to the simple fact that the existing operations need to be maintained. The approach of the industry changed towards the normally used cleaner production techniques today, which would talk of making some changes in the existing production processes in the plant, which would particularly tend to reduce the pollution levels at the first stage.

1.2 Existing Efforts by Different Organizations for Pollution Abatement

The movement to curb the environmental pollution caused by the industry needed a specific focus by way of attacking the problem at different levels. It is important to note that the goal of reducing pollution cannot be imposed by the government and the law makers without looking at the factual data on the extent of pollution in the first place and real possibilities of achieving cleaner production. The lawmakers have understood this fact and have promoted a number of programs to facilitate the industry to adopt cleaner production in their operating plants. United Nations Environmental Programme (UNEP) has been taking initiatives towards adopting good techniques to curb the pollution levels. Initially, UNEP concentrated on the specific industry sectors like Textile, Pulp and Paper, Electroplating, Food etc., which were the focus areas in the developing countries. To facilitate cleaner production in these industrial sectors, UNEP has promoted different demonstration projects in the industry, which are being implemented in the Asia pacific region [1].

1.3 Study of Available Database on the Cleaner Production Potential

One of the largest database available in the Asia pacific region, which has been worked out by the UNEP is the Industrial Cleaner Production Information Clearinghouse (ICPIC). The ICPIC case studies are from different industrial sectors like textile, pulp and paper, food, electroplating etc.

Their case studies have been gathered to facilitate the industry to a database of CP techniques. In the context of Pulp and Paper industry, there are 72 case studies, which give variety of information like:

- ⇒ Name of the mill adopting technology
- ⇒ Brief description of the technology
- ⇒ Accrued benefits of the technology
- ⇒ Contact details of the supplier/ technology provider

The 72 cases of ICPIC talked of 60 % CP management practices and 40 % CP technologies.

It is also interesting to note that the ICPIC case studies were contributed by the Mills and Research Institutions in majority and the contribution by the Suppliers was very limited (Refer Figure 1). The costing details available in the case studies were also very limited in nature with very less data on the actual operating requirements of the technologies. The costing details provided in the case studies were limited to the capital cost requirements of the implemented technologies.

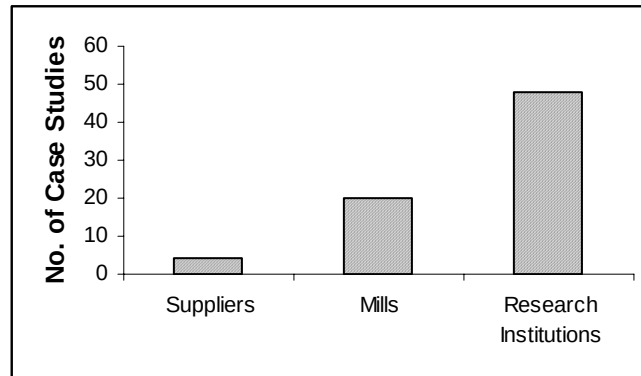


Figure 1. Number of Case Studies (ICPIC)

Though, the information made available in the ICPIC cases is good enough for the primary introduction, in practice, mill engineers would like to have more technical details before adopting such technologies, namely technology description, initial investments, operation and maintenance costs and required modifications in the plant, etc. With this in view, it was challenging to take up listing of technologies applied in the industry. It was thought that a database be generated which would talk of newer technologies in the field of cleaner production.

2. CLEANER PRODUCTION IN THE PULP AND PAPER INDUSTRY

In general, the status of the cleaner production in the pulp and paper industry can be classified in the following two ways [2, 3 & 4], namely:

- ⇒ Cleaner production management practices
- ⇒ Cleaner production technologies

Cleaner production management practices: these are the cleaner production techniques, which promote small change changes revolving around the smaller investments. Majorly these changes are concentrating on the housekeeping techniques in the industry. Usually these changes are easy to implement and give immediate results.

The second class of cleaner production implementations in the pulp and paper industry are the ones which can referred to as the cleaner production technologies. These are the typical combinations of the technology and the hardware requirements in the industry. These demand higher investments and higher implementation time. Operating these plans would also require investments in terms of power, chemicals, water, steam etc and thus a detailed financial

analysis. The results obtained from the implementation of these techniques are usually in the higher range of benefits like savings in the overall operations of the plant etc.

For a real implementability of achieving cleaner production in the pulp and paper industry, it is important to note that the industry can implement the cleaner production management practices as a short term goal, to achieve faster results. The working “cult” in the mills needs to be changed in this direction to achieve continual results. As against this, the cleaner production technologies need be evolved as a long-term strategy in the plant. For example, the installation of units to separate the fibres from the wastewater used to be one of the talked of cleaner production technologies in the pulp and paper mills. But with the newer technologies being used for the processes, it is important to understand that the state of the art of the production processes would change from time to time. With this in mind, the “older” cleaner production technologies would now become a part and parcel of the technology being recommended by the process consultants. With this again, a need would arise to keep updating the databases which list the cleaner production technologies and the management practices.

3. PROJECT DETAILS

With a view to concentrate on the updating and creation of a database to facilitate the mills to adopt cleaner production in their plants, it was deemed important to start the continuous process of available cleaner production technologies. As against the available database as discussed in the earlier sections, it was important to generate a database of the technologies available for the benefit of the industry.

3.1 Introduction to the Project

The United Nations Environment Programme has been involved with the betterment of the pulp and paper industry at large. This has been achieved by way of undertaking demonstration projects in the industry through the Network for Industrial Environmental Management (NIEM). Under this project, it was targeted to introduce Cleaner Production methods in the Asia Pacific region, and 35 demonstration mills in seven countries in the region were identified for introducing cost effective measures that mills can take to reduce waste and improve profitability. The measures that were taken by the project until 1997, were only related to the individual mills and then it was thought to have a new approach towards introducing cleaner production opportunities for the benefit of the industry at large.

3.2 Joining of Partners

For a better dissemination of the cleaner production opportunities, it was decided to generate a document that could be referred to by the pulp and paper mills at large. The best way to achieve this for the reference by the mill engineers was to generate a document compiling all such technologies. Since the proposed document was intended to be referred by the mill engineers, it was construed necessary to procure maximum possible information on the applied technologies. The information gathered was intended to answer the questions raised by true mill engineers, which would talk on the applicability of the technology and cost. The best indicators of beneficial technologies would be to gather information in the following area:

- Applicability of technology in the individual mill;
- Benefits of the technology; and
- Cost estimates of the technology.

3.3 Methodology

For carrying out this task of procuring information on the applicable technologies, the project went through different steps as highlighted in the following figure.

- ⇒ Formulation of a standard fact sheet format
- ⇒ Review of state of the art technologies in the pulp and paper industry
- ⇒ Studies on the latest technologies to achieve cleaner production in the pulp and paper industry
- ⇒ Correspondence:
 - Identification of pulp and paper industry association/ suppliers from all over the world
- ⇒ Devising a suitable direct mailer to attract the suppliers, mills and associations to frame their success stories
- ⇒ Listing of all the suppliers in a database, compiling e-mail listing of CP groups, associations Follow up on the responses from the suppliers
- ⇒ Compilation of data

3.4 Evolution of Database Format

For the benefit of the industry, it was decided to gather information on the CP technologies, which would talk of the following information:

- ⇒ Applicability in the individual mill section
 - These are 6 mill sections which are diversified for the database collection.
- ⇒ Benefits of adopted technology
 - Result of technology adoption in terms of benefits in the saving energy, reducing pollution load etc.
- ⇒ A detailed process description
- ⇒ List of benefits
 - Actual benefits in terms of power consumption, pollutional load, water/raw material consumption and pollutants load like air, solid, liquid waste etc.
- ⇒ Costing details: investment, operating costs, savings and payback period
- ⇒ Listing of technology supplier/ mill implementing CP technologies
- ⇒ Block diagram/ pictorial view of the adopted technology

4. ANALYSIS OF DATA

4.1 Categorization and Analysis of Responses

The responses received from different sources have been analysed on the basis of different parameters such as:

- CP technology implementation in different mills sections
- Benefits of the technology implementation

From table 1, it is evident that the data gathered from various countries shows a pattern in terms of the number of fact sheets received. The fact sheets from Finland were rich in the implementable cleaner production technologies, which are the components of the state of the art modern mills. As against this, the fact sheets generated from the Asian countries were more towards the cleaner production management practices, which are not attacking the pollution related problems in a real way.

Name of the Country	No. of Factsheets Received
Australia	1
Austria	1
China*	4
Denmark	1
Finland	14
France	6
Germany	10
India	16
Italy	6
Japan	1
New Zealand	1
Sweden	2
Taiwan	2
Thailand	14
United Kingdom	1
USA	10

*Including Hongkong

Table 1. Number of Fact Sheets vis-a-vis the Country

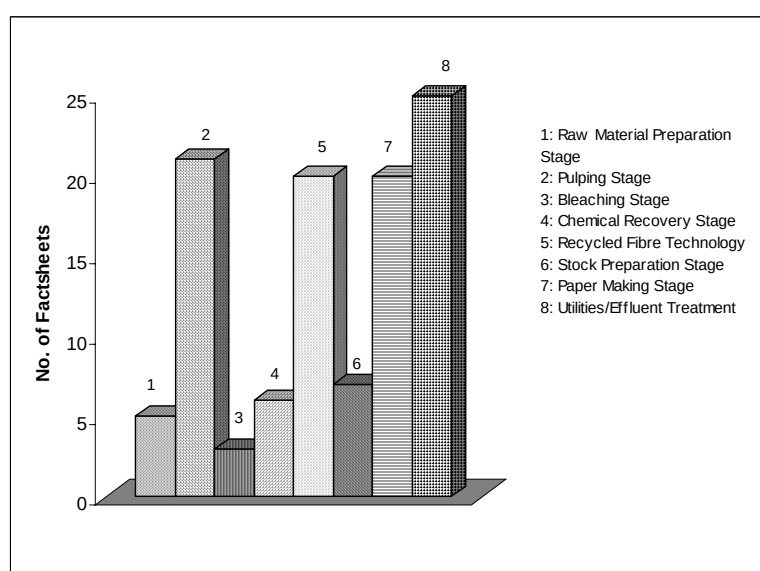


Figure 2. Technology – Mill Section Distribution

The mill wise distribution of the received technology fact sheets shows a definite trend in terms of potential in pollution abatement. The two highest categories receiving maximum numbers of fact sheets recommend technologies in the utilities/effluent treatment in the mills and the pulping preparation stage. This is due to the inherent pollution generating nature of these sections and the stage of development. It will be to the advantage of the mills to design the plants based on the modern technologies in the pulp preparation stage to control the pollution levels.

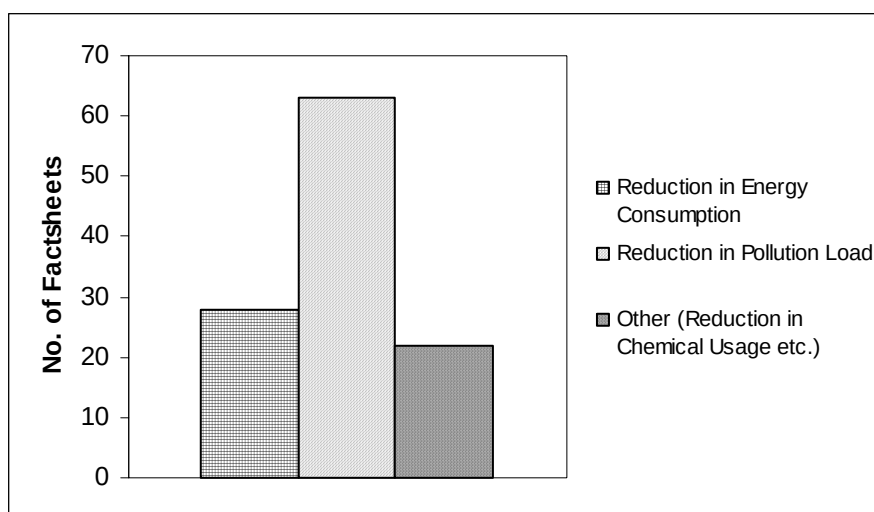


Figure 3. Data on the Impacts of the Technology Consumption

5. CONCLUSIONS AND RECOMMENDATIONS

From the data sources, it is evident that the focus of the existing cleaner production measures is over the reduction in the pollution prevention. Equipment suppliers are more focused on this approach. The issues related to the energy consumption have not surfaced as yet and this means that there holds a good potential in this area. Looking at the implemented cleaner production technologies, it can also be concluded that the respondents have focused on the implementation of the cleaner production technologies which find application in the pulp preparation and digestion stage. The next highest area in which the cleaner production is implemented is in the papermaking section and the effluent recycling section. At the same time it also must be understood that as a first step towards the cleaner production in the industry, the cleaner production management practices should be employed in the operating plants. This will give a valuable boost to the mill management to employ cleaner production techniques in the plant. The faster benefits achieved out of implementation would give a good incentive to the mill management.

As the efforts towards the implementation of the cleaner production technologies are concerned, it also must be understood that these efforts need to be taken on a regular basis. This can be achieved by way of employing different measures towards generating and maintaining a good database of the implemented cleaner production technologies. The efforts

need to be taken on a regular basis at different locations in the world. The main challenges of these continual efforts are in the following area:

- ⇒ Maintain a dynamic database of the newest technologies: website
- ⇒ Appoint country-wise experts to assess the situation of implemented technologies
- ⇒ Publish a compilation document on a regular basis

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