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LETTER FROM THE CHAIRMAN

That this is the fourth edition of the group's Environmental Report is itself evidence of Pirelli's continued commitment to improving its environmental performance despite what is a far from rosy situation for the economy in general and for a number of our specific areas of production in different geographical areas.

Confirmation of the positive trend of the significant indices illustrating the impact of our production on the external environment and the continued focus of our research on ever-more eco-compatible processes and products and innovative solutions (for example, in the field of materials science or the production of alterative energy, or those *clean* forms of energy that reduce the emission of greenhouse gases), represent a guarantee of continuity for our policies.

We are deeply convinced that correct management of environmental questions, in terms of the use of resources, the optimization of processes and products and the marketing of low environmental impact products, represents a measure of success for our company and one of the key elements in our sustainable development.

The identity of our group is historically founded on the array of values that have over the years been upheld and safeguarded by us all; the very values that have allowed us to consolidate and enrich our business culture and to play a social role in the areas in which we operate with solid professionalism.

Among the many possible examples, it is sufficient to mention that fact that early in the last century Pirelli was one of the first companies in the world to establish a health service for its employees. Recognition of the group's efforts has since come in the form of its inclusion in the Dow Jones STOXX Sustainability Index and the FTSE4GOOD index.

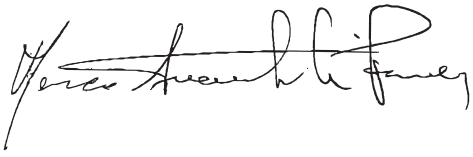
This is not all, however, as in order to better develop our activities in the field of Corporate Social Responsibility we have formed a Steering Committee with similar functions in this specific field to those performed by the Steering Committee for the implementation of the Environmental Management System. We are, in fact, heavily committed to the creation of an organic system for the collecting and processing of our data in this field and for defining precise and attainable objectives coherent with the values clearly expressed in our *Ethical Code*.

Two group projects were launched during the course of the year: the No Smoking campaign that will lead Pirelli to become a global "No Smoking Company", and the so-called "Woman Project", which has the objective of further improving the conditions of equal opportunity through specific positive initiatives.

These are transverse processes that require the combined and coherent efforts of company employees at every level, each within his or her own role, coordinated by central management but appropriately adapted to the specific social, economic and cultural situations in which Pirelli operates.

The challenge actually lies in the fact that Pirelli has production facilities on all five continents and must therefore be capable of reconciling reception of the message coming from the mother company with scrupulous respect for the local reality: the motto "*think globally but act locally*" is particularly appropriate for our group and well encapsulates the type of approach the company intends to pursue as it contributes to providing the conditions and means for a better quality of life for the present generation and those of tomorrow.

While not wishing to anticipate on-going initiatives, the commitment that we have made to our stakeholders is that of presenting a report next year that will be still further enriched with information and data documenting the company's activities in the fields of both environmental and social performance.



2003 REPORT DEVELOPMENT CRITERIA

While maintaining editorial continuity with respects to previous editions, the Environment & Safety Report 2003 nonetheless presents significant changes and supplements.

In particular, the report has been subdivided into three major sections:

- An initial general section, describing how the group has approached and managed the on-going relationships between its activities and the environment;
- A main section in which specific themes associated with the group's diverse production sectors are briefly examined;
- A statistical appendix containing quantitative data regarding the principal environmental parameters.

As was the case with the 2002 Report, in this latest edition the *Energy Cables and Systems* and *Telecom Cables and Systems* sectors have been treated separately in both the descriptive section and the statistical appendix.

Furthermore, in accordance with the policies adopted previously, the operational units with *mixed* production outputs (cables for both the energy and telecommunications sectors) have again been included in the Energy Cables and Systems sector, reflecting their business management structures.

This report concerns all those Pirelli & C. S.p.A. production units that manufactured goods during the course of 2003. It therefore includes those that as a result of divestitures and other operational decisions only produced for part of the period (for example, the Energy Cables and Systems factory in Budapest that was officially closed at the end of October, 2003). Clearly, this approach is intended to provide the most comprehensive overview possible of the effective environmental burden generated by Pirelli during the course of the year in question.

The report instead does not take into consideration — given that they were non-productive throughout 2003 – the Energy Cables and Systems facilities at Erith, Eastleigh and Southampton (in Great Britain), Berlin (Germany) and Colusa (the United States).

In terms of quantitative data of an "environmental" nature, a substantial uniformity is confirmed with respects to the findings of the previous report and in particular:

- ***Water consumption***, both in absolute and normalized terms with respect to the specific industrial output.
- ***Energy consumption***, both in absolute and normalized terms with respect to the specific industrial output, confirming the real data recorded "at the meter" by the various production units.
- ***Consumption of organic solvents***, both in absolute and normalized terms.
- ***Production of waste***, both waste considered to be hazardous and non-hazardous, according to the definitions employed within the ambit of the European Community and now accepted on an international level. In this context, this year too the report comprises data relating to the percentages of the waste products used for recycling purposes by agents outside the group.
- ***Quantity of dielectric oil containing PCB*** (polychlorinated biphenyls) *and/or* ***PCT*** (polychlorinated triphenyls) in concentrations above 50 mg/kg present in certain electrical

apparatus such as transformers and capacitors, whether they are in use, in storage or awaiting disposal.

- ***Ozone layer depleting substances***, which are present in the cooling/conditioning systems and/or the fire extinguishing systems or used for greasing operations or in the laboratories, both in use and in storage.
- ***CO_2*** and ***NO_x emissions*** referring both to the consumption of fuel needed for the production of purchased electrical energy that is acquired and to the internal consumption of fuel for the production of energy.

Factors of conversion deriving from international databanks have been used (in particular BUWAL 250 and Idemat 2001) presented in the following table.

CO_2 and NO_x Energy Conversion Factors

Type of energy	Source	Conversion factor	
Natural gas	BUWAL 250	57.0	Kg CO_2 / GJ
		0.06	Kg NO_x / GJ
Gas oil	Idemat 2001	2983.3	Kg CO_2 / t gas oil
		9.7	Kg NO_x / t gas oil
LPG	Idemat 2001	2703.6	Kg CO_2 / t LPG
		13.2	Kg NO_x / t LPG
Fuel oil	BUWAL 250	88.9	Kg CO_2 / GJ
		0.23	Kg NOx / GJ
Electricity	BUWAL 250	119	Kg CO_2 / GJ
		0.26	Kg NO_x / GJ

International references

As was the case with the previous report, we have decided to follow where possible the guidelines indicated in the document entitled "Sustainability Reporting Guidelines on Economic, Environmental and Social Performance" of the Global Reporting Initiative™, in relation to the section concerned with quantitative environmental data (specifically the method of presenting the data, their processing and so on).

The environmental databank

During 2003, work continued on the project (initiated in the autumn of 2002) designed to transform the current data archive – resident on a central server – into a web-based archive within the intranet area in order to allow the various operational units to insert data directly via computer, thus making the processes of data entry, verification and processing considerably more efficient.

The usual activities of analysis and processing of the data collected by the operational units (currently of an environmental nature only) have proceeded in parallel with the above project.

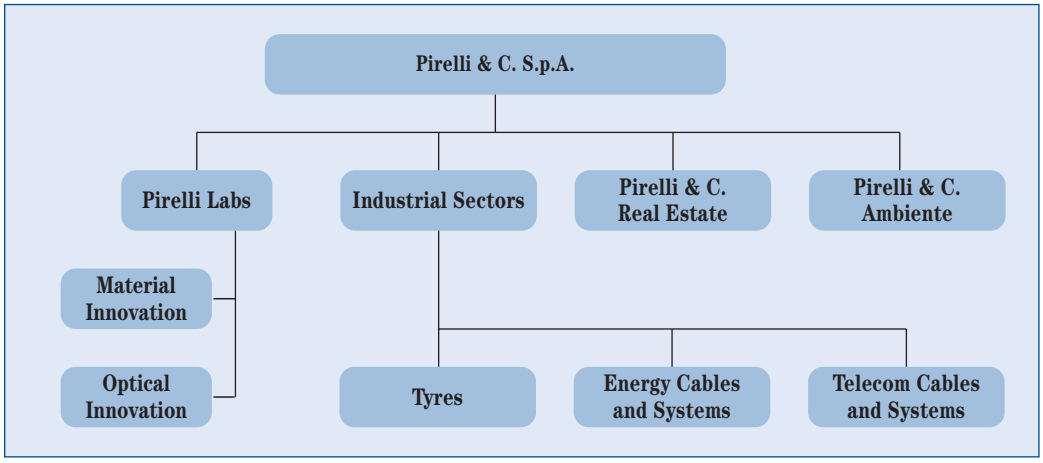
PRESENTATION OF PIRELLI & C. S.p.A.

The new business structure

2003 saw the formal approval of the important merger between Pirelli S.p.A. and Pirelli & C. Luxembourg to form Pirelli & C. S.p.A. This operation came into effect on the 4th of August 2003.

The merger marked the substantial completion of a wide-ranging process designed to simplify and financially reinforce the group, while bringing the industrial production structure into line with current market conditions (radically different with respects to previous years), above all in relation to the Energy Systems and Cables and Telecom Systems and Cables sectors.

Accordingly, from the "operational" point of view the new structure of Pirelli & C. S.p.A. is as shown in the diagram below:



As will become clear, the quantitative data reproduced in the technical appendix refer to the industrial sectors alone; that is to say, to the activities associated with the "Tyres", "Energy Cables and Systems" and "Telecom Cables and Systems" sectors.

The Pirelli & C. operational units around the word

As at 31/12/2003, the Pirelli Group was present on 77 industrial sites in 24 countries on 5 continents.

It should also be pointed out that in the preparation of this report, 86 operational units were taken into consideration, once again confirming the previously adopted policy of including all those facilities that made even a partial contribution to the turnover produced during 2003.

There follows a detailed overview of the production facilities considered in this report, with the Energy and Telecom Cables and Systems sectors being grouped together.

Cables and Systems

Argentina
La Rosa
Quilmes

Australia
Dee Why
Liverpool

Brazil
Cerquilho
Jacarei
S. Andrè
Sorocaba

Canada
Prescott
St. Jean

China
Baosheng
Tianijn
Wuxi

Finland
Pikkala

France
Amfreville
Angy
Charvieu
Chavanoz
Gron
Neuf Prè
Paron
Vologne
Xoulces

Germany
Neustadt
Schwerin

Holland
Delft

Hungary
Balassagyarmat
Budapest
Kistelek

Indonesia
Bukit Indah

Italy
Arco F.
Ascoli P.
Battipaglia
Giovinazzo
Livorno F.
Livorno
Merlino
Pignataro M.
Quattordio
S. Giuliano M.

Malaysia
Shah Alam

Portugal
Valadares

Romania
Slatina

Slovak Republik
Bratislava

South Africa
Vereeniging

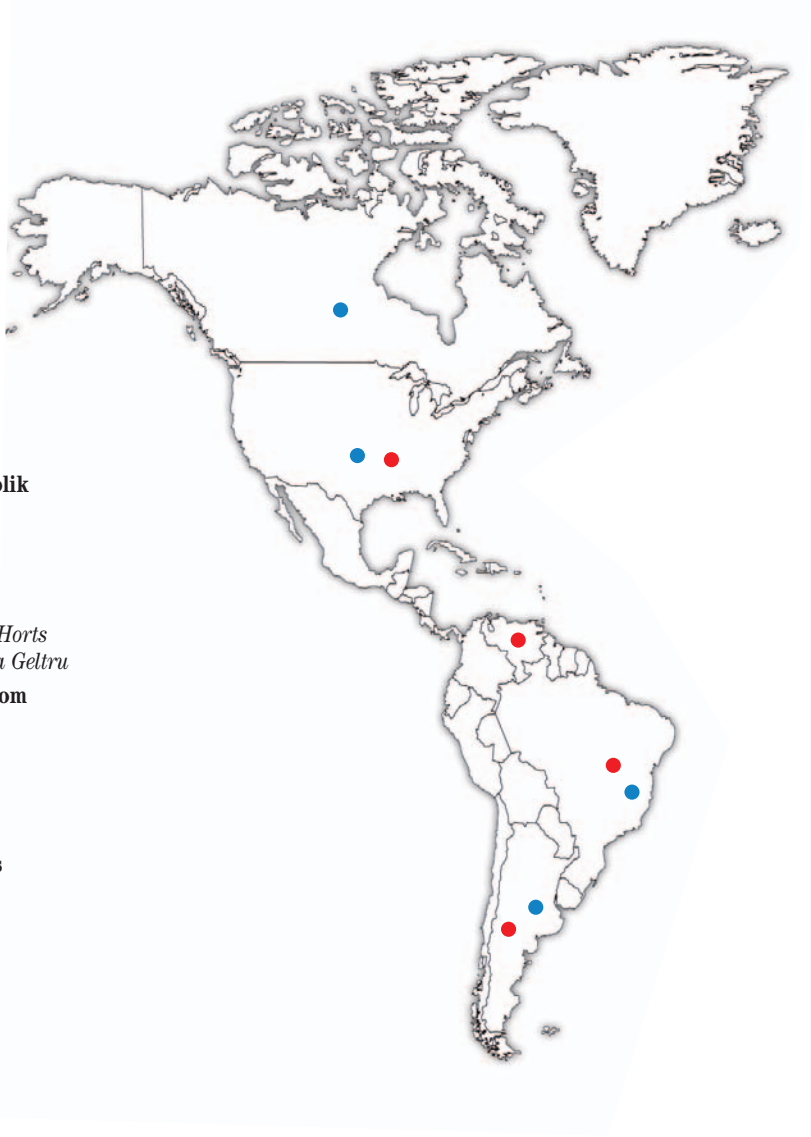
Spain
S. Vicenç dels Horts
Villanueva y la Geltru

United Kingdom
Aberdare
Bishopstoke
Eastleigh
Prescott
Wrexham

United States
Abbeville
Lexington

Turkey
Mudanya

Zimbabwe
Harare



Tyres

Argentina
Merlo

Brazil
Campinas
Feira de Santana
Gravatai
S. Andrè
Sumarè

Egypt
Alexandria

Germany
Breuberg
Merzig

Italy
Bollate
Figline V.
Settimo T.

Spain
Manresa

United Kingdom
Burton on Trent
Carlisle

United States
Little Rock
Rome

Turkey
Izmit

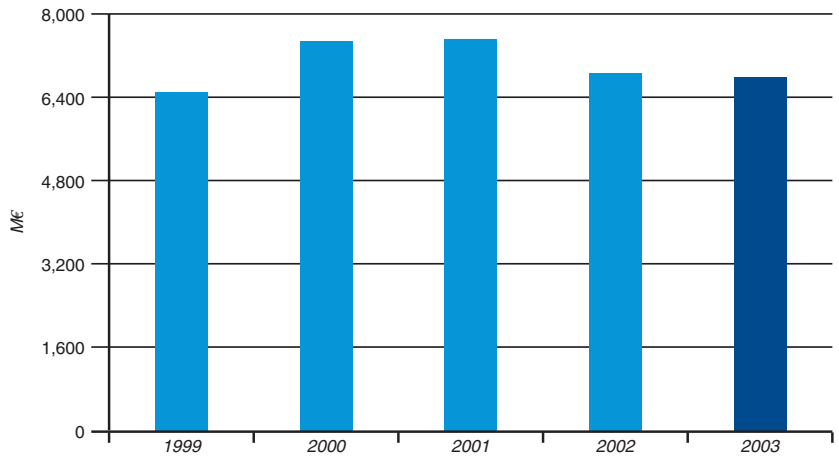
Venezuela
Guacara

Pirelli & C. S.p.A. in figures

With regard to the above-mentioned changes in the structure of the company, on the 31st of December 2003 the business was subdivided as follows:

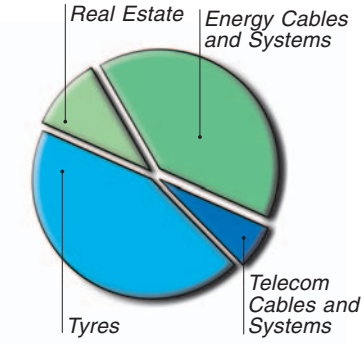
- Three industrial sectors, "Energy Systems and Cables", "Telecom Systems and Cables" and "Tyres"
- The "Real Estate" sector covered by the activities of Pirelli Real Estate.

Pirelli & C. S.p.A. consolidated turnover (as at 12.31.2003)

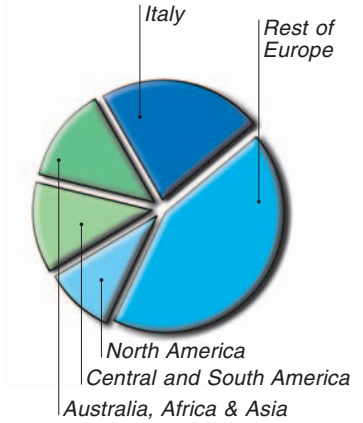


The group's total workforce as at the 31st December 2003 comprised 36,337 employees, a reduction of 1.013 units compared with 31/12/2002; the personnel situation in detail, both sector by sector and geographically, is illustrated below:

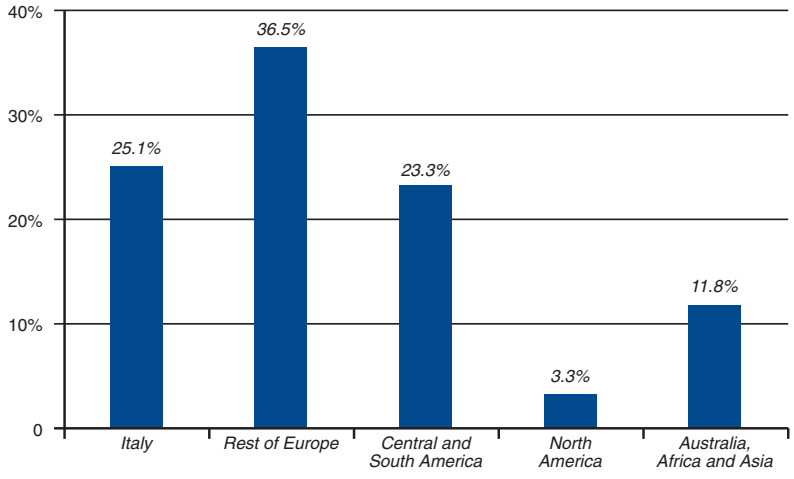
Sector	Employees	%
Energy Cables and Systems	10,746	29.6%
Telecom Cables and Systems	2,218	6.1%
Tyres	20,437	56.2%
Real Estate	1,544	4.3%
Others	1,392	3.8%



Subdivision of 2003 sales by Sector and Geographical Area.



Subdivision of Employees by Geographical Area



The subdivision of sales by sector and by geographical area is illustrated in the following diagrams:

Sector	2003	2002
Energy Cables and Systems	40%	45%
Telecom Cables and Systems	6%	7%
Tyres	44%	42%
Real Estate	10%	6%

Geographical Area	2003	2002
Italy	22.3%	22.9%
Rest of Europe	43.1%	41.1%
North America	9.4%	10.9%
Central and South America	12.3%	11.6%
Australia, Africa and Asia	12.9%	13.5%

Significant events from the first six months of 2004

Along with the quantitative data contained in the appendix (referring to the final balance as at 31.12.2003), there follows an overview of the principal events characterising the first six months of 2004:

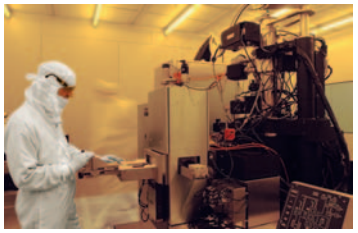
- In the month of March, a specific *Corporate Social Responsibility Steering Committee* was constituted (composed of the *Administration and Control* general management, the *Public and Economic Affairs* management, the *Personnel* management and the *Corporate Health, Safety & Environment* management) and entrusted with the following tasks:
  - Guiding the operational deployment of the *Corporate Social Responsibility* project within the group;
  - Evaluating any new initiatives inspired by the international *Corporate Social Responsibility* trends and principles;
  - Preparing the Pirelli Group's Sustainability Budget.
- In the month of May, in accordance with the guidelines dictated by the international standard SA 8000 standard (relating to respect for human rights, protection against the exploitation of children, respect for workers' rights and guarantees of safety and wellbeing in the workplace), the Pirelli Group decided to proceed with a worldwide internal audit regarding the above-mentioned themes, involving all the corporate structures normally designated for such tasks.
- In the interests of confirming the group's commitment to supporting and respecting the protection of human rights, as well as considering the protection of the health and wellbeing of its employees as a primary requirement, in the month of June the chairman signed the new "*Pirelli Policy for the Health, the Safety, the Environment and the Social Responsibility*". This document, as well as referring to the principle of "*Sustainable Development*", brings together under a single heading the earlier policy documents regarding the Environment (September 2000) and Safety at Work (July 1995).
- Within the ambit of the new policy mentioned above, Pirelli has decided to equip itself with an internal regulation that will lead it to become a *No Smoking Company*, in the interests of both non-smokers and smokers.
  This programme will be implemented in progressive phases, with local adaptation taking into account the specific cultures and legislation of the countries concerned.
- The *Ethical Code*, developed by Pirelli with the objective of providing an even stronger and more homogeneous orientation for the professional attitudes and actions within the company (June 2004), has been translated into 12 languages.

Pirelli Labs

Created in 2001, Pirelli Labs occupies a surface area of around 13,000 m2 in the Milano Bicocca area and represents the diamond tip of the group's advanced research.

With regards to the *Optical Innovation* area, work is principally focused on research in the field of nanotechnologies applied to photonics and the development of devices and modules for application in the world of telecommunications.

The Pirelli Labs constitute the point of reference for all the Pirelli Group's research activities and thanks to a series of agreements and consortia has direct ties to private and university research centres in Italy and elsewhere around the world.



R&D activities within Pirelli Labs.

With regard, instead, to the *Materials Innovation* area, work focuses on research in the field of materials science for application to Pirelli's traditional core businesses, on the distributed generation of energy and on fundamental scientific research. In 2003 work again proceeded in three principal directions:

- ***Short term*** projects relating to the identification and development of innovative solutions, principally in the field of materials science and immediately usable in Pirelli's traditional core businesses.

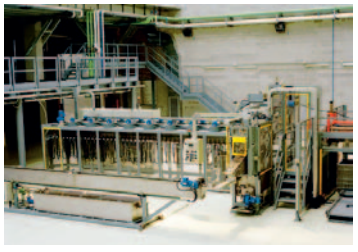
  The development of the CCM process (Continuous Compound Mixing) used to create compounds for tyres belongs to this category.

  Particularly noteworthy results have been obtained with regards to the reproducibility of the compound's critical criteria.

  Similarly, in the Energy Cables and Systems sector, an interesting and innovative procedure is being developed that involves the use of recycled materials in the manufacture of sheaths for low and medium voltage cables.

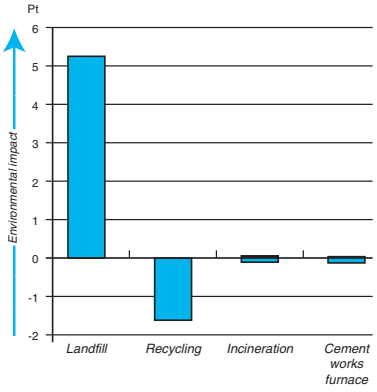
  Should the current industrialization phase bear positive fruit, products with a high added value may be produced from waste plastic that would otherwise be dumped.

- ***Medium term*** projects, such as the one focussing on the highly significant development of fuel cells. This represents one of the best options for producing electrical energy in a global context now characterised by dwindling fossil fuel reserves and an increasing demand for clean energy sources that reduce the emission of greenhouse gases.



A phase in the CCM process for the automated production of tyre compounds.

- ***Long term*** activities such as those concerned with the exploration of innovative proposals for the so-called "Cyber Tyre" project (magnetic sensors incorporated in the tyre and capable of monitoring its deformation when rolling and its real time pressure and inflation status…) and the continuation of research into the physics of matter in the condensed state.



Types of final disposal.

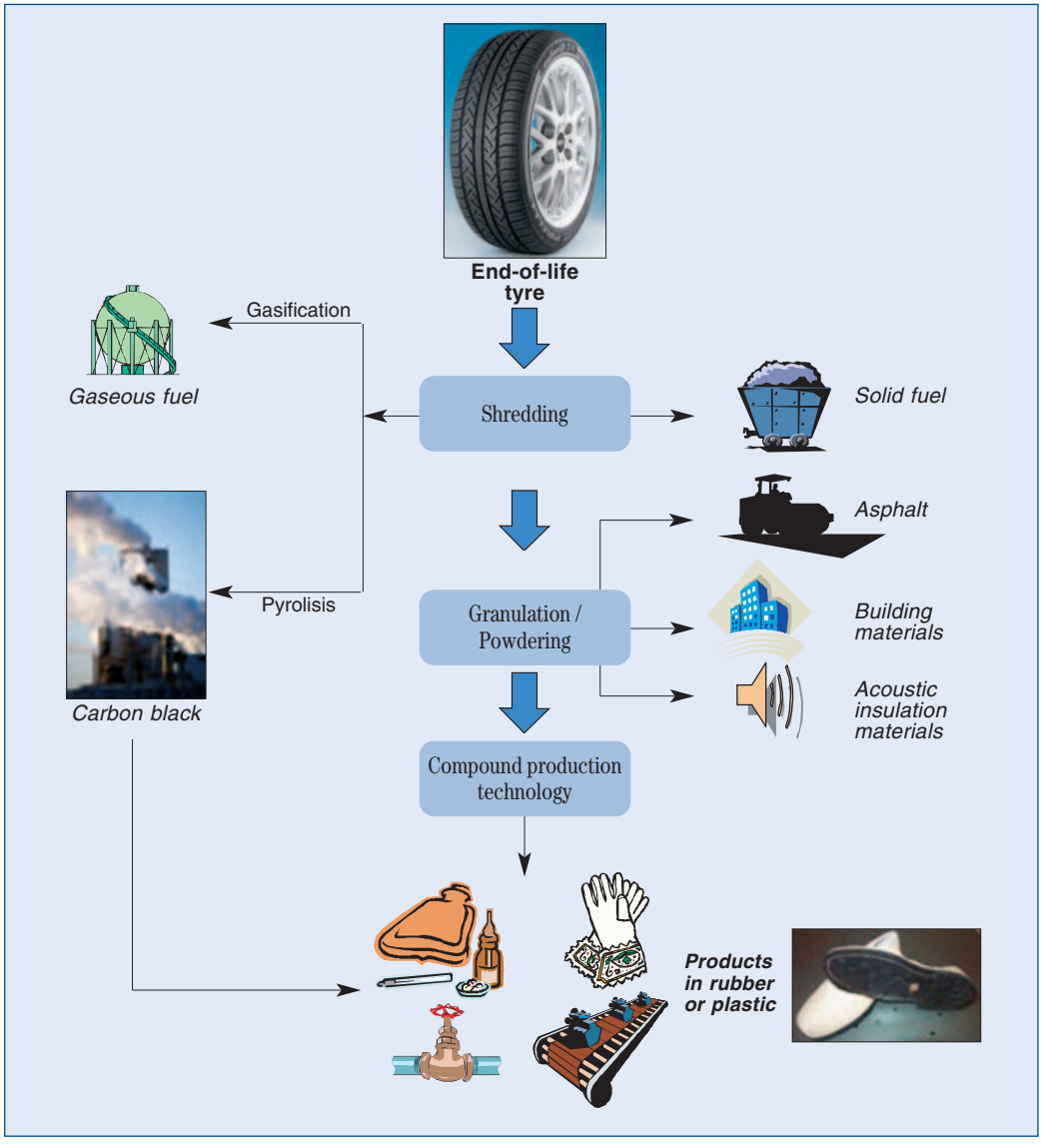
End-of-life tyres

Also worthy of mention is Pirelli's commitment to the continuation of the project relating to the disposal of end-of-life tyres (ELT), one of the group's research objectives for some years now.

The *end-of-life scenario* makes only a modest contribution to the overall impact of the complete life cycle and, among the diverse final disposal options, dumping is without doubt the least compatible from an environmental point of view, as clearly illustrated by the graph on the left.

Moreover, it should also be noted that the European Directive 1999/31/CE has prohibited the disposal of whole used tyres in landfill sites since 2003 and will also prohibit dumping of shredded tyres from 2006. This method of disposal will therefore shortly have to be abandoned in favour of alternative solutions, as indicated in the following diagram.

Tyre recycling diagram



Work concentrates on the recycling of the rubber contained in the tyres, a field that is still underdeveloped largely due to the technical difficulties in breaking down the bonds established between the polymeric chains during the vulcanization phase that make the material almost immune to thermal processing.

A number of different technologies have therefore been developed with the aim of recycling used tyres. These include granulation that, once the textile and metallic components have been removed, produces rubber granules. These may in turn be ground further to produce a finer powder.

In this context, new solutions are being implemented such as the acoustic insulation of buildings that exploits the properties of the rubber generated from used tyres to absorb vibrations and noise and to dampen their transmission through the floors and vertical walls of a building.

As is clear from the preceding diagram, the technologies developed to date effectively focus on the production of powdered rubber to be used as a reinforcing material for certain sports floorings, soles for shoes, internal and external cladding, road accessories, drainage conduits, modified asphalts and in civil engineering projects.

The objective of the research conducted by Pirelli Labs' *Materials Innovation* division is essentially the identification and experimentation of possible chemical, physical and thermal treatment methods and processes that permit the production of "secondary raw material" for high added value applications.

In particular, research and development activities are on-going in the fields of:

- *chemical processes* that may make the powder compatible with rubbers, plastics, bitumens, asphalts and other building materials;
- *physical processes* designed to obtain, at reasonable costs, a technologically more sophisticated rubber powder with an extremely fine granularity (lower than 200 µm). It should be remembered, in fact, that the performance of the powder is inversely proportional to its dimensions and that the technologies currently available are highly expensive as they imply an elevated consumption of the refrigerant (in particular, liquid nitrogen) required to make the rubber sufficiently fragile to facilitate the granulation.

Pirelli & C. Ambiente

In the fields of ***environmental reclamation*** and the ***recovery of energy from waste*** and the recycling of materials through innovative and economically self-sufficient projects, Pirelli & C. Ambiente, a company wholly controlled by Pirelli & C. S.p.A., draws on the synergies within the Pirelli Group (collaborating in particular with the Pirelli Labs research and development facilities), and represents a prestigious point of reference on the Italian and international scenes.

In relation to the first aspect, during the course of 2003 Pirelli & C. Ambiente undertook the environmental reclamation of over 2,000,000 m^2 of industrial areas through interventions that required economic commitments in the order of € 20 million for asbestos decontamination and over € 36 million for the reclamation of contaminated soil and land.

With regards to the recovery of energy from waste, Pirelli & C. Ambiente has developed the idea of the Integrated System based on the integration of urban and special waste handling with a cement works or thermoelectric power station energy generation system, thus permitting:

Pirelli & C. Ambiente's logo.

- an effective recovery of energy from urban and special waste;
- its use in non-dedicated systems;
- environmental conditions that are generally better than with other forms of disposal;
- an economic return from the fuel used;
- in the future, lower waste disposal costs for the community with respects to alternative solutions (landfill and/or waste to energy incineration).

This system is based on collaboration with the territorial authorities, the local waste management operators and the potential users of the recovered energy, and is integrated with the safeguarding of the territory concerned.

For each project, in fact, local roundtables are established with the participation of all social groups in order to achieve the required consensus. To this end a "Life Cycle Analysis" (validated by the Milano-Bicocca University) is also compiled as a scientific support and an environmental guarantee.

The CDR fuel ("Waste Derived Fuel").

In detail, the fuel used is a blend of the dry portion of solid urban waste with particular components of a high calorific value, including used tyres and non-chlorinated plastics, representing in this way a valid alternative usable as a replacement for traditional fossil fuels in existing industrial systems.

In general, the quality of the product of Pirelli & C. Ambiente's technology may be considered to be superior to that of fuels derived exclusively from urban waste given:

- the consistency and homogeneity of the product,

- the type of prime materials used,
- the low humidity and chlorine content,
- the elevated calorific power,
- the physical form of the fuel, that guarantees homogeneous charging of the combustion chamber.

Pirelli & C. Ambiente possesses the know-how required for the construction and running of production systems, design on the basis of the international patents it holds. Adaptable to the local situation it is to serve, the process may be structured on the basis of the solid urban waste or the dry portion of it produced by a pre-existing separation plant and guarantees a quality product that meets the demands of the end user.

The advantages of the Integrated System

The *Integrated System* permits complete synergy with the objectives of waste disposal planning, including differentiated collection, territorial self-sufficiency with regards to the community's handling and energy recovery of its own waste and the containing of disposal costs.

Along with a series of economic advantages, the *Integrated System* also permits a number of important environmental advantages such as:

- the improvement of the overall environmental impact, thanks to the use of an existing system for the energy recovery;
- the improvement of toxic emissions from the systems using the fuel;
- the reduction of carbon dioxide emissions in line with the Kyoto Protocol, thanks to the use of CDR; that is to say, a renewable energy source as a partial replacement for fossil fuel;
- the reduction of greenhouse gases such as carbon dioxide and methane which would otherwise be produced as a result of the disposal of waste in landfill sites;
- the environmental impact avoided due to the non-extraction and transportation of the fossil fuel replaced by the renewable source.

The results of the first application of the Integrated System: the I.D.E.A. GRANDA project

Pirelli & C. Ambiente and A.C.S.R., the consortium of 54 municipalities that manages the environmental services for the 154.000 inhabitants of Catchment Area No.10 of the Province of Cuneo, have founded I.D.E.A. GRANDA, a consortium company of which 51% is controlled by the public partner and 49% by Pirelli & C. Ambiente which, as well as providing the technology, is also responsible for running the firm.

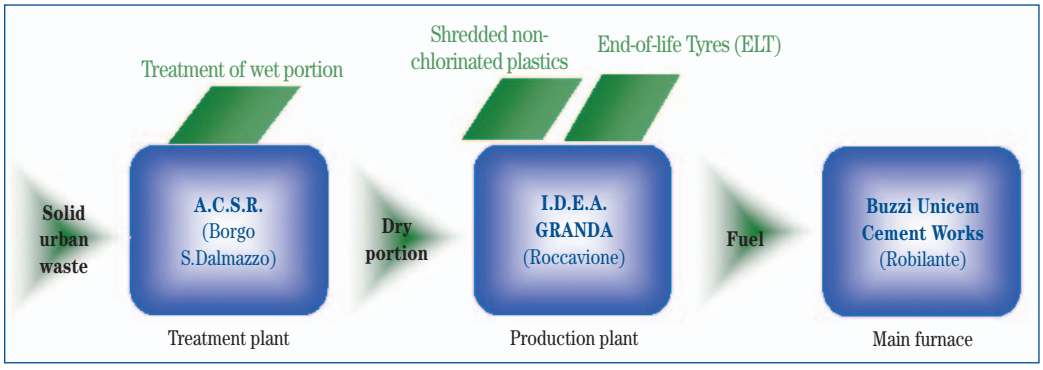
The "Idea Granda" project represents the first use of CDR fuel in a cement works furnace.

This is an innovative project, one of its kind in Europe, and involves all the waste normally disposed of in the A.C.S.R. landfill site at Borgo S. Dalmazzo being treated

to separate the dry and wet components. The dry fraction is then treated and valorized in the I.D.E.A. GRANDA plant where the CDR-Pirelli is produced.

The effective recovery of energy from the fuel takes place thanks to its use in a form of direct co-combustion in the nearby Buzzi Unicem cement works, feeding the principal furnace as a partial replacement for fossil fuel.

Flow chart of the integrated system of the IDEA Granda plant at Roccavione (CN)



Over 12,000 tonnes of CDR-Pirelli have been used since the system actually came on stream (February 2003), corresponding to around 30,000 tonnes of solid urban waste put into the CDR-Pirelli production cycle rather than being sent directly to landfill sites.

Furthermore, the use of CDR-Pirelli as a fuel in the cement works has led to a saving of over 4,000 tonnes of fossil fuel (petcoke blends and fossil carbon), reducing the quantity of CO_2 emitted by around 12,000 tonnes; on the basis of the renewable nature of CDR-Pirelli and taking advantage of the analytical data recorded continuously in the furnace's chimney, we can also signal reduced emissions of NO_x and SO_2 in the order of around 271 and 4 tonnes respectively.

A view of the I.D.E.A. GRANDA plant.

It is equally important to underline the fact that the system installed guarantees "Cuneo Catchment Area 10's" self-sufficiency with respects to the management of its own urban waste, with a catchments area energy recovery equivalent to 32%.

In conclusion, it should be noted that the project has also been evaluated from an environmental point of view through the aforementioned *Life Cycle Assessment*, validated by the Milano-Bicocca University, which highlights how, ignoring the impact deriving from the construction of the plant itself, the solution offered is:

- 90 times more favourable from an environmental point of view than the landfill alternative;
- 72 times more favourable with respects to a hypothetical waste-to-energy plant.

Pirelli & C. Real Estate

As a result of the aforementioned fusion between Pirelli S.p.A. and Pirelli & C. Luxembourg to form Pirelli & C. S.p.A., since August 2003 the Pirelli Group's activities also include those of the real estate sector conducted by Pirelli & C. Real Estate S.p.A..

In this context, Pirelli & C. Real Estate S.p.A. may in every respect be considered as a management company handling real estate companies and funds (Asset Management and Fund Management activities) to which it supplies, as it does to other clients, a full range of specialist real estate services (Service Provider activities).

The historic Bicocca cooling tower, now the central feature of the new Pirelli & C. Real Estate offices in Milan.

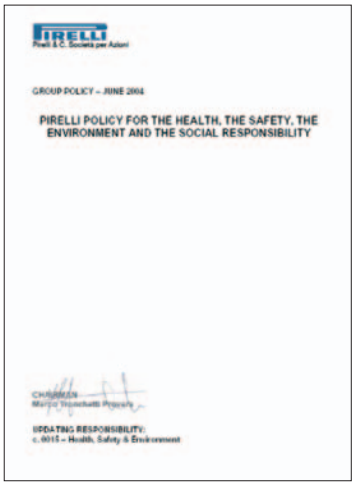
THE ENVIRONMENT AND SAFETY WITHIN PIRELLI

The Pirelli Group's new Policy

The Policy for the Health, the Safety, the Environment and the Social Responsibility

Within an international scenario in which social, environmental and economic expectations are ever more pressing, the new *Policy* adopted by the Pirelli Group has further enhanced the correct equilibrium between sustainability and the group's industrial development.

In particular, the new *Pirelli Policy for the Health, the Safety, the Environment and the Social Responsibility*, issued by the directors in the June of 2004, makes reference to the principle of Sustainable Development and brings together in a single document the earlier policies relating to the Environment (September 2000) Safety in the Workplace (July 1995).


PIRELLI

GROUP POLICY – JUNE 2004

PIRELLI POLICY FOR THE HEALTH, THE SAFETY, THE ENVIRONMENT AND THE SOCIAL RESPONSIBILITY

The Group's new Policy

Recognising the safety, health and wellbeing of its employees and the environment as one of the prerequisites in the organization of its activities, the Pirelli Group adheres to the concept of *Sustainable Development*, committing itself to respect the following principles:

- to manage its activities by adopting health, safety, environmental and social accountability Management Systems in compliance with international standards;
- to communicate and spread health, safety, environmental and social accountability information to the internal and external stakeholders, actively co-operating with national and international academic and legislative bodies;
- to promote the use of the most advanced technologies in order to achieve the excellence in safety, workers health and environment protection;
- to assess and reduce the environmental impact of its processes/products adopting the "life cycle assessment" approach;
- use material resources responsibly, with a view to achieving sustainable growth that respects the environment and the rights of future generations;
- to appraise the risks of work injury or occupational ill health and to identify the environmental impact of its activities. In order to eliminate or minimize them, complying with the legislation in the different countries as a minimum requirement;
- not to engage in or support the use of child labour and forced labour;
- to ensure equal opportunity, freedom of association and to promote the development of each individual;
- to counteract the use of mental or physical coercion, verbal abuse or corporal punishment;

- to comply with applicable laws and industry standards on working hours;
- to ensure that wages shall always meet at least legal or industry minimum standards and shall be sufficient to meet basic needs of personnel;
- to establish and maintain appropriate procedures to evaluate and select suppliers and subcontractors based on their commitments to social and environmental accountability;
- to involve all levels of the organization and all Group employees by assuring that responsibilities and operating procedures are precisely defined, appropriately communicated and clearly understood.

The Management Systems Approach

In order to conduct the complex process of dealing with environmental and safety questions, Pirelli has adopted the Management Systems approach, concentrating its efforts on the identification of the impact caused by its activities on both the internal and external environment, the prevention of such impact or its reduction to a minimum and the continuous improvement of the group's performance.

To this end, the first concrete step was the establishment in 1998 of the programme for the actuation and certification – by a third-party body – within the group's operational units of an Environmental Management System conforming to the requisites of the ISO 14001 standard within the Group's operational units.

Subsequently, in the face of the growing interest in the systemic approach and thanks to the experience gained in the environmental field, Pirelli decided to adopt the same approach in the field of safety, establishing a programme for the actuation of a Safety Management System conforming to the international OHSAS 18001 standard in all the group's factories.

The programme was launched early in 2001 in the Tyres Sector and was subsequently extended to the Cables and Systems Sector; in this case too Pirelli decided to request the certification of the Safety Management System by an independent body, believing such certification to be an important opportunity for verification and a stimulus for continued improvement.

Since its inception in 1998, the Environmental Management System has been coordinated by the *Environmental Steering Committee* (ESC), presided over by the Corporate Health, Safety & Environment Board made up of the sectorial HSE responsibles.

Similarly, the Safety Management System has been coordinated by an analogous *Certification Coordination Committee* (CCC), initially created in 2001 for the tyres sector only.

At the end of 2003, the earlier ESC and CCC were integrated to form a single new operational committee, the *Environment Safety Committee* (ESC) in order to guarantee coordination of the Environmental and Safety Management Systems at a group level.

In practice, the *new* ESC defines, updates and applies the group's standardized rules for the meeting of the certification requisites while respecting the objectives and specific characteristics of the sectors.

As confirmation of the Pirelli management's commitment with regards to Health, Safety and the Environment, the managing director of the Pirelli Group's Operational Activities has created the *HSE Steering Committee*, presided over by himself and composed of the Personnel Director, the General Directors of the various sectors and the chief executive of the Corporate HSE Board.

The committee meets periodically to evaluate the Health, Safety and Environment activities undertaken within the Pirelli Group as a whole and to establish the objectives for improvement at a group level.

The chief executive of the Corporate HSE Board guarantees the link-up between this committee at the executive level and the operational committee (ESC), keeping the group's upper echelons informed about the ESC's activities and the progress of the Management Systems, thus permitting periodic evaluation of their efficacy at a group level.

In future, the *Environment Safety Committee* will continue to oversee the certification processes for both Management Systems within the operational units in the interest of promoting, where feasible, the gradual integration of the two systems. In this way there will also be an emphasis on greater efficacy in the managing of both environmental questions and those concerned with safety within the group's operational units.

The Environmental Management System: characteristics and results

The *Environmental Management System* adopted within the operational units of Pirelli's industrial sectors concerns the production activities, the most significant from the point of view of the potential impact on the environment, but in certain cases also include the design, research, logistical or service activities conducted by Pirelli.

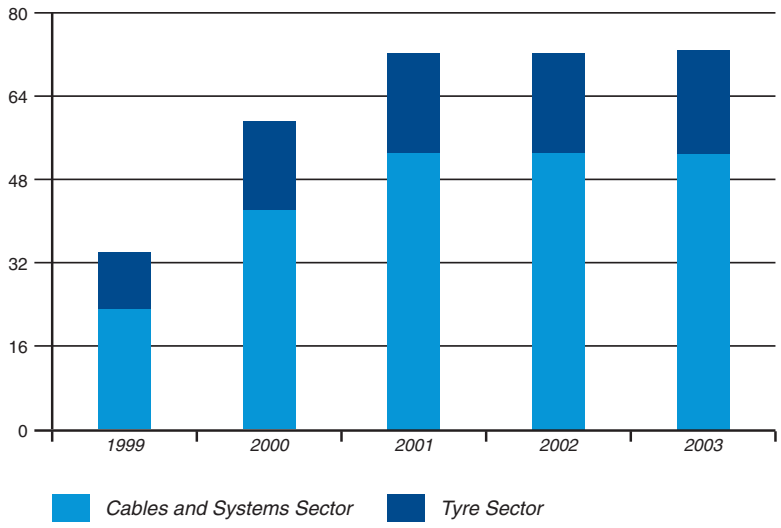
For example, with regards to the installation of cables, an activity in which Pirelli may perform operational or managerial roles, an ad hoc system has already been configured, implemented and certified in the Hong Kong cable installation site, while it is currently being implemented on a number of other installation sites in Great Britain.

The results achieved at a group level demonstrate the suitability and efficacy of the approach adopted: by the end of 2003, around 90% of the group's operational units had adopted an Environmental Management System, certified to ISO14001 standard by an independent body.

The Pirelli & C. S.p.A. Group Certificate.

As can be seen in the following graph, this percentage has not varied greatly over recent years, due in part to the divestitures or the sale of productive sites that have counterbalanced the latest certifications. However, work is still in progress and further certifications have been programmed throughout 2004.

ISO 14001: the certification trend (1999-2003)



The efforts made at a group level to introduce the Environmental Management System and appropriately maintain it over time have favoured the gradual increase in awareness of, and expertise with regards to, environmental questions and, in many cases, the improvement of the group's environmental performance.

The Safety Management System: the Safety Focus programme

The actuation of the *Safety Management System* was incorporated within a broader programme entitled *Safety Focus*. Departing from an initial definition of the methodologies for meeting the requisites of the OHSAS18001 standard and the operational requisites valid for the Pirelli Group, this programme proposes diverse tools and methodologies regarding safety training and communication within the operational units.

This programme was set up with the precise aim of reducing the number and gravity of accidents, starting with those operational units in which the statistical trend indicated the greatest need.

In order to provide the programme with an unequivocal identity, it was decided to adopt an ad hoc slogan and logo for each of the two macro-areas of industrial interest (the production of tyres and *cables and systems*).

For the Tyres Sector, the slogan chosen was "*Safety is nothing without control. Let's work together*", that identifies all the initiatives associated with the programme, paraphrasing one of the most famous slogans used in the group's marketing campaigns.

The Tyre Sector's safety slogan.

The logo features Leonardo's Vitruvian man depicted within a stylised tyre in order to highlight the centrality of the individual and the depth of the programme itself in terms of contents.

The slogan chosen for the *Cables and Systems* sector was instead "*Success is no accident*", picking up on the well-known slogan adopted by the European Agency for Safety and Health at Work a number of years ago.

The Cable & Systems Sectors' safety slogan.

As well as the requisites of the certification standards, the *Safety Focus* programme pays particular attention to *training*, through a project featuring a series of workshops, with the involvement of all levels in the company's organizational structure.

The objective, at the level of the individual operational units, is that of explicating the corporate management's role as sponsor, reinforcing commitment to action favouring safety and making operational staff fully aware of ever safer working practices.

The third key area of the *Safety Focus* programme concerns *communication*.

In this case, the objective is that of reinforcing the ability to communicate effectively and constructively the information relating to safety at work, integrating and completing what has already been done in the other two areas.

Despite what is a less than rosy economic situation, Pirelli intends to continue to guarantee strategic investments in training and communication, even in those factories that have already completed the entire *Safety Focus* programme, in order to maintain constant awareness throughout the group of the importance of improving and continuing to reduce the number and gravity of industrial accidents.

Example of communications within the ambit of the Safety Focus project.

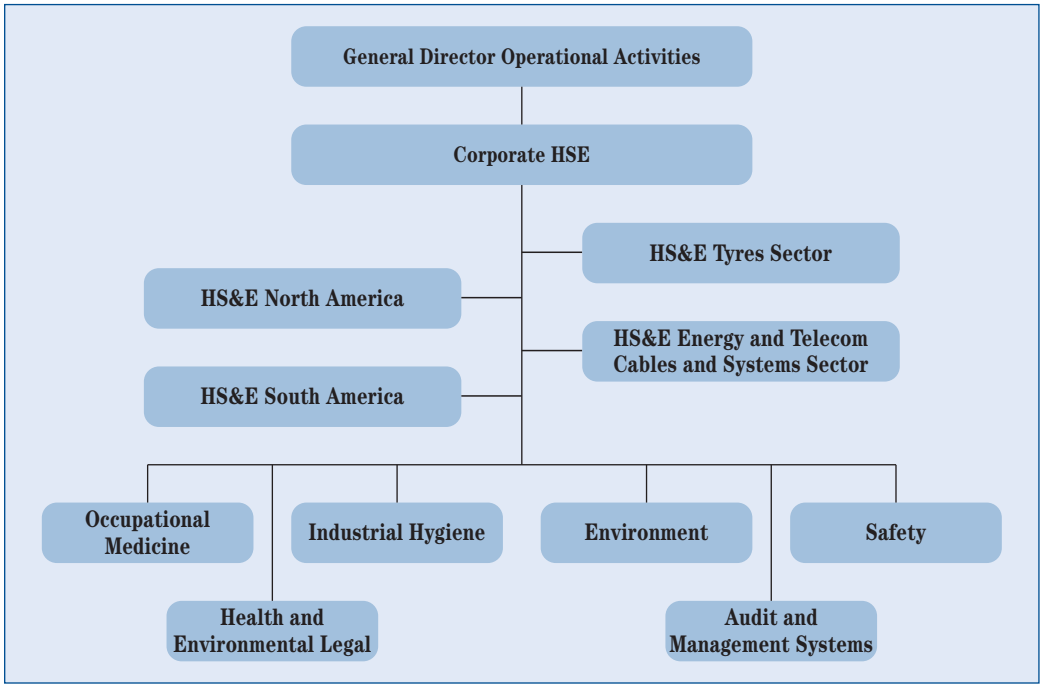
The organization

Confirming the validity of the now consolidated approach hitherto adopted, both the structure and the roles of the specialist offices devoted to the safeguarding of the environment have remained substantially unchanged with respects to the previous years. The Corporate Health, Safety and Environment offices are essentially responsible for direction, coordination and verification as well as representing a centre of excellence in terms of the solution of particularly complex technical and/or managerial problems.

Specific HS&E offices have been operational for some years now in certain geographical areas of importance to the group (in particular, North and South America), naturally reporting at a national and a corporate HS&E level.

Finally, also worthy of mention are the HS&E offices dedicated to the Tyres and Cables and Systems sectors (in this last case, a single structure for the two Eenergy and Telecom areas), are also worthy of mention. Each of these offices is involved in the overseeing of pertinent activities at the operational unit level and, in certain cases, at the national level.

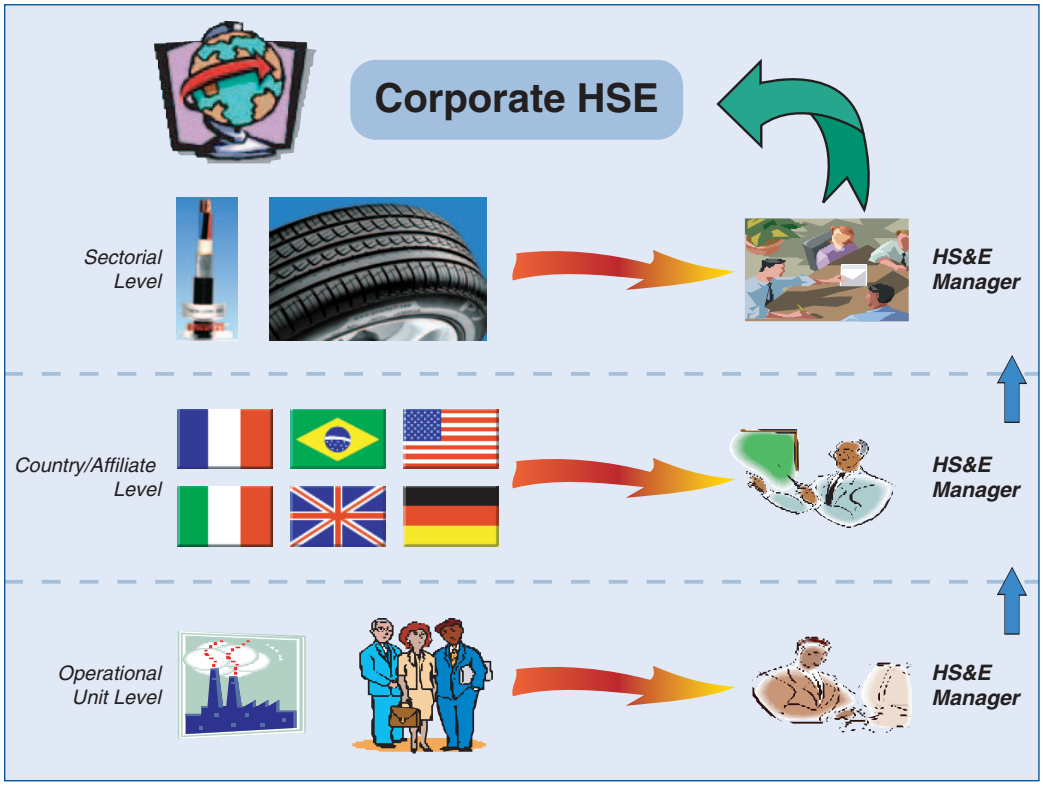
The Corporate HSE Management Structure



In this context, the *Corporate HSE* management, as well as performing specific auditing activities, has the task of updating the General Management of the various sectors with regards to the latest information, promoting an exchange of experience and knowledge regarding the environment, health and safety throughout the group.

The structures of the Sectors reporting to the operational management of the various sectors and the *Corporate HSE* management have the important role of adapting the directives of the centre to the specific operational conditions of the industrial units, guaranteeing their implementation through the above-mentioned operational unit and national HS&E offices.

Diagram of the organizational structure of the Pirelli & C. S.p.A. Health, Safety and Environment Offices



While taking into consideration local situations that are in many respects very different to one another, the HS&E offices of the operational units (and/or the national offices) are generally located – from an organizational point of view – within the Manufacturing or Human Resources areas, and currently have a staff of around one hundred people dedicated to these tasks.

The objectives for improvement

Pirelli establishes and periodically verifies its objectives and programmes for improvement in accordance with the principles of the group policy and the ISO 14001 and OHSAS 18001 standards illustrated above.

In most cases, these programmes are defined by the individual operational units in agreement with the sector of reference and on the basis of the environmental aspects and the specific risks and their significance, taking into account the local legislative and operational requirements.

Within this context, it should be remembered that both the sectorial and corporate HS&E offices make a fundamental contribution to the continual improvement of the way significant environmental and safety questions are handled by the operational units through the publication of operational normatives and the revision and updating of those already in existence.

Furthermore, at the sectors level ad hoc committees have been formed that, in view of the definition of the annual objectives for improvement, preside over the actuation of the programmes, evaluate plans and investments and analyse the performance indicators.

By way of example, and for a number of the operational units, the outlines on the following outlines detail some of the most important projects undertaken in the environmental and safety fields during the course of 2003.

In particular, for the *Energy Cables and Systems* sector:

Operational Unit	Intervention	Cost (€)
Amfreville (France)	Replacement of the system for handling the spools of finished product	140,000
Cerquilho (Brazil)	Modification of the enamelling winders	150,000

Similarly, for the *Telecom Cables and Systems* sector:

Operational Unit	Intervention	Cost (€)
Battipaglia (Italy)	Environmental monitoring of the ecosystem around the factory	700,000
Livorno Ferraris (Italy)	Removal and decommissioning of the electrical equipment containing PCB	500,000

Lastly, in the case of the *Tyres* sector:

Operational Unit	Intervention	Cost (€)
Alexandria (Egypt)	Technical updating to the group's Environmental and Safety standards	52,000
Carlisle (Great Britain)	'Energy Efficiency Improvements' project Replacement of the heating system in the "finishing" department	27,400 65,000
Manresa (Spain)	Interventions to improve the ventilation and the microclimate conditions in the "vulcanization" department	63,000
S. Andrè (Brazil)	Interventions to improve the protection on the machinery in the vulcanization area	218,200
Settimo T. - Vettura (Italy)	Installation of special stalls for smokers	130,000

The environmental auditing of products

Initiatives concerning the environmental management of products

During the course of 2003, activities in this respect focused on the analysis of possible means of exploiting the knowledge and experience previously gained in previous years through *Life Cycle Assessments* ('LCA').

The possibility of using the results of these studies to create Environmental Product Declarations (EPD) is currently undergoing evaluation.

The EPDs constitute an important tool for communicating – on a voluntary basis – the environmental requisites for goods or services to a potential purchaser (whether they be a private individual, a company or an institution) or any other interested party.

As a consequence, if appropriately handled, the *Environmental Product Declaration* makes it possible to compare the environmental performance of products and their alternatives: it may take on the value of an "ecological" label informing the consumer of the impact that particular product has on the environment.

The INTEND project

The development and management of the EPDs requires the organization of an ad hoc system overseen by a regulatory body. One of the most important such systems around the world is found in Sweden and is run by the *Swedish Environmental Management Council* (SEMC). This system has gained international significance, attracting supporters in many European countries as well as Sweden itself.

The logo of the INTEND project, part of the European Union's LIFE Programme.

Pirelli is participating as an observer in the *INTEND* project, financed by the European Union within the ambit of the Life programme. With the aim of experimenting with an EPD management system operating on an international level, the project will, in fact, give rise to the first international EPD management system.

In particular, Pirelli has given – and continues to give – its support to the following activities:

a) the definition of the principles concerning the structure of the declaration, the establishment of the LCA study as the foundation of the declaration and the definition of the *Product Category Requirements* (PCR);

b) the structuring of the international system, with the definition of participants, roles and responsibilities (the PCR approval procedure, the accreditation of the companies for the certification of the declaration, consultancies, a technical committee…).

ENERGY CABLES AND SYSTEMS SECTOR

Presentation of the Sector

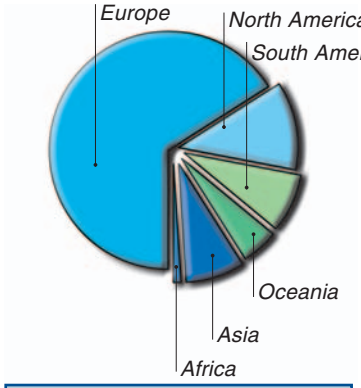
The *Energy Cables and Systems* sector produces a vast number of electrical cables (from those for low, medium and high tension, to cables for data transmission, cables for robotics and special-purpose cables…), enamelled cable, components and accessories, offering the market an integrated range of products and engineering services (cabling, "turn-key" installations, submarine systems and so on).

Research into high-voltage energy cables.

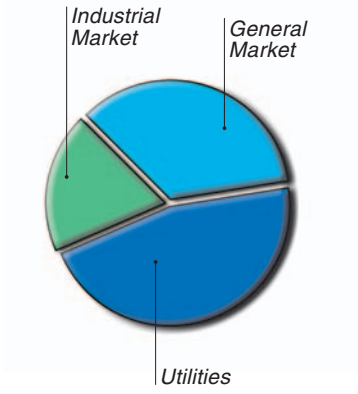
The consolidated turnover of the sector as at 31.12.2003 (the distribution of which is illustrated in the graph below) featured sales to the value of € 2,637 million, with a decrease of 12.7% compared with the previous year, although, taking the so-called "homogeneous" conditions into consideration (thus excluding the effect of exchange rates, the prices of metals and variations in the perimeter of consolidation, the actual variation in sales was instead -4.4 %.

The fields in which the products of the *Energy Cables and Systems* sector are used principally consist of:

- the generation, transportation and distribution of electrical energy;
- the equipping of machinery, ships, lifting systems, rolling stock, machine tools and domestic appliances;
- the powering and control of industrial plants, railway lines, petrochemical and extraction installations, infrastructures and offshore platforms;
- the windings for electric motors.



Energy Cables and Systems: 2003 sales by geographical area and product category.

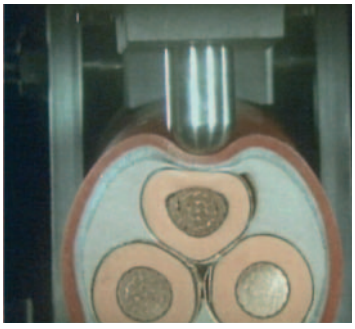


The distribution of net sales is as follows:

Geographical area	2003	2002
Europe (of which Italy 10%)	66%	65%
North America	12%	14%
South America	8%	7%
Oceania	5%	4%
Asia	8%	9%
Africa	1%	1%

Product category	2003	2002
General Market	35%	34%
Utilities	46%	46%
Industrial Market	19%	20%

In this report we have taken into consideration 54 operational units (including four that are involved in "mixed" production and are therefore shared with the *Telecom Cables and Systems* sector), naturally identified in accordance with the criteria outlined above. These operational units are distributed geographically across the five continents as follows:



Impact testing of an Air Bag™ cable.

– 38 operational units in Europe,

– 9 between North and South America,

– 7 between Australia, Asia and Africa.

As of 31 December 2003, the sector had 10,746 employees, with a reduction of around 1,700 units with respects to 2002.

As was the case with the preceding 2002 report, three production categories have been identified, "Energy Cables", "Accessories" and "Wire Rod", with homogeneous characteristics in terms of industrial processes and consequent environmental impact.

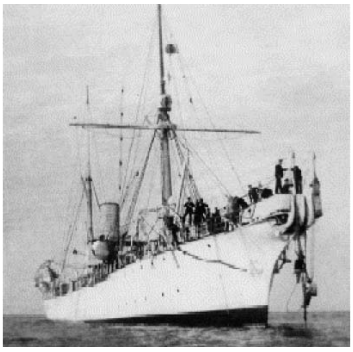
In the following paragraphs we have illustrated the principal features of these three categories. Please see the Quantitative Data appendix of this report for quantitative information regarding the environmental impact indicators taken into consideration for the Energy Cables and Systems sector.

53 operational units were ISO14001 certified as at 31 December 2003, while two were certified in accordance with the OHSAS 18001 safety management system.

Production of Energy Cables

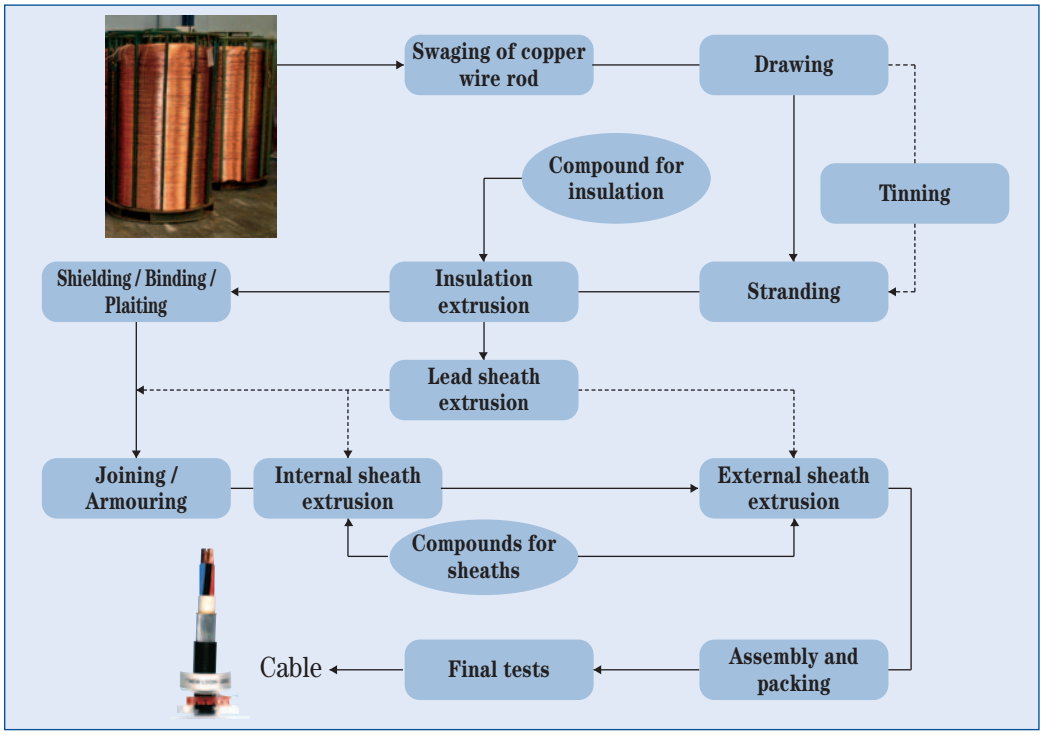
As mentioned above, the Energy Cables and Systems sector produces a vast range of types of cables for the carrying of very high to low voltage energy, for terrestrial, submarine and overhead applications.

In general terms, the principal phases of the process of producing an electrical cable are summarized in the following diagram, in which a number of processes are indicated (with a dotted line) that are not relevant to all product lines.



Pirelli's first cable-laying ship, the Città di Milano (1887).

Principal phases in the production of an energy cable



Submarine Energy Cables and Systems

In 2003, activities in the Submarine Energy Systems field focussed on the production of the "Basslink" cable, used to link Australia and Tasmania.

Pirelli produces and installs submarine cables for energy transmission, paying the utmost attention to the minimizing of environmental impacts, both during the design phase when materials that are compatible with the marine environment are chosen and during the laying and installation of the cable itself.

View of the cable-laying ship "Giulio Verne".

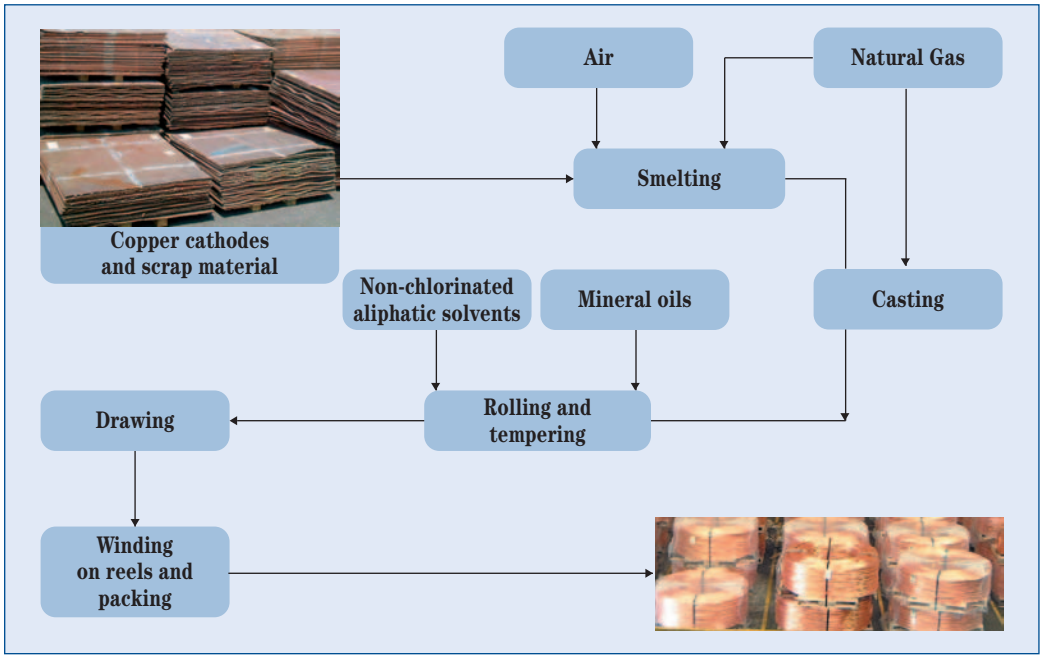
Production of Copper Wire Rod

The Energy Cables and Systems Sector produces the copper wire rod that is used in the manufacture of the conductors of the energy cables and, in part, for the transmission elements in telephone cables.

Copper wire rod is produced in the plants located at Prescot (Great Britain), Quilmes (Argentina) and Jacarei (Brazil).

Despite certain differences in the processes undertaken, the production of copper wire rod follows a "standard" model, as shown below.

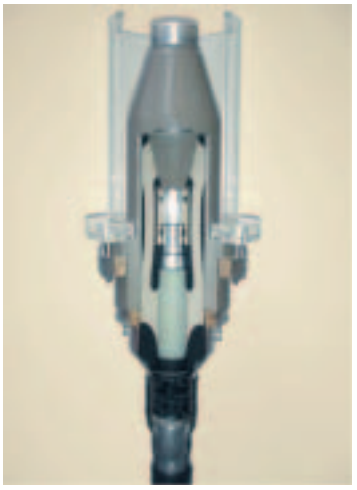
Principal phases in the production of copper wire rod



Production of Accessories

In 2003, despite the fact that the so-called "Utilities" market (which includes accessories) suffered a severe contraction, Pirelli achieved an increase in production volumes of around 4 %, recovering market shares, especially in Europe.

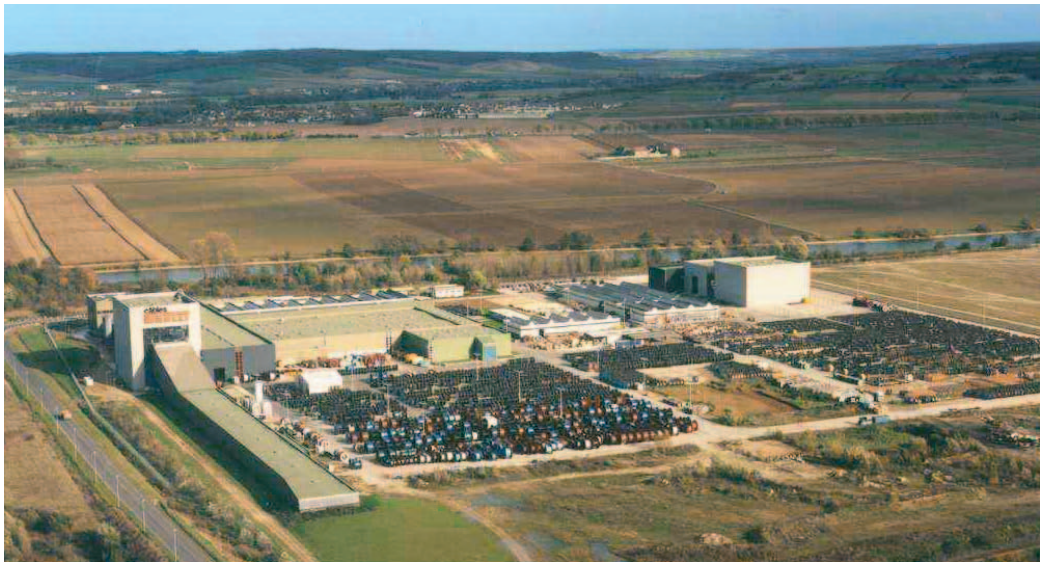
This field comprises a vast range of solutions supplied to clients, above all within the ambit of the "High Voltage" projects, in particular with regards to joints and glands for offshore installations, but also the casting and turning of metal, the production of resins, the assembly of joints and the preparation of joint kits.



A joint for a high voltage system.

Although accessories are also produced by other operational units, the separate environmental data contained in the Appendix are only available for the plants at Bishopstoke and Prescot (Great Britain), Livorno (Italy) and Neuf Prè (France).

Due to the diverse and variable nature of these activities, in the Quantitative Data appendix an absolute value alone has been indicated rather than environmental indicator values per product units.



The Pirelli plant at Gron (France) where very high voltage (380 kV) subterranean cables and accessories are being produced.

Technological innovation in the Energy Cables Sector

As has become customary, R&D activities in the Energy Cables and systems sector (that in 2003 accounted for expenditure of around € 33 million, the equivalent of 1.2% of total sales) focussed on the introduction of high-tech products with minimal environmental impact, in line with the group's constant emphasis on respect for the environment.

Energy Cables research and development was conducted in two main directions simultaneously: the reduction of product costs and the introduction of technological breakthroughs in segments with a high added value (HV, EHV, Submarine, Special & Industrial cables).

In 2003, the sector deposited 11 patents and obtained rights to a further 22 patents, 13 of which in the United States and nine in Europe. In the case of certain research ventures, collaboration continued with university bodies/consortia (Milan Polytechnic, The University of Bologna, the University of Naples), and the group's various R&D centres.
Among the most significant activities were those conducted by the Power Networking Centre regarding:

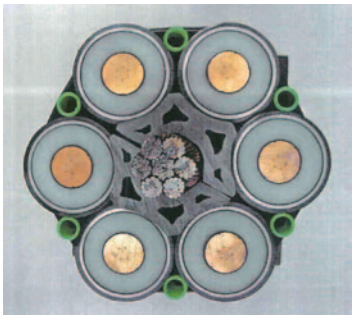
Optopower™: the development of a system for monitoring and managing of transmission systems (for example, the project at Madrid's Barajas airport, the realization of the "Basslink" submarine cable between Australia and Tasmania, and technical interventions within the ambit of the "China Light & Power" project…).

Pit-Stop-EMC: work principally concerned with the development of components for shielding the magnetic fields generated by underground cable systems.

Network technologies: permitting more direct access to the problems of the management and control of transmission networks, above all following the black-outs that occurred during the summer of 2003, through the actuation – together with the National Power Transmission Network authority – of a collaborative programme designed to produce an in-depth study of the integration of buried cables within the Italian transmission network.

Network Components: production of cable, joints and terminals for the 400 kV class continued, with the major application being that completed at the Barajas airport, Madrid, where the existing overhead lines in the area were replaced by high reliability buried Compact™ Cable Systems.

With regards to the ***Multipurpose Modules Centre***, the principal development activities concerned the Industrial and Special cables markets with, for example, the development of a project for the low temperature (down to – 40°C) protection of the so-called LSOH ("*Low Smoke Zero Halogen*") cables, destined above all for the markets of Siberia and Northern Canada.



Cable with tubes incorporated in the structure for the housing of optical monitoring sensors (Optopower™ system).

A low voltage LSOH-type cable.

In this field, Pirelli has extended the range of *Low Smoke Zero Halogen* products to interesting segments of the Industrial and Special cables markets (in particular, trains, ships and so on).

To this end, the existing range of LSOH AFUMEX™ cables destined for industrial uses in mechanically hostile environments (heavy industry, subways, etc…) has been extended to include the so-called building wires, medium and high voltage cables for special installations (wells and so on).

The advantage of these cables lies in the elimination of those halogenated polymers and additives used as protection against the propagation of fires, without sacrificing the level of fireproofing.

In this way, in the case of fire no toxic or corrosive gases are produced (for example, HCI and HBr), while the formation of dense smoke is prevented, allowing people affected by the fire to be evacuated swiftly.

Within the ambit of the Air Bag™ and Pitstop-SR technologies, the ***Extruded Systems Technologies*** centre has turned its attention to particular development activities such as that of the development of the ABC cable (Air Bag™ Composito), resistant to oils and mechanical stresses and principally destined for the petrochemical industry market on the American continent.

Thanks to the multipurpose protection offered by the Air Bag™ system, the cable is installed directly in the trench with no need for further protection.

The environmental benefits of this system are essentially concerned with the installation phase, the reduction in the quantity of materials required to fill the laying trenches (given that the excavation soil may be re-used) and the parallel reduction in the weight of the cables, with a consequent reduction in the consumption of materials and energy for production and transportation.

Lastly, in the context of the use of substances and products that are ever less hazardous for human health and the environment, worthy of mention is the establishment of a programme to progressively replace the lead compounds used as additives in PVC-based materials for low and medium voltage cables is also worthy of mention.

A high voltage Air Bag™ cable.

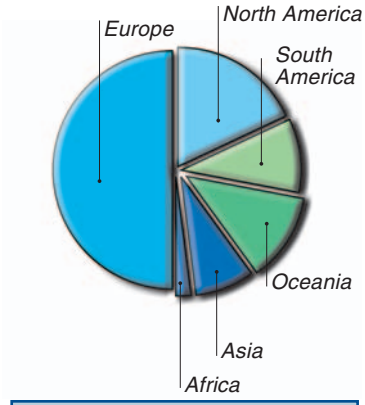
TELECOM CABLES AND SYSTEMS SECTOR

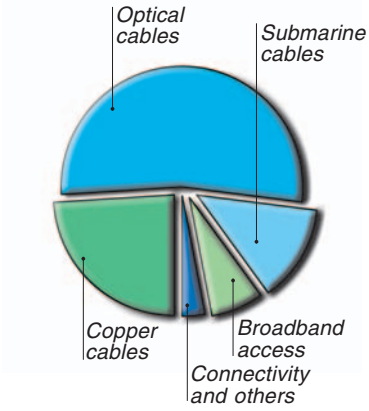
Presentation of the Sector

The long history of the Pirelli company dates back to 1879 with the production of the first telegraph cable in the factory in Milan: since then, during the course of a century of growth and innovation, Pirelli has become a worldwide leader in the supply of products for telecommunications networks.

The consolidated turnover of the sector (the distribution of which is indicated in the following table) as at 31.12.2003 saw sales amounting to € 427 million, with a fall of 8.8 % with respects to the previous year. This figure drops to 3.2 % if the so-called exchange rate effect is ignored.

The distribution of sales from a geographical point of view and by product category is also illustrated below.





Telecom Cables and Systems: 2003 sales by geographical area and product category.

Geographical area	2003	2002
Europe (of which Italy 20%)	50%	49%
North America	18%	22%
South America	10%	6%
Oceania	12%	12%
Asia	8%	8%
Africa	2%	3%

Product category	2003	2002
Copper cables	24%	20%
Optical cables	53%	70%
Submarine cables	13%	4%
Broadband Access	7%	2%
Connectivity and others	3%	4%

This report takes into consideration 11 operational units (all certified to the ISO 14001 standard), identified on the basis of the criteria mentioned above and with the following geographical distribution:

- 6 operational units in Europe, of which one wholly dedicated to the production of optical fibres,
- 1 in North America,
- 2 in South America,
- 1 in Australia,
- 1 in Asia.

As at 31 December 2003, the personnel numbered 2,218, a decrease of 328 units with respects to the same period in 2002.

As with the Energy Cables and Systems sector, for the purposes of this report two types of production were identified with homogeneous characteristics in terms of industrial processes and consequent environmental impact:

- "Telecom Cables and Systems",
- "Optical Fibres".

The principal characteristics of these two categories are illustrated in the following paragraphs. Please see the "Quantitative Data" appendix for statistical information regarding the environmental impact indicators taken into consideration.

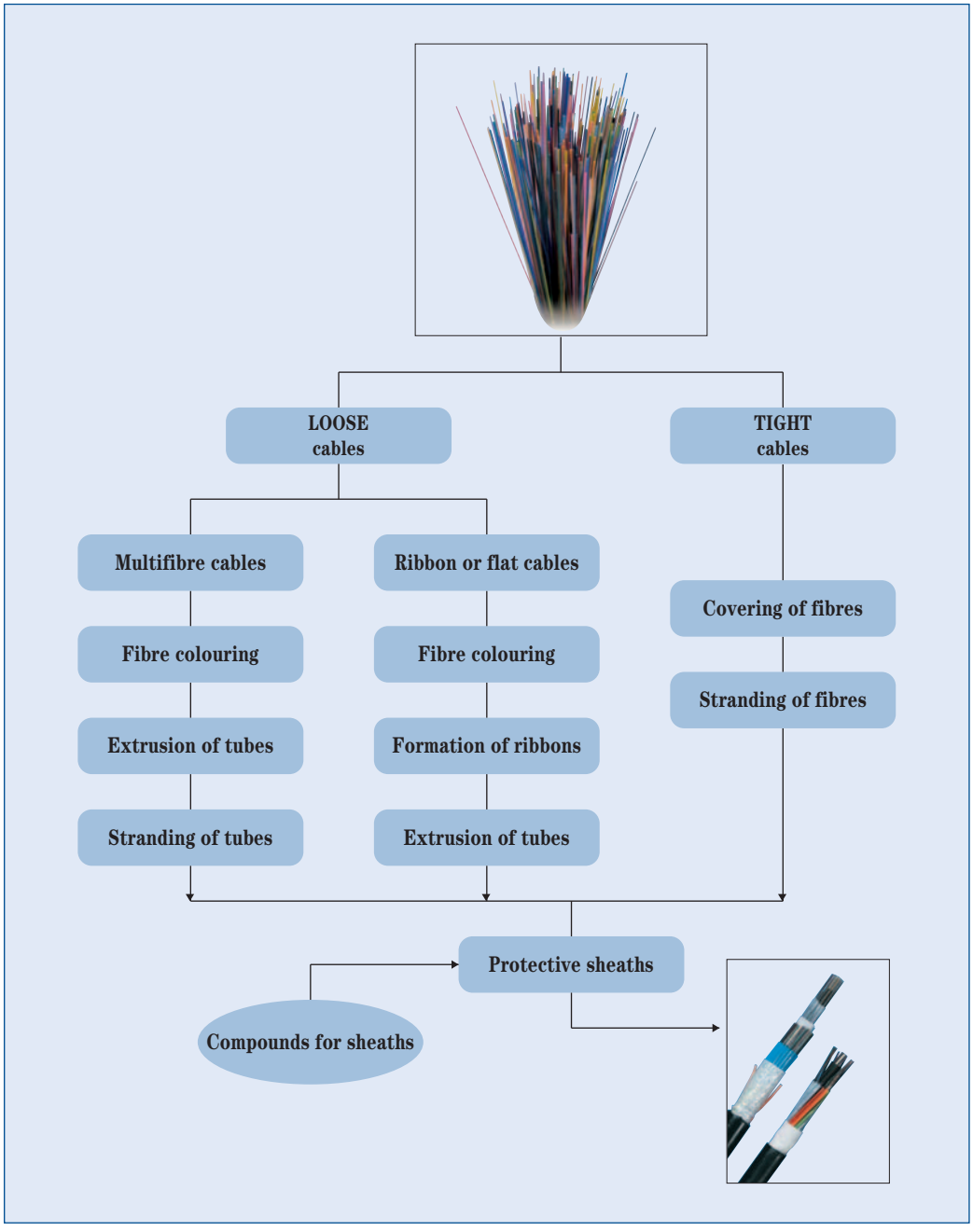
Work has almost been completed on the new Telecom Cables factory at Villanueva y la Geltru (Spain).

Production of Telecom Cables

While there are a number of different processes according to the type of cable and its function, the following diagram illustrates the principal phases in the production of a fibre-optic telecommunications cable.

This report considers 9 operational units dedicated to the above-mentioned production activities.

Principal phases in the production of fibre-optics cables for telecommunications



Production of Optical Fibres

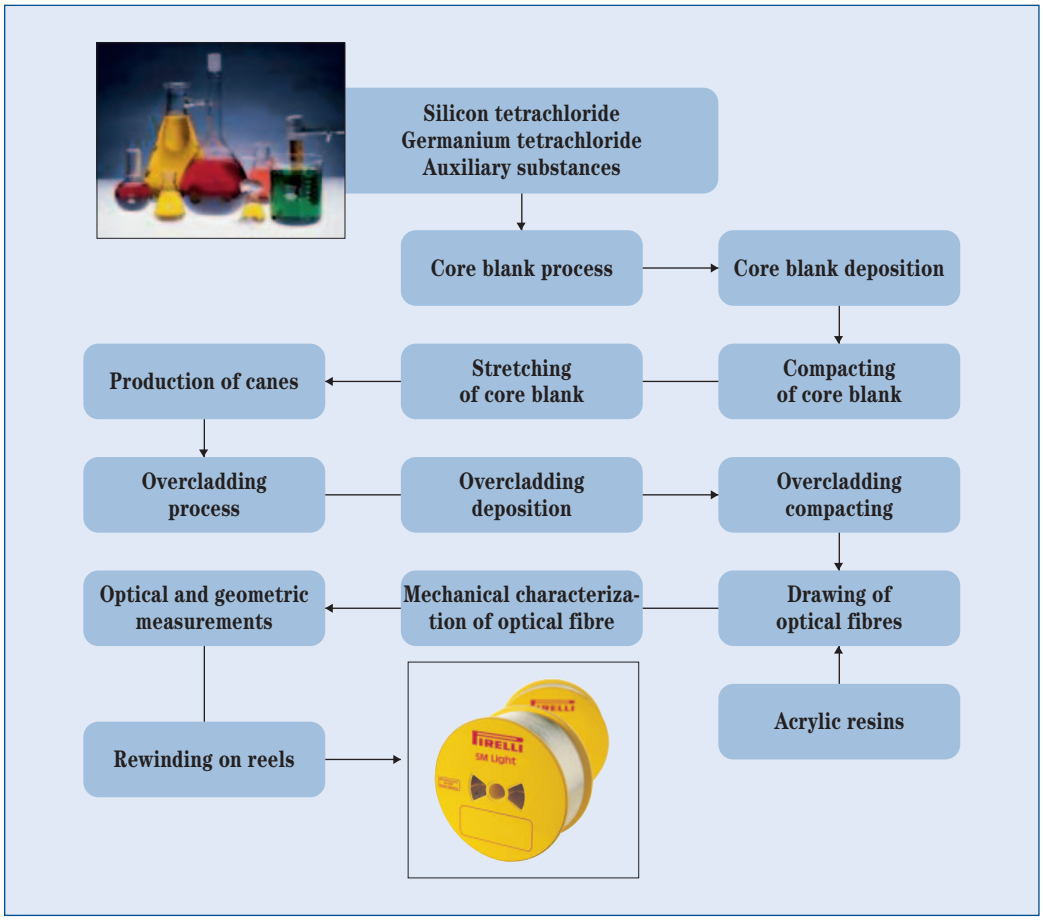
The continued caution with regards to investments on the part of companies operating in the telecommunications field again translated in 2003 into a further contraction of the demand for telecom cables and, consequently, for optical fibres.

Nonetheless, even though 2003 saw a downturn in fortunes, the Telecom Cables and System sector (together with the division responsible for the production of optical fibres) displayed a significant recovery with respects to the positions achieved in 2002.

The Pirelli Group has two production units in this sector (one in Brazil and one in Italy, both certified to the ISO 14001 standard), for which the processes adopted are illustrated in the diagram below.

Production of a glass blank for optical fibres.

Diagram of optical fibre production



Technological innovation in the Telecom Cables Sector

Within the ambit of the production of *optical fibres*, in 2003 work continued on the development and industrial feasibility of the introduction of alternatives to silicon tetrachloride as a raw material in the optical fibre production process.

In particular, research is focussing on the use of chemicals that do not contain halogens (the so-called aliphatic siloxane hydrocarbons) with which it would be possible to develop production processes with a lower environmental impact.

Other benefits of an environmental nature are represented by the significant reduction in the quantity of water required for the scrubbing of fumes prior to their release into the atmosphere, accompanied, from the point of view of the production process, by greater deposition efficiency. This last advantage translates into a highly significant reduction in both energy consumption and the quantity of raw materials used.

In this respect, a further benefit of a "global" nature deriving from the use of these siloxanes is represented by the reduced in transportation of silicon tetrachloride, a substance that due to its intrinsic nature is considered to present a serious accident risk.

Another important project that has already been implemented on an industrial scale with immediate "environmental" effects is represented by the development of a new type of optical fibre coating known as NEON™ Plus.

The SM Light fibre brought the new Pirelli NEON™ Plus coating into production.

This type of coloured coating, in fact, almost completely eliminates the phase in the production of fibre-optic telecommunications cables involving the off-line application of the ink normally used to colour the fibres, an activity generally conducted in the operational units devoted to the production of telecom cables.

Furthermore, this type of coating permits a slight reduction in the final diameter of the optical fibre, thus improving the overall efficiency of the telecommunications cable production process.

With regards to telecom cables, the development of products with a low environmental impact involved the following categories of fibre-optic cables:

- cables with a single sheath rather than the traditional dual plastic sheath, that permit a significant reduction in the consumption of energy and the quantity of raw materials used in their production;

- cables without interstitial grease (dry core fibre-optic cables) a feature that permits a drastic reduction in the amount of waste generated during both the production and installation phases.

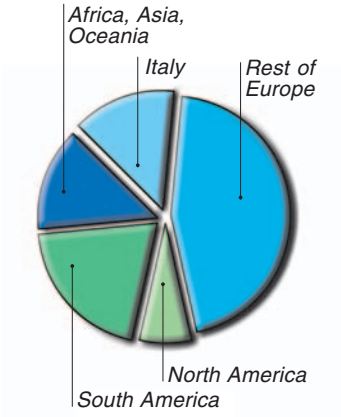
TYRE SECTOR

Presentation of the Sector

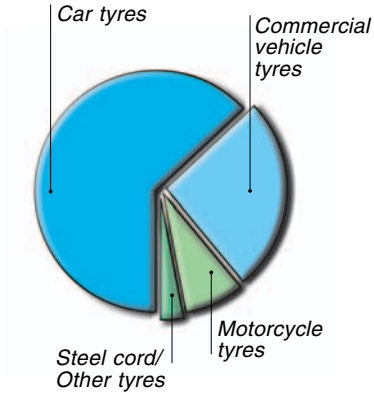
The *Tyre* sector produces a vast range of tyres for cars, industrial and commercial vehicles and motorcycles, as well as a significant quantity of steel cord, principally used as structural reinforcement in the tyres.

As at 31.12.2003 the sector's consolidated turnover (the distribution of which is indicated in the tables and diagrams) saw sales accounting for € 2,970 million, with a significant 4 % rise with respects to the previous year.

The new tyre plant in Feira de Santana which was inaugurated in September 2003.



Tyre Sector: 2003 sales by geographical area and product category.



From a quantitative point of view, sales were distributed as follows:

Geographical area	2003	2002
Italy	14%	14%
Rest of Europe	45%	46%
North America	7%	8%
South America	20%	19%
Africa / Asia / Oceania	14%	13%

Product category	2003	2002
Car tyres	63%	62%
Commercial vehicle tyres	26%	26%
Motorcycle tyres	8%	8%
Steel cord/Other tyres	3%	4%

As at 31/12/2003 the sector had a staff of 20,437 employees, slightly more than the figure for 31/12/2002 (20,222 employees), due above all to:

- the on-going development of the MIRS™ plants in Germany, Great Britain and the United States;
- the increase in production capacity at the Izmit plant (Turkey);
- the start-up of the new car tyre factory at Feira de Santana (State of Bahia, Brazil).

In this report, 21 operational units have been taken into consideration, 17 producing tyres and 4 producing steel cord.

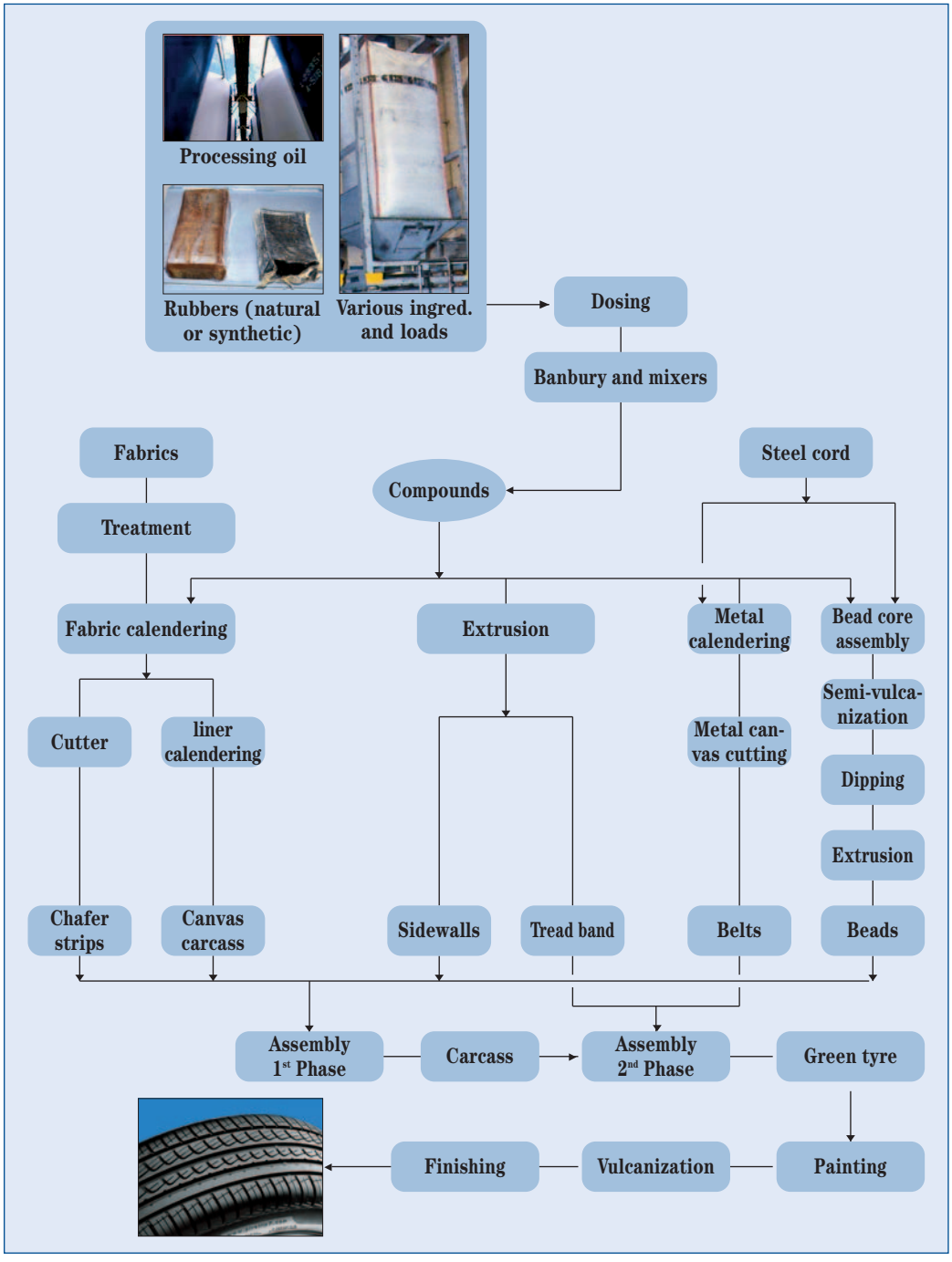
The following paragraphs present the principal characteristics of the two categories, while the quantitative data relating to the environmental impact indicators are collected in the Quantitative Data appendix.

Production of Tyres

As mentioned above, the Tyre Sector's range of products comprises tyres for cars (standard, high performance and competition models), off-road vehicles, industrial vehicles, buses and motorcycles.

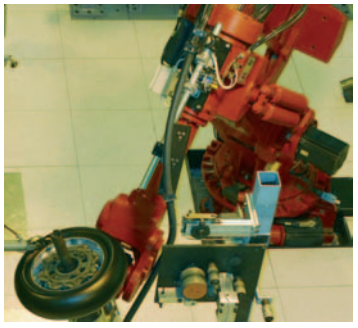
The following diagram illustrates the principal phases of a process relating to the production of a standard tyre.

Diagram of tyre production



The MIRS™

Work continued on product/process development relating to the MIRS™ ("*Modular Integrated Robotized System*"), above all through the consolidation of the plants utilising this technology in Germany, the United Kingdom and the United States.



A phase in the MIRS™ process.

This led to the American branch winning the prestigious "*Robot & Vision User Recognition Award 2003*" and the development of compounds with the innovative process known as *CCM* ("*Continuous Compound Mixing*"), described below.

In terms of the production process, the MIRS™ technology allows significant improvements in terms of the optimization of the production phases, passing from the conventional 13-14 steps normally taken in the production of tyres to just 3: preparation of the part-finished components, assembly-vulcanization, finishing.

The first Pirelli works at S. Andrè.

In relation to the specific production of car tyres, it should be emphasised that the MIRS™ process has led to significant savings, above all in terms of:

- the consumption of organic solvents normally used in the process (around 0.2 kg/tonne of product against 1 kg/tonne);
- the consumption of water, which drops from the 9.3 m^3/tonne of the conventional process to around 6.3 m^3/tonne in the MIRS™ process.

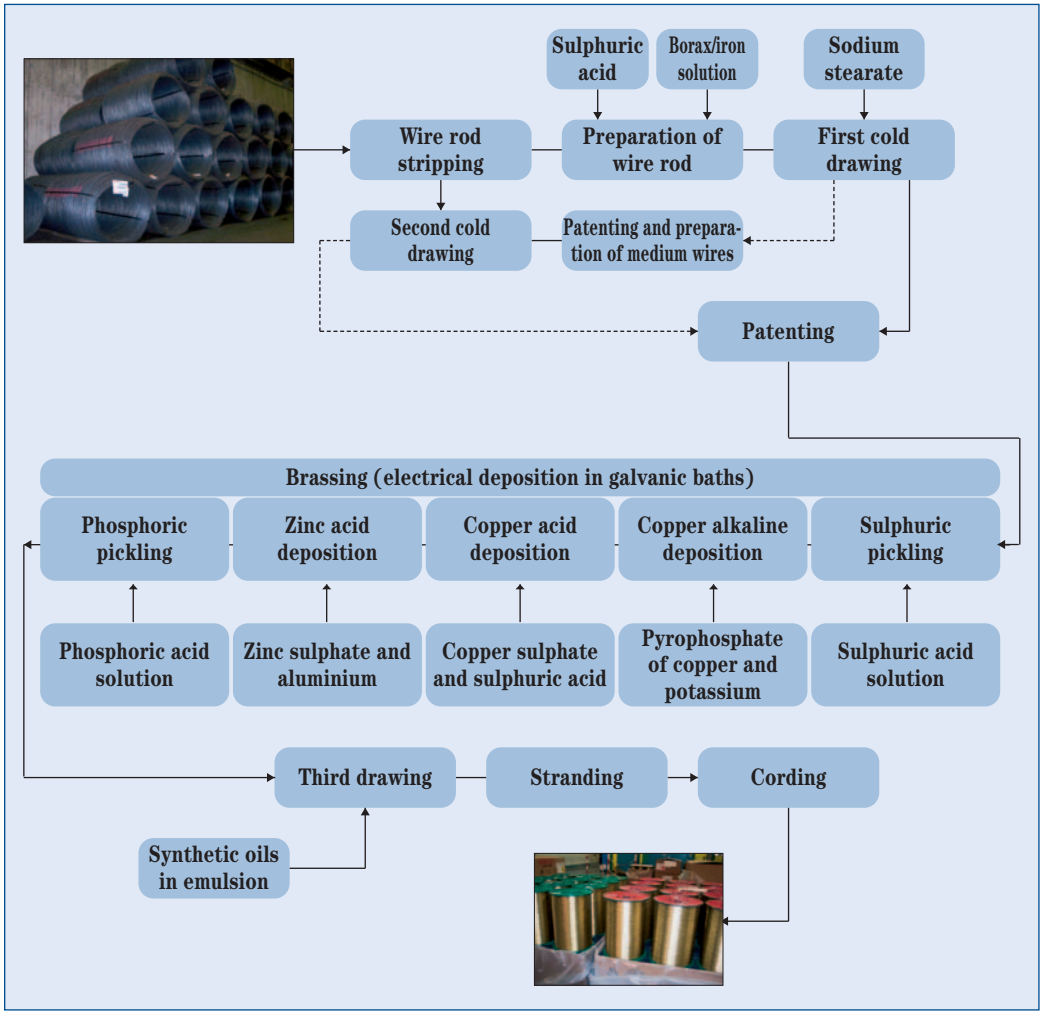
The new Feira de Santana tyre factory.

Production of Steel Cord

Steel cord is a part-finished product used both in the production of tyres and in metal fabrics and bead cores. Currently, steel cord production takes place in 4 operational units, located in Brazil, German, Italy and Turkey.

The following diagram illustrates the principal phases in the standard steel cord production process.

Diagram of steel cord production



Research and development of low environmental impact products

Research and development in the Tyres Sector in 2003 accounted for expenditure of over € 123 million, equal to 4.1 % of the sector's turnover.

These activities are essentially focussed on the improvement and innovation of the product range through intensive development in the areas of materials (traditional and innovative), modelling and the design of new profiles and tread patterns.

CCM technology

The system known as *CCM* ("*Continuous Compound Mixing*"), is based on two twin-screw extruders working continuously on the preparation of the compounds. A computer-controlled pneumatic distribution system, allows the ingredients to be transported directly from the storage silos to the extruders.

From the hygienic-environmental point of view this system, as well as featuting the adoption of powder capture systems that permit the collection and recycling of the powders, permits dust levels within the departments to be maintained at significantly lower levels with respects to those normally found in "traditional" factories.

The CCM (Continuous Compound Mixing) technology integrated with the MIRS™ plant at Milano Bicocca.

Evaluating the new raw materials

The programmes initiated in late-2001 regarding the evaluation of the eco-toxicological characteristics of any new material prior to its introduction to the production cycles continued for the year in question, in accordance with the group's internal standards.

In particular, in accordance with recent European normative requirements regarding the classification, labelling and packing of hazardous substances and compounds, the list of those substances that must not be used in production processes, or for which programmes of research for their replacement have been established, was updated.

In this context, during the course of 2003 over 200 new raw materials were analysed and evaluated.

Heavy metals

The *Tyres* Sector already meets the prescriptions of the European Union's most stringent normatives (in particular, Dir. 2000/53/CE and Decision 2002/57/CE) regarding the measures taken to ban the use as raw materials of the so-called *heavy metals* (for example, lead, cadmium, mercury and hexavalent chromium), recognised as substances extremely hazardous to human health and for the environment.

Aromatic oils

Aromatic oil is one of the principal products derived from the first phases in the distillation of crude oil. It is widely used as a plasticizer in the preparation of compounds by the entire tyre industry.

The company is strongly committed to the analysis of and search for alternative materials given that such oils present recognised hazards due to their PAH content ("*Polycyclic Aromatic Hydrocarbons*").

To this end, the Pirelli Group participates – together with other tyre producers – in the working group constituted by the BLIC ("*Bureau de Liaison des Industries du Caoutchouc*")

with the aim of defining the technical and toxicological characteristics of alternative products, coordinating activities with other industrial sectors involved and providing support for the EU institutions.

Such replacement has proved to be particularly complex in the case of car tyres as it involves redefining the formulae of the compounds from scratch, revising the industrial processes and road-testing the new products so as to guarantee the safety and performance levels demanded by current legislative norms and by the market.

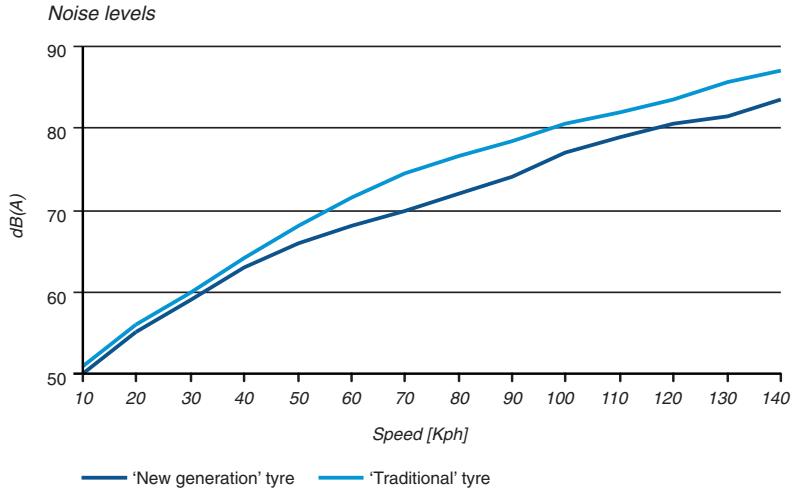
The reduction of noise and rolling resistance

In line with its group policy, Pirelli's new product development is oriented towards a reduction of environmental impact compared with preceding lines.

In order to achieve these objectives, the Tyres Sector is constantly involved in the design and development of new compounds and new product lines that, thanks to new materials, innovative internal structures and new tread patterns, are capable of reducing rolling resistance without sacrificing the durability of the tyre itself.

In this context, it should be remembered that the tread pattern is a key element of the tyre and that every detail is painstakingly studied.

For example, the sound levels generated by the tyre are studied with the aid of special software and testing procedures, both in the field and through laboratory testing in appropriately equipped facilities (*anechoic chambers*).

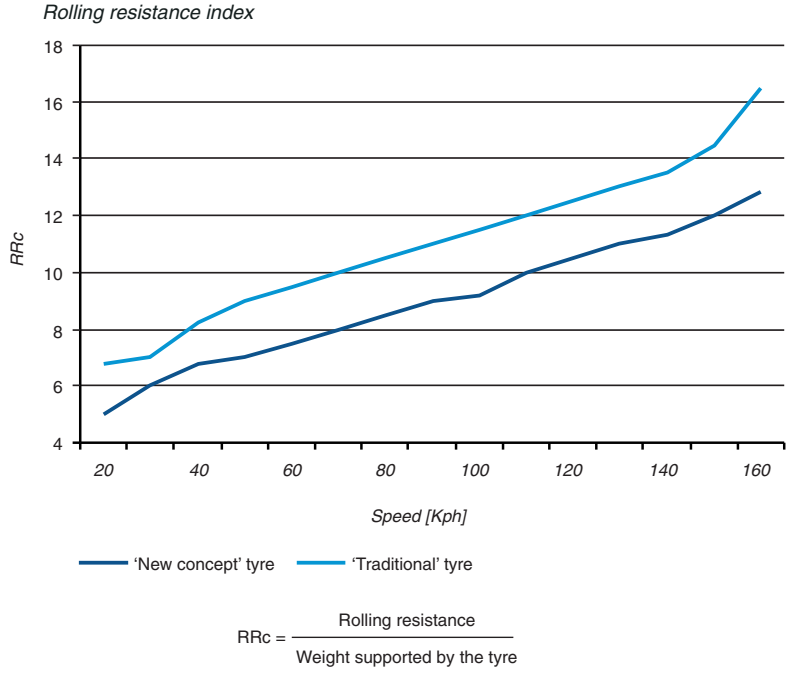


Analysis of the graph presented above reveals that there is a significant difference in the noise level – at various speeds – generated by traditional and new generation tyres.

Rolling Resistance is the force that the tyre opposes to the advancement of the vehicle. Together with the resistance offered by the mechanical organs and the vehicle's resistance to the penetration of the air, it influences the consumption of fuel and, in consequence, the emission of exhaust gases.

The rolling resistance value is naturally different for the different types of tyres and depends on a series of factors such as the formulation of the tread compound, the tyre's inflation pressure, the speed and weight of the vehicle, the road surface characteristics, the ambient temperature and way in which the tyre is used…

In this context the ELRR ("*Extra Low Rolling Resistance*") packet has been available for some years and influences every component of the tyre to obtain an improvement in general tyre performance as well as a further reduction in rolling resistance.

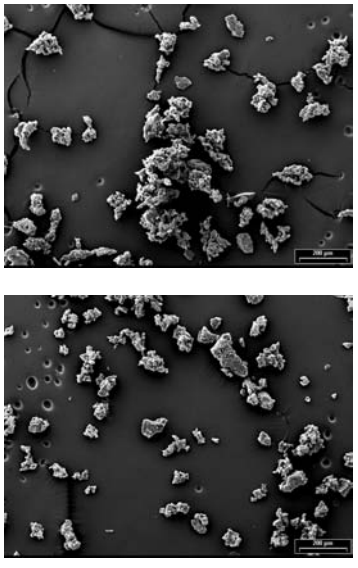


$$RRc = \frac{\text{Rolling resistance}}{\text{Weight supported by the tyre}}$$

Tyre Debris

The term *tyre debris* signifies the particles of rubber worn away as a result of the friction between the tread and the road surface.

During its life cycle, a tyre sheds a quantity of debris that may be estimated as around 10% of its original weight: the impact of these particles on the environment is currently still under investigation. Pirelli constantly monitors this topic through a continuous exchange of information with other tyre manufacturers, especially at an international level through its participation in the BLIC.



Granulometric fraction of under 100 µm from the tyre debris generated by a truck tyre (above) and a car tyre (below).

The recycling of tyre powder

The compounds required for the manufacture of tyres currently contain an average 2-4% of recycled powder deriving from the granulation and regeneration of end-of-life tyres.

In 2003, Pirelli continued its work in this area with a research and development project aiming to double the quantity of usable recycled product.

The Environmental Vendor Rating

As in previous years, suppliers continued to be rated in 2003 on the basis of their environmental performance.

The so-called "Environmental Vendor Rating" parameter is evaluated through a targeted questionnaire and accounts for 9% of the overall supplier performance rating.

Clearly, the objective of this evaluation is to identify a series of suppliers recognised for their commitment in this field and who substantially apply the principles contained in the group policy.

The Vendor Rating effected in 2003 considered a total of 88 suppliers, of which over 37% have already obtained ISO 14001 or EMAS certification. Of the remaining suppliers, around 47% plan to complete the certification process within 2005.

End-of-life Tyres

End-of-life tyres may be recycled either to recover the materials of which they are composed (*materials recovery*), or by using them as fuel ("*energy recovery*") exploiting their high calorific power (7,400 ÷ 8,000 Kcal/kg).

In this respect, it should be noted that tyres possess characteristics (see the following tables) that make the use of ELTs in combustion processes a valid alternative to the use of solid fuels, above all in terms of improving atmospheric emissions.

Average characteristics of the end-of-life tyres [1]

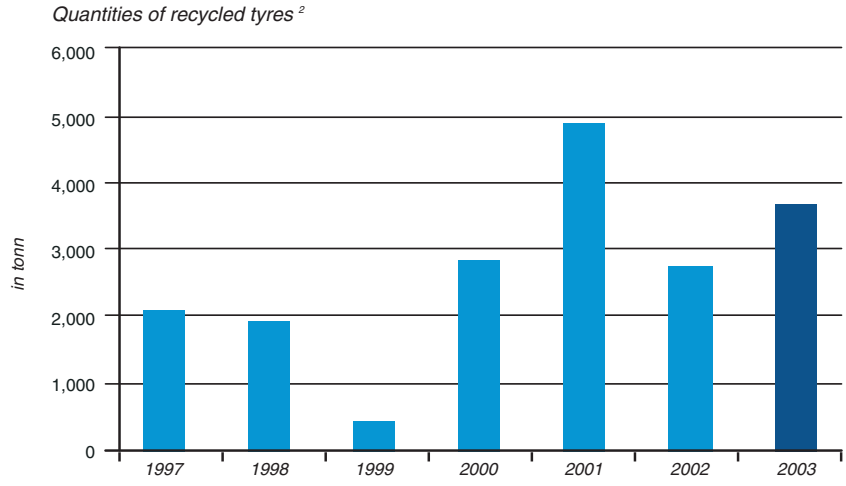
	Average values
Ferrous materials	15%
Ashes	2%
Fuel	81,5%
Sulphur	1.5%
Inferior calorific power	> 7.400 Kcal/kg
Volatile materials (regarding the fuel component)	> 70%

[1] U. Ghezzi, M. Giugliano, M. Grosso, S. Pollo, G. Zerbo: "*Tyres used as fuel within a cement works furnace*" (Original Title: "*L'impiego di pneumatici come combustibile in un forno da cemento*").

Elementary comparative analysis [1]

Parameters		De-steeled tyres	Fuel oil ATZ	Petroleum Coke
Carbon	[%]	90 ÷ 92	85 ÷ 88	85 ÷ 90
Hydrogen	[%]	5 ÷ 7	10 ÷ 11	5 ÷ 10
Sulphur	[%]	1.5	1.5 ÷ 3	3 ÷ 5
Ashes	[%]	2	-	1

The cement industry (see the graph below) uses notable quantities of alternative fuels (such as ELTs) in its production processes, permitting a diminution of the environmental impacts – as well as a reduction in costs – through energy recovery from waste that would otherwise be destined for landfill sites [2].



[1] U. Ghezzi, M. Giugliano, M. Grosso, S. Pollo, G. Zerbo: "*Tyres used as fuel within a cement works furnace*" (Original Title: "*L'impiego di pneumatici come combustibile in un forno da cemento*").
[2] Source: Italcementi S.p.A., Cement works of Scafa (PE, Italy), 2003.

Along with the research and development activities described above (see pg. 16 onwards), Pirelli is part of a specific group constituted within the ambit of the BLIC with the aim of coordinating on a European level activities in the various European nations, facilitating comparison between diverse national situations.

Given that ELTs should not be considered merely as a problem, but rather as an opportunity to be grasped, Pirelli supports and actively contributes to national associations and consortia (Joint Stock Companies) that promote or handle the recycling of tyres.

Examples of European Associations or National Consortia promoting or handling the recycling of ELTs.

QUANTITATIVE DATA

1. The environment: results

1.1 Analysis of the data at the Group level

The environmental data at the group level refer to all the operational units of the three industrial sectors, Energy Cables and Systems, Telecom Cables and Systems and Tyres.

This aggregation provides us with an idea of the overall environmental burden, expressed through the parameters taken into consideration (the consumption of water, energy and organic solvents, the production of hazardous and non-hazardous waste, the total amount of recycled waste and the recycled hazardous waste, the quantity of dielectric oil containing PCB/PCT and ozone depleting substances, and the CO_2 and NO_x emissions of the companies in the various geographical areas: Europe, North America, South America and Africa/Asia/Australia.

The data are expressed as absolute values or as percentages but not in terms of consumption per unit of production, a figure of no relevance given the diversity of the products.

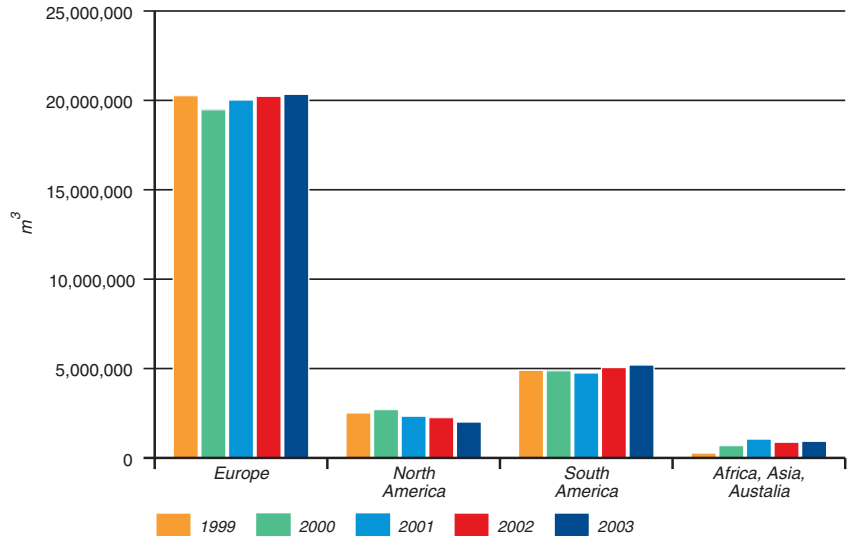
In general, as far as consumption is concerned, there was substantial confirmation of the absolute values recorded in previous years; an analysis of the trends regarding the individual product categories follows in Chapter 1.2 in which, along with more detailed explanations, the environmental parameter values with reference to units of production are presented.

1.1.1 Consumption of water

Consumption of water by Pirelli & C. S.p.A. [m^3]

	1999	2000	2001	2002	2003
Europe	20,261,863	19,471,284	20,019,126	20,226,483	20,336,608
North America	2,512,618	2,700,602	2,331,495	2,249,650	2,004,201
South America	4,899,277	4,873,805	4,749,713	5,053,207	5,193,969
Africa, Asia, Australia	270,639	684,433	1,050,570	873,808	927,852
Total	**27,944,397**	**27,730,124**	**28,150,904**	**28,403,148**	**28,462,630**

Consumption of water by Pirelli & C. S.p.A.



A slight increase in the consumption of water was recorded compared with 2002 (+ 0,2%), although the value remained congruent with the levels recorded over the last three years. This result is, however, the sum of the trends in the diverse product categories and in particular:

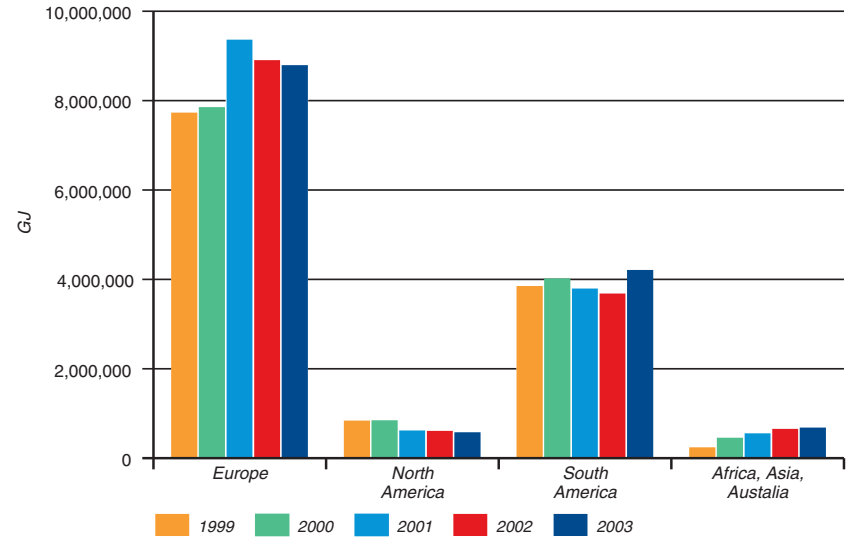
- reductions were recorded with regard to the production of tyres and energy cables;
- the Telecom Cables and Steel Cord categories recorded increases in the absolute values although as these are due to the increase in production they actually correspond to reductions in consumption per unit of production;
- the other productive categories (for example, wire rod and optical fibres) recorded both absolute and specific increases.

1.1.2 Consumption of energy

Consumption of energy by Pirelli & C. S.p.A. [GJ]

	1999	2000	2001	2002	2003
Europe	7,742,381	7,865,935	9,387,532	8,926,406	8,810,231
North America	812,932	820,125	594,249	584,910	550,145
South America	3,840,870	4,012,615	3,787,648	3,675,538	4,201,940
Africa, Asia, Australia	211,151	427,477	530,094	630,098	655,779
Total	**12,607,334**	**13,126,151**	**14,299,523**	**13,816,952**	**14,218,095**

Consumption of energy by Pirelli & C. S.p.A.



Compared with 2002, the consumption of energy saw a rise of 2,9% and approached the levels recorded in 2001, although remaining slightly lower. All the productive categories contributed to this increase with the exception of Energy Cables and Optical Fibres, both of which recorded significant falls in consumption.

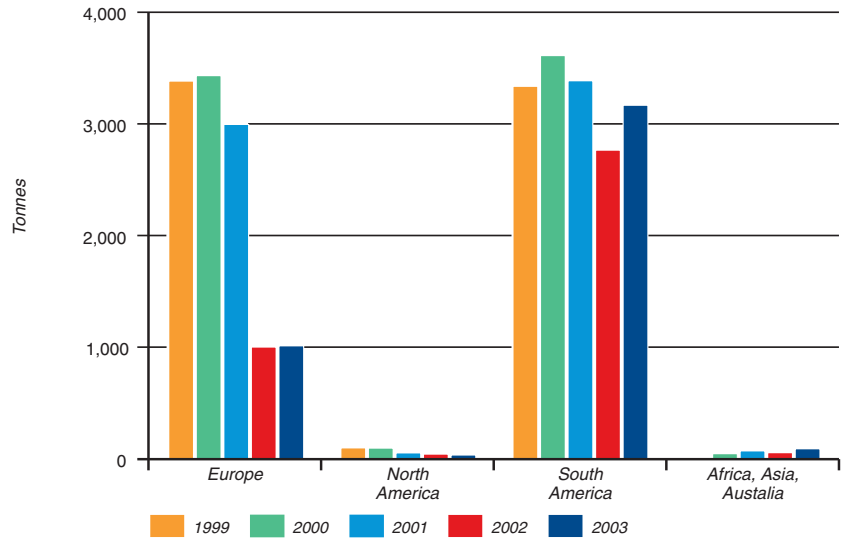
A more detailed analysis of each individual category reveals that this result is largely due to the increases in production, increments that outstrip those relative to this parameter, with the sole exception of the Telecom Cables category.

1.1.3 Consumption of organic solvents

Consumption of organic solvents by Pirelli & C. S.p.A. [tonnes]

	1999	2000	2001	2002	2003
Europe	3,397	3,446	3,008	1,010	1,021
North America	105	103	60	49	41
South America	3,350	3,626	3,400	2,777	3,180
Africa, Asia, Australia	11	53	78	62	97
Total	**6,864**	**7,228**	**6,546**	**3,899**	**4,339**

Consumption of organic solvents by Pirelli & C. S.p.A.



Following the optimization of the use of solvents initiated in 2001, the absolute values regarding the consumption of such substances have seen a slight increase.

While most of the categories have contributed to this increase in consumption, it is largely due to the production of enamelled wire that necessitates a quantity of solvents per unit of production far higher than that of the other categories.

In the case of the production of optical fibres and tyres, this increase was due entirely to increased production volumes, thus translating into lower consumption per unit of production.

1.1.4 Production of Waste

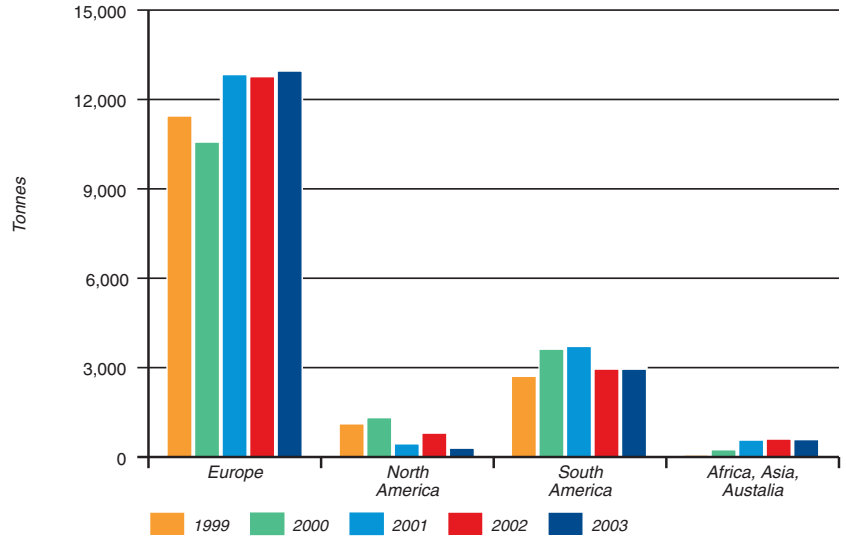
While at an international level there is no unequivocal definition of hazardous or non-hazardous waste, the subdivision provided for by current European legislation has been adopted for the purposes of this report.

Hazardous waste

Hazardous waste produced by Pirelli & C. S.p.A. [tonnes]

	1999	2000	2001	2002	2003
Europe	11,463	10,587	12,854	12,784	12,973
North America	1,124	1,331	452	812	306
South America	2,719	3,631	3,724	2,962	2,960
Africa, Asia, Australia	77	253	578	612	593
Total	**15,383**	**15,801**	**17,607**	**17,170**	**16,832**

Hazardous waste produced by Pirelli & C. S.p.A.

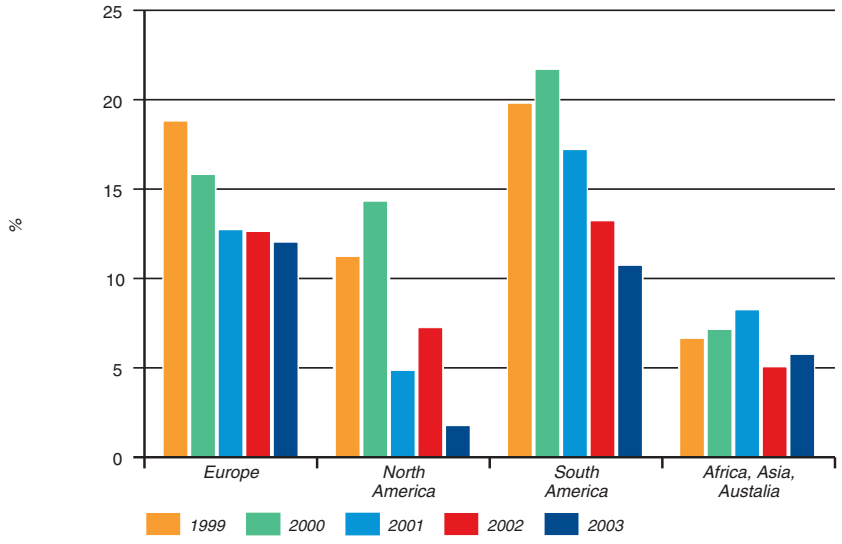


Compared with 2002, there was a 2% reduction in hazardous waste, the lowest value recorded in the last three years.

Percentage of hazardous waste against total waste produced by Pirelli & C. S.p.A. [%]

	1999	2000	2001	2002	2003
Europe	18.9	15.9	12.8	12.7	12.1
North America	11.3	14.4	4.9	7.3	1.8
South America	19.9	21.8	17.3	13.3	10.8
Africa, Asia, Australia	6.7	7.2	8.3	5.1	5.8
Total	**18.0**	**16.5**	**12.8**	**11.7**	**10.4**

Percentage of hazardous waste against total waste produced by Pirelli & C. S.p.A.

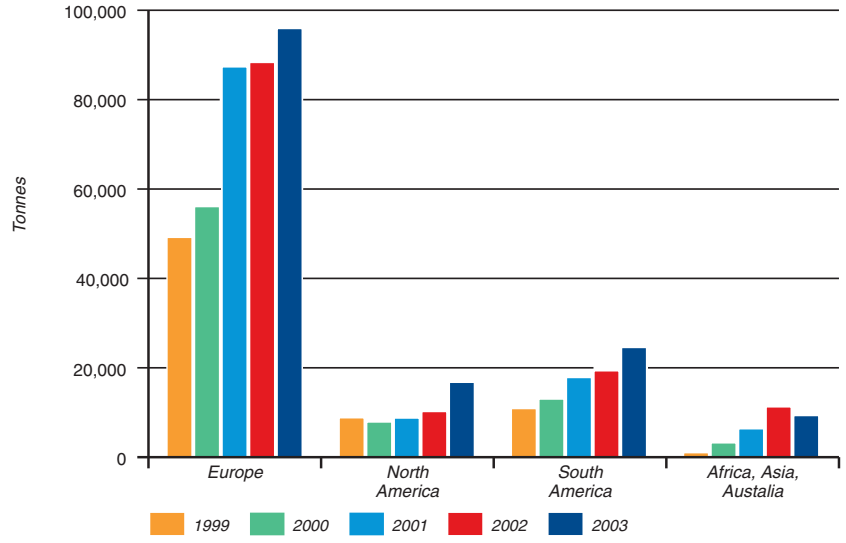


Non-hazardous waste

Non-hazardous waste produced by Pirelli & C. S.p.A. [tonnes]

	1999	2000	2001	2002	2003
Europe	49,135	56,003	87,196	88,185	95,761
North America	8,858	7,914	8,793	10,254	16,776
South America	10,913	13,034	17,844	19,342	24,552
Africa, Asia, Australia	1,062	3,258	6,401	11,295	9,353
Total	**69,968**	**80,207**	**120,234**	**129,076**	**146,442**

Non-hazardous waste produced by Pirelli & C. S.p.A.



There was a 13.5% increase in the production of non-hazardous waste compared with 2002; however, considering the disaggregated data for the individual product categories and ignoring certain products that "bucked the trend", the following may be observed:

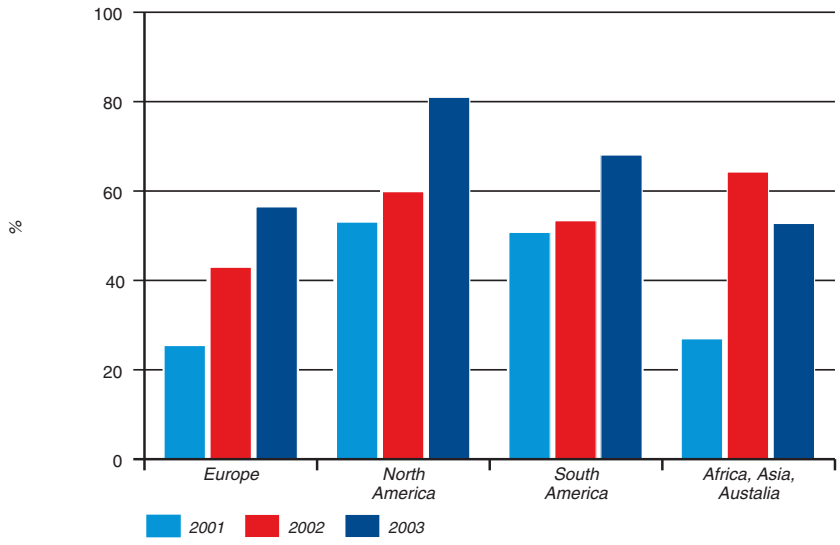
- the Telecom Cables category recorded an absolute increase, but a reduction in the value per unit of production;
- the wire rod, accessories and optical fibres categories instead registered reductions in both the absolute value and the value per unit of production.

Recycled waste/ total waste

Percentage of recycled waste against total waste produced by Pirelli & C. S.p.A. [%]

	2001	2002	2003
Europe	25.5	43.0	56.5
North America	53.1	59.9	81.0
South America	50.8	53.4	68.1
Africa, Asia, Australia	27.0	64.3	52.8
Total	**31.4**	**47.6**	**60.8**

Percentage of recycled waste against total waste produced by Pirelli & C. S.p.A.



Improvements in the handling of the waste production question within the operational units are reflected in the increase in the percentage of recycled waste compared with the total waste (from 47,6% to 61,1%). In order to explain the trend, certain concepts should be emphasised:

- the quantity of recycled non-hazardous waste rose, making a significant contribution to the increase in non-hazardous waste in general, of which it is a part. As the increase in recycled waste was greater than that of non-recycled waste, the percentage of the former with respect to the sum of the two is also subject to an increment. As a consequence, the causes of the increase in recycled waste partially coincide with those that led to the increase in non-hazardous waste (see above);
- the percentage is calculated with respect to the total amount of waste; this includes hazardous waste, which instead fell and therefore contributed to shifting the "recycled waste against total waste" ratio upwards;
- in some plants improvements were made, with increases in the quantities of recycled waste.

1.1.5 Dielectric oils containing PCB / PCT

Dielectric oils containing PCB / PCT used by Pirelli & C. S.p.A. [kg]

	2001	2002	2003 (*)
Europe	110,501	89,403	51,923
North America	2,600	2,600	2,600
South America	43,292	43,292	43,692
Africa, Asia, Australia	23,114	23,114	325
Total	**179,507**	**158,409**	**98,540**

(*) In relation to the data presented in the table, it should be noted that the quantities referred to in precious reports (2001 and 2002) comprise all the dielectric oils containing PCBs in any concentration found in equipment that was either in use (essentially transformers and capacitors) or idle.

However, this data did not take into account the limits of significance of the presence of PCBs. In many cases, the concentration of PCB/PCT is very low, either because it has been reduced by topping up with dielectric oils not containing PCBs or because this is a feature of the equipment containing them.

Taking as a point of reference the most restrictive European normatives, the concentration of PCB held to be significant is equal to 50 ppm: below this concentration, the devices containing this substance are not held to be critical, their use being permitted through to the end of their operating lives.

In view of the above, and with the aim of providing an overview that is closer to the true environmental risk represented by this type of substance, the situation presented in the 2003 report refers solely to the quantities of dielectric oils in concentrations of over 50 ppm.

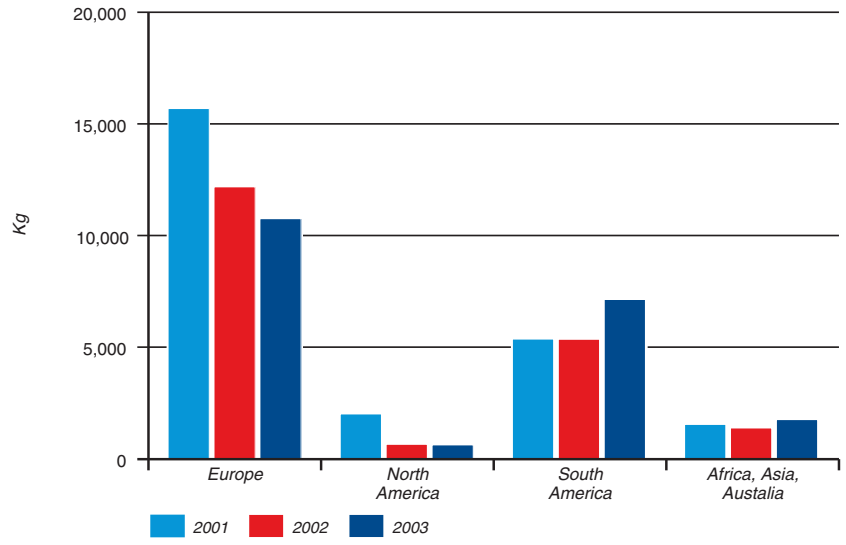
For reasons of completeness and transparency, it should be pointed out that the values declared also comprise the quantities of PCB/PCT for which the quantities but not the concentrations are known.

1.1.6 Ozone depleting substances

Ozone depleting substances used by Pirelli & C. S.p.A. [kg]

	2001	2002	2003
Europe	15,751	12,238	10,810
North America	2,050	687	662
South America	5,409	5,399	7,185
Africa, Asia, Australia	1,580	1,421	1,797
Total	**24,789**	**19,744**	**20,453**

Ozone depleting substances used by Pirelli & C. S.p.A.



Separating the data by category, the following points emerge:

- the Accessories, Telecom Cables and Optical Fibres categories show significant reductions due principally to disposal;
- while the values for Wire Rod have remained stable, the Energy Cables and Tyres categories show increases.

1.1.7 CO_2 and NO_x emissions

In general, the emissions of CO_2 and NO_x (the latter being reported for the first time) refer to the processes of combustion determined by the use of energy by the operational units. For the purposes of this report, the CO_2 and NO_x values have been subdivided as follows:

- the "internal" component, referring to the processes of combustion taking place within the Pirelli operational units;
- the "external" component, referring to the part emitted in the generation of electrical energy used by the operational units but produced beyond their confines.

This type of subdivision is valid for all the product categories that follow, while the factors used for converting the quantities energy to kg of CO_2 and NO_x emitted are detailed in the chapter entitled "2003 Report Development Criteria".

The slight increase in the amount of energy consumed (see paragraph 1.1.2) is reflected in the CO_2 emitted, which also rose slightly (by 3%). This is true for both *internal* (+ 2,3%) and *external* CO_2 (+3,1%). A comparison between the two reveals that, overall, there was an increase in the component deriving from external energy (electrical energy) while the amount emitted as a result of internal energy consumption actually dropped (the variations are, however, very slight), although in Europe and North America the opposite was true (see graph).

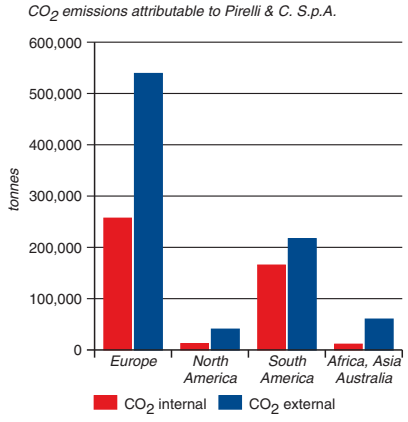
The NO_x trend mirrors that of CO_2, both sharing the basic parameters of internal and external combustion processes.

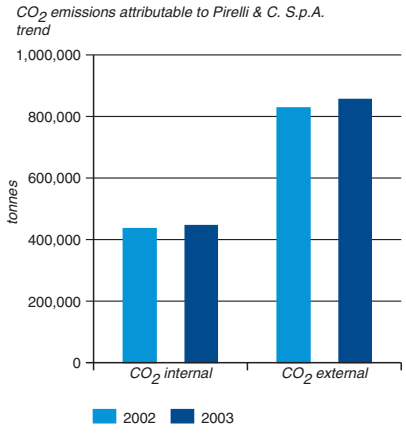
CO_2 emissions attributable to Pirelli & C. S.p.A. [tonnes]

	CO_2 internal	CO_2 external	CO_2 total
Europe	257,029	538,816	795,846
North America	12,430	40,390	52,820
South America	165,568	216,822	382,391
Africa, Asia, Australia	11,354	59,971	71,325
Total	**446,382**	**856,000**	**1,302,382**

CO_2 emissions attributable to Pirelli S.p.A. [tonnes]

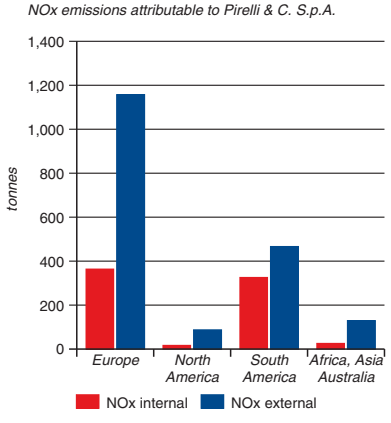
	2002	2003
CO_2 internal	435,812	446,082
CO_2 external	828,014	856,000
Total	**1,263,825**	**1,302,082**

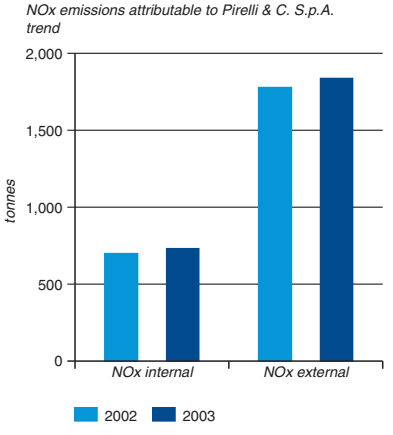




NO_x emissions attributable to Pirelli & C. S.p.A. [tonnes]

	2002	2003
NO_x internal	699	733
NO_x external	1,778	1,838
Total	**2,478**	**2,571**





2. Analysis of the data subdivided by product category

The term category is used to define a product type (for example “Steel Cord” or “Optical Fibres”), presenting clear characteristics of homogeneity, both from the point of view of the industrial processes and with regard to the values of the various environmental impact indicators considered.

The sectors taken into consideration are as follows:

Sector	Category
Energy Systems and Cables	*Energy Cables*
	Accessories
	Wire Rod
Telecom Systems and Cables	*Telecom Cables*
	Fibre Optics
Tyre	*Tyres*
	Steel Cord

2.1 The "Energy Cables" category

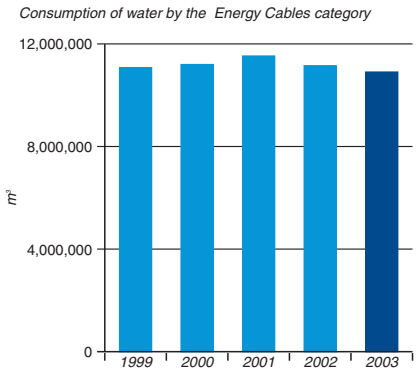
Again in 2003 there was a reduction in the production of energy cables, a drop of 2,6% compared with 2002. The causes are essentially to be found in the divestitures that took place during the course of the year, but the industrial rationalization actuated by certain operational units also played a part.

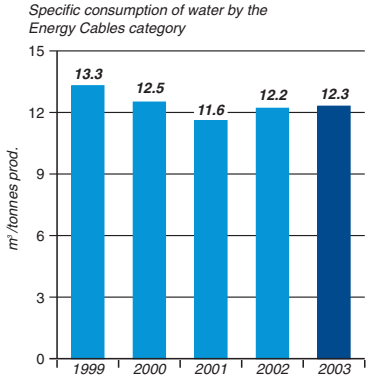
2.1.1 Consumption of water

Compared with the *normalized* consumption that was substantially stable (+ 0.35%), the *absolute* consumption of water by the category saw a drop of 2.2%, accurately reflecting the reduction in production.

The elements that contributed to an increase in the consumption per unit of production may traced to:

- the climatic conditions on the European continent, with particularly high summer temperatures in 2003, and consequently greater losses through evaporation;
- variations in the type of product manufactured.



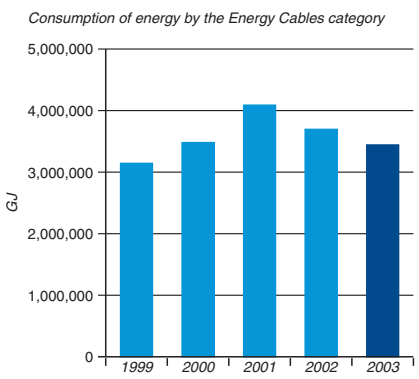


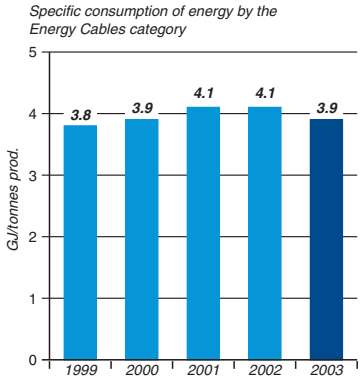
The elements that instead had the opposite effect, annulling those described above and guaranteeing the condition of stability, were mainly due to the following causes:

- the definitive closure of a number of plants that registered high consumption last year, both in absolute and normalized terms, due to the limited production volume during the pre-closure phase;
- technical improvements (for example, the use of air rather than water cooling units, maintenance and so on).

2.1.2 Consumption of energy

As well as a significant drop in consumption in absolute terms (- 6.9%), there was also a net reduction in the normalized energy consumption (- 4.4%), a value far greater than that accounted for by the drop in production values (- 2.6%).

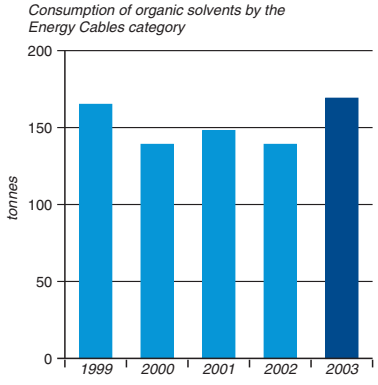


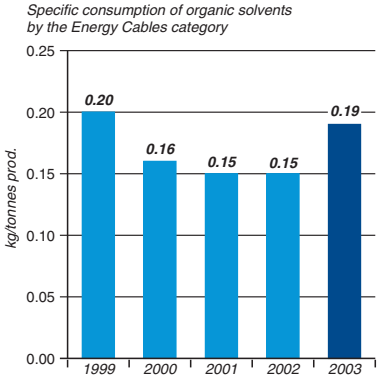


The reduction compared with the values recorded the previous year may be ascribed to the following factors:

- as mentioned above, 2003 saw the definitive closure of a number of plants that last year were still in the pre-closure phase with absolute and normalized energy consumption values. Their production was transferred to other existing operational units, with a consequent reduction in consumption per tonne produced, thanks to the spreading of fixed energy consumption across a greater production volume;
- minor reductions in the specific consumption recorded by many operational units.

2.1.3 Consumption of organic solvents

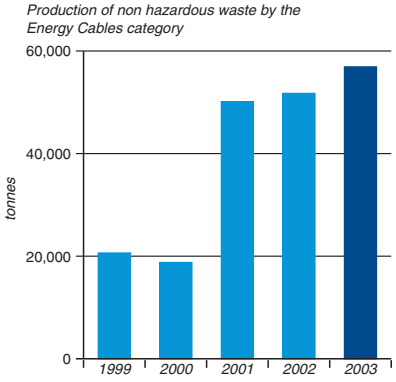


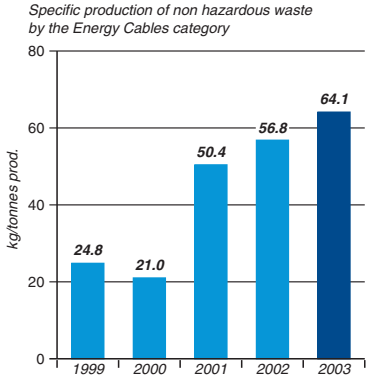


An improvement in the trend observed with regard to the normalized consumption of solvents (essentially ascribable to problems encountered by an operational unit not certified to the ISO 14001 standard) was set as one of the primary objectives for reduction in 2004.

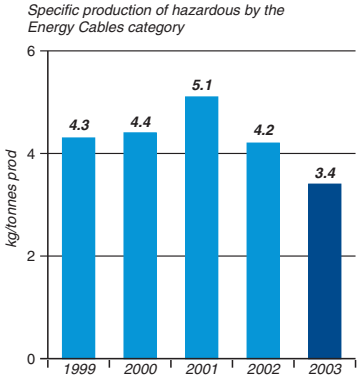
2.1.4 Production of waste

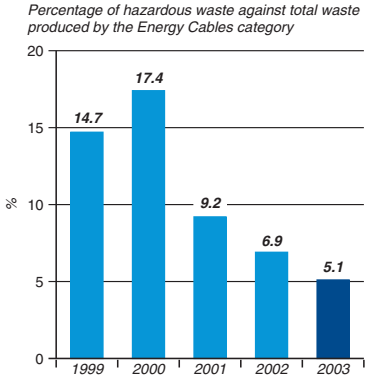
Non-hazardous waste





Hazardous waste

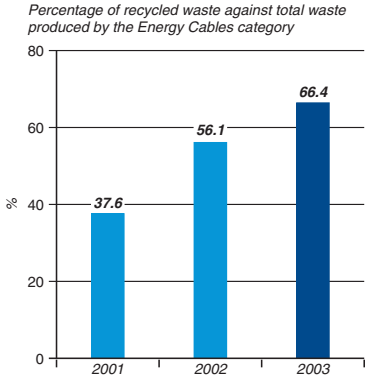




There was a clear improvement in the managing of hazardous waste that in 2003 led to a significant decrease in both the *absolute* quantities produced (-20.5%) and the *normalized* quantity with respect to production (-18.4%).

This was made possible above all due to optimization of certain machinery (for example, the extruders) that led to a reduction in the quantities of spent oils and emulsions.

Recycled waste



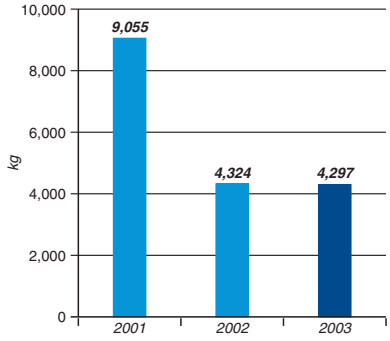
2.1.5 Dielectric oils containing PCB / PCT

In the light of what has been described in paragraph 1.1.5, in 2003 it was decided to adopt different criteria for the quantification of dielectric oils containing PCB.

In particular, as at 31.12.2003, 59,847 kg of oils containing PCB/PCT in concentrations of above 50 ppm were recorded for the Energy Cables category.

2.1.6 Ozone depleting substances

Ozone layer depleting substances used by the Energy Cables category



2.1.7 CO_2 and NO_x emissions

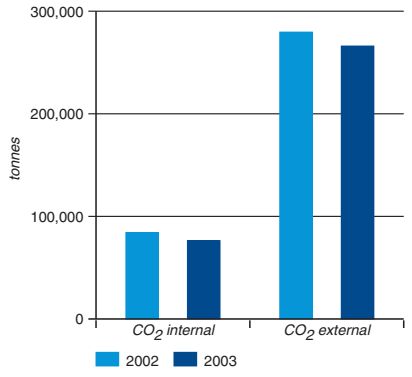
CO_2 emissions attributable to the Energy Cables category [tonnes]

	2002	2003
CO_2 Internal	84,147	76,278
CO_2 External	279,612	266,019
Total	**363,759**	**342,296**

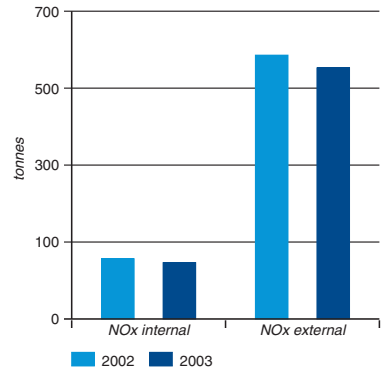
NO_x emissions attributable to the Energy Cables category [tonnes]

	2002	2003
NO_x Internal	137	128
NO_x External	600	571
Total	**738**	**699**

CO_2 emissions attributable to the Energy Cables category



NOx emissions attributable to the Energy Cables category



In general, the trends may be observed in the following table:

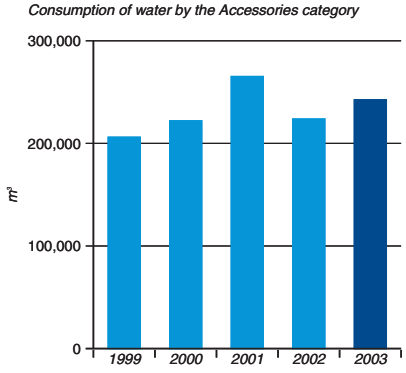
CO_2 trend		NO_x trend	
Total CO_2	-5.9%	Total NO_x	-5.3%
Internal CO_2	-9.4%	Internal NO_x	-7.3%
External CO_2	-4.9%	External NO_x	4.9%

2.2 The "Accessories" category

In line with the previous years, the absolute values for the parameters are presented, omitting the specific values per unit of production given that for the extremely varied range of products such relative values would have no significance.

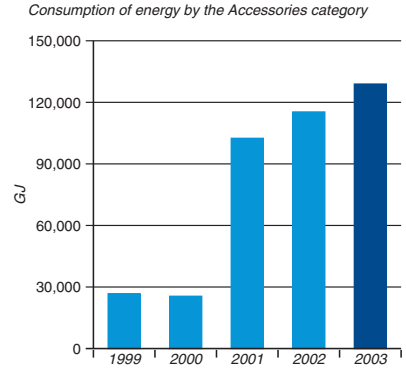
2.2.1 Consumption of water

The increase in the consumption of water recorded in 2003 may essentially be attributed to the increase in production.



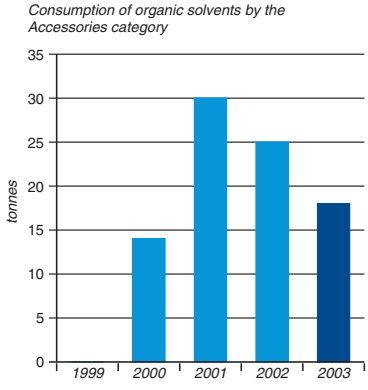
2.2.2 Consumption of energy

Here too, the increase in the consumption of energy (+ 11.8%) may be attributed to the progressive increase in production recorded between 2001 and 2003.



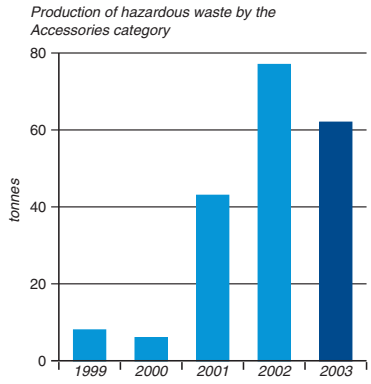
2.2.3 Consumption of organic solvents

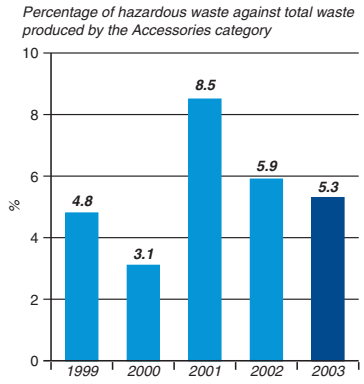
The net improvement recorded in 2003 (- 25.6%) was due to changes in production methods that made a significant reduction in the use of such substances possible.



2.2.4 Production of waste

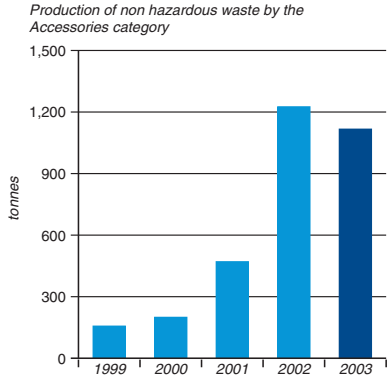
Hazardous waste

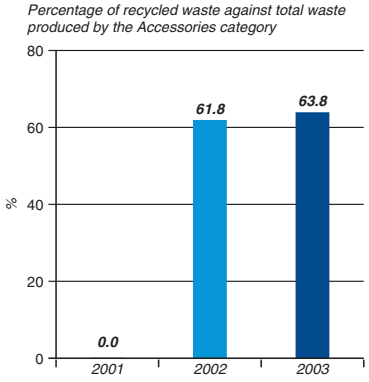




In general, the observations made with regard to Energy Cables are also applicable to the Accessories category; that is to say, improved management of waste has led to a decrease in the quantities produced (-19%).

Non-hazardous waste and Recycled waste





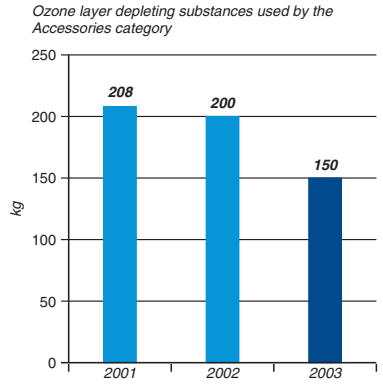
In this case, the reduction observed (- 8.9%) was mainly due to the particular situation found within an operational unit where, in 2002, there was an abnormal production of ferrous waste. This quantity was reduced in 2003.

2.2.5 Dielectric oils containing PCB / PCT

The four operational units producing accessories do not possess electrical equipment with oils containing PCB/PCT in concentrations above 50 ppm.

2.2.6 Ozone depleting substances

The significant reduction recorded in 2003 (-25%) is to be ascribed to the disposal of equipment containing this type of substance.



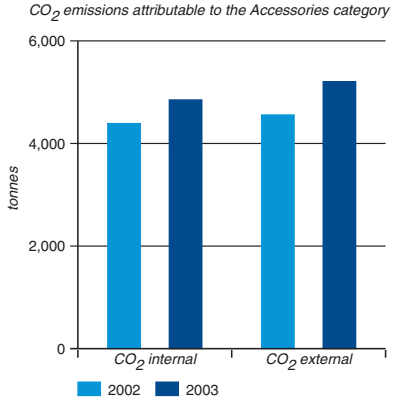
2.2.7 CO_2 and NO_x emissions

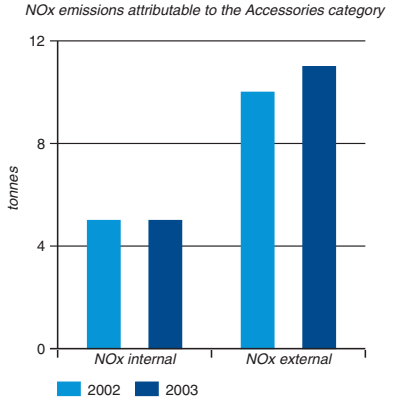
CO_2 emissions attributable to the Accessories category [tonnes]

	2002	2003
CO_2 Internal	4,390	4,851
CO_2 External	4,558	5,207
Total	**8,948**	**10,058**

NO_x emissions attributable to the Accessories category [tonnes]

	2002	2003
NO_x Internal	5	5
NO_x External	10	11
Total	**15**	**16**

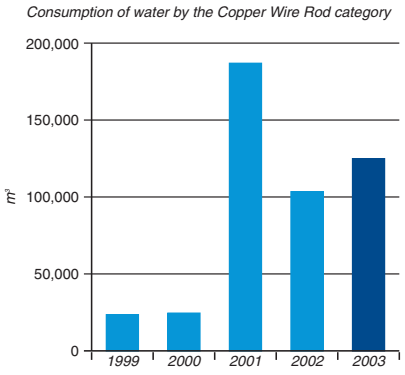


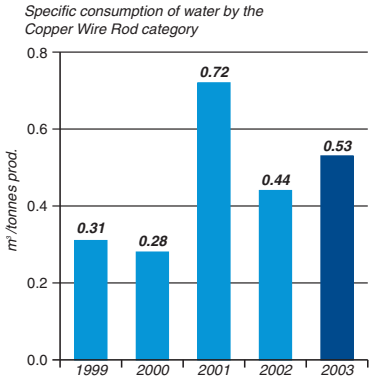


2.3 The "Copper Wire Rod" category

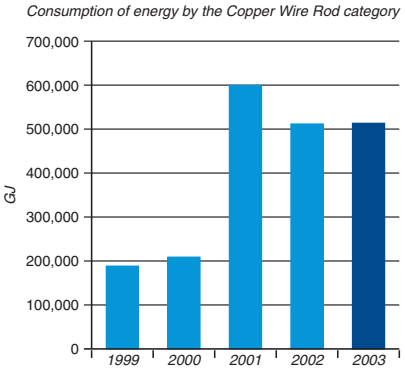
In 2003 the production of copper wire rod stabilised at levels very close to those of the previous year (for the record there was a drop in output of 0,2%).

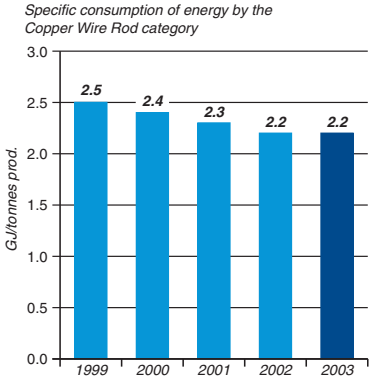
2.3.1 Consumption of water





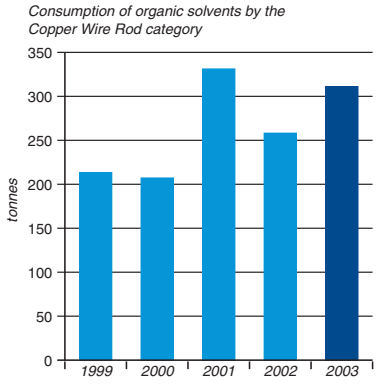
2.3.2 Consumption of energy

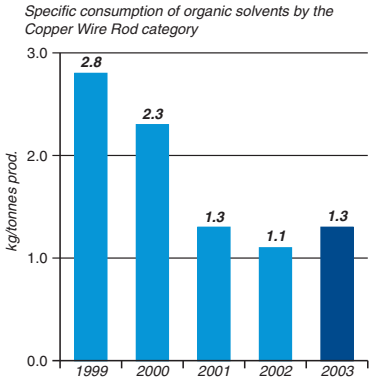




The graphs reveal a substantial similarity of the 2003 data with respect to those of 2002, principally as a result of the production dynamics of the individual operational units (in particular, the specific consumption dropped where production increased and vice versa).

2.3.3 Consumption of organic solvents

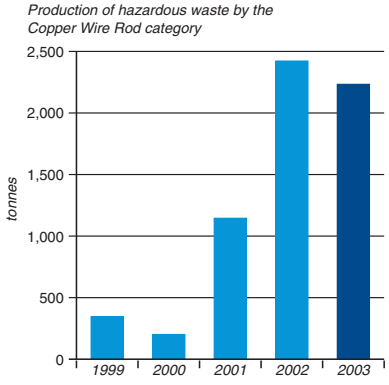


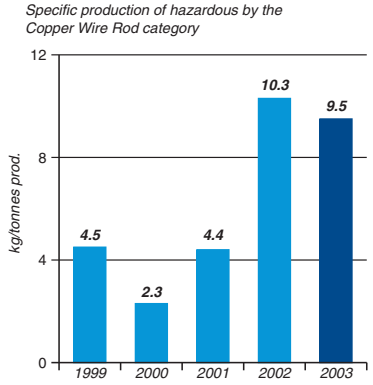


The data reveal that the increase in consumption in 2003 with respect to the previous year was essentially caused by technical problems encountered in a single operational unit (excessive volatilization of the solvent during the rod cooling phase), for which alternative solutions are being prepared.

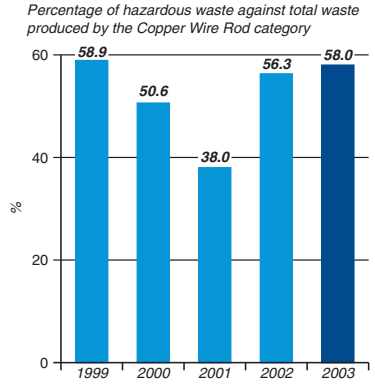
2.3.4 Production of waste

Hazardous waste

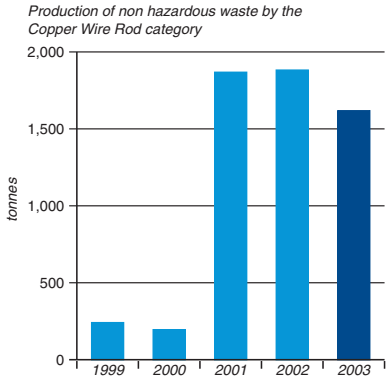


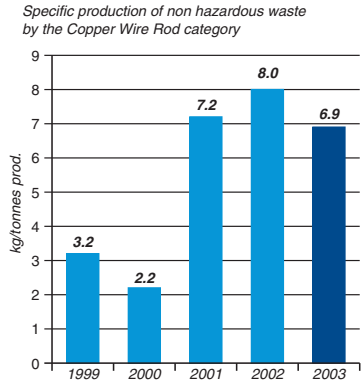


The significant reduction in waste production that may be observed in both absolute and normalized terms was due to the optimization of certain machinery specific to this activity that led to a reduction in the quantities of oily emulsions disposed of.

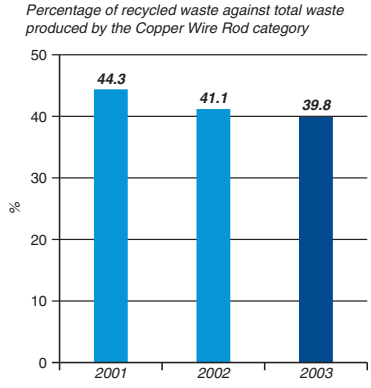


Non-hazardous waste





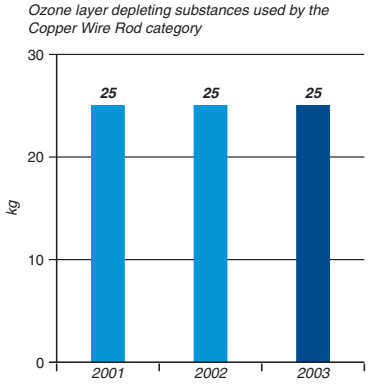
Recycled waste



2.3.5 Dielectric oils containing PCB / PCT

As in the previous case, the operational units belonging to this category do not posses equipment using dielectric oils containing PCB/PCT in concentrations above 50 ppm.

2.3.6 Ozone depleting substances



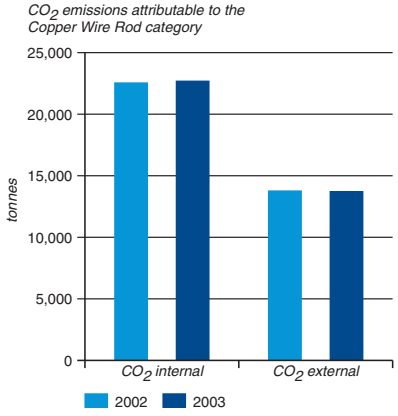
2.3.7 CO_2 and NO_x emissions

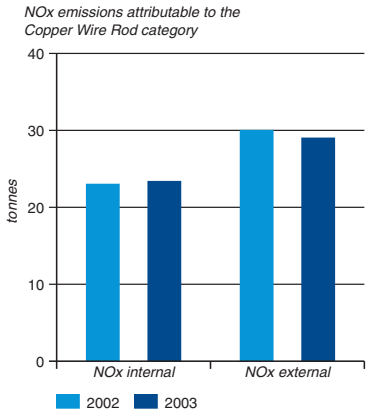
CO_2 emissions attributable to the Copper Wire Rod category [tonnes]

	2002	2003
CO_2 Internal	22,544	22,688
CO_2 External	13,767	13,717
Total	**36,311**	**36,404**

NO_x emissions attributable to the Copper Wire Rod category [tonnes]

	2002	2003
NO_x Internal	23	24
NO_x External	30	29
Total	**53**	**53**



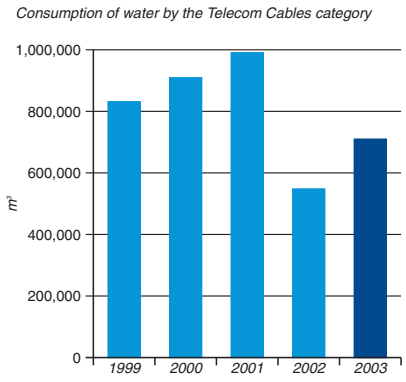


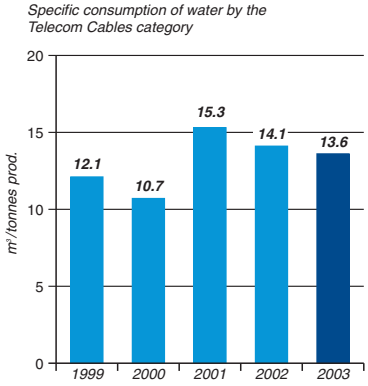
It should be pointed out that this is the only category in which internal CO_2 emissions exceed external emissions due to the fact that the production process includes copper ingot smelting lines running on methane.

2.4 The "Telecom Cables" category

The output of cables for telecommunications (both in copper and optical fibres) increased in 2003 by around 35% (expressed in product weight), with clear implications in terms of both the absolute and normalized consumption trends.

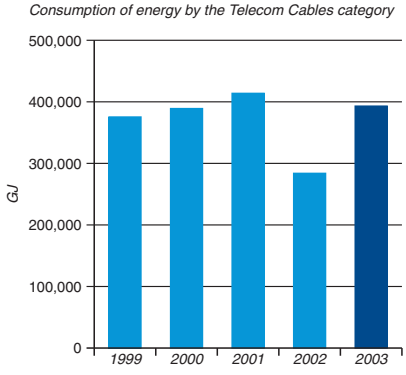
2.4.1 Consumption of water

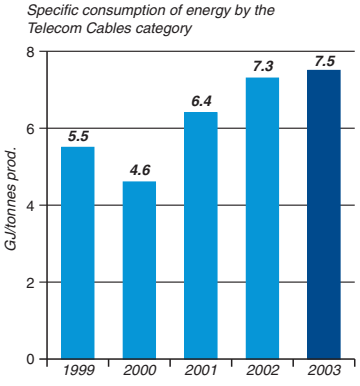




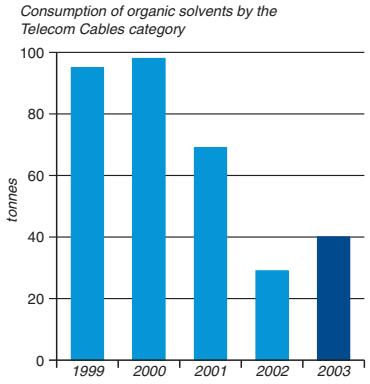
Together with the logical increase in the absolute consumption of water, 2003 saw a significant reduction (-4.1%) in specific consumption per unit of weight of the finished products, confirming a now consolidated trend associated with the validity of the design features adopted.

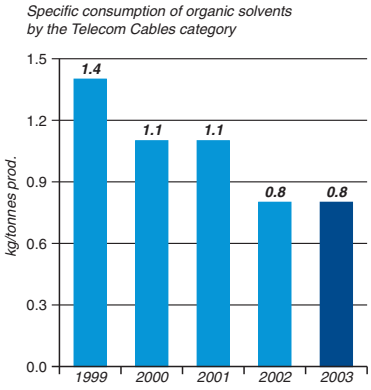
2.4.2 Consumption of energy





2.4.3 Consumption of organic solvents

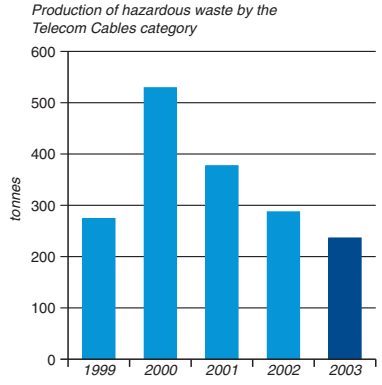


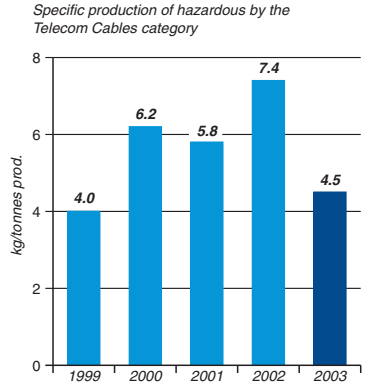


The increase in production in 2003 (above all in terms of product mix) led to an understandable rise in the absolute energy consumption value, while the normalized consumption figures were virtually unchanged.

2.4.4 Production of Waste

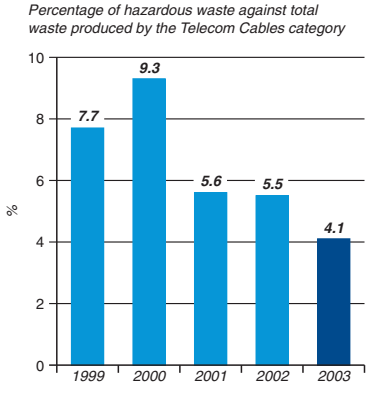
Hazardous waste





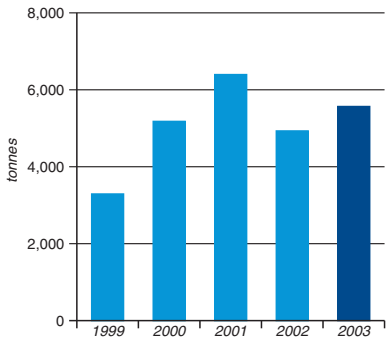
The positive result achieved in 2003 (-39.2% with respect to the normalized figure) essentially derives from two factors:

- the closure of an operational unit (the production capacity of which was underused in 2002, generating notable quantities of waste per unit of production) and the relative transfer of the production lines to another plant which came on stream in 2003;
- the increase in the quantity of waste subjected to recycling.

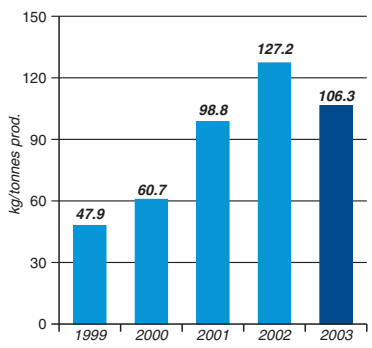


Non-hazardous waste

Production of non hazardous waste by the Telecom Cables category



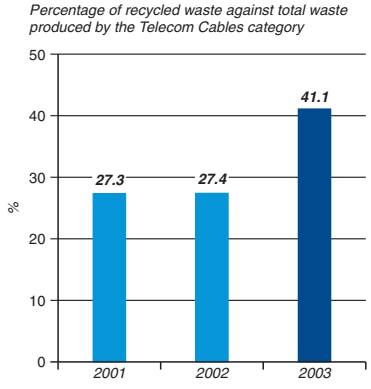
Specific production of non hazardous waste by the Telecom Cables category



Despite an increase (+12.9%) in the absolute value for the production of non-hazardous waste (directly related to the increase in production recorded in 2003), the value of such waste normalized with respect to production output registered a decrease of 16.4%, prevalently associated with the internal recycling of certain materials (such as buffers, waxes, greases and relative packaging…) that has significantly reduced the purchased quantities of these materials.

Recycled waste

Percentage of recycled waste against total waste produced by the Telecom Cables category



2.4.5 Dielectric oils containing PCB / PCT

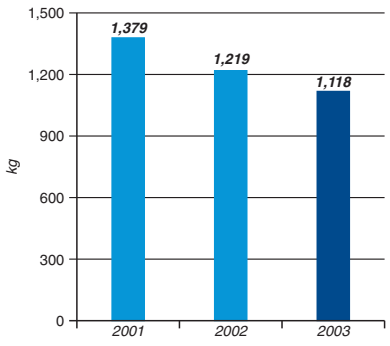
As mentioned in paragraph 1.1.5, in 2003 Pirelli decided to adopt different criteria for the quantification of dielectric oils containing PCB.

In particular, 11,560 kg of oils containing PCB/PCT in concentrations above 50 ppm were recorded for the Telecom Cables category.

2.4.6 Ozone depleting substances

In 2003 too, work continued on the decommissioning of equipment containing these substances, which led to a reduction of over 8% of the total quantities.

Ozone layer depleting substances used by the Telecom Cables category



2.4.7 CO_2 and NO_x emissions

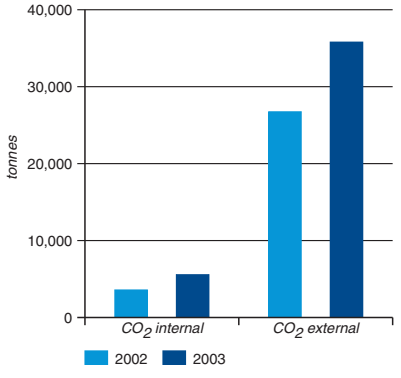
CO_2 emissions attributable to the Telecom Cables category [tonnes]

	2002	2003
CO_2 Internal	3,581	5,567
CO_2 External	26,739	35,793
Total	**30,321**	**41,359**

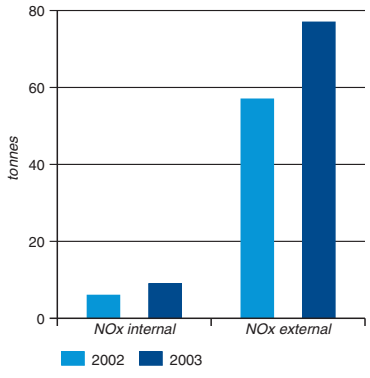
NO_x emissions attributable to the Telecom Cables category [tonnes]

	2002	2003
NO_x Internal	6	9
NO_x External	57	77
Total	**63**	**85**

CO_2 emissions attributable to the Telecom Cables category



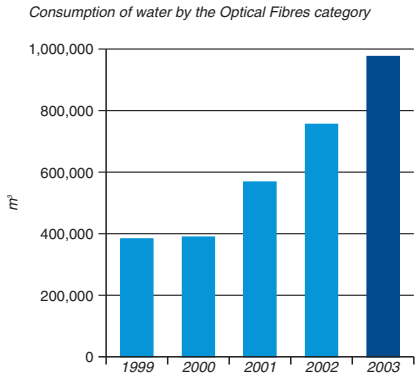
NOx emissions attributable to the Telecom Cables category

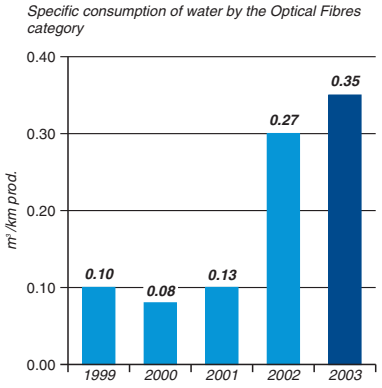


2.5 The "Optical Fibres" category

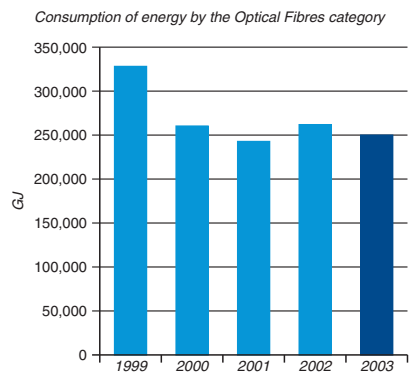
In general, the values of the environmental parameters recorded below were affected by the anomalous conditions caused by the delay in the revival of the market and the industrial rationalization conducted in this field between 2002 and 2003.

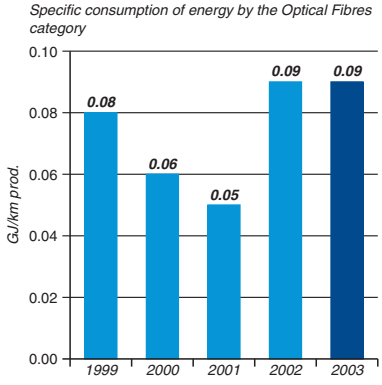
2.5.1 Consumption of water





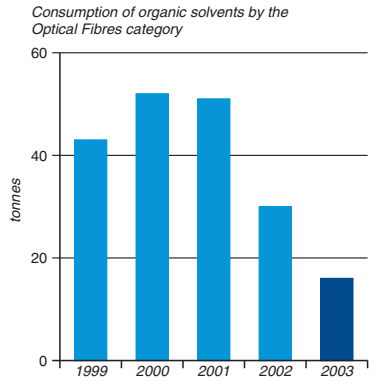
2.5.2 Consumption of energy

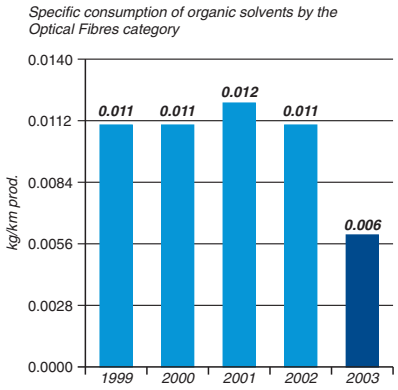




While the figure relating to normalized consumption was substantially confirmed with respect to 2002. it should be pointed out that there was a significant reduction (over 4.5%) in the absolute consumption of energy, which fell from the 261,000 GJ of 2002 to around 250,000 GJ in 2003.

2.5.3 Consumption of organic solvents

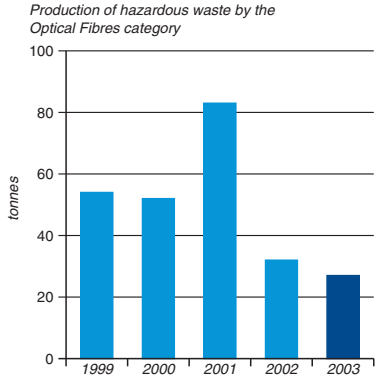


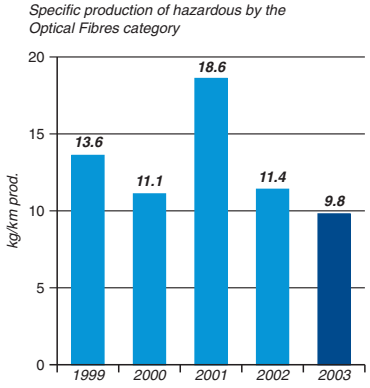


As mentioned above, the result achieved in 2003 relating to the consumption of organic solvents (-47.3% in absolute terms, -47.5% in normalized terms) is closely associated with the rationalization of production (divestitures, transfers to other operational units and so on) conducted between 2002 and 2003.

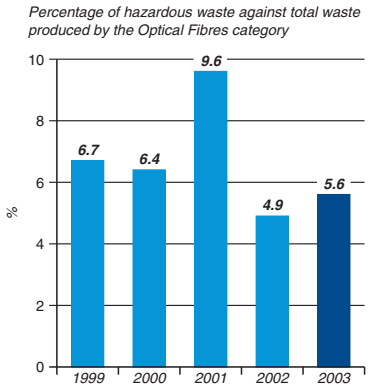
2.5.4 Production of waste

Hazardous waste

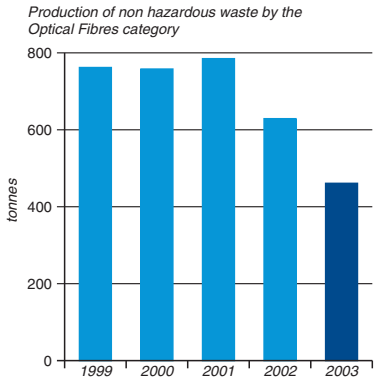


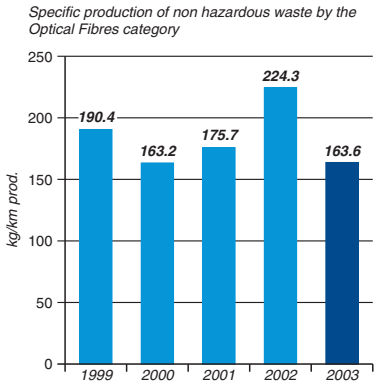


In the case of hazardous waste too, the observations made previously are applicable here and led to a net reduction of both the absolute quantities (-14.3%), and those normalized with respect to production (-14.7%).



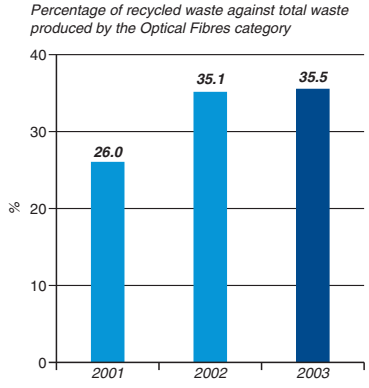
Non-hazardous waste





As was observed in the case of hazardous waste, there were significant reductions in the production of non-hazardous waste in both absolute (-26.7%, dropping from around 630 tonnes of 2002 to the 460 tonnes of 2003) and normalized terms (-27%).

Recycled waste



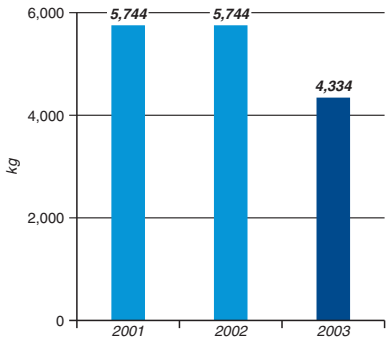
2.5.5 Dielectric oils containing PCB / PCT

The figure recorded in 2002 was confirmed; that is to say no equipment with dielectric oils containing PCB or PCT was present in the two operational units producing optical fibres.

2.5.6 Ozone depleting substances

The significant reduction recorded in 2003 should be seen in the light of the industrial rationalization conducted between 2002 and 2003 that led to the disposal of 1,400 kg of these substances.

Ozone layer depleting substances used by the Optical Fibres category



2.5.7 CO_2 and NO_x emissions

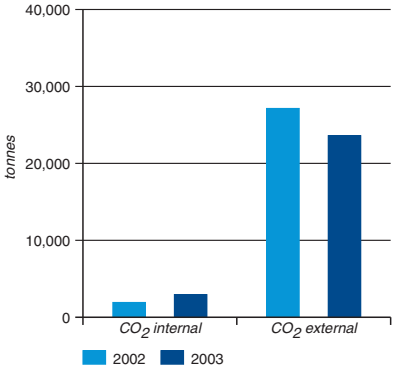
CO_2 emissions attributable to the Optical Fibres category [tonnes]

	2002	2003
CO_2 Internal	1,925	2,946
CO_2 External	27,141	23,602
Total	**29,066**	**26,548**

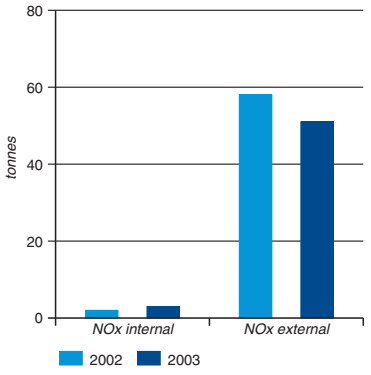
NO_x emissions attributable to the Optical Fibres category [tonnes]

	2002	2003
NO_x Internal	2	3
NO_x External	58	51
Total	**60**	**54**

CO_2 emissions attributable to the Optical Fibres category



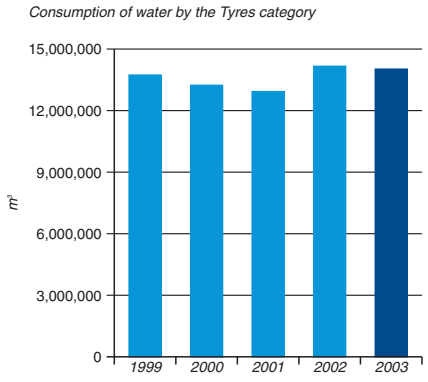
NOx emissions attributable to the Optical Fibres category

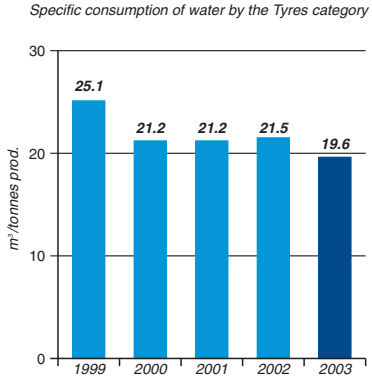


2.6 The "Tyres" category

In a continuation of the positive trend recorded in recent years, in 2003 there was a further increase in the production of tyres (subdivided into the various types for cars, industrial vehicles, commercial vehicles and motorcycles), with in particular an increment of 8.9% in terms of weight of product.

2.6.1 Consumption of water

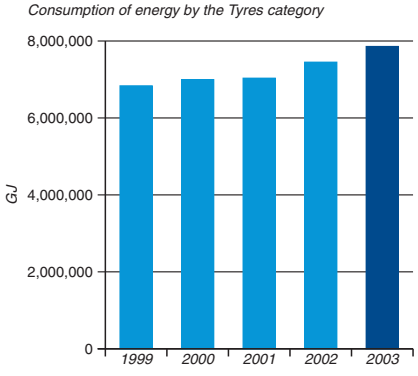


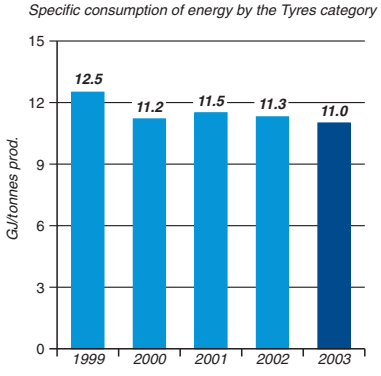


Despite the increase in production described above, the figure for 2003 reflects a particularly significant reduction in both the absolute consumption of water and the consumption per unit of production (the lowest values since 1999).

This was the case principally because of the rationalization of the use of water, based on the increase of the amount of water subjected to recycling.

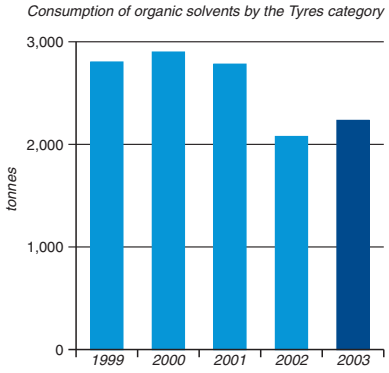
2.6.2 Consumption of energy

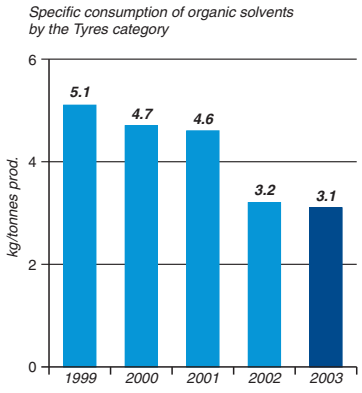




Although there was an increase in the absolute quantities (+5.5%), the optimization of various machines conducted during the course of 2003 allowed a reduction of normalized energy consumption of around 0.3 GJ/tonnes of product.

2.6.3 Consumption of organic solvents



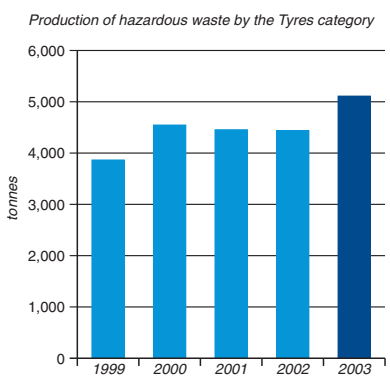


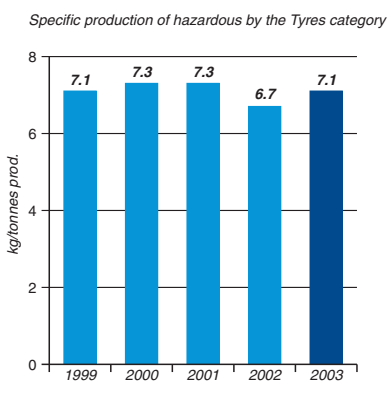
The previously cited increase in production volumes resulted in an increase in the absolute consumption of organic solvents, but this was counterbalanced by the reduction of the normalized figure, the lowest since 1999.

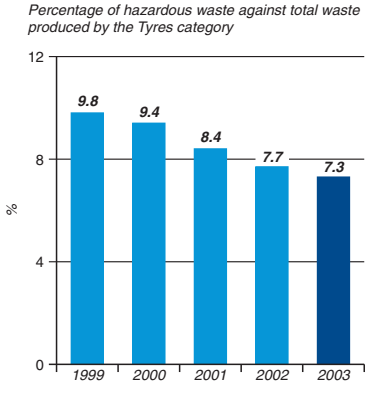
These results were achieved principally thanks to the continuation of the proactive reduction of the consumption of solvents in the grouting and assembly phases, which allowed the over 2,800 tonnes consumed in 1999 to be reduced to 2,200 tonnes in 2003.

2.6.4 Production of waste

Hazardous waste

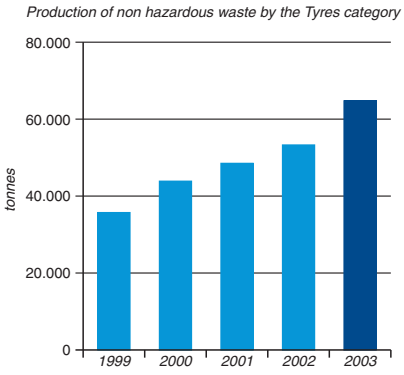


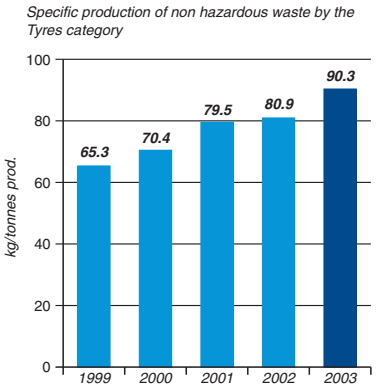




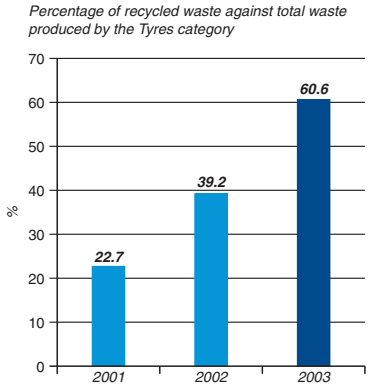
The different productive demands expressed in 2003 led to an increase in the quantities of hazardous waste produced by the operational units, partially counterbalanced, however, by the diminution of the percentage of such waste with respect to the total.

Non-hazardous waste





Recycled waste

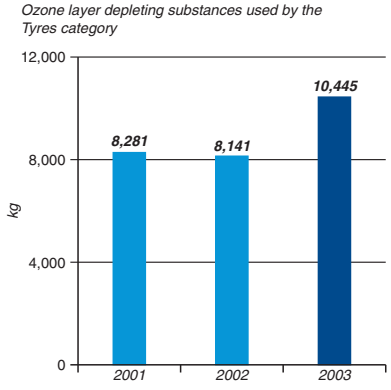


The increase in the production of non-hazardous waste (diversification of the product mix, systems testing, particular local demands…) led to an increase in the quantity of waste subjected to recycling.

2.6.5 Dielectric oils containing PCB / PCT

In 2003, 27,333 kg of oils containing PCB/PCT in concentrations above 50 ppm were recorded for the tyres sector.

2.6.6 Ozone depleting substances



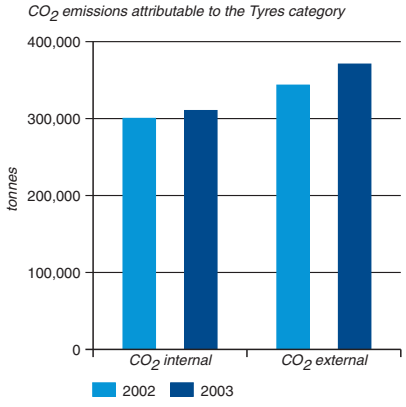
2.6.7 CO_2 and NO_x emissions

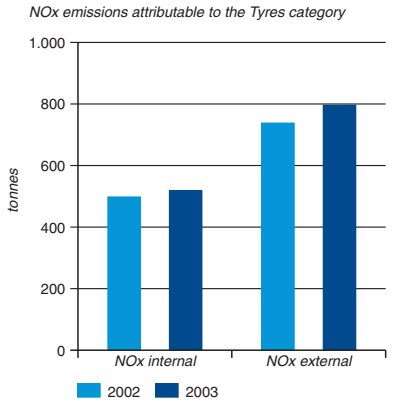
CO_2 emissions attributable to the Tyres category [tonnes]

	2002	2003
CO_2 Internal	300,334	310,526
CO_2 External	343,530	370,878
Total	**643,865**	**681,404**

NO_x emissions attributable to the Tyres category [tonnes]

	2002	2003
NO_x Internal	498	518
NO_x External	738	796
Total	**1,236**	**1,314**



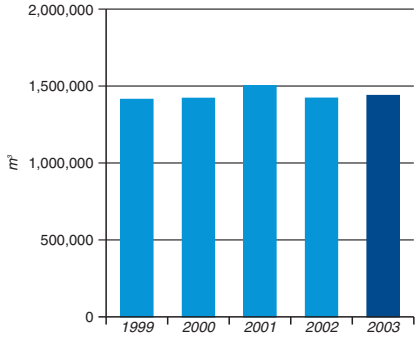


2.7 The "Steel Cord" category

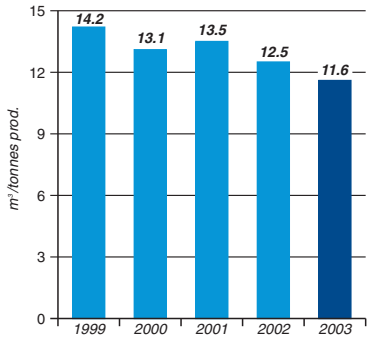
2003 saw a continuation of the positive trend in the production of steel cord, with an increment of 9.3% being recorded. The comparison between the absolute values and the normalized values reflects this trend in as much as many of the environmental parameters, while recording increments in absolute terms, showed significant reductions in specific terms (by unit of production).

2.7.1 Consumption of water

Consumption of water by the Steel Cord category



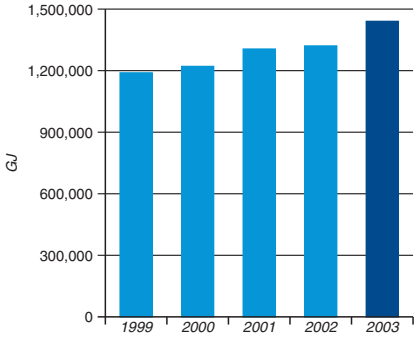
Specific consumption of water by the Steel Cord category



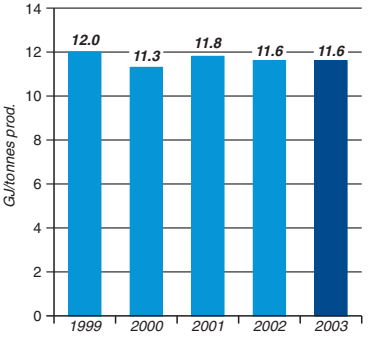
Despite the modest increase in absolute terms (+1.2%), 2003 saw a significant reduction in normalized consumption that dropped from 12.5 m³/tonnes of product in 2002 to 11.6 m³/tonnes in 2003.

2.7.2 Consumption of energy

Consumption of energy by the Steel Cord category



Specific consumption of energy by the Steel Cord category

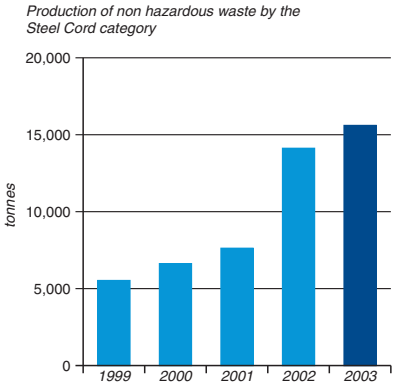


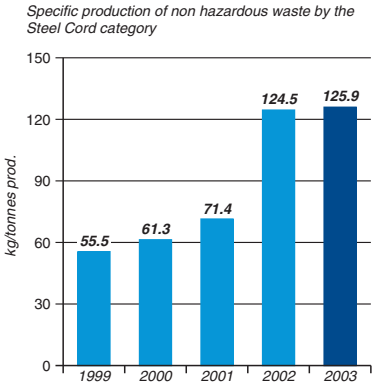
2.7.3 Consumption of organic solvents

Data regarding organic solvents have not been recorded for this category as the substances in question are not used in the production process, but only in modest quantities for general maintenance operations.

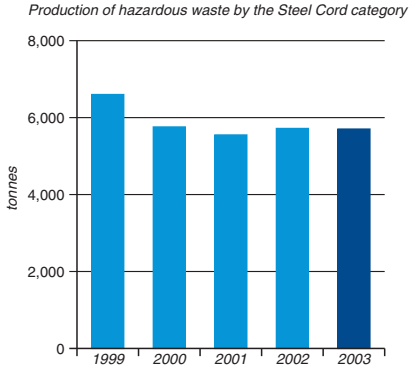
2.7.4 Production of waste

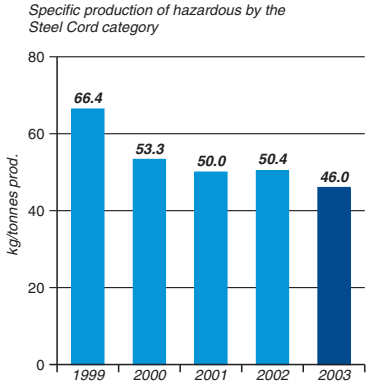
Non-hazardous waste

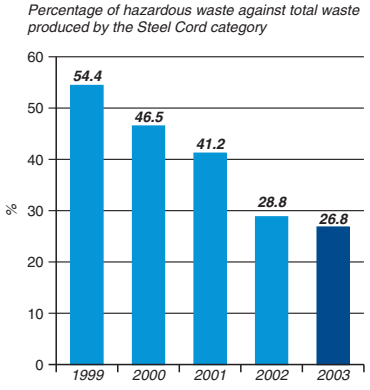




Hazardous waste



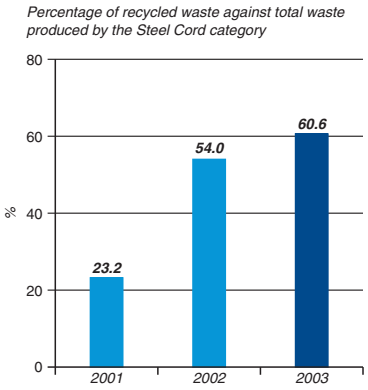




Despite the substantial confirmation of the absolute figure, the significant reduction of the normalized figure is worthy of note; this dropped from the over 50 kg/tonne of product in 2002 to 46 kg/tonne of product of this year.

The greater attention paid to this question is also reflected by the figure relating to the percentage of hazardous waste with respect to the total waste production which dropped from 28.8% in 2002 to 26.8% in 2003.

Recycled waste

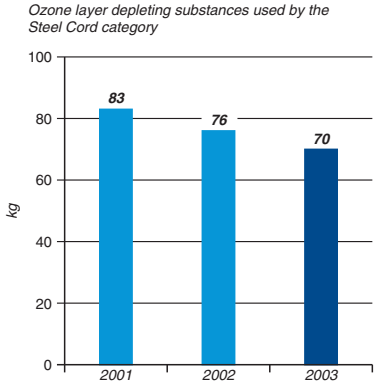


The positive trend highlighted in the graph relating to the recycled waste is mainly due to the improved characteristics of certain waste products (for example, the copper sulphate deriving from the treatment of pickling reflux) that have made recycling possible.

2.7.5 Dielectric oils containing PCB / PCT

In the operational units devoted to the production of steel cord there was no equipment using dielectric oil containing PCB/PCT in concentrations above 50 ppm.

2.7.6 Ozone depleting substances



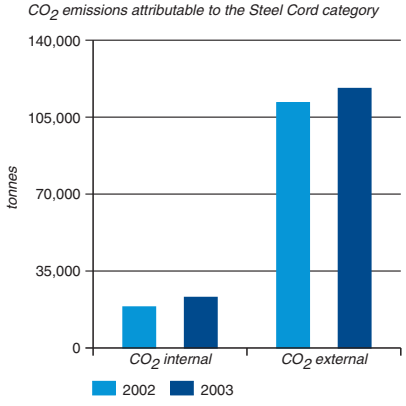
2.7.7 CO_2 and NO_x emissions

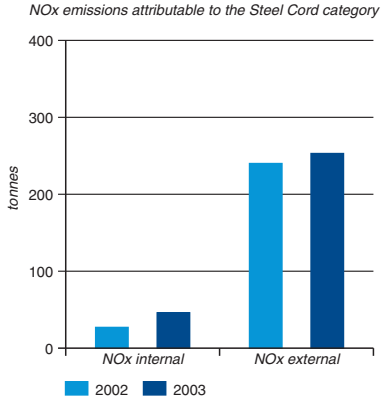
CO_2 emissions attributable to the Steel Cord category [tonnes]

	2002	2003
CO_2 Internal	18,651	22,994
CO_2 External	111,565	118,028
Total	**130,216**	**141,023**

NO_x emissions attributable to the Steel Cord category [tonnes]

	2002	2003
NO_x Internal	27	46
NO_x External	240	253
Total	**266**	**299**





GLOSSARY

Abrasion	The cause of tyre tread (see entry) wear. Determined by the phenomena of friction between the tread and the ground. Heavily influenced by temperature and abnormal tyre inflation pressures.
Accident	Damaging event due to violent causes during work and leading to death or permanent invalidity (absolute or partial) or a temporary invalidity causing absence from work.
Acrylic resins	Organic substances used in the production of optical fibres as a protective sheath for the fibres themselves. Applied in a liquid state and then solidified through a process of reticulation in which the optical fibres pass through ovens with UV lamps.
Anechoic chamber	A chamber in which sound propagates without reflections and/or interference. The walls are covered with perfectly sound-absorbent plastic pyramids.
Armouring	Mechanical protection for the metal conductors obtained by applying appropriate ribbons or straps or galvanized or prebituminized steel wire.
Aromatic hydrocarbons	Stable organic compounds whose structures are characterized by the presence of at least one benzenic ring.
Atmospheric emission	Any solid, liquid or gaseous substance introduced to the atmosphere from an industrial plant or any other source that may produce atmospheric pollution.
Banbury	A machine for the preparation of polymeric compounds used as raw materials for the production of plastic- or rubber-based components. In the banbury, the various ingredients are introduced according to pre-determined quantities and timings, mixed at pre-determined conditions of temperature and pressure to form compound subsequently extruded in granules or strips.
Bead	Part of a tyre composed of a number of steel wire rings, usually composed of a single wire wound number of times to form layers. It has the function of anchoring the tyre to the wheel rim and transferring the stresses of the car to the road and vice versa.
Bead core	Metal ring composed of a number of rubber-covered parallel wires around which the body-plies of the carcass are wound from the inside to the outside so that the plies are securely locked in place and cannot unwind under pressure.
Belt	Positioned beneath the tread, the belt is designed to stabilise the carcass in the footprint area, distribute the stresses throughout the tyre section and contribute to the handling characteristics.
Binding	The operation whereby paper ribbons are wound around the conductor. The winding is generally helicoid.
Body-ply	Basic element on which the resistant structure of the tyre carcass is constructed.
Brassing	Deposition on the steel wire of a very thin layer of brass (around 0.002 – 0.004 mm), necessary for the adhesion of the rubber compound to the metal cords.
Building	In the production of tyres, the assembly of the various part-finished components to obtain a “green” tyre subsequently subjected to the vulcanizing process.
Cable splices	Joints required to unite two cables of the same type on two separate spools in order to cover the desired distance.
Calendering	Operation that permits a sheet of rubber of a constant thickness to be obtained, or to cover one or both sides of a length of fabric with a constant thickness of rubber.
Capacitor	Component in an electrical circuit designed to transform energy from electricity (with moving loads) to static electricity (with static loads) and vice versa. A capacitor is composed of two flat or cylindrical conductors known as armatures, separated by a dielectric insulator.
Carbon dioxide (CO_2)	Natural colourless, odourless and flavourless component of the atmosphere. One of the end products of the process of combustion of materials containing carbon. Contributes to the so-called “greenhouse effect” (see entry).
Carcass	Load-bearing structure of the tyre, composed of one or more layers of fabric or rubberized steel cords.

Chloro-fluorocarbons	Also known as CFCs or freon. Practically odourless and non-inflammable substances highly suitable for use as fluids in the cooling circuits of refrigerators and air conditioners and as propellants in aerosol canisters, as solvents in the electronics and mechanical industries and as reagents in the chemical industry. The widespread use of CFCs (in particular in the '60s and '70s) has led to their accumulation in the atmosphere and their diffusion towards the stratosphere where the action of ultraviolet radiation has provoked a progressive deterioration of the ozone layer (see entry) and the consequent drafting of a number of international agreements regarding the gradual outlawing of these substances.
Compacting	In the production of optical fibres, a heating process whereby the residual traces of water vapour present in the porous material are eliminated in order to guarantee the required transparency of the fibre.
Copper wire rod	Part-finished metal component obtained through hot-rolling; usually has a circular section with a diameter of between 5 and 5.5 mm.
Core blank process	An activity that leads to the definition of the optical profile of the optical fibre. In this phase, glass blanks are produced in which small quantities of germanium dioxide (GeO_2) are inserted.
Corporate Social Responsibility	The integration on a voluntary basis of the companies' social and ecological concerns with their commercial operations and their relations with interested parties.
Deposition	A fundamental process in the production of optical fibres, that consists of synthesizing silicion dioxide (SiO_2) and germanium dioxide (GeO_2) starting out with primary materials in the liquid phase. The powder thus obtained is deposited on a rod rotating around its axis and also moving in a longitudinal direction order to obtain glass blanks.
Dielectric oil	Oil with a very low factor of conductivity used as insulation in electrical apparatus (transformers, capacitors…).
Dipping	The immersion of the bead cores (see entry) in a solution of heptane and rubber designed to favour the successive application of the bead (see entry).
Dow Jones STOXX Sustainability Index	Family of indices created in the September of 1999 by the Swiss ethical rating agency, SAM Sustainability Group, together with the Dow Jones stock index of New York, in order to evaluate at a European and global level the share performance of those companies oriented towards sustainability.
Drawing	In the case of energy cables, the reduction of the copper wire rod to the dimensions required for the various types of cable is completed through cold-drawing. Furthermore, it also can be considered as the final process in the manufacture of optical fibres. The fibre is created by the controlled drawing of a glass blank heated to softening temperature (around 2,000°C) in a special furnace. During this phase a special protective coating is also applied to the optical fibre using particular organic substances (see ***Acrylic resins***).
Enamelled wires	Thin, variable section copper wires with the function of transporting electrical current for specific applications, such as electromagnetic (solenoid) windings of electric motors. The copper wire is insulated (enamelled) with organic-based products.
Environmental audit	Systematic and documented verification process analysing and evaluating, with objective evidence, whether the methods of dealing with environmental questions and the procedures conform to the requisites established and accepted by an organization or parts of the same.
Environmental Due Diligence	Systematic verification of the environmental conditions of a site in order to establish the current or potential environmental liabilities.
Environmental impact	Any modification to the environment, detrimental or beneficial, total or partial, as a consequence of the activities, products or services of an organization.
Environmental indicator	A parameter or numerical value describing the impact of a human activity on the environment.

Environmental Management System	Part of the overall management system comprising the organizational structure, the planning activities, the liabilities, the practices, the procedures, the processes and the resources for developing, implementing, creating, verifying and maintaining the environmental policy.
Extrusion	The process of assembling the compounds on part-finished components (such as cables), through specific processes involving the fusion of the compounds themselves.
Finishing and control	Operations following vulcanization during which a tyre is subjected to trimming (to remove any excess rubber that alters its appearance) and an internal and external visual inspection. In tyres with metal structures (or metal belts) there is also a control phase to verify the correct positioning of the belt and the fabric mesh.
Flat cables	Telecommunications cables made by inserting one or more strands of optical fibres within a channelled nucleus or special tubes. The types of protection available for the channelled nucleus or the tubes (which may be stranded) include aramid and/or glass fibres, metal armour or special plastic sheaths.
FTSE4Good	An index designed to monitor the ethical, environmental and social performance of individual companies. The selection of the firms included in this index is entrusted to an independent body, the Advisory Committee, which works on the basis of the data provided by a British research institute, the Ethical Investment Research Service (EIRIS).
Fuel cell	Electrochemical devices that convert chemical energy into electrical energy; they are classified according to the electrolyte used in the process. Various fuels may be used (natural gas, hydrogen…).
Greenhouse effect	The phenomenon of rising terrestrial temperatures due to the excessive atmospheric presence of certain gases (mainly carbon dioxide and a number of nitrogen and ozone oxides) that prevents the dispersion of heat.
Grip	The capacity of a tyre to maintain an effective coefficient of friction with the road surface in all conditions of use (under braking, in acceleration, when cornering etc.).
Hazardous waste	Categories of waste of actual or potential danger to human health or the environment, classified on the basis of specific European norms (see ***also Non-hazardous waste***).
Intermediate forging	A mechanical process in which the wire rod (copper, aluminium or steel) is reduced in diameter, usually through cold drawing.
ISO 14001	A standard drawn up by the International Organisation for Standardization (ISO), specifying the requisites of an Environmental Management System that permits an organization to formulate an environmental policy and to establish objectives, taking into account legislative factors and information concerning significant environmental impacts.
Kyoto Protocol	An international agreement on the reduction of the atmospheric emission of the greenhouse gases (see entry) responsible for global warming.
Layering	An operation whereby a number of insulated cables are consolidated by winding them around a common axis. Each core, composed of an insulated conductor carries a single phase of electrical current.
Life Cycle Analysis, LCA	A method of evaluating the overall environmental impact of a product, taking into consideration its entire life cycle, starting out form the activities relating to the extraction and treatment of the raw materials, through to its manufacturing processes, transportation, distribution, use, recycling and re-use and disposal.
Loose cables	Telecommunications cables created by loosely inserting one or more optical fibres in extruded plastic tubes. These tubes are then protected with appropriate coverings (see also ***Flat cables***).
Mechanical and optical profiling	A process for verifying the optical and mechanical characteristics of the optical fibre with the aim of identifying and eliminating any defects present in the finished product.
Nanocomposite	A mixture of materials (ceramic, metals, etc.) with dimensions on the nanometric scale (10^{-9} m).
Nanomaterials / Nanoparticles	Materials/solid particles with dimensions on the nanometric scale.

Nanotechnology	Technology with the aim of developing applications based on nanomaterials.
Newton	A unit of force in the International System (N), equal to the force required to produce acceleration of 1 m/s^2 when exerted on a mass of 1 kg.
Nitric oxides	Gases produced by the combustion of fossil fuels. They contribute to the formation of ozone in the lower atmosphere and "acid" depositions during normal rainfall.
Non-hazardous waste	Categories of waste that are not dangerous to human health or the environment, classified on the basis of European Union Decision 2000/532, modified by Decisions 2001/118/CE, 2001/119/CE and 2001/573/CE.
NOx	See ***Nitrogen oxides***
OHSAS18001	An international certification standard relating to safety at work and industrial hygiene. This standard establishes the requisites for a Health and Safety at Work management system, in order to allow companies to manage its liabilities in this respect and improve its performance in the field.
Optical fibres	In the field of telecommunications, very thin glass threads (with a diameter of around 125 µm) and an elevated index of refraction. The fibre is composed of silicion dioxide (SiO_2) and extremely small quantities of germanium dioxide (GeO_2), used above all to increase the index of refraction. The end product is completely transparent to allow light to propagate and to reduce unwanted phenomena to a minimum.
Organic solvent	Any VOC (see entry) used alone or in combination with other agents in order to dissolve primary materials, products or waste materials, without being subject to chemical transformation, or used as cleaning agents to dissolve contaminants, or used as a solvent, a means of dispersion, a corrector of viscosity, as a corrector of surface tension, as a plasticizer or a preservative.
Over-cladding	The production of glass blanks to which a further layer of silicion dioxide (SiO_2) has been added in order to ensure that the finished optical fibre has adequate transmission properties.
Ozone	An allotropic form of oxygen with the chemical symbol O_3. It is found in small quantities throughout the atmosphere and is formed by the action of electrical discharges and ultraviolet light that convert oxygen molecules into ozone. At around 25 km from the earth's surface there is a concentrated layer of ozone that absorbs ultraviolet rays and represents a vital shield (the ozonosphere). The diminution of the thickness of and creation of holes in the ozone layer appears to be linked to human activities releasing nitric oxides (see entry) and chlorofluorocarbons (see entry) into the air.
Painting	A chemical treatment that prevents the adhesion of the non-vulcanized tyre (the so-called "green" tyre) to the moulds and/or the vulcanizing chamber.
Pascal	An international unit of pressure equal to 1 Newton per square metre (Pa = N/m^2).
Patenting	The thermal treatment necessary to restore the structure of steel wire so as to make it suitable for further deformation via cold drawing.
PCB/PCT	Acronyms for polychlorinated biphenyls and polychlorinated terphenyls, substances that are potentially dangerous, bio-accumulable, with insulating and fire-resistant characteristics, principally used in electrical equipment (transformers and/or capacitors – see entry).
PE	Polyethylene. A synthetic polymer composed of ethylene monomers.
Photochemical smog	Atmospheric pollution principally caused by the exhaust emissions of urban vehicular traffic; it is the result of a complex chain of photochemical oxidation reactions triggered by sunlight and favoured by particular meteorological conditions (inversion…). One of the consequences of photochemical smog is an increase in ozone in the troposphere (see entry), which thus becomes a secondary pollutant. Furthermore, the relatively non-volatile organic compounds that form may condense, creating a characteristic mist of tiny droplets.
Photonics	Science and technology relating to a class of devices using photons. The term photonics was introduced as an analogy with the term electronics in reference to the replacement of the electron with the photon in operations typical of electronics such as the processing, transmission and memorization of data.

Photovoltaic cell	An elementary device for the conversion of solar energy into electrical energy based on the photovoltaic effect (see entry). Photovoltaic cells are composed of thin layers of semi-conductors (mainly silicon). They are commonly used, for example, in sun-powered calculators and clocks.
Photovoltaic effect	The conversion of electromagnetic radiation (above all, light) into electrical current that is produced in certain materials, such as silicon and germanium, the so-called semiconductors (see entry). Devices that function on the basis of this effect are called photovoltaic cells.
Pickling	The elimination of the oxidization formed on metal surfaces (for example, copper and steel). The operation is generally conducted in baths containing solutions of phosphoric or sulphuric acid.
Pressure	A physical measurement expressing the ratio between the intensity of a force (expressed in Newton) exerted on a surface in the normal direction and the area of that surface (expressed in square metres).
PVC	Polyvinylchloride. A synthetic polymer with a structure similar to that of PE, but with a chlorine atom replacing one of hydrogen.
Resistivity	A measure of a material's resistance to the conduction of electricity, in reference to a body of uniform section and length. In the International System, resistivity is expressed in ohm per metre (Ωm). Resistivity is the opposite of conductivity, which expresses a material's ability to conduct electricity. When the temperature descends to values approaching absolute zero (- 273 °C), the resistivity of conductors tends to be nullified: hence the phenomenon known as superconductivity.
Rolling resistance	The component of resistance to the advancement of a vehicle wholly attributable to the tyres.
SA 8000	An international standard developed by the CEPAA (Council of Economical Priorities Accreditation Agency) regarding respect for human rights, workers' rights, safeguarding against exploitation of minors and guarantees of health and safety at work.
Safety and Health at Work Management System	Part of the global management system facilitating the handling of risks relating to health and safety at work associated with a company's activities. This includes the organizational structure, the planning activities, the responsibilities, the practices, the procedures, the processes and the resources for the development, actuation, realization, revision and maintenance of the policy for health and safety at work.
Semiconductors	Substances of a crystalline nature presenting electrical conductivity (and therefore a resistivity) (see entry) mid-way between that of the metallic conductors and that of insulators. In contrast with what occurs in the case of conductors, with semiconductors conductivity increases as the temperature rises. The materials that possess the properties of semiconductors are elements such as silicon, germanium, selenium and certain compounds (indium phosphide, gallium arsenide, indium antimonide, …).
Semi-vulcanization	Within the ambit of the production of bead cores (see entry), a thermal process conducted in dedicated autoclaves with the aim of preventing subsequently movement of the steel wires making up the bead core.
Shielding	The process of applying a protective shield to energy cables. As well as providing protection for the cable, the shield is also designed to interrupt the electric field generated by the passage of current.
Sidewall	That part of a tyre between the bead (see entry) and the shoulder of the tread (see entry). The sidewalls are generally composed of strips of rubber that are very resistant to repeated flexure and oxidation ("ageing") and serve to protect and give strength to the carcass, as well as to absorb part of the dynamic stresses to which the tyre is subjected.
Sipes	Thin grooves, generally in an angular and closely spaced pattern, cut into the tread of a tyre. They are designed to improve grip especially on smooth or wet road surfaces.

Specific Heat	Quantity of thermal energy (or heat) released by a determined mass of fuel burning in standard conditions. Subdivided into *Upper Specific Heat* representing all the energy developed in combustion, and *Lower Specific Heat* which instead represents the difference between the total heat released and that lost through the evaporation of the water produced during combustion. Usually expressed in Joules per kilogramme (J/kg) or kilocalories per kilogramme (Kcal/kg) for solid fuels and liquids and in Joules per cubic metre (J/m^3) or kilocalories per cubic metre (Kcal/m3) for gases.
Stranding	In the production of cables, an operation that involves the combining of a number of individual wires by twisting then around a common axis. This confers flexibility on the finished product while maintaining the desired physical-mechanical qualities. The mechanical process of assembling the brass-coated wires.
Sustainable development	Development capable of satisfying the needs of current generations without compromising the capacity of future generations to satisfy their own. This type of development does not represent a state of pre-established harmony but rather a process of change in which the exploitation of resources, the pattern of investments and the institutional changes are rendered compatible with both the needs of the future and those of the present.
Tight cables	Telecommunications cables created by tightly inserting one or more optical fibres into extruded plastic tubes. Tight fibres may subsequently be stranded and protected with special coverings (see also ***Flat cables***).
Tinning	In cables with insulation in rubber, an operation that permits the depositing of a thin layer of tin between the metal (copper) conductor and the insulation, protecting both from possible mutual attack.
Transformer	A static electrical device (with no moving parts) that transfers electrical energy from one *primary* circuit to another *secondary* circuit, modifying its voltage and current. In its simplest form it is composed of a closed magnetic circuit made with ferrosilicon blades and two coils made by helically winding two conductors onto an insulating support.
Tread	That part of a tyre in direct contact with the ground when rolling; it is composed of special compounds of rubber resistant to abrasion and laceration while providing good roadholding and guaranteeing a certain level of comfort (low road noise, …). The tread pattern is in turn composed of a deliberate arrangement of solids (blocks) and voids (grooves, slots, sipes) (see entry).
Troposphere	The lowest part of the atmosphere, between the ground and the stratosphere. This is the home of the most common meteorological phenomena.
Volatile Organic Compounds (VOC)	Any natural or anthropic organic compound that at a temperature of 20°C has a vapour tension of 10 Pascal or greater, or that has a corresponding volatility in particular conditions of use. They may contribute to the production of photochemical smog (see entry), with impacts on human health and the environment.
Vulcanization	An irreversible thermal process in the solid phase through which the elastomers present in a compound pass from a prevalently “plastic” state to one that is essentially “elastic”. This is due to the formation of a series of bonds between the various polymeric chains that lead to the formation of three-dimensional molecular structures.

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