# Environmental Report 2003

UNIONE NAZIONALE INDUSTRIA CONCIARIA

# NATIONAL TANNING INDUSTRY UNION

UNIC

The Italian trade association, member of Confindustria, the Italian manufacturers' association, groups together and represents the most highly specialised firms in the area of tanning, dyeing and finishing of skins and hides in Italy. The member firms supply producers of footwear, leather accessories, furniture, upholstered items, bodywork and clothing, guaranteeing efficiency, flexibility and a guarantee of quality of the product and manufacturing process, with respect for the environment, consumers and workers. One of the keys to the success of Italian goods worldwide lies in ongoing research into tanning and finishing, experimenting new physical and chemical treatments, and in the high calibre of tanners. Via special schemes the association supports and enhances this expertise and, beyond the structural features of the skin and hide, also deals with promoting the intrinsic qualities consisting of technical specifications which can be checked "a posteriori" and which represent the actual essence of the product.
**www.unic.it**

## THE GROUP

**National union of accessories and components**, trade association founded in 1991 and member of Confindustria. It represents Italian producers of accessories and components for the footwear, leather accessories, clothing and furniture industries (2002 revenues: 1.9 billion euros).

LINEAPELLE

The most important trade show in the world for supplies (leather, fabrics, materials, synthetics, accessories, designers etc.) for footwear, furniture, car interiors, clothing and leather accessories. The 1,500 exhibitors from 50 countries and the 30,000 visitors from 117 countries meet twice a year in Bologna.
**www.lineapelle-fair.it**

anteprima

Presentation of the design projects of the 117 best Italian and European producers to designer firms, privately, with exclusive professional value.
Held twice a year in Milan.
**www.trendselection.com**

Trend Selection

Specific presentation for US firms and designer labels of the design projects of top-range Italian producers.
Held twice a year in New York and, as a conference, in Paris.
**www.trendselection.com**

CONCIARICERCA ITALIA s.r.l.

Scientific research company, owner of programs found on the market or funded by the European Commissions or by Italy's education and research ministry, currently engaged in projects with total value of 15 million euros in order to perfect the production cycle, technological level and environmental impact.

ICEC

DNV DET NORSKE VERITAS

**ICEC**, certification body and partner of DNV, specialised in leather, has to date issued around 150 certificates (quality, environment, product).
**www.icec.it**

*AreapelleClub*
*Lead firms in the supply chain*

An exclusive club of 20 entrepreneurs, the equivalent of 1.6 billion euros of revenues, which brings together manufacturers and producers of top-range intermediate goods in order to group together lead companies, promote strategic innovations and encourage cooperation and fair play between members.

MdP settimanale la Conceria

Weekly journal, founded in 1893, it gives information on the market and economy of the leather industry. Average circulation of 2000 copies.
**www.laconceria.it**

**LPMagazine**, a weekly publication, provides analyses and forecasts of consumption in the leather industry for around 20,000 readers.

LINEAPELLE magazine

The quarterly **Lineapelle Magazine** is a presentation of the fashion trends and selection of products from exhibitors at Lineapelle.

# PRESENTATION

In the public imagination a tannery is reminiscent of smells, polluted water and contaminated soil. As if often the case, when environmental problems are involved, there is a divergence between the perception and the reality of the risk.
Large and targeted investments, stricter laws in competitor countries, national association schemes and awareness of the competitive importance of the ecological variable have pushed the industry towards standards of absolute excellence. The category for many years has undertaken research into constant improvements of its impact in the territory and in society.
This first edition of the environment report aims at testifying on the results already achieved. It is not a mere physical balance, however essential for grading progress, but instead a set of indications on the role we have played in the relationship with the public, from whom we obtain resources but to whom we return a series of benefits, both economic and social.
It is structured in two sections.
The first analyses the positioning, policies and relations as indicators of value generated in the broadest sense, such as for example regular employment and social integration.
The second forms the environmental balance, structured in sections (water, air, waste, energy). The resulting situation has widely differing sources, in that it is a consequence of an industrial structure with highly fragmented districts.
The report sets out to contribute to defining an information system useful for institutions and social and economic organisations, and essential for building modern industrial growth, in an increasingly complex situation, now impossible to manage with a single, rigid legislative system. The report, updated periodically, is to become the starting point for group synergies, in which UNIC is to act to maintain the leadership of the Italian tanning industry.
The cooperation of the 23 tanneries
(cf. page 52), taking part in the work, deserves official recognition.

*S. Mercogliano*

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PART ONE

# The Tanning Industry and the Environment

# Beginnings and Histor of the Tanning Industry

Mankind, using animal flesh for food, was left with a rigid material which rotted easily, yet, right from Palaeolithic times, discovered that special treatments could make it durable, strong, soft and flexible. Thus the history of tanning began (even if the actual art of tanning is only mentioned at the end of the nineteenth century, with the development of modern chemistry).

There are three early tanning (or semi-tanning) techniques, directly demonstrated by archaeological findings: tanning with fats (or oil), vegetable tanning and smoking.

The first, suitable for obtaining soft leather, consists in treating dry skins and hides with fatty waste and brain matter, while vegetable tanning is carried out by immersing the hides in water containing tannic extracts from oak bark or other plants including sumac (Rhus coriaria) and acacia (Acacia nilotica). This latter method was then developed to obtain a hard, compact and strong leather (vegetable-tanned leather).

*Engravings on an ancient Egyptian tomb*

Again during the Palaeolithic age, after the birth of *Homo Sapiens*, smoke tanning was introduced, consisting of the prolonged exposure of skins and hides to smoke containing aldehyde and phenolic compounds which, as was later discovered, are suitable for obtaining non-rotting products.

These techniques were perfected and developed as the human race evolved and were adopted by the major ancient peoples, as shown by pictures, objects and written documents handed down by the Sumerians, Assyrians, Babylonians, Egyptians and Greeks. Homer too, in the Iliad(1), describes efforts by tanners in stretching the skin and hide in order to permeate it with fat.

In addition to the tanning methods described above, as from circa 5000 BC, others became widespread. There is evidence of the use of alum by the Egyptians, in the pre-dynastic age, which provided stiff, white leather which could be softened by further chemical or mechanical treatments. Irrespective of the tanning methods, the uses of hides and leather became increasingly diverse in ancient times, both among the wealthy and noble and the lower classes, as it was part of all human life experience, from work in the fields to mystic phenomena. Hides and skins were used to manufacture weapons, ornaments, shoes, blankets and mats, and also the vestments worn by priests during propitiatory rites.

Given the variety of applications of this material, its use and importance grew, until it gained considerable weight in the economy of its main producers. The Romans, who had inherited from the Greeks the various techniques for treating hides and skins, were renowned producers of footwear, and became its main exporters throughout the Empire. For this reason they organised an efficient system of trade with the colonies, which represented both the main source of supply of raw hides and the outlet market for sale of their own finished products. The importance of these processes is borne out by the existence of the guild of tanners among the various *Collegia opificium*, *Sutores pelliones*, in ancient Rome as from the 7th century BC(2). A similar development of the industry, with the undeniable political control exerted by the Romans over the peoples they had conquered, prevented flourishing of the hide and skin processing industry outside of Italy, in Western Europe, which only took place after the fall of the Empire. In the Middle Ages the trade of hides and skins and the vast range of items in leather became widespread, as did the techniques of decoration and embellishment of leather, even if the tanning systems remained virtually unchanged, with the exception of the use of lime for removing hair.

A special leather processing technique which spread during this period was cooking in water; an item in leather, if boiled, can be shaped permanently and becomes particularly strong and resilient.

[1] *And as when a man giveth the hide of a great bull to his folk to stretch, all soaked in fat, and they take and stretch it standing in a circle, and strightway the moisture thereof departeth and the fat entereth in under the haling of many hands, and it is all stretched throughout (Iliad, book XVII)*

[2] *Plutarch, Parallel Lives: Life of Numa*

*Work in a tannery in the early 19th century*

Development of this treatment, which spread during the late Middle Ages under the name of "*cuir boulli*", was encouraged by the proliferation of wars which required increasingly strong breastplates and shields.
Another typical moulding technique of this period is "*lamination*", so called as special laminae of leather were glued one on top of the other on the medium to be decorated, thus obtaining the required shapes.
Together with the moulding techniques, the art of decorating leather, until that time performed solely by eastern races, spread throughout Europe in the Middle Ages. Between the tenth and eleventh centuries the Spanish specialised in producing "gold leather", thus named as the technique used to produce it consisted in gluing gold laminae on the leather with egg white or lacquer. This process also spread to Naples, Milan and Venice. It was above all from the latter city that, from the fifteenth century onwards, large quantities of leather were exported to other Italian courts and overseas.
With the discovery of the New World, marking the start of the modern age, the market for hides and skins and leather gained an international dimension. Access to the new continents first of all allowed an increase not only in quantity, but also in the variety of raw hides available. Where there were no local manufacturers, the hides were sent to Europe and converted into finished products. This increase in production on a world scale was balanced by the expansion in outlet markets and, lastly, a growth in demand. However, despite this sharp increase in production, hides and skins were still tanned by traditional methods, costly in terms of time and effort. A revolutionary change in the treatment of hides and skins took place at the end of the nineteenth and early twentieth centuries, when the developments in chemical science began to be applied on an industrial scale. The research topics were numerous, one of the most innovative being that which led to the use of salts of chromium in tanning(3). The result of the application of the first techniques of tanning with salts of chromium was not very encouraging. The hides and skins were treated with a hexavalent salt of chromium which, after partial drying, was reduced by means of ferrous sulphate. In this way iron tanning was preferred over chromium tanning and the leather obtained was of poor quality. This method was the subject of new research and experiments which led in 1883 to a tanning process which could be applied on an industrial scale(4). Ten years later, in 1893, the American M. Dennis introduced tanning with a single bath(5), whereby, with the subsequent improvements made by H. R. Procter, tanning moved towards modern methods, replacing vegetable tannin tanning with the mineral, chromium type. This change, with a contribution by the developments of mechanisation in tanning and the introduction of barrels, produced numerous advantages both as regards the quality of hides and the tanning times. Chromium tanning produced softer hides, with greater resistance to water and heat, in a much shorter time. Thus, although for thousands of years tanning was based on the use of craft techniques which underwent very limited changes in time, in just fifty years, after the industrial revolution tanning underwent a radical transformation which had a profound affect on the structure of the industry, and led to the introduction of industrial areas and the development of the modern tanning industry, whose strategic goals now include the concept of sustainability on a permanent basis.

*[3]The 1853 patent belonged to Sweden's Hylten-Cavallius and was registered as Cavallin due to an error in transcription.*

*[4]This technique was devised by a textiles dyeing worker, A. Schultz and involved the treatment of the hides and skins with sodium dichromate and, after absorption, the reduction of this salt with sodium hyposulphite.*

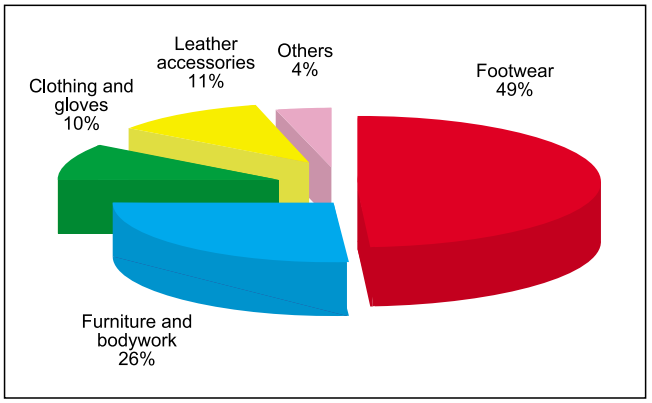
*[5]Tanning with two baths was devised by Cavallius, basing on the use of hexavalent chromium with its subsequent reduction. Tanning with one bath uses trivalent chromium.*

# The Structure of the Italian Tanning Industry

*The Italian tanning industry produces 65% of the EU total in value*

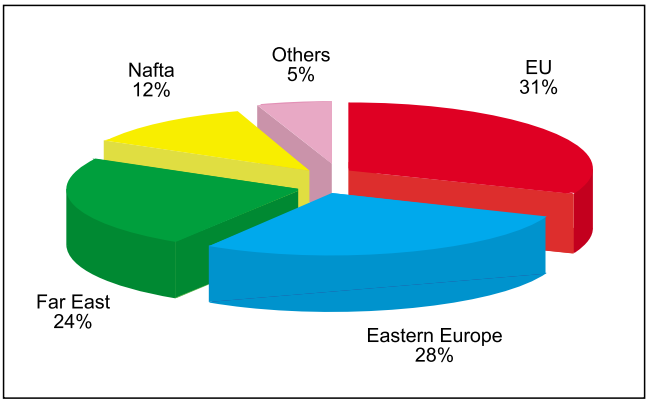
The tanning industry is made up of around 2,300 firms with around 30 thousand employees. With 2002 revenues of almost 6.2 billion euros, the Italian tanning industry is traditionally and indisputably considered a leader in Europe (65% of EC revenues) and the rest of the world (20% approximately of world production in value). This is one of the most globalised industrial sectors in Italy, as fully evidenced by both the figures of exports of finished products and those relating to the imports of raw materials (raw and semi-processed hides). Exports, which in 2002 reached 127 countries, represent around 2/3 of total revenues, while the foreign supply of raw material, which covers 85% of needs in the sector, comes from 120 countries. The industry mostly consists of small and medium enterprises and is concentrated within areas specialised by type of process and commodities. In particular, at Arzignano, Zermeghedo and Montebello Vicentino, in the province of Vicenza, 764 firms operate, mainly processing cow and calf hides for footwear, furnishing and clothing. Between Turbigo and Castano Primo, in the province of Milan, there are around 140 firms which process sheepskins and goatskins for leather accessories and footwear. At Santa Croce sull'Arno and Ponte a Egola, both in the Pisa area, there are 873 factories which mainly process cow and calf hides, mostly for footwear, clothing and leather goods. Finally at Solofra, in the province of Avellino, and in the Naples area, there are 368 plants which process sheepskins and goatskins mainly for clothing and footwear. This geographical concentration is in addition to over 300 units, with various specialisations, located in Piedmont, Trentino Alto Adige, Friuli Venezia Giulia, the Marches, Abruzzo and Apulia. The tanning industry, as mentioned, mainly consists of small firms. Only around 4% of the 2,400 firms have more than 50

**Figure 1: applications of Italian tannery products in 2002**

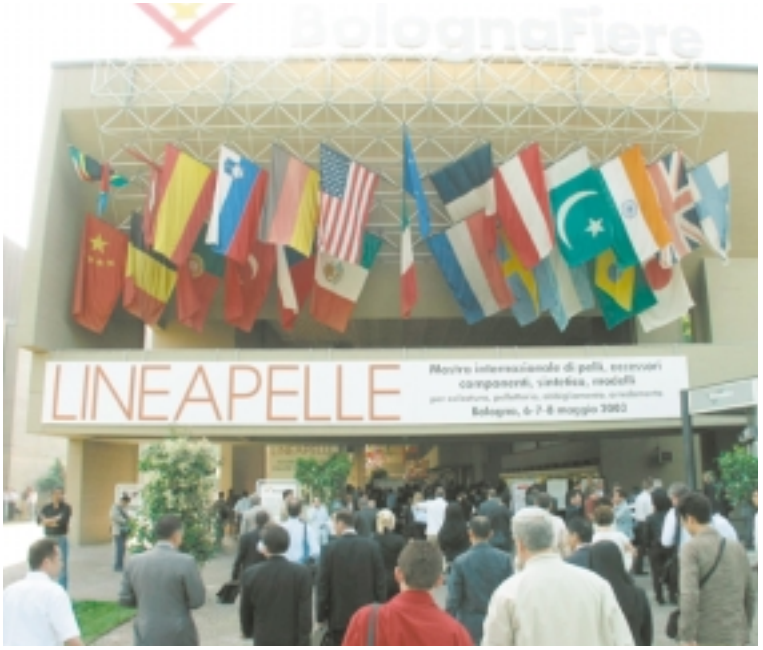



*Source: UNIC 2003*

**Figure 2: Italian exports of tanned products in value (%) 2002. Analysis by macro areas**




*Source: UNIC 2003*




*Lineapelle: two events a year, over 1500 exhibitors, around 30,000 visitors*

employees and only around 400 (16%) have more than 20. It should also be noted that this 16% of firms has 56% of the employees, while 4% of firms with more than 50 employees have alone 25% approximately of the employees. Account also has to be taken of the fact that the lower brackets (up to nine employees) are mostly made up of contractor firms, where the production phases are often limited to mechanical operations of low complexity. Given this structure, it is estimated that the category of firms with more than 50 employees represents alone more than half of the national production quota.
Further proof of the fact that Italy represents a key frame of reference for the world supply chain for leather and leather accessories is represented by Lineapelle, the most important international trade show for leather, synthetics, fabric and accessories for footwear, leather goods, clothing, furnishing and car interiors. On the basis of the seasonal nature of products, linked to the fashion world, Lineapelle is held twice a year (usually May and October) in Bologna, with participation by over 1,500 exhibitors (of which a third from 50 foreign countries) and around 30,000 visitors (13,000 approximately from abroad, representing 120 countries). The annual revenues of the trade attending Lineapelle are over 80 billion USD, more than 40% of the world business in the industry.

**Table 1: 2002 structure of the Italian tanning industry**

| Regions | Employees | Firms | Revenues (millions of euros) | Exports (millions of euros) | % National revenues |
|---|---|---|---|---|---|
| Veneto | 10,772 | 764 | 3,357.8 | 1,976.9 | 54,3% |
| Tuscany | 8,388 | 873 | 1,645.0 | 816.2 | 26,6% |
| Campania | 4,807 | 368 | 435.4 | 411.3 | 7,0% |
| Lombardy | 1,819 | 141 | 255.5 | 173.3 | 4,1% |
| Other regions | 4,254 | 180 | 492,3 | 415 | 8,0% |
| **National total** | **30,040** | **2,326** | **6,186.0** | **3,792.4** | **100%** |

*Source: UNIC 2003*

# Evolution of Environmental Problems: an Industrial Analysis

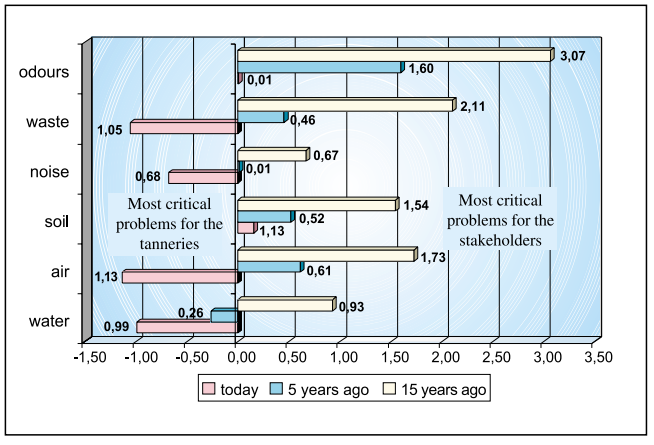
*The end market assigns an important role to the environmental factor*

The environment variable as a critical factor in corporate management led UNIC to carry out an analysis to investigate the perception of critical environmental factors both inside and outside the industry. The analysis was carried out throughout Italy into tanneries, the manufacturing industry downstream and some of the most important stakeholders in the environment, such as environment agencies, local organisations, environmentalist groups and purification consortia. The aim of the study was to pinpoint the gap in perception of the most important environmental problems among firms in the industry and outside contacts. The results of work which involved 30 tanneries, 26 stakeholders and 30 manufacturing firms highlight aspects which can be interpreted positively as regards the development in the industry's relationship with the environment (Fig. 3).

The most significant elements can be summed up as follows:

**1** Despite the increased critical nature of the environment factor for entrepreneurs, who increasingly perceive it as an important aspect, the institutional stakeholders judge environmental performances in the industry as generally improved. Particularly the values of those relating to effluent and waste have improved by as much as 40% compared to 15 years ago.

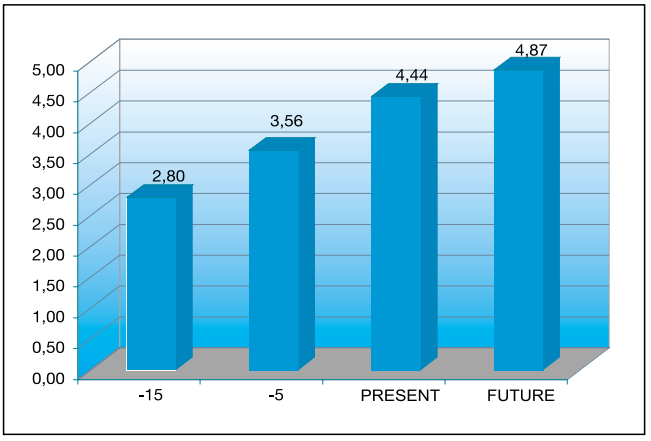
**Figure 3: Gap in perception of critical environmental factors between stakeholders and tanneries (scale from 1 to 6)**




*Source: UNIC research*

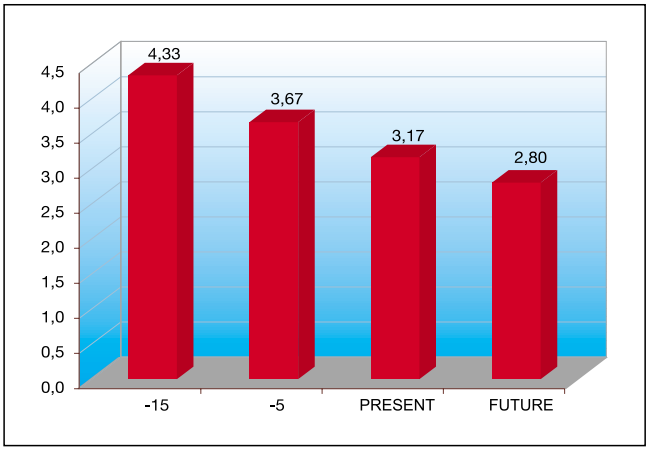
**2** Also as regards the development in relations between tanneries and stakeholders, work together has gradually been stepped up, with additional margins of improvement forecast for the future. Likewise the conflicts between tanneries and institutional stakeholders are increasingly infrequent and a further significant decrease is foreseen.

**Figure 4: Development in work relations over the past 15 years**




*Source: UNIC research*

**Figure 5: Development in conflicts over the past 15 years**




*Source: UNIC research*

**3** On the communications front 50% of tanneries make their environmental commitment public. There are wide margins for growth in their environmental reputation, in that only 29% of those contacted expressed complete satisfaction with environmental investments in the industry, thus revealing a lack of coherence in relation to awareness of the evident environmental improvements. The need thus arises for better and more systematic communication of environmental performances and investments.

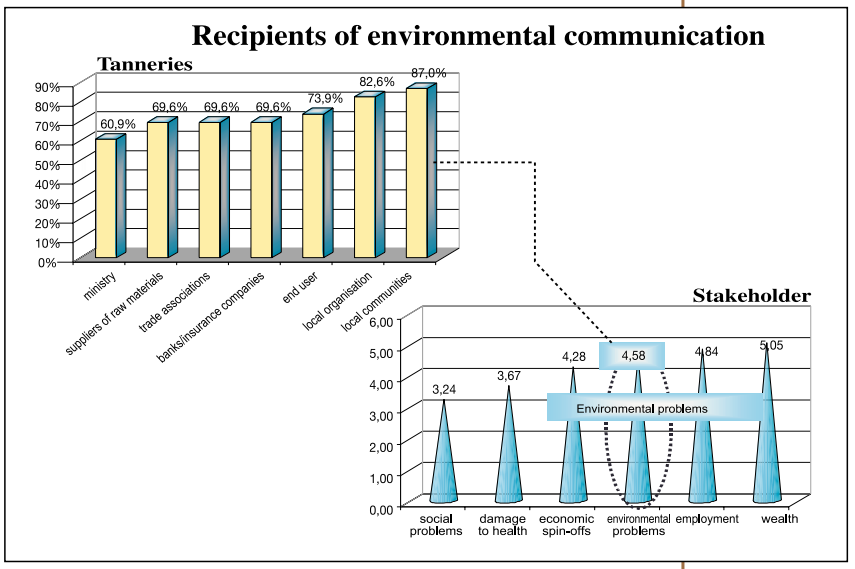
*Interior of a modern tannery*

**4** The need to communicate to firms in the manufacturing industry is placed at a slightly lower level compared to the institutions. It is in any case essential not to underestimate the importance of the environmental factor for the relevant outlet market. The firms in the manufacturing industry contacted attribute great importance to it and, if their suppliers were perceived as environmentally/ethically inferior, they would not hesitate to break off relations. This is not to be seen as a threat for the industry, but instead as an opportunity, in that it is a chance to communicate with greater force the intrinsic value of Italian leather compared to that from developing countries.

**5** There is a vast difference between the values assigned to the ethical-environmental factor by the tanneries compared to their clients. This difference is reflected in the different percentage assigned to the environment as a significant element of competitive advantage (tanneries 30%; clients 60%).

In conclusion the work confirms, through an in-field investigation, how the environmental situation of the industry is definitely more satisfactory compared to widespread opinion. The environmental report sets out therefore to be a means of communication to succeed in circulating and valuating the results achieved.

**Figure 6: Gap in perception between the end market and tanneries**




*Source: UNIC research*

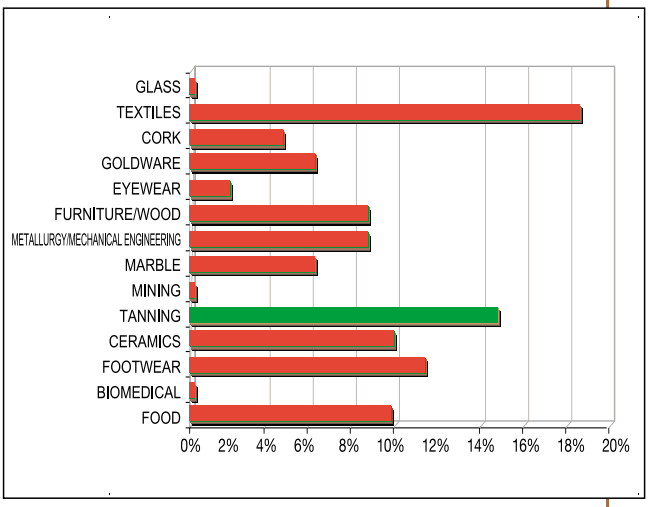
# Area Health and Environment: Positioning of the Industry

Given the nature of the industry, mainly concentrated in three areas, it is interesting to calculate how they are positioned in relation to other areas with different types of industrial activities. These considerations are extremely useful for interpreting the degree of sustainability of the tanning industry in the territory.
In order to achieve this positioning information was analysed, taken from a study by Legambiente in 2002 on 47 industrial areas representing the national production system.
The positioning was made on the base of some quality parameters (Table 2), which provide a definition of the environmental application on an area basis.

### Integrated area infrastructures for safeguarding the environment

The tanning industry represents 15% of the environment infrastructures in all the areas considered (Fig. 7). This information is interesting when compared with revenue figures, equal to 12.2% of the total (Fig. 8), in that the tanning industry contributes more to the total environment infrastructures than to the total revenues.
Direct confirmation of environmental commitment by the industry, translated into a major financial effort, is given by the figures from the interim census of industry and services by ISTAT, the Italian statistics institute, in 1999. The questions on the costs of environmental protection in the questionnaire sent to companies provided information, in relation to 1997, on the amount of expenditure for protecting the environment by companies with at least 20 employees. The definition of current expense for protecting the environment covers that relating to independent schemes and that for

**Figure 7: environmental infrastructures per production sector**




*Source: Ecodistretti 2002. Innovative environmental policies in Italian industrial areas (Ambiente Italia)*

**Table 2: some of the indicators used in the ECODISTRETTI 2002 research**

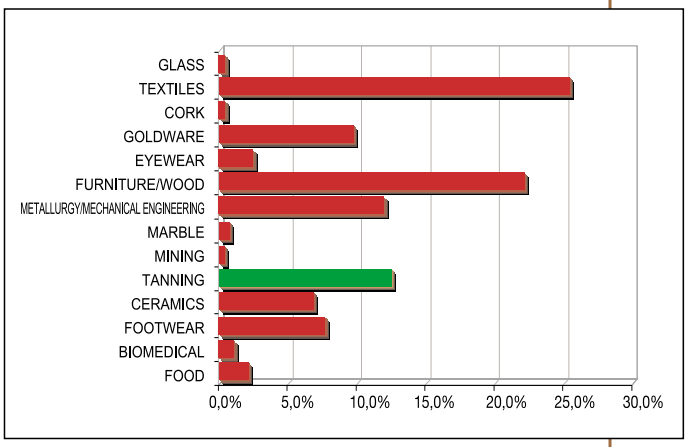
| | |
|---|---|
| ***Integrated district infrastructures for safeguarding the environment*** | Existence or use of environmental systems (treatment of water, dual industrial water supply systems, waste treatment, energy production) serving industrial companies in the district and managed by private or public organisations. |
| ***Integrated environmental services*** | Centres serving the enterprises located in the district which have provided firms with technical assistance and consultancy on themes linked to monitoring (laboratory) or the spread of services mainly of environmental innovation. |
| ***Cleaner technologies*** | Presence or lack of cleaner technical technologies (in the definition given by the Cleaner Production UNEP) on the basis of a predefined list of the best practices in the sector known nationally and internationally. |
| ***Certification Environmental registrations*** | Number of firms certified according to the standard ISO 14001 or EMAS registered (Regulation 1836/93) in the districts examined. |
| ***Promotion of innovative tools for environmental management*** | It was assessed whether in the district schemes, managed by public or private organisations and linked to the promotion of corporate environmental innovation tools, have been carried out and are in progress. |

*Source: Ecodistretti 2002, innovative environment policies in Italian areas (Ambiente Italia)*

*A centralised purification unit in Tuscany*

services and materials purchased from others.
The ISTAT data show that the tanning industry is, after the chemicals industry, that with the highest ratio between current expenditure on the environment and total expenditure.

**Figure 8: revenues per production sector**




*Source: Ecodistretti 2002. Innovative environmental policies in Italian industrial areas (Ambiente Italia)*

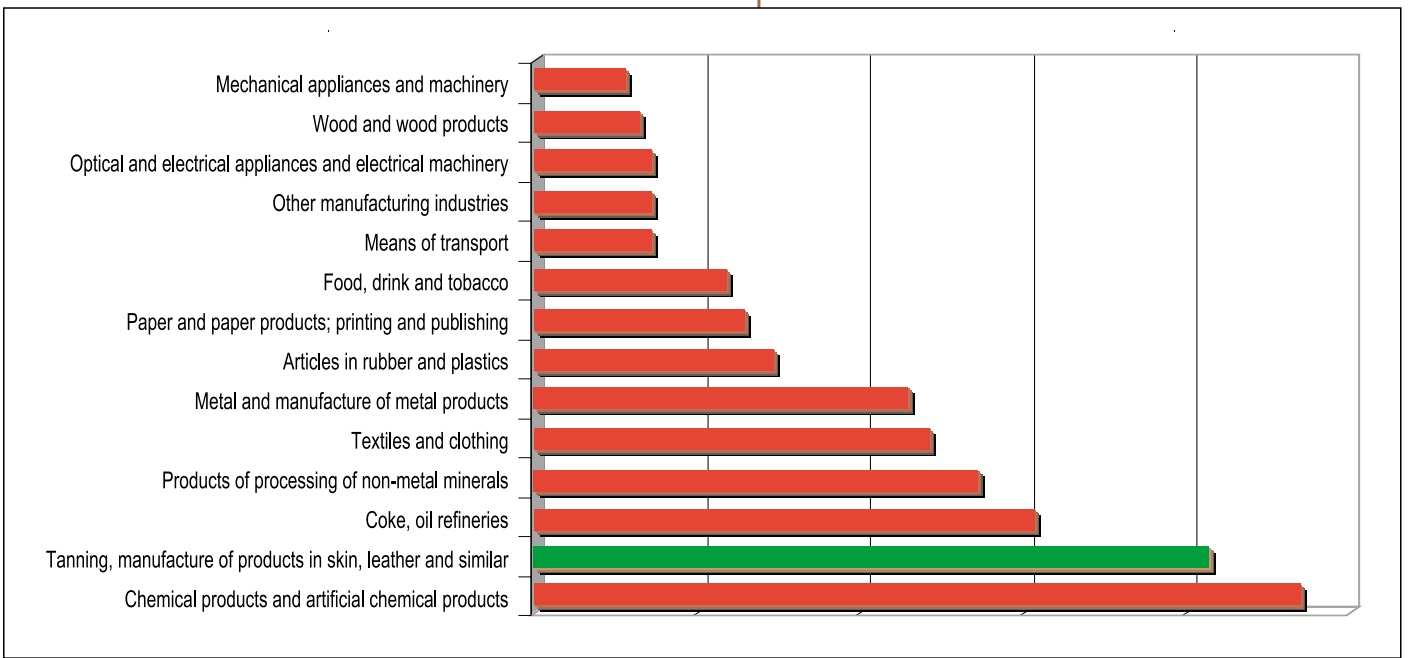
### INTEGRATED ENVIRONMENTAL SERVICES

As regards the presence of integrated environmental services, schemes were considered relating to:

- search for eco-compatible products
- search for clean technologies
- environmental certification
- services for the spread of environmental technologies
- analysis laboratories
- assistance and consultancy for innovative tools
- training
- energy audits.

Local enterprises were identified as being

**Figure 9: ratio between current environmental costs and total costs**




*Source: ISTAT data (1997)*

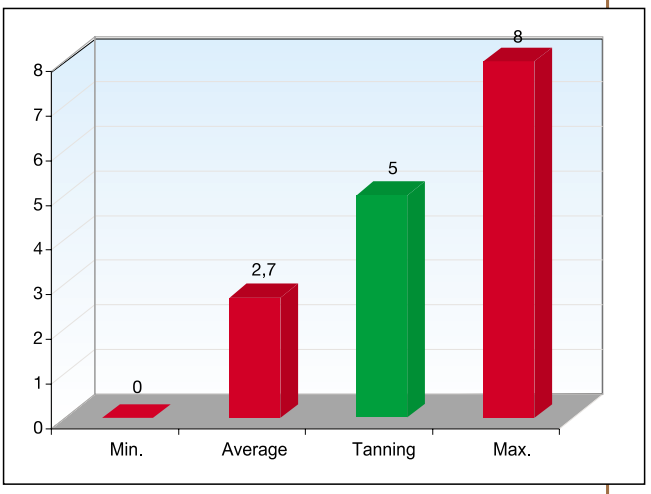
more innovative with reference to this factor.
The tanning industry is above the average value, conforming its level of relative excellence.
This aspect is particularly important in the relationship with the territory, in that it contributes to circulating management and production policies more orientated towards sustainability (Fig. 10).
The tanning industry also stands out due to the presence of specialist analysis laboratories and for having promoted schemes for technological research, environmental certification, assistance, consultancy and training on the environment.

### Cleaner technologies

The Legambiente research shows how, out of the 47 areas considered, changes were noted aimed at introducing cleaner technologies only in 16 enterprises. They include all three of the tanning industry areas, where cleaner technologies were identified with reference to:

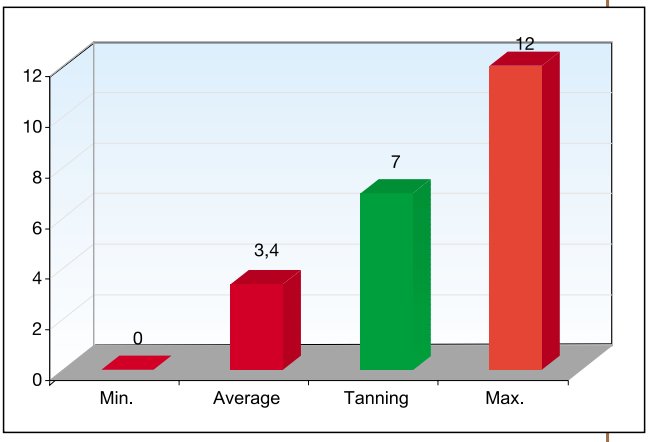
- treatment of liming and desalting water with electrochemical systems to reduce the sulphides and recover the chlorides and sulphates;
- reduction in the consumption of chemical products and water;
- replacement of current spray finish technologies, responsible for emissions of VOS in the air, with the use of roller machines;
- elimination of pollutants in liquid effluent, using an enzymatic product during unhairing;
- use of carbon dioxide rather than ammonia chloride or sulphate to separate the residual lime used in previous processes, forming compounds which are more soluble and easily removed from the hide;
- for the pickling-tanning phase, replacement of the traditional acidifiers responsible for pollution by chlorides, sulphates and chromium, with alternative substances (organic acids);
- use of water-based paints in place of those containing organic solvents;
- dry tanning which allows a saving in water of 1/3 while the consumption of basic chromium sulphate drops from the 10% in weight of dry hides to 6.5-8%;
- cogeneration plants (energy + heat).

**Figure 10: number of environmental schemes with reference to integrated environmental services**




*Source: Ecodistretti 2002. Innovative environmental policies in Italian industrial areas*

**Figure 11: ISO 14001 certified firms in 2001**



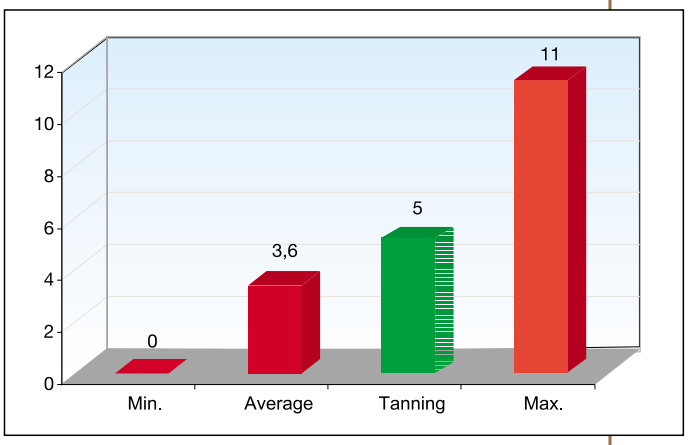

*Source: Ecodistretti 2002. Innovative environmental policies in Italian industrial areas*

### Environmental certification

Environmental certification represents a means of guarantee throughout the production chain. As witness of commitment in this area, UNIC has, since 1994, organised a specific certification body for the industry, ICEC, with the task of guiding member firms in undertaking a process aimed at obtaining environmental certification. In 2003 ICEC was SINCERT accredited for the environment.
Without considering ICEC certifications prior to 2003, which are however important as regards willingness of firms in the industry to operate on a certification basis, the industry is in any case positioned at a satisfactory level in relation to all the areas considered.

*An area formerly used for dumping as it appears now:*
*an example of environmental improvement and commitment*

**Figure 12: schemes for the promotion of environmental innovation**




*Source: Ecodistretti 2002. Innovative environmental policies in Italian industrial areas (Ambiente Italia).*

Experiments in environmental technologies were reported in the tanning industry, with widespread certification both of individual firms and the district area, with the launching of the Agenda 21 process. An additional initiative not mentioned in the Legambiente research is the Giada project for integrated environmental management of the tanning district of the Valle del Chiampo, co-funded by the EU. Two schemes have been launched at Santa Croce sull'Arno, via the local Agenda 21 and experiments in environmental technologies.
Agenda 21 was recently launched locally at Solofra too, in addition to eco-management schemes at individual firms.
For some of these aspects refer to the paragraph "The industry and the territory: indicators of sustainability (page 18).

### PROMOTION OF INNOVATIVE MEANS OF ENVIRONMENTAL MANAGEMENT

In the various industrial areas examined, eight types of means of promoting environmental innovation were basically examined:
1) agencies/monitoring bodies/forums
2) territorial balances/Agenda 21
3) environmental marks of quality/LCA
4) testing of environmental technologies
5) spread of ecomanagement (ISO 14001/EMAS)
6) SGA/EMAS for districts/areas
7) voluntary agreements
8) environmental accounting in firms
9) sustainable mobility.

**Figure 13: industrial centres and the business activities located there**

| Industrial centres | Business activities |
|---|---|
| 1. Brindisi | petrochemical |
| 2. Gela | petrochemical |
| 3. Manfredonia | petrochemical |
| 4. Massa Carrara | marble industry |
| 5. Portoscuso | metals mining |
| 6. Sarno | tanneries |
| 7. Taranto | iron and steel |

## HEALTH AND THE ENVIRONMENT: ASSESSMENTS BY THE WHO

The impact of tanning production on the ecosystem has for many years been associated with a presumed higher rate of some types of disease. Scientific tests have instead shown how no direct link has been found between a large presence of tanneries and public health. The results of research by the WHO in December 2002 compare some areas with high environmental risk with industrial activities structured on an area basis.
The results presented are from the processing of data produced by a study organised and carried out by the ***European health and environment centre of the World Health Organisation*** by a proposal by the environment ministry. This study analysis the data relating to eight locations, featuring a dominant type of industrial activity, and seven areas, where it is not possible to identify one industrial activity prevailing over the others. Only six of the eight locations are studied in our analysis, chosen on the basis of the variety of the economic activities and their intensity. Of the overall areas only that of Sarno is considered, referring only to those data relating to the tanning industrial area. A limitation to the publication used is represented by the fact that it is delayed by some years compared to the period of reference of the data presented (1990-1994). However it is still true that many of the health questions arising from the analyses presented relate to chronic disease, with a long latency period. Our aim in processing the data was to **assess the effects of pollution** by tanning **on the health of the population**

*WHO study data for assessing how the various industries affect public health*

**Figure 14: Significant SMRs for non-tumoral causes of death in the female population**

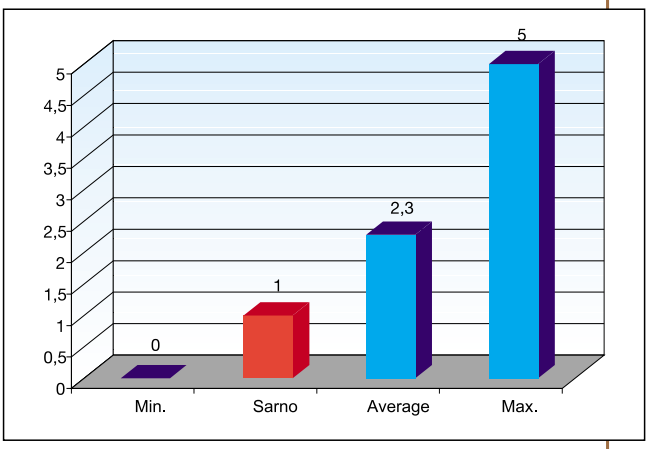
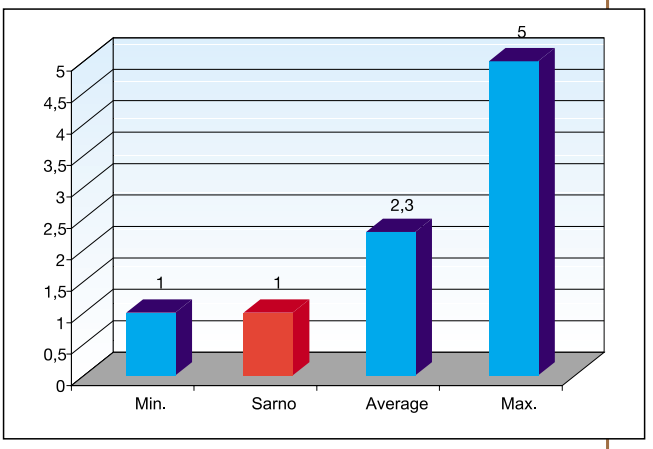



**Figure 15: Significant SMRs for non-tumoral causes of death in the male population**




and compare them with the effects caused by different types of activity, yet which can be qualified as having high environmental impact.
The study is based on a comparison between the mortality rates in municipalities where industrial activity is more intense that of the larger relevant geographical area (generally regions or provinces). This comparison gives the SMRs (standard mortality ratios), obtained from the relationship between the cases observed and those expected in the hypothesis where the mortality rates of the reference population prevail.
The interpretation to be given is the following:

- when the SMR > 100, in the industrial area the mortality rates are higher compared to the relevant region;
- when the SMR < 100, in the industrial area the mortality rates are lower than those of the relevant region.

For the purposes of evaluating whether and how the tanning industry affects public health, those diseases have to be identified for which the mortality rate of the tanning district is higher than the mortality rate recorded in the relevant region. Once these cases have been identified, the difference has to be significant, i.e. with a probable link between the existence of the tanning industry and an abnormality in the trend in the mortality rates.
The analysis was performed on men and women separately as the occupational distribution of the sexes differs. Exposure, both long and short-term, to the agents which may trigger tumours and other diseases varies according to the profession.
The WHO study shows that, for men, the only diseases with a significant excess are those of the respiratory system. Three of the causes of tumours (cancer of the larynx, bladder, total lymphohematopoietic system and soft tissue) are the values which exceed the regional averages. However none of these values was found to be statistically significant due to the low number of cases recorded. No significant excess between the causes of tumours was found in the female population either, while one single excess is observed among non-tumoral causes (diabetes).
In addition to the snapshot of the state of health of the population in the year to which the data analysed refer (1994), the evolution from 1981 to 1994 was evaluated by studying the SMRs calculated for three separate periods, 1981-1984, 1985-1989 and 1990-1994. One problem which appears to emerge clearly is that of disease of the respiratory system. These diseases show significant trends and always above regional values. However the trend observed is divergent. While the number of women affected decreases, that of the men affected increases. As regards causes of tumours, the SMRs for all tumours are rising, even if they remain below the values indicated in the rest of the region. Therefore, both for men and for women, tumours are increasing, but at a lower rate compared to the growth in tumours in the Campania region, a factor which further endorses the fact that it is not possible to trace tumoral pathologies to the tanning industry.
After having evaluated the impact on public health in the Solofra tanning district, the impact on the other six locations was evaluated with the presence of business activities considered as having high environmental impact.
The picture emerging shows how Sarno, both due to tumoral and non-tumoral diseases, is placed among the areas with the lowest number of significant SMRs. In greater detail, from the joint analysis of Figs. 14, 15, 16 and 17, it can be seen how, with the exception of the non-tumoral causes of death in the female population, in all the remaining three cases the value recorded at Sarno represents the minimum value recorded in the various industrial areas taken into consideration.

**Figure 16: Significant SMRs for non-tumoral causes of death in the female population**

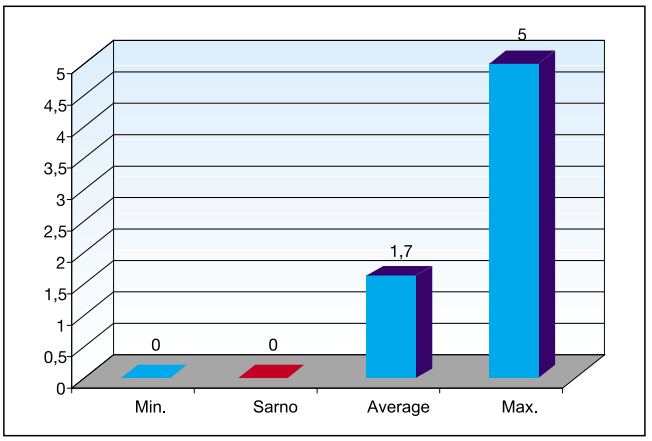
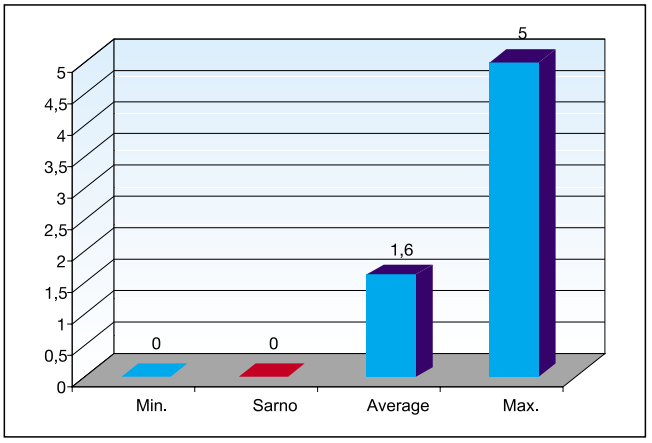



**Figure 17: Significant SMRs for non-tumoral causes of death in the male population**



# The Industry and the Territory: Indicators of Sustainability

In the areas where it has developed, tanning represents an industrial activity which has a decisive effect on the sustainability of the territory. The concept of sustainable development is not linked solely to environmental aspects but also to social and economic ones. From this standpoint the tanning industry represents a stable and enduring source of development. Four indicators were chosen to describe the social and economic situation of the territory where the tanneries are concentrated:

- number of firms operating in the tanning industry
- number of employees
- amount of bank deposits per inhabitant
- number of foreigners in the "tanning" municipalities.

Other initiatives were considered in addition to these indicators, such as the level of implementation of the local Agenda 21, for a better understanding of the relationship with the territory, not only technical or managerial, but also cultural, in the areas where the Italian tanning industry is concentrated.

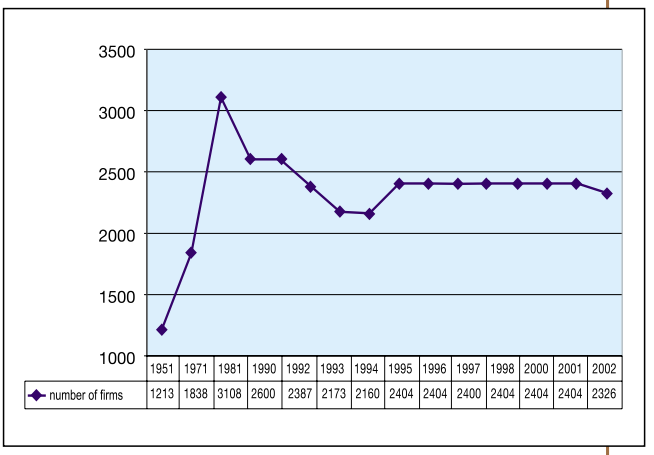
### Firms and employees

The trend in the number of tanneries operating in the territory, concentrated in the districts of Arzignano, Santa Croce sull'Arno and Solofra, and the number of employees in the industry have been relatively stable over the past thirty years. After the peak of the early 1970s, also associated with the maximum level of employees in the industry, the number of firms dropped in the 1980s and then settled at levels of around 2500 in the 1990s (Fig. 18). The trend in the number of firms in the industry is correlated to the trend in the number of tannery workers, which since 1995 to date has grown by around 20% although in recent years has shown a constant trend (Fig. 19).

### Bank deposits

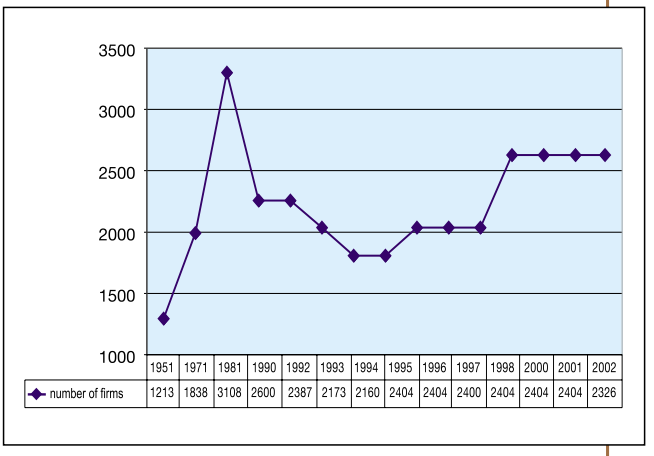
The stability in the number of firms and employees guarantees a permanent source of employment and wealth for the territory. In order to evaluate this latter variable, the amount of bank deposits was analysed per resident in the municipalities with a particular

**Figure18: number of firms in the industry from 1951 to 2002**



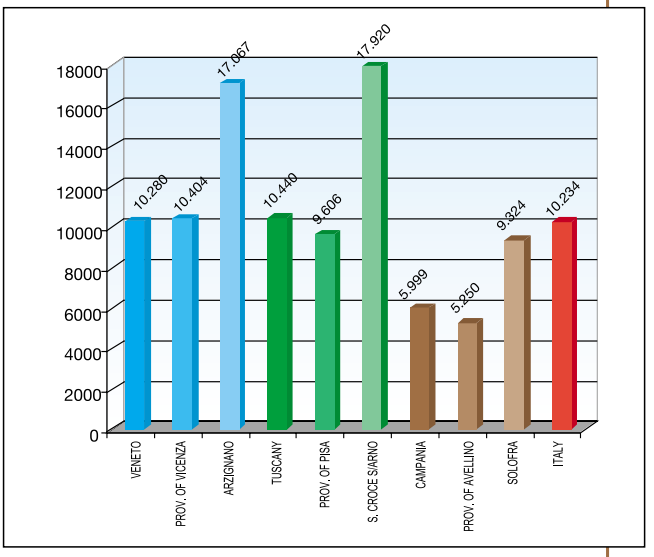

*Source: UNIC data*

**Figure 19: number of employees in the industry from 1951 to 2002**




*Source: UNIC data*

**Figure 20: amount of residents' bank deposits**




*Source: Banca d'Italia and ISTAT (2002 figures)*

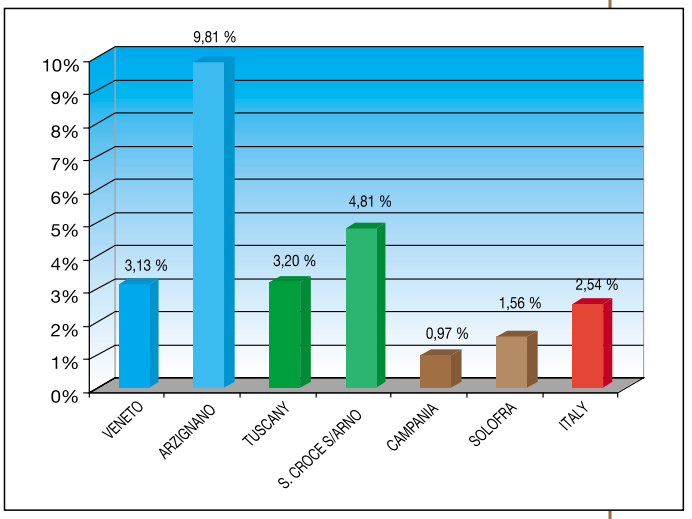
concentration of tanneries. This study showed, on the basis of data supplied by Banca d'Italia, that in municipalities with a high number of tanning firms the deposits are always of considerably higher value compared to that of the relevant province and region, and with the exception of Solofra, compared to the Italian average.

### Role of immigrants

The creation of employment and income by the tanning industry benefits not only the local population but also foreign workers, a high number of whom work in tanneries. According to ISTAT figures, in the main municipalities of the tanning districts the percentage of foreign residents out of the total population is higher compared to the extent of the number of foreigners within the relevant region. Considering that the reference factor in these municipalities is represented by the presence of the tanning industry, it is plausible to state that the percentage of foreign labour out of the total reflects the trend of the total population. The data at our disposal confirm these hypotheses: out of a sample of 3000 employees of the tanning industry in the Pisa area, 145, equal to 4.8%, are foreign, an identical percentage to that of the foreign citizens out of the total population of the municipality of Santa Croce sull'Arno. On the basis of these data it can be said that the tanning industry plays an important role in social integration, given that the tannery becomes a place where people of different culture, religion and customs cohabit.

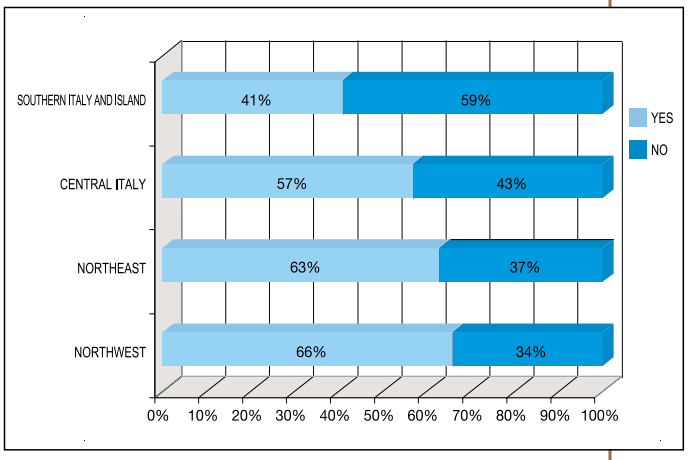
*The industry plays an important role in social integration*

**Figure 21: percentage of foreign residents out of total population**




*Source: ISTAT (2000 figures)*

**Figure 22: organisations which have implemented the Agenda 21 process, divided by macro regions.**




*Source: 2002 Focus Lab figures*

## LOCAL AGENDA 21

### Introduction

The concept of sustainable development originates in the definition which the Brundtland commission gave in 1987, i.e. how "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". An objective of this kind requires involvement by a group of players with different yet complementary skills and visions. For this reason, following the UN conference on the environment and development in Rio in 1992 Agenda 21 was introduced, a document of planning intents and objectives for the environment, economy and society. This document places special emphasis on the role played by local communities in implementing sustainable

policies which allow a balance in ecological responsibility, economic efficiency, social justice and solidarity. In particular, chapter 28 of Agenda 21, on the schemes by local governments backing Agenda 21, states: *"Each local authority should enter into a dialogue with its citizens, local organisations and private enterprises and adopt a local Agenda 21. Through consultation and consensus-building, the local governments should learn from citizens and from local, civic, community, business and industrial organisations and acquire the information required for formulating the best strategies".* The local Agenda 21 is thus translated into a joint process for defining a local plan of action which involves all those operating in the territory. The development policies will thus be outlined not only by the public administration but also by all the stakeholders, including the actual population, environmentalists and entrepreneurs. The body of participation and involvement of the various agents in the territory is the Forum, where all the organisations and players with legitimate interests and representing the social, cultural, environmental and economic situation of a local community are called upon to contribute to exchange and communication.
One of the most important parts of the local Agenda 21 is the drafting of the State of the Environment Report, which represents the knowledge base required for later outlining the Environment Action Plan which in turn becomes a frame of reference in the decision-making processes of the local organisation for development sustainability. At present, the situation of implementation of Agenda 21 in Italy is fairly varied. Irrespective of geographical distribution, Agenda 21 has been implemented in the tanning districts of Valle del Chiampo, Valdarno and Solofra. In Valle del Chiampo and Valdarno, given the huge size and high number of municipalities included, Agenda 21 is promoted at a provincial level, while in the case of Solofra, development is on a municipal level and with more recent application compared to the other two places. Both in Valle del Chiampo and Valdarno Agenda 21 was implemented at the end of the 1990s; consequently its first results can already be seen, represented by the State of the Environment Report. The following pages give a brief outline of the projects of Agenda 21 in the various

*Sustainable development: environmental improvement and product innovation*

situations of the tanning districts with indications emerging from the state of the environment report which may have a direct link with the tanning industry in the area.

### Province of Pisa: Agenda 21 in the "leather district"

The "leather district" experimented forms of environmental agreements well before 1999, starting date of the project "Sustainability in the economic systems of the Province of Pisa - Pisa 21". As early as the end of the 1960s, with the introduction of the first anti-pollution committees, the first spontaneous agreements between the public and private sectors came into being, aimed at monitoring concern by the public regarding the affects of production on their health and on the environment. The outcome of exchanges between the private and public sectors led to major investments aimed at making production in the district increasingly compatible with the needs of safeguarding the more extensive environmental system in which it is located. Agenda 21 thus became the natural outcome of a process of cooperation which

had already been in progress for some time and which thus found continuity and method.
One of the crucial parts of this process was the setting-up of the Forum, active since October 2000, which relies on participants with widely differing origins. There has been involvement by the environmentalist associations, public administration, health authorities, trade unions, local trade associations, consortia for purification and firms in charge of public service management. The work of the forum has led to approval of the preliminary document "Progress of Agenda 21 in the Leather District" and took the shape of the 2002 State of the Environment Report. After thorough monitoring of the environmental situation, the Leather District is moving towards the phases of consolidation and integration of sustainable development policies by drafting the Environment Action Plan.

### State of the environment report

The report on the state of the environment of the "leather district" is divided into three sections, one of which analyses environmental systems, the other the human factors and the last one aspects linked to the quality of life in the area considered. The results set out in the first section are particularly interesting as they enable ascertaining of the state of health of the water, air and soil and the extent of possible damage caused by the tanning industry.

### Water

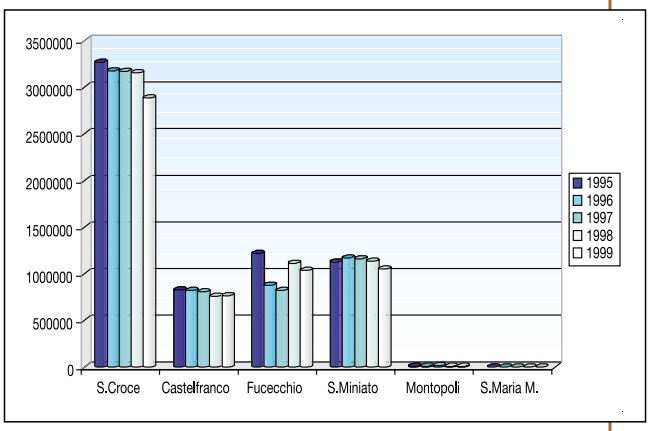
The Leather District has four particularly important waterways:

- Arno
- Padule di Fucecchio
- Egola (stream)
- Usciana (canal)

Pursuant to Decree Law no. 152/99 only the Arno, Usciana canal and Padule di Fucecchio are considered significant waterways and were carefully analysed in order to assess the quality of their water. According to the classification laid down by the laws in force[1], the surface waters of this area were considered of poor quality. This classification moreover was assigned to the river Arno well before its inclusion in the District, so that this state of decline is difficult to attribute to the processes at the tanneries. Another particularly critical factor arises from the high quantities of water taken from the water bed. This supply of water is intended almost entirely for industrial use and 75% is used in tanning in the strictest sense of the word, while the remainder is used in secondary processing of hides, in the chemicals industry and others. However from 1995 to date the trend in supplies shows an overall downturn (Fig. 6).

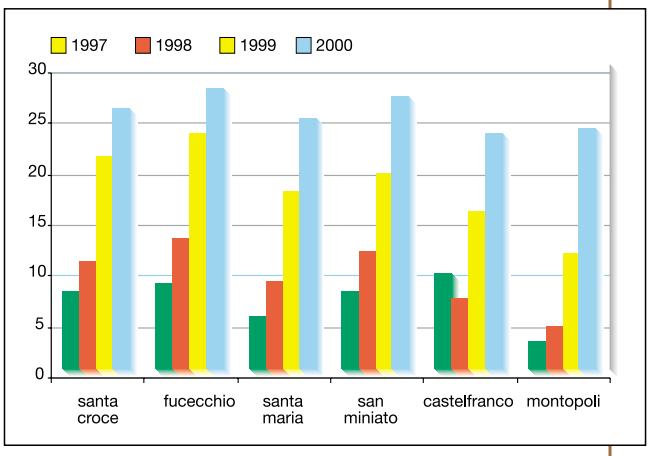
[1] *Pursuant to Decree Law no. 152/99, the quality of the surface water is assessed via the SECA (environmental state of waterways). On the basis of this indicator a distinction is made between water in class 1 (high quality), class 2 (good), class 3 (adequate), class 4 (low quality) and class 5 (very poor quality).*

**Figure 23: supplies of underground water for industrial use ($m^3$/year)**




*Source: 2002 state of the environment report, province of Pisa*

**Figure 24: % of selective waste collection in the municipalities of the leather district (1997- 2000)**




*Source: 2002 state of the environment report, province of Pisa*

### Air

The Leather District contains several sources of air pollution, for which obviously the presence of tanneries in the territory does not account entirely. However the main pollutants emitted into the atmosphere by

the tanning process can be identified and their time trend monitored.
Among the substances emitted into the atmosphere particular importance is gained, both in terms of quantities emitted and chemical and toxicological properties, by volatile chemical compounds, the most significant of which are hydrogen sulphurate (H2S) and volatile organic substances (VOS). Smaller quantities are also released of ammonia, aliphatic ammines, volatile organic acids and sulphites.
The trend in the concentrations of hydrogen sulphurate and ammonia has recorded a significant reduction in emissions in recent years for both substances taken into examination.

### Province of Vicenza: Agenda 21 in the Valle del Chiampo

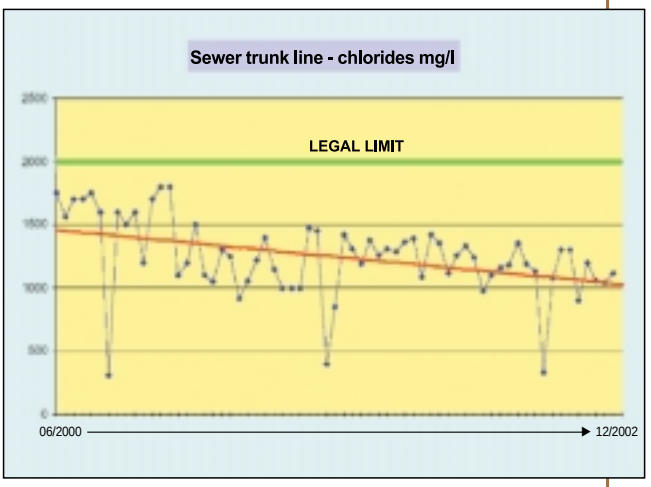
In the Valle del Chiampo, where all the tanneries of the province are located, the Giada project was set up in 2001 to develop integrated management of the environment, acting on the territory by safeguarding aspects which affect the quality of the environment. The project is born of cooperation between the provincial authorities of Vicenza, municipality of Arzignano, ARPAV (Veneto regional agency for protection of the environment) and ENEA (organisation for new technologies, energy and the environment) with a dual purpose of sustainable development of the territory. Its performance was made possible thanks to EU funding. Giada involves seventeen municipalities bordering the provinces of Vicenza and Verona, for a total of around 120 thousand inhabitants over a surface area of over 340 thousand square kilometres. This is a production area with high environmental risk, where almost 800 firms operate, processing hides and skins for the furniture and bodywork, footwear and clothing industries, and represent an economic volume higher than three billion euros.

*The production area of Arzignano*

Extremely briefly, the aims of the Giada project are:

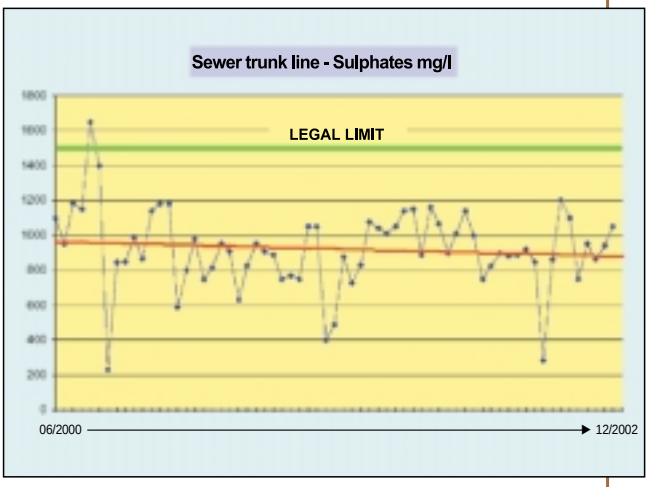
1) reduction in air, water and soil pollution via technological innovation in companies;
2) involvement of the public in defining

**Figure 25: chlorides in mg/l of water from the sewer trunk line (June 2000 - December 2002)**




*Source: ARPAV*

**Figure 26: sulphates in mg/l of water from the sewer trunk line (June 2000 - December 2002)**




*Source: ARPAV*

environmental policies;
3) sustainability of economic growth.

Giada is to lead to the creation of a local agency which, overcoming the current obstacles caused by the overlapping of competencies relating to the environment, can be become the frame of reference among the many organisations for the public, companies and local organisations. Work at the agency is also to aim at ascertaining and making known the problems and needs of the district and to involve all stakeholders, including the public and entrepreneurs, in defining the environmental policy to add value to the environment investments and commitments of commercial and institutional organisations in the territory and, at the same time, to ensure competitiveness of the production system.

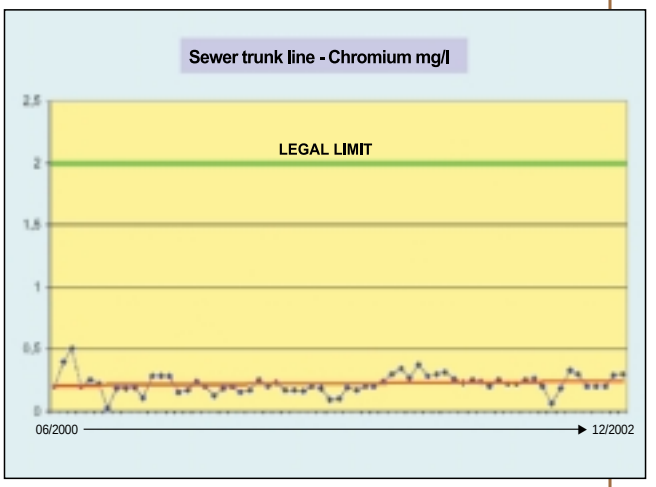
### State of the environment report

The Vicenza provincial authorities published the first report on the state of the environment in the year 2000. As often happens in the first versions of these types of documents, some information is incomplete or lacking, for this reason the following information has been obtained from processing of the results of the Giada project integrated with data from the Veneto regional environment agency.

### Water

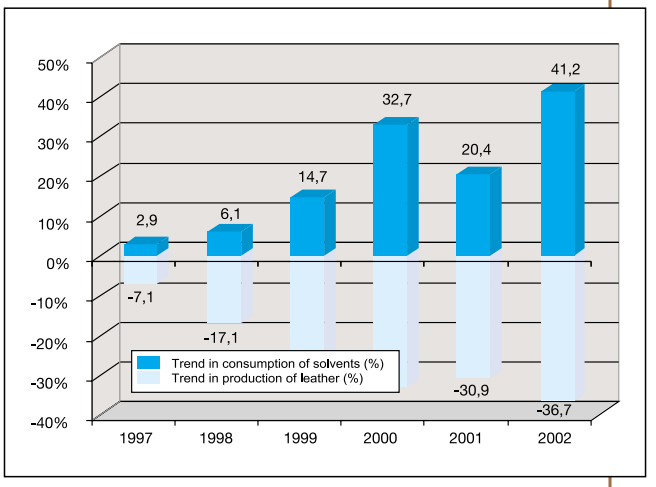
The analysis considered both the state of the surface water and water bed. In the first case the quality of the water of the basins of the whole provincial territory was analysed, including part of the basins of the Brenta, Bacchiglione and Fratta - Gorzone, which showed quite different characteristics.
The quality of the water of the Brenta was considered good while the Bacchiglione, which from the city of Vicenza flows east towards Padua, has a very variable quality of water, which however improves when moving downstream due to the supplies of good quality affluent. The basin of Fratta Gorzone shows in the upstream portion satisfactory quality features which deteriorate downstream of the industrial area of Arzignano.
In order to seek to solve the problem of contamination of the surface water, the sewer trunk line came into action in June 2000. The trunk line pipe currently receives the waters of the Rio Acquetta and an extension to the river Fratta is being built. The

**Figure 27: chromium in mg/l in water from the sewer trunk line (June 2000 - December 2002)**




*Source: ARPAV*

**Figure 28: trend in the production of leather and consumption of solvents from 1996 to 2002**




*Source: ARPAV*

performances shown by the sewer trunk line from its commissioning to date are very good. Figures 25, 26 and 27 show, from June 2000 – to December 2002, the declining trend in chlorides, sulphates and the lower chromium content in the water, well below legal limits.

### Air

To assess the quality of the air and, in greater detail, the contribution by tanning production to air pollution, data relating to the consumption of solvents are available, on which the emission of the VOS depends, updated at 2002.
These data demonstrate how the consumption of solvents and the production of leather show opposite trends. While the production of leather increases constantly, the consumption of solvents has decreased.

This greater efficiency in the production process means a lower impact by tanning production on the quality of the air in the district of Arzignano.
In this area (data updated to 2000) the more critical situations are generated by an excessive concentration of traditional pollutants (NO2) which cannot be traced directly to tanning.

### Province of Avellino: Agenda 21 in the Solofra industrial area

In the tanning area the municipality launched in 2003 the Agenda 21 project entitled " Informing and motivating the community in order to carry out A21L Solofra". The title of the project gives ample indication of the aims which the public administration sets out to achieve by the activities contained in it. They all aim at involving the public, starting with students and finally reaching out to the business world, in order to define together the Environment Action Plan, which has to be shared to enable joint efforts by many different players for its performance. For this purpose the following schemes have been implemented, already carried out or currently in progress:

- ***construction of the web portal*** for informing the public at the same time interacting with them;
- ***multimedia CD ROM***, designed to publicise the contents of Agenda 21;
- ***courses of training and information on Agenda 21;***
- ***training courses on subjects of sustainable development, environmental planning and biotechnological architecture;***
- ***investigation of environmental perception*** for researching public opinion on the environmental problems considered more serious, involving the public and encouraging the success of the Forum;
- ***involvement of primary and middle schools*** for an investigatory analysis of the municipal territory;
- ***training of facilitators*** of thematic work groups, contributing the creation of specialists in management of collection decision-making.

When a picture has been sketched of the environmental problems of the area, joint action strategies can be defined in the Forum and later publicised via the information campaign carried out both via booklets and the web portal.

*The symbol of the tanning district of Solofra*

# Research, Training, Certification

## Research

CONCIARICERCA ITALIA s.r.l.

Constant improvement in environmental performances is the aim of the Italian tanning industry; ongoing investments in research are essential for pursuing this goal.
For this reason Conciaricerca Italia was set up in 1989, which since then has worked to research innovative technological solutions capable of reducing the environmental impact of the tanning production cycle. This purpose is pursued by:

- censuses
- innovation processes
- study of substances and raw materials
- improvement in purification and disposal
- work on the process
- training and technological transfer.

*Specialist research laboratory*

In 1994 Conciaricerca took part in the national chemistry research programme of the MURST.
Since then a staff of researchers has worked to produce a series of important projects which have allowed it to act as an industrial frame of reference for the definition and development of research programmes both for individual tanneries and consortia of companies.
The schemes implemented by Conciaricerca aim at providing a product which is as compatible as possible with the environment. To achieve this objective the research is focused on minimising the use of natural resources, recovery and disposal of the by-products generated by the production process, considering refuse not as waste but instead as resources for other production cycles (e.g. experiments in the use of fertiliser containing sludge and other tannery residues, such as flesh trimmings and scrap from the first phases of the production cycle).

Conciaricerca operates:

- nationally, where the Progetto Concia is currently underway, as part of which experiments are being performed on alternative methods to salting hides, new tanning agents, the use of new materials for the reduction of sound pollution, the use of fertilisers containing sludge and other tannery residues;
- on an EC level, where it performs and coordinates a number of projects, including:
  - CRAFT Water Free Dyeing: the project has led to the development of a dyeing machine for skins and hides which enables a saving in water of around 85% and a potential saving in chemical products of around 30%;
  - CRAFT decontamination and valorisation of sludge from tanning with recovery of the chromium;
  - CRAFT new cross-linking agents for low-impact finishes. In particular a product has been found to replace formaldehyde as casein cross-linking agent.

Conciaricerca is also active in consultancy. In order to minimise environment impact not only cleaner technologies are required but also the necessary assistance for their effective use. For this reason the services supplied by Conciaricerca for members can be summarised as:

- sampling and chemical and biological analyses which allow the environmental situation to be kept under constant control;
- technologies and systems for abatement and purification with which it is possible to reduce the impact of production ex post;
- environmental management, a new form of management whereby a set of

programmed and coordinated management actions, operating procedures, systems of documentation and registration are set up to prevent the negative effects and promote activities which maintain and improve environmental quality;
- training, as good environmental management requires all operatives to be trained in the procedures to be implemented in order to improve the environmental quality of the relevant production set-up.

*The value of research increases with information and training*

### Training

UNIC organises both national and international training programmes, whose goals are:
- *qualification, updating and professional development of member firms;*
- *specialisation and training of staff to be included in the production structure of the supply chain, with schools, technical colleges and universities;*
- *development of the skills of management and technical and design staff of firms in the leather supply chain, designer fashion companies and sales outlets.*

The training processes include meetings, seminars, workshops, vocational training courses and college courses with both theoretical and practical lessons. Since 2002 UNIC and Conciaricerca Italia have used Istituto G. Baldracco, a leading European tanning college founded in 1902, as location for the training courses.

**Table 3: latest UNIC international training schemes**

| Location | Description |
|---|---|
| **Russia, Ethiopia, Kenya, Uganda, Morocco** | Cycle of seminars |
| **Bangkok (Thailand)** | Training course for firms in "Footwear design" with the local trade association |
| **Ho Chi Min, Hanoi (Vietnam)** | Training course for firms in "Footwear design" with the local trade association<br>Seminar "The environmental impact of the tanning industry" with the EC programme ASIA-ECO-BEST and local trade associations |
| **Guangzhou (China)** | Training course: "Italian design for footwear technicians |
| **Wengzhou (China)** | Seminar "The environmental impact of the tanning industry" with the EC programme ASIA-ECO-BEST and local trade associations |
| **Jogyakarta (Indonesia)** | Seminar "The environmental impact of the tanning industry" with the EC programme ASIA-ECO-BEST and local trade associations |
| **Moscow (Russia)** | Technical design seminar |
| **New York (USA)** | Technical seminar "The leather-making process and the characteristics of the end-product" |

The following have been organised there, with the Turin industrial unions, since 2002:

- training courses for tanning operatives (factory workers and technical staff);
- seminars for an introduction to topics such as quality, safety and the environment (students or company personnel introduced in learning about the topics mentioned);
- conferences, meetings and workshops on the topic of leather, its production and uses.

UNIC also works with fashion and design colleges where it carries out meetings and seminars on leather, tanning and the international trade show system. To train staff from firms in the industry and fashion firms, courses have been held on the "tanning production process and features of leather products", organised to fulfil special needs of the client. On the international scene, forms of training have been carried out for foreign users of leather and accessories and suppliers of rawhide/semimanufactures to strengthen trade and cooperation between firms. The activities include actual training courses for technical and design staff, seminars and workshops.
Also on an international basis Unic has carried out a series of seminars, in line with the global missions of the industry. The table gives the locations and types of the latest schemes.

## CERTIFICATION

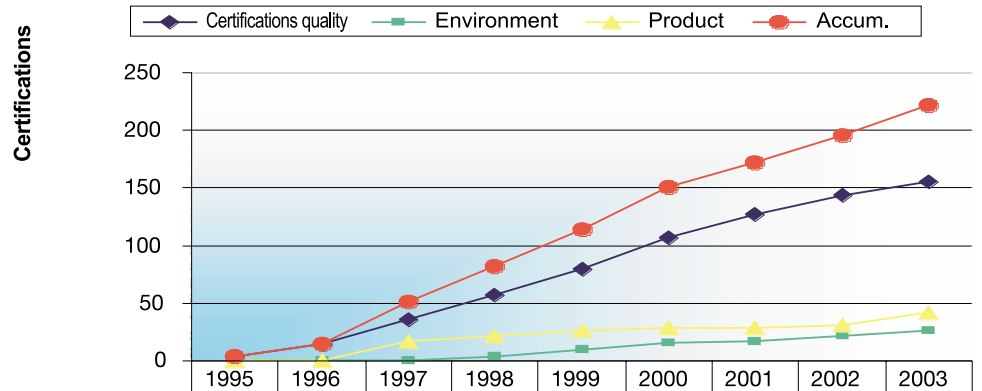
In 1994 UNIC, by request of the main business enterprises in the industry, founded, for certification in the leather industry, the ICEC, the quality certification institute for the tanning industry, an independent, specialist and non-profit-making institution.

ICEC is today the only organisation in Europe and the world dedicated to the leather industry. The members are national associations representing footwear and leather accessories manufacturers, tanners and producers of furniture, and the experimental institute for the leather and tanning materials industry of Naples, UNI (Italian standards body) and the CNR (national research council). Italy is also the only country to have an accredited product certification format for the leather hides and skins industry, recognised worldwide and which enables marking of the end products – from footwear to car interiors.

ICEC is SINCERT-accredited for the system of quality, environment and product management and also a partner of Det Norske Veritas, a world leader certification body.

Figures today show how the tanning industry is at the forefront in certification. With over 220 certificates have been issued (with over 180 tanning units involved – no country in the world with a developed leather industry has reached such levels), certification covers approximately 23% of production and 12% of certificates are revoked.

**Figure 29: trend in certification divided by category from 1995 to 2003**




| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| Certifications quality | 4 | 14 | 35 | 57 | 79 | 107 | 127 | 143 | 155 |
| Environment | 0 | 0 | 0 | 4 | 9 | 15 | 17 | 21 | 26 |
| Product | 0 | 0 | 16 | 21 | 26 | 28 | 28 | 31 | 41 |
| Accum. | 4 | 14 | 51 | 82 | 114 | 150 | 172 | 195 | 222 |

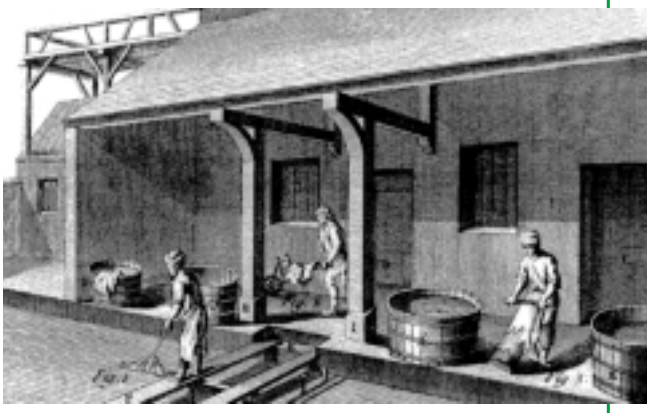
*- Only EA 05 certifications are included (manufacture of leather and leather products) which can be related directly to tanning*

*- Data processed by UNIC*

PART TWO

# Environmental Balance

# Tanneries: Production Process and Environmental Aspects



*Tanning processes in the seventeenth century*

Tanning production in Italy, although maintaining typical craft aspects which ensure the high quality of the product, has for some years now taken on industrial features: increasingly efficient tanners and machinery, automation of entire sequences of operations, rationalisation of the production process and protection of the environment are an integral part of the activity of every tannery.

The tanning production cycle consists of a series of chemical and mechanical treatments which allow a putrescible organic material (rawhide) to be transformed into a product with high added value for footwear, furniture, car interiors, clothing and leather accessories.

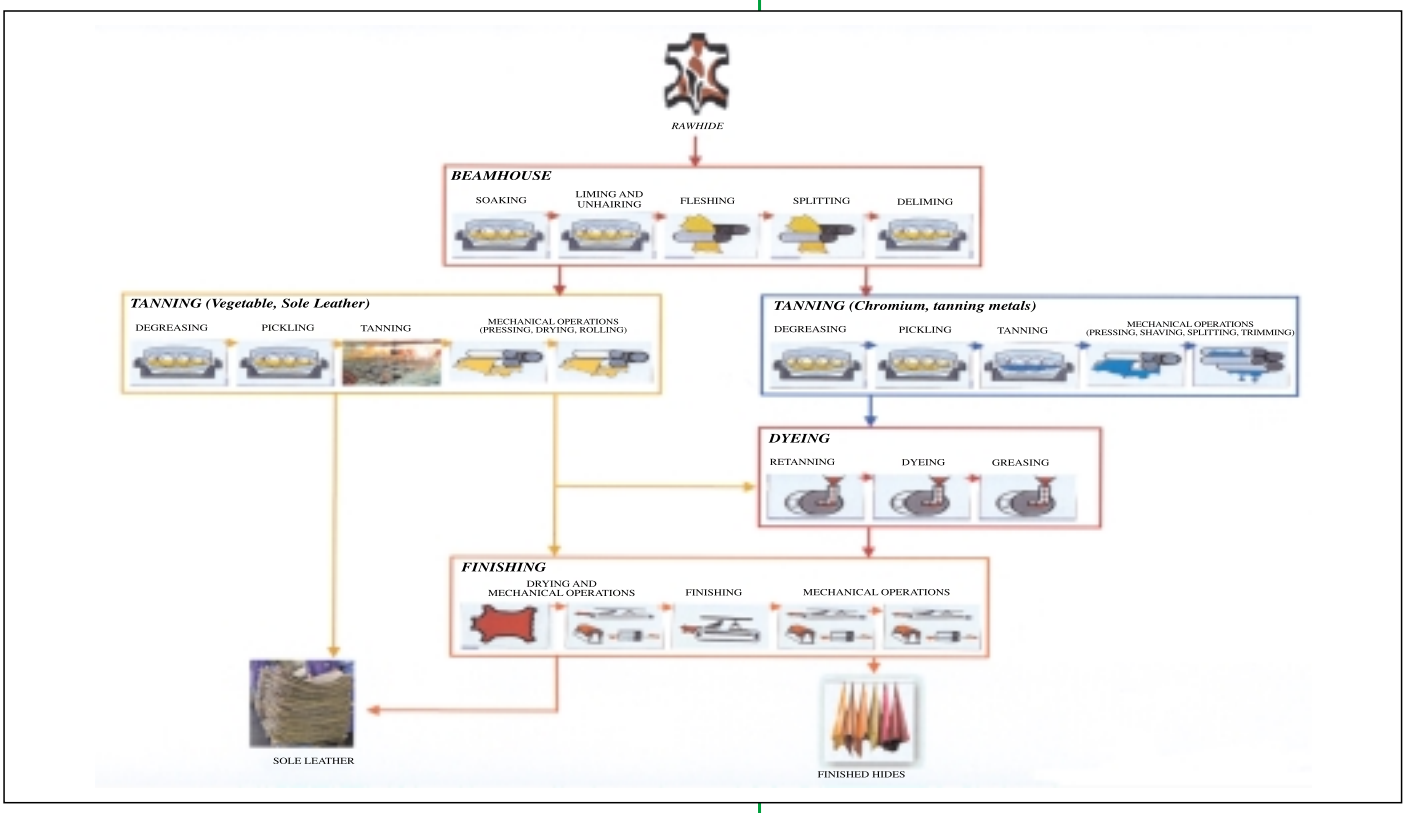
In order to identify the environmental aspects of the processes of a tannery the various phases of the production cycle have to be analysed. The cycle is represented (simplified and generalised) in Fig. 1, understood as a "guide" for defining the environmental problems of tannery processes.

### Preserving skins and hides

The rawhide which arrives at a tannery has been subjected to a preserving treatment in order to slow down decomposition as far as possible, maintaining it in the best condition until processing in the factory. The most commonly used methods are:

- Chilling: the hides are stored at temperatures which, also with the aid of suitable products, inhibit bacterial activity. It is only useful for short periods and entails constant use of refrigerated storage and transport means.

**Figure 1: production phases**



- Salting: after flaying the skins are saturated with salt (sodium chloride, NaCl) which inhibits the development of bacteria and hence decomposition reactions.
- Drying: the skins are brought to fairly low humidity contents in order to kill bacteria and prevent the enzymatic reactions of putrefaction.

*Poor quality preserving may cause **free ammonia** and unpleasant **odours** to develop which do not represent in themselves a risk for human health or for the ecosystem in general, but affect the quality of life of residents in the surrounding areas. To avoid the formation of **ammonia** and **unpleasant odours**, the rawhide is not exposed to atmospheric agents which speed up the rotting processes, but is instead stored in the tannery in cold rooms at temperatures slightly higher than 0°C.*

*Drums: typical tannery machinery*

### Beamhouse operations

Beamhouse operations are carried out to remove from skins and hides all those parts no longer useful for the production process (such as for example the preserving salt, hair and portions of subcutaneous tissue), relax the collagen structure and encourage the penetration of the various tanning agents.
The first beamhouse operations (soaking, liming/unhairing) are performed in drums, large cylindrical recipients similar to industrial washing machines, where the hides are treated with water, normally with the addition of chemical or enzymatic products which encourage washing and unhairing of the same.
The hides are then treated with machinery which eliminate subcutaneous tissue (fleshing) and are in some cases cut longitudinally, obtaining two or more layers (splitting) for subsequent processes. At this point the cycle continues once again in the drum, where the hides are cleaned residues of the chemical products used during liming and brought to optimal conditions for tanning.

*During the beamhouse operations quantities of water are consumed in proportion to the weight of the treated hides. The discharged water is full of dissolved substances which affect its quality. The beamhouse mainly affects the parameters of water effluent such as the COD, suspended solids, chlorides, sulphides and organic nitrogen. The waters undergo purification processes (if necessary, differentiated for some baths) which reduce the pollutants to values which do not entail risks for the environment. The hair can be recovered in special screens and later reused as felt. Some innovative technologies allow removal of hair with enzymes and recycling of the unhairing baths, with a reduction in water consumption and emissions of pollutants. Fleshing produces the flesh trimmings which, like the scraps produced by trimming, must be treated as a solid residue. At tanneries all the types of refuse produced is collected selectively, to allow it to be sent to the proper destination. The flesh, hair and skin trimmings are sent for recycling with various destinations both in industry and agriculture and livestock farming.*

*Department for tanning processes in drums*

### TANNING THE HIDES

After having been treated in order to remove excess substances, alter the pH values and prepare the collagen fibres, the hides undergo actual tanning. Tanning takes place using substances which fix irreversibly to the fibres of the hide and prevent its decomposition, making it stable and long-lasting and without altering its natural properties. There are various types of tanning and the phases differ widely according to the processes and end products: mineral tanning (mainly performed with salts of chromium), vegetable tanning and organic and mixed tanning. The most widespread type is chrome tanning, performed in drums with the tanning product in an acid pH bath. The most commonly used vegetable tanning system for sole leather involves immersing the skins in a series of successive vats containing solutions of extracts of tannins at increasing concentrations. The duration of the process can even reach 30 days. To produce sole leather in Italy a mixture of chestnut, mimosa and quebracho tannins is mostly used. At the end of tanning in the vat the hides move on to the phase of tanning in the drum for which the same vegetable extracts are almost always used.
After the tanning operations the skins undergo mechanical treatments to define and standardise the their thickness, according to the intended use of the actual product. This operation, known as skiving or shaving, is performed on all types of hide.

*Tanning sole leather in vats*

*Tanning operations consume quantities of water in proportion to the weight of the hides washed, and produce a pollutant content in the effluent water consisting of COD, surfactants, chlorides, sulphates, ammonia-N, chromium III. In this case too the water discharged from the tanning vats and drums is sent, via special drainpipes, to be purified both inside and outside the tannery. Nowadays there are various technologies for reducing to a minimum the quantities of chromium III by discharge of water. It is possible to recover the exhausted tanning baths and then reuse them or use high-exhaustion tanning products, which ensure in many cases the same effect with smaller amounts. Techniques of ultrafiltering of the vegetable tanning baths have also been experimented, which enable the tannins not fixed to the skins to be recovered, preventing them from being conveyed into water drains and allowing their partial reuse.*
*The byproducts of the shaving process are selectively collected in the tannery and sent for reuse, leading to the production for example of regenerated fibres of leather, glue and fertilisers.*

*Shaving chromium-tanned skins*

### Dyeing operations

The hides from the various tanning processes have to undergo additional treatments in water baths. The latter, grouped together under the term dyeing operations, aim at giving the skins specific properties such as fullness, texture, surface and touch and, obviously, the required colour. Actual dyeing may only concern the external surfaces or the whole section of the hide. The hides are first retanned with natural and/or synthetic products such as tannins and resins of various types, and later dyed with colouring agents of various types. The dyeing is performed in drums which are made to rotate at high speed until the dye is fully absorbed by the skins.

*The effluent from dyeing operations which, per unit of product processed, is smaller than that from previous phases, is discharged, at modified values of temperature, COD, ammonia nitrogen, phenolic compounds and fats. The dyes used are mostly exhausted in the actual dyeing baths so that the waters are not discharged with notable colour changes, particularly after mixing with the other tanning discharges. In this case too all the effluent is sent for purifying via special drainpipes installed in the department.*

### Finishing the skins: creating the final external appearance

The dyed hides are then dried appropriately by means of the operations of pressing, when the excess water is eliminated, and drying, mainly by hanging. The hide is then slightly moistened and subjected to mechanical operations in order to soften and relax it and even out its surface. In some cases it also undergoes surface buffing in order to produce a useful surface with a "nap" of varying length. This operation can also be carried out on only tanned dry hides which are dyed later. Actual finishing consists in applying a surface film with varying thinness and transparency of chemical substances of various types, according to the article to be produced. The most frequently used of the various finish application technologies is the system of spraying with compressed air. The hides are placed on a conveyor moving at an adjustable speed to receive the necessary quantity of covering mixtures by means of spray guns which generally move in a

*"Overhead chain": traditional method for drying skins*

circular motion. As a final operation the finished skins are then trimmed, eliminating all the parts which have defects and unwanted parts, prior to delivery to the customer.

*The finishing operations, and in particular the surface application of products by compressed air spraying, affect the quality of emissions into the atmosphere as regards in particular dust and volatile organic substances (VOS). All the emissions from buffing the hides and from the spray booths of the finishing lines are sent to filters and abatement systems of various types, which ensure observance of the legal limits. These abatement systems in some cases use water as purifying agent and in this case it is periodically replaced and sent for purification, to maintain the efficiency of the plant. In recent years there has also been gradual replacement of finishing products with a solvent base with equivalent products with a water base, which has made a considerable contribution to improving the quality of the emissions. Finally the trimmings of the hide, formed during the final selection and control phase, are collected selectively and reused for production, in some cases, of other small items in leather, and in other cases for the production of regenerated leather fibre.*

*Before despatch all the defective parts or those not useful are eliminated*

# Environmental Balance

The environmental balance, a voluntary information tool, is used by firms for better management of certain aspects and for communicating environmental performances. Since to date no legal requirements have been laid down, there is no fixed format for its drafting; each firm adapts the structure of the balance to the type of information which the special features of its production processes make management and publication necessary and appropriate.

## Methods

• *Sample*

The sample on which the analysis is based consists of 23 tanneries, selected according to the production structure of Italian tanning to represent, in the most standardised form possible, the national situation, where the Veneto region represents the largest percentage of production (54.3%), Tuscany 26.6%, Campania 7% and the other regions (mostly Piedmont and Lombardy) 12.1%. The firms of the sample represent overall 11.73% of Italy's revenues in the industry and employ 6.41% of the total work force (2116 out of 30,040), as shown in detail in Table 1. Almost all the tanneries included in the sample also have a complete production cycle, thus allowing a comparison of their environmental performances.

• *Environmental balance format*

The data were collected from the firms in the sample using a questionnaire structured with a physical and economic environmental balance format, organised by standardised environmental compartments and based on the experience gained by the industry during performance of the EC project LIFE 96/ENV/IT/136 *"Pilot*

**Figure 2: structure of the sample**

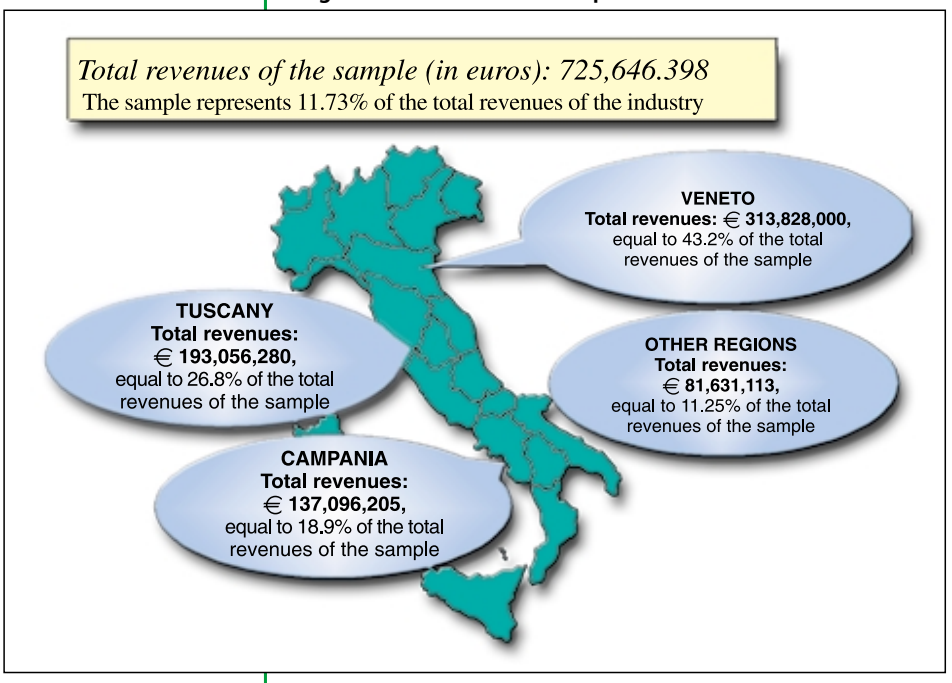



**Table 1: representative nature of the sample selected**

| Regions | Sample revenues (values in €) | Regional revenues (values in €) | % of sample out of regional total, by revenues | % composition of sample, by region |
|---|---|---|---|---|
| Campania | 137,096,205 | 465,999,060 | 29.42% | 18.89% |
| Tuscany | 193,056,280 | 1,820,510,569 | 10.60% | 26.60% |
| Veneto | 313,862,800 | 3,364,716,697 | 9.33% | 43.25% |
| Other regions | 81,631,113 | 649,547,841 | 12.57% | 11.25% |
| **TOTAL** | **725,646,398** | **6,186,000,000** | | |

*Source: UNIC, ISTAT*

*project for preparing, promoting and facilitating participation by Italian tanning firms in the EC environmental management and audit system".* The environmental balance format proposed is drawn up in the form of an input-output matrix with reference to the solar year. Reporting of environmental aspects includes:

- Supply and discharging of water
- Waste production and management
- Atmospheric emissions
- Other environmental aspects
- Energy supply

The document is then made up of a set of accounting schedules containing chemical and physical and economic information which, interpreted jointly, enables the environmental impact of the firm and the economic and financial efforts made to restrict them to be quantified.
The criteria of identifying and obtaining data, both physical and economic and clearly defined, give a reference framework capable of allowing comparability in subsequent periods.
The representation used for the physical data is based on the model known as "black box", where the tannery is represented as a "transformer" of flows of material and energy which, passing through the site, then produce as a final result the product to be sold (finished leather) and various types of emissions conveyed towards different environmental receiving compartments.
In order to make a clear distinction between environmental costs from non-environmental ones, specific identification criteria are required. An attempt is also made to avoid that the generic nature of the definition of environmental expenditure can lead to over-subjective definition of the costs, creating as a result problems linked to the comparability of the data in time. Reference is therefore made to the definition of environmental expenditure proposed by Eurostat, whereby the "expenditure incurred for performing activities whose main objective (direct or indirect) is management and protection of the environment, that is to say activities aimed deliberately and principally at preventing, controlling, reducing or eliminating

*Environmental protection in the tannery: reduction in consumption and purification of effluent*

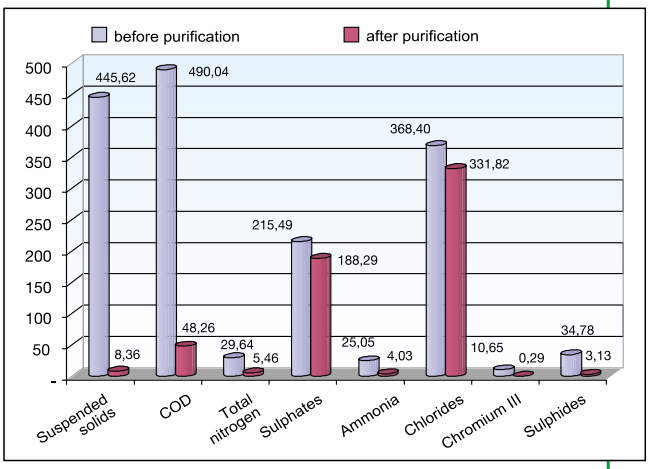
pollution and the environmental decay caused by production and consumption" can be defined as environmental.

# Results

The analysis aims at presenting some of the most significant indicators relating to the environmental impact and intensity of the tanning industry and evaluating the financial commitment by the industry to the environment. It should be underlined how the costs incurred for energy supply have not been included among the environmental costs and are presented separately, given that energy consumption is indicative of the consumption of natural resource and not their safeguarding.
The methods of processing physical data and those of an economic nature are separate.
As far as the physical data are concerned, the average and percentage values of the parameters measured are illustrated, specifying however that the average is weighted for the number of firms who have supplied the data required. The values obtained were also related to production to find out the average pollutant content per product unit. The square metre of leather was considered as product unit, in that this is the unit of measurement used in most commercial transactions internationally.
As far as costs are concerned, the total, average and percentage values are presented (arithmetic mean), giving an indication of the average economic commitment of the 23 firms who collaborated in drawing up the report.

*Each firm in the sample spends on average approximately 450 thousand euros on water purification*

**Figure 3: pollutants before and after water purification (g/m²)**




*Source: UNIC research*

### Water supply and discharge

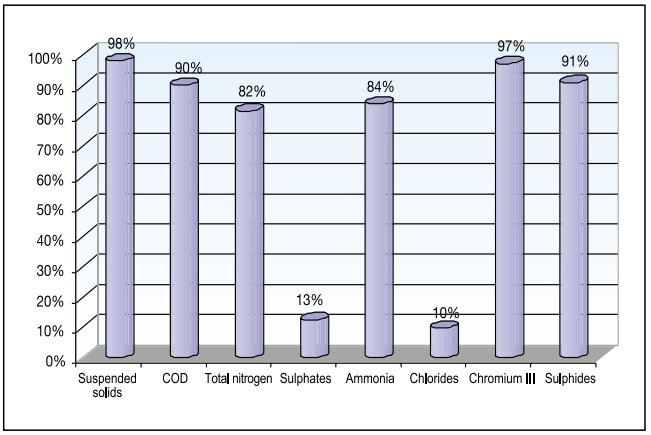
Consumption and purification of water represent the most important environmental aspects for tanneries, from both the physical and economic standpoint. Most of the firms in the sample draw water for industrial use from their own wells on the production site. In other cases water is found to be taken from industrial water supply systems. **Each tannery uses an average of 136 litres of water per square metre produced**, value measured by reading the meters of internal wells and/or industrial water supply systems.
After having been used in the tannery, the water is conveyed into specific drain systems and sent for purification, with a pollutant content which varies according to the type of process performed by the plant. The most typical parameters of the tanning process, and therefore considered in the analysis, are given below:

- Suspended solids
- COD
- Total nitrogen
- Sulphates
- Ammonia
- Chlorides
- Chromium III
- Sulphides

The water is then treated in specific purification cycles. The structure of the tanning industry has led many firms to form consortia to build centralised purification plants. Others have installed internal systems for water treatment. 65% of the

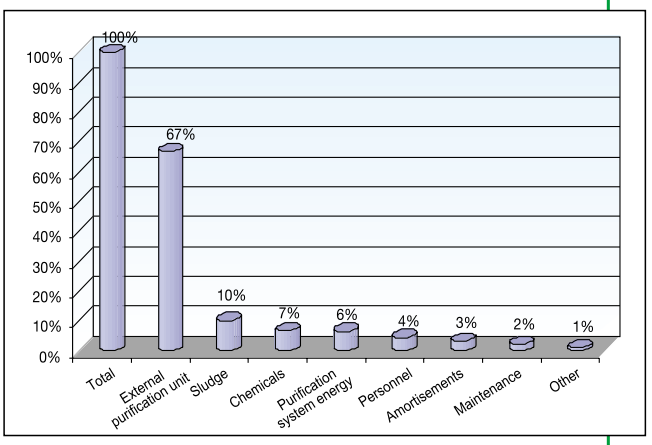
firms of the sample are connected, via consortium trunk lines, to centralised treatment systems; at the same time 73% of them carry out preliminary treatments of the same water, before sending it to the purification unit.
The type of pre-treatment varies from mechanical screens for eliminating coarse suspended materials to actual purification with chemical, physical and biological treatments.
In order to calculate the performances of the purification systems adopted by tanneries, consideration was made of the average values of the pollutants in the discharge upstream of the purification system and a comparison was made with the levels measured at the outlet of the purification system adopted. For tanneries connected to consortium purifiers the purification system as a whole is formed by a possible internal pre-treatment and centralised purification systems, whereas for the others the system

**Figure 4: levels of abatement of pollutants in water (%)**




*Source: UNIC research*

**Figure 5: breakdown of purification costs (%)**




*Source: UNIC research*

is represented solely by the internal purification system.
As shown in Fig. 4, the firms in the sample achieved highly significant abatement goals.
To reach the aforementioned purification levels, each firm in the sample spends on average around 450,000 euros, mainly allocated (67% of the total) to covering the costs of the centralised external purification unit. Significant shares of the purification costs are also represented by disposal of the sludge produced during internal purification and pre-treatment, and by the elements required for managing auxiliary plants linked to actual purification, such as electrical energy, chemical products and personnel.
These are in addition to around 15,000 euros spent at each firm for maintaining efficiency of the system for the intake and distribution of water. The cost of purification per $m^3$ of water discharged is 4.90 euros, even if there were considerable changes in the figure mainly due to the structure of the purification systems and the geographical location of the firms.

**Table 2: summary of water supplies and drainage**

| SUMMARY TABLE WATER SUPPLIES AND DRAINAGE | | |
|---|---|---|
| **Indicator** | **Value** | **Unit of measurement** |
| Litres consumed/product unit | 136 | l/$m^2$ |
| Purification costs/revenues | 1.43 | % |
| Unitary purification costs | 4.90 | €/$m^3$ |
| Purification costs/product unit | 0.61 | €/$m^2$ |

*Source: UNIC research*

### Waste production and management

Waste from the tanning cycle is widely diversified according to the phase of the cycle from which it comes and can therefore have different final destinations. The origin of the waste in a tanning production process is represented mainly by elimination from the skins, at the various stages of the process, of excess parts or

*Most waste produced in tanneries is represented by scraps from the actual skins and hides*

those not useful to the finished product. They originate directly from the waste or flow into the discharge water, which during purification generates waste sludge. The item "waste" therefore represents an important aspect which has to be analysed in an industrial environment report. The vast majority of the waste produced (95%) can be traced to the tanning process, while only around 5% consists of refuse of a variable type, and in any case coming to a great extent from packaging. The breakdown of the various types of specific waste of the tanning activity arising from the analysis of the sample is given in Table 3. It should be noted how the production of purification sludge has been underestimated, in that it comes from the purification process, contracted to consortia firms in 65% of cases.

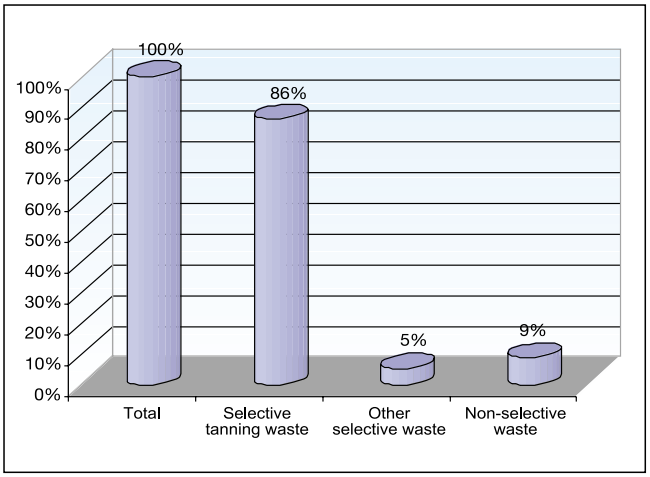
Analysis of the data shows how the tanneries in the sample are actively engaged in the management and differentiation of the waste at the respective plants. This has allowed results to be achieved such as the 91% of selective collection out of the total waste produced and the sending of 69% of the same for recycling.

**Table 3: summary of water supplies and drainage**

| Type of waste | % of total |
|---|---|
| Flesh trimmings | 31.2% |
| Sludge containing chromium | 22.1% |
| Tanning liquids | 19.1% |
| Shavings, scraps and trimmings | 17.5% |
| Non-sorted | 6.9% |
| Sludge not containing chromium | 1.8% |
| Hair and pieces from liming | 1.3% |
| Degreasing baths | 0.1% |

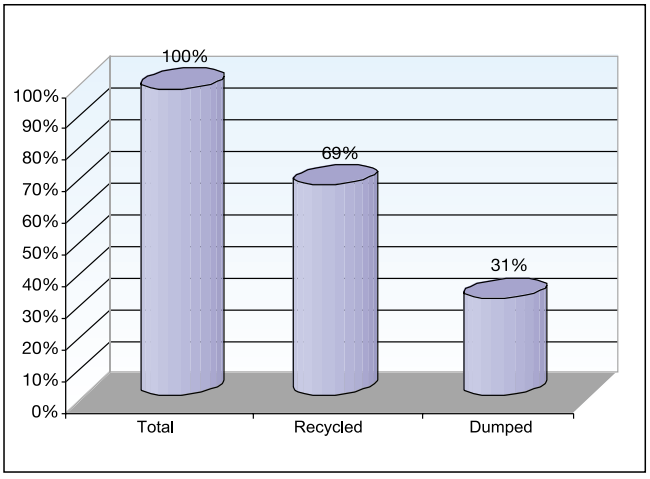
*Source: UNIC research*

**Figure 6: selective waste collection**



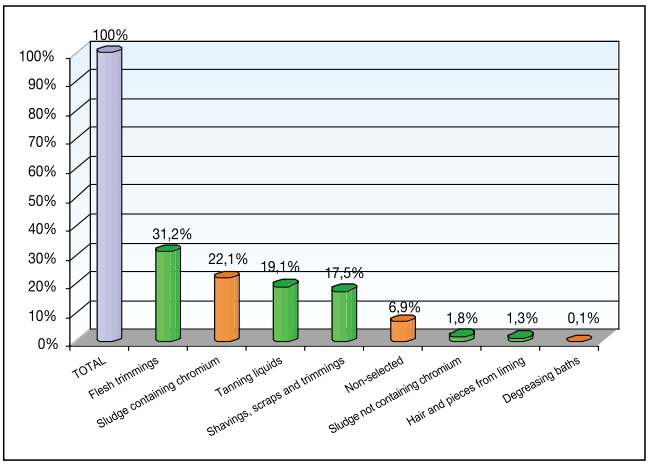

*Source: UNIC research*

**Figure 7: final destination of waste**



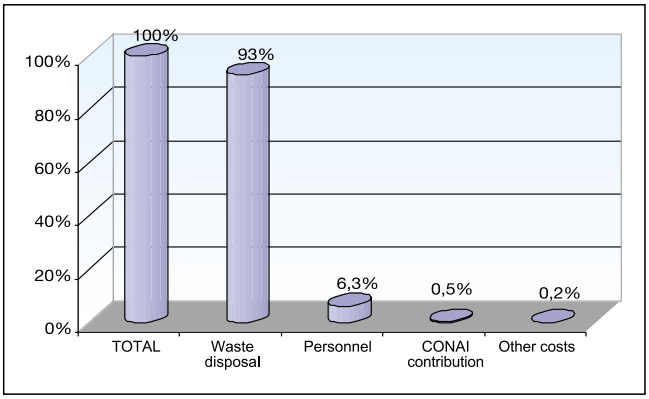

*Source: UNIC research*

**Figure 8: composition of typical waste from tanning (waste for recycling in green)**




*Source: UNIC research*

**Figure 9: waste: breakdown of costs**




*Source: UNIC research*

Each firm in the sample spends on average around 123,000 euros for waste management, equal to 0.39% of revenues. These costs mostly consist of the item relating to disposal of the same waste to authorised organisations (irrespective of the final destination of the same waste) and to a much lesser extent by personnel and administrative costs.

### The tanning industry and atmospheric emissions

The tanneries of the sample spend on average around 22,000 euros for control of atmospheric emissions, a value which represents approximately 0.1% of revenues. This value is in actual fact below the real cost, in that many of the filters used for fumes abatement are an integral part of the equipment and machinery used in the process (and therefore are not amortised separately from the same machinery). The main results in terms of reduction of atmospheric emissions have also been achieved in recent years by replacing solvent-based finishing products with equivalent products with a water base. The price differences between these products (which to all effects are to be considered environmental expenditure) are not easy to calculate and therefore were not accounted.

The atmospheric emissions conveyed by tannery stacks can be traced to dust, volatile organic substances (VOS) and hydrogen sulphurate, produced during the various phases of the production process, and to nitrogen oxides (NOx) and sulphur oxides (SOx), emitted during combustion in thermal power plants for the production of hot water and steam. In particular:

- the **dust** comes from mechanical operations such as shaving and buffing and is removed by pneumatic suction and sent to specific abatement systems (mainly bag filters or centrifugal dust separators) which reduces its concentrations to values well below legal limits and enables it to

**Table 4: summary of waste production and management**

| SUMMARY TABLE WASTE PRODUCTION AND MANAGEMENT | | |
|---|---|---|
| **Indicator** | **Value** | **Unit of measurement** |
| Waste/product unit | 2.16 | kg/m² |
| Waste sent for recycling | 69 | % |
| Waste costs/revenues | 0.39 | % |
| Unitary management costs | 0.06 | €/kg |
| Waste costs/product unit | 0.12 | €/m² |

*Source: UNIC research*

be collected selectively and sent for recycling. Another origin of dust is the finishing spray booths, from which dye pigment particles contained in the products are emitted, in this case too sent to specific abatement systems and emitted according to legal limits;

- the **volatile organic substances (VOS)** are emitted almost solely during spray finishing of the hides in very reduced concentrations and as part of large volumes of air and then sent to the abatement systems (mainly lamellar filters and scrubbers) to observe the legal limits of emission at the stack. The technologies for reduction of pollution by VOS mainly tend towards replacing the solvent-based products with equivalent water-based ones in order to reduce the causes of the pollution at source;
- The **hydrogen sulphurate** ($H_2S$), gas with a characteristic rotten egg smell, is mainly produced in deliming drums, due to the change in the pH values. To avoid uncontrolled emission into the atmosphere, drums are used in tanneries connected to specific abatement systems which use caustic soda solutions which bond with the $H_2S$, also removing more than 95% of the gas emitted.
- The **nitrogen and sulphur oxides (NOx and SOx)** are by-products of the reactions of combustion of the thermal power plants and their concentration in the emissions basically depends on oxidation of the nitrogen present in the air and the content of sulphur of the fuels used; in this case too there has been a gradual conversion over the years in thermal power plants from traditional fuels (diesel oil and BTZ oil) to cleaner solutions, mainly methane.

The graph below shows the values (in g/m²) of some air pollutants, calculated as follows:

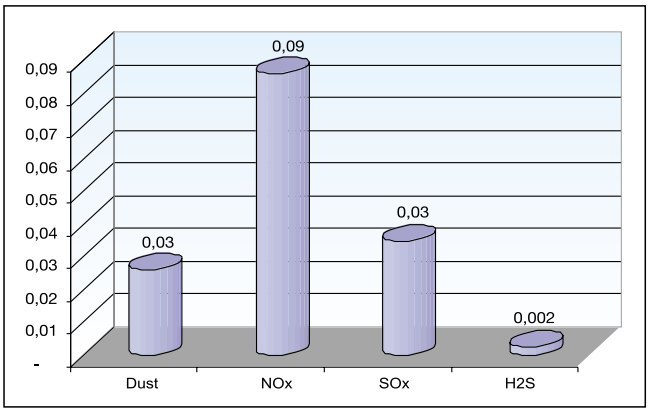
**Pollutant per unit of product (g/m²) = AC (kg/year) / P (production in m²) * 1000**

where AC, annual contents, were obtained as follows:

**Annual contents [Kg/y] = C [mg/Nm³]* F [Mn³/h] *h [hours worked/y]/10⁶**

where C is the average concentration measured at the stack, F is the overall flow rate of the systems which emit the specific pollutant and h is the sum of hours worked during the year.
As regards the VOS, a different method of controlling and measuring the emissions was found among tanneries located in different geographical areas, due to the different legal provisions in force. Given the varied nature of the information gathered, to avoid presenting non-significant and in some cases misleading results, it was decided instead to present the only work

**Figure 10: pollutants in the atmosphere per product unit (g/m²)**




*Source: UNIC research*

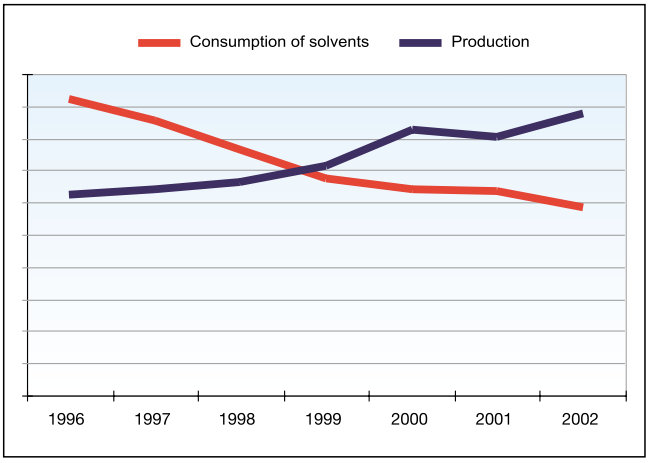
**Table 5: consumption of solvents and production in the Veneto tanning district**

| | Consumption of solvents | | Production | |
|---|---|---|---|---|
| | Value (thousands of kilos) | Change % | Value (thousands of m²) | Change % |
| 1996 | 18,439 | – | 124,516 | – |
| 1997 | 17,128 | -7% | 128,145 | +3% |
| 1998 | 15,295 | -17% | 132,856 | +7% |
| 1999 | 13,489 | -27% | 142,870 | +15% |
| 2000 | 12,852 | -30% | 165,221 | +33% |
| 2001 | 12,744 | -31% | 160,766 | +29% |
| 2002 | 11,663 | -37% | 175,788 | +41% |

*Source: Province of Vicenza, Environment dept., 2003*

available to date on emissions of VOS. In particular the results collected by the province of Vicenza on the Veneto tanning district show, from 1996 to 2002, a decreasing trend in the consumption of solvents (-37%) in relation to an increase in production of 41%. This led to a 55% reduction in the value of the pollutants emitted per product unit. The graph and the table given below describe in detail the progress made.
For control of atmospheric emissions, tanneries spend

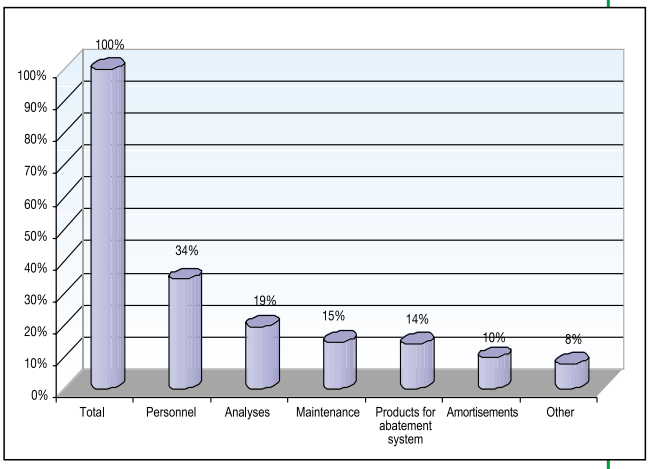
**Figure 11: trend in production and consumption of solvents**




*Source: Province of Vicenza, Environment dept., 2003*

on average 22,000 euros a year, mostly relating to personnel costs (34%), analysis and maintenance contracts for the abatement systems and thermal power plants. Special consideration should be given to the amortisation items, in that the abatement systems used for reducing and limit the atmospheric emissions

**Figure 12: breakdown of costs of management of atmospheric emissions**




*Source: UNIC research*

from the finishing phases are purchased and managed as an integral part of the production systems, making allocation of the share of the investment (and as a result its amortisement) to the specific environmental cost item difficult.

*Atmospheric emissions are controlled by abatement systems connected to the production machinery*

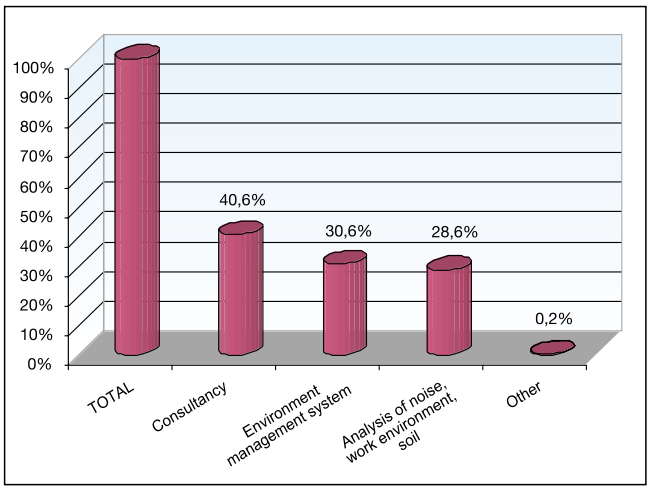
**Table 6: summary of atmospheric emissions**

| SUMMARY TABLE ATMOSPHERIC EMISSIONS | | |
|---|---|---|
| **Indicator** | **Value** | **Unit of measurement** |
| Dust/product unit | 0.03 | $g/m^2$ |
| NOx/product unit | 0.09 | $g/m^2$ |
| SOx/product unit | 0.03 | $g/m^2$ |
| $H_2S$/product unit | 0.002 | $g/m^2$ |
| Costs of emissions/revenues | 0.1 | % |
| Costs of emissions/product unit | 0.049 | €/$m^2$ |

### Other costs

Additional activities relating to the environment by firms in the sample are also represented by the administrative costs for maintaining the environmental management systems (22% of firms of the sample have the UNI EN ISO 14001 certificate), expenditure for analysis and consultancy linked to the process of improvement of environmental performances, not included in the categories previously listed. The average annual value is around 11,300 euros.

**Figure 13: breakdown of other environmental costs**



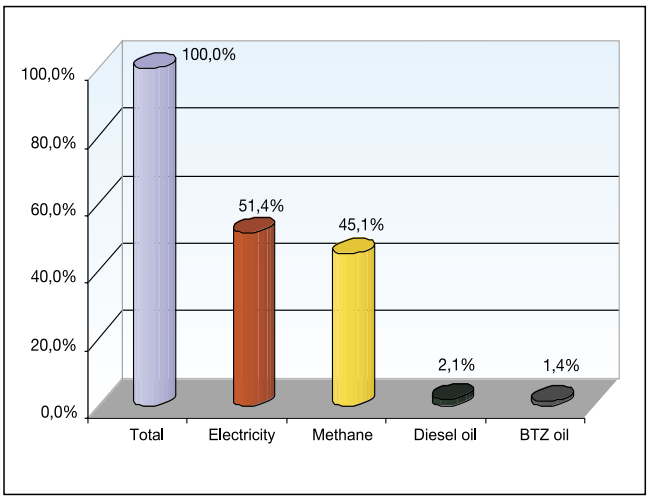

*Source: UNIC research*

### The tanning industry and energy consumption

Production in the tanning industry does not feature high energy intensity. The energy used in tanning is mainly electrical and thermal, the first for operating the plants and equipment, the second for controlling the temperature of the water and work areas. The average energy supply value per product unit is 0.0024 tonnes of oil equivalent (TOE) per $m^2$. Electricity and methane cover almost all the energy needs of the industry, which also relies in much smaller proportions on fuel oil and diesel oil, as a result of a gradual process of conversion of the heat production systems towards cleaner fuels.
The tanneries in the sample spend on average around 569,000 euros a year for energy supplies, equal to 1.72% of revenues and with a rate per product unit equal to 0.54 euros per $m^2$, with the breakdowns shown in Fig. 13.

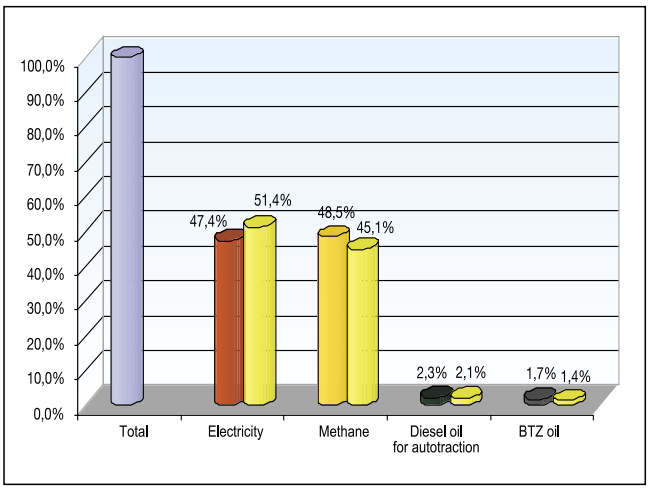
*Electricity and methane is mainly consumed in tanneries for operating machines and heating process water*

**Figure 14: breakdown of consumption**



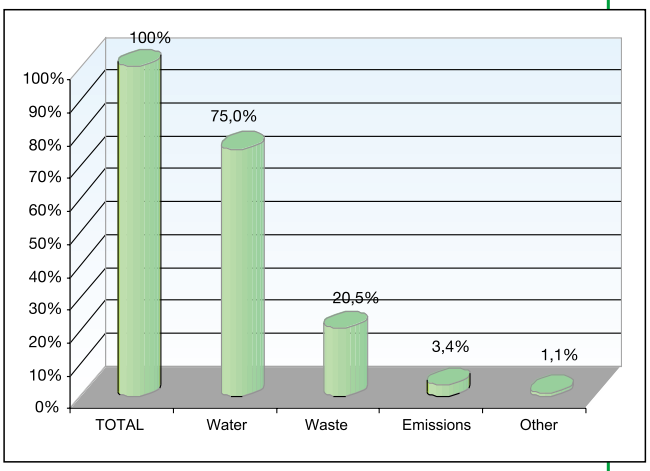

*Source: UNIC research*

**Figure 15: breakdown of energy costs and supplies**



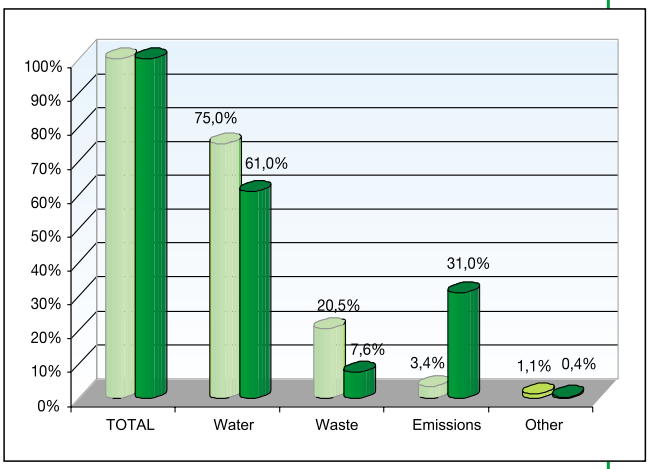

*Source: UNIC research*

**Figure 16: breakdown of environmental costs**




*Source: UNIC research*

**Figure 17: environmental costs and investments (2000-2002 investments)**




*Source: UNIC research*


## Summary

**Each firm in the sample spent on average, in 2002, circa 600 thousand euros for the environment.** 75% can be related to water purification costs, 20.5% to waste management and disposal, 3.4% to abatement of atmospheric emissions and 1.1% to other costs, among which the most significant items are consultancy and costs for analysis (the latter cannot be related to any specific environmental department).
The proposed breakdown of the environmental running costs tends however to some extent to underestimate commitments in the industry, above all as regards emissions into the atmosphere, in that the improvement of the performance is linked, in addition to replacement of solvent-based products, to structural investments in abatement systems and equipment, which do not require special management or maintenance. Considering the investments of the past three years, it is seen how the atmospheric emissions are considered when defining the improvement processes. The average investments incurred by firms over the past three years for purchasing plant and equipment relating to control of atmospheric emissions amount in fact to approximately 75,265 euros. It should be underlined how this calculation does not


**Table 7: summary of total environmental costs**

| SUMMARY TABLE AVERAGE VALUES PER FIRM | | |
|---|---|---|
| **Indicator** | **Value (€)** | **Percentage %** |
| Total environmental costs | 600,207.8 | 100 |
| Water purification costs | 450,397.7 | 75.0 |
| Waste management costs | 123,051 | 20.5 |
| Atmospheric pollution costs | 20,190.3 | 3.4 |
| Other environmental costs | 6,568.9 | 1.1 |

| **Indicator** | **Value** |
|---|---|
| Percentage of environmental costs out of revenues | 1.90% |
| Percentage of environmental costs out of total running costs | 2.1% |
| Percentage of environmental costs out of gross operating margin | 17.6% |

*Fonte: ricerca UNIC*

include the costs relating to energy and water supplies, in that they do not come under the proposed definition of environmental expenditure.
**The percentage of environmental costs is 1.90% of revenues**; the percentage reaches **2.1% when considering the total running costs** and **17.6% when considering the gross operating margin**, values which confirm the importance of the environmental variable in the industry, in addition to the financial commitment which firms incur and have incurred.
The environmental commitment and resulting financial effort in the tanning industry take on even greater meaning at a time when international competition forces the Italian industrial system to communicate increasingly the environmental and ethical nature of its production, turning the rules of the game towards cleaner production. The Italian tanning industry is at the cutting edge in this challenge and this report represents the first essential communication tool.