

Resource Efficient & Cleaner Production Experiences

'towards achieving sustainable development goals'



Gujarat Cleaner Production Centre

ENVIS Resource Partner on: Cleaner Production & Clean Technology

Supported by: Ministry of Environment, Forest & Climate Change

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Gujarat Cleaner Production Centre (GCPC), 2019

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Foreword



Gujarat Cleaner Production Centre (GCPC) was established in the year 1998, by the Department of Industries and Mines, Government of Gujarat with technical support of United Nations Industrial Development Organization (UNIDO).

GCPC is a regular member of Global Resource Efficient and Cleaner Production Network (RECPnet) of UNIDO. GCPC as a regular member of RECPnet is promoting RECP Concept conducting orientation and awareness programmes, training programmes, conducting RECP Assessment Projects and Dissemination Programmes through its knowledge, experience and expertise.

The centre also provides assistance to overcome financial barriers for successful RECP Implementation in the industries, which industry mostly faces while implementing RECP in their enterprises.

GCPC has compiled success stories of 'Resource Efficient and Cleaner Production' (RECP) implementation in different industrial sectors by various RECPnet members across the globe, with the objective to replicate and disseminate the technologies adopted in the different countries.

This publication may be useful to industries as a reference material for RECP implementation in their respective industries, to improve their environmental and economic performance. It helps in developing approaches towards 'pollution prevention' rather than its control or treatment at the end-of-pipe.

We hope that this will be useful to all concern.

Dr. Bharat Jain
Member Secretary
Gujarat Cleaner Production Centre

TABLE OF CONTENTS

Sr. No.	RECP Experiences
1.	RECP Experiences at Aceros Industriales <i>(Transforming of Cold Ferrous and Non-Ferrous Materials)</i> <i>Centro Nacional de Produccion Mas Limpia</i>
2.	RECP Experiences at Three Quinoa Processing Enterprises <i>(Food Processing Sector)</i> <i>Centre for Promotion of Sustainable Technologies, Bolivia</i>
3.	RECP Experiences at Europe Joint Stock Company <i>(Joint Stock Company)</i> <i>Vietnam Cleaner Production Centre, Vietnam</i>
4.	RECP Experiences at Standard <i>(Furniture Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
5.	RECP Experiences at Srebreničanka <i>(Food Processing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
6.	RECP Experiences at Sarajevska Pivara ltd. <i>(Brewery and Beverage Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
7.	RECP Experiences at Sarajevo International Airport <i>(Resource Conservation & Waste Minimization at International Airport)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
8.	RECP Experiences at Prevent ltd. <i>(Textile and Leather Processing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
9.	RECP Experiences at Menprom ltd. <i>(Meat Processing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
10.	RECP Experiences at Madi <i>(Poultry Meat Processing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
11.	RECP Experiences at Klas d.d. Sarajevo <i>(Food Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
12.	RECP Experiences at ELAS Metal expert <i>(Metal Sheet Processing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>
13.	RECP Experiences at Colorit ltd. <i>(Paints, Varnishes and Acrylic, Mineral and Mineral Polymer Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i>

<p>14.</p>	<p>RECP Experiences at Biser <i>(Food Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i></p>
<p>15.</p>	<p>RECP Experiences at “Izazov” d.o.o. Kalesija <i>(Furniture Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i></p>
<p>16.</p>	<p>RECP Experiences at Atlantic bb <i>(Printing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i></p>
<p>17.</p>	<p>RECP Experiences at Bentoproduct ltd. <i>(Calcium and Sodium Bentonite Manufacturing Sector)</i> <i>National Cleaner Production Centre, Bosnia & Herzegovina</i></p>

RECP Experiences at ACEROS INDUSTRIALES

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Resource Efficient and Cleaner Production (RECP) is a way to achieve this in a holistic and systematic manner. 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 ACEROS INDUSTRIALES in Colombia.

Achievements at a Glance

The company receives steel bars and then they are transformed into coils of different sizes and shapes. Originally the company had a chemical preparation of metals. This process was changed to a mechanical one. Aceros Industriales changed completely the production line, the layout and the basis of the production process with this investment. The impact was reflected in positive changes in environment, economic and social. New production process also reduced the processing times and got better the quality of the product. The competitiveness of the company was clearly potentialized, giving an example of sustainable



BEFORE



NOW

Overview

Aceros Industriales S.A. is a company founded in 1977 and works on transforming in cold ferrous and non-ferrous materials (tefilation). They used, from the beginning of the company, the chemical stripping process, due to the fact that in that time it was the only technology available. As a part of a continuous improvement program Aceros Industriales S.A. makes the decision of getting a world level concerning its technology, by changing its productive system and acquiring equipments for shot blasting and decalamination of brushes, thus eliminating the chemical stripping.

By the mechanical stripping process, a decrease of environmental damage was achieved (diminishing in DQO and mud generation, among others), a better performance of the industrial process, the incorporation of industrial incomes diminished, maintenance

and operation of the shot blasting and decalamination units got easier and an estimated saving rate of 500.000 USD per year was achieved.

After lamination steel (hot deformation) the surface is covered by a crust formed by iron oxides. This calamine impairs the cold deformation process, affecting the surface quality of the material. This is where the material surface cleaning is necessary to remove the calamine.

The cleaning processes available for this are chemical and physical means. In corrosion chemically process it made by using acids (hydrochloric and sulfuric generally), which attack the material forming iron chlorides or sulphides as appropriate, achieving highly results in removing the calamine. Although the quality is pretty good the chemical process has a serious environmental impact caused by these practices, the process requires heating, which leads to emissions of greenhouse gases. In addition large quantities of sludge and hazardous discharges are generated, thus affecting water resources, air and soil. The physical media are the latest in the global industry. With them we reduce the negative environmental impacts without compromising the quality in the process of surface cleaning. Among the physical processes we can mention the blasting and pickling using brushes. The blasting process is a surface treatment technique by impact, is a bombardment of abrasive particles at high speed (65 -110 m / s) to impact the treated part produces the removal of surface contaminants. The brushes used for pickling steel, which, by means of a rotational movement, calamine tears of the material surface, thus achieving a clean surface suitable for cold deformation.

Benefits

The environmental benefits of the change were:

- The effluents were completely eliminated and they stopped in discharging annually over 60 tons of sludge from the company (the company dumped its small unit of wastewater treatment and made a parking lot out of this space).
- The company stopped producing 400 ton/year of CO₂ emissions (the boiler was sold and is no longer used diesel and gas fuel while the new equipment requires more electricity, the net energy and the CO₂ effect remains highly positive).
- The company reduced around 8000 m³ per year in water consumption
- It stopped using hazardous chemical products

Indicator	Before	After	Reduction	% Reduction
Lodos generados (Kg/Ton producida)	0,026	0	0,026	100%
Consumo de agua (m ³ / Ton producida)	0,972	0,45	0,522	54%
Caudal de Agua Residual Industrial (m ³ / Ton Producida)	0,073	0	0,073	100%
Carga de DQO (Kg DQO / Ton Producida)	0,043	0	0,043	100%
Costo preparación superficial / Kg producido	60	50	10	17%
Consumo de ACPM (Gal / Año)	50.400	0	50.400	100%
Emisión de CO ₂ por combustión de ACPM (Kg CO ₂ / mes) ²	20.355	0	20.355	100%
Emisión de CO ₂ por consumo de energía (Kg CO ₂ / mes)	46.235	50.403	-	-
Emisiones Totales de CO ₂ (Kg / mes)	66.590	50.403	16.187	24%
Emisiones de CO ₂ / (Ton Producida)	83,2	63	20	24%

Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*

> Through improved productive use of natural resources by enterprises

- *Environmental management*

> Through minimization of the impact on nature by enterprises

- *Human development*

> Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

New production process also reduced the processing times and got better the quality of the product.

The competitiveness of the company was clearly potentialized, giving an example of sustainable industrial production modes.

Main economic impacts were:

- Improved in product quality.
- An increased productivity due to re-duce in production time
- Reduction in chemical products and fuel consumption.
- Less maintenance of other equipment of the company that were corroded by the acid used in the chemical treatment.
- Improving the quality just is estimated by the company to be worth an additional fee of 5% resulting in additional revenue per year by U\$300.000.
- The productivity was increased significantly, so working capital could be reduced by around 1,5 million dollars.
- In total economic benefits are estimated at approximately 500.000 USD per year, which led to a payback in less than two years.



RECP Experiences



Testimony Box
National Cleaner Production Centre (NCPC)
<p>This project was financed by the Green Credit Line. For more information go to http://www.lineadecreditoambiental.org/lca/en</p> <p>The investment made by the company on the new equipment was 640,000 USD and the company got reimburse of 200,000 USD thanks to the Green Credit Line.</p> <p>The Green Credit Credits has granted since 2003 until middle of 2015 over US\$ 12,433,431 and the total of reimbursement have been around US\$ 3,403,841.</p>
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ABOUT RECP EXPERIENCES

Through the joint Resource Efficient and Cleaner Production (RECP) Programme, the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP) cooperate to improve the resource productivity and environmental performance of businesses and other organizations in developing and transition countries. The Programme is implemented in partnership with the Global Network for Resource Efficient and Cleaner Production (RECPnet). This series of enterprise success stories documents the resource productivity, environmental and other benefits achieved by enterprises in developing and transition countries through the implementation of RECP methods and practices.

These successes were achieved with the assistance of the National Cleaner Production Centres, which are part of RECPnet established with support of the UNIDO and UNEP. The success stories employ the indicator set described in *Enterprise Level Indicators for Resource Productivity and Pollution Intensity*, UNIDO/UNEP, 2010. The primer with accompanying calculator tool and further case studies are available at www.recpnet.org, as well as on www.unido.org/cp and www.unep.fr/scp/cp.

RECP Experiences at three quinoa processing enterprises

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Resource Efficient and Cleaner Production (RECP) is a way to achieve this in a holistic and systematic manner. 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 three quinoa enterprises [IRUPANA, AVSA and ANAPQUI].

Achievements at a Glance

In this case study we analyze the effect of a cleaner production (CP) technological innovation on three quinoa processing companies. In order to establish the context of the study, it has to be said that quinoa is a unique grain in the world because of its excellent nutritional characteristics. It has an important content of high-quality proteins, a perfect balance of amino acids and it does not contain gluten. Due to these characteristics, quinoa is a 'complete' food and in several senses unbeatable, in addition to the fact that it is highly valued by international markets. For all these reasons, quinoa was declared to be the Perfect Food for Humanity by UNESCO.

In spite of the exceptional characteristics of this grain, the world seems to have discovered it only recently, which is why it has been called "the top secret super food". In recent years, world quinoa demand has risen significantly, something which is unprecedented and has been caused by three fundamental reasons which are: (1) the increasing demand for grains with no gluten content (at present 0.4% of the world population have celiac disease¹); (2) the accelerated growth in demand of high-quality organic products together with the increase in the fair trade products market; and (3) food efficiency programs which are being adopted by several countries with the support of the Food and Agriculture Organization of the United Nations (FAO).

Nonetheless, the major machinery and equipment manufacturers of the world did not produce custom technology for quinoa processing activity, and therefore this unique segment remained unattended. This arises from the fact that quinoa production is quite small in comparison to other grains. As a result, there are not many companies in the world dedicated to quinoa processing, and the market for specific technology for this sector is comparatively reduced. It is most likely that the major technology manufacturers of the United States, Europe and Japan were not interested in investing R&D resources in a sector constituted by so few costumers. Logically, they focused their efforts in developing technologies for processing the most widely grown and used grains, such as rice, wheat or soy. In view of that situation, the quinoa processing industries had to use adapted technology originally developed for wheat or rice processing, making use of different production parameters and production scales. The technological adaptation under such conditions caused problems related to processing capacity and efficiency.

Without appropriate production factors, and the lack of a specific combination of them, the quinoa sector had deficiencies in increasing its processing capacity and adding value to the product under competitive conditions. There was, consequently, a huge necessity for better production technology, locally developed, efficient, adequate to the needs and particular characteristics of the sector, and economically accessible to all quinoa-processing companies.

Problems detected in the quinoa sector can be seen in other Bolivian agricultural sectors; for instance, the production and processing of annatto, Brazil nut, tarwi, *cañagua*, sesame and amaranth. All of these products have great potential for growth and insertion into national and international markets. Therefore, we believe that the experience that is reported below is replicable in other Bolivian economic sectors.

¹ Celiac disease is a disorder resulting from an immune system reaction to gluten, a protein found in wheat and related grains, and present in many foods, resulting in diminished nutrient absorption in the body.



Overview

After the CP assessments in quinoa-processing companies, where the characteristics of the technology used were also evaluated, the necessity to embark on the development of new technology became evident. The problems identified in the quinoa-processing companies can be summarized as follows:

- Significant losses of raw material (grain), with the consequent increment in the quantity of residues discharged.
- Low quality of the grain.
- High specific consumptions of water, electrical energy and gas, with the consequent increment in production costs.
- Intensive use of labor force, with the consequent increase in operation costs.
- Wastewater with high contents of saponins, with the consequent pollution of bodies of water.
- Unfeasibility of recovering pure saponin, with the consequent loss of its commercial value.

The main causes of these problems and the respective technological solutions that were proposed are as follows.

a) Use of adapted technology in an inadequate manner for processing quinoa. For instance, the use of rice peelers for the scarification of quinoa. This caused not only product losses, but also a loss of grain quality. To solve the problem, an efficient system of dry cleaning was designed, constructed and implemented. The system used the inherent abrasive properties of quinoa for scarification, through friction between grains. In addition, a system of saponins recovery was installed in order to recuperate this important sub-product that was previously being wasted.

b) Washing systems with a wide range of residence time. Quinoa-processing companies used washers with turbulent flows in order to accelerate the washing process and eliminate the saponin remaining on the grain. When water flow is turbulent, quinoa grains exit the washer randomly; that is, the last grain entering the washer can be the first to come out, or the first one entering can be the last to come out. This produces two negative effects: (i) in the case of a short residence time in the washer, grains come out badly washed and must be re-washed, consequently increasing operation costs; (ii) in contrast, with a long residence time, the grains are excessively moistened as well as increasing their processing time, energy costs for drying, and reducing product quality due to the dissolution of salts, proteins and starches in the washing water. To arrive at the solution for this problem resulted in the design of a washer which accomplishes the simulation of a laminar trajectory of the grain, through the use of a turbulent flow. This guarantees that the first grain entering the washer is the first one exiting. In addition, the system reduced the average time of residence in the washer, from 22 minutes to 4.7 minutes

c) Drying systems with insufficient air flows, which allowed the re-humidification of the grain in a significant percentage. The new drying system design is highly efficient. It employs a turbine which generates a greater air flow with lower energy consumption. The efficiency of the turbine is 76%, almost double that of similar turbines manufactured in other countries.

d) Use of technology that did not allow the recovery of sub-products of high commercial value. For instance, saponin, which has a high economic value in the market. Using older technology, saponin was contaminated with impurities from the quinoa and particles detached from the grain itself. As a result, the price of saponin decreased by 70%. Moreover, in various cases, saponin recovery was not at all possible.

e) Use of technology that operated in small batches (not continuously). For instance, the centrifugation operation was carried out in batches of less than 20 kg and demanded an intensive labor force with exclusive dedication. The new technology operates in a continuous manner and demands few personnel.

f) Excessive, and in some cases, unnecessary number of unit operations in the process, with the consequent use of an excessive number of machines associated with each of the unit operations. For example, after the washed grain drying and centrifugation process, which takes into account a previous destoning system, and in spite of the existence of a prior, initial dry cleaning operation, the grain was cleaned again using various machines including additional destoners, venting machines, an optical colored particles selection system and, finally, a manual impurities selection system carried out by personnel exclusively dedicated to this purpose. The new technology is more efficient in each of the steps in the drying and wetting process; for this reason, there is no need to include additional cleaning unit operations after these processing steps have been concluded.

To solve these problems CPTS developed and implemented a new technology based on Cleaner Production. The technological innovation have had a positive impact on the productivity, it has also resulted in a considerable reduction on the environmental impact and has come concurrently with a convergence process in productivity indicators, as its described in the next section.

Benefits

In order to illustrate the impact of the application of the new technology on productivity, various tests and measures were carried out in three companies which are responsible for 47% of quinoa exports. Seven indicators were used to make it possible the comparison of efficiency levels before and after the implementation of the new technology.

Absolute Indicator	Irupana – La Paz		AVSA – La Paz		ANAPQUI - Oruro		Relative Indicator	Irupana Change (%)	AVSA change (%)	ANAPQU change (%)
	Before	After	Before	After	Before	After				
Resource Use	Before	After	Before	After	Before	After	Resource Productivity			
Electricity use [kWh/year] ¹	114.481	64.452	89.492	42.242	117.222	27.282	Electricity savings	44%	53%	77%
Thermal Energy Use [Mcal/year]	992.325	222.045	334.530	98.280	265.323	170.886	Thermal Energy savings	78%	71%	36%
Water Use [m ³ /year]	25.152	16.997	13.230	5.670	14.540	6.746	Water savings	32%	57%	54%
Raw material use [tons /year]	2.345	2.181	1.029	1.010	1.910	1.662	Raw material savings	7%	2%	13%
Pollution Generated	Before	After	Before	After	Before	After	Pollution Reduction			
Air emissions [tons of CO ₂ equivalent/year]	54	30	42	20	55	13	Emissions reduction	44%	53%	77%
Reduction in discharges of saponin [tons/year]	98,25	-	47,25	-	74,95	-	Reduction in discharges of saponin	100%	100%	100%
Reduction in product losses [tons/year]	318,3	194,5	77,5	60,5	322,3	146,9	Reduction in product losses	39%	22%	54%
Biochemical Oxygen Demand - BOD ₅ ² [tons/year]	152,9	70,0	46,3	21,8	145,3	52,9	Reduction in DBO ₅	54%	53%	64%
Production Output	1.960 tons/year		945 tons/year		1.499 tons/year					

Source: IRUPANA, AVSA, ANAPQUI and CPTS

(1) Calculated based on the emission factor of the grid in the national interconnected system is 0.47 t CO₂e per 1,000 kWh generated.

(2) It is estimated that 1 kg of grain provides 360 g of BOD₅ and 1 kg of saponin powder provides 390 g of BOD₅.

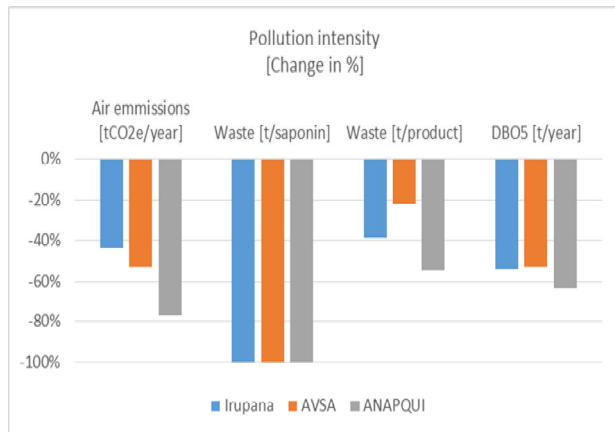
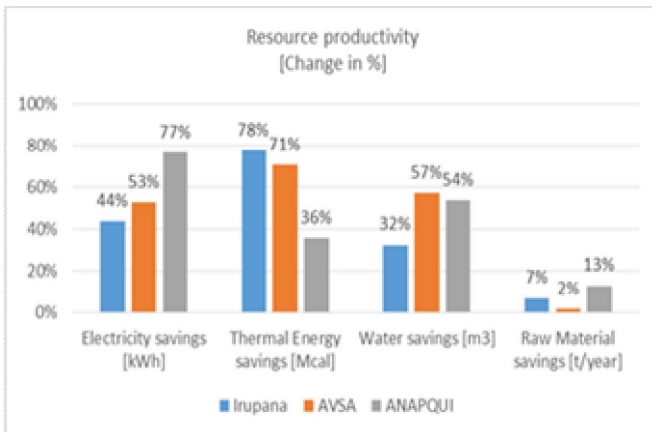
It is worth highlighting that the increase in efficiency evolved simultaneously with a convergence process of the productivity indicators (see Table below). The reasons for such a convergence are: (i) the substitution of batch operations by a continuous process, and (ii) the exhaustive technical training provided to the employees at the time the new technology was installed. This training allowed the “homogenization” of the operations management through procedures using parameters control and the establishment of production protocols. Before, no norms or procedures were followed.

The standard deviation is used as a dispersion measure of the inter-company productivity. With the exception of the water specific consumption indicator, all efficiency indicators show a lower inter-company standard deviation after the implementation of the CP technology. This signifies a greater convergence in the productivity of the sector.

Productivity indicators	Inter-company Standard Deviation before the new technology	Inter-company Standard Deviation After the new technology
Electricity specific consumption [kWh/ ton of processed grain]	14.9	6.3
Water specific consumption [m ³ / ton of processed grain] (*)	1.8	2.1
Thermal energy specific consumption [Mcal/ ton of processed grain]	133.8	5.8
Global yield [tons of processed grain/ ton of raw grain]	0.05	0.02
Labor force use [man-hours/ ton of processed which grain]	51.1	3.75
Capital use [US\$ of machines and equipment/ ton of processed grain]	103.7	64.8

(*) The increase in the Inter-company Standard Deviation is due to problems in the lay out of the new installations at one of the processing companies.

RECP Profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*

> Through improved productive use of natural resources by enterprises

- *Environmental management*

> Through minimization of the impact on nature by enterprises

- *Human development*

> Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

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Principal Options Implemented	Benefits obtained by three companies (IRUPANA, AVSA and ANAPQUI)*			
	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)
Technology replacement	450.000	1.082.000	Electricity: 187.219 kWh/year Thermal energy: 1.100.967 Mcal/year Water: 23.510 m ³ /year Grain: 316 tons/year Saponin: 220 tons/year	CO ₂ eq = 88 tons/year Waste water: 23.510 m ³ /year DBO ₅ = 200 tons/year

*Estimates made for a total production of 4.409 tons/year

Approach taken

CPTS carried out Cleaner Production (CP) assessments in five main quinoa-processing companies. These CP assessments were the basis for approaching a more ambitious project --the development of new technology for quinoa processing. The old technology was so inefficient that nothing from it was taken into account to design the new one. To develop the new technology CPTS got funds from international cooperation for the execution of a demonstration project aimed at designing and constructing an entire quinoa processing plant, based on Cleaner Production (CP) principles and adapted to the needs of the existing quinoa processing companies. The technology was designed by CPTS, constructed by Industrias Metálicas Andinas (IMA) and installed at AVSA.

The first prototype of the new technology began working in AVSA and increased its processing capacity, reduced its operation costs, increased its cash flow and improved its environmental performance indicators. The success achieved with the implementation of the first prototype led to the establishment of an alliance between CPTS, IMA and AVSA. The alliance aimed initially at consolidating the work relationship that arose between these companies during the prototype development phase. In the long term, the purpose has been to focus the joint effort in research and development activities within the quinoa sector.

As soon as the dissemination of the technology began, other companies and institutions joined the alliance, which resulted not only in the establishment of the formal 'Quinoa Alliance' but also in the rapid adoption of the technology. At the present time, 85% of Bolivian quinoa exports is processed with this technology.

Business case

The technological innovation in quinoa grain processing have had a significant impact on the productivity of the Bolivian companies dedicated to this activity, which has resulted in a considerable augmentation of its exports and the sector's growth. This has come concurrently with a convergence process in productivity, the consequence of the process mode modification (of replacing batch operations with a continuous process) and the introduction of homogeneous production protocols inherent to the new technology.

The positive results obtained have led to the natural creation of an alliance among the most important companies of the sector: producer associations and technology manufacturers. To the extent that a small program such as the Quinoa Alliance has gotten tangible results, other institutions, public and private, have shown more interest in actively participating of the process. Hence, it



RECP Experiences



is possible to think that in some cases where government capacity is limited in terms of generating and coordinating larger development programs, it is useful to concentrate intervention efforts into more limited and well-focused areas. This will trigger positive effects and lead to actions by the rest of the actors and sectors.

In order to reach the expected objectives, the technological innovation must come with parallel innovations in the institutions that promote development. The public sector has an important role to play in boosting coordinated policies aimed at promoting the adoption of these innovations. The generation of technology as well as its adoption is affected by deliberated public policies (e.g. infrastructure development, research funding and activities of agricultural extension), not deliberated policies (e.g. changes of commodity prices), and activities of the private sector. One of the challenges related to the design of development policies based on technological change is an optimal integration of public and private efforts.

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English Abstract (where applicable)
The Centre for Promotion of Sustainable Technologies (CPTS) is a civil non-profit association. Its main objective is to assist Bolivian institutions, entities, municipalities, companies and industries to meet challenges relating to sustainable development through sound cleaner production (CP) and energy efficiency (EE) practices and technologies. The purpose is to achieve an optimal use of resources (water, energy, fuels, etc.) in all sectors in order to improve their productivity and environmental performance, with the ultimate aim of contributing with the sustainable development of the country and region. CPTS's institutional mission is "to improve the competitiveness of companies from various sectors of the economy, based on the introduction of the philosophy and practices of cleaner production". With more than 20 years of experience, CPTS constitutes the cleaner production leading organization in Bolivia as strong expertise has been built up in cleaner production, energy efficiency and pollution prevention assessments, sustainable management of resources, scientific research and development of sustainable technologies. From this perspective, cleaner production is a preventive strategy, which encompasses energy efficiency and pollution prevention.

ABOUT RECP EXPERIENCES

Through the joint Resource Efficient and Cleaner Production (RECP) Programme, the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP) cooperate to improve the resource productivity and environmental performance of businesses and other organizations in developing and transition countries. The Programme is implemented in partnership with the Global Network for Resource Efficient and Cleaner Production (RECPnet). This series of enterprise success stories documents the resource productivity, environmental and other benefits achieved by enterprises in developing and transition countries through the implementation of RECP methods and practices.

These successes were achieved with the assistance of the National Cleaner Production Centres, which are part of RECPnet established with support of the UNIDO and UNEP. The success stories employ the indicator set described in *Enterprise Level Indicators for Resource Productivity and Pollution Intensity*, UNIDO/UNEP, 2010. The primer with accompanying calculator tool and further case studies are available at www.recenet.org, as well as on www.unido.org/cp and www.unep.fr/scp/cp.

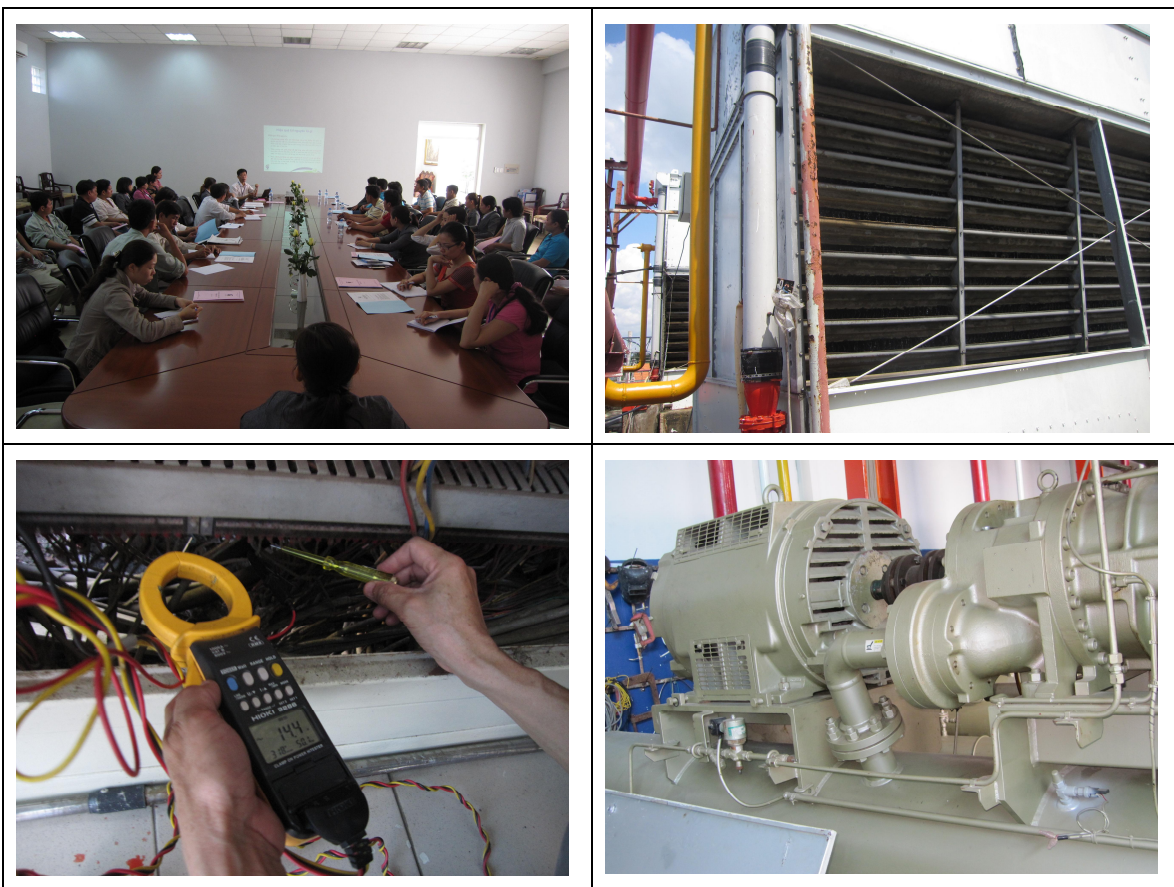
RECP Experiences at Europe Joint Stock Company

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Resource Efficient and Cleaner Production (RECP) is a way to achieve this in a holistic and systematic manner. 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 Europe Joint Stock Company (Vietnam).

Achievements at a Glance

Based on the focus assessment that investigated the operation of main engines, heat system, the RECP assessment identified 25 RECP options to solve the identified problems. Implementing most of the feasible RECP solution, the company has achieved following results:

- Saving generated by 214.729USD annually;
- CO₂ emission reduced by 1.721 tons annually;
- Improved occupational health and safety condition by reduced electricity leakage and reduced fire/explosion risk.



Overview

Europe JSC is a member of Hung Vuong Corporation, which runs a closed system of producing breed, aquaculture, processing, cold storage, and export of pangasius product. Hung Vuong Chau Au JSC locates in Tien Giang province – Viet Nam. The company is operating one factory specialized in pangasius processing for export. RECP assessment at the factory was conducted from April to December 2015 in the frame work of the project „Establishing a sustainable Pangasius supply chain in Vietnam“ (SUPA), which is funded by Switch Asia programme (EU). The objectives of the assessment consist of the followings:

1. To improve company’s management and staff awareness of RECP concept and methodology;
2. To demonstrate the RECP benefits brought to company through the full process of production analysis, RECP option identification and implementation; and
3. To improve the quality of pangasius products toward a Vietnam’s sustainable pangasius supply chain.

Europe JSC was established in November 2009 with the designed processing capacity of 500 tons materials per day. The company’s product is high quality Pangasius fillet for exporting to markets such as Europe, Brazil, Mexico, Australia, the USA, Middle East and Asian countries... Hung Vuong Corporation and the company manager showed strong commitment to the project.

Benefits

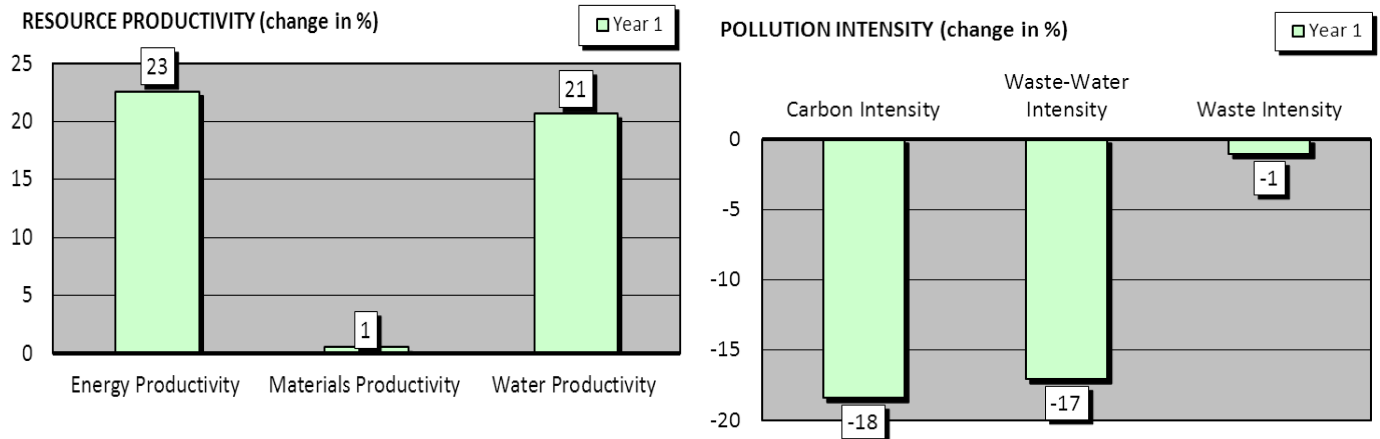
The production of a seafood processing company is typically water- and energy-consuming starting with raw fish through several key steps of washing, filleting, skinning, trimming, sizing, and freezing. The final product is pangasius fillet. Beside raw fish, main input of the production is electricity and water.

Absolute Indicator	Change (%) Year 1	Relative Indicator	Change (%) Year 1
Resource Use		Resource Productivity	
Energy Use	-14	Energy Productivity	23
Materials Use	5	Materials Productivity	1
Water Use	-13	Water Productivity	21
Pollution Generated		Pollution Intensity	
Air emissions (global warming, CO ₂ equivalent)	-14	Carbon Intensity	-18
Waste-water	-13	Waste-water Intensity	-17
Waste	4	Waste Intensity	-1
Production Output	5		

Note: Absolute indicators present the total resource used by the company for the production in one year basis Relative Indicators show how efficient the production is per unit of resource consumed.

After the implementation of identified RECP solution, the company has reduced its energy and water used by 14% and 13%, respectively, in first year, while its production has been increased by 5%. This relates to the improvement of energy and water productivity by 23% and 21% accordingly. As the result of this, the carbon emission per ton of product has reduced by 18%.

RECP Profile



Success Areas

Main area of improvement in the RECP assessment at Europe JSC is electricity consumption, hot water and water usage. The big issues of the company are electricity leakage, bad maintenance and operating practices. Therefore, RECP assessment helps company with following key measures:

- Regular check and fix electric leakage in distribution lines and control boxes
- Establish a preventive maintenance plan
- Invest a hot water system using solar energy or heat pump combined with solar energy
- Increase air convection to reduce overheat
- Move capacitors from power station to compressors' motor
- Regular descale the condenser tube.
- Install capacitor to the lighting electric box to handle with overload of conductors
- Better production planning and control water consumption.
- Install capacitors in the wastewater treatment plant

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)
Invest hot water system using solar energy or heat pump combined with solar energy	22,730	22,560	~352,800 kWh	~198 tons of CO ₂
Install capacitors	11,275	7,820	~114,264kWh	~64 tons of CO ₂
Replace old light bulbs and tubes by energy saving ones	2,205	1,486	~23,235 kWh	~13 tons of CO ₂

Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*
 - > Through improved productive use of natural resources by enterprises
- *Environmental management*
 - > Through minimization of the impact on nature by enterprises
- *Human development*
 - > Through reduction of risks to people and communities from enterprises and supporting their development



Approach taken

The RECP assessment at the company was conducted from April 2014 to March 2015 with the participation of VNCPC expert and company's RECP team. The RECP assessment in the company has been run within following stages:

No	Work	Brief description of work
1	Training on RECP for RECP team of the company	- 01 day RECP training with following contents: (1) PDCA and Resources Efficiency (1), RECP technique and options (2), RECP Methodology (3) and RECP assessment by themes (Raw materials, Energy, Water, Chemicals and Waste).
2	Detailed assessment	- 3 missions: <ul style="list-style-type: none"> o Data collection, walkthrough for pre-assessment; o Waste stream diagnosis, cause analysis and RECP option generation o RECP screen, feasibility study and implementation o Monitoring/Evaluation

Business case

RECP assessment do not only focus on the internal improvement of the company operation, but also try to link with community such as solutions to help farmers to improve paddy quality.

Testimony Box
National Cleaner Production Centre (NCPC)
Vietnam Cleaner Production Centre (VNCPC) was established by the United Nations Industrial Development Organization (UNIDO) and the Ministry of Education and Training in 1998 under the financial support of the State Secretariat for Economic Affairs Switzerland (SECO). During the establishment period from 1998 to 2009, as a project implementer, 4 main activities of the Centre consisted of awareness raising, national capacity building, in-plant demonstration and policy advice for promoting the concept of Cleaner Production. Since 2009, VNCPC has been transformed into an organization with legal entity providing scientific and technological training and consulting services for promote RECP and SCP in industrial and service sectors.
Contact Details
Vietnam Cleaner Production Centre Address: P228B, Ta Quang Buu Library Building, Hanoi University of Science and Technology Dai Co Viet Street, Hanoi, Vietnam Phone: +84 4 3868 4849 Email: vncpc@vncpc.org



RECP Experiences



ABOUT RECP EXPERIENCES

Through the joint Resource Efficient and Cleaner Production (RECP) Programme, the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP) cooperate to improve the resource productivity and environmental performance of businesses and other organizations in developing and transition countries. The Programme is implemented in partnership with the Global Network for Resource Efficient and Cleaner Production (RECPnet). This series of enterprise success stories documents the resource productivity, environmental and other benefits achieved by enterprises in developing and transition countries through the implementation of RECP methods and practices.

These successes were achieved with the assistance of the National Cleaner Production Centres, which are part of RECPnet established with support of the UNIDO and UNEP. The success stories employ the indicator set described in *Enterprise Level Indicators for Resource Productivity and Pollution Intensity*, UNIDO/UNEP, 2010. The primer with accompanying calculator tool and further case studies are available at www.recpnet.org, as well as on www.unido.org/cp and www.unep.fr/scp/cp.

RECP Experiences at Standard

The efficient and environmentally sound use of materials, energy and water, coupled with the minimization of waste and emissions, makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Standard a.d. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Standard wood processing industry will achieve annual savings of 54.000 EUR, with investment of 45.000EUR and average payback time of 8 months. By application of the RECP measures, a total water consumption will be reduced by % and the total energy consumption by 6.5 %.



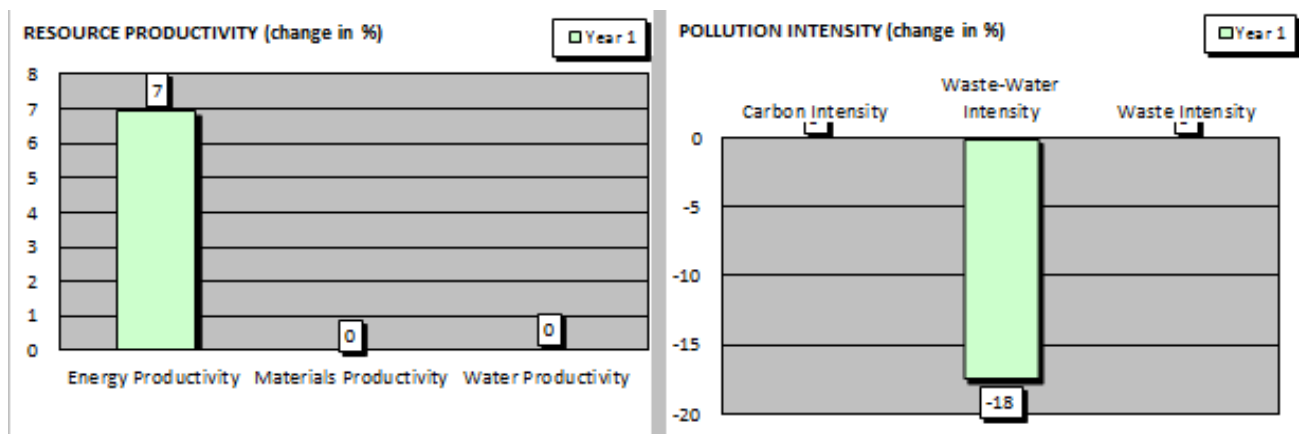
Overview

Founded in 1943, Standard a.d. from Prnjavor is a furniture manufacturer with a long tradition. By the virtue of outstanding quality and successful design, Standard has grown in the 1980s, in a company with 300 employees which has been distributing its products in both domestic and foreign markets. Cooperation with the Swedish company IKEA began in 2000. That same year, Standard has been registered as a joint stock company, which was a precondition for starting the sale of shares. During 2004, Swiss company Dacomet AG from Zurich started privatization and currently owns 84.5% of shares.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-6.5	Energy Productivity	6.94
Water Use		Water Productivity	
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)		Carbon Intensity	
Waste-Water	17.5	Waste-Water Intensity	17.5
Waste	0	Waste Intensity	

RECP profile



Resource Efficient and Cleaner Production (RECP)

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RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*

- > Through improved productive use of natural resources by enterprises

- *Environmental management*

- > Through minimization of the impact on nature by enterprises

- *Human development*

- > Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
1. Utilization for rainwater	3200	2700	1 year 3 months	5400 L	0
2. Installation of the water flowmeter	-	-	-	-	n.d.
3. Installation of the water settling tank	1275	2002	6 months	-	3465 L
4. Insulation of the hot water pipelines	5000	8900	6 months	951 MWh	n.d.
5. Installation of frequent regulation and soft starters on larger electric engines	40000	45000	11 months	-	-

n.d. – not defined



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. Management of company did not specify timeline for implementation of selected RECP options.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

The program is designed to foster expertise, service delivery capacity and implementation of RECP practices and policies in the country, building on UNIDO's experience in supporting National Cleaner Production Programmes (NCPPs) and Centres (NCPCs), in collaboration with UNEP, under the global joint RECP Programme. The program that was officially launched in 2015, contributes to improve the resource efficiency and environmental performances in terms of sensible use and management of natural resources in businesses and other organizations in Bosnia and Herzegovina. Applying a systematic RECP approach, the project aims at providing:

- Training to national experts on UNIDO's RECP methodology
- Assessment services to companies
- Information dissemination and awareness raising

Contact Details

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RECP Experiences at Srebreničanka.

The efficient and environmentally sound use of materials, energy and water, coupled with the minimization of waste and emissions, makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of “Srebreničanka” d.o.o. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Srebreničanka potatoes processing industry will achieve annual savings of 865.000 EUR with investment of EUR 179,000.00 and payback time of 4 months. By application of the RECP measures, a total energy consumption will be reduced by 62 % and the carbon dioxide emissions by 62%.



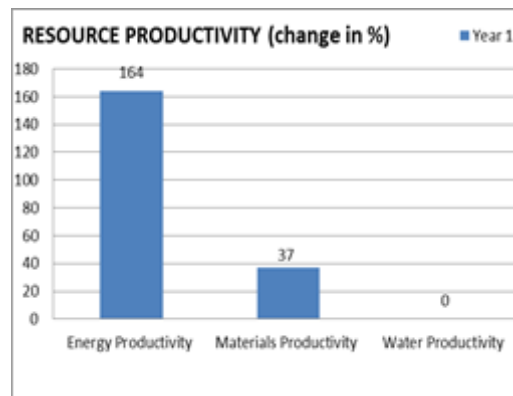
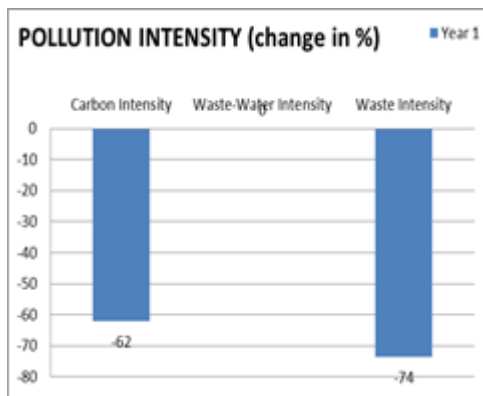
Overview

Srebreničanka processes potatoes in to different form of sliced potatoes, which is then frozen packed and distributed to commercial centres. The company is established in 2015. Factory for French fries production from Srebrenica was launched as a strong need to carry out a substitution of imports significant quantities of French fries and other potato products quality domestic product.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-62	Energy Productivity	164
Materials Use	-27	Materials Productivity	37
Water Use		Water Productivity	0
Pollution generated	0	Pollution Intensity	0
Air Emissions (global warming, CO2 eq.)	-62	Carbon Intensity	-62
Waste-Water	0	Waste-Water Intensity	0
Waste	-74	Waste Intensity	-74

RECP profile



Resource Efficient and Cleaner Production (RECP)

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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Peeling potatoes with steam	n.d.	n.d.	n.d.	n.d.	Waste 3,356 t
Production of biogas	10,225.84	65,007.20	2 months	Electric energy 1,935 .337 kWh	
Production of biodiesel	48,572.74	360,767.65	2 months	-	-
Installation of biomass boiler	120,000.00	440,000.00	4 months	5800 MWh	CO ₂ 3,042.35 t

n.d. – not defined



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. The selected RECP options will be implemented in following period (management of company did not specify timeline).

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

The program is designed to foster expertise, service delivery capacity and implementation of RECP practices and policies in the country, building on UNIDO's experience in supporting National Cleaner Production Programmes (NCPPs) and Centres (NCPCs), in collaboration with UNEP, under the global joint RECP Programme. The program that was officially launched in 2015, contributes to improve the resource efficiency and environmental performances in terms of sensible use and management of natural resources in businesses and other organizations in Bosnia and Herzegovina. Applying a systematic RECP approach, the project aims at providing:

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- Assessment services to companies
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Contact Details

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RECP Experiences at Sarajevska pivara ltd.

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Sarajevska pivara Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

Current production of beer in the Sarajevo brewery is well below the installed capacity. All auxiliary plants are designed to meet the maximum capacity, and the use of such a system results in an increased power consumption. The brewery has more production units, including the bottling of water and juices. Resource consumption by plants is not measured, thus information on resource consumption and possible rationalization is limited. The pipeline for distribution of alcohol in the cooling system records losses, therefore the reconstruction is needed.

The Resource Efficient and Cleaner Production (RECP) project in brewery and beverage company Sarajevska pivara will achieve annual savings of EUR 112,900, with investment of EUR 103,679 and average payback time of less than 1 year.



Overview

Sarajevska pivara was founded in 1864. The main products of the company include beer, soft drinks and water. The company is the largest producer of beer in BiH with an installed capacity of production of beer and soft drinks of 1,000,000 hL per year. The company employs 340 workers. Production takes place in an area of 17,400 m² and is in line with both national and international standards and requirements. Sarajevska pivara has implemented standards such as ISO 14001: 2004, ISO 9001: 2008 and Codex Alimentarius.



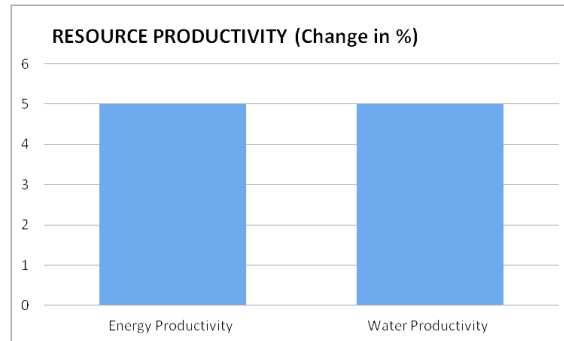
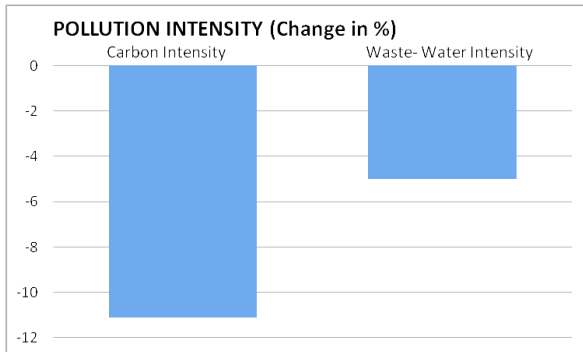
RECP Experiences



Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-5	Energy Productivity	5
Water Use	-5	Water Productivity	5
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-27	Carbon Intensity	-27
Waste-Water	-5	Waste-Water Intensity	-5

RECP profile

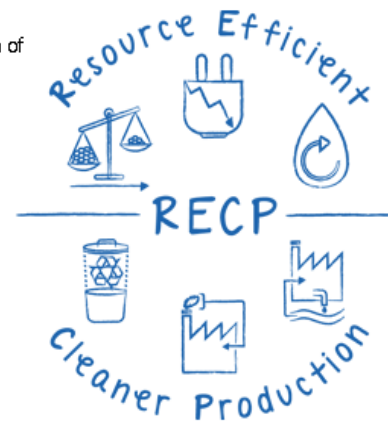


Resource Efficient and Cleaner Production (RECP)

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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Reducing peak load by production management enabling sequential turn on / Turn off large electricity consumers.	13,071	28,632	6 months	-	-
Installation of meters (compressed air meter, electric power meters, water meter, steam flow meters), data collection and monitoring	52,284	24,005	2 years and 2 months	Electric energy 304,866 kWh Water 30,465 m ³	CO ₂ = 220.4 t, Waste water 30,465 m ³
Insulation of steam pipeline / valves / connections at the steam distribution line	3,817	8,725	6 months	Electric energy 172,207 kWh Gas 19,525 Sm ³	CO ₂ = 124.5 t
Replacing existing lighting with LED lighting	8,365	2,454	3,5 year	Electric energy 30,000 kWh	CO ₂ = 21.7 t
Reconstruction of the pipelines for distribution of alcohol in the cooling system	26,142	49,084	6 months	Electric energy 60,000 kWh	CO ₂ =43.4 t



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. They decided to give priority to reconstruction of the pipelines for distribution of alcohol in the cooling system, including insulation on the steam pipeline / valves / connections, and to establish metering program in order to be able to manage resource consumption.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

The program is designed to foster expertise, service delivery capacity and implementation of RECP practices and policies in the country, building on UNIDO's experience in supporting National Cleaner Production Programmes (NCPs) and Centres (NCPCs), in collaboration with UNEP, under the global joint RECP Programme. The program that was officially launched in 2015, contributes to improve the resource efficiency and environmental performances of businesses and other organizations in Bosnia and Herzegovina. With the application of a systematic RECP approach, the project aims at providing:

- Training to national experts on UNIDO's RECP methodology
- Assessment services to companies
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Contact Details

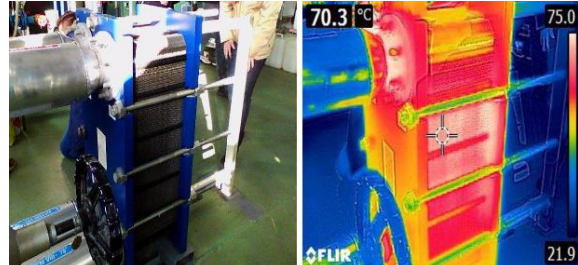
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RECP Experiences at Sarajevo International Airport

Efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Sarajevo International Airport from Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project at Sarajevo International Airport, the main international airport serving the capital of Bosnia and Herzegovina, will achieve annual savings of EUR 703,366 with investment of EUR 4,295,844 and payback time of 6 years. Implementation of all suggested resource efficiency measures will reduce electric energy consumption by 24.3% and fuel consumption by 10.5%, which gives the total reduction of 16% compared to total energy consumption. Installation of photovoltaic power plant brings major reduction of carbon footprint (3,474.1 t CO₂/a).



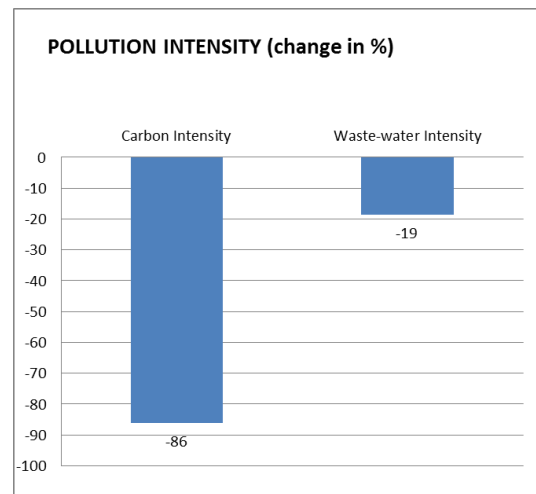
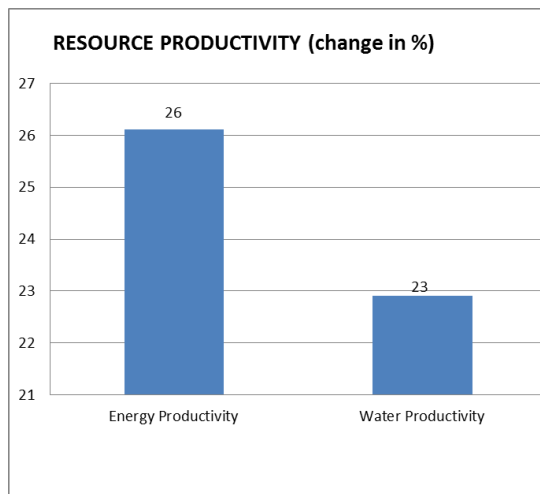
Overview

Airport Sarajevo has approx. 400 employees, traffic capacity of 800,000 passengers a year, over 7,000 flights and over 2 million kg of cargo. It has 5 gates, 4 restaurants and bars, duty free, sanitary installations and cargo storage. The airport consumes 14,000 m³/y of water; 360,000 Sm³ of gas and has significant amount of different type of waste. The company has 14001 in place, since 2004.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-21	Energy Productivity	26
Water Use	-19	Water Productivity	23
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO ₂ eq.)	-86	Carbon Intensity	-86
Waste-Water	-19	Waste-Water Intensity	-19
Waste	0	Waste Intensity	0

RECP profile



Resource Efficient and Cleaner Production (RECP)

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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Payback period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Installation of photovoltaic power plant on covered parking	3,888,376	526,446	7 years and 5 months	Electric energy 2,210,000 kWh	3,474.1 tCO ₂
Printing photovoltaic thin film on glass facade	239,445	95,776	2 years and 6 months	Electric energy 363,800 kWh	571.9 tCO ₂
Replacement of 40 reflectors with Tungsten halogen light bulbs	5,113	1,018	5 years	Electric energy 8,800 kWh	13.8 tCO ₂
Replacement of lightning of Coca-Cola advertisement	123	204	7 months	Electric energy 2,600 kWh	4.1 tCO ₂
Replacement of fluorescent tube T12 with T8 at Terminal B	2,396	14,462	2 months	Electric energy 186,700 kWh	293.5 tCO ₂

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Payback period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Turning off all the laser printers during night and weekends.	0	263	0	Electric energy 3,400 kWh	5.3 tCO ₂
Setting up computer equipment in the energy saving mode	0	63	0	Electric energy 800 kWh	1.3 tCO ₂
Central printing system in Administrative building	4,090	15,814	3 months	Electric energy 8,400 kWh	13.2 tCO ₂
Replacement of 18 pumps with frequency controlled pumps in substation of Terminal B	11,412	1,350	8 years and 6 months	Electric energy 17,400 kWh	27.4 tCO ₂
Installing daylight and motion sensors	10,000	26,215	2 months	Electric energy 112,800 kWh	177.3 tCO ₂
Installing water-water heat pump for heating and cooling purposes of Administrative building	101,400	6,511	15 years and 7 months	Fuel 18,770 m ³	41.8 tCO ₂
Hydraulic balancing and correction of the internal temperature of the Terminal B's heating system	12,782	9,742	1 year and 4 months	Fuel 25,405 m ³	56.6 tCO ₂
Installing motion sensor faucets	6,902	964	7 years and 2 months	Water 1,298 m ³	Waste water 1,298.0 m ³
Installing dual-flush systems	13,805	4,538	3 years	Water 3,450 m ³	Waste water 3,450.0 m ³



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and waste water. In consultation with expert teams the company management selected the RECP measures to be implemented. Presented measures for lightning efficiency improvement contribute in overall electric energy consumption savings by 44%. Hydraulic balancing and correction of the internal temperature of the Terminal B's heating system will influence the most on fuel consumption reduction, with relatively short payback period. Turning off all the laser printers during night and weekends; and setting up computer equipment in the energy saving mode are no-cost measures that bring electric energy consumption saving, consequently money savings. Installing motion sensor faucets and dual-flush systems contribute to significant water consumption reduction, also improving resource efficiency.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

The program is designed to foster expertise, service delivery capacity and implementation of RECP practices and policies in the country, building on UNIDO's experience in supporting National Cleaner Production Programmes (NCPPs) and Centres (NCPCs), in collaboration with UNEP, under the global joint RECP Programme. The program that was officially launched in 2015, contributes to improve the resource efficiency and environmental performances of businesses and other organizations in Bosnia and Herzegovina. With the application of a systematic RECP approach, the project aims at providing:

- Training to national experts on UNIDO's RECP methodology
- Assessment services to companies
- Information dissemination and awareness raising

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RECP Experiences at Prevent Ltd.

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Prevent Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

Compressor station, stetner machine and laminating machines, as well as lines for painting have been identified as significant consumers of energy in textile production. Heat from the stetner machine is wasted, as well as the heat contained in the waste water from the dyeing process. The company decided to focus on heat recovery from the stetner machine. This will result in annual savings of EUR 35,000, with investment of EUR 140,000 and payback time of 2 years.



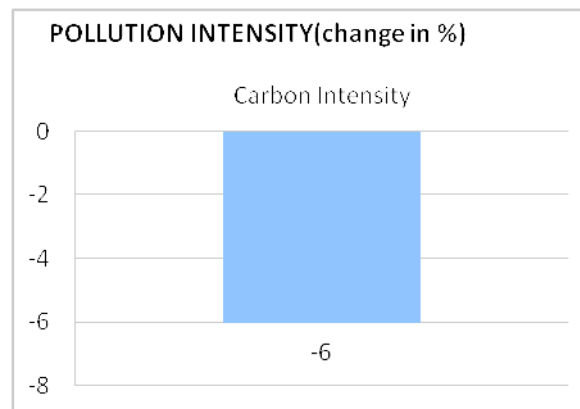
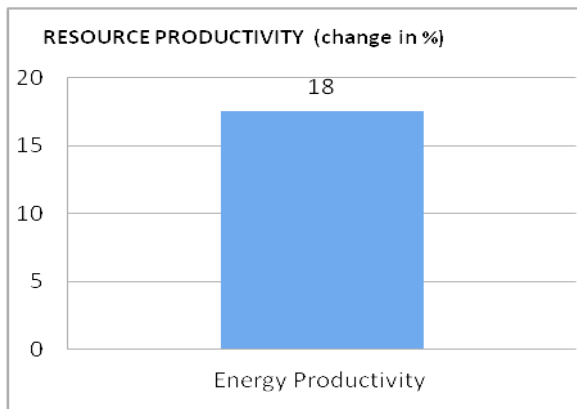
Overview

The company produces textile and leather upholstery for cars, with an installed capacity of 10,000 m² / day. Prevent Fabrics was established in 2012 as a part of the Prevent Group, world leader with a wide assortment of products ranging from leather and fabric production to metal components for sewing and cutting services. With years of experience and knowledge, the company is a strategic partner of the world's leading automobile manufacturers (Audi, BMW, Citroen, Peugeot, Ford). The company currently employs 165 workers. The company plans to implement ISO standard 14001: 2004.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-15	Energy Productivity	18
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-6	Carbon Intensity	-6

RECP profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*
 - > Through improved productive use of natural resources by enterprises
- *Environmental management*
 - > Through minimization of the impact on nature by enterprises
- *Human development*
 - > Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Exhaust hot air heat recovery at the stetner machine	140,000	70,000	2 years	Gas 50,000 m ³	CO ₂ 565.4 t



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. It was not possible to determine the water and waste water balance as the company shares these resources with other companies in the industrial park without metering. The company identified several areas for improvement, such as heat recovery from waste water from dying machine and heat recovery from stetner machine. However, the company management decided to move the dying line to another factory, so they have selected heat recovery from statner machine as the only RECP measure to be implemented.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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RECP Experiences at Menprom Ltd.

The efficient and environmentally sound use of materials, energy and water, coupled with the minimization of waste and emissions, makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Menprom Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Menprom meat processing industry will achieve annual savings of EUR 18,550, with investment of EUR 7,820 and payback time of 5 months. By application of the RECP measures, a total water consumption will be reduced by 40 % and the total energy consumption by 4 %.



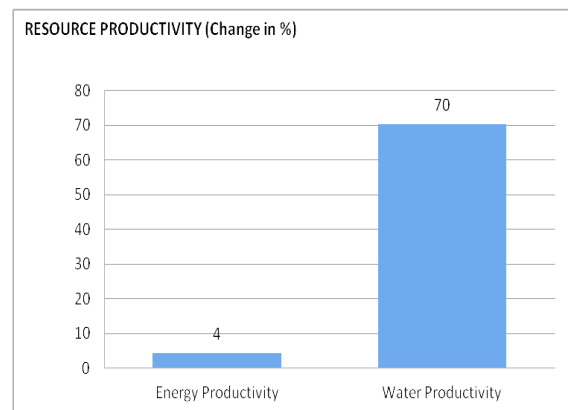
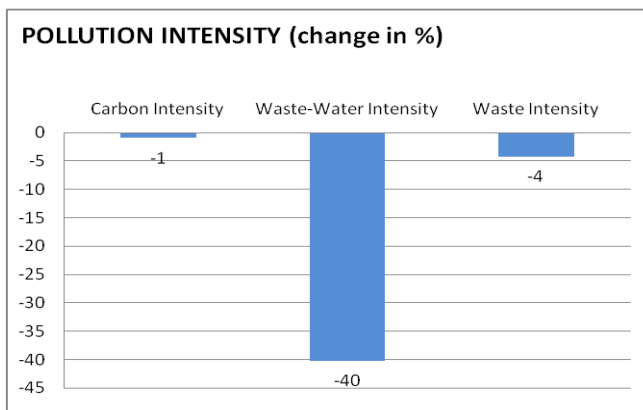
Overview

Menprom Ltd. was founded in 1998. The principal activity of the company is processing of poultry, beef and turkey meat. The production capacity of the company is 10 tons / day. Due to the increasing demand for and interest in meat products, the company is continually investing in both new knowledge and technology and expansion and modernization of its manufacturing processes. In 2007 Menprom implemented ISO standard 22000: 2005 - Food Safety Management System, and in 2008 the HALAL standard. The company has 139 employees.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-4	Energy Productivity	4
Water Use	-41	Water Productivity	70
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-1	Carbon Intensity	-1
Waste-Water	-40	Waste-Water Intensity	-40
Waste	-4	Waste Intensity	-4

RECP profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*
> Through improved productive use of natural resources by enterprises

- *Environmental management*
> Through minimization of the impact on nature by enterprises

- *Human development*
> Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	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 compressed air consumption through installation of two air flow meters and manometers	2,650	1,996	1 year and 5 months	Electric energy 30.672 KWh	CO ₂ 51,4 t
Installation of air valves and valve insulation in boiler house	2,500	1,260	2 years	LPG 4,021 l	CO ₂ 6,1t
Optimizing the efficiency of packaging lines- adjustment of plastic foil machine	0	1,900	Immediate	Plastic foil 1,350 m ² (0,21 t)	Plastic foil 1,350 m ² (0,21 t)
Automatic cooling of cooked products- procurement of automatic ball valve with timer	250	940	<4 months	Water 625 m ³	Waste Water 625 m ³
Recirculation of cooling, washing water and condensate for cleaning and gardening purposes	2,500	3,070	11 months	Water 7.454 m ³	Waste Water 7.454 m ³



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. The selected RECP options will be implemented in auxiliary processes, i.e. compressor units and boiler house. Other selected RECP options will improve water efficiency by recirculation of cooling, washing water and condensate for cleaning and gardening purposes.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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- Training to national experts on UNIDO's RECP methodology
- Assessment services to companies
- Information dissemination and awareness raising

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RECP Experiences at Madi

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Madi Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievement at glance

The Resource Efficient and Cleaner Production (RECP) project in Madi will achieve annual savings of EUR 77,500 with investment of EUR 96,207 and payback time of 7 month to 1 year per selected measure. Water productivity has been improved by 65 %. The major contribution to water savings has been made by reuse of treated waste water for cleaning purposes.



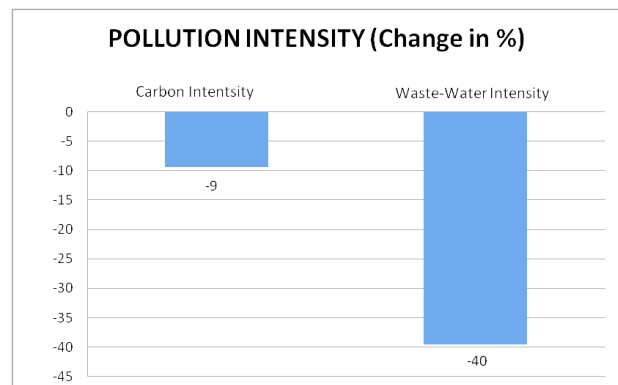
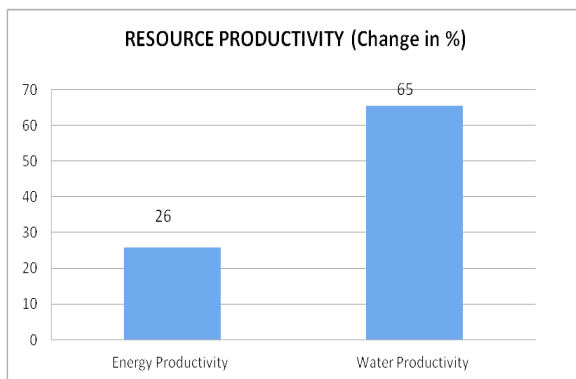
Overview

The principal activity of the company is poultry slaughter and processing of poultry meat. The Company has an Installed slaughtering capacity of 2,500 birds per hour. The company was founded in 1997. Madi Ltd. Tešanj is certified according to the standards of HACCP, ISO 9001: 2008 and HALAL. Madi has more than 400 employees.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-21	Energy Productivity	26
Water Use	-40	Water Productivity	65
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-9	Carbon Intensity	-9
Waste-Water	-40	Waste-Water Intensity	-40

RECP profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*

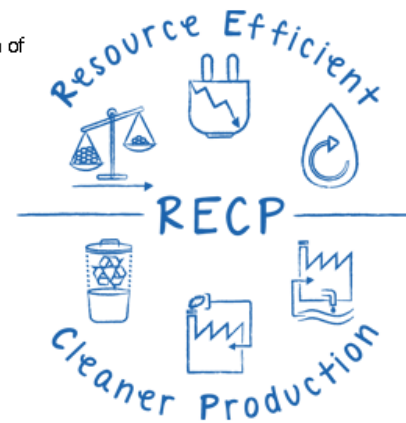
> Through improved productive use of natural resources by enterprises

- *Environmental management*

> Through minimization of the impact on nature by enterprises

- *Human development*

> Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Installation of a hybrid system for the peak load reduction	50,000	50,000	1 year	Electric energy 279,946,6 kWh	CO ₂ 440 t
Preventing exposure of wood to weather conditions by construction of an open steel hall	7,500	11,481	8 months	Wood 382 m ³	-
Installation of devices for grease removing at the WWTP and construction of pipelines and tanks for re-use of wastewater	20,000	38,726	7 months	Water 21,888 m ³ WWTP chemicals 1 t	Waste water 21,888 m ³ Waste 1t



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be included in the action plan for implementation. The measures will contribute to electric energy savings, wood consumption reduction, water and waste water reduction. The company is expanding their production to poultry farming so they will also consider feasibility of biogas production from poultry wastes after construction of new poultry farms.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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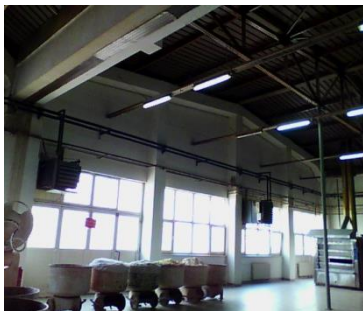
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RECP Experiences at Klas d.d. Sarajevo

Efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Klas d.d. Sarajevo from Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Klas d.d., a commercial bakery products manufacturing industry, will achieve annual savings of EUR 33,813 with investment of EUR 102,075 and payback time of 36 months. Implementation of all suggested resource efficiency measures will reduce electric energy consumption by 7.7% and fuel consumption by 3.6%. Total energy consumption reduction is 4% and water consumption reduction is 11%. Carbon footprint of 5,526 t CO₂/a will be reduced by 6% and amount of waste water will decrease by 21%.



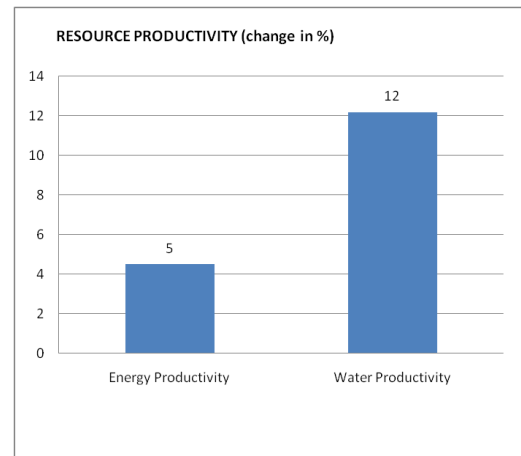
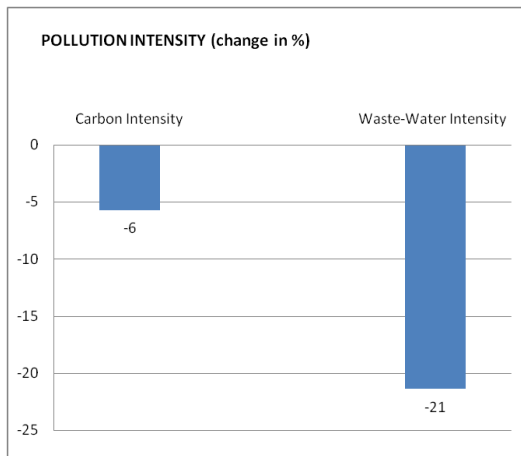
Overview

“Klas” d.d. Sarajevo develops, produces and sells grain-based food: flour, bread, rolls, pasta, confectionery products, etc. It has its own mills, bakery plants, shops and shopping centres where domestic products prevail in overall range of products. Klas offers its own products at the market for final users, industrial consumers and other bakeries, via its own retail and wholesale network. “Klas” exports its products at the markets of the region, EU, USA, and Middle East countries. “Klas” is the company whose business operations rest on the top-quality products and services through consistent application of the guidelines and requirements of internationally acknowledged systems and norms of quality management – ISO 9001:2000, ISO 14001:2004, HACCP, KRAV, HALAL.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-4	Energy Productivity	5
Water Use	-11	Water Productivity	12
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO ₂ eq.)	-6	Carbon Intensity	-6
Waste-Water	-21	Waste-Water Intensity	-21
Waste	0	Waste Intensity	0

RECP profile

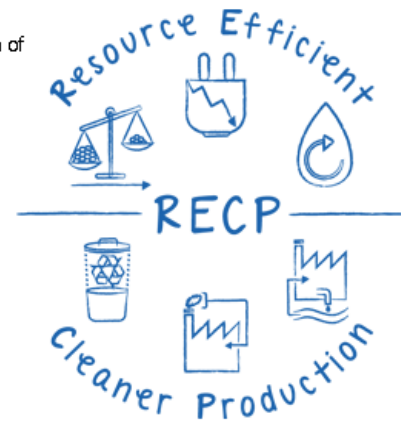


Resource Efficient and Cleaner Production (RECP)

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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Payback period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Installing thermostatic radiator valves	1,350	495	2 years and 9 months	Fuel 1,383.8 m ³	2.6 tCO ₂
Repair of pipeline and heat insulation on distribution channels of refrigeration machines, replacement of sealed tire in cold storage rooms	4,264	3,183	1 year and 4 months	Electric energy 41,504.9 kWh	65.2 tCO ₂
Installing plastic curtain for cold storage	383	2,387	2 months	Electric energy 327,2 kWh	48.9 tCO ₂
Replacement of fluorescent tube T12 with T8 in production plant; and replacement of magnetic with electric damper	7,737	2,403	3 years and 3 months	Electric energy 31,326.9 kWh	49.3 tCO ₂
Installing variable	3,579	1,254	2 years	Electric energy	25.7 tCO ₂

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Payback period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
frequency drives (VFD) on line ones mixer at bread production line			and 10 months	16,352.0 kWh	
Automatic boiler (Toplota Zagreb) blowdown system and installing heat exchanger and tank for blowdown wastewater utilization	14,316	3,218	4 years and 5 months	Fuel 7,897.8 m ³ Water 233 m ³ vode	Waste water 272.2 m ³ 14.7 tCO ₂
Insulating condensate receiver in boiler room	92	465	2 months	Fuel 1,299.8 m ³	2.4 tCO ₂
Replacing thermal insulation of Toplota Zagreb boiler	818	1,322	7 months	Fuel 3,692.8 m ³	6.9 tCO ₂
Installing economizer in Toplota Zagreb boiler	33,234	7,725	4 years and 4 months	Fuel 21,584.4 m ³	40.2 tCO ₂
Installing high-pressure blowers for pan cleaning in Velepekara plant	511	655	9 months	Electric energy 8,541.0 kWh	13.5 tCO ₂
Installing VFD on compressors' motors	5,113	3,359	1 year and 6 months	Electric energy 43,800.0 kWh	65.2 tCO ₂
Utilization of rainwater from rooftop of Velepekara plant	20,452	5,147	4 years	Water 3,216.5 m ³	
Utilization of rainwater from silo's rooftop	10,226	2,198	4 years and 8 months	Water 1,378.0 m ³	



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. In consultation with expert teams the company management selected the RECP measures to be implemented. Installing variable frequency drives on air compressors proved to be the major contributor to electric energy savings, and when it comes to fuel savings; installing boiler economizer is the leading contributor to fuel consumption reduction. Installing plastic curtain for cold storages is the suggested measure with the shortest payback period which, at the same time, contributes to electric energy consumption savings by 18%. Two major CO₂ reduction come from (1) installing VFD on compressors' motors and (2) repairing of pipeline and heat insulation on distribution channels of refrigeration machines, and replacement of sealed tire in cold storage rooms.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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Contact Details

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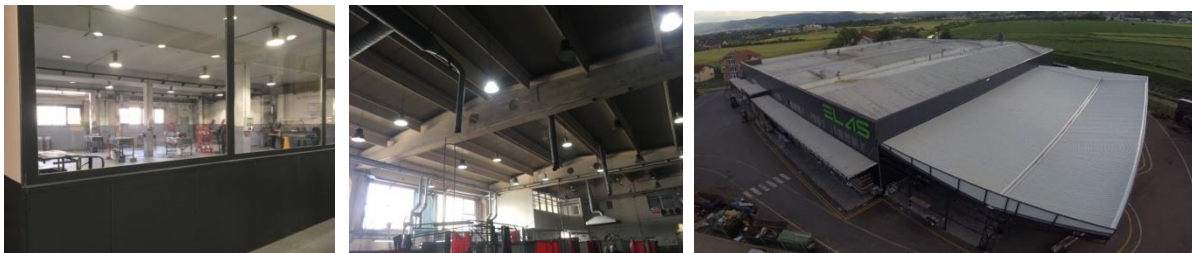
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RECP Experiences at ELAS Metalexpert

The efficient and environmentally sound use of materials, energy and water, coupled with the minimization of waste and emissions, makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of ELAS Metalexpert Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in ELAS Metalexpert sheet metal processing industry will achieve annual savings of EUR 96,601.46 , with investment of EUR 68,615.38 and payback time of 9 months. By application of the RECP measures, a total energy consumption will be reduced by 27 %.



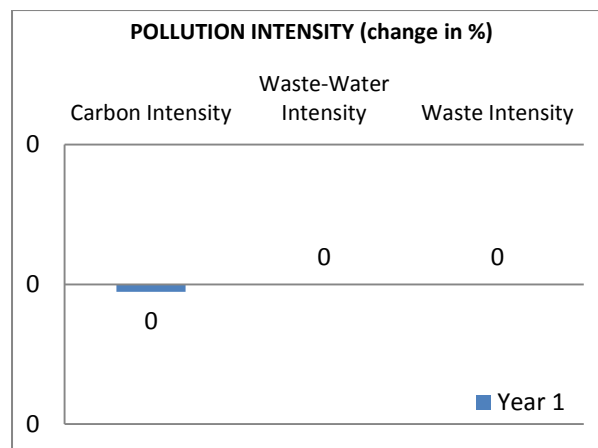
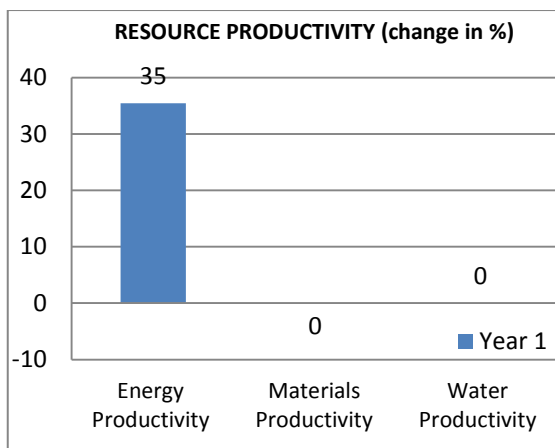
Overview

ELAS Metalexpert was founded in 1994 with the focus on sheet metal processing. The company now expands on 5500 square meters and has 110 employees. With our design and project teams we provide full service, from customer idea to 3D model and project prototype.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-26.18	Energy Productivity	35.47
Water Use	0	Water Productivity	0
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-0.02	Carbon Intensity	-0.02
Waste-Water	0	Waste-Water Intensity	0
Waste	0	Waste Intensity	0

RECP profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

- *Production efficiency*
> Through improved productive use of natural resources by enterprises

- *Environmental management*
> Through minimization of the impact on nature by enterprises

- *Human development*
> Through reduction of risks to people and communities from enterprises and supporting their development



Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Utilization for rainwater	1,636.13	58.28	28 year and 1 month		
Installation of soft starter	5,624.21	6,442.27	11 months	Electric energy 1.030 kWh	
Installation of biomass boiler	25,564.60	58,645.19	5 months	Energy 663.60 MWh	
Installation of Termopanel	23,008.14	12,018.42	1 year and 10 months	Electric energy 117.530 kWh	
Utilization of waste heat from the plastification plant	5,112.92	364	14 years	3.562 MWh	
Utilization of waste heat from the compressor plant	7,669.38	19,437.27	5 months	Electric energy 190.080 kWh	



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. The selected RECP options will be implemented in following years (management of company did not specify timeline).

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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RECP Experiences at Colorit Ltd.

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Colorit Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

Implementation of selected measures will lead to annual savings of EURO 11,650 with investment of EURO 107,100. Energy productivity will be increased by 18% and water productivity by 14%. Waste intensity will increase by 20% and carbon Intensity by 12%.



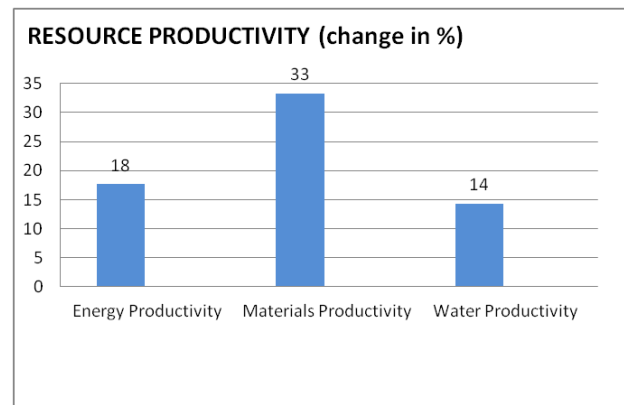
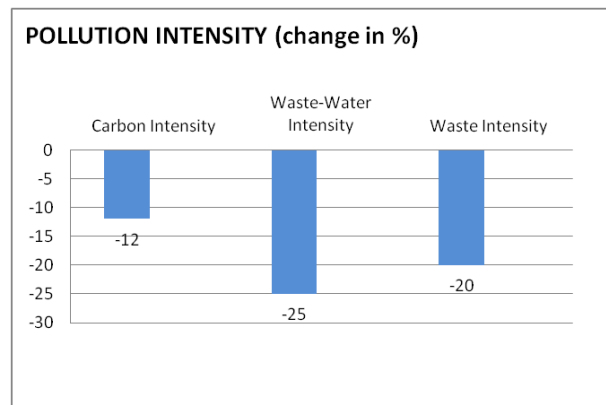
Overview

COLORIT Ltd. was established in late 1996 as a manufacturer of paints, varnishes and acrylic, silicate, silicone, mineral and mineral polymer facades for all finishing work in construction. The company's installed capacity equals 50-60 t / day. Products are placed on BiH, Albanian and Croatian market. The company has implemented and maintains an environmental management system that meets the requirements of ISO 14001: 2004. The company is also certified to ISO 9001: 2008. COLORIT has 49 employees.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-15	Energy Productivity	18
Water Use	-12	Water Productivity	14
Materials Use	-25	Materials Productivity	33
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-12	Carbon Intensity	-12
Waste-Water	-25	Waste-Water Intensity	-25
Waste	-20	Waste Intensity	-20

RECP profile



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- *Human development*
> Through reduction of risks to people and communities from enterprises and supporting their development



Resource Efficient and Cleaner Production (RECP)

Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Procurement of a smaller capacity filling machine	15,000	4,000	4 y	Water consumption 106,70 m ³ Raw material 1000 t	Waste water 51 m ³ Waste 1,1 t
Procurement of a closed line with belt conveyor	10,000	2,000	5 y	Water 161,7m ³ Raw material 382,8 t	Waste water 99 m ³ Waste 0,42 t
Construction of prefabricated warehouses and better organization	80,000	5,000	16 y	Fuel 114,200 MJ	CO ₂ reduction 204,89 t Waste 1,1 t
Supply two multi-purpose central printing devices	2,100	650	3,5y	Inkjet 0,1 t/y Paper 0,8 t/y	Waste (Inkjet and paper) 0,9 t



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. Due to specific market requirements, the company produces small batches of products in a particular colour. This is so called "production for known consumer". However, the frequent changes of colour result in significant waste of dye. Thus, the company decided to procure the filling machine with smaller capacity in order to avoid further losses. An analysis of the resource efficiency in the administrative building showed that each office has a printing device. In order to reduce paper and inkjet consumption they decided to procure two multi-purpose central printing devices.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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RECP Experiences at Biser

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Biser Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in bakery Biser will achieve annual savings of EUR 386, with investment of EUR 500 and payback time of 1 year and 10 months for waste utilisation measure and 5 months for water reduction measure respectively.



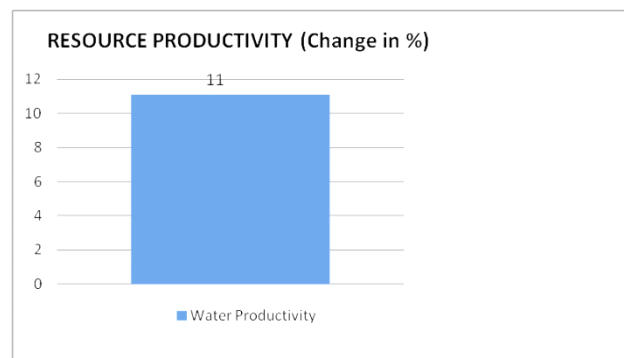
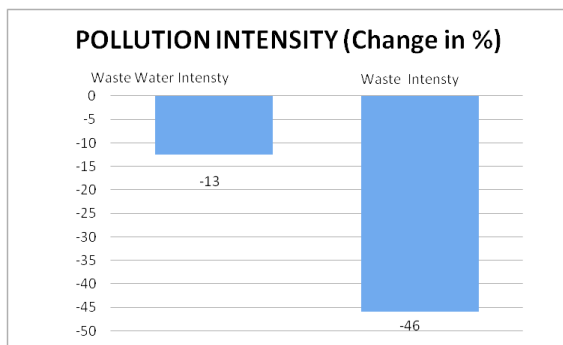
Overview

The company produces bread, pastries, cakes, pasta and ice cream. The company was founded in 1989. Progressive development of modern technological processes and equipment has enabled the company to become a modern production plant. The company's production capacity is 150 t / year of flour. It has 165 employees.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Water Use	-10	Water Productivity	11
Pollution generated		Pollution Intensity	
Waste-Water	-13	Waste-Water Intensity	-13
Waste	-46	Waste Intensity	-46

RECP profile



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Resource Efficient and Cleaner Production (RECP)

Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period		
Recycling of cardboard waste	400	216	1 y and 10 months	-	Packaging material 4.3 t
Procurement and setting of 3 water meters in critical areas of consumption, and installation of pressure nozzles on washing pipes	100	170	5 months	Water 157,4m ³	Waste water 157,4m ³



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. It was not possible to obtain precise data on the resource consumption and thus to prepare material balance. The company has no designated resource management officer. After consultation with the company management the company team has selected the packaging waste separation and recycling as the RECP measures to be implemented.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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RECP Experiences at “Izazov” d.o.o. Kalesija

The efficient and environmentally sound use of materials, energy and water, coupled with the minimization of waste and emissions, makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of “Izazov” d.o.o. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Izazov furniture manufacturing industry, will achieve annual savings of EUR 42.994,55, with investment of EUR 31.395,90 and payback time of 9 months. By application of the RECP measures, a total electric energy consumption will be reduced by 11.04% and contribution to reduction of carbon dioxide emissions will be 11% and waste 4.60%.



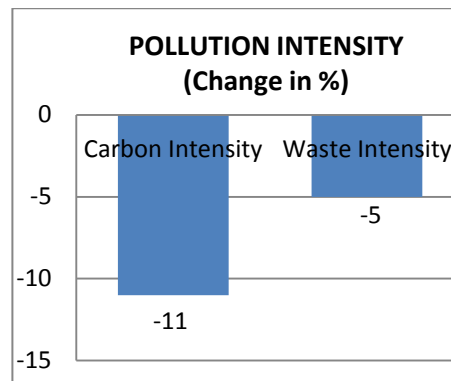
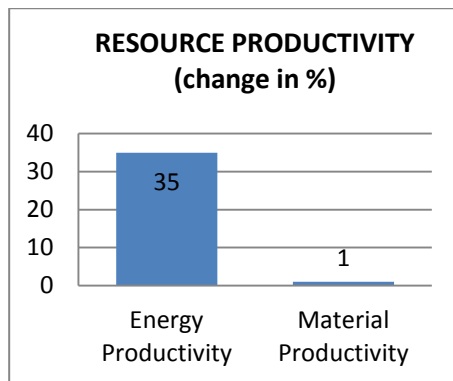
Overview

Izazov has been operating since 1996, with the core activities of primary and final wood processing. The following operating and production units are part of Izazov: transportation of logs and finished products, sawmill, kiln, lines for the manufacture of composite, upholstered and solid wood furniture. The company currently has over 100 employees.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-26	Energy Productivity	35
Water Use	0	Water Productivity	0
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO ₂ eq.)	-11	Carbon Intensity	-11
Waste-Water	0	Waste-Water Intensity	0
Waste	-5	Waste Intensity	-5

RECP profile



Resource Efficient and Cleaner Production (RECP)

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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Replacement of energy saving bulbs, with LED panels	5,879.85	5,164.04	1 year and 2 months	Electric energy 44,006.40 kWh	Waste 4.78 t
Installation of container for compressed air	1,073.71	2,556.46	5 months	Electric energy 1,200 kWh	-
Installation of three frequency regulators on the dedusting system engines	9,970.19	2,602.47	3 years and 10 months	Electric energy 42,354 kWh	-
Organization of work space	2,045.16	1,227.10	1 year and 7 months	-	Waste 2.04 t
Implementation of Lean standard	6,902.44	7,567.12	10 months	Input feedstock 11.2 t	Waste 3.8 t
Installation of frequency regulators to the dryer motors	2,492.54	894.76	2 years and 9 months	Electric energy 14,515.02	-



RECP Experiences



RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment (EURO)	Savings (EURO/year)	Pay back period	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
				kWh	
Planting fast -growing trees	3,031.60	24,363.06	2 months	Fuel 1,350 l	-



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. After consultation with expert teams the company management selected the RECP measures to be implemented. The selected RECP options will be implemented in furniture manufacturing plant , compressor units, dedusting system and boiler house. Other selected RECP options will improve pellet production and wood dryer. Presented measures for lightning efficiency improvement contribute in overall electric energy consumption savings and more efficient production. All measures will contribute to electric energy savings, wood consumption and carbon dioxide emissions reduction.

Testimony Box

National Cleaner Production Program in Bosnia and Herzegovina

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RECP Experiences at Atlantic bb

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Atlantic bb Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The Resource Efficient and Cleaner Production (RECP) project in Atlantic bb printing industry, will achieve annual savings of EUR 8,500 with investment of EUR 12,946 and payback time of 1,5 year. The company selected 2 RECP measures to reduce energy consumption by 11%.



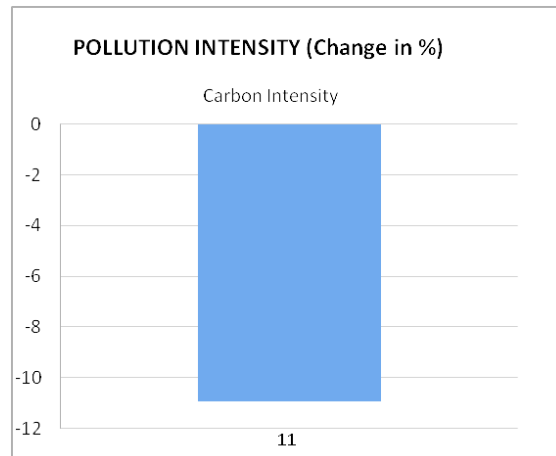
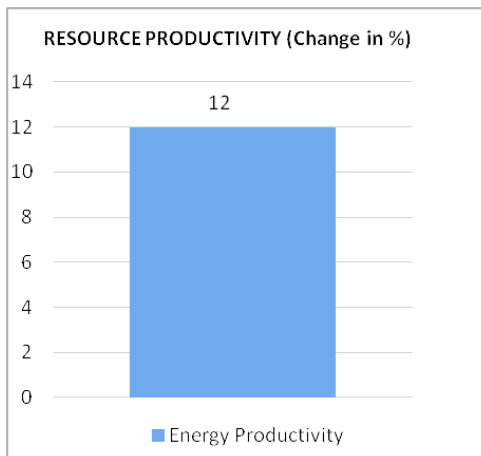
Overview

Atlantic was founded in 1988. The principal activities of the company include production and printing of all kinds of paper products and cardboard, light packaging, various types of forms, books and notebooks, posters, labels, brochures and catalogues. In addition to manufacturing, the Atlantic is engaged in trade of various types of stationary and office supplies. Atlantic employs 104 workers and hires seasonal workers as necessary.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-11	Energy Productivity	14
Pollution Generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-11	Carbon Intensity	-11

RECP profile



Resource Efficient and Cleaner Production (RECP)

Resource Efficient and Cleaner Production (RECP) entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

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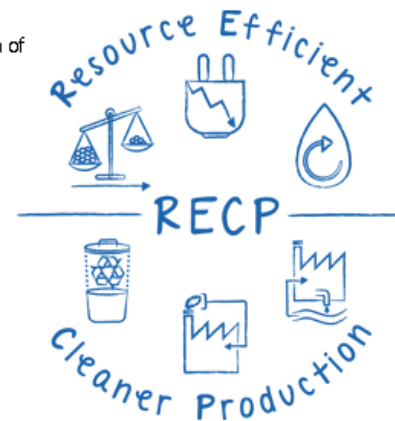
> Through improved productive use of natural resources by enterprises

- *Environmental management*

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Success Areas

RECP measures	Benefits					
	Economic			Resources		Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period	Reductions in energy, water and/or materials use (per annum)	Reductions in waste, water, air emissions and/or waste generation (per annum)	
Replacement of 25 metal halide bulbs of 400 watts, with LED bulbs 120W	4,316	2,805	1,5 y	Electric energy 33,945 kWh	Reduction of waste bulb for 2,5 times, 1 kg CO ₂ = 514,7 t	
Replacement of 78 bulbs with LED bulbs 250 W	8,629	5,695	1,5y	Electric energy 10,386 kWh	Reduction of waste bulb for 2,5 times, 1 kg CO ₂ = 157,5 t	



RECP Experiences



Approach taken

The Company participated in the National Cleaner Production Program in Bosnia and Herzegovina as one of the ten selected companies. The RECP assessment was performed by the company team and national experts trained in RECP methodology. The RECP assessment was supervised by international experts. The purpose of assessments made at the beginning of the project was to prepare a material balance, an energy balance and balances of water consumption and wastewater. The company management decided to focus on lighting system and to improve its energy efficiency.

Testimony Box

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RECP Experiences at Bentoproduct Ltd.

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Using Resource Efficient and Cleaner Production (RECP) this can be achieved in a holistic and systematic manner. RECP applies preventive management strategies to improve natural resources productivity, minimize generation of waste and emissions, and foster safe and responsible production. As experiences of Bentoproduct Ltd. Bosnia and Herzegovina show, benefits are obvious in many enterprises, regardless of their line of business, location or size.

Achievements at a Glance

The company Bentoproduct has a poor dedusting system and significant loss of product during charging. Selected RECP measures focus on material recovery and energy efficient lighting. The Resource Efficient and Cleaner Production (RECP) project in company Bento Product will achieve annual savings of EUR 109,707 with investment of EUR 109,619 and payback time of 1 year.



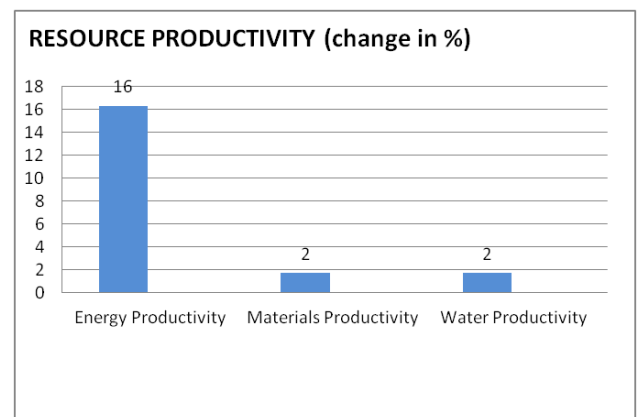
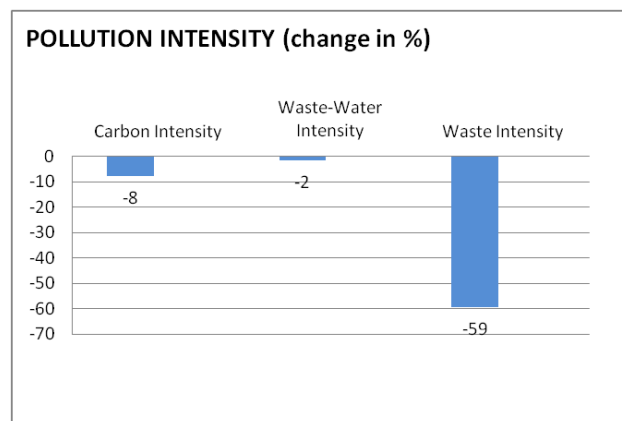
Overview

Bentoproduct Ltd. was founded in 2007 and it presently has 340 employees. The company manufactures calcium and sodium bentonite. The installed capacity enables the production of about 50,000 tons of various products of exceptional quality. The production plant is designed based on current scientific knowledge about the optimal technical and technological solutions for bentonite processing. The company has implemented ISO 14001: 2004.

Benefits

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
Resource Use		Resource Productivity	
Energy Use	-13	Energy Productivity	16
Materials Use	-	Materials Productivity	2
Water Use	-	Water Productivity	2
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-6	Carbon Intensity	-8
Waste-Water	-	Waste-Water Intensity	-2
Waste	-59	Waste Intensity	-59
Product Output	2		

RECP profile



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Success Areas

RECP measures	Benefits				
	Economic			Resources	Waste flow
	Investment EURO	Savings (EURO/year)	Pay back period		
Construction of a prefabricated building for storage of raw material	76,693.8	37,324.3	2 y	Reductions in energy use, water use and/or materials use (per annum) LPG 48,525.75 kg	Reductions in waste water, air emissions and/or waste generation (per annum) CO ₂ 162t
Installation of central dedusting and dust recovery	32,925.5	72,383.6	5,5 month	Bentonite 363 t	Dust 363 t
Preventing losses during charging of products in tanks	511.3	1615.7	4 months	Bentonite 8,1 t	Waste product 8,1t
Replacement of high pressure mercury vapor lamps in the production plant with high-pressure sodium lamps	5,887.4	2,396.2	1 year and 6 months	Electric energy 27,376 kWh	CO ₂ 11,2 t



RECP Experiences



Approach taken

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Testimony Box

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Gujarat Cleaner Production Centre

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