Cleaner Production and Sustainable Technology Case Studies from APEC Economies with Some Economic Analysis and Interpretation

Asia-Pacific
Economic Cooperation

Industrial Technology Development Institute
Department of Science and Technology
Republic of the Philippines

APEC Industrial Science and Technology Working Group
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Department of Science and Technology
Republic of the Philippines
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INTRODUCTION

The environmental problems we are facing today are largely a consequence of rapid economic development. Economic progress has resulted to environmental degradation, resource depletion, deforestation and pollution of air, water and land resources.

Due to an increasing public concern over environmental protection, many industries today recognize the development of strategies and technologies to maximize their productivity, while minimizing pollution and harmful wastes to the environment. Cleaner production (CP) options are now beginning to be appreciated as a waste management strategy and preventive approach to pollution. It entails the continuous use of industrial processes and products to prevent pollution and reduce wastes at their source. Industries in developing economies have much to gain from CP because it promotes a more effective means of preventing pollution at the source rather than the more expensive control at the end-of-pipe treatment.

In an effort to effectively transfer CP and sustainability technologies and practices among members of the Asia-Pacific Economic Cooperation (APEC), a compendium of CP case studies has been developed. This project was implemented by the Department of Science and Technology of the Philippines, through the Integrated Program on Cleaner Production Technologies - Industrial Technology Development Institute, with support from APEC. Economies from the APEC region were enjoined to prepare and contribute these case studies.

This compendium features success stories on cleaner production adoptions that have been initiated by industrial facilities from member economies of APEC. The purpose of this project is to quantify the cost/benefit of investing in CP and sustainable technologies by small and medium scale enterprises. This project also complements the efforts of the APEC Industrial Science and Technology Working Group to establish links and provide opportunities for the sharing of information among APEC economies.

Contents

Asia-Pacific Economic Cooperation

PostCP

INDONESIA
Metal and Allied Industry

In **PostCP**

- CP Options Implemented
- Economic and Environmental Benefits
- Company Profile
- Agencies Involved

PostCP \pōst\sē\pē\ *<United Nations Environment Programme: **CP**, abbrev. of **cleaner production**, an integrated preventive environmental strategy applied to processes, products and services to increase efficiency and reduce risks to humans and the environment> adj* **1** referring to the condition of a facility after it has adopted CP; *n* **2** a publication of success stories of companies assisted by the Department of Science and Technology in the adoption of CP.

Solvent recovery at automotive repair shops in Indonesia

In June of 1993, a World Bank funded study of the greater Jakarta area determined that wastewater from small automobile repair shops was the most polluting of all the small scale industries studied. By volume, the bulk of this wastewater comes from washing cars but the most concentrated toxic waste comes from the solvent cleaning of mechanical parts. Diesel fuel, kerosene, gasoline and detergents are commonly used because they are cheap. The solvents, oil, detergent, and grease-laden water from these operations flow directly into a hole or a channel that eventually empties directly into the waterways. The technique is ubiquitous. Virtually every small automobile repair shop in Indonesia uses a variation of this system.

From 1998 to 1999, Swisscontact conducted Clean Workshop Programs for the automotive repair sector in various cities in Indonesia. The main goal was to seek for WIN-WIN situations motivating workshop owners to adopt cleaner production (CP). The adoption of the solvent tank, as proposed hereunder, was only one element of the upgrade but the most important one with regard to reduction of pollution. After the initial pilot phase, the promotion of solvents tanks among automotive repair workshops was then done in cooperation with the local environmental authorities.

The low cost project has one objective - dramatically reduce the wastewater pollution generated by the solvent cleaning operations of small automobile repair shops.

CP Option Implemented

The solvent tank is a very simple piece of equipment easy to set up and operate. The solvent tank system is introduced to individual workshops as a simple three-part package namely the solvent tank, a few supplementary tools and an introductory training of approximately 2 hours at the time the tank is delivered.

Economic and Environmental Benefits

CP Options	Capital,US$	Environmental Benefits	Economic Benefits,$	Payback Period
Installed and use solvent tanks to recover solvents used for cleaning mechanical parts	89	Reduced solvent discharge into the environment by 1.5 m3/yr Eliminated the need for detergent use and discharge into the environment Reduced water consumption by >1 m3/yr	91.3	12 months

Other Benefits

- Increased worker efficiency
- Improved working position
- No rusting of parts
- Cleaner workshop

Before CP

AfterCP

Agency Involved

Swisscontact, founded in 1959, is a Foundation for Technical Cooperation based in Zurich, Switzerland. Swisscontact's focus is on Small and Medium Enterprise Promotion, Financial Services, Vocational Training and Urban Environment Protection.

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ITDI-DOST

Asia-Pacific Economic Cooperation

PostCP

KOREA
Textile Industry

In **PostCP**

- CP Options Implemented
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Evaluating dyeing processes to cut costs at a textile company in Korea

Textile dyeing processes are applied to almost all the textile products during its production stage. It consumes massive amount of water, chemicals, and energy through consecutive wet treatments. Air pollutants come from the emission of CO_2 generated from heat energy during the dyeing process. In terms of water pollution, the dyeing process consumes a lot of water in a product to water ratio of about 1:200 by weight. Korea has already been identified as the water deficient nation and most of the used water is released in the form of wastewater. Fortunately, technologies in the textile equipment industry, parts and materials, auxiliaries, dyestuff, and finishing agents are continuously improving, and integration of these technologies to dyeing processes can contribute to cleaner dyeing.

A group of experts assessed Dae-Yang Dyeing Co., a textile dyeing company in Korea, for process assessment, where possible cleaner production technologies were identified. The general goal of the CP Program was to achieve environment-friendly dyeing process with higher energy efficiency for the global competitiveness of these companies.

This project was supported by the Korea National Cleaner Production Center through Korean government's Cleaner Production Technology Development Funds.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Dyeing liquor is not measured quantitatively during the continuous process causing waste	Installed quantitative pumps Implemented appropriate management of chemicals	2,900	Reduced wasted water by 6% Reduced energy consumption by 9% Reduced material usage by 5%	9,200	4 months
The large pumps were not in the inverter style wasting energy	Used inverter method to control the main motor in jet dyeing machine	26,000	Reduced energy consumption Reduced air emissions	9,300	34 months
Insulation of pipes is insufficient	Improved insulation of pipes	2,500	Reduced energy consumption Reduced air emissions	54,400	0.6 month
Energy is wasted due to bad management of ventilation for tentering machine	Established a new system to lessen the ventilation for the tentering machine when not in use	4,200	Reduced energy consumption Reduced air pollution	13,500	4 months
Mixing incompatible dyes caused irregularities in color	Optimized dyestuff recipe for each color	1,700	Reduced energy and chemical consumption	17,000	1 month
Poor lighting conditions and ventilation near the jigger machine causing low work efficiency and low product quality	Fixed the ceiling to let more sunlight in and increase the average illumination	2,700	Increased in labor productivity and improved safety of the work place	Not measured	Immediate
TOTALS		40,000		103,400	

Other Benefits

- Increased production efficiency and product quality
- Increased safety and reduction of industrial accidents in the work place
- Increased revenue from enhanced product quality
- Reduced health risk to workers
- Increased awareness for the employees

Agency Involved

The Korea National Cleaner Production Center (KNCPC) is a non-profit organization established in 1999 under the support of the Korean Ministry of Commerce, Industry and Energy (MOCIE). KNCPC develops sustainable industrial development policies by taking the role of innovative technological agency for Industrial Environment Division of MOCIE. It assists companies to establish the cleaner production infrastructure by process assessment, training, providing cleaner production technology development funds, and disseminating the development results.

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Asia-Pacific Economic Cooperation

PostCP

KOREA
Textile Industry

Waste minimization and cost reduction in dyeing processes in Korea

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A group of experts assessed Wowcom Corp., a textile dyeing company in Korea, for process assessment, where possible cleaner production technologies were identified. The general goal of the CP Program was to achieve environment-friendly dyeing process with higher energy efficiency for the global competitiveness of these companies.

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Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Cooling water is not recyled	Reused cooling water for wool scouring	5,800	Reduced wastewater generation	15,800	5 months
Energy is lost due to high RPM of fans when tentering machine is not operating	Applied sensor and modified operating unit of the tentering machine	500	Reduced gas emission Reduced energy consumption	40,000	Immediate
Heat is lost through the steam pipe due to lack of insulation	Installed an insulation unit	2,700	Reduced energy consumption	9,500	3 months
Steam is supplied even when the anti-felting machine is on standby	Installed automatic value to stop the steam supply while the machine is on standby	1,250	Reduced energy consumption	3,900	4 months
Dyes of low compatibility are mixed resulting to poor quality in color	Applied dyestuff mixtures of high compatibility by examining adsorption behavior	-	Higher product quality Higher reproducibility of color		Immediate
There is lack of liquor flow management	Installed flow detector	15,000	Reduced wastewater generation	44,000	4 months
Leakage occurs due to aging of pipes	Replaced old pipes with new ones	10,000	Reduced wastewater generation	22,000	5.5 months
All measures implemented		35,250	Reduced wastewater generation by 12% Reduced energy consumption by 9%	135,200	

Other Benefits

- Increased production efficiency and product quality
- Increased safety and reduction of industrial accidents in the work place
- Increased revenue from enhanced product quality
- Increased awareness for the employees

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PostCP

NEW ZEALAND Chemical Industry

Increasing productivity at a rubber company in New Zealand

In **PostCP**

- CP Options Implemented
- Economic and Environmental Benefits
- Company Profile
- Agencies Involved

The management team of Skellerup Industries, a rubber manufacturing company, implemented cleaner production (CP) introduced by the Target Zero program. The objective of this program is to enhance efficiency in every aspect of the business from manpower right down to production. Skellerup has been a participant in Target Zero, a two-year sponsored cleaner production program involving 12 companies in Christchurch and 10 in Hawkes Bay during the period 1997-1999. The Sustainable Management Fund of the Ministry for the Environment, Meridian Energy Ltd (formerly ECNZ) sponsored the program, and the local authority and electricity company in each area.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
The calender machine had an unacceptable product yield on certain products.	Fitted a special attachment to the calender machine to reduce manual handling and edging misalignment	20,000	Reduced waste rubber and usage of raw materials and fuel Increased productivity	269,480	< 1 months
Plastic sheets that are used to wrap belting and sheeting products were used once and landfilled.	Recycled plastic sheeting before disposal	-	Reduced raw material consumption by 50%	18,000	Immediate
There are a number of dripping taps and continuously running drinking fountains.	Implemented regular maintenance program	1,000	Reduced demand on the aquifer in a salt water intrusion zone	5,025	4 months
Extruder mill cooling water, which is drawn from the aquifer was used on a once-through basis.	Recovered the extruder mill cooling water and returned it to the groundwater	1,500	Reduced wastewater generatiom	780	2 years
Route cards are used to track the production of rubber parts around the factory. A blank route card was routinely attached at the back of each work order.	Eliminated blank route cards	-	Reduced cardboard wastes Reduced resource consumption	1,700	Immediate
Large quantities of paper are routinely used to print line flow reports at the site.	Rationalized report print format	-	Reduced paper usage Reduced landfill disposal	75	Immediate
Cardboard packaging was not recycled.	Segregated cardboard packaging to allow for recycling	-	Reduced landfill disposal Reduced raw material usage	1,500	Immediate
Monophosphor lamps, which are less efficient than triphoshpor lamps are used.	Progressively replaced monophosphor lamps with triphosphor lamps	-	Reduced amount of mercury disposed Reduced energy consumption	400	< 1 months
Steel strapping, which is used as a component of the packaging on palletised raw materials are landfilled.	Recycled steel strapping	-	Reduced resource requirement; Reduced landfill disposal	50	1.5 years
TOTALS		22,500		297,010	

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Other Benefits

- Prevented water restrictions
- Reduced the chances of lost production due to imposed restrictions
- Increased social responsibility

Company Profile

Skellerup Industries is a rubber manufacturing company that was started in 1910 with the establishment of several Para Rubber shops. A manufacturing plant was established at the current Woolston site in Christchurch in 1935. At its peak, the Skellerup Group contained 27 companies manufacturing a wide range of rubber products. After a takeover by Brierley Investments in 1986 the various companies were split up and sold. Further restructuring took place in 1996 when Maine Investments purchased the group from Brierley Investments. In July 1998 financial difficulties forced the sale of Skellerup Industries to Viking Pacific, a new company owned primarily by Goldman Sachs investment bank. The Woolston manufacturing site currently employs 300 people.

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Agency Involved

Target Zero is a Christchurch City Council initiative that helps Christchurch businesses to move towards sustainability by improving resource efficiency, minimizing waste and reducing the risk of harming the environment.

The aim of Target Zero is to develop innovative, profitable and accountable businesses that integrate sustainable economic, social and environmental values in their thinking, decision-making and behavior in Christchurch City.

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Asia-Pacific Economic Cooperation

PostCP

NEW ZEALAND Chemical Industry

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Reusing wastewater at a fertilizer manufacturer in New Zealand

The Ravensdown Fertiliser Co-op site at Hornby in Christchurch is one of the three sites in the Ravensdown group that manufactures phosphate fertilizers for New Zealand's agricultural industry.

The cleaner production approach was introduced at the Hornby site in parallel with the establishment of an environmental management system (EMS) based on ISO 14001. As a result of this implementation, Ravensdown has recognized the close synergy between cleaner production and EMS and they are now integrating the CP principles, practices and objectives into the ISO 14001 system.

Ravensdown Fertiliser has been a participant in the Target Zero Program, a two-year sponsored cleaner production program involving 12 companies in Christchurch and 10 in Hawkes Bay during the period 1997-1999. The Sustainable Management Fund of the Ministry for the Environment, Meridian Energy Ltd (formerly ECNZ), and the local authority and electricity company in each area sponsored the program.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Road lights are left turned on during the day. As electricity is generated on site, electricity has been customarily regarded as a free good.	Installed clock timer to automatically turn off some of the lights around the site.	279	Reduced electricity consumption and increased bulb life	403	9 months
Drums cannot be recycled because of the large amount of lithium grease left at the bottom of the drum.	Improved suction of grease by adding a 10 mm thick metal plate to the suction pump. The extra weight creates a greater suction of grease by the pump.	65	Increased amount of grease removed by 9.45 kg/drum Reduced grease waste from 22% to 4.5% Allowed recycling of drums	1,180	3 weeks
Treated acid plant cooling waters are discharged to the ground. Also, bore water used in the acid-plant plate heat exchangers are stored in an open pond that developed algae and required chemical treatment before use.	Used the existing bore water ponds for acid plant waste waters and reused them as make-up water for scrubber. Installed 4 new enclosed bore water tanks that prevented algae growth.	185,000	Compliance to regional council regulations Reduced bore water consumption and chemical use	11,400	Several years
TOTALS		185,344		12,983	

Company Profile

Ravensdown supplies more than half of all the fertilizers used in New Zealand agriculture. It is 100% owned by New Zealand farmers. Starting from being mainly a solid NPKS fertilizer supplier, Ravensdown now offers a comprehensive range of products and services to farmers such as soil testing, animal health testing, solid fertilizers, other organic products, anthelmintics, animal health supplements, lime and agrochemicals.

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PostCP

NEW ZEALAND Food Processing Industry

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Integrating environment and quality in gelatin production in New Zealand

Leiner Davis Gelatin, manufacturer of gelatin and gelatin products, recognized that improving the utilization of inputs and minimizing the production of unwanted or low value outputs was fundamental to improving profitability. Adopting a cleaner production approach has helped staff become more aware of the consequences of environmental practices that are unfriendly and that are detrimental to the company's bottom-line.

Leiner Davis saw cleaner production playing an important role in their company as it extended its existing continuous quality improvement program to incorporate environmental performance. This has resulted in the integration of ISO14001 into their existing ISO9001 quality standard in 1999.

The Leiner Davis Gelatin plant has been a participant in Target Zero, a two-year sponsored cleaner production program involving 12 companies in Christchurch and 10 in Hawkes Bay during the period 1997-1999. The Sustainable Management Fund of the Ministry for the Environment, Meridian Energy Ltd (formerly ECNZ), and the local authority and electricity company in each area sponsored the program.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Gelatin powders that are set aside or taken from the process chain prior to final packaging (testing samples, spilt product, product in damaged packaging, etc.) are re-processed in the extractor.	Adopted heat conditioning as additional process for food safety assurance, followed directly by blending or packaging	-	Reduced resource use by eliminating additional processing	25,000	Immediate
At the end of process runs in the Specialty Department, the pipe work, containing high gelatin content, is flushed to the drains.	Collected the flush liquor and sent back for re-processing		Reduced trade waste discharge volume and loading.	3,000	Immediate
TOTALS		-		28,000	

Company Profile

Leiner Davis Gelatin is a part of the Goodman Fielder group of companies that manufactures gelatin and specialty gelatin products. Leiner Davis has been producing gelatin at the Christchurch plant for 91 years. It is the smallest and oldest plant in Leiner Davis Gelatin International, the largest edible gelatin-manufacturing group in the world.
Gelatin is pure protein extracted in New Zealand from beef skin. The Christchurch product is used mainly for confectionery and dairy desserts. The plant exports two thirds of its production.

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Agency Involved

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NEW ZEALAND Food Processing Industry

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Preventing product loss at a meat processing plant in New Zealand

In response to the pressure exerted by the local authority in compliance to environmental regulations, the management of Food Solutions, a meat processing company, soon realized that production efficiency and quality were closely allied to environmental performance. A department-by-department focus on product handling procedures readily identified opportunities to reduce product losses, increasing productivity and reducing the environmental impact on the trade waste system and the landfill.

The Food Solutions plant has been a participant in Target Zero, a two-year sponsored cleaner production program involving 12 companies in Christchurch and 10 in Hawkes Bay during the period 1997-1999. The Sustainable Management Fund of the Ministry for the Environment, Meridian Energy Ltd (formerly ECNZ), and the local authority and electricity company in each area sponsored the program.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Spilled sausages from the de-skinning machine are disposed to the landfill.	Prevented spillages by constructing a larger two-tier tray and educating staff to remove the tray before it overflows	1,000	Reduced disposal of meat waste to the landfill;Increased product yield	15,235	< 1 month
A proportion of processed sausages are wasted and landfilled due to the unraveling of sausage skins. This happens when the end of the skin is not adequately secured.	Implemented a simple procedural change that ensures an additional twist to the skin to prevent skin unraveling	-	Reduced disposal of meat waste to the landfill;Increased product yield	71,100	Immediate
Some sausages are dropped onto the floor from transfer trolleys and are disposed to the landfill.	Added a wire mesh tray at the bottom of the trolleys to catch any sausages that may fall	2,000	Reduced disposal of meat waste to the landfill;Increased product yield	30,470	< 1 month
The Langen machine tumbles ham with brine but opens before all product has settled, spilling 70-100 kg of ham/day.	Installed a PLC to delay opening until the mixture has settled	30,000	Reduced disposal of meat waste to the landfill;Increased product yield	61,100	6 months
Some of the minced sausage overflows from the bowl-cutter onto the floor due to overfilling. These are then disposed to the landfill.	Reformulated recipes to a consistent batch size that are compatible with equipment capacity and trained staff to take extra care to prevent loss	-	Reduced disposal of meat waste to the landfill;Increased product yield	75,730	Immediate
One cause of product returns was found to be due to pinholes in plastic webbing caused by creasing at the corners of rectangular bacon packs.	Changed the packaging dye from square to round to reduce creasing and the tendency to form pinholes in the vacuum packs	2,000	Reduced disposal of meat waste to the landfill;Increased product yield	23,230	1 month
TOTALS		35,000		276,865	

Company Profile

Huttons Kiwi Ltd, one of the first participants of the Target Zero program, operated a small goods manufacturing plant at Bromley in Christchurch. In December 1997, Huttons Kiwi Ltd merged with Top Hat Bacon to become Food Solutions Ltd, which was 70% owned by Brierley's. In December 1998, Brierley's sold its stake in Food Solutions to Mainland Products Ltd. As Mainland already owned a ham and bacon plant at Oamaru and concluded it was not economical to keep both plants open, the Bromley plant was scheduled for closure in the latter part of 1999.

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Email: *john.walker@mainland.co.nz*

Agency Involved

Target Zero is a Christchurch City Council initiative that helps Christchurch businesses to move towards sustainability by improving resource efficiency, minimizing waste and reducing the risk of harming the environment.

The aim of Target Zero is to develop innovative, profitable and accountable businesses that integrate sustainable economic, social and environmental values in their thinking, decision-making and behavior in Christchurch City.

Contact information
Target Zero
Tel. No: (03) 941 8830
Email: *targetzero@ccc.govt.nz*

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ITDI-DOST

Asia-Pacific Economic Cooperation

PostCP

NEW ZEALAND Food Processing Industry

In **PostCP**

Cutting costs, improving efficiencies at a juice manufacturing facility in New Zealand

ENZAFOODS saw cleaner production as a way to cut costs, to reduce dependence on limited resources and to improve efficiencies in a competitive market. The export-oriented business requires high standards in quality of product, operational efficiencies and increasingly in environmental performance. ENZAFOODS' involvement with the Target Zero, a two-year sponsored cleaner production program follows on from a 1995 study on their environmental performance that identified a number of options for improvement.

The Sustainable Management Fund of the Ministry for the Environment, Meridian Energy Ltd (formerly ECNZ), and the local authority and electricity company in each area sponsored the program.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
The factory was using between 125,000 l/hour and 187,500 L/hour of bore water, with a resource consent for the abstraction of 156,900 L/hour.	Re-used waste bore water from the final juice coolers and evaporators, the belt press pasteurizer and the chiller plant heat exchanger.	67,287	Reduced bore water consumption by 18,000 to 80,000 L/hour Compliance to resource consent limit	3,536	19 years
Approximately 150,000 L/yr of concentrate was being lost due to the inability to incorporate this retentate stream back into the main process.	Decanters were used to capture all retentate, therefore maximizing sugar recovery.	400,000	Prevented 23,000 L of sugar-rich product from entering the wastewater stream to trade waste Projected increased productivity of 150,000 L of additional product	222,500	1.8 years
TOTALS		467,287		226,036	

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Company Profile

ENZAFOODS is a major manufacturer of fruit and vegetable juice concentrates and other processed apple and vegetable products. The Hastings site manufactures both clear and cloudy apple juice concentrates, as well as pear, kiwifruit and carrot concentrates. The site operates all year round with high levels of production in the winter months.

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Agency Involved

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Asia-Pacific Economic Cooperation

PostCP

In **PostCP**

- CP Options Implemented
- Economic and Environmental Benefits
- Company Profile
- Agencies Involved

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Solid waste minimization at a flexible packaging company in New Zealand

AEP Flexipac in Christchurch is one of the largest and most diverse producers of flexible packaging solutions in New Zealand. The company had previously been internally reviewing on-site waste streams with a small group of key employees. However, the company recognized that the Target Zero Program would provide the guiding hand they needed in achieving waste reductions and would also give them ability to review waste minimization techniques and processes adopted by other companies.

One of the major environmental problems faced by AEP is the large amount of solid waste generated as a consequence of the manufacturing processes involved in producing flexible packaging. Therefore, the Target Zero team as part of the initial analysis reviewed the solid waste leaving the site and also completed an entire site walk-through identifying areas requiring further investigation.

Economic and Environmental Benefits

Conditions Before CP	CP Options	Capital,$	Environmental Benefits	Economic Benefits,$	Payback Period
Inner cores are used on-site to wrap the flexible packaging between processes and also to transport the finished product to the client. Some cores are used only once and discarded while others are cut to length with the remaining section thrown away.	Salvaged all cores greater than 400 mm in bins for re-distribution around the site to be re-used or cut to a desired length; Optimized the cutting size of new cores;Requested two of the main customers to return the inner cores to them	-	Reduced 60 tons of solid wastes	56,000	-
Disposable rubber gloves used during the washdown of printing machines are seldom used more than once even when still in good condition.	Drip-fed the disposable gloves to the operators	-	Reduced solid waste generation	4,000	-
Around 300 kg of rags are used to clean up spills and for washdown processes.	Used a new brand of rag that can be re-used up to six times.	-	Reduced solid waste generation	3,000	-
The boiler circulates heated water around the site to various machines for heating purposes. In order to avoid problems with the boiler set-up due to high temperature, the hot condensate would have to be cooled in a radiator before being returned to the boiler.	Modified pipework and pumps to allow the condensate to be returned at 96°C instead of 51°C.	860	Reduced LPG consumption	3,556	3 months
TOTALS		860		66,556	

Company Profile

AEP Flexipac in Christchurch is one of the largest and most diverse producers of flexible packaging solutions in New Zealand. Part of a worldwide organisation, it employs 175 people at its Hornby plant.

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Agency Involved

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Asia-Pacific Economic Cooperation

PostCP

PERU
Metal and Allied Industry

In **PostCP**

Improving refining process at a foundry in Peru

Foundry 2 is a Peruvian company dedicated to smelting and land refinery of batteries to obtain secondary lead refined antimony. Before the introduction of cleaner production (CP) in the foundry, 9% of the lead gets lost in the dreg, which translates to more than 29 tons of lead. Hence, the main recommendation during the assessment is the recovery of lead from the dreg. Reduction in electric power consumption and increase in the efficiency of the burner of the rotary oven were also major objectives of the CP program. Moreover, implementation of the latter has consequently resulted to savings in fuel consumption, recovery of the dusts generated and savings in water consumption.

CP Options Implemented

- Modified the refractory material of the oven
- Replaced the burner and optimized the residual duel and diesel
- Utilized the residual heat of the oven to warm the fuel
- Eliminated electrical charges during peak hours
- Gradually replaced incandescent lights into savers lights
- Eliminated leaks in the gas washer tank
- Increased efficiency of the gas washer
- Installed bell on the oven

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Modified refractory bricks from 31% to 50% albumen	370	Increased lead recovery by 347 tons/yr (19% of lead less in dross)	450	10 months
Installed bell on the oven		Reduced 35,500 kg/yr of material input		
Replaced burner and optimized the residual fuel and diesel	965	Reduced use of residual oil by 19.1 gal/ton lead (32.5% reduction)	3,092	4 months
Mixed fuel		Reduced fuel consumption by 21,500 gal/yr		
Improved refining process		Reduced CO_2 emissions by 266 tons /yr		
Utilized residual heat of the oven to warm the fuel	280	Saved 5,760 kWh/yr (7.3 % reduction)	184	Immediate
Installed auxiliary baghouse	2,100	Recovered 6,950 kg powder/yr	2,527	10 months
Installed bells that encase the rotating oven				
	120	Improved occupational safety	Not determined	Not determined
TOTALS	3,835		6,253	

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Rotating oven

Rotating oven with bell

Gas washer

Auxiliary tank for decantation

Company Profile

Foundry 2 initiated operations in March 2001. The plant consists of a Chief Engineer and four workers, two in the daytime and two in the night shift. It operates 12 hours/ day and 20 days a month, with a maintenance period of 5 days in a month.

Agency Involved

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Applying waste minimization techniques at a paint manufacturer in Peru

The Paint Factory principally manufactures paints and cleaning products. In an effort to reduce environmental impacts and reduce production costs, a Cleaner Production Project was implemented in the company. Conservation of water and material inputs, energy efficiency, atmospheric emissions, and effluent discharge became the high-priority areas of the CP Program.

Implementation of CP recommendations, majority of which are good operating practices, involved an investment of approximately US$ 2,600 that translated to US$ 12,800 economic benefits.

CP Options Implemented

- Re-used washwater for washing
- Eliminated leaks
- Recovered the chalk to minimize its use
- Reduced solvent losses due to evaporation
- Minimized paint losses
- Switched off machines when not in use
- Improved plant cleanliness by using a chronogram for cleanliness
- Repaired filters for latex paints
- Fixed the position of large cooking pans with respect to the axis of the blenders
- Improved time and motion in the temple area

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Re-used water for washing	40	Reduced water consumption by 11,200 m3/yr (17% duction)	850	Immediate
Eliminated leaks		Reduced wastewater generation and pollution load		
Minimization and recovery of chalk	400	Recovered 9,600 kg/yr of chalk (5.4% reduction)	840	6 months
Reduced solvent losses	50	Recovered 475 gal/yr of paint (5.1% reduction)	1,890	Immediate
Minimized paint losses		Recovered 860 gal/yr of solvent (0.53% reduction)		
Avoided formaldehyde losses due to evaporation	Minimal	Recovered 1,033 kg/yr of formaldehyde (46% reduction)	600	Immediate
Minimized resin wastage in cylinders	Minimal	Recovered 2,583 kg/yr of resin	3,445	Immediate
TOTALS	~490		7,625	

Improved housekeeping in the plant

Conducted and observed the sedimentation of temple in the

Adjusted the batteries with respect to the axis of blenders to reduce losses

Company Profile

The Painting Factory has been operating for 20 years with an annual sale of US$ 1M. Latex paints, temple, enamel and imprimatur constitute 70% of the volume of the company's sales.

Agency Involved

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ITDI-DOST

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- Economic and Environmental Benefits
- Company Profile
- Agencies Involved

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Equipment modification at a smelting plant in Peru

Accessories for Smelting manufactures refractories for smelting (muffs) and cold plates using as raw materials recycled products, aluminum powder, cellulose of newspapers, etc. The company went into cleaner production (CP) to upgrade their technologies and be at par with those of the most advanced countries.

Priority areas for the reduction of environmental impacts are the use of thermal energy, change of fuel, use of electricity, use of water and use of material inputs. Likewise, the project included atmospheric emissions and effluent discharge.

CP Options Implemented

- Installed flow restrictors and repaired leaks
- Repriced BT4 to BT2
- Replaced 40-W capacity lights with 36-W ones and incandescent lights with savers lights
- Modified the drying kiln to avoid heat losses
- Covered the mounds of silica and aluminum eith awning
- Stored raw materials in metallic containers to reduce emissions

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Installed flow restrictors and repaired leaks	Minimal	Reduced water consumption by 360 m^3/year (40% reduction)	840	Immediate
Repricing of BT4 to BT2	440	Reduced electricity by 14,600 kWh/yr (14% reduction)	5,640	1 year
Replaced 40-W capacity lights to 36 W ones and incandescent lights to savers light		Reduced gas discharge of effect conservatory (GEI) and polluting gases of the atmosphere (GCA)		
Modified the drying kiln to avoid heat losses	Minimal	Reduced use of diesel by 29,500 gal/yr (62% reduction) Reduced GEI and GCA Reduced CO_2 emissions by 360 tons/yr	66,000	Immediate
Covered the mounds of silica and aluminum with awning	Minimal	Reduced raw material losses (dust of silica and aluminum) and emission of particulates	Not determined	Immediate
Stored raw materials in metallic containers				
TOTALS	~440		72,480	

Improved housekeeping in the plant

Conducted and observed the sedimentation of temple in the

Adjusted the batteries with respect to the axis of blenders to reduce losses

Company Profile

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- Economic and Environmental Benefits
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CP Options Implemented

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Repricing of BT4 to BT2 Replaced 40-W capacity lights to 36 W ones and incandescent lights to savers light	440	Reduced electricity by 14,600 kWh/yr (14% reduction) Reduced gas discharge of effect conservatory (GEI) and polluting gases of the atmosphere (GCA)	5,640	1 year
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Covered the mounds of silica and aluminum with awning Stored raw materials in metallic containers	Minimal	Reduced raw material losses (dust of silica and aluminum) and emission of particulates	Not determined	Immediate
TOTALS	~440		72,480	

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Company Profile

Accessories For Smelting initiated its operations in the year 1980, as an individual company. It has 15 workers in the production area, 11 administrative workes and a chief of plant. It operates 6 days a week in one shift only.

Agency Involved

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Optimizing energy use at a textile company in Peru

Textile Factory 2 is a Peruvian textile company engaged in fiber spinning, knitting, fabric dyeing and finishing. During the cause diagnosis in the cleaner production (CP) assessment, opportunities for improvement were identified in the generation of thermal energy, energy recovery of warm gases liberated by the chimneys of the boilers and combustion process in boilers, which registered efficiencies between 56 - 82 %. Likewise, the presence of leaks in the keys and steam pipelines were detected. In addition, high power consumption was observed due to the leakage of compressed air in the distribution line.

CP Options Implemented

- Optimized the combustion process
- Implemented quality control of fuel
- Maintained cleanliness of the boiler
- Isolated steam pipelines
- Evaluated steam traps and corrected for losses in steam traps to decrease heat losses in the steam distribution line and during condensation
- Optimized the use of electricity by eliminating losses of compressed air during dry cleaning

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Optimized the combustion process	1,000	Reduced fuel consumption by 28,800 gal/yr Reduced gas emission of effect conservatory (GEI) and polluting gases of the atmosphere (GCA) Increased boiler efficiency by 16.5, 7.8 and 33.5% Reduced CO_2 emissions by 850 tons/yr	27,400	3 months
Implemented quality control of fuel				
Maintained cleanliness of boilers				
Isolated steam pipelines, evaluated steam traps and corrected losses in steam traps	11,000			5 months
TOTALS	12,000		27,400	

Before CP After CP

Reduction of heat losses in pipelines (comparison of temperatures in °C)

Company Profile

Textile Factory 2, founded in 1947, produces base of printing, flat, veils, etc. It caters both to the national and international market. The company has two industrial plants in the industrial zone of Callao, the staple fiber plant and the plant of texturizer. The plant operates 7 days a week in two shifts.

Agency Involved

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Integrated Program on Cleaner Production Technologies
Industrial Technology Development Institute

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ITDI-DOST

Asia-Pacific Economic Cooperation

PostCP

PHILIPPINES
Food Processing Industry

Technology changes at a pastel bread making facility in the Philippines

In **PostCP**

- CP Options Implemented
- Economic and Environmental Benefits
- Company Profile
- Agencies Involved

VjANDEP (Pastel of Camiguin) Bakeshop is faced with various environmental concerns before cleaner production (CP) was introduced to them. First, the company consumes a considerable amount of water due to its washing activities. The wastewater the company produces also contains a mixture of margarine, butter, flour mixtures and detergents, resulting in the wastewater's high pollution load. Prior to CP, the company also did not produce uniform sizes of pastel. Finally, the management wanted to find more recycling opportunities for the company's waste eggshells, egg yolks and tin cans. To address these issues, the CP assessment focused on increasing the company's productivity and recycling its solid waste.

CP Options Implemented

- Mechanized material preparation and baking
- Modified design of oven
- Renovated the plant building and layout to increase productivity
- Shifted from aluminum to stainless steel cans for cooking to reduce cooking time
- Used double yolk eggs instead of large ones with single yolks
- Scraped containers prior to washing to reduce water consumption
- Segregated eggshell and egg white wastes to allow for recycling
- Improved operating practices to avoid product contamination
- Converted egg whites into other products
- Passed eggshell waste and waste milk cans to other manufacturers for reuse

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$	Payback Period
Improved operating practices	-	Reduced water consumption by 350 m^3/year	113	-
Technology changes	27,800	Increased productivity	25,750	2.5 years
		Reduced raw material usage by 20% Recovered 20% of waste oil Reduced man-hours	10,750	
Recycling	-	Reduced solid waste generation Converted waste to other products	160	-
Raw material change	-	Reduced raw material usage by 40%	13,400	-
TOTALS	27,800		50,173	

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Company Profile

VjANDEP (Pastel of Camiguin) Bakeshop produces cakes, breads and other pastry products. Its specialty product is pastel, a bread delicacy with a variety of fillings such as yema, ube and langka.

The baking facility in Mambajao, Camiguin maintains an 8-hours per day, 7-days per week production schedule. It currently employs 28 workers and produces around 200 boxes per day of yema pastel (1dozen/box) during lean months (June-July). Peak seasons are during Christmas, Holy Week and summer months. At present, the company markets its products through stores in Camiguin and in Cagayan de Oro City.

Contact information
Vjandep (Pastel of Camiguin) Bakeshop
Mambajao, Camiguin
Tel. No: 063-088-387-0049

Agency Involved

The Integrated Program on Cleaner Production Technologies (IPCT) is one of the flagship programs of the Department of Science and Technology of the Philippines that aims to promote sustainable development and strengthen the competitiveness of Philippine industries through the adoption of cleaner production technologies.

IPCT conducts CP audits and recommends eco-efficient practices and technologies for the industry sector and the general public; undertakes policy research, technology assessment, feasibility and technical studies; enhances technological capabilities through manpower training, infrastructure and institution building; and develops and maintains an information system on evaluated environmental technologies and CP success stories.

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ITDI-DOST

Changing raw material specifications at a food canning plant in the Philippines

Keeping a good public image is important for Moondish as it caters to both the local and international market. This motivated the company to seek assistance on cleaner production. More than just enhancing its image, Moondish, through these initiatives, greatly reduced its environmental impacts and incurred major savings.

Moondish had been a volunteer facility for the mock assessment of a Cleaner Production Assessment Training conducted by the Integrated Program on Cleaner Production Technologies (IPCT). A full facility assessment successfully reduced manufacturing and treatment costs by reducing wastewater and solid waste.

Economic and Environmental Benefits

Conditions Before CP	Implemented CP OPtions	Environmental Benefits	CAPITAL, us$	Economic Benefits, US$/yr	Payback Period
Suppliers provided MoonDish with taro leaves with stalks. Because MoonDish needed only the leaves, the company still had to cut the stalks.	Suppliers provide MoonDish with taro leaves without the stalks.	Reduced fuel used for material pick up by 5,336 L/yr	-	2,000	-
		Used 65% less taro in production	-	3,210	-
		Saved 15,100 hours of workers' time	-	7,100	-
		Reduced disposal cost by 75%	-	1,020	-
Suppliers delivered taro leaves packed in large bundles, resulting in yellowing of leaves in inner parts of bundles.	Suppliers now deliver taro leaves packaged loosely in baskets.	Reduced rejects from 2.5% to 0	-	1,670	-
		Increased productivity	-	17,680	-
Wastewater from retorting goes directly to the drain. The company did not have standard methods for vegetable washing and floor sanitation.	Company collects wastewater from retorting for floor cleaning, and standardized water for vegetable washing and floor sanitation	Reduced overall water consumption by 8,400 cum/yr	-	5,180	-
		Reduced wastewater generation by 8,400 cum/yr	-		
Parts of steam pipe insulation worn out	Replaced insulation	Reduced fuel consumption by 25,920 L/yr	2	12,000	1 year
Boiler consumed too much fuel and often broke down	Company acquired a more efficient boiler		13,180		
TOTALS			700,120	2,720,840	

In **PostCP**

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- Agencies Involved

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Company Profile

MoonDish, Inc., the first company to adopt the canned *laing* (taro leaves in coconut cream) technology developed by the Food and Nutrition Research Institute of DOST, started producing canned *laing* at a leased space from ITDI. By participating in various product exhibits, it was able to successfully promote its product and started getting more orders for export. To cope with the increase in demand, it established its own canning plant at FTI Complex, Taguig, Metro Manila and started operations in December 2001. Since then, MoonDish has diversified to other canned vegetable products. Along with canned *laing*, the company now sells *bicol express* (green chili pepper in coconut cream), *camansi* (breadnut fruit) and *puso ng saging* (banana heart) to the local market, as well as to the Middle East, Canada, Guam, Chinese Taipei and the United States. The facility currently employs more than 50 workers and has the capacity to produce 12,000 cans per day.

Contact information
Food Terminal Incorporated (FTI) Complex
Taguig, Metro Manila
Tel. No: 0632-838-4301 local 3849

Agency Involved

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ITDI-DOST

Asia-Pacific Economic Cooperation

PostCP

UNITED STATES OF AMERICA
Metal and Allied Industry

Optimizing production of truck and tractor-trailer brakes in USA

In **PostCP**

Midland Brake Company is a manufacturer of brakes and brake components for large trucks and tractor-trailers. Since 1990, Midland Brake Company has taken steps to recycle paper and cutting oil, substitute water-based cleaners for solvent cleaners, and improve finish and coating processes. Midland was interested in preventing pollution in its production process while boosting profitability.

Personnel welfare and environmental protection had been the major driving forces in Midland's cleaner production program. Company executives attribute Midland's success in protecting the environment to management commitment, employee involvement, and a staff member who is an advocate of pollution prevention.

CP Options Implemented

- Upgraded equipment used
- Routinely tightened cutting machine seals
- Routinely clumped sumps and removed chips where bacteria may grow
- Switched from petroleum-based solvent to water-based detergent after installationof heated parts washers
- Improved chromate-coating operations by cutting immersion time and increasing drain time
- Switched from manual to automated powder coating
- Switched from xylene-based ink stripping for stroke indications on push rods to a tape applicator

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$	Payback Period
Used water-based detergent with heated parts washers; subsequent separation of oil from wastewater	1,200	Oil is recycled and water is treated	2,500	< 6 months
Lowered the rate of water flow in the rinse tanks, cut immersion time, and increased drainage time in the chromate coating process	-	Reduced water usage Reduced chemical carry over Reduced nitric acid consumption by 121,000 lbs (58% reduction) between 1990 and 1994 Reduced hazardous cake waste by 35%	35,000	-
Switched from manual to automatic powder coating	100,000	Eliminated air or liquid wastes		< 2 years
Recycled powder in powder coating application	-	Powder no longer adheres to parts and is disposed of as a non-hazardous material		-
Switched to tape applicator for stripping stroke indicators on push rods	-	Eliminated xylene emissions Avoided the hazardous material requirements and air permitting requirements associated with using xylene		-
Upgraded equipment, tightened cutting machine seals to prevent tramp oil leaks, routinely cleaned sumps, and removed chips from machining parts		Extended the life of cutting fluids		
All measures from 1990-1994	101,200	Reduced oil waste stream by 73%; saved 27,000 gallons of oil	66,000	

Source: Kansas Small Business Environmental Assistance Program, Lawrence, Kansas

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Other Benefits

- Cost savings from switching to water-based fluids funded a new job, providing preventive maintenance on the cutting machines.
- Pollution prevention has been good for Midland's image
- Operators of the powder-coating machine no longer need respiratory protection

Company Profile

Midland Brake Company in Iowa, Kansas, is a manufacturer of brakes and brake components for large trucks and tractor-trailers, with gross sales of more than $85 million a year. In 1995, the Kansas Pollution Prevention Awards committee recognized Midland as a "Trendsetter" company.

Agency Involved

The Small Business Environmental Assistance Program (SBEAP) aims to help small businesses in Kansas to comply with environmental regulations and identify pollution prevention opportunities. SBEAP is funded through a contract with the Kansas Department of Health and Environment.

Contact Information:
Pollution Prevention Institute
Kansas State University
133 Ward Hall
Manhattan, KS 66506-2508
Tel. No: 1-800-578-8898
E-mail: *sbeap@ksu.edu*
http://www.sbeap.org

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In **PostCP**

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Eliminating CFCs and VOCs from an automotive air conditioning and condenser plant in USA

Even though the RMF plant complied with the requirements of the Montreal Protocol and the Clean Air Act two years prior to the scheduled timetables, the plant saw added economic incentives in reducing their use of chlorofluorocarbons (CFCs) and volatile organic compounds (VOCs). Total elimination of the use of CFCs from the vapor degreasing process and elimination of VOCs from the wash process were RMF Plant's goals. ITT, a fabricator of automotive parts for air conditioning and condenser units, provided the capital support for the plant's effort by funding more than US$ 220,000 of aqueous wash equipment and more than US$ 400,000 for improved braze equipment processes. The RFM plant purchasing and engineering departments works with the suppliers to produce pre-cleaned raw material, brazeable and evaporative oils.

CP Options Implemented

- Eliminated the use if 1,1,1-thrichloroethane, replacing it withan aqueous wash system using environmentally soap
- Eliminated acid wash lines by changing to flame brazing technology as a replace ment for the salt bath brazing

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$	Payback Period
Replaced 1,1,1-tricholoroethane with aqueous wash system and environmentally friendly soap	1,099,810	Eliminated release of over 700,000 lbs of chloroethane emission	645,649	1.7 years
Replaced salt bath brazing with flame brazing technology		Eliminated over 500 tons of waste water		

Other Benefits

Employees are no longer subjected to hazardous chemicals and hazardous waste in their working environment.

Company Profile

ITT Automotive-Fluid Handling System employs 162 employees at their plant in the Town of Gates. Using purchased aluminum tubing, ITT fabricates parts for automotive air condition and condenser units. General Motors is the primary customer, with most shipments going to the Delphi thermal plant in Lockport, New York. ITT also supplies GM plants in France and Canada as well as Ford and Saturn.

Agency Involved

The Pollution Prevention Unit is a non-regulatory program within the New York State Department of Environmental Conservation. The program provides outreach and technical assistance to businesses throughout the New York State that would like to improve their environmental compliance by reducing or avoiding the generation of waste. This Unit also develops, implements and monitors programs that promote pollution prevention, comprehensive environmental management systems and incentive programs.

Contact Information:
Pollution Prevention Unit
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-1750
Tel. No: (518) 402-9469
www.dec.state.ny.us/website/ppu

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Reduction of electricity consumption in seafood processing in Vietnam

Ben Tre Forestry and Aquaproduct Import-Export Company (FAQUIMEX) is a state-owned seafood processing company. FAQUIMEX has made every effort to meet the strict requirements of its customers, which are mainly from the European and American markets.

Before cleaner production, the company consumes high amounts of electricity and water. Consequently, there is high production cost, significant carbon dioxide (CO_2) emission into the atmosphere and high volume of contaminated wastewater. The effluent badly affected the surroundings, therefore, the company faced complaints from neighboring residents. The exploitation of groundwater for company's use has also reduced the groundwater level in the area.

Participating in the CP assessment program for the seafood processing industry organized by the Seafood Export and Quality Improvement Program (SEAQIP), the CP team of the company was established. With technical and financial support from SEAQIP, the team put into operation a monitoring system and identified a number of CP options. The company's CP program aimed to reduce electricity and water consumption.

In 2003 - 2004, in addition to simple CP options, FAQUIMEX company implemented the several technology-related options with total investment of US$ 35,222 and annual economic benefits of US$ 66,411 based on full load operation.

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Optimized the compressor system of freezers	6,038	Reduced electricity consumption by 537,500kWh/yr Reduced CO_2 emission by 487 ton/yr	34,775	2 months
Optimized the compressor system of cold store and flake ice machine	9,057	Reduced electricity consumption by 162,000kWh/yr Reduced CO_2 emission by 116.64 tons/yr	10,384	10.5 months
Recycled circulated chilled water	8,051	Reduced electricity consumption by 220,000kWh/yr Reduced CO_2 emission by 158.4 tons/yr Reduced water consumption from 8 m^3/hr to 0.5 m^3/hr Reduced time for cooling steamed shrimp	14,102	7 months
Used the inverter for condenser's fan	9,057	Reduced electricity consumption by 93,240kWh/yr Reduced CO_2 emission by 67.1 tons/yr	5,977	18 months
Used the inverter for fan of 2 re-freezers	3,019	Reduced electricity consumption by 18,300kWh/yr Reduced CO_2 emission by 13.2 tons/yr	1,173	31 months
TOTALS	35,222		66,411	

Company Profile

Ben Tre Forestry and Aquaproduct Import-Export Company manufactures frozen black-tiger shrimp, pangasius fish fillet and oyster, which are exported to Europe and the United States of America. The company specializes in offshore, shrimp breeding, farming, processing and exporting of frozen seafood. The company consists of the following subsidiaries: shrimp hatchery farm with more than 500 hatching tanks; intensive black-tiger shrimp farm with 69 ponds, which was certified by the Aquaculture Certification Council (ACC) in October 2005; pangasius fish farm with a capacity of 10,000 ton per year; Ba Lai aqua-product processing plant with a capacity of 6,000 ton of product per year and offshore fishing fleet with 17 offshore fishing vessels (380CV each).

Contact information

Ben Tre Forestry and Aquaproduct Import-Export Company (FAQUIMEX)
71 National Road 60, Chau Thanh District
Ben Tre Province, Vietnam
Tel: 84-75-860 265
Fax: 84-211-860 346
Email: aquatex@hcm.vnn.vn
http://www.faquimex.com

Agency Involved

From 2000 to 2005, the Danish development assistance has funded a Fisheries Sector Program to support the Ministry of Fisheries. Cleaner Production was an integral part of one of the five components of the program: the Seafood Export and Quality Improvement Program (SEAQIP). The immediate objective of SEAQIP was to increase the export earnings of the seafood processing industry based on environmentally sound practices.

Technical services on cleaner production in the form of training and consultancy were carried out in 21 seafood companies from 2001-2005. Trainees by the Vietnam Cleaner Production Centre were invited to serve as CP service provider.

Contact information

Vietnam Cleaner Production Center
4th Floor, C10 Bldg., Hanoi University of Technology
1 Dai Co Viet Road
Hanoi, Vietnam
Tel. No. (84-4) 868-4849
http://www.un.org.vn/vncpc

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Asia-Pacific Economic Cooperation

PostCP

VIETNAM
Metal and Allied Industry

In **PostCP**

- CP Options Implemented
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- Agencies Involved

Production cost reduction at a metal finishing company in Vietnam

Having learnt about cleaner production (CP), the Xuan Hoa Company, a metal finishing facility, participated in a CP Program in 2003 with the goals of minimizing the usage of main input consumption, i.e., water, electricity, fuel, gas and chemicals.

Four modules of implementation were carried out with a combination of in-class training and in-company consultancy, ie. the company sent staff members to participate in the three to four day in-class training and brought the knowledge they acquired in their own company with the facilitation and instruction of the Vietnam Cleaner Production Centre's experts. During the period of program of 2003-2004, the company identified 49 options, of which 45 had been implemented.

Recovery and reuse of cooling water

CP Options Implemented

- Replaced overflow rinsing by reverse rinsing
- Installed additional recovering tanks
- Redesigned the rack system
- Extended the length of the drying chamber
- Recovered/reused the cooling water and condensate
- Modified the racks of workpieces for more effective dripping

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
All measures implemented	13,400	Reduced water consumption by 200,000 m^3/yr	40,000	4 months
		Reduced electricity consumption by 1.2 M kWh/yr		
		Reduced fuel oil consumption by 150,000 L/yr		
		Reduced gas consumption by 100,000 m^3/yr		
		Reduced raw material consumption by 3.3%		
		Reduced chemical consumption by 5%		
		Reduced CO_2 emission by 909,000 tons /yr		

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Company Profile

Xuan Hoa Company is a state-owned enterprise that was established in 1980 in Vinh Phuc Province of Vietnam. The company specializes in the production of various types of tables, chairs, and interior equipment for offices and households. With 930 employees, the company is receiving both ISO 9001 and ISO 14001. Besides the domestic market, the company is within IKEA's supply chain and exports about 50% of its products to European, Japanese and Korean markets. The company's overall capacity is 58,000,000 square decimeter (dm^2) (Cr-Ni, Zn and electro powder coating).

Contact information

Xuan Hoa Company
Xuan Hoa Township, Me Linh District
Vinh Phuc Province, Vietnam
Tel No: (84-211) 863042
Fax No: (84-211) 863019
Email: *xuanhoa@hn.vnn.vn*
http://www.xuanhoa.com

Agency Involved

The Viet Nam Cleaner Production Centre implemented the Program on "Cleaner Production in Metal Fabricating and Finishing Industry" during the period of 2003-2004. The program aims to provide training and demonstration of CP implementation in Metal Fabricating-Finishing Industry. Joining this program were four metal finishing companies in North, Middle and South of Vietnam. Through in-class and on-the-job training cum consultancy, the centre expected that after the training and in-plant demonstration, participants are capable of conducting CP in companies of metal finishing industry and expand CP implementation in the industry.

Contact information

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4th Floor, C10 Bldg.
Hanoi University of Technology
1 Dai Co Viet Road
Hanoi, Vietnam
Tel. No. (84-4) 868-4849
http://www.un.org.vn/vncpc

"Thanks to cleaner production program, the results of surveillance audit this year is very positive - we are certified to continue the ISO 14001 certificate without any non-conformance"

"After the intensive training, we are now well understood what CP is and very happy to apply this approach in our company. The efforts were well paid in the end of the year"

- Ms. Dang Thanh Thuy
Chief of Administration
Xuan Hoa Company

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Energy savings at a paper company in Vietnam

During the start of the GERIAP Project, the company has just expanded its production and installed a new production line with a capacity of 26,000 tons/year. The total output of the Viet Tri (two production lines) is around 41,000 tons of paper/year whereas the output of the old production line is 15,000 tons annually. The products of the company, including printing paper, writing paper, toilet paper and wrapping paper, are well sold in the market.

The company decided to participate in the project because the energy saving activities were seen as a means to save money. High energy costs had been a burning issue for the management because energy costs are mainly related to turnover. During the implementation, the company followed the United Nations Environmental

Economic and Environmental Benefits

CP Options	Capital, US$	Environmental Benefits	Economic Benefits, US$/yr	Payback Period
Installed a Variable Speed Drive to control motor speed of paper machines	95,240	Reduced GHG emissions by 836 tons/yr	76,190	15 months
Recovered condensate from paper machines 1, 2 and 6	3,175	Reduction of GHG emissions by 693 tons/yr	6,348	4 months
Insulated steam pipelines	2,540	Reduction of GHG emissions by 602 tons/yr	5,524	6 months
Used better quality coals (dust coal 4a instead of dust coal 5a) and strictly controlled quality of input coals.	Negligible	Increased boiler efficiency Reduced GHG emission	Calculated in overall benefits	
Fixed steam leaks in steam pipelines	83	Reduction of heat loss, thus reduction of GHG	Calculated in overall benefits	
Repaired leaks and maintained steam traps	635	Reduction of heat loss in distribution lines	Calculated in overall benefits	
Installed economizers on boilers	4,762	Reduction of energy for heating up feed water	8,750	7 months
Constructed a coal storage to reduce the moisture in coal from 15% to 10%	6,349	Reduction of GHG emissions by 148 tons/yr	1,375	4.6 years
All measures implemented	112,784		123,390	

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