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From Cleaner Production to cleaner and innovative products

UNIDO's HOLISTIC AND SECTORAL CP APPROACH

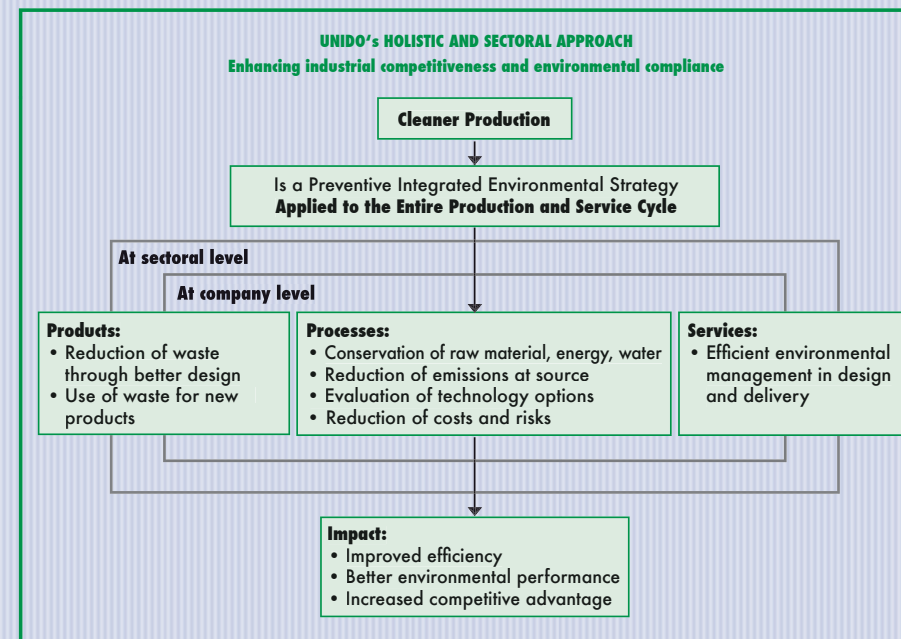
In order to increase the impact of the programme, the new holistic and sectoral Cleaner Production (CP) approach of UNIDO promotes the sustainable application of CP throughout the entire product cycle, at company and sectoral level.

At company level, the activities should progressively go beyond process improvement to

- Take the whole product cycle into account, from raw material production until product recycling and/or disposal, using tools as Life Cycle Assessment (LCA);
- Involve all functions and departments of the company, from product development (using tools as Eco-design) to sales via marketing (using Eco-labelling), procurement, production and transport;
- Involve suppliers and customers in the reflection on new concepts for product design, marketing, procurement, etc. and new partnerships and relations between them;
- Promote integrated solutions: other techniques, which are not directly contributing to productivity increase (e.g. end-of-pipe technologies), should not be excluded, but applied as a complement to CP, after the CP potential has been fully exploited.

This holistic approach will allow the companies to **design, produce and promote innovative, environmentally and economically sound products of adequate quality**, improving their ability to successfully negotiate their position in the global markets.

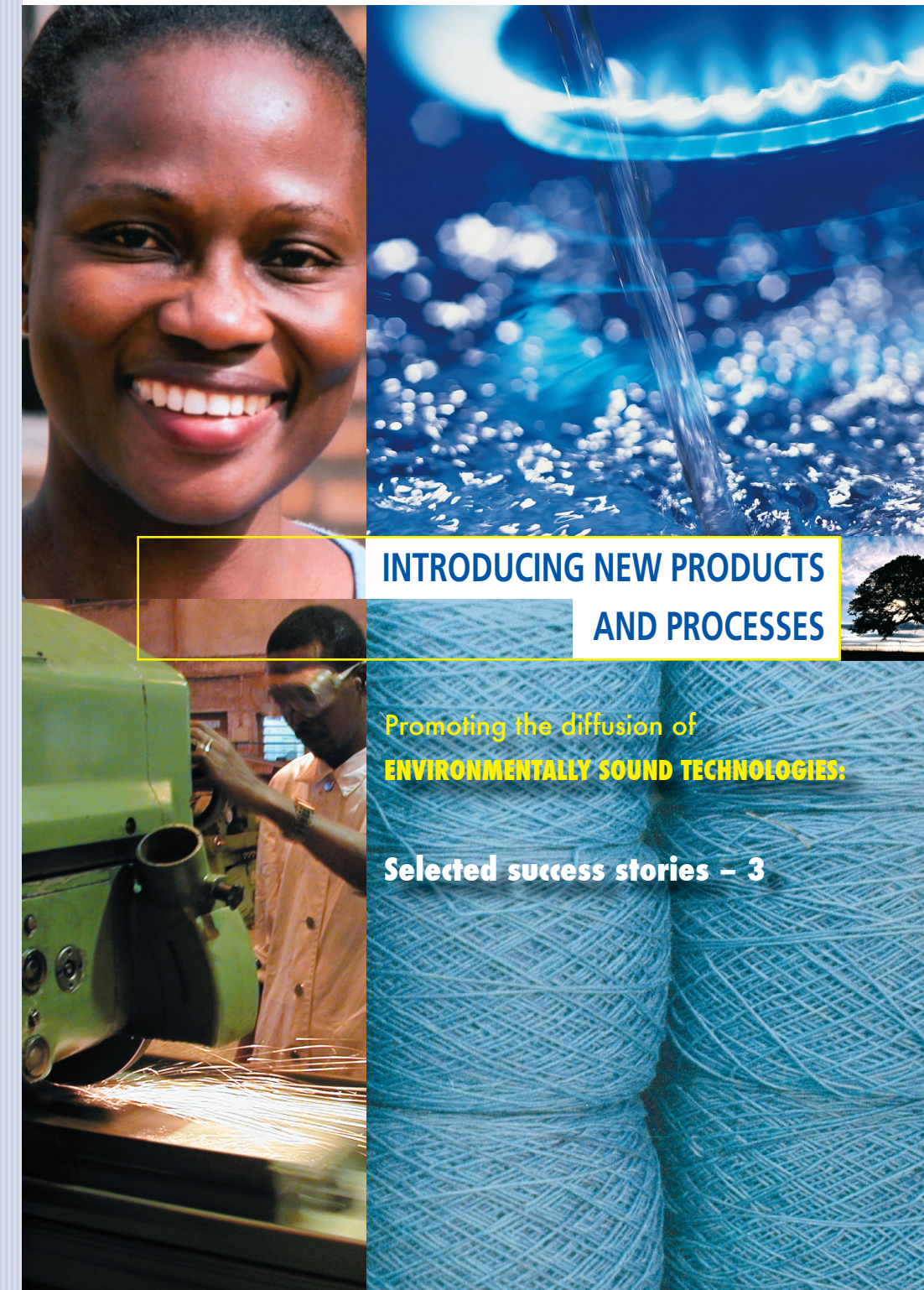
At the sectoral level, the CP Centres and Programmes should develop **national sector specific CP strategies**. This will allow them to put their interventions at company level in a broader perspective and to point out possible synergies between companies, suppliers and customers, making it possible to optimize the gains obtained at the sectoral and national levels. It will also allow for more coherent choices in technology development and transfer in the country as well as the preparation of coherent investment plans to be presented to potentially interested companies and financial institutions. As an example, Life Cycle Assessment and Eco-design may be used at the sectoral level to study the potential innovative utilizations, products and processes related to specific materials. In this perspective, the waste of one process or product can become raw material for another one.



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UNIDO CLEANER PRODUCTION PROGRAMME

one step ahead makes a difference



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
economy environment employment



CUBA

AGRO-INDUSTRY SECTOR

Mr. A. Rivera

INTRODUCTION

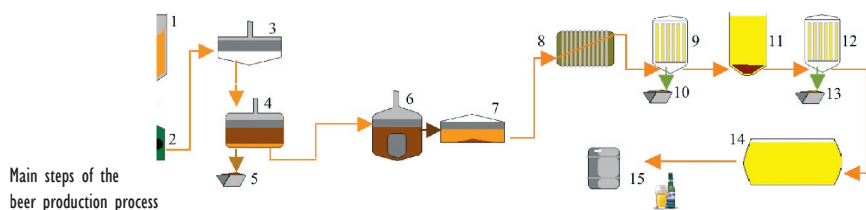
Tinima Brewery is the second largest brewery in Cuba. It produces 476,000 hL of beer per year. Part of the production is bottled and the other is sold in barrels to the national market. 537 employees work at the installation.

This brewery was selected in 2002 for the implementation of a Cleaner Production (CP) in-plant assessment performed by the IIIA Focal Point (Instituto de Investigaciones para la Industria Alimenticia - Institute for Research on Food Industry) of the Cuban National Cleaner Production Network. As a result of the first stage of the assessment, a CD-ROM containing all the CP activities and achievements obtained was produced by the Focal Point staff.

A NEW TECHNOLOGY

In February 2003, the management of the brewery asked for a new assessment to improve its energy efficiency. In order to meet this request, the IIIA Focal Point developed a new technology applicable to all Cuban breweries.

Beer production mainly consists of a hot process (steps 1-8), followed by a cold process (steps 9-14) during which fermentation takes place (step 11). In the hot section, a sugary liquid of characteristic flavour called wort is produced by mixing, milling and boiling three main components: barley malts, sugar (used as additive and partial substitute to malt) and water. In the cold section, the wort is fermented thanks to the addition of yeast and filtered to obtain the final product.



The new technology is based on the separation of the three main components of the wort: only a concentrated malt extract goes through the hot section, while concentrated sugar syrup and water are added at a later stage, after a first fermentation has already taken place in the fermentation tank (11).

This means that the main volume of liquid does not have to go through the hot section (1-8) and the wort filter (9). Consequently, only one brew (steps 1-9) is needed to fill the fermentation tank (11), compared to four brews in the conventional technology, thus allowing for a significant reduction in energy and water consumptions.

BENEFITS

The new technology is applicable to all beer formulations that use sugar or syrup as additive. It allowed for the following achievements at Tinima Brewery:

- 50% savings on total thermal energy consumption in the heating and evaporating stages;
- 30% savings on total thermal energy consumption in the cooling stages;
- 4% savings on sugar consumption (used as additive to the beer);
- 74% reduction in cooling water consumption;
- 7% savings on total water consumption;
- 11% reduction in total wastewater generation;
- 12% savings on total electricity consumption;
- 3% savings on caustic cleaning solution consumption;
- 21% reduction in greenhouse gases emissions;
- Capacity for wort elaboration tripled;
- Reduction in the maintenance requirements.

The investment required is very low as only a few pipelines arrangements are needed and the estimated savings achievable by the brewery are about 109,500 US\$ for a planned annual production of 189,000 hL (considering 8° beer characteristics).

DISSEMINATION

The IIIA Focal Point team has presented the new energy efficient technology developed in Tinima Brewery to the Food Industry Minister. As a result of this meeting, the technology was approved to be disseminated to all breweries of the country.



UGANDA

PACKAGING SECTOR

Mr. K. P. Mwesigye

INTRODUCTION

MAKSS Packaging Industries Ltd., a producer of corrugated cardboard boxes, was one of the first companies to get in touch with the Uganda Cleaner Production Centre (UCPC) in January 2002.

A rapid Cleaner Production (CP) in-plant assessment (quick scan) showed interesting potential for improvement and MAKSS decided to participate in the ECO-BENEFITS programme, a ten-month CP programme that combines a CP assessment and the implementation of the CP options with comprehensive training of company staff and consultants.

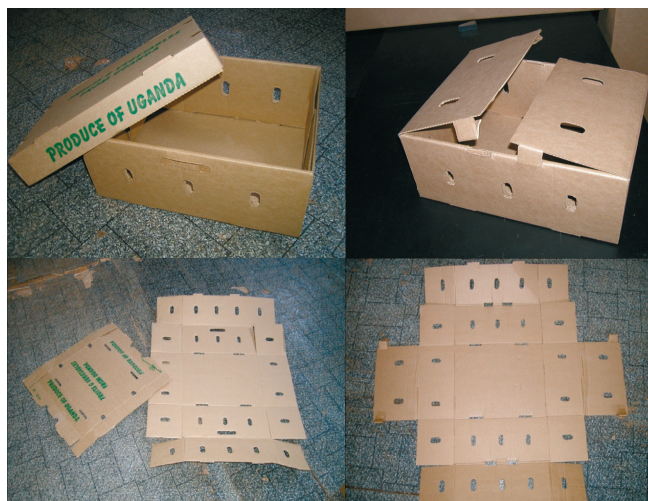
ECO-DESIGN PROJECT

The UCPC found that MAKSS had a big potential not only to improve its production process of corrugated cardboard boxes, but also to adopt innovative solutions for its products. The design of the fruit box for example was a traditional one and had not changed for 20 years. Since transportation is done first via trucks and lorries on rough roads and later on via air mainly to Europe, the corrugated cardboard boxes need to be both very robust and lightweight.

Therefore the UCPC invited MAKSS to become the pilot company for the first Eco-design training course to be held in Uganda in August 2002. First ideas were generated during this workshop, like reducing the thickness of the corrugated cardboard from 5-layer to 3-layer and strengthening the boxes with stiff edges and stiffeners at the same time. Additional ideas included the integration of the lid into the box design in order to reduce the total mass of the box. This last idea also has the advantage of reducing the number of parts to be handled, thereby simplifying the procurement and logistics operations.

In the next phase, MAKSS started its own Eco-design project guided by the UCPC. Intensive discussions involved different customers (flower producers, fruit and vegetable exporters, etc.) to define their requirements and adapt the design of the boxes accordingly.

As a first result MAKSS launched two redesigned products on the Ugandan market in November 2002: the 5 kg fruit box and the flower box for export.



5 kg fruit box: traditional (left) and redesigned product (right)

BENEFITS

Both products allowed the company to achieve the following results:

- Reduced consumption of paper and decrease of weight (-10.7% in the case of the flower box);
- Reduced number of pieces (fruit box) or plies (flower box) and absence of staples;
- Reduced space required and possibility to create piles;
- Easy locking system;
- Better protection and ventilation of the product;
- Reduced costs for transportation due to the lower weight.

In other words:

- Reduced environmental impacts;
- Simplified production and logistics;
- Reduced costs;
- Improved product functionality and customer satisfaction.



EL SALVADOR

DAIRY SECTOR

Mr. R. Nuila

INTRODUCTION

Liquid waste constitute the main environmental problem of the dairy sector. They include cleaning water, loss of raw material and final products and, most of all, a high concentration of whey in the waste water.

Whey is the main by-product of cheese production: on the average the production of one kilogram of cheese requires 10 litres of milk, leaving nearly 9 litres of whey as a by-product.

Due to its high organic content, whey is considered hazardous to the environment and many countries have introduced rigorous restrictions for its elimination through drains, including strict standards for liquid waste.

In order to help the dairy companies to comply with the regulations, the National Cleaner Production Centre (NCPC) in El Salvador, in cooperation with the national dairy sector association, is carrying out an important project on the efficient utilization of whey. At the same time, the project aims at providing the companies with new sources of revenues.

WHEY: TOO PRECIOUS TO BE WASTED DOWN THE DRAIN

Before starting the project, 1,830 tons of this by-product were lost each year in the drainage from cheese solidification operations and discharged to the waste water.

In order to avoid the contamination, whey is sometimes used as fertilizer or animal feed, but these solutions don't take advantage of the genuine qualities of the product, which contains proteins and lactose. Big companies use large scale ultra-filtration plants to produce powder whey, pure lactose, additives for ice creams and other food products, as well as cosmetics and pharmaceutical products. These technologies, though, are not accessible to small and medium size companies, which require more simple solutions.

One such solution is the production of a marketable whey fruit drink, which can be achieved through modifications in the cheese production process and the introduction of a new technology for centrifugation, mixing and pasteurization treatments. The benefits obtained thanks to these modifications are detailed below.

BENEFITS

The use of whey for the production of fruit drink can bring an overall economic benefit of around 426,000 US\$ per year to a middle sized dairy company producing 1,800,000 litres of whey, as can be seen in the following table:

ESTIMATED BENEFITS	
Reduction in volume of wastes	- 11.5 %
Reduction of BOD ₅ level in wastewater	40,000 mg/l
Reduction of COD level in wastewater	60,000 mg/l
Reduction in wastewater treatment plant operating costs	60,000 US\$/yr
Income from the production of whey fruit drinks	366,000 US\$/yr

DISSEMINATION

Whey drinks are already available in the European markets and enjoy increasing demand by the consumers.

The introduction of the product in El Salvador will require its adaptation to the taste of the local consumers and an appropriate marketing strategy. Awareness raising workshops have already shown the interest of the dairy sector in the country and very positive reactions towards this new product.

A similar programme is developed by the NCPC in Guatemala and another one is foreseen in a near future by the NCPC in Mexico.



Preparation and tasting of whey drink during a demonstration workshop