



**assomac**

NATIONAL ASSOCIATION MANUFACTURERS  
OF FOOTWEAR, LEATHERWOODS  
AND TANNERY TECHNOLOGIES

**SUSTAINABILITY**

**LEATHER** INDUSTRY **SURVEY**



## Definition of "Sustainable Development"

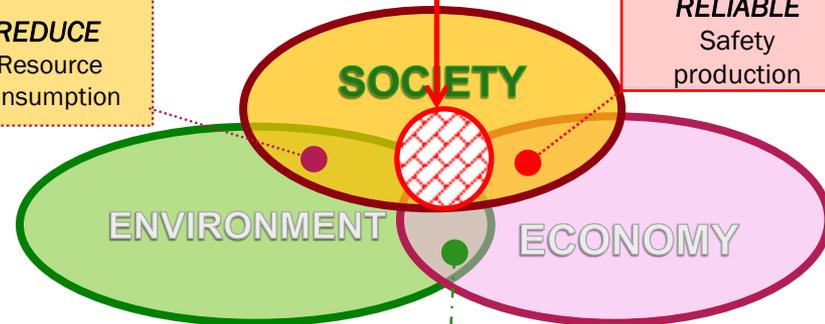
"... support the present necessities without compromising the ability of future generations to meet their own needs ..."

1985 World Commission on Environment and Development



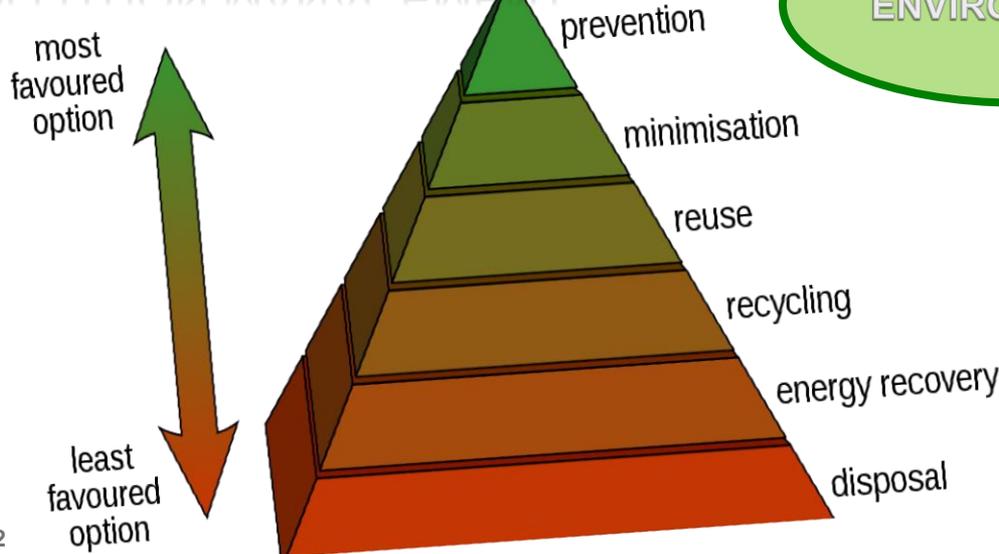
**REDUCE**  
Resource  
Consumption

**RELIABLE**  
Safety  
production



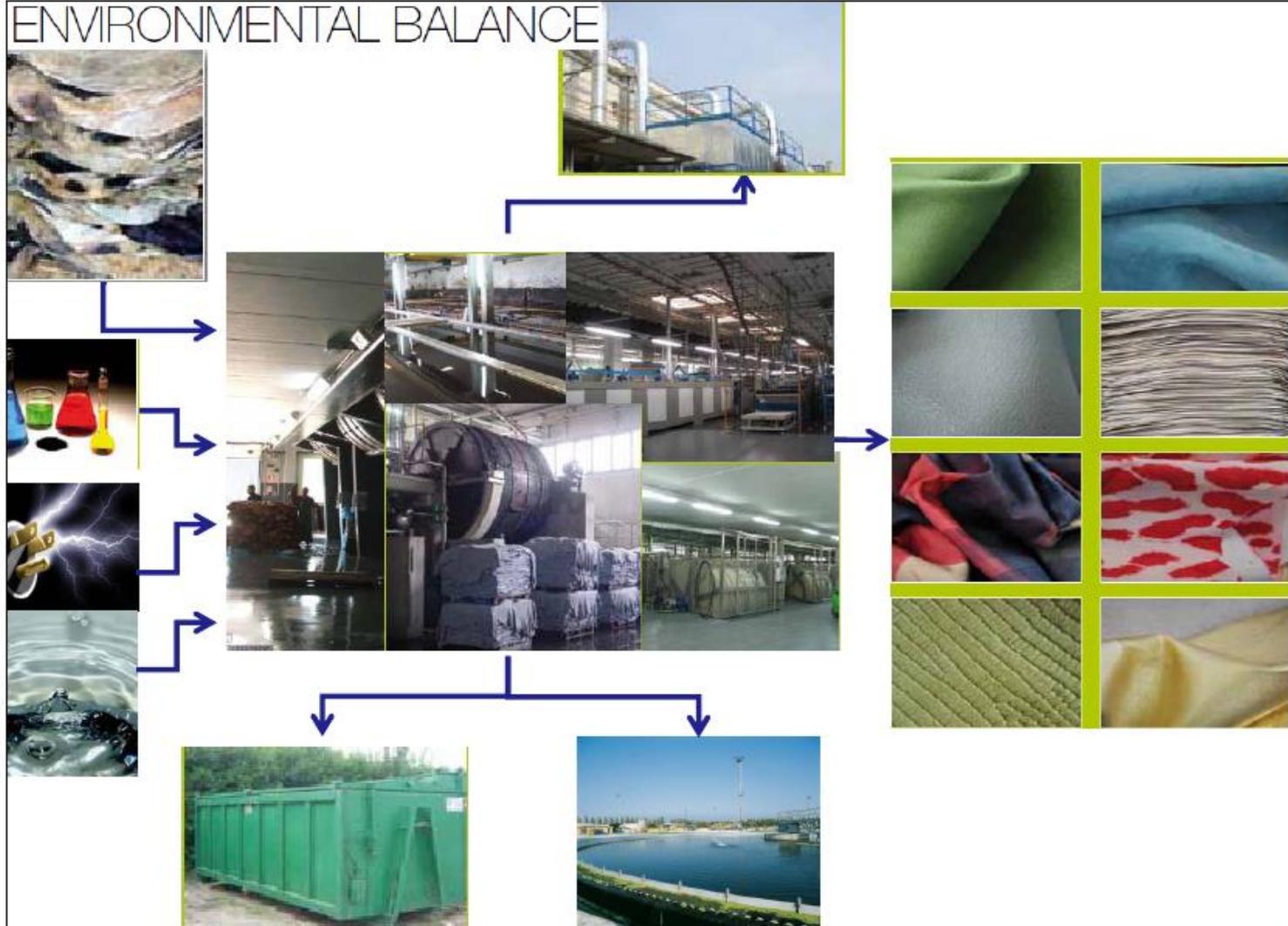
**RECYCLE**  
Waste recovery

## HIERARCHY OF POLLUTION MANAGEMENT



# BALANCE ... !!!

Typically, the value of cattle hides, sheep and goat skins represents in the region of 5-15% of the market value of an animal.





## Alternative Tanning Systems

# leather sustainability

<http://www.leathersustainability.com>

Trivalent chromium remains a key chemical in the production of leather. However, there is continued interest in alternative tanning chemistries to provide options for the production of chrome free leathers (to a standardised level of chrome).

Collagen can be tanned in many different ways including metals and range of polyphenol and reactive chemicals. The two main alternatives to chromium are, however, vegetable tanning and aldehyde tanning. The resulting leather from these alternative tannages is different in terms of performance, handle and appearance to a chrome tanned leather but can be used for specific end uses.

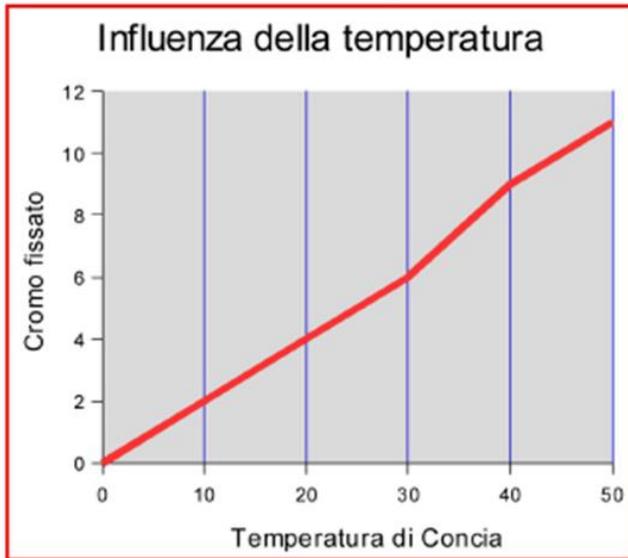
Development with the leather industry, particularly within the chemical sector is ongoing to further refine systems and offer new alternatives.



## In Tannery

improve Cr fixation:

- Offered Cr (in Cr<sub>2</sub>O<sub>3</sub>)
- Final temperature of tanning
- Duration of tanning
- pH end tanning
- masking.



## Leather Cluster



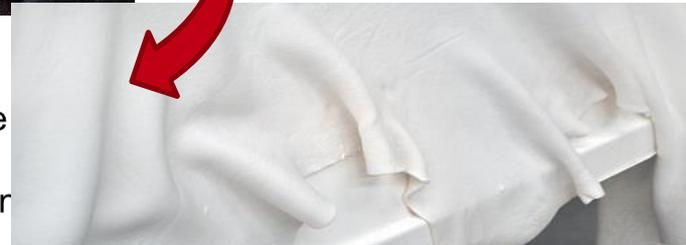
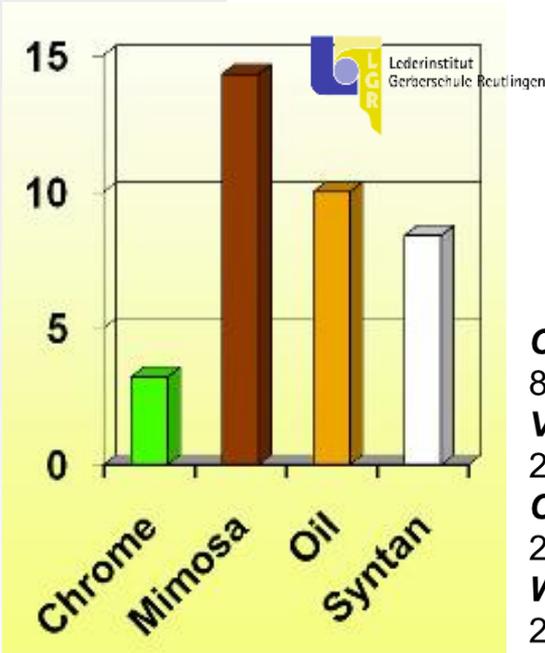
Total volume of Cr-effluents (m <sup>3</sup> /day)	80
Mean Cr III content (1) (g/L as Cr <sub>2</sub> O <sub>3</sub> )	3.25
Max. recoverable chrome (kg Cr <sub>2</sub> O <sub>3</sub> /year)	65,000
Plant working hours (2) (one shift per day)	16
<b>Efficiency of recovery %</b>	<b>99 ca.</b>
Residual Cr III in the filtration waters (mg/L as Cr)	5-10



# CLEAN OR .... CLEANER...??

Tannery Industry

## Guidelines for a more sustainable BEAMHOUSE & TANNING PROCESSES



**Chrome:**  
8% tan.ag. = 2% Cr-oxide

**Vegetable (Mimosa):**  
25% tannins (70% tan.con)

**Chamois (Oil):**  
25% offer

**White-tan. (Syntan):**  
20% tan.ag. (95% tan.cont.)

- Biodegradation**
- Banana peel 2-10 days
  - Cotton 1-5 months
  - Paper 2-5 months
  - Plastic bags 10-20 years
  - **Leather shoes 25-40 years**
  - Aluminium cans 80-100 years
  - Nappies 500-800 years



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## BIODEGRADABILITY...



## LCA Life Cycle Assessment

# SOCIAL RESPONSIBILITY

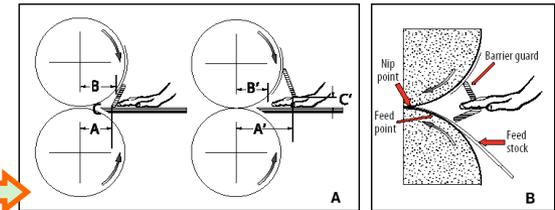


## Safety Management:

- Prevention
- Safety
- Guard Control

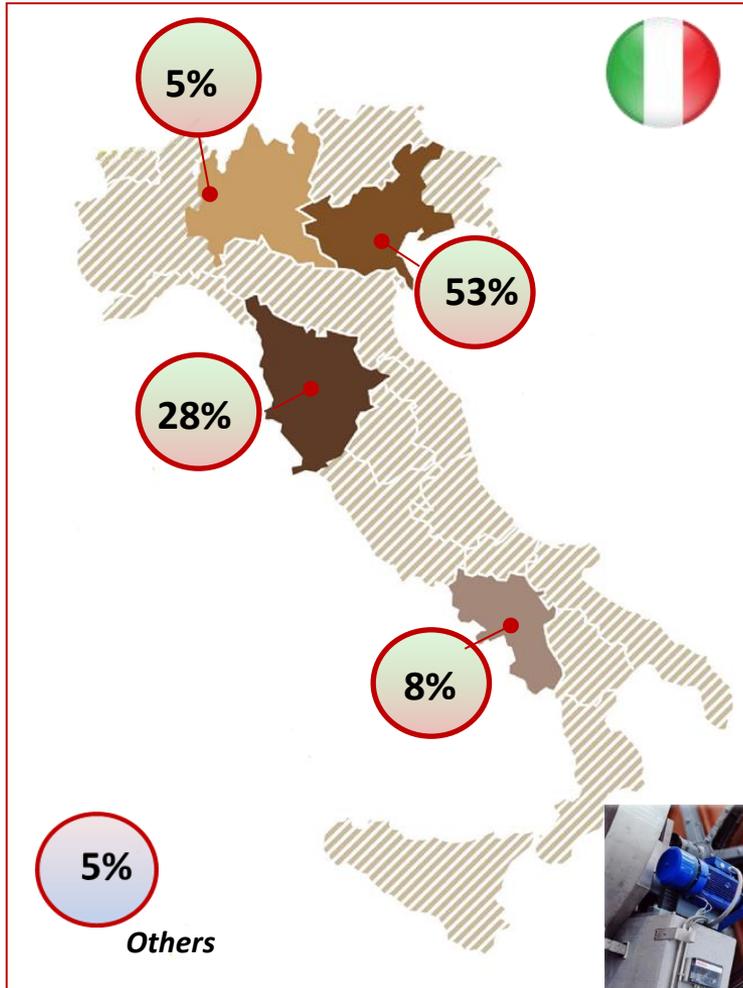


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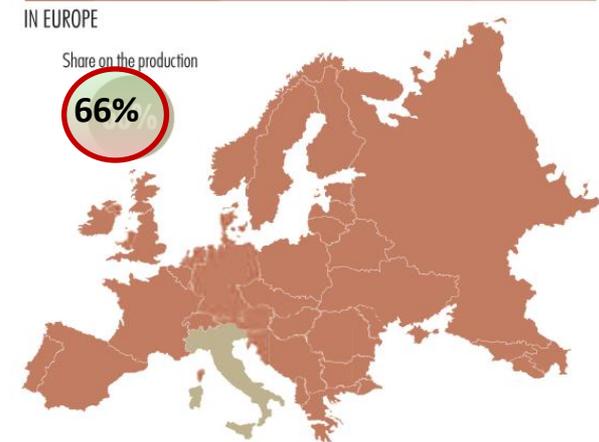


EN	Standard title
UNI EN 972	Reciprocating roller machines
UNI EN 13112	Bandknife shearing machines
UNI EN 1035	Moving platen machines
UNI EN 13113	Roller coating machines
UNI EN 13114	Rotating process vessels

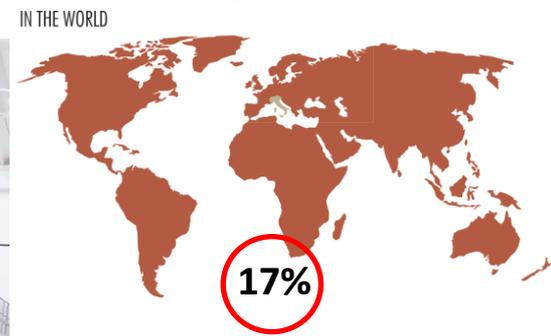
# Italian Tannery Industry



COMPANIES	1260
employers	18000
sqm leather	127 milions
sqm sole leather	32 th. tons
revenues	5.3 billions €
Export 121 countries	4.1 billions € (75% of turnover)

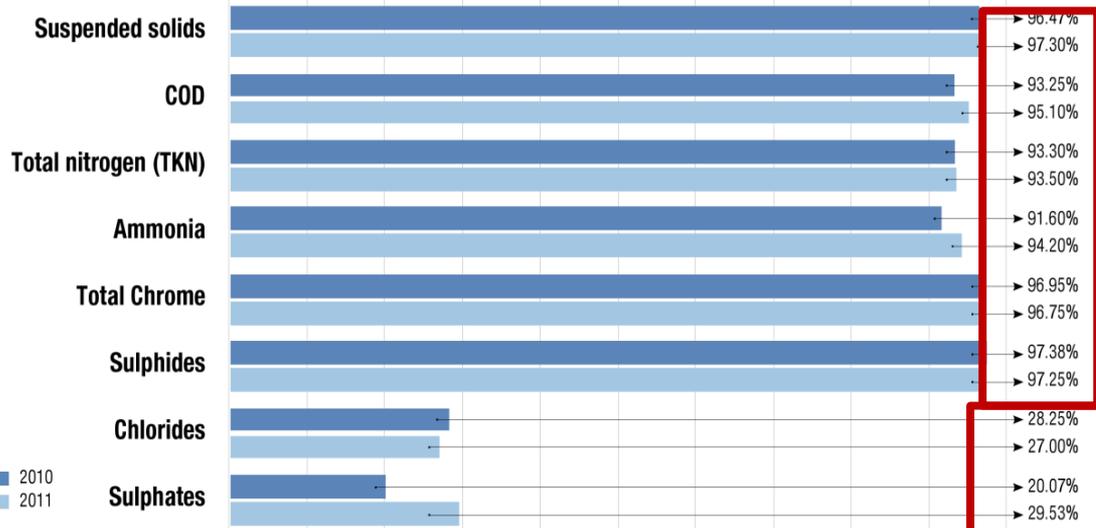
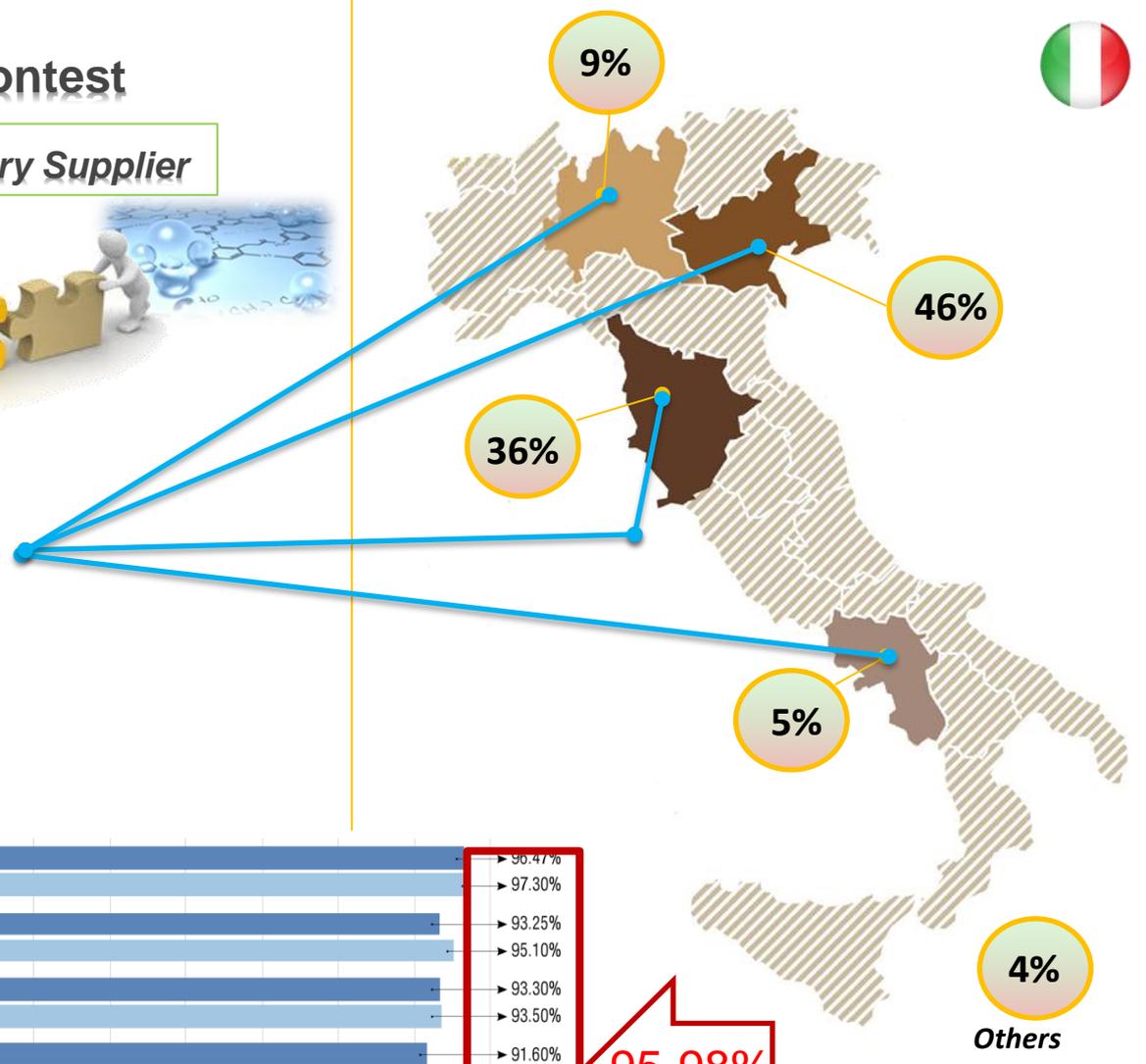


UNIC 2014 Sustainability Report



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# Italian Tannery Contest



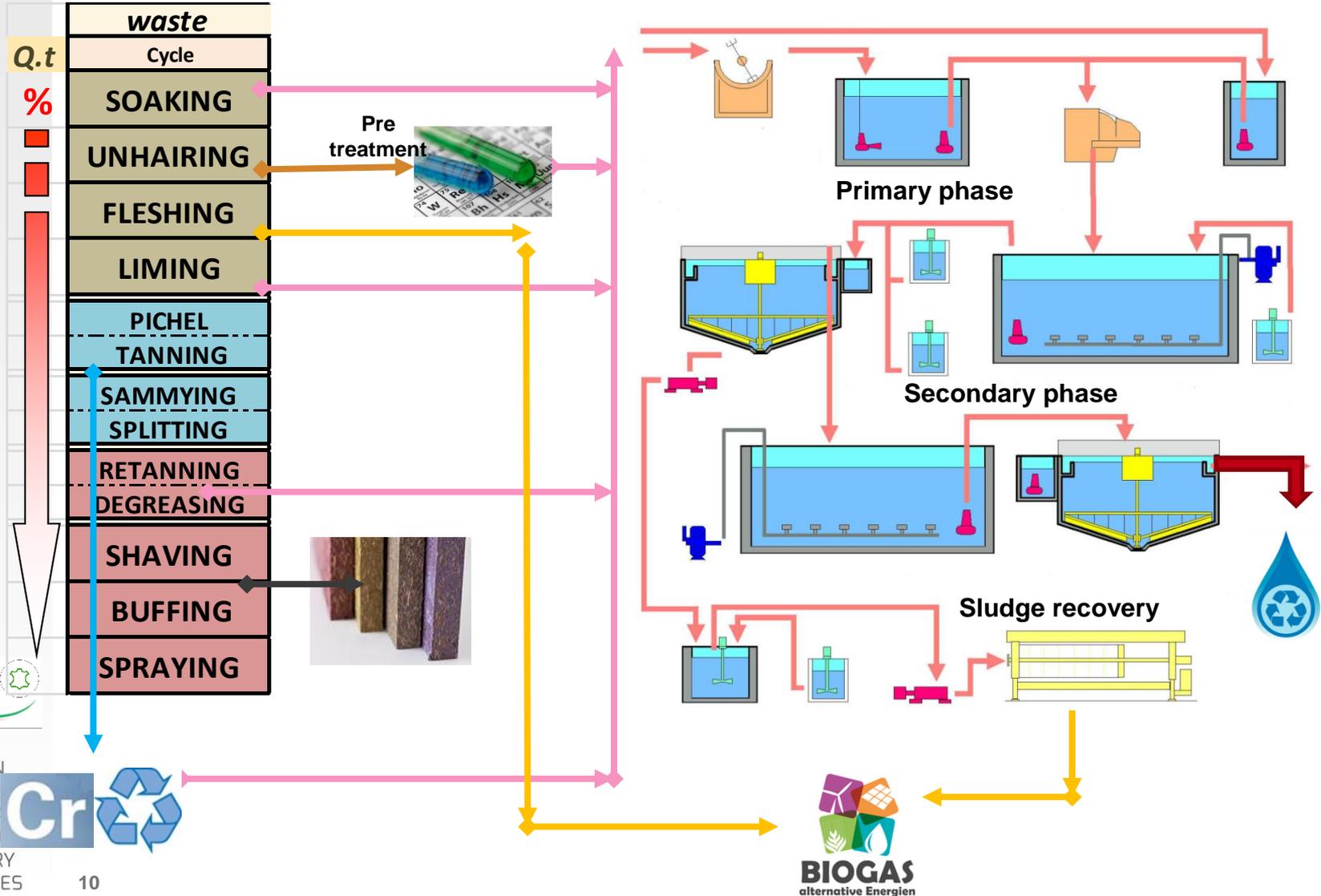
95-98%

28-33%



# TANNING WASTE WATER ... FLOW MAP

*Upstream ...provide a good "SELECTION" for ensuring effective waste management ...Downstream*





	from RH to WB	from WB to end
<b>COD (filtr) mg/l</b>	5000	2500
<b>CrIII mg/l</b>	120	45



Waste water from tanneries to ETP  
(average composition, year 2010)

<b>pH</b>	<b>8</b>	
<b>Sulphide (S<sup>=</sup>)</b>	<b>63</b>	<b>mg/l</b>
<b>Chrome (Cr<sup>3+</sup>)</b>	<b>79</b>	<b>mg/l</b>
<b>COD</b>	<b>5439</b>	<b>mg/l</b>
<b>BOD<sub>5</sub></b>	<b>2241</b>	<b>mg/l</b>
<b>TKN</b>	<b>439</b>	<b>mg/l</b>
<b>TSS</b>	<b>2112</b>	<b>mg/l</b>
<b>Surfactants</b>	<b>104</b>	<b>mg/l</b>
<b>Chloride</b>	<b>2278</b>	<b>mg/l</b>
<b>Sulphate</b>	<b>1592</b>	<b>mg/l</b>

IN ≅ industrial wastewater (by a specific sewer):

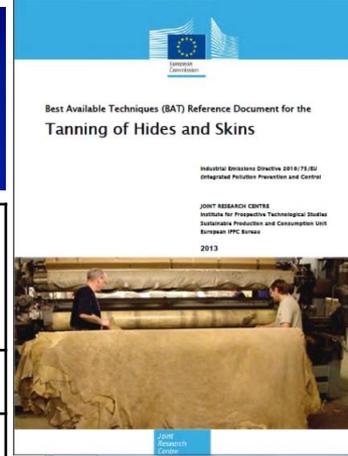
**30.000 m<sup>3</sup>/d**

IN ≅ municipal wastewater (by separated sewer):

**10.000 m<sup>3</sup>/d**

Tanneries Connected	130
Capacity	1.500.00 eq. Inh
Employees	60
Electrical power	6.500 Kw
Area covered	50.000 sq/mt





Parameter	Average values (2010) (mg/l)	Permit conc.(mg/l)	YIELD %	BREF 2013 %
COD	89	150	97	85-95
BOD <sub>5</sub>	< 5	25	99,7	90-97
TSS	10	35	99,2	90-98
TKN	6	-	97,7	80-90
N-NH <sub>4</sub>	< 0,4	15	99,8	-
N-NO <sub>2</sub>	0,05	0,6	-	-
N-NO <sub>3</sub>	13	20	-	-
Cr <sup>3+</sup>	0,26	2	99,4	<1 (mg/l)
S <sup>--</sup>	N.R.	1	100	<1 (mg/l)
Cl <sup>-</sup>	1353	2050	-	-
SO <sub>4</sub> <sup>--</sup>	1247	1850	-	-

N<sub>tot</sub>=92,2

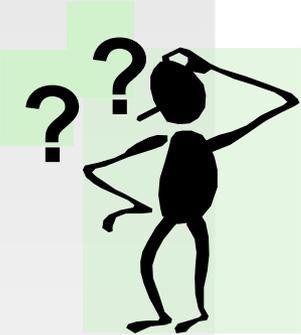


JOINT RESEARCH CENTRE





# SOLID WASTE REQUALIFICATION



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# Gelatine applications



healthcare

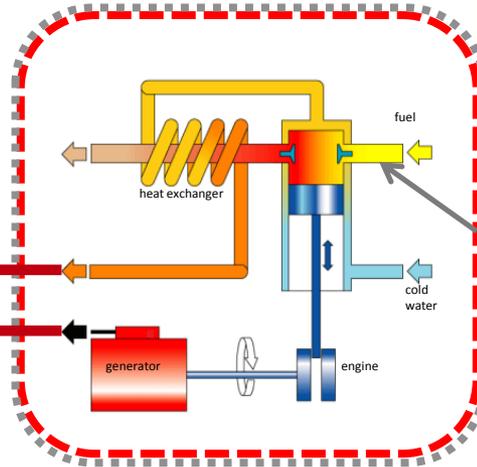


foods preparation

Industrial



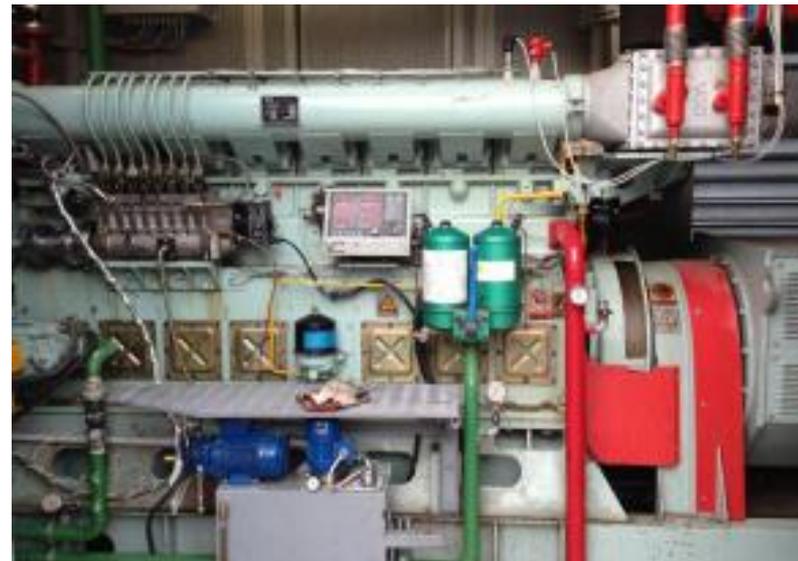
# COGENERATION



<b>Electric Power generation</b>	<b>200 kWe</b>	<b>340 V 50Hz</b>
<b>Thermic Power generation</b>	210 kWt	
<b>Operation</b>	7000 h/year	
<b>Fuel consumption</b>	250 g/kWh	Fat or Veg. oil
<b>Process efficiency</b>	0,94	

**The system can be scaled up to 1 MW**





### Alternator data:

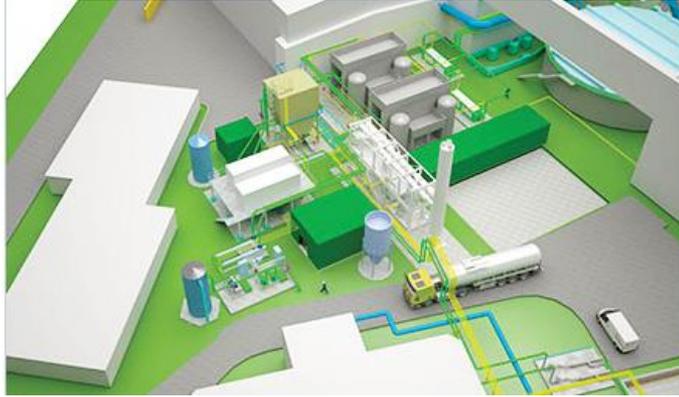
<b>Rated power</b>	<b>199 kW</b>	
<b>Rated voltage</b>	400 V	
<b>Rated current A 360</b>	360 A	
<b>Phase and connection</b>	3-phase, 4-wires	





# SOLID WASTE ...

## Fertilizer



<http://www.ilsagroup.com>

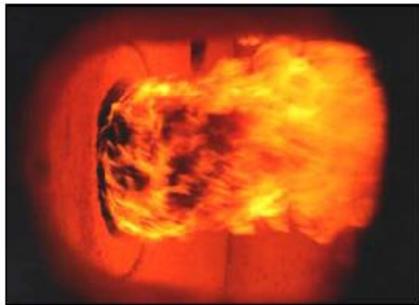
## Extrusions



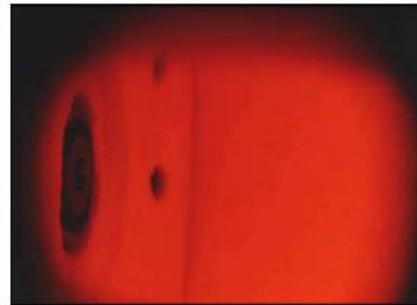
<http://www.bader-leather.de>



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Flame Combustion



Flameless Combustion

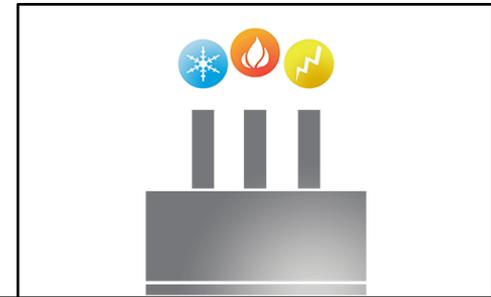
ON-FIELD,  
*some interesting results  
 combustion without oxygen  
 pyrolysis or  
 gasification*



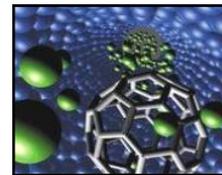
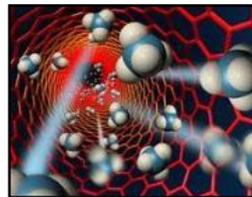
## COMUNICACIONES



## BIOTECHNOLOGIES



## COGENERATIONS



## NANOTECHNOLOGIES