OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

23538

NATIONAL CLEANER PRODUCTION CENTRE SA

NCPC
national cleaner production centre
South Africa

CONTRACT REPORT

QUICK SCAN REPORT FOR BOKOMO OATS BREAKFAST CEREALS

086DG / HY7AGRO

Prepared for:

S Windell
Bokomo Breakfast Foods - Oats (PTY) LTD
PO Box 319
Epping Industrial
7475

Prepared by:

Z Zwavel, J Fresner, Th Buerki
National Cleaner Production Centre SA
P O Box 395
Pretoria
0001

QUICK SCAN REPORT FOR BOKOMO OATS BREAKFAST CEREALS

Z Zwavel, J Fresner, Th Buerki

30 August 2007

DOCUMENT CONTROL

Degree of Confidentiality:	Client Confidential		
Title:	Quick Scan Report for Bokomo Oats Breakfast Cereals		
Authors:	Z Zwavel, J Fresner, Th Buerki		
Date of Issue:	30 August 2007		
No. of Pages	22		
Issuing Organisation: National Cleaner Production Centre PO Box 395 0001 Pretoria RSA	Telephone: Telefax:	(Nat) (Int) (Nat) (Int)	(012) 841 3754 + 27 12 841 3754 (012) 841 5039 + 27 12 841 5039
Contract Name:	UNIDO Agro-Processing Sector Project		
Project Number:	HY7AGRO		
Keywords:			
Issue Number:	001		
Copy Number:			
Project Leader:	P Maepa		

APPROVED BY:

Responsibility	Name	Signature
Technical	Z Zwavel	
Review	K Cilliers	

DISTRIBUTION:

Company	Contact Person	Copy Number
Bokomo Breakfast Foods - Oats (PTY) LTD	S Windell	1 - 3
NCPC (File: 086DG / HY7AGRO)		4

FILENAME, TEMPLATE AND VERSION CONTROL

I:\NCPC\Efiles06_07\Sectors Projects\Agro Processing -Mano's files\UNIDO AGRO PROCESSING SECTOR\UNIDO Agro Plan\Reports\UNIDO Contract Report\BokomoQS.doc. Created: 26 November 2007, from template:

I:\NCPC\Communications and Stakeholder Relations\NCPC Templates\Proforma Templates\Ext_Report NCPC.dot. Template revision 2, 3 May 2004.

EXECUTIVE SUMMARY

This report follows a facility walk-through that was performed at Bokomo Foods. This walk-through forms part of a Prevention Quick Scan (PQS), which aims at identifying focus areas that may need further study. In the course of approximately one day, the entire company was scrutinized for opportunities to prevent the generation of waste and emissions or to reduce the consumption of energy or raw materials.

As a starting point Bokomo Foods received a PQS questionnaire to use as a guideline for collecting the relevant data. The student, in conjunction with a knowledgeable employee at Bokomo Foods collected the data. The results from the Prevention Quick Scan were used to assess the focus areas and generate improvement options. The table below summarizes the recommendations that were made in order to minimise the waste streams

CONTENTS

1. INTRODUCTION

1.1 Background

This report outlines the activities undertaken during a Prevention Quick Scan of the Bokomo Oats manufacturing site in Epping Industria, Cape Town. The project is part of a Cleaner production Demonstration Project for the Agroprocessing sector coordinated by the National Cleaner Production Centre (NCPC). Bokomo Foods is the largest breakfast foods company in South Africa. In the pursuit of sustainable development they have also joined the Waste Minimisation Club for the Epping industrial Area.

1.2 Working Procedure

A consultant from BECO - Institute for Sustainable Business, Zubeida Zwavel, is part of a consulting team leading the Cleaner Production project. Support is provided by Thomas Beurki and Johannes Fresner of UNIDO. The project consists of two phases the Quick Scan (QS) and the In Plant Assessment (IPA). The Quick Scan aims to examine the potential for Cleaner Production to be implemented at Bokomo Oats.

It requires close cooperation between the consultant and the participating company. Therefore a walkthrough was conducted at Bokomo Oats by the consultant team and members of the processing department.

2. COMPANY DESCRIPTION

2.1 Company Profile

During the first quarter of the twentieth century the wheat farmers of the Western Cape experienced difficult times. There was no control over the wheat industry, wheat prices fluctuated and farmers often faced losing everything. For these reasons seven men with vision signed the Memorandum and Articles of Association of "De Boeren Ko-operatieve Molen Maatschappij Beperkt (BOKOMO) in December 1920. On 28 December 1920 Bokomo was officially registered under the Companies Act of 1892. Thus the long awaited co-operative deal, which would put the interest of the farmer first and foremost, was realised. Only bona fide farmers could become members and the new organisation brought much needed stability to the wheat industry.

Bokomo has developed into one of the most important organisations in the industry. The small group of pioneers has grown into a work force of more than 10 000 employees. Bokomo's market leadership has enabled the company to form strategic alliances internationally specifically the UK.

Table 1: Details of the company

Firm	: Bokomo Breakfast Foods – Oats (Pty) Ltd
Plant Site	: Breakfast Foods – Oats (Pty) Ltd.
Postal Address	: P.O. Box 319 Epping Industrial 7475
City	: Cape Town
Contact Persons	: Steven Windell - Plant Manager Oats : Roche Vermaak - SHE Manager
Telephone	: +27 21 534 5240
Fax	: +27 21 534 5219
Production hours per year	: 6300
Total staff complement	: 41
Shifts	: 2 per day (5 days per week)

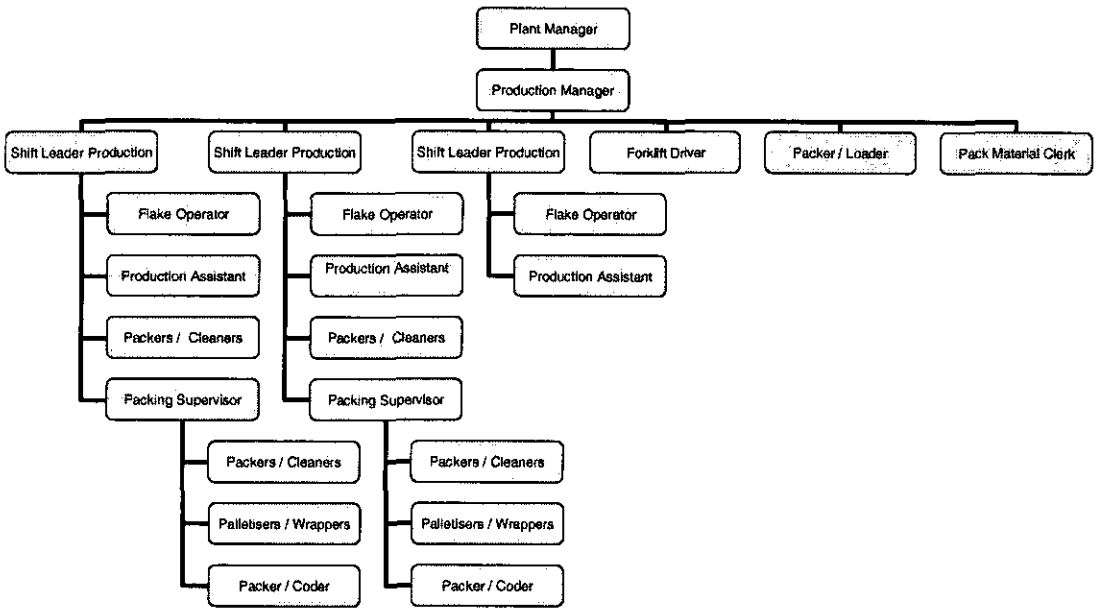


Figure 1: Organogram of Oats Factory

2.2 Product Range

Bokomo Foods is the biggest name in breakfast cereals in South Africa ranging from cold- to hot- and convenience cereal. Bokomo belongs to the Pioneer Food Group which has more than 200 different listed food products in retail. It is one of the biggest food companies in South Africa. One of the product ranges within Bokomo is the Oats range. The Oats plant has 11 different products indicated in the table below

Table 2: Overall production

Product group	Production in tons (per year)
Oats	1 667
Oats one minute	926
Oats Instant	288
Oats Quick Cooker	490
Groats	147
Oats Ground	393
Oatmeal	35
Oats Rolled	2 947
Oats Quick Morning	2 322
Meal Smash	35
Real Meal	99
TOTAL	**9 667**

2.3 Customers and Suppliers

Bokomo sells directly to the largest retailers within South Africa viz, Pick 'n Pay, Woolworths, Spar and Shoprite. This indicates that they are in direct contact with consumers and branding is very important.

The oats suppliers vary from national and international suppliers. Packaging materials is supplied by local suppliers such as NAMPAK. .

2.4 Location (Site Plan)

The company is located in an industrial area with 3 operations taking place on one site. All three operations belong to the Pioneer food group. One is form the

Moirs baking ingredients range, the second is from the Sasko milling group and the third is Bokomo Oats. Energy bills are split between these plants proportionally as well as the water consumption.

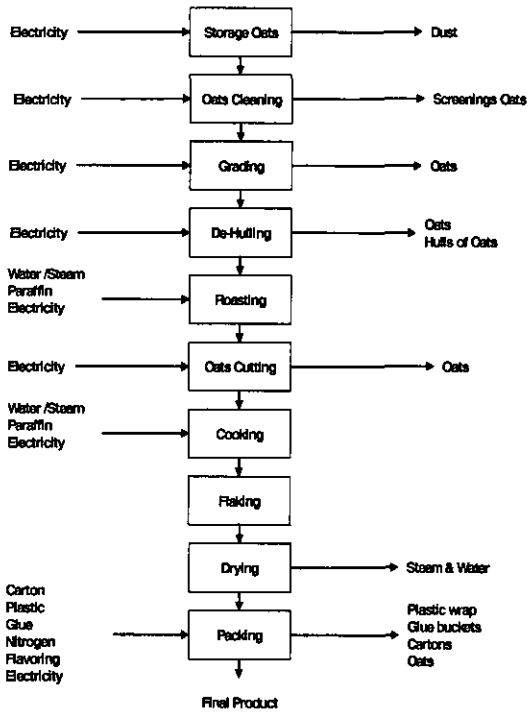
2.5 Management Systems

The company has a five star rating for the NOSA group, which is a South African Safety Health and Environment management certification body. Bokomo Oats do not employ any other certification systems. They utilise SAP for their financial management system. Bokomo aims at maintaining an ISO 9000 & HACCP in quality management. Good hygeine standards were observed in areas where employees are in contact with the product such as the packaging areas. Very little protective hearing aids is used by the employees however they are informed about occupational health and safety.

3. DESCRIPTION OF PRODUCTION PROCESSES

This chapter summarizes briefly the production processes within the Bokomo Oats factory. The general flowchart layout of each department is given below.

Figure 2: Process Flowchart Oats Factory



3.1 Process Steps

The description of the process steps of the Flow Chart is given below.

The Oats are transported by rail to the plant where the oats goes via a conveyer belt from the train into big silos where it is stored. When the oats are needed it goes underground via a conveyer belt from the silos to the oats factory.

The first step is to clean the oats from screenings (stones, dust, unwanted material etc). All screenings is separated from the oats and the screenings continue further in process as cow meal. After the oats are cleaned from the screenings, the oats are graded into small, medium, large and crushed oats. These separated kinds of oats is stored in separate silos. The next step is to de-hull the oats. Once removed from the oats the hulls will continue further in process as cow meal and the de-hulled oats is roasted in a big roaster which utilises a large amount of steam.

The roasted oats is then cut into pieces before it goes into the cooker. In the cooker the oats is boiled with high pressure steam to clean and disinfect the oats. The wet oats is rolled and flaked into flat oats. The flat oats is dried in a warm air dryer which is warmed by high pressure steam. The moisture from the oats goes into the atmosphere. The oats is then ready for consumption and is packaged in different flavours and quantities by the packaging department.

3.2 Storage

Large quantities of oats comes in via rail either from the harbour whereby it is put on conveyer belts and transported to large silos. On average Bokomo Oats uses about 11 000 tons of oats per year which is stored in these silos. These oats cost R 1500 per ton thus it is the highest purchasing cost for the factory. This storage method is suitable for bulk storage and the system of transport is optimised. Intermediate storage of materials takes place for packaging materials. The warehouse holds all outgoing products. All storage is based on the First in First out principle. Appendix 1 shows the raw material and auxiliary material costs for the year.

3.3 Transport

Bokomo transports their own goods to and from the sites. Not much knowledge exists at this point of the external transport of employees. Transport internally

can also be optimised as the shortest routes are not necessarily taken due to the layout of the factory.

3.4 Energy Management

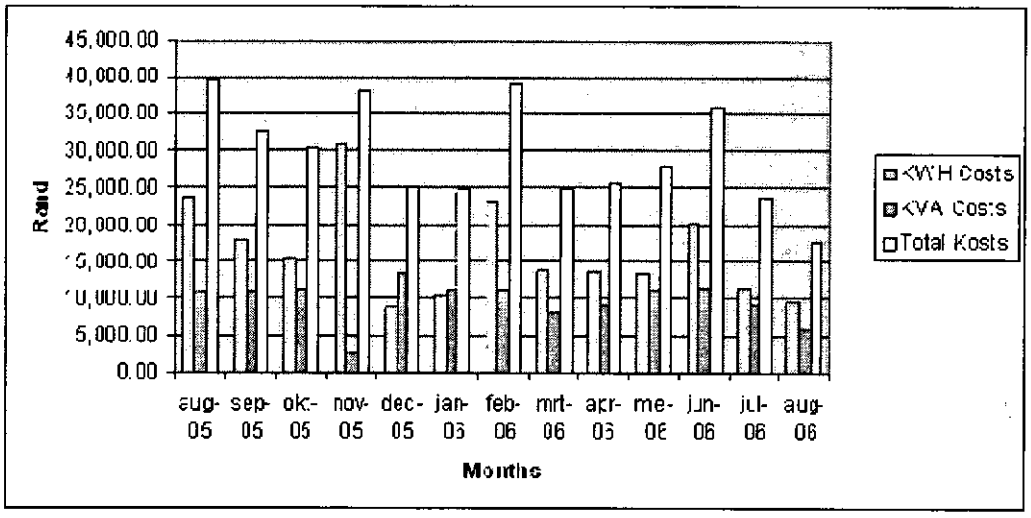
There is no defined energy management system in place for Bokomo Oats. Peak Demand Monitoring take place via an external party but information have not been communicated to employees. An account of the kWh and the kVA consumed is monitored for the entire plant but it is not divided for the specific processes within Bokomo Oats. No account of steam monitoring takes place either.

3.5 Energy Provision – Electricity

Electricity is one of the largest energy costs within Bokomo Oats. The annual electricity cost from August 2005 till the end of July 2006 (for combined KWH energy consumption as well as KVA peak demand consumption) is approximately R 367 953. The total machinery of the oats factory uses 96.5% of the total electricity consumption. The lighting uses about 3%. High electricity demand was reached in the months of August 2005, November 2005, and February 2006.

	Amount per year	Cost per year
KWh	1 382 460	R 201,977
KVA	2 776	R 120,788
Total annual electricity costs		R 322,766
Total annual electricity costs inc. tax rates		**R 367,953**

Figure 3: Overview electricity costs division



3.6 Energy Provision – Process Heat

Bokomo Oats has one paraffin boiler supplying steam to the entire plant. The paraffin costs about R 767,587 and is the highest contributor of the energy cost at BOKOMO oats factory. The Plant manager said that the boiler produces about 1.3 tons of steam per hour. The steam pressure is at 8-10 bars. The processes only utilise steam at a pressure of 3-4 bar. The temperature of the steam is round 130 degrees. Steam is used for roasting, cooking, cleaning and drying the oats. The condensate which exists in the pipes, valves and the radiator of the dryer is lead back to the boiler. Some moisture goes into the products during boiling and some goes into the atmosphere by drying with hot air. Boiler blowdown takes place once every five hours. During the walkthrough quite a few unsinuated piping and connections was observed, The temperature in the boiler room is also quite high. This is due to the un-insulated boiler which loses heat by means of radiation and conduction. Some pipes and valves leak steam which is also not regularly fixed. Steam leaks represent significant energy losses over a year.

3.7 Energy Provision – Compressed Air

There is one compressor at the rear of the factory which is not very close to the point of use. Upon the 2 occasions during site walkthroughs the compressor room was locked and no inspection has been done of the compressor. Compressed air is used in the pneumatic system for valves and slides. Compressed air is a vital part of the production process and comes from a combined compressed air system. Some of the compressed air piping, flanges and valves have leaks in them. Compressed air leaks are significant sources of waste energy and results in excess compressor capacity. The compressed air operates at 4 bar in certain areas but it is unknown what the pressure is at discharge of the compressor.

3.8 Water Consumption

The total cost of water is about R 41 000 which is about 6300 kL of water per year. This amount is almost entirely consumed by the boiler. A small percentage of this water is used for cleaning and sanitation. Some of the condensate is returned to the boiler. All the wastewater is disposed directly to the sewer system. No major problems have been experienced with the wastewater pollution being disposed to date.

3.9 Solid Waste generation

Various waste streams have been identified during processing. Some of these waste streams are re-used or recycled, some are disposed to landfill. Waste streams range from specific production waste to general company waste.

Screenings is waste which comes with the oats and is removed from the usable product. This waste would go to the farmer for cow meal. All oats production waste, generated by dust, leaking machinery, dehulling, grading etc, is also externally reused as cow meal.

Packaging waste such as plastic wrapping and carton waste is mostly recycled if it is not contaminated or soiled. These will be disposed of to landfill. A lot of waste has been generated by the packaging department on the instant oats line. This waste occurs during start up of the machinery as the optimum settings have not been found. On average at least one cubic metre bag gets filled per day. This product waste is disposed to landfill.

There is also waste which is dumped in a general container. This waste is mainly plastic packaging which can't be reused or recycled because it is polluted. The container is commonly used by the whole site including all the other factories as well. The container is removed on average 2-3 times per week. The total disposal costs come to about R 150 000 per year The exact amount generated by the Oats factory alone is unknown.

4. FINDINGS OF THE QUICK SCAN

4.1 Methodology

The data collected during the company visit was evaluated with the software-tool Eco Inspector. The CP potential of individual process steps, including those covering the sub processes was examined in accordance with the following criteria:

Inputs:

- Are there any problem materials which are hazardous to the environment or to health?
- Are large volumes of raw, auxiliary and operating materials used?
- Is the level of energy consumption high?
- Are major costs incurred on the input side (materials or energy)?

Outputs:

- Are large volumes of (problematic) waste, special waste, wastewater, wastewater components or emissions generated?
- Are high internal/external preparation and disposal costs incurred?

Technology:

- Is the applied technology state of the art?
- What is the level of automation?
- Are there losses incurred through faulty batches or scrap?
- How are the systems serviced or cleaned?
- Are high costs incurred for maintenance, cleaning, stoppages?

Each process step was qualitatively checked on these criteria and was classified according to the following scale:

Potential Points – Assessment of Potential Level for Each Criterion

Criterion not applicable to this process area, or no CP potential	Zero points
Moderate CP potential anticipated	1 point
Significant CP potential anticipated	2 points

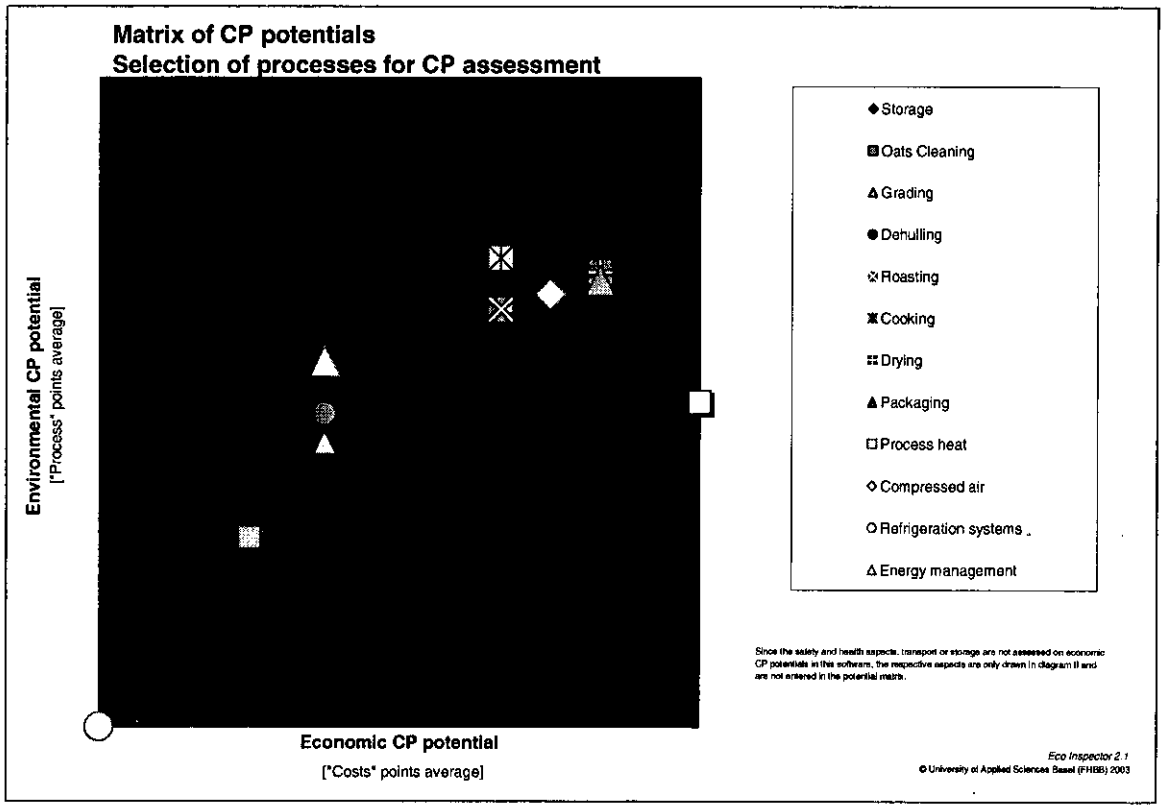
The next step examines each sub-process as an entity according to the scale in Table 2 to determine the actual level of optimisation already achieved; i.e. whether or not the CP potential is already exhausted. Thus the "relevance" of the identified potentials is described and a weighting factor is defined. This is a qualitative estimate and draws on the experience of the person conducting the Quick-Scan (expert opinion).

Scale for Estimating the Level of Optimisation of the Current Process (weighting factor)

Level of optimisation "high"	Optimisation potential largely exhausted	0 Points
Level of optimisation "high to medium"		0.5 Points
Level of optimisation "medium"	Optimisation potential not fully exhausted	1.0 Point
Level of optimisation "medium to low"		1.5 Points
Level of optimisation "low"	Non-optimised process step	2.0 Points

The product of the potential point and weighting factor indicates the current CP potential for each criterion point of each sub-process. The average of points for the individual categories (Inputs, outputs, technology and cost) gives a benchmark for the CP potential of individual process steps. This enables a rapid comparison of the sub-processes and facilitates selection of the processes for more detailed analysis.

4.2 Discussion of Results



From the ECO inspector tool (set up by UNIDO) a graph indicating the economic potential vs. the environmental potential for CP is shown above. The processes in the top right hand quadrant indicate areas where further investigation should be made. These areas include:

- Cooking
- Roasting
- Drying
- Packaging
- Compressed air
- & Process heat (steam)

4.3 Cleaner Production Improvement Opportunities

4.3.1 Reduction of product waste

During the processing of the product there is a number of places where leakage of oats takes place which occur due to the machine breakages, stoppages etc. An example is during the grading of oats the sleeves of the machine is not of a good quality so it breaks often. These sleeves is not replaced immediately so there is some leakage taking place. According to an employee these sleeves are replace once every 2 weeks. The number of breakages should be reduced by replacing the sleeves with better quality material and ensuring that proper maintenance takes place. Although this waste will be given to the cow meal farmer it is still a loss of material which is at a much higher value than what the cow meal farmer pays to Bokomo. The cow meal farmer pays Bokomo R 500 per ton of waste whereby the raw material is bought for R 1500 per ton. This equates to a loss of R 1000 per ton of waste going to the farmer. A quick rough mass balance also indicates that there is about 1300 tons of oats being wasted which costs the company over R 1 000 000. A detailed mass balance would be conducted in the In Plant Assessment.

4.3.2 Compressed air leaks

There is at least 10 places where holes can be found in the compressed air system within the factory. Compressed air leaks are significant sources of waste energy and results in excess compressor capacity. The cost of compressed air leaks is the energy cost to compress the volume of lost air from atmospheric pressure to the compressor operating pressure. A ccompany such as Bokomo that do not monitor their compressed air leakage rate tend to lose between 20 – 30% in energy for compressors. Fixing leaks within a compressed air system renders:

- Stable system pressure resulting in higher operational efficiency, and uninterrupted production.
- Reduction in energy consumption due to a reduction of compressor running time.
- Increased service life and reduced maintenance on equipment, resulting in reduced maintenance costs.

4.3.3 Lighting

Almost all the lights in the factory is burning the whole day even when there is no production or people working in the areas. There is also enough daylight to provide enough lux in the building during daily production. The windows could

also be cleaned for optimal lighting from the sun. Savings can be made if lights are switched off when not needed and optimising the use of natural light. Less than 5% of the electricity consumption could be saved if this option is implemented.

4.3.4 Boiler optimisation

The cost for generating steam is the biggest energy costs within Bokomo Oats. This increases the need for the process to be as efficient as possible. Upon inspection of the boiler room it was found to be hot around the area and the pressure set to 9 bar. The pressure for steam could be reduced as the steam is required at a much lower pressure of 4 bar. We were told that condensate is returned to the boiler, exactly how much is not clear. What is evident is that there is a significant loss of radiation within the entire steam piping infrastructure. A detailed steam system audit needs to look at the steam lines, combustion efficiency, condensate return steam traps, flash steam, insulation etc. this will add to the boilers efficiency and reduce significant costs in fuel.

4.3.5 Steam leaks & insulation

There are a few places where steam leaks are occurring in the factory. Steam leaks represent significant energy losses over a year. Fixing steam leaks and insulating pipes and valves is an easy and low cost way of decreasing operational cost and increasing energy efficiency.

Insulating piping and valves in the factory and fixing the steam leaks renders:

- A reduction in paraffin loss and contributes to having proper steam pressure at machinery in the factory.
- A reduced risk of burns by insulating hot surfaces, which also contributes to making the work place safer and more comfortable.
- Decrease temperatures in the boiler room and surrounding distribution lines.
- Heighten in system pressure that can cause machinery to operate more efficiently by raising the amount of heat delivered.

During maintenance, insulation over pipes, valves, and fittings is often damaged or removed and not replaced again. Uninsulated pipes, valves and fittings can be safety hazards and sources of heat loss. Removable and reusable insulating pads are available to cover almost any surface. The pads are made of a non-combustible insulation material, and a non-combustible

outside cover that is tear- and abrasion-resistant. Materials used in the pads are oil- and water-resistant and can be designed for temperatures up to 870℃. The pads are held in place by wire laced through grommets or by using straps and buckles.

4.3.6 Packaging machine waste

One of the areas generating a lot of product waste is the packaging area. The packaging machine used for packaging the 35 g instant oats has been installed since April 2006. This machine has not been operating optimally and interviews with employees indicate that when startup occurs the settings needs to be adjusted and this causes a lot of waste. Observations indicate that the machine should be cleaned properly to avoid dust accumulation and the compressed air pressure should be increased to 6 bar at least. This area will be investigated further in the In Plant Assessment phase and exactly how much is lost needs to be established.

4.3.7 Management systems

Although Bokomo Oats has a 5 star NOSA rating it is still valid to improve their systems within environment. Detailed monitoring and benchmarking will be required for all raw and auxiliary material consumption. Regular audits should be conducted and preventative maintenance scheduled for all process machinery and utilities infrastructure. Because energy is one of the highest costs at Bokomo efficiency technologies are a rapidly changing field. Bokomo should also designate a staff member to keep up with changes and consider scheduling an energy audit at least every two years.

We would recommend that Bokomo also tracks the resource usage per tonne of product for Key performance indicators. This should include all the resource inputs in order to gain a holistic view of the operation. The resource accounting system should be compiled and communicated to external and internal stakeholders.

4.3.8 Good Housekeeping

Often the biggest savings can be made through the easiest actions. There are many opportunities through no- and low-cost good housekeeping measures to improve the efficiency of cleaning operations. Where good housekeeping practices are implemented it is important to monitor the results to ensure that they are being maintained.

4.3.9 Employee involvement

One of the biggest assets of a company is the employees. If the company does not have employees that are committed then they will have a high staff turnover which will reduce morale and in turn reduce efficiency. Employees need to be trained so that team work is encouraged and increased efficiency is created. An employee involvement programme by setting up teams and increasing feedback from them could add significantly to the company.

5. CONCLUSION AND RECOMMENDATIONS

As indicated in the improvement options 2 of the areas which needs attention is the steam system and the packaging area. With this significant savings can be realised if the options are coupled with detailed monitoring and benchmarking. The In Plant Assessment report would include more in depth analysis on the cost benefit of implementing options in these areas. Employee involvement teams and training should be an organisational practice to be followed up if Bokomo aims at improving even further.

APPENDIX 1: RAW AND AUXILIARY MATERIAL CONSUMPTION

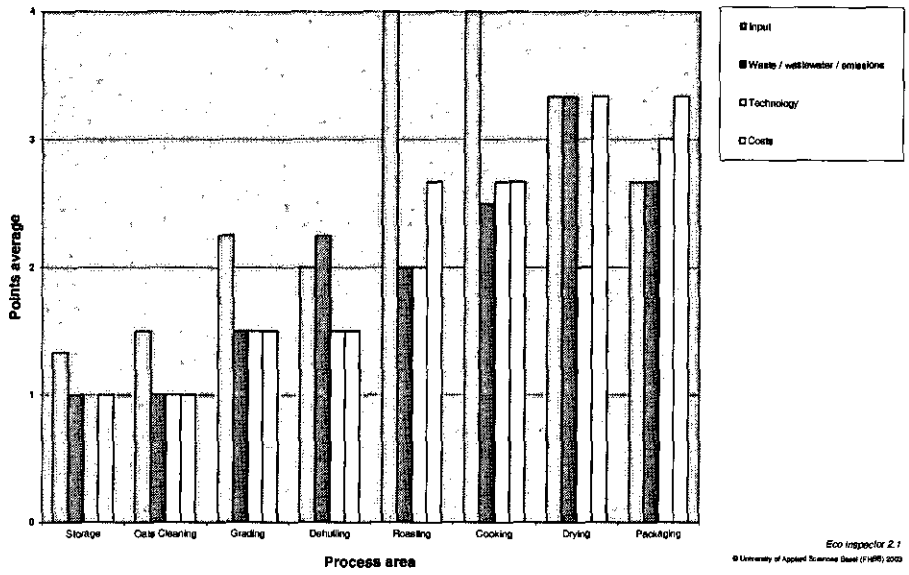
Overview of Raw Material Consumption

Raw material	Amount per year	Costs per unit	Annual purchase costs
Oats	11,000 Tons	R 1500	R 16,500,000
Paraffin	185,856 Litre	R 4.13	R 767,587
Electricity	202 000 kWh	R 0.14	R 367,953
Water		R 6.59	R 41,282

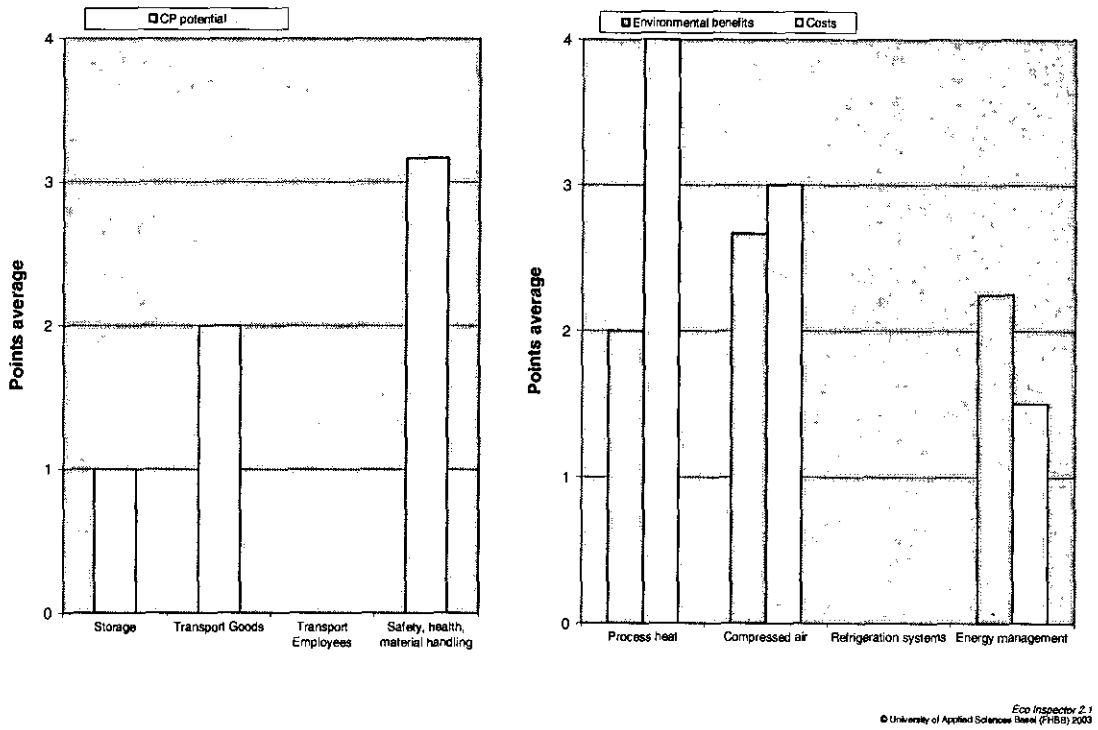
Packaging	Price per unit
Bag Polyprop	R 1.95
Carton inner	R 0.68
Sheeting inst oats	R 76.56
Glue	R 8.58

APPENDIX 2: CLEANER PRODUCTION POTENTIAL

Bar plot of CP potentials - sub-processes I



Bar plot of CP potentials - sub-processes II



Summary of results Bokomo Oats

Process	CP potential environmental benefits (process)												CP potential economic benefits			Estimation of CP potential*			
	Input			Waste / wastewater / emissions					Technology				Costs						
	(Eco-) toxic problem materials	Raw, auxiliary, operating materials	Energy consumption	Solid waste	Special waste	Wastewater (flow, amount)	Wastewater components	Airborne emissions	Status of technology	Level of automation	Faulty batches, scrap	Maintenance, servicing, cleaning	Input materials, safety	Disposal, preparation	Maintenance, stoppages	Points average of environmental benefits (process)	Points average of economic benefits (costs)	Environmental CP potential	Economic CP potential
P1 Storage	1	2	1	1	-	-	-	1	-	-	-	-	1	-	-	1.2	1.0	X	X
P2 Oats Cleaning	-	2	1	1	-	-	-	1	1	-	1	-	1	-	-	1.2	1.0	X	X
P3 Grading	-	3	1.5	1.5	-	-	-	1.5	1.5	-	-	1.5	1.5	-	1.5	1.8	1.5	XX	XX
P4 Dehulling	1.5	3	1.5	3	-	-	-	1.5	1.5	-	-	1.5	1.5	1.5	1.5	1.9	1.5	XX	XX
P5 Roasting	-	4	4	2	-	-	-	2	2	-	2	2	4	2	2	2.6	2.7	XX	XX
P6 Cooking	-	4	4	2	-	2	2	4	2	2	-	4	4	2	2	2.9	2.7	XXX	XX
P7 Drying	2	4	4	4	-	2	-	4	2	2	2	2	4	4	2	2.9	3.3	XXX	XXX
P8 Packaging	2	4	2	4	2	-	-	2	-	-	4	2	4	4	2	2.8	3.3	XXX	XXX
P9 Storage	Low CP potential available for further analysis															1.0		X	
P10 Transport Goods	Moderate CP potential anticipated. Additional analysis of goods transport system recommended.															2.0		XX	
Employees	Low CP potential available for further analysis															0.0		-	
E1 Process heat	High CP potential for environmental benefits or financial savings anticipated. More detailed analysis of the process(es) 'heat provision' urgently recommended.															2.0	4.0	XX	XXX
E2 Compressed air	*High CP potential for environmental benefits or financial savings anticipated. More detailed analysis of 'compressed air provision'* processes urgently recommended.															2.7	3.0	XX	XXX
E3 Refrigeration systems	No CP potential anticipated															0.0	0.0	-	-
E4 Energy management	Moderate CP potential for environmental benefits or financial savings. Additional analysis of the energy management system *recommended.*															2.3	1.5	XX	XX
Safety, health, material handling	High CP potential anticipated. More detailed analysis of the safety, health and material handling aspects is urgently recommended															3.2		XXX	

* Estimation of CP potential

X	low CP potential	Points average "environmental benefits" or "economic benefits"	0.0	to	1.3
XX	moderate CP potential	Points average "environmental benefits" or "economic benefits"	1.3	to	2.7
XXX	high CP potential	Points average "environmental benefits" or "economic benefits"	2.7	to	4.0

** The value of "Process points average" corresponds to the environmental CP potential, the value of "points average of environmental benefits" corresponds to the "Economic potential"
The calculation of the points average covers all positions with a value. Positions without CP potential (value = "-") are not taken into account.

Eco Inspector 2.1