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Regional Activity Centre for Cleaner Production

MINISTERIO DE MEDIO AMBIENTE

Generalitat de Catalunya
Government of Catalonia
Department of the Environment and Housing

No. 23 Pollution prevention case studies

Water and energy conservation in the food industry

Company background	Edfina Company for Preserved Food is a public sector company that has a staff of 600 employees and its factory at Montazah, Alexandria, is one of the largest producers of preserved foods in Egypt. Kaha for Preserved Food (Kaha) is a private company that employs 650 staff. Production lines in both factories involve fruit juices, jam, frozen vegetables, canned beans and tomato paste. Both factories have can making, canning facilities and freezing units on site. Production at both factories is seasonal, and production levels are currently below full capacity.
Industrial sector	Preserved Food industry
Environmental considerations	In both factories, energy and water consumption was excessive. In addition, Kaha discharges 780,680 m^3/year of untreated effluent into the El Qalubiya Drain and Edfina discharges around 520,000 m^3/year of untreated effluent into the public sewer system, although it is in the process of installing a wastewater treatment plant.
Background	Industrial audits at both factories identified the following aspects to improve: As regards energy issues, both plants had steam leaks from the process and steam lines, heat losses through poor steam line insulation, steam losses from existing steam traps and in the can sterilisation unit, lack of steam traps on some jacketed equipment, and frequent condensate discharges to the drain. As regards water issues, there was excessive water consumption due to open cooling cycles and water leaks, some cooling towers out of order, insufficient cooling water recovery systems, taps and hoses left running and high water use in vegetable washing and for equipment and floor washing.
Summary of actions	A series of measures to reduce water and energy consumption were identified. Interventions to reduce energy consumption, mainly aiming at reducing steam and heat losses, were undertaken in both companies; interventions to reduce water usage were undertaken only at Edfina. As regards energy saving measures, the following were undertaken: 1. Insulation of bare steam pipes. 2. Replacement of leaking steam traps. 3. Replacement of leaking steam valves. 4. Installation of pressure regulators on sterilisers. 5. Installation of a condensate recovery system. 6. Improvement of boiler efficiency.

As regards water saving measures:

1. Placement of water meters in 13 locations in the factory to monitor water consumption.
2. Installation of hose nozzles to allow water flow only when required instead of using it continuously.
3. Improving water collection on the Dowe-Pack juice line by installing a larger tank together with a new water pump.
4. Installation of a cooling tower for the bottled juice line to recover and recycle cooling waters.

Balances

Options		Costs (€)	Annual savings	Payback period (months)
Energy-saving options	Insulation of steam pipes	Edfina: 38,009 Kaha: 18,956	Edfina: 24,504 Kaha: 22,307	Edfina: 19 Kaha: 10
	Replacement of leaking steam traps	Edfina: 4,277 Kaha: 4,430	Edfina: 6,182 Kaha: 9,777	Edfina: 8 Kaha: 5
	Replacement of leaking steam valves	Edfina: 14,379 Kaha: 11,891	Edfina: 4,790 Kaha: 8,400	Edfina: 36 Kaha: 17
	Installation of pressure regulators	Edfina: 13,329 Kaha: 13,822	Edfina: 16,373 Kaha: 47,231	Edfina: 10 Kaha: 4
	Recovery of steam condensate	Edfina: 10,154 Kaha: 12,183	Edfina: 2,772 Kaha: 10,190	Edfina: 44 Kaha: 14
	Improved boiler efficiency		Edfina: 4,734 Kaha: 10,603	
Total		Edfina: 80,148 Kaha: 61,288	Edfina: 59,355 Kaha: 108,508	
Water-saving options (only implemented in Edfina)	Hose nozzles	1,499	2,754	7
	Rehabilitation of the water collection system	2,587	7,344	5
	Cooling tower	25,953	26,438	12
Total		30,039	36,536	

Conclusions

Thanks to the implementation of the above-described options, steam savings were 15,278 m^3/year at Edfina and 18,125 m^3/year at Kaha, fuel oil consumption was reduced by 40% at Edfina and 34% at Kaha, and water consumption was reduced by 17% at Edfina in addition to wastewater volume reduction. It should also be stressed that the savings achieved in both companies are based on current production levels, and would increase 2-3 times when the factories are operating at maximum capacity.

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.

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