EXAMPLES

RECOVERY AND RECYCLING AT SOURCE

The company belongs to the garment-ennobling sector for third parties. It has implemented a system for recovering and recycling the desizing baths:

Installation of:	**BENEFITS**
An additional drainage system for emptying the desizing baths of the machines	- Reuse of the desizing baths up to 20 times - Reduction by 68% of the consumption of enzymes in the desizing bath formulation - Reduction by 85% of water consumption in the desizin process - Reduction by 85% of COD in the wastewater discharged into the treatment plant of the company
A storage tank for the desizing baths	
A system for sending the recovered desizing bath back to the machines	
A control system	

Investment: 57,276 € **Savings:** 85,188 €/year **Payback period:** 8.4 months

The company belongs to the ennobling sector. It has installed a system for neutralising the wastewater by using the steam produced by the cogeneration boilers:

	BENEFITS
Installation of a system to use the combustion gases generated by the cogeneration boilers to neutralise the wastewater, previous to their biological treatment	- Reduction by 50% in the consumption of sulphuric acid used for neutralisation - Reduction of the presence of sulphates in the wastewater neutralised - Reduction of CO_2 and SO_2 emissions - Reduction of the risk of over-acidification and operation in the biological treatment plant

Investment: 210,354 € **Savings:** 48,377 €/year **Payback period:** 4.4 years

NEW TECHNOLOGIES

The company belongs to the dyeing and garment-ennobling sector. It has installed an integrated computer system to control all stages in the dyeing process:

Installation of an integrated computer syst. consisting of:	**BENEFITS**
A central computer and processor	- Reduction in the consumption of energy, water, dyes and auxiliaries - Reduction of COD and SS in the wastewater
Microprocessors	
Flowmeter	
Measurers	

Investment: 327,626 € **Savings:** 49,348 €/year **Payback period:** 6.6 years

Mediterranean Action Plan

Regional Activity Centre
for Cleaner Production (RAC/CP)

París, 184, 3a planta - 08036 Barcelona (Spain)
Tel.: +34 93 415 11 12 - Fax: +34 93 237 02 86
E-mail: cleanpro@cema-sa.org
http://www.cema-sa.org

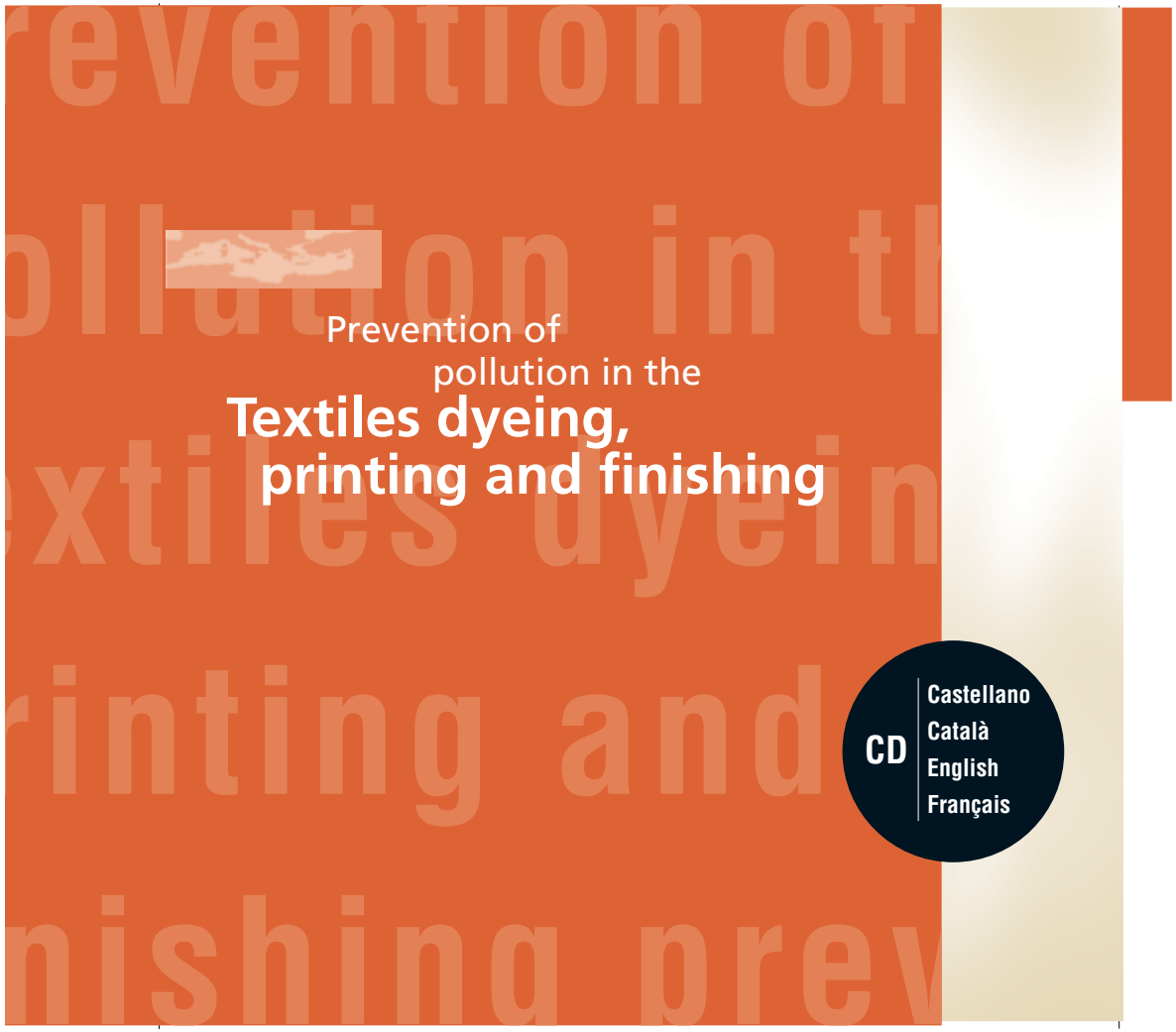
UNEP

Regional Activity Centre for Cleaner Production

Ministry of the Environment Spain

Government of Catalonia Ministry of the Environment

rev
oll
exti
rint
nis



The Regional Activity Centre for Cleaner production (RAC/CP) of the Mediterranean Action Plan has prepared this brochure about prevention of pollution in the textiles dyeing, printing and finishing in order to present some of the opportunities that can be implemented for reducing pollution and recycling at the source.

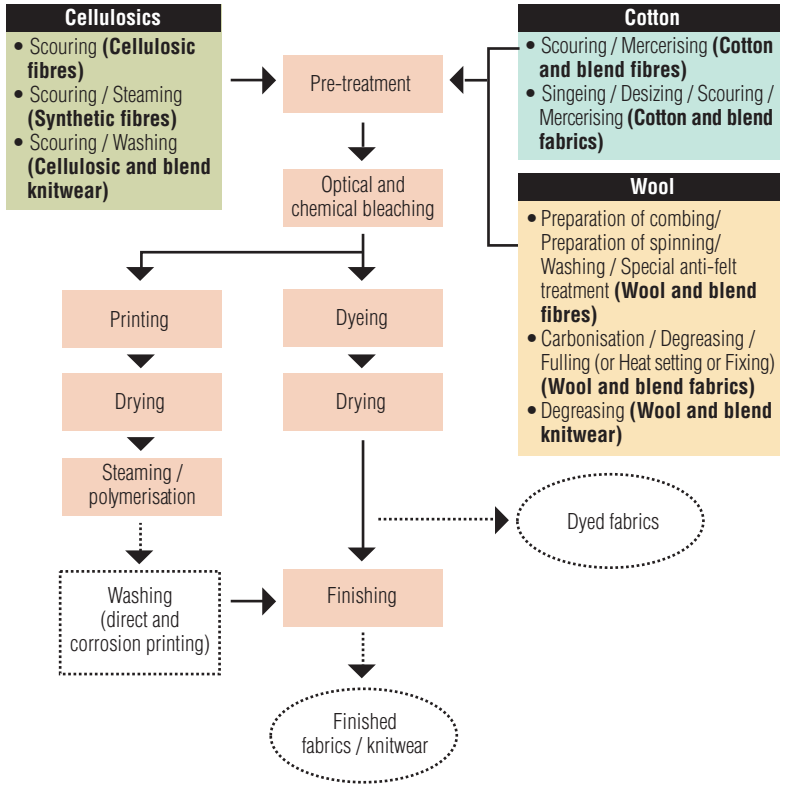
The textiles dyeing, printing and finishing sector has the following main **characteristics**:

- Raw materials from other companies and, often, no knowledge of the chemicals that may have been used at previous stages of their manufacture
- Great variety of raw materials and processes
- Handling of a large number of dyes, auxiliary products and chemicals
- Processes that quickly change with time
- Progressive reduction of consignments to be processed
- Many of the stages are done wet and at a high temperature, needing water of a certain quality and thus requiring previous conditioning
- Growing quality requirements

Given these characteristics, the following main **effects on the environment** are generated:

- High water and energy consumption
- Generation of a large volume of wastewater with a significant pollutant load and colour
- Generation of out-of-date or obsolete dyes, auxiliary products and chemicals
- Generation of a large number of empty containers and packaging waste
- Emission into the atmosphere of volatile organic compounds, if dyes, auxiliary products and sizing agents containing such compounds have been used

Simplified flow chart of the most common processes in the textiles dyeing, printing and finishing



MINIMISATION OPPORTUNITIES

REDUCTION AT THE SOURCE	*SUBSTITUTION OF RAW MATERIALS*	Selection of new ranges of reactive dyes
		Substitution of conventional lubricants with hydrosoluble oils in the manufacturing of knitted
		Substitution of surfactants with biodegradable surfactants
		Replacement of the afterchroming wool dyeing process with the dyeing process using reactiv
		New selected sulphur dyes
		New oxidising system for dyes made with sulphur dyes
		New formulas for reductive baths following polyester dyeing with disperse dyes
	NEW TECHNOLOGIES	E-control process for dyeing cellulosic fabric with selected reactive dyes
		Colorite
		Recovery and reuse of printing pastes
		Reductive treatment following the dyeing of polyester with disperse dyes in the same dye bat
		Jet-overflow dyeing machine
		Liposomes as auxiliaries for dyeing wool
		Washing knitted elastic fabric prior to heat setting
		Easy care finish low in formaldehyde
		Bioscouring process of cotton fabric and blends in overflow-type discontinuous processes
		Cotton pretreatment with cationic agents
		Samples by digital printing
		Technology of printing by transfer
		Systems of minimum finish application
	GOOD HOUSEKEEPING PRACTICES	Substitution of traditional paraffin with synthetic paraffin in the formula for sizing cellulose warp threads a
		Demineralisation and desizing of woven cotton fabric by the pad-batch system
		Washing and dyeing of knitted polyester fabrics in a single bath
		Single stage desizing, scouring and bleaching of cotton fabric
		Printing with pigments
		Other good housekeeping practices
RECYCLING AT THE SOURCE		Substitution of starch-type sizing products with synthetic, hydrosoluble sizes in the sizing of warps f
		Membrane technology for recycling wastewater

	BENEFITS							
	REDUCTION OF WATER CONSUMPTION	REDUCTION OF ENERGY CONSUMPTION	REDUCTION IN THE CONSUMPTION OF RAW MATERIALS	REDUCTION IN WASTEWATER POLLUTANT LOAD	REDUCTION IN ATMOSPHERIC EMISSIONS	RREDUCTION IN THE AMOUNT OF WASTE GENERATED	IMPROVEMENTS IN THE WASTEWATER TREATMENT PLANT	INCREASE IN PRODUCTIVITY
		■	■	■			■	■
ıg of knitted fabric	■	■						■
				■			■	
ısing reactive dyes				■				■
	■		■	■	■			
				■				
	■			■				
	■	■	■	■				■
	■	■	■	■	■	■	■	■
	■	■	■	■		■	■	
ıme dye bath	■	■		■				■
	■	■						
		■	■	■				■
	■				■			■
		■			■			
processes	■	■		■				■
			■	■				
	■			■		■		
	■			■				
	■	■		■				
arp threads and its blends with chemical fibres	■	■	■	■				
	■	■		■				
	■	■						■
	■	■	■	■				■
	■	■		■	■			
	■	■		■	■	■		
ıg of warps for manufacturing woven fabric	■		■	■				
	■			■				