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**NATIONAL CLEANER PRODUCTION
CENTRE SA**



CONTRACT REPORT

Report to UNIDO on services provided within *US/SAF/04/068* and *US/SAF/02/1069*
(Establishment of a UNIDO National Cleaner Production Centre in South Africa):

SOUTH AFRICAN AGRO-PROCESSING SECTOR CLEANER PRODUCTION IN-PLANT ASSESSMENT REPORT

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**SOUTH AFRICAN AGRO-PROCESSING
CLEANER PRODUCTION IN-PLANT
ASSESSMENT REPORT**

P Maepa, K Cilliers

28 January 2008

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EXECUTIVE SUMMARY

This report outlines Cleaner Production (CP) assessments undertaken by the NCP-C-SA within the Agro-Processing Industry sector as outlined in the proposal document and contract US/SAF/04/06 & US/SAF/02/069 "Comprehensive National Cleaner Production Training and Assessment Programme for CP Experts and Companies in the SA Agro-Processing Industry Sub-Sectors". The report focuses on the outputs listed under Activity 3 relating to cleaner production CP assessments conducted in selected companies within the Agro-processing sector situated in the Western Cape and Gauteng provinces. In order to ensure the sustainability of the activities the NCP-C followed the UNIDO CP methodology approach.

Seven companies were identified and selected to participate in the CP programme. The companies that agreed to participate included:

Gauteng:

- Early Bird Farm (PTY) LTD, Olifantsfontein (Chicken abattoir)
- Hudson and Knight (PTY) LTD (Vegetable oil refining and processing)
- Premier Foods Pretoria Wheat Mill (PTY) LTD (Wheat and cereals milling)

Western Cape:

- SAB Miller Newlands Brewery (Brewery)
- RFF Canning (Food Canning)
- Bokomo Breakfast Foods (Cereals)
- Nampak DivFood Foodcan (Can producer)

The company assessments yielded good potential for CP improvements to be made. These now need to be followed up to determine the actual level of implementation. At the same time the consultants gained excellent exposure to the challenges encountered, and activities that need to be undertaken when conducting a CP assessment.

The results showed significant opportunities for CP improvement projects. Some of the key options and projected savings are highlighted in the table below:

		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
Early Bird Olifantsfontein								
1.	Installation of nozzles on open ended hose pipes	Pos	Pos	Pos	Pos		Low	24 576
2.	Replacement of water consuming spin chillers with air chillers	Neg	Pos	Pos	Pos		High	619 186
3.	Recovery of condensate and return to boiler	Neg	Pos	Pos	Pos		Med	221 184
4.	Effluent Treatment Plant upgrade to include DAF unit to reduce BOD & COD	Neg	Pos	Pos	Pos		9 000 000	3 200 000 effl. discharge penalties
Hudson & Knight								
5.	Recovery of oil from wax slurry	Neg	Pos	Pos	Pos		Med	3 457 000
6.	Steam leak repairs and implementation of regular maintenance schedule	Pos	Pos	Pos	Pos		Low	1 520 000
7.	Recovery of condensate and recycle back to boiler	Pos	Pos	Pos	Pos		Med	231 033
Premier Foods Pretoria Wheat Mill								
8.	Improvement of shrink-wrap tunnel insulation	Pos	Pos	Pos	Pos		Low	2 987
9.	Reduce shrink-wrap tunnel temperature to 120°C	Pos	Pos	Pos	Pos		5 000	9 894
SAB Newlands								
10.	Reusing bottle washing water for crate washing. The Kronas bottle washer in Line 1 has been fitted with a valve for the water to be used directly to the crate washer.	Pos	Neut	Pos	Pos		Low	350 000 hl of water for crate washers (Approx R 245 000)
11.	Reducing amount of water used for bottle washing from 400ml per bottle to 200 ml per bottle in line 1.	Neut	Neg	Pos	Pos		Medium	285 000 hl H ₂ O saved pa (approx R 200 000)
12.	Installation of a recirculation tank for vacuum pumps	Pos	Pos	Pos	Pos		Medium	219 000 hl H ₂ O
13.	Solid waste minimisation - Reuse label	Pos	Pos	Pos	Pos		Low	R 211500

Description of CP Option ¹		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						Investment (R)	Projected Savings per Annum (R)
		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision			
	pulp from bottle washers for recycling paper								
14.	Solid waste minimisation - Reuse of kieselguher in the cement industry	Neut	Pos	Pos	Pos		Low	R 466 000	
15.	Energy - Replace the current dry heat exchanger (ammonia to beer) by a new flooded evaporator.	Neut	Neut	Neut	Pos		Cost of installing flooded evaporators	20% of chilling (R 400 000)	
RFF Canning									
16.	Waste Product Recovery	Pos	Neg	Pos	Pos		Low	R3 000 per day (in season)	
17.	Cascade rinsing	Neg	Neg	Pos	Pos		Med	Conservative water savings of 30%	
18.	Magnuson Rinse optimisation	Neut	Neg	Pos	Pos		Med	Redn in flow rate of 30% or 120 m ³ per day	
19.	Tariff Management, load profile and peak demand	Pos	Pos	Pos	Pos		Low	10% redn electricity consumption (R200,000)	
20.	Steam balance and boiler efficiency	Pos	Pos	Pos	Pos		Med	2-5% redn in fuel consump. R40 – R100 000 saving	
21.	Repair compressor leaks	Pos	Pos	Pos	Pos		Low	Annual redn of approx. 26,000 kWh	
22.	Draw air from boiler ceiling	Pos	Pos	Pos	Pos		Low	0.5% red coal usage equates to approx. R10 000 p.a.	

		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
23.	Install energy efficient motors	Neg	Pos	Pos	Pos		High	1-10% saving in energy on the current motors.
24.	Floor cleaning	Pos	Pos	Pos	Pos		Low	50% water used for cleaning (6% of total used for canning = 29,300 kl / yr)
25.	Closing doors to refrigeration storerooms after entering of exiting.	Pos	Pos	Neg	Pos		Low	20% energy saving. Approx. R 285 000
Bokomo								
26.	Implement energy saving behavior ie. Turn off lights when not in use	Pos	Pos	Pos	Pos		None	R 4 000 per year
27.	Improved insulation of boiler and piping system. Repair of steam leaks and introduction of regular scheduled maintenance.	Pos	Pos	Pos	Pos		Medium	R 150 000 per year
28.	Compressed air leaks and implement maintenance schedule.	Pos	Pos	Pos	Pos		Payback 6 months	R 70 000 per year.
29.	Mess Pack Machine material losses	Pos	Pos	Pos	Pos		Low	R 1 749 647 potential lost revenue

¹Try to describe exactly, what should be changed, for example: change of raw material by using recycled material, change manual control of fuel feed for boiler to automatic control consisting of preventative maintenance etc.

²Without further assessment

The projects have also required a mindset shift from the consultants and companies to consider the process holistically rather than implementing isolated options. This project has served well to hone the skills of the existing locally based consultants to be able to provide the NCP with improved services and expertise for future projects.

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1. INTRODUCTION

This report outlines activities to be undertaken by the NCPC-SA within the Agro-Processing Industry sector in support of the implementation of the National CP Strategy for the South African industry sectors.

As part of its efforts to create awareness and develop capacity in Cleaner Production (CP), the NCPC entered into an agreement with UNIDO to undertake assessments with the Agro-processing sector using locally based consultants. This project would provide opportunities to increase the existing consultants expertise and capacity in CP to enable them to serve the industry sectors more effectively. At the time of the project idea inception the Agro-processing sector appeared to be more receptive to such a programme and was selected as a priority focus sector for this project.

The outputs for this project are based on the deliverables as outlined in the proposal document and contract US/SAF/04/06 & US/SAF/02/069 "Comprehensive National Cleaner Production Training and Assessment Programme for CP Experts and Companies in the SA Agro-Processing Industry Sub-Sectors". This report focuses on the outputs listed under Activity 3 relating to cleaner production CP assessments conducted in selected companies within the Agro-processing sector situated in the Western Cape and Gauteng provinces.

2. OBJECTIVES OF THE PROJECT

The objectives as outlined in the proposal and contract documents aimed to implement a comprehensive CP training and assessment programme for existing CP practitioners and companies, from various sub sectors within the Agro-Processing industry. This approach would have a twofold benefit, namely:

- i. CP consultants within the SA environmental goods and services sector would receive training on the UNIDO CP approach based on the UNIDO CP Toolkit; and gain hands-on practical exposure to conducting a CP assessment.
- ii. The companies involved would receive first hand experience on what a CP assessment entails, and the various factors that need to be considered when addressing CP. Through direct involvement greater awareness and understanding of CP is created, and where successful

implementation is achieved such companies can serve as future ambassadors for adoption of CP in the rest of the industry sectors.

The project proposal identified the Western Cape and Gauteng provinces as the two focus regions for the Agro-Processing sector project activities. Seven companies were identified and selected to participate in the programme. The companies that agreed to participate included:

Gauteng:

- Early Bird Farm (PTY) LTD, Olifantsfontein (Chicken abattoir)
- Hudson and Knight (PTY) LTD (Vegetable oil refining and processing)
- Premier Foods Pretoria Wheat Mill (PTY) LTD (Wheat and cereals milling)

Western Cape:

- SAB Miller Newlands Brewery (Brewery)
- RFF Canning (Food Canning)
- Bokomo Breakfast Foods (Cereals)
- Nampak DivFood Foodcan (Can producer)

The selection of these companies gave a good representation of regions as well as activities in the sub sectors, making it possible to multiply the achieved results among the sector, and maximise the impact and adoption of Cleaner Production practices within the Agro-processing sector in South Africa.

The CP In-Plant assessment programmes were carried out following the guidelines of the National CP strategy for the Agro-Processing sector and in accordance with the UNIDO NCPC project document for South Africa. The UNIDO CP methodology was applied to ensure sustainable application of CP at company level.

3. PROJECT OUTPUT

The outputs for this phase of the Agro-Processing Project focussed primarily on the company assessments as detailed below.

For the company assessments, 7 companies were selected to undergo assessments with allocated consultants, who had completed training on the UNIDO CP Toolkit as part of Activity 1 of this project. During this phase the consultants were guided by Austrian and Swiss Chief Technical Advisors on how to undertake the CP assessments, and the various factors that need to be

taken into account when conducting a CP assessment. Key focus and emphasis was placed on the management of water, solid and liquid waste, energy efficiency analysis, environmental controlling and benchmarking.

A major part of the assessment output was to assist the companies with identifying CP opportunities and proposing possible options for consideration and implementation. This required the consultants to evaluate the feasibility of the various options identified from an economic, technical and environmental perspective, before making final recommendations to the company.

The company assessments included a minimum of four visits per company by the CP consultants. Each company was allocated a Lead consultant to head the assessment. Two professional consultants were also allocated to each of the Gauteng based companies to assist the Lead consultant, as part of developing additional consulting expertise and capacity within the environmental goods and services sector. Due to the bulk of the consultants trained on the Toolkit being located in Gauteng, it was decided from a logistics point not to allocate additional support consultants to the Western Cape based companies. Table 3 below provides a breakdown of the companies assessed and the respective consultant allocation:

Company	Activity Type	Region	Lead Consultant	Support Consultant
Early Bird Farm, Olifantsfontein	Chicken abattoir and rendering	Gauteng	W Naicker	L Thomas H Nuwarinda
Hudson and Knight	Vegetable oil refining & processing	Gauteng	Woody Naicker	B Mudau T Mutshatshi
Premier Foods	Wheat and cereals milling	Gauteng	A Ebrahim	T Mutshatshi S Moletsane
SAB Miller, Newlands	Brewery	Cape Town	Zubeida Zwavel	-
RFF Canning	Canned Foods	Cape Town	S Oldham	-
Bokomo	Cereals	Cape Town	Z Zwavel	-
Nampak DivFood Foodcan	Can producer	Cape Town	C Janisch	-

Detailed In-Plant Assessment reports were prepared for each of the participating companies covering all the above stated elements and have been submitted to the respective company management representatives. The reports included recommendations for improvement, indicating the estimated costs for implementation and/or investment if required. Copies of the preliminary quick scan and detailed assessment reports have been included as part of this report and are listed in Appendix A.

Part of this phase also included feedback presentations to the companies on the assessment methodology and approach, assessment findings and recommendations.

4. KEY FINDINGS OF THE IPA ASSESSMENTS

Based on the assessment findings Table 4 below provides a summary of the key options identified and the predicted associated savings.

		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
Early Bird Olifantsfontein								
30.	Installation of nozzles on open ended hose pipes	Pos	Pos	Pos	Pos		Low	24 576
31.	Replacement of water consuming spin chillers with air chillers	Neg	Pos	Pos	Pos		High	619 186
32.	Recovery of condensate and return to boiler	Neg	Pos	Pos	Pos		Med	221 184
33.	Effluent Treatment Plant upgrade to include DAF unit to reduce BOD & COD	Neg	Pos	Pos	Pos		9 000 000	3 200 000 effluent discharge penalties
Hudson & Knight								
34.	Recovery of oil from wax slurry	Neg	Pos	Pos	Pos		Med	3 457 000
35.	Steam leak repairs and implementation	Pos	Pos	Pos	Pos		Low	1 520 000

		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
	of regular maintenance schedule							
36.	Recovery of condensate and recycle back to boiler	Pos	Pos	Pos	Pos		Med	231 033
Premier Foods Pretoria Wheat Mill								
37.	Improvement of shrink-wrap tunnel insulation	Pos	Pos	Pos	Pos		Low	2 987
38.	Reduce shrink-wrap tunnel temperature to 120°C	Pos	Pos	Pos	Pos		5 000	9 894
SAB Newlands								
39.	Reusing bottle washing water for crate washing. The Krones bottle washer in Line 1 has been fitted with a valve for the water to be used directly to the crate washer.	Pos	Neut	Pos	Pos		Low	350 000 hl of water for crate washers (Approx R 245 000)
40.	Reducing amount of water used for bottle washing from 400ml per bottle to 200 ml per bottle in line 1.	Neut	Neg	Pos	Pos		Medium	285 000 hl H ₂ O saved pa (approx R 200 000)
41.	Installation of a recirculation tank for vacuum pumps	Pos	Pos	Pos	Pos		Medium	219 000 hl H ₂ O
42.	Solid waste minimisation - Reuse label pulp from bottle washers for recycling paper	Pos	Pos	Pos	Pos		Low	R 211500
43.	Solid waste minimisation - Reuse of kieselguher in the cement industry	Neut	Pos	Pos	Pos		Low	R 466 000
44.	Energy - Replace the current dry heat exchanger (ammonia to beer) by a new flooded evaporator.	Neut	Neut	Neut	Pos		Cost of installing flooded evaporators	20% of chilling (R 400 000)
RFF Canning								
45.	Waste Product Recovery	Pos	Neg	Pos	Pos		Low	R3 000 per day (in season)
46.	Cascade rinsing	Neg	Neg	Pos	Pos		Med	Conservative water savings

		Only fill out Pos (= positive, yes); Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
								of 30%
47.	Magnuson Rinse optimisation	Neut	Neg	Pos	Pos		Med	Redn in flow rate of 30% (120 m ³ per day)
48.	Tariff Management, load profile and peak demand	Pos	Pos	Pos	Pos		Low	10% redn electricity consumption (R200,000)
49.	Steam balance and boiler efficiency	Pos	Pos	Pos	Pos		Med	2-5% redn in fuel consump. R40 – R100 000 saving
50.	Repair compressor leaks	Pos	Pos	Pos	Pos		Low	Annual redn of approx. 26,000 kWh
51.	Draw air from boiler ceiling	Pos	Pos	Pos	Pos		Low	0.5% red coal usage equates to approx. R10 000 p.a.
52.	Install energy efficient motors	Neg	Pos	Pos	Pos		High	1-10% saving in energy on the current motors.
53.	Floor cleaning	Pos	Pos	Pos	Pos		Low	50% water used for cleaning (6% of total used for canning = 29,300 kl / yr)
54.	Closing doors to refrigeration storerooms after entering of exiting.	Pos	Pos	Neg	Pos		Low	20% energy saving. Approx. R 285 000
Bokomo								
55.	Implement energy saving behavior ie.	Pos	Pos	Pos	Pos		None	R 4 000 per

		Only fill out Pos (= positive, yes), Neut (= neutral, don't know), Neg (= negative, no) or n.a. (= not applicable, not available)						
Description of CP Option ¹		Directly Implemented ²	Technical Feasibility	Economic Viability	Environmental Evaluation	Implementation Decision	Investment (R)	Projected Savings per Annum (R)
	Turn off lights when not in use							year
56.	Improved insulation of boiler and piping system. Repair of steam leaks and introduction of regular scheduled maintenance.	Pos	Pos	Pos	Pos		Medium	R 150 000 per year
57.	Compressed air leaks and implement maintenance schedule.	Pos	Pos	Pos	Pos		Payback within 6 months	R 70 000 per year.
58.	Mess Pack Machine material losses	Pos	Pos	Pos	Pos		low	R 1 749 647 potential lost revenue

¹Try to describe exactly, what should be changed, for example: change of raw material by using recycled material, change manual control of fuel feed for boiler to automatic control consisting of preventative maintenance etc.

²Without further assessment

5. CONCLUSION

The company assessments yielded good potential for CP improvements to be made. These now need to be followed up to determine the actual level of implementation. At the same time the consultants gained excellent exposure to the challenges encountered, and activities that need to be undertaken when conducting a CP assessment. This has also required a mindset shift to consider the process holistically rather than implementing isolated options. This project has served well to hone the skills of the existing locally based consultants to be able to provide the NCPC with improved services and expertise for future projects.

APPENDIX A: QUICK SCAN AND IN-PLANT ASSESSMENT REPORTS

- i. Quick Scan Summary Report of Early Bird Farm Olifantsfontein Processing, W Naicker, L Thomas, H Nuwarinda
- ii. In-Plant Assessment Report of Early Bird Farm Olifantsfontein Processing, W Naicker, L Thomas, H Nuwarinda
- iii. Quick Scan Summary Report for Hudson and Knight (PTY) LTD, B Mudau, H Munjoma, D Musetsho
- iv. In-Plant Assessment Report for Hudson and Knight (PTY) LTD, W Naicker, B Mudau, T Mutshatshi
- v. Quick Scan Summary Premier Foods (PTY) LTD, A Ebrahim, T Mutshatshi, S Moletsane
- vi. In-Plant Assessment Report of Premier Foods – Pretoria Wheat Mill (PTY) LTD, A Ebrahim, T Mutshatshi, S Moletsane
- vii. Quick Scan Summary Report of SAB Limited Newlands, Z Zwavel
- viii. IPA Report – SAB Newlands, Z Zwavel
- ix. Quick Scan Summary Report of RFF Canning, S Oldham
- x. IPA Report – RFF Canning, S Oldham
- xi. Quick Scan Report for Bokomo Oats Breakfast Cereals, Z Zwavel
- xii. IPA Report – Bokomo Breakfast Foods, Z Zwavel
- xiii. Nampak DivFood Foodcan, C Janisch