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Pollution

Prevention in the

Paper Sector

in the Mediterranean Region

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Castellano

English

Français

The Regional Activity Centre for Cleaner Production (RAC/CP) of the Mediterranean Action Plan has produced this leaflet in order to present some of the integrated opportunities for pollution prevention (OPP) in the paper sector in the Mediterranean region, with the objective of encouraging companies in the sector to apply practices, techniques and technology intended to prevent the environmental impact resulting from their activities.

Paper is a substance obtained from vegetable cellulose fibres, which are intertwined, forming a resistant, flexible sheet. The main raw material for the manufacture of paper products is cellulose fibre, either virgin fibre or secondary fibre, although other auxiliary raw materials are used to reduce costs (mineral fillers), to improve the manufacturing process (processing additives), or to improve the properties of the final product (pigments, sizing agents, coating agents, etc.)

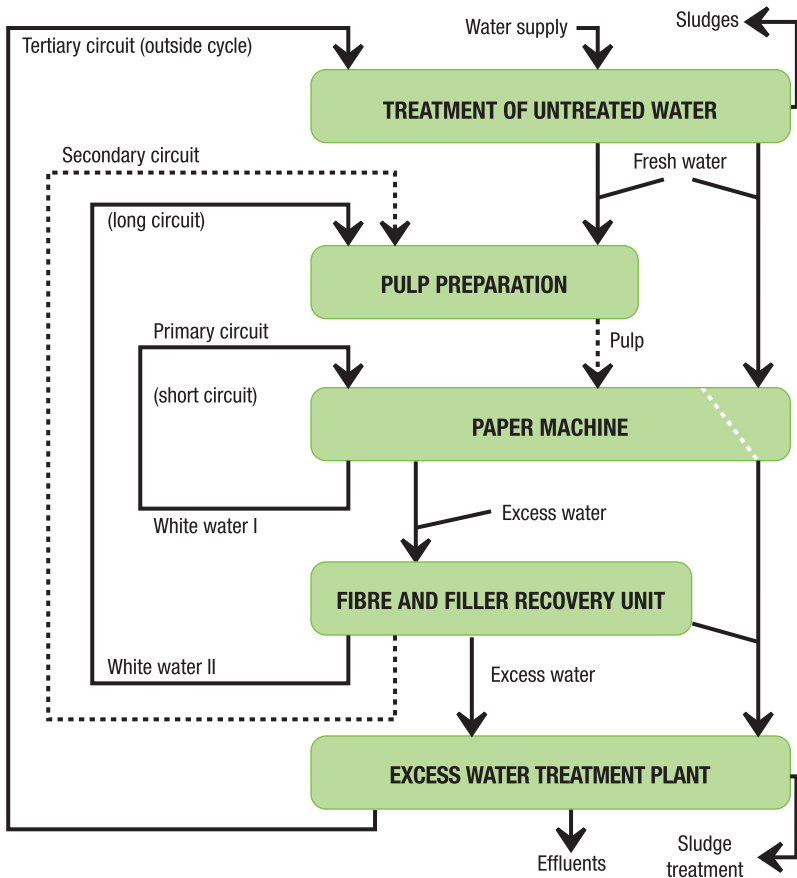
The main potential sources of pollution are:

Atmospheric	Volatile organic compounds, malodorous compounds, CO ₂ , NO _x , SO _x , suspended particles in energy production processes, etc.
Effluents	Organic and inorganic suspended solids and dissolved solids, halogenated compounds, etc.
Solid waste	Rejects produced during pulp purification, sludges from the treatment of feed water and white waters, starch remnants, chemical additives, harmless waste, etc.

ENVIRONMENTAL PROBLEM	PREVENTION ALTERNATIVE	BENEFITS					
		Reduction in water consumption	Reduction in energy consumption	Reduction in raw materials consumption	Reduction in liquid waste	Reduction in pollutant load of wastewater	Reduction in atmospheric emissions
Pulp manufacturing	Dry debarking		■		■	■	
	Water recirculation				■		
	Use of storage tanks				■	■	
	Control and recovery of leaks and spills				■		
	Screening of the unbleached pulp					■	
	Closure of water circuits				■	■	
	Efficient washing			■		■	
	Extended modified cooking			■		■	
	Oxygen delignification			■		■	
	Ozone bleaching				■	■	
	ECF bleaching					■	
	TCF bleaching					■	
	Elimination of chelating agents			■			
	Clarification by air flotation					■	
	Use of filtration membranes and recycling					■	
	Membrane bioreactor					■	
	Control of emissions from the wood yard						■
	Increased concentration of the black liquor		■				■
	Washing of boiler gases					■	■

ENVIRONMENTAL PROBLEM	PREVENTION ALTERNATIVE	BENEFITS					
		Reduction in water consumption	Reduction in energy consumption	Reduction in raw materials consumption	Reduction in liquid waste	Reduction in pollutant load of wastewater	Reduction in atmospheric emissions
Pulp manufacturing	Purification and reuse of condensates from evaporation	■					■
	Processing the gases from boilers with an electrostatic precipitator			■			■
	Selective non catalytic reduction "SNCR"						■
	Improvement in the washing of causticising sludges						■
	Improvement in pulp preparation		■				■
	Energy and steam cogeneration		■				■
	Boilers with fluidised beds for sludge incineration						■
	Minimising loss from rejects			■			
	Dry debarking	■	■		■	■	
	New energy efficient TMP pulp processes		■				
Paper manufacturing	Circuit closure	■			■		
	Use of disc filters for recovery of fillers and fines					■	
	Recovery and recycling of coating products	■				■	
	Pre-treatment of wastewater				■	■	
	Replacement of chemical products					■	■
	Elimination of accidental spillages				■	■	
	Energy and steam cogeneration		■				■
	Use of low sulphur or renewable fuels						■
	Optimisation of dewatering in presses		■				

PULP, WATER AND WASTE FLOWS IN A PAPER FACTORY



SOME EXAMPLES OF THE INTRODUCTION OF OPP

A company with problematic accumulation of contaminants in process waters installed a dissolved air flotation (DAF) treatment stage to eliminate suspended solids and stickies, and then recirculate the treated water in the manufacturing process.

	BENEFITS
Dissolved air flotation unit with an effective surface area of 69 m ² and a height of 1m. The suspension is saturated with pressurised air, thus generating small bubbles.	<ul style="list-style-type: none">- Elimination of 99% of suspended solids- Elimination of 80-95% of ash- Elimination of 10-15% of COD

Investment: €253,000

- This system means that the accumulation of contaminants does not affect process waters and/or the quality of the final product.

A company involved in the manufacture of various types of paper from recovered paper applied the following environmental improvement measure to reduce water consumption in the process and wastewater discharge.

	BENEFITS
Reuse of the water from the vacuum pumps in the paper machine.	<ul style="list-style-type: none">- 10% reduction in water consumption and 10% reduction in the treatment and discharge of wastewater.

Investment: €6,000

Annual savings: €11,785

Payback period: 0.51 years

Mediterranean Action Plan

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Ministry of the Environment
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