

ENTERPRISE BENEFITS FROM RESOURCE EFFICIENT AND CLEANER PRODUCTION

SUCCESSSES FROM SRI LANKA

Taking care of materials, energy, water, waste and emissions makes good business sense. Resource Efficient and Cleaner Production (RECP) is the way to achieve this. RECP covers the application of preventive management strategies that increase the productive use of natural resources, minimize generation of waste and emissions, and foster safe and responsible production. Benefits are eminent in many enterprises, regardless of sector, location or size, as demonstrated by the experiences of Heritage Kandalama Hotel and Rathkerewwa Desiccated Coconut Industry in Sri Lanka.

Successes at a glance

The Sri Lankan enterprises covered here demonstrate that it makes good business sense to improve resource productivity and reduce pollution intensity.

Rathkerewwa Desiccated Coconut Industry saved USD 50,000 during the initial phases of the RECP programme and, after the implementation of all the options identified; the savings were in excess of USD 200,000 for an investment of less than USD 5,000. RECP enabled the company to simultaneously decrease waste quantities and reduce the amount of greenhouse gas emissions to almost zero through the utilization of waste for energy.

RECP has provided Heritage Kandalama Hotel with a comprehensive strategy to improve environmental performance and gain the support of the local community and acknowledgement from local and national authorities. Today the hotel is recognized as a model for sustainable tourism, which attracts an increasing flow of visitors.

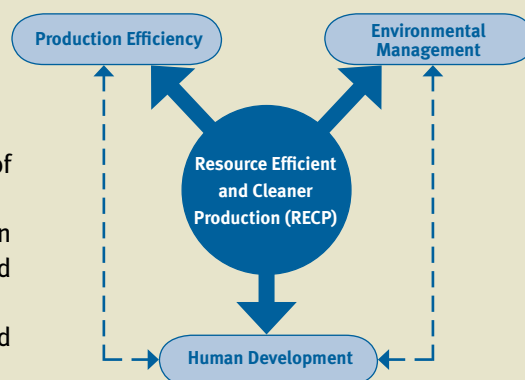
These successes were achieved with the assistance of the Sri Lanka National Cleaner Production Centre, which is part of the global RECP Network established with support of the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP).

Resource Efficient and Cleaner Production (RECP)

RECP builds upon Cleaner Production and related practices to accelerate the application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses the three sustainability dimensions *individually and synergistically*:

- **Production Efficiency**: optimization of the productive use of natural resources (materials, energy and water);
- **Environmental management**: minimization of impacts on environment and nature through reduction of wastes and emissions; and
- **Human Development**: minimization of risks to people and communities and support for their development.



RATHKEREWVA DESICCATED COCONUT INDUSTRY

Overview

Rathkerewva Desiccated Coconut Industry was built in 1966 as a one of the first desiccated coconut mills in Sri Lanka. The factory is situated at Maspotha, 105 km from Colombo, in North Western Province of Sri Lanka within the Coconut Triangle.

Resource Efficient and Cleaner Production (RECP) has helped Rathkerewva Desiccated Coconut Industry to improve their raw material utilization efficiency and reduced the discharge of waste water. The options improved their environmental performance beyond compliance. In addition to the above benefits, the company recovered most of the oil previously discharged with waste water thereby reducing the total pollution load.

Benefits

Rathkerewva Desiccated Coconut Industry has applied RECP practices during last few years mainly to improve raw material consumption, water consumption and energy consumption. Reducing the water usage has been immensely helpful for the factory to enhance their environmental performance. After applying the RECP practices, they have reduced raw material use by 390 tons per year and reduced water use by 5,400 kl per year. The company has also implemented a range of energy efficiency measures and replaced the fossil fuel by waste coconut shells pieces leading to significant reductions in greenhouse gas emissions.

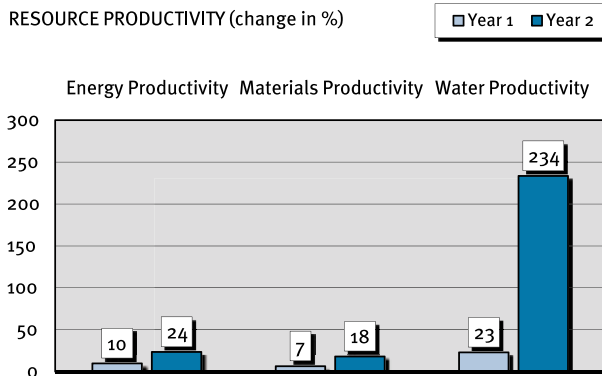
TABLE 1: RESULTS AT A GLANCE

Absolute Indicator	Change (%) year 1	Change (%) year 2	Relative Indicator	Change (%) year 1	Change (%) year 2
Resource use			Resource productivity		
Energy use	-8	-12	Energy productivity	10	23
Materials use	-5	-8	Materials productivity	7	18
Water use	-18	-68	Water productivity	23	234
Pollution generated			Pollution intensity		
Air emissions (global warming, CO ₂ eq.)	-8	-89	Carbon intensity	-9	-90
Waste-water	-15	-63	Waste-water intensity	-16	-66
Waste	-9	-76	Waste intensity	-10	-78
Production output	1	8			

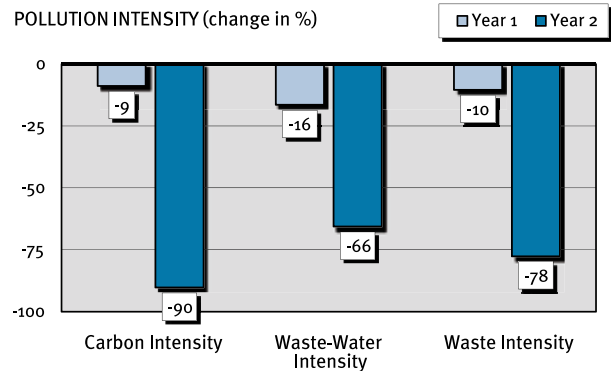
Note: The *absolute indicators* provide a measurement of how much resource use/pollution output has changed in absolute terms e.g. units of energy used or tons of waste generated. A negative percentage indicates a decrease and a positive percentage indicates an increase. The *relative indicators* provide a measurement of changes in resource use/pollution in relation to production output. *Resource productivity* provides a measurement of how much product output can be produced per unit of resource use, from a sustainability perspective, productivity should increase. *Pollution intensity* provides a measurement of how much pollution is generated per unit of production output, from a sustainability perspective, intensity should decrease.

RATHKEREWVA DESICCATED COCONUT INDUSTRY RECP Profile

RESOURCE PRODUCTIVITY (change in %)



POLLUTION INTENSITY (change in %)



Note: The RECP profile provides a visual overview of resource productivity and pollution intensity shown as change in % compared to the baseline values. Environmental performance is improved when resource productivity increases and when pollution intensity decreases. Year 1 measurements were made after the implementation of low and no cost options, while Year 2 measurements were made in 2008, after the implementation of further options including measures that required investments.

Areas of improvement

Major issues faced by the company were related with raw material and water consumption.

A considerable amount of nuts were rejected daily due to mishandling when loading to trucks at the collection points and when unloading at the mill premises. The damage due to unloading was reduced by re-laying rubber carpets on cemented floor. This measure saved the mill USD 11,750.

To reduce the wastage at paring stage (removing the brown outer peel of kernel) the wastage was quantified first and the peelers were made aware of the value involved. This measure gave the highest financial benefit with savings in the range of USD 94,500.

Water was used heavily in the factory for the cleaning purposes. Water was purchased from outside in tankers. Taking steps to control water use in operations and cleaning in the mill resulted in the reduction of water usage by almost 70% corresponding to savings in the range of 5,400 kl per year. The reduction of wash water drastically reduced the pollution load of the treatment system (by 42%) and saved USD 6,600.

The recovery of oil from the coconut water accumulated in the waste water pits brought an additional income of USD 49,500 to the company. The fuel switching in the boiler from furnace oil to coconut shell saved USD 165,000 and reduced CO₂ emissions by almost 900 tons. Material use was decreased by 390 tons and waste was decreased by almost 400 tons.



Hand paring process (waste reduced from 53 grams per nut to 45 grams per nut)



Reduced water consumption in the white meat cleaning process

TABLE 2: OPTIONS IMPLEMENTED

Principal options implemented	Benefits			
	Economic		Resource use	Pollution generated
	Investment [USD]	Cost-saving [USD/yr]	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Reduction of coconut kernel during peeling	< USD 100	USD 94,500	Waste of coconut kernel reduced by 50% (30 kg per 1000 nuts) and increase in DC output.	Waste generation reduced by 18 tons.
Reduction of water consumption through improved processes and cleaning	< USD 500	USD 6,600	Reduced water consumption by 5,400 kl.	Waste water volume reduced by 50%.
Recovery of oil from coconut water in wastewater pits	USD 2,200	USD 49,500	Recovered oil which has economic value.	Reduced BOD and oil in waste water.
Switching fuel from fossil fuel to coconut shells	USD 1,450	USD 165,000	Reduced use of fossil fuels and utilization of wasted coconut shell pieces from the DC process.	Reduced GHG emissions by almost 900 tons of CO ₂ equivalent.

Note: In total, waste water was reduced by 5,520 kl per year and waste was reduced by 397 tons per year.

Approach taken

Rathkerewwa DC Industry was a traditional desiccated coconut (DC) mill; which operated at very low efficiency using unskilled employees from the neighbourhood. The company was purchasing water from external sources at a very high cost. Also the company generated high levels of waste of coconut meat which was sent to make copra, a product with low value addition. Upon participation in a CP awareness program the proprietor invited Sri Lanka National Cleaner Production Centre (NCPC) through a regional organization, ISB, to help them to reduce their wastes.

Sri Lanka NCPC conducted a comprehensive audit and held many training sessions for the workers and demonstrated how to use less water in washing and cleaning. The facilitators showed how to recover oil from the coconut water accumulated in waste water pits and showed how to reduce the paring loss to reduce waste.

„I am pleased to endorse the contribution of Cleaner Production to improve our desiccated coconut output and reduce the waste. The reduction in water consumption helped us to save purchase of water and also cut down the necessity for extra waste water treatment and waste water became an income earner for us. I recommend that CP can do wonders to all DC mills“.

Mr Sarath Jayalath- Proprietor, Rathkerewwa DC Industry

Business case

The company saved at least USD 50,000 during the initial phases of the RECP programme and, after the implementation of all the options; the savings were in excess of USD 200,000 for an investment of less than USD 5,000. Today, Sri Lanka NCPC uses Rathkerewwa DC Industry as a model to show the other DC millers in the region how to successfully integrate CP into the desiccated coconut making process.

HERITANCE KANDALAMA HOTEL

Overview

Heritage Kandalama Hotel which was built in 1993 with 152 rooms and other facilities is situated 212 kilometres away from the capital of Colombo within the cultural triangle. Situated on the embankment of the Kandalama reservoir it was considered to be a threat to the fragile environment. Resource Efficient and Cleaner Production (RECP) has helped Kandalama Hotel to improve resource utilization efficiency while enhancing environmental performance. In addition to the financial and environmental gains achieved, the hotel has enhanced its reputation as an environmentally and socially responsible hotel. Today Heritage Kandalama Hotel is recognized as the most eco-friendly hotel in the country and a model for sustainable tourism in the region.

Benefits

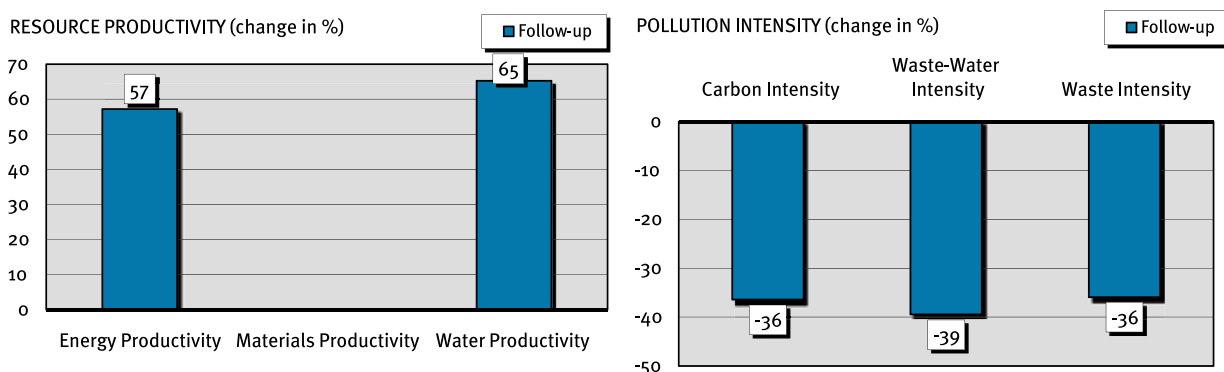
The accommodation market depends on the general tourist influx to the country but after applying sustainable practices, the guest influx to the hotel increased from 41,599 to 65,000 in 2008. The hotel has decreased energy use by 3% and achieved a reduction of water use and waste water by 8%. The hotel segregates wastes into 16 categories and most of the wet biodegradable waste is composted and used in the garden for organically grown vegetables.

TABLE 1: RESULTS AT A GLANCE

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource use		Resource productivity	
Energy use	-3	Energy productivity	57
Materials use	0	Materials productivity	0
Water use	-8	Water productivity	65
Pollution generated		Pollution intensity	
Air emissions (global warming, CO ₂ eq.)	-3	Carbon intensity	-36
Waste-water	-8	Waste-water intensity	-39
Waste	-3	Waste intensity	-36
Production output	52		

Note: The *absolute indicators* provide a measurement of how much resource use/pollution output has changed in absolute terms e.g. units of energy used or tons of waste generated. A negative percentage indicates a decrease and a positive percentage indicates an increase. The *relative indicators* provide a measurement of changes in resource use/pollution in relation to production output. *Resource productivity* provides a measurement of how much product output can be produced per unit of resource use, from a sustainability perspective, productivity should increase. *Pollution intensity* provides a measurement of how much pollution is generated per unit of production output, from a sustainability perspective, intensity should decrease. The baseline measurements were made in 2006, year 1 measurements were made in 2008.

Kandalama Hotel RECP Profile



Note: The RECP profile provides a visual overview of resource productivity and pollution intensity shown as change in % compared to the baseline values. Environmental performance is improved when resource productivity increases and when pollution intensity decreases.

Areas of improvement

The major issue faced by Kandalama Hotel was the release of waste water to the nearby Kandalama reservoir. The disposal of solid wastes also was considered to be a threat to the water quality of the reservoir. Therefore, priority was placed on reducing water consumption in the kitchen, laundry and rooms; reuse/recycling waste water and reducing solid wastes and streamlining the waste management system. The hotel also took a management decision to reduce their carbon footprint through improving energy efficiency and through offsetting.

The hotel reduced water use by operating dish washers at full capacity, operating the laundry machine at full capacity and reducing water quantity, introducing a dish washer to the employees' kitchen, training of employees and attending to housekeeping. The hotel also improved the quality of waste water by segregating and adding an extra filter. The water is recycled for urinals and irrigation.

The hotel segregates solid wastes to 16 different categories and bio degradable waste is now composted. The hotel intends to generate biogas in 2010 to use in the employee kitchen. Most of the containers and packaging are now being reused or returned to suppliers; in addition, some wastes are being given out to micro industries in the villages.

All lamps are replaced with compact fluorescent lamps (CFLs). The chiller water temperature is controlled and the steam flow to the laundry is scheduled. The washrooms are fitted with motion detectors. The hotel has acquired and maintains a forest area of 80 hectares to offset their carbon footprint.

TABLE 2: OPTIONS IMPLEMENTED

Principal options implemented	Benefits	
	Resource use	Pollution generated
	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Water - Operating equipment at full capacity, investing in new equipment, segregation of waste water flows and installing new filter. Reuse of water.	Reduction of water use by almost 6,500 m ³ .	Waste water was reduced by more than 6,100 m ³ .
Energy and carbon dioxide emissions - Replaced light bulbs, control of chiller water temperature, controlled steam flow. Purchase of forest (80 ha) to offset carbon footprint.	Reduction in energy use by more than 551,000 MJ.	CO ₂ emissions were reduced by almost 31 tons.
Waste - segregation of waste into 16 categories, composting organic waste, reuse or return of packaging. Some wastes given to micro industries.		Waste was reduced by 6 tons.

Note: The hotel has since 2008 invested in a new biomass plant to reduce the use of fossil fuels, the fuel switch has led to additional CO₂ emission savings of 500 tons per year.



Scenic view of Kandalama hotel with rich biodiversity



Elephant dung incorporated in the paper recycling plant

Approach taken

The hotel is situated on the embankment of Kandalama Reservoir which is the only source of water for many villages for their domestic and irrigation uses. The villagers and other pressure groups were originally opposed to the hotel due to concerns of pollution of water and other environmental impacts. Therefore, the hotel needed a comprehensive strategy ensure the cooperation of villages and other pressure groups. The idea was to gain the support of the community by proving that the hotel does not harm the environment while at the time gaining economic benefits from improved resource efficiency. The vision of the hotel was to be a truly eco-friendly organization having sustainable practices.

In order to address this situation, the hotel selected to utilize a Cleaner Production (CP) approach and requested assistance from the National Centre of Cleaner Production (NCPC). A group of employees were trained in CP and a comprehensive assessment was carried out to identify areas of improvement. In addition to the economic gains and improved environmental performance that was achieved through the application of CP, the hotel has strengthened collaboration with nearby villages and pressure groups through their Corporate Social Responsibility (CSR) activities. The hotel has invested its own funds to provide access to electricity to over 750 families, access to safe drinking water to over 600 families and built 6.5 km of road access to the village for common public use. This led to significant improvements in access to basic services and has boosted economic activity in the village. The conservation and recycling processes of the hotel are also designed to assist the social and economic growth of the villagers who live close to the hotel. The hotel supports local development through the procurement of a range of services and products for the resort from local businesses.

The hotel has developed and implemented a system for monthly monitoring the carbon footprint of the hotel and carbon emitted by the guests per guest night. Targets are set, monitoring is conducted regularly and performance is reviewed monthly for continuous improvement. The hotel keeps checklists, monitoring results and records are maintained and audited through internal audits in accordance with the environmental management system, which has been certified for ISO 14001 and Earth Check Silver certification. The purification processes of the waste water recycling plant are regularly checked by scientists from the University of Peradeniya, to ensure compliance with the highest possible standards.

„The motive, objective and the target for Heritance Kandalama hotel from the concept, design, planning, construction to operations and maintenance was to be sustainable. Cleaner Production and Corporate Social Responsibility were two very useful mechanisms to achieve these aspirations and remain green for the past 15 years with total stakeholder acceptance“.

Ravi de Silva- Environmental Consultant- Aitken Spence Group of Hotels Ltd.

Business case

Today Heritance Kandalama Hotel is recognized as a model for sustainable tourism, winning many local and international awards including the National Cleaner Production Award in 2009. As a result of its environmental performance, the hotel has also gained ISO 14001, ISO 22000 and Green Globe certification. Heritance Kandalama has joined the Greening Sri Lanka Hotels programme coordinated by the Ministry of Tourism (MoT), Sri Lanka Sustainable Energy Authority (SLSEA) and the Responsible Tourism Partnership (RTP) to learn new methodologies and share best practices in optimizing energy efficiency and natural resources sustainability actions with Sri Lanka's Hotel industry. The hotel has received a certificate from the Ministers of Environment, Tourism and Energy for 'Exceptional Contribution to Environment Conservation demonstrating continued efforts in Optimising Energy Efficiency and Natural Resources Sustainability in Sri Lanka hotels industry in 2010'. The hotel has also entered a partnership to validate its carbon emission reduction so that it can offer a carbon neutral holiday for guests. Furthermore, guests and staff are actively encouraged to participate in energy, water and waste reduction measures.

ABOUT THESE SUCCESS STORIES

The United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP) cooperate in their joint Resource Efficient and Cleaner Production (RECP) Programme. The RECP Programme aims at improving the resource productivity and environmental performance of businesses and other organizations in developing and transition countries. The Programme is implemented in partnership with a network of National Cleaner Production Centres (NCPCs) that have currently been established in some 50 countries. This series of enterprise success stories documents the resource productivity, environment and other benefits achieved by enterprises in developing and transition countries through the implementation of RECP methods and practices.

The success stories employ the indicator set described in *Enterprise Level Indicators for Resource Productivity and Pollution Intensity. A Primer for Small and Medium Sized Enterprises*, published by UNIDO and UNEP in 2010. The primer with accompanying calculator tool and further case studies are available at www.unido.org/cp and www.unep.fr/scp/cp.

National Cleaner Production Centre Sri Lanka

The National Cleaner Production Centre Sri Lanka was established in 2001. It is an independent centre of expertise reporting to the Ministry of Industry. By mid 2010 the centre had assisted more than 200 enterprises in a variety of sectors to implement cleaner production and contributed to a range of projects including the development of a green supplier programme, cleaner production awards programmes, eco-product promotion, awareness raising, development of guidelines, and training of consultants on ISO 14001 and OHSAS 18000. In addition, the centre provided services to local authorities in the areas of waste water management and integrated solid waste management. The centre also supported projects related to the establishment of waste exchanges, greening supply chains, and chemical leasing (www.ncpcsrilanka.org).

This publication was made possible with the generous support of the State Secretariat for Economic Affairs, Government of Switzerland.



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Telephone: (+43-1) 26026-0, Fax: (+43-1) 26926-69
E-mail: unido@unido.org, Internet: www.unido.org



UNITED NATIONS ENVIRONMENT PROGRAMME
Division of Technology, Industry and Economics
15 rue de Milan, 75441 Paris Cedex 09, France
Telephone: (+33-1) 4437 1450, Fax: (+33-1) 4437 1474
E-mail: unep.tie@unep.fr, Internet: www.unep.fr