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CHAIRMANS LETTER

Last year in the first Environmental Report of the Pirelli Group, I said that the road of Sustainable Development is the correct path for the successful business of the third Millennium. During 2001 Pirelli has built on the foundations reported last year, and has continued to implement its Environmental Policy.

Over 80% of our plants are now certificated to ISO14001, and this will rise to over 90% in 2002. The introduction and implementation of an Environmental Management System brings with it the adoption of rigorous methodologies which encompass the activities of the company, its' products and its' suppliers.

In our plants improvement programmes are focussed on areas of greatest environmental impact, in particular reducing consumption of resources (water, energy, raw materials), and improving the working environment.

We continue to increase our knowledge of the environmental effects of our production systems in collaboration with governments in different countries, and other National and International bodies, to ensure an up to date science based assessment of the potential impacts of our processes/products. By working closely with clients we have the opportunity to minimise the potential environmental impacts of our products over their whole life cycle (production/distribution/use/end-of-life).

In the Cables & Systems Sectors we have launched new products:

- the Action™ range of fibre optic cable was developed using the results of a Life Cycle Assessment (LCA) study;
- the Dry-Dry and Drylam™ cable ranges use substances with improved eco-compatibility;
- the continued development of the Afumex® and AirBag™ cable ranges, including the application of MicroTunnelling technology – (an innovative method for burying cable), gives our clients the opportunity to select products with reduced environmental impact for an ever increasing range of applications.

In the Tyre Sector we continue to develop the MIRS production technology, and have installed new production lines in Germany, England and the USA. This allows us to



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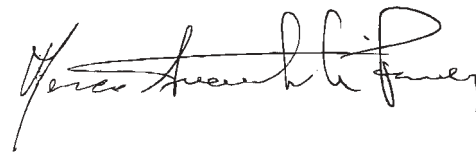
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produce tyres with a considerable reduction in the consumption of energy, and in the generation of emissions to atmosphere.

Through continuous comparison with other makers of tyres, we are growing our knowledge of the environmental impacts of tyres over their whole life cycle.

Pirelli Labs, the new Centre of Research, has within its mission the development of technologies for renewable sources of energy and for clean energy production, plus materials recycling technologies, related particularly to End-of-Life tyres.



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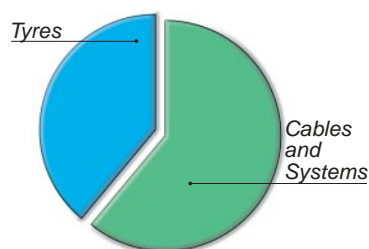
PIRELLI SPA

At 31st of December 2001, the activities of Pirelli SpA were focussed on two main areas: Cables & Systems and Tyres, accounting for 62% and 38% respectively of sales, with affiliates in 24 countries in all 5 continents. In May 2001, Pirelli Labs was created to become the Pirelli group's new centre for basic and advanced research.

Following the decision to separate the activities relating to the production and sales of energy cables from the activities relating to the production and sales of telecommunication cables, action was taken during the year to separate the cable operations in various countries. This operation was completed at the end of 2001 with the creation of two Holding Companies: "Pirelli Energy Cables and Systems" and "Pirelli Telecommunication Cables and Systems".

Compared to the year 2000, the number of plants decreased by three units: two of them in the Cables and System Sector, (Esmar in Spain and Surrey in the USA), and the other one in the Tyre Sector. (Hanford, USA). In addition, the production of optical fibre ceased in one plant during 2001.

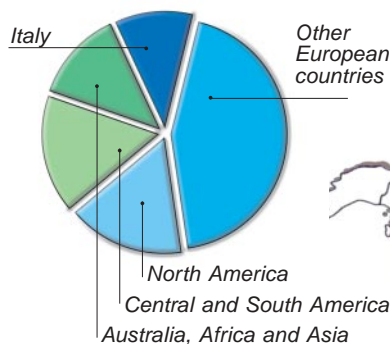
Sales were split between Europe: 60.7%, North America: 13.6%, Central/South America: 12.1%, and Australia, Africa, Asia: 13.6%.



Pirelli SpA in numbers

	2001	2000	1999
Consolidated sales revenue (millions of Euro)	7,509	7,477	6,482
Number of employees	39,127	41,914	40,103
Number of plants	84	87	87

Group sales in 2001 by Sector and geographical area



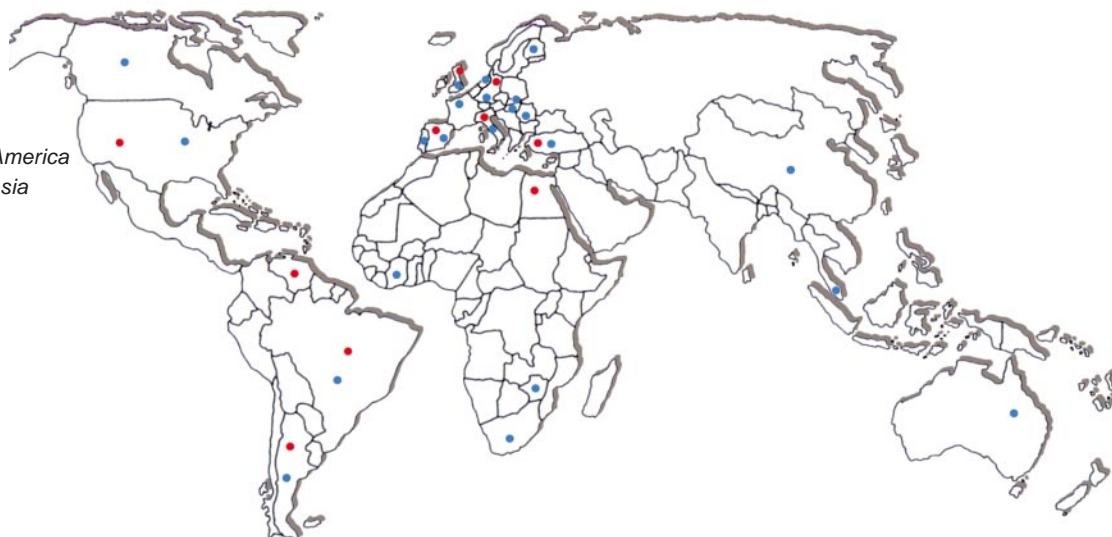
Pirelli SpA Operating Units Worldwide

Cables and System

Argentina	Finland	Malaysia	Spain
Australia	France	Holland	South Africa
Brazil	Germany	Hungary	Turkey
Canada	Great Britain	Portugal	United States
China	Indonesia	Rumania	Zimbabwe
Ivory Coast	Italy	Slovakia	

Tyres

Argentina	Italy
Brazil	Spain
Egypt	Turkey
Germany	United States
Great Britain	Venezuela



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ENVIRONMENTAL POLICY OF PIRELLI

Pirelli's Environmental Policy was reviewed in September 2000. In accordance with International Standards and Group Instructions, the Policy is applied in all of the Operating Units of Pirelli to ensure appropriate management of operational activities.

The Pirelli Group has adopted the following principles:

- to identify the environmental impact of its activities in order to eliminate or minimize them, complying with existing legislation in different countries as a minimum requirement;
- to manage its production activities by adopting Environmental Management Systems in compliance with international standards;
- to abide by the principle of "sustainable development" and
- to assess the environmental impact of its products adopting a "full life cycle" approach and to promote the development of products to reduce their impact on the environment;
- to contribute to preserving natural resources also by re-using, recycling materials or by recovering energy from materials;
- to promote the use of the most advanced technologies in order to achieve excellence in the environmental field, maintaining contacts with international scientific circles;
- to actively involve all levels of the organization and all Group employees;
- to ensure that its business locations are in harmony with their natural and human surroundings
- to communicate and spread environmental information internally and externally, developing co-operation with customers, suppliers, the public and other interested parties.

CRITERIA USED IN PRODUCING THIS REPORT

This current Environmental Report of Pirelli S.p.A. describes the environmental initiatives undertaken by the company during 2001, for each different type of production activity. Details are given in the chapters entitled "Sector Activities". In the chapters entitled "Production and Quantitative data" the report gives the numerical data for 2001, and the specific environmental parameters relating to each type of production activity.

For the sake of comparison with the previous Environmental Report, the 2001 reported data for the Cables & Systems Sectors refers to the aggregate activities of the two Sectors, (unless specifically stated otherwise). The Report covers the world-wide Operating Units of Pirelli SpA at 31 December 2001.

In addition to those Operating Units included in the 2000 Pirelli Environmental Report, all the Operating Units acquired during 2000 from the industrial group "BICCGeneral", the Rumanian Operating Unit, and the three Operating Units producing cable accessories have been included in this report.

At present the Operating Unit in the Ivory Coast, and the European Unit which makes moulds for tyres, are excluded. Although the specific data for the tyre mould plant are not reported,

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the Operating Unit is certificated to ISO14001. It has not been possible to collect data for the three Operating Units which ceased production during 2001.

Collection and processing of data has been carried out using the same methodology as adopted previously. Specific data modules are completed by each Operating Unit, and the data is verified and analysed at Corporate level using a customised database.

The quantitative data described in this annual report provides an overall picture of Pirelli's environmental performance, and enables year-on-year comparisons to be made.

In order to improve the reliability and completeness of the data, improvements have been made to both the Database and to the procedure used for data collection. The scope of data collection has been extended to cover a wider range of environmental issues, which it is intended to include in future reports.

THE ORGANISATION

Managerial responsibilities for environmental matters have not changed during 2001. The responsibilities are defined on the basis of the skills required, and then delegated to operational departments.

Specialist skills and the associated responsibilities are held by Corporate "Health and Environment" and by the other Environment, Health and Safety functions in the Sectors and Affiliates.

The Corporate Department has the job of leadership, coordination and control, as well as being the centre of excellence for resolving particularly complex problems.

At the level of geographical area (South America and the United States/Canada) Health and Environment departments operate, reporting hierarchically to the area CEO, but reporting functionally to Corporate Health and Environment. The Sector structures also report hierarchically to the Sector Directorate, and functionally to the Corporate Group. The Sector professionals interpret and adapt the Corporate Guidelines to implement them according to the specific industrial and legal context. At Affiliate or Operating Unit level, the Health and Environment structure can report, (according to local context), to Manufacturing, Human Resources, or directly to the Head Office – but always reporting functionally to the Sector professional leadership.

The overall resource devoted by Pirelli to the management of environment, health and safety currently amounts to about one hundred people worldwide.

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THE ENVIRONMENTAL MANAGEMENT SYSTEM

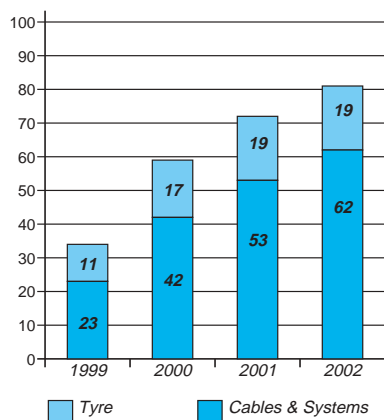
ISO 14001 – Operating Units certificated (2001 and target for 2002)

Since 1998 a programme has been undertaken to implement and certify an Environmental Management System in all Operating Units of the Group, in compliance with the international standard ISO 14001. An Environmental Steering Committee, chaired at Corporate level, and including representatives of all three manufacturing Sectors of the Pirelli Group, manages the implementation, maintenance and verification of the Environmental Management System, and manages liaison with SGS Yarsley, the body responsible for certification and surveillance.

A qualified team of Pirelli auditors has been created to work together with the external auditors of SGS Yarsley. This team operates according to an homogeneous methodology, defined by the Environmental Steering Committee. At the end of 2001, the Pirelli team included 19 qualified auditors with two further auditors being trained.

A first analysis of the performance of the Environmental Management System in the Operating Units certificated between 1999 and 2001 has been carried out in collaboration with SGS Yarsley. The analysis highlighted areas of potential improvement in the Management System, and has provided methodologies to define priorities at Unit level, and to highlight the key issues requiring attention at Group level.

The effectiveness of the approach, and of the audit system adopted by Pirelli, is evidenced by the fact that, at the end of 2001, 72 Operating Units were certificated (80% of the total), and another 9 are scheduled to be certificated during 2002¹.



ISO 14001 – Number of Operating Units with Certification (1999-2001 and target for 2002).

Environmental Information and Training

To implement the Environmental Management System, information and training activities are carried out involving staff at all levels. Where staff from external companies have the potential to impact significantly on the environmental performance of the Pirelli business they also were included in the training.

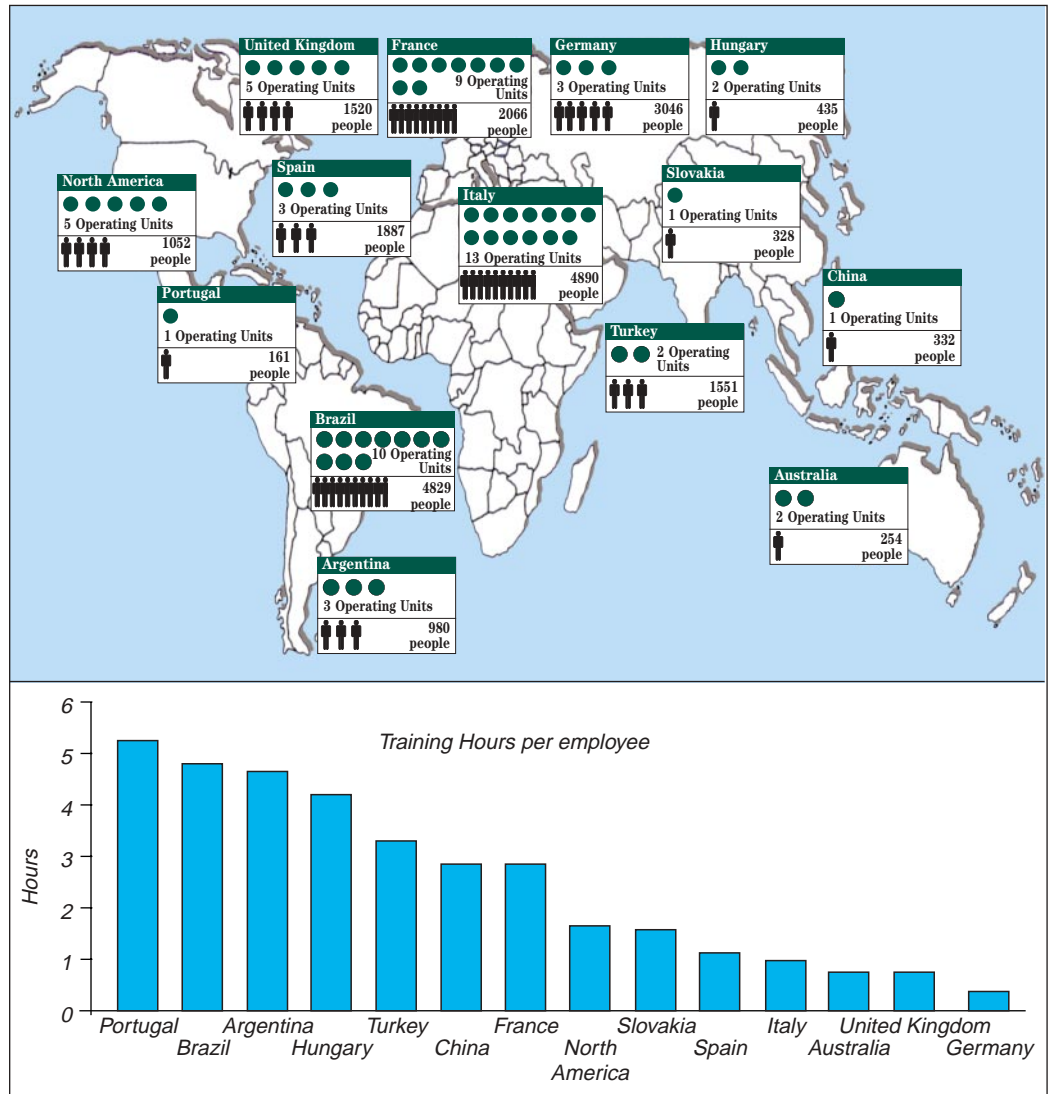
All staff receive copies of the Group and Affiliate Environmental Policies, and participate in an information session on the characteristics of the Environmental Management System, including the roles and responsibilities of the individual departments. The functions more directly involved in environmental management receive specific training geared to their expected operational duties. Training is refreshed periodically, depending on the demands made by the particular Environmental Management System, and the requirements of specific duties.

All the Pirelli team qualified auditors have been given specific training. Similar training has been given to personnel who act as internal auditors of the Pirelli Environmental Management System.

¹ The Environmental Management System has been implemented with reference to the specific types of production activities. Therefore, the number of certificated Operating Units does not match exactly with the number of plants, because of the existence in some plants of more than one Environmental Management System, and certification.

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ISO 14001: Information and training carried out to obtain certification (1998-2001) – Operating Units and staff involved²:



² Data relative to 60 Operating Units out of 72 Units certificated at the end of 2001.

Environmental Improvement Programmes

In 2001 Affiliates defined their own objectives and environmental programmes, in accordance with the requirements of the Environmental Policy and their Environmental Management System. In many cases, specific improvement targets have been defined, identified on the basis of the environmental aspects register, and periodically reviewed and assessed with the support of environmental performance indicators.

The range of improvement projects includes management of water, waste, noise, energy, emissions, protection of soil, and reduction in materials consumption. Below are some examples of completed projects.

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Examples of Environmental Improvement Projects Completed in 2001

Operating Unit	Project	Objective/Results	Investment (kEuro)
Cable & Systems Sectors			
Desco (Portugal)	Renewal and automation of the production line in the compound mixing room	Reduction in particle emissions and consequent abatement both internally and externally	189k€
Cavimar (Spain)	Equipment purchased to reduce use of solvent in the cleaning of cable armour	Reduction of 80% in consumption of solvent	77k€
Paron (France)	Internal & external noise survey leading to major investment in noise reduction. Focussed initially on soundproofing of wire drawing lines	Reduction in noise levels, internally and externally	532k€
Tyre Sector			
Settimo Vettura (Italy)	Construction of indoor warehouse for oils and for waste oils	Optimisation of oil storage and transport; prevention of soil pollution	153k€
Merlo (Argentina)	Replacement of underground solvent tank	To prevent pollution of soil and groundwater by eliminating risk of underground leakage	27k€
Burton/Carlisle (United Kingdom)	Improvement in Energy Efficiency	To reduce consumption of non-renewable energy resources	124k€
Figline (Italy)	Construction of warehousing for waste	Optimisation of waste management	39k€
Celikord (Turkey)	Construction of treatment plant for civil/sanitary water discharge	Reduction of impact on surface water	74k€

Management of Environmental Risk

In 2000 a programme of testing underground tanks commenced, and by the end of 2001 was nearing completion. The objective was to identify any major environmental issues and to set up action programmes as required.

Where necessary, tanks were removed, made safe, or, if replaced, were installed with a loss detection system. If replacement was with an above-ground storage tank, these were specified to have bunds or other containment systems. This work programme results in the elimination of one of the least controllable sources of environmental risk.

Pirelli carries out full Environmental Due Diligence for all its acquisitions, in accordance with internal company procedures. In addition, there is a Corporate procedure for “Environmental Risk Assessment” for expansion of activities and design/installation of new plant.

The corporate environmental database is used to collate information and for management of environmental risk.

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VOLUNTARY ACTIONS

Pirelli Internationl Award

As part of the prestigious “Pirelli Internationl Award 2001”, the 2000 Environmental Award was for “Piera”.

Piera is a can who wants to be recycled. Developed by the Italian school “Dante Alighieri”, in Italy, Piera is available as a multimedia product for environmental education, aimed at children of primary and middle schools.

It shows the importance of environmental issues to children at an age when they can begin to develop an interest in care for the environment.

Recycling is presented as a key contribution towards increasing sustainable development, by reducing the rate at which we absorb raw materials, and produce waste and pollution.

Also for parents!

Previous award winners include:

- 1999: Tropical Rain Forest Ecology Programme of Brazil
- 2000: “Crop Protection Compendium”
CAB International – UK



The logo of the 2001 awards.



Piera: a new product for environmental education in schools.

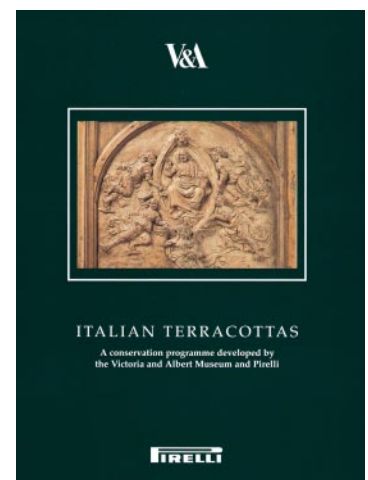
Programme of Restoration and Conservation of Italian Terracottas

Since the 1980's, Pirelli has supported many projects worldwide, linked to conservation of the arts. Among the most important are:

- Restoration of the Etruscan Halls of the Louvre in Paris, and of the Museum of La Scala theatre in Milan;
- Complete restoration of “Pinacoteca Capitolina” in Rome;
- Continuous support for the “Pinacoteca di Brera” in Milan;
- Partnership with MASP – the Art museum of São Paolo in Brazil.

In 2001, Pirelli's continued commitment to safeguard our cultural heritage was demonstrated through the support of restoration work on some world famous pieces from the collection of Italian terracotta sculptures at the Victoria and Albert Museum in London.

The programme will restore and preserve eight masterpieces by the sculptors Andrea del Verrocchio, Benedetto da Maiano, and pieces from the school of Donatello.



Pirelli has financed a programme of restoration and conservation of eight works from the famous collection of Italian terracottas at Victoria and Albert Museum in London.

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PIRELLI & C. REAL ESTATE: PROPERTY MANAGEMENT

In 2001 Pirelli continued to restore and remediate industrial areas. More than 8 billion Euros were invested in environmental studies, restoration and/or remediation activities in both specific industrial areas and in remediation projects in the wider area of Bicocca Milan.



Theatre Arcimboldi: constructed by Pirelli & C. Real Estate in Bicocca, Milan.

The main remediation activities in the Bicocca area during 2001 included:

- removal of more than 1,000 metres of asbestos lining from pipes;
- removal and disposal of more than 3,000 m² of asbestos cement board (Eternit);
- removal, disposal and/or treatment of more than 200,000 tonnes of contaminated soil; leading to the restoration of 60,000 m² of land;
- making safe and cleaning redundant plant.

During the last few years, Pirelli has recovered approximately 650,000 m² of industrial land, and the remediated areas will be put to a variety of uses as described in the table, below:

Designated Use	m ² recovered
gardens or public spaces	160,000
residential	132,000
offices	130,000
production	135,000
sporting activities	80,000
industrial services and/or research	120,000
streets and roads	100,000

The redevelopment of these areas is at present underway, and will be completed over the next few years.

The other main remediation activities in Italy during 2001 were in the industrial areas of Livorno Ferraris, Settimo Torinese, and San Donato (this last area having been recently bought by Pirelli):

- removal of more than 5,000 metres of asbestos cement (Eternit) lining from pipes;
- removal and disposal of more than 8,000 m² of eternit from walls and floors;
- removal, disposal and/or treatment of ~500 tonnes of contaminated soil, with consequent recovery of 36,000 m² of land;
- making safe and cleaning numerous items of redundant plant.

These activities continue to be managed by a team of specialists in Pirelli & C. Real Estate, one of the companies of the Pirelli Group. Pirelli & C. Real Estate has particular expertise in the planning and management of environmental remediation of industrial areas.

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PIRELLI LABS

The creation of Pirelli Labs in 2001 was a fundamental demonstration of Pirelli's commitment to the long-term future – a sustainable future. Pirelli Labs activities are focused on two main themes: Materials Innovation and Optical Technology.

As part of the programme of advanced research, some important technologies have been identified which when applied to industrial production, and when used in the every day life of ordinary people, could contribute to a more sustainable future.

Some of these environmental research projects which started in 2001 are described below.

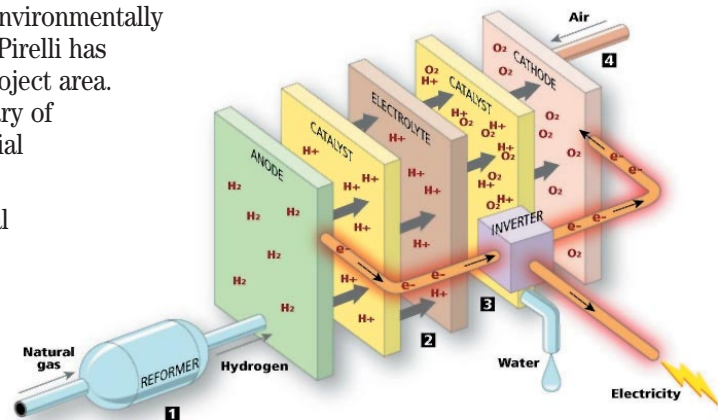


The logo of the new business: Pirelli Labs S.p.A.

Fuel Cells

In the field of new, and more environmentally sustainable sources of energy, Pirelli has identified fuel cells as a key project area. The following is a brief summary of research objectives and potential advantages accruing.

- direct conversion of chemical energy into electrical energy with high efficiency;
- low or zero emission of polluting gases;
- absence of solid waste;
- usage of fuels which are readily available, (H_2 , CH_4 , CH_3OH , natural gas), and which have a lesser environmental impact in comparison with those in common use today;
- ability to generate power over a wide range - watts to megawatts.



Schematic of a fuel cell.

Some examples of potential applications are:

- power supply to electric motors for zero emission vehicles (ZEV);
- batteries for portable electronic devices;
- generation of electricity near to the consumer.

A confirmation of the importance of success in the development of energy sources with reduced environmental impact is given by the results of market research, which indicate a 20% increase in demand over the next 5 years.

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Photovoltaics

Solar radiation represents by and large the most abundant energy source available on the Earth, estimated to be about 10,000 times our present total energy consumption. By using currently available photovoltaic systems, which have an efficiency of only 10%, the transformation into usable energy of only 0.1% of the solar energy impinging on the Earth would still be enough to satisfy completely the present energy needs of humanity!

The main obstacles to the wider use of the most commonly available photovoltaic systems, (based on mono- and poly-crystalline silicon), is due not only to their high cost, but also the high environmental impact of the production process. Current production processes have very high energy demand, which, in fact, matches the energy produced by photovoltaic systems over several years of their use.

The objective of this project is the development of innovative photovoltaic cells using thin films based on hybrid nanostructures. In manufacture, these novel systems are much less energy intensive and less costly than the mono- and poly-crystalline silicon based systems.

Cost calculations indicate that these innovative photovoltaic systems will allow wide and effective use of solar energy, with reduced environmental impact, and a corresponding reduction in the use of non-renewable fossil fuels.

Management of End-of-Life Tyres

Having exploited fully the possibilities of re-use and retreading of tyres, then emerges the problem of end-of-life disposal (as illustrated in the diagram over leaf).

In addition, considering that the European Directive 1999/31/CE forbids the landfilling of whole tyres after 2003, and ground tyres from 2006, the issue of end-of-life tyre disposal cannot be missing from the high priority objectives of Pirelli's technologically advanced materials research programme.

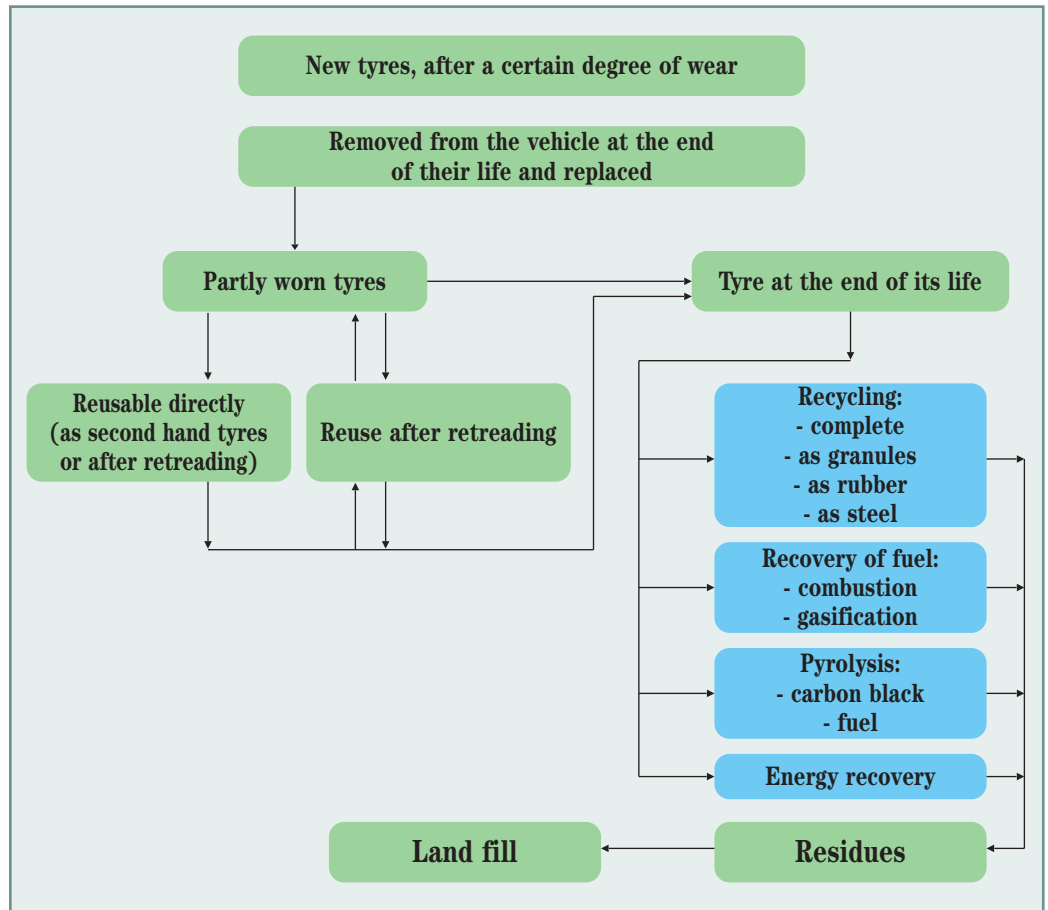
Solutions to this problem will be found through innovative applications for the materials found in end-of-life tyres. The research programme will focus on the optimisation of existing processes for recycling, in addition to developing new processes with lower environmental impact.



Deposition of photosensitive resin during studies of optical chips.

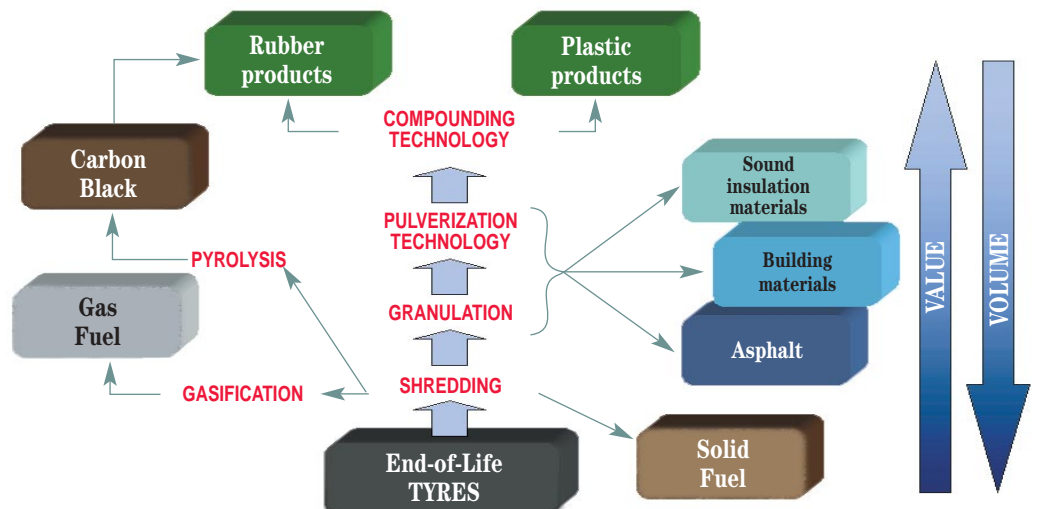
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Different types of used tyres and possible end-of-life scenarios



The following diagram shows a simplified representation of the possible routes for tyre recycling.

Tyre Recycling Tree



Cables and Systems Sectors
Sector Activities
Production and quantitative data

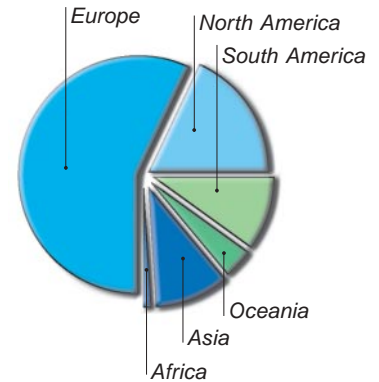
CABLES AND SYSTEMS SECTORS

A real technological partner for its customers world-wide, Pirelli has a fully integrated range of cables, components, systems, engineering, and installation for global turnkey projects in the fields of both telecommunication and energy transmission.

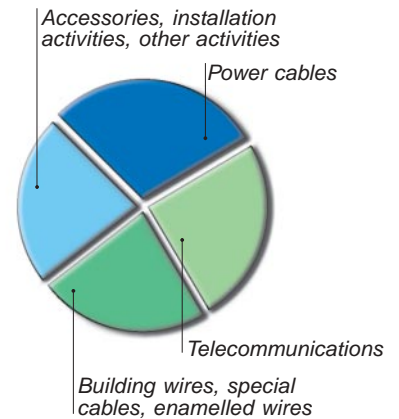
As explained previously, during the year separation was carried out between Pirelli Cables and Systems activities relating to the production and sales of energy cables and the activities relating to the production and sales of telecommunication cables. However, for homogeneity with the previous Environmental Report, and taking into account the fact that this separation is progressive, the environmental data reported herein remains an aggregate of the two Cable Sectors.

At 31 December 2001, the two Cable & Systems Sectors had 63 Operating Units (43 in Europe, 5 in North America, 6 in South America, 9 in Australia, Asia and Africa) and 18,314 employees, with a turnover of 4,762 million Euro, of which approximately 75% is generated by the Energy Cables and Systems Sector.

At the end of 2001, 53 Operating Units³ had been certificated to the International Environmental Management Standard ISO 14001.



Cables and Systems: 2001 sales by geographical area and product category



SECTOR ACTIVITIES

Life Cycle Assessment

Using Life Cycle Assessment methodologies the Group has continued to study the environmental impact due to products and processes and, during 2001, has worked in close contact with customers to improve knowledge of the environmental impact of products throughout the full life-cycle. In particular, some LCA studies have been carried out in the field of telecommunication cables.

During 2001 a project was carried out in collaboration with an important customer, (British Telecom), to assess both environmental and cost impacts of a new design of optical fibre cable, including the installation process. The evaluation revealed not only a lower cost system, but one with reduced environmental impact. As a result British Telecom nominated Pirelli winner of their annual award for “Commitment to Social Responsibility. More detail of the evaluation of this new cable - “Action™ cable” is given below.

³ The Environmental Management System has been implemented in relation to the type of production activity carried out by an Operating Unit. Therefore, the number of “Units” certificated does not correspond exactly with the number of sites, as it is possible for a site with a variety of different production activities to hold more than one certificate of environmental management.

Cables and Systems Sectors
Sector Activities
Production and quantitative data

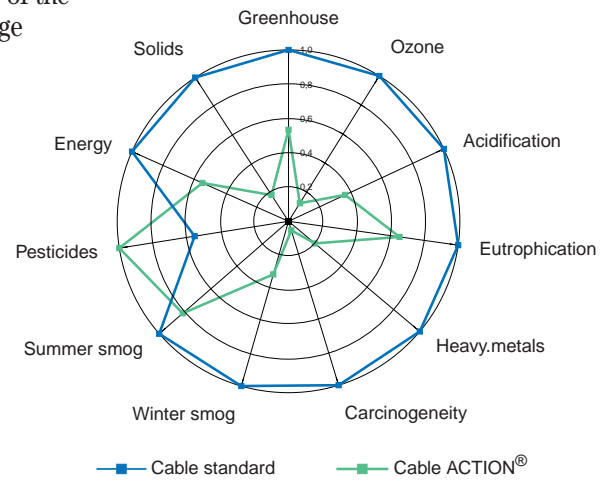
**Use of LCA to Develop Products with Environmental Attributes:
Action™ Cable**

The objective of Pirelli in developing the Action™ cable range was to produce a cable with reduced dimensions in comparison with the “Multi Loose Tube” (MLT) standard cable, while maintaining all of the functional characteristics. The diameter of an “MLT” standard cable⁴ of 72 “fibre counts” was first reduced from 8.2mm to 7.7mm, and eventually, after successive technological developments, to an external diameter of 6.6mm.

This reduction in diameter has given a corresponding reduction of at least 25% in use of raw materials, and a higher percentage of these new materials can be recycled at end-of-life. Other positive effects from this reduction in raw material usage are the simplification of handling, and significantly reduced energy consumption during manufacture. Plus, Action™ cable uses Neon™ self coloured optical fibre, which eliminates the use of solvent based inks.

To achieve all of the environmental benefits which result from a major reduction in the size of the cable, it was necessary to radically change the materials used.

The relative environmental effects of these changes in raw materials were analysed according to the principles of the ISO14040⁵ series of standards on LCA, and using SimaPro™⁶ software, with additional databases from Buwal⁷ and APME⁸. EcoIndicator⁹⁵ from the SimaPro method was used to generate the radar chart on the right. This chart demonstrates the overall reduction in environmental impact achieved by the change in materials and reduced cable size.



Evaluation of the Life Cycle of the raw materials used in the new Pirelli "Action™ Cable"

The reduced dimension of these cables also allows longer production lengths, with a resulting decrease in scrap, reduced packaging (~50% less), and a reduction of about 10% in environmental effects due to transport activities.

It is also possible to install longer lengths, therefore allowing savings for both the installer (fewer joints and inspection chambers), and for the customer who, in fact, gets a lower costs for the entire system.

Today, there are already many different utilities requiring reduced dimension cables, mainly due to lack of room in the existing conduits. Use of reduced dimension cables avoids the necessity of installing new conduit systems – which activity, according to Life Cycle Assessment studies, is one of the higher sources of environmental impact for telecommunication cables.

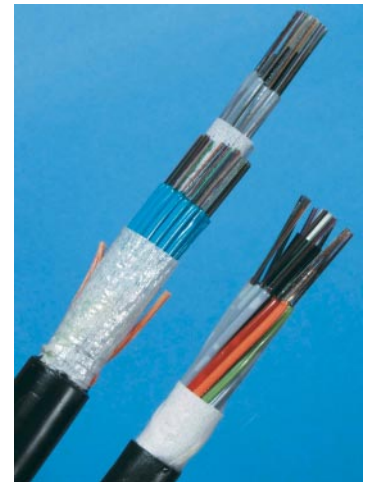
⁴ The functional unit was selected to compare like for like duty (carrying capacity).
⁵ ISO14040-97 Environmental management - Life cycle assessment - Principles and framework.
⁶ Prè Consultants, Holland.
⁷ Bundesamt für Umwelt, Wald und Landschaft: the Swiss Environmental Authority.
⁸ Association of Plastics Manufacturers in Europe.

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Environmental Aspects of Product Innovation

In recent years the Cable and Systems Sectors have had more focus on the development of products with reduced environmental impact. These developments take into account the most significant environmental impacts as indicated by Life Cycle Assessment studies.

In the field of telecommunication, two new cable families were born: Action™ cables (as described) and Dry-Dry cables. In both the Energy and Telecommunication Sectors, the Air Bag™ and Afumex® product ranges are continuously developed, together with new methods of installation, all giving a considerable reduction in environmental impact. Pirelli has a strategy of continuously replacing materials to reduce environmental impact of products, which is demonstrated in the “Dry-Dry” cable range, in cold shrink accessories, and by the progressive elimination of lead (Drylam™ cables and Ecology line).



Two designs from the new Action™ cable range.

Elimination of Substances: “Dry-Dry” Optical Cable

The initial development of “Dry-Core” cable eliminated gel from the cable inner. In the “Dry-Dry” optical fibre cable range the use of water blocking gel is completely eliminated. Applying the gel in a factory environment is labour intensive, and generates a high level of non-recyclable waste (a mixture of gel with paper, tapes, polymers, etc). Elimination of the gel also reduces waste during installation, and significantly reduces time required to joint cable in the field.

The production, initially of Dry-Core cables, and subsequently of the Dry-Dry design resulted in:

- Substantial time saving in the preparation of fibre joints (both in the plant and on site);
- Significant reduction in non-recyclable waste through the elimination of the buffering and stranding processes.

The Air Bag™ Cable System

The objective in developing the AirBag™ system was to eliminate the usage of metal armour in energy cables and in classically designed optical cables, while keeping the same level of mechanical protection. The AirBag™ system allows underground installation with a much reduced environmental impact, since neither protective conduit or sandfilled trenches are required. In fact, excavation spoil can be re-used in the installation process.

The replacement of metallic armouring with polymeric protective elements in traditional underground cables has resulted in:

- reduction in the environmental impact of the raw materials, by replacing metals with polymers; (Life Cycle Assessment shows that use of metal has a greater environmental impact than the equivalent use of polymeric materials);
- reduction in the use of raw materials by reducing cable weight (by at least 20%), with associated reduction in environmental impacts of transport.



Section of an AirBag™ cable.

Installation: AirBag™ Microtunnelling

“Microtunnelling” technology consists of horizontal drilling of channels with reduced diameter, using a remote controlled perforated drill monitored by radar, and concurrently drawing the cable into this “microtunnel”.

This minimises the environmental impact of the installation, in respect both of disturbance of the ground and disruption of daily activities in the area. These reduced impacts further enhance the eco-compatibility of the AirBag™ cable.

Afumex® Cables

In developing the Afumex® cable range the objective was the elimination of polymers or flame retardants containing halogens, sulphur or nitrogen, while maintaining the equivalent level of protection in case of fire.

By taking these steps, in case of fire:

- certain toxic gases are not developed – for example HCl, HBr, NO_x, SO₂, ...
- the development of smoke opacity is delayed, facilitating escape of persons caught in fires.

Pirelli has continued the development of the Afumex® cable range, to increase use of the technology across a growing range of applications. In particular, Pirelli supplies a complete range of cables for plants generating electricity from renewable sources, particularly wind farms, which represent the most common source of renewable energy. The variability of the climate, coupled with the harsh environments in which the wind farms are installed, makes this application very challenging in terms of cable requirements for mechanical strength and performance across a wide temperature range. The Afumex® solution promotes the safety both of people, and of systems, in the event of fire developing inside windfarm towers.



Interior of the Liceu Theatre at Barcelona, cabled with Afumex® cable.

Elimination of Metallic Lead: Drylam™ Cables

Drylam™ is an innovative solution developed by Pirelli to protect cables installed in critical applications (chemical and petrochemical plants) against moisture and chemical substances. The most commonly used protective measure is a lead sheath. This, though having good functional characteristics, has a higher environmental load. Drylam™ is the alternative offered by Pirelli, which ensures a high level of service performance while eliminating the use of lead. Drylam™ has been installed by major oil companies such as Shell.

Accessories

As part of the range of accessories for transmission and distribution power cables, Pirelli Cables and Systems Energy have developed a new generation of “cold shrink” joints. These compact joints do not require the use of flame or other heat sources for their installation, which, as a result, becomes easy and reliable, and eliminates this use of energy. In addition, the joint is supplied pre-lubricated and with a sealing system for its’ extremities, thus limiting the generation of waste materials.

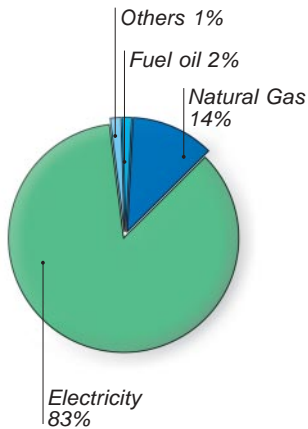
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PRODUCTION AND QUANTITATIVE DATA

Energy and Telecommunication Cable Sectors

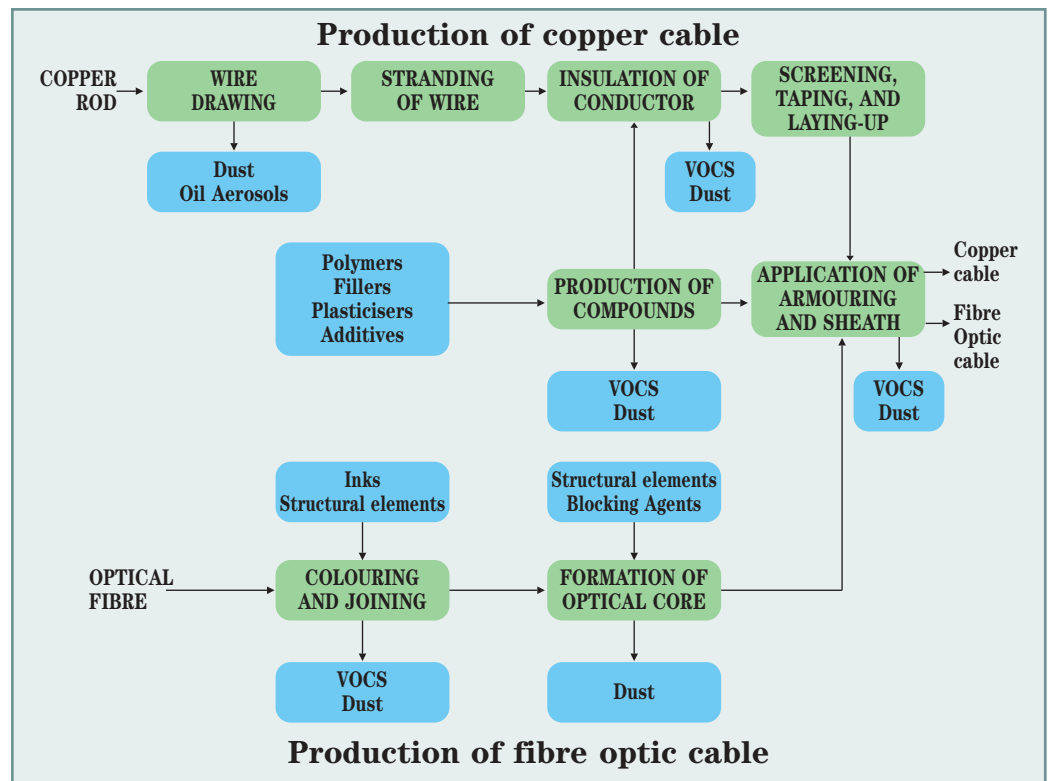
Pirelli produces cables for telecommunications, for the transmission of data, and for energy transmission – from high to low voltage, for land, subsea, and aerial applications-and a wide range of accessories. In addition, Pirelli produces copper rod, used as conductive elements in cables, and is a leading producer of advanced optical fibres and fibre optic cables.

The production process varies according to the type of cable and its intended use. In general terms, the main processes, and the main inputs and outputs related to cable production are shown in the Figure below.



Energy consumption by energy source in telecommunication and energy cable production units (2001)

Main production phases and main inputs and outputs in the production of a cable



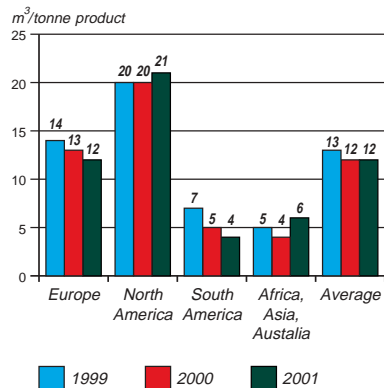
QUANTITATIVE DATA

For the energy and telecommunication cable plants, the data relating to consumption of water, energy, and solvents is reported, plus data for the generation of hazardous and non-hazardous waste.

WATER CONSUMPTION

As indicated in the previous Environmental Report, over 95% of the water consumed is used either for cooling or for the production of steam.

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Consumption of water by energy and telecommunication cable production units⁹

	1999		2000		2001	
	(1000m ³)	(m ³ /tonne product)	(1000m ³)	(m ³ /tonne product)	(1000m ³)	(m ³ /tonne product)
Europe	8,634	14	8,711	13	9,185	12
North America	2,327	20	2,515	20	2,303	21
South America	620	7	408	5	331	4
Africa, Asia, Australia	277	5	363	4	698	6
Total/Average	11,858	13	11,997	12	12,517	12

⁹ 1999: excluding South Africa (1 Operating Unit), and Hungary (3 Operating Units); 2001 excluding one European Operating Unit.

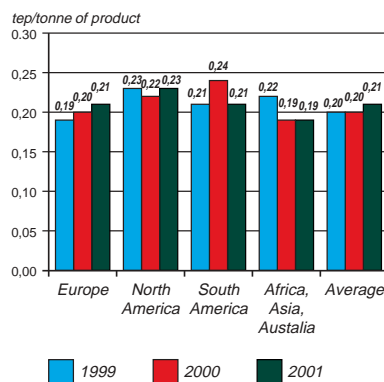
Overall a steady trend in reducing the consumption of water is being maintained by the Sectors, through efficiencies, increased recycling, plus maintenance and repair of drainage systems.

During 2001, an increased use of water per tonne of production was recorded in some areas, due to the inclusion of recently purchased sites.

In Europe, to avoid serious distortion of the index of water use per tonne of production, the high water use of one recently purchased plant has been excluded from the figures. A system of recycling for cooling water is being introduced by Pirelli during 2002 in that factory.

ENERGY CONSUMPTION

Although cable production is not an energy intensive process, energy efficiency is dependant not only on product mix, but more specifically upon the level of plant utilisation. There is a significant “baseload” consumption of energy required to maintain plant in good operational condition and in readiness for production.



Consumption of energy by energy and telecommunication cable production units¹⁰

	1999		2000		2001	
	1000 tep	tep/tonne product	1000 tep	tep/tonne product	1000 tep	tep/tonne product
Europe	123	0.19	134	0.20	160	0.21
North America	26	0.23	27	0.22	25	0.23
South America	18	0.21	19	0.24	17	0.21
Africa, Asia, Australia	12	0.22	16	0.19	22	0.19
Total/Average	179	0.20	196	0.20	224	0.21

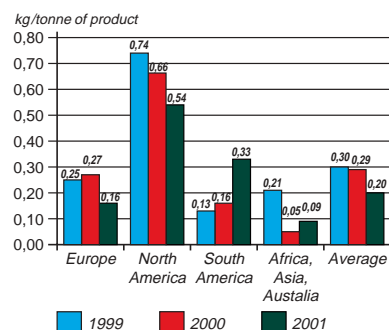
¹⁰ 1999: excluding South Africa (1 Operating Unit), and Hungary (3 Operating Units).

The increase in energy use per tonne of production in Europe during 2001 is due partially to reduction in overall production, but is mainly due to the fact that three plants were being prepared for closure. For these three units a baseload of energy is required to maintain plant and buildings, but without the normal level of production load.

SOLVENT CONSUMPTION

Differences in the level of use of solvents in the various geographical areas is essentially due to differences in the production mix. It is an objective of Pirelli to eliminate the use of solvents wherever possible.

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During 2001 a major reduction in solvent consumption has been achieved due to process changes in two plants (one in Europe, the other in the United States).

Consumption of solvents by energy and telecommunication cable production units¹⁰

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe	157	0.25	182	0.27	120	0.16
North America	84	0.74	82	0.66	60	0.54
South America	10.8	0.13	12.7	0.16	26	0.33
Africa, Asia, Australia	11.3	0.21	4.3	0.05	10	0.09
Total/Average	263.4	0.3	281.2	0.29	216	0.20

¹⁰ 1999: excluding South Africa (1 Operating Unit), and Hungary (3 Operating Units).

The apparent increase in consumption of solvents in South America is due to an inaccuracy in the previous data reported for 1999 and 2000. The error was discovered during the 2001 data verification process. For reasons of transparency, the same figures published previously are reproduced here - however, from 1999 to 2001 solvent consumption in these South American plants has not changed significantly.

WASTE PRODUCTION

Hazardous Waste produced by energy and telecommunication cable production units (classified according to the categories of the European Union)¹¹

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe	2,824	4.4	2,737	4.3	3,857	5.1
North America	738	6.5	806	6.4	447	4.0
South America	374	4.5	615	7.7	635	8.0
Africa, Asia, Australia	77	1.7	71	1.3	510	4.4
Total/Average	4,013	4.6	4,229	4.7	5,449	5.1
% recycled	n.a.		n.a.		2.2	

Non-Hazardous Waste produced by energy and telecommunication cable production units (classified according to the categories of the European Union)¹¹

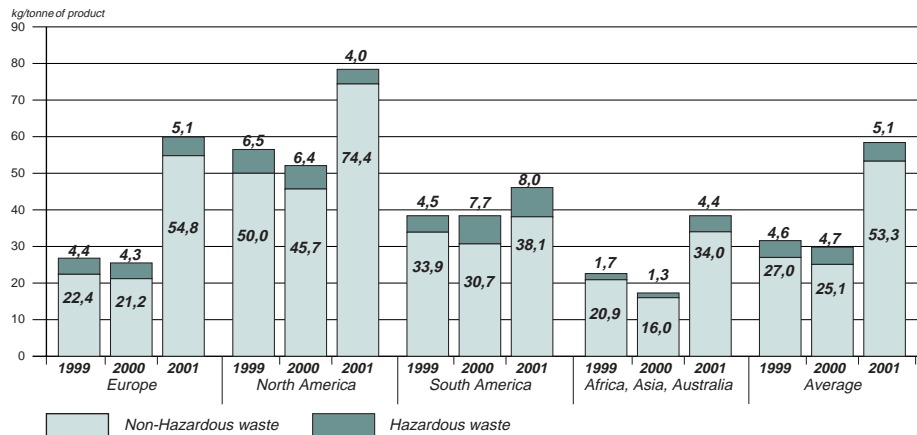
	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe	14,323	22.4	13,453	21.2	41,212	54.8
North America	5,704	50	5,702	45.7	8,347	74.4
South America	2,820	33.9	2,445	30.7	3,005	38.1
Africa, Asia, Australia	943	20.9	866	16	3,938	34
Total/Average	23,790	27	22,466	25.1	56,502	53.3
% recycled	n.a.		n.a.		36	

¹¹ 1999 e 2000: excluding China (2 Operating Units), Indonesia (1 Operating Unit), SouthAfrica (1 Operating Unit), Hungary (3 Operating Units).

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For 2001 Pirelli has redefined the basis for the collection of data for waste. All waste is now included. In the past waste which was recycled (within Pirelli and externally) had been excluded, as had, in some cases, packaging waste. It has not been possible to revise the historical data, so the data for 2001 represents a discontinuity.

While a proportion of the apparent increase in waste generation can be ascribed to the wider definition, it is also true that data collection has, with experience, improved considerably. Thus the data for 2001 represents a much more comprehensive picture.



Optical Fibre

During 2001, production ceased in one fibre optic plant. There are now three fibre optic production units in the Telecommunication Cables and Systems Sector, located in Italy, Brazil, and the United Kingdom.

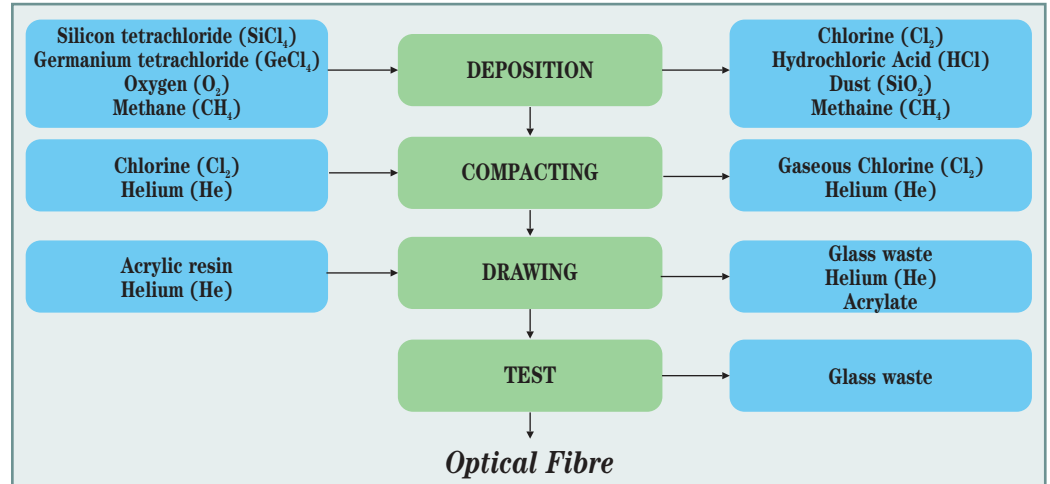
The three production processes differ considerably, each being based on a different technology.



Optical fibre.

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Optical Fibre: Main production phases and main inputs and outputs (with reference to the Battipaglia FOS Operating Unit)



Evaluation of the Environmental Impact of the Operating Unit FOS at Battipaglia

The commitment of Pirelli Group towards environmental protection has continued during 2001 with the completion of an Environmental Impact Assessment for the expansion of the fibre optic production plant, FOS, at Battipaglia, Italy.

Pirelli has sent to the Local Authorities a formal study, carried out by an accredited third party, in which all of the potential Environmental Impacts relating to an expansion of activities at the Operating Unit are described and critically evaluated.

The analysis and the assessments indicated a low impact on all environmental receptors (land, air, water), as well as showing the effectiveness and reliability of current monitoring systems (which cover the entire site). This furnished the Local Authority with all of the necessary information, based upon which they gave a positive response relating to the environmental compatibility of the site expansion.



The head-office of the FOS Unit in Battipaglia, Naples.

Emissions to atmosphere

The Telecommunication Cables & Systems Sector has maintained voluntarily imposed limits for emissions to atmosphere for all of its' Operating Units producing optical fibre, based on those required by Italian legislation. The Italian requirements are more severe than the local requirements in the other territories in which Pirelli produces optical fibre.

Atmospheric emission limits set by the Cables and Systems Sector for Operating Units producing optical fibre (limits imposed by Italian legislation)

Emissions	Concentration (mg/m ³)
Chlorine	< 5
Hydrochloric Acid	< 30
Hydrofluoric Acid	< 5
Particulates	< 50

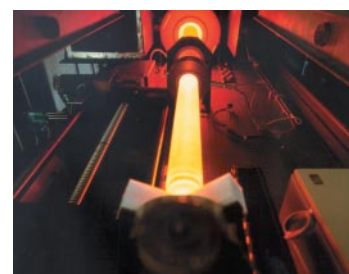
QUANTITATIVE DATA

All plants respect the limits adopted by the Sector. The reported major reduction in emission of particulates is due mainly to the installation of new abatement plant in one of the units.

Atmospheric emissions – Average concentrations of emissions relative to the limits set by Pirelli

	1999 (mg/m ³)	2000 (mg/m ³)	2001 (mg/m ³)	Reference Limits (mg/m ³)
Chlorine	1.3	0.9	0.3	5
Hydrochloric Acid	5	3	3.3	30
Hydrofluoric Acid	0.9	0.3	0.2	5
Particulates	16	18	5.9	50

During 2001, all of the plants have reduced the quantity of energy consumed per km of product. In the case of water consumption, all the plants have reduced consumption per km of product, with the exception of one plant which used an abnormally high level of water due both to the necessity of testing wells, and also to the construction and commissioning of new production lines.



Production of optical fibre.

Consumption of water and energy by fibre optic production units

	1999	2000	2001
Water consumption (m ³ /km fibre)	0.1	0.08	0.1
Energy consumption (tep/1000km fibre)	3.8	3.4	3.3

**Hazardous Waste produced by fibre optic production units
(classified according to the categories of the European Union)**

	1999 (kg/1000km fibre)	2000 (kg/1000km fibre)	2001 (kg/1000km fibre)
	14	11	19
% recycled	n.a.	n.a.	1.2

**Non-Hazardous Waste produced by fibre optic production units
(classified according to the categories of the European Union)**

	1999 (kg/1000km fibre)	2000 (kg/1000km fibre)	2001 (kg/1000km fibre)
	190	163	176
% recycled	n.a.	n.a.	29

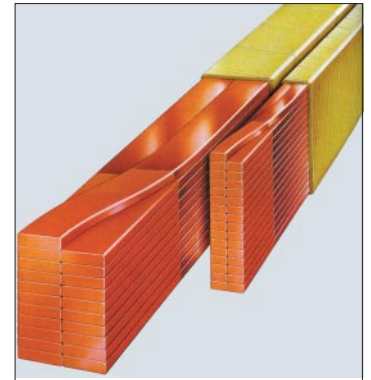
The reasons behind the increase in waste production have been described in the corresponding section of Cables & Systems Sector.

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Enamelled Wires

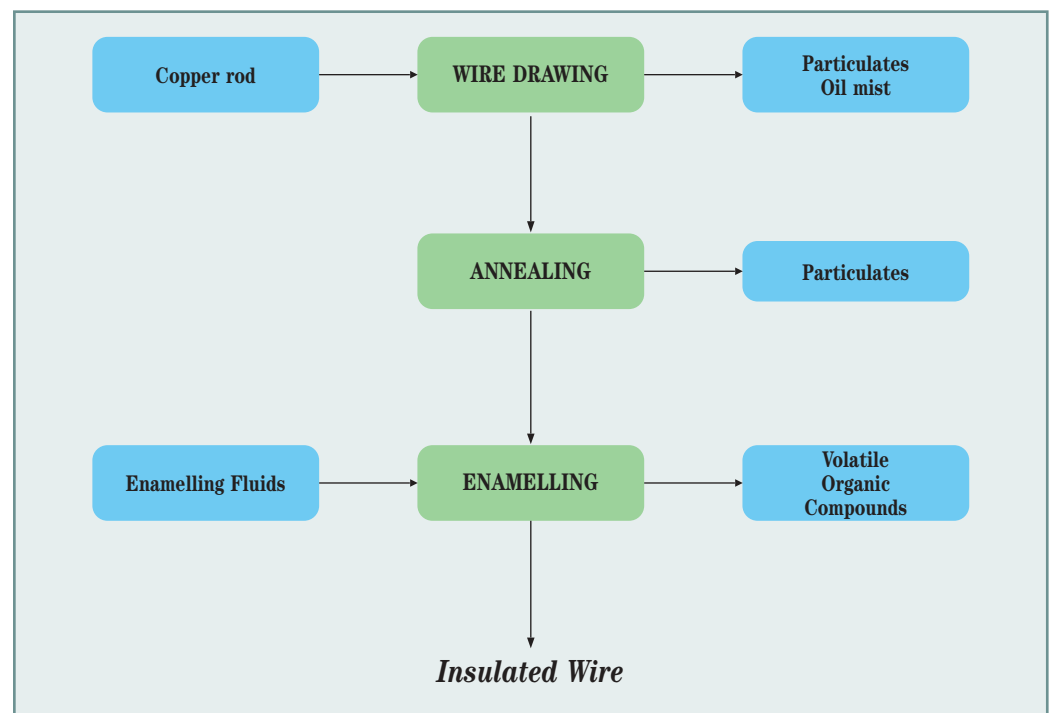
The Energy Cables and Systems Sector manufactures copper wire with enamel insulation which is used in the production of electric motors and windings. During 2001 the plant in Spain was closed, and the two Italian plants were merged. Therefore only two Operating Units exist - one in Italy, and another in Brazil.

Although the production of enamelled wires represents less than 5% of the turnover of the Sector, the environmental data is included separately in this Report both because of the nature of the environmental impacts, and the fact that the production processes are significantly different from manufacture of standard energy or telecom cables.



Copper straps, type "eleonora".

Enamelled Wires - Main production phases and main inputs and outputs



QUANTITATIVE DATA

The technology for manufacturing enamelled wires uses water only for cooling and for producing steam. As there is no process water, pollution from waste water is negligible, although in any case discharges are subjected to regular monitoring.

The reduction in the total quantity of water consumed is primarily due to plant closure, but the reduction in consumption per tonne of production is due to the introduction of a new process, which uses less water.

Compared to other types of production in the Cables and System Sector, there is more intensive consumption of solvents and energy in processes used for the production of enamelled wire.

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Water consumption by enamelled wire production units

1999		2000		2001	
1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product
282	4.3	338	4.7	186	2.7

Consumption of energy by enamelled wire production units

1999		2000		2001	
1000 tep	tep/tonne product	1000 tep	tep/tonne product	1000 tep	tep/tonne product
28	0.43	30	0.42	28	0.41

Consumption of solvents by enamelled wire production units

1999		2000		2001	
tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
3,540	54.3	3,819	53	3,136	45

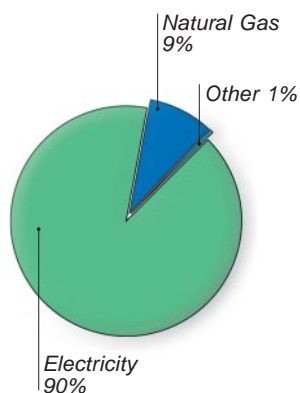
Hazardous Waste produced by enamelled wire production units (classified according to the categories of the European Union)

	1999		2000		2001	
	tonne	kg/tonne	tonne	kg/tonne	tonne	kg/tonne
total	698	10.7	772	10.7	886	12.8
recycled [%]	n.a.		n.a.		1	

Non-Hazardous Waste produced by enamelled wire production units (classified according to the categories of the European Union)

	1999		2000		2001	
	tonne	kg/tonne	tonne	kg/tonne	tonne	kg/tonne
total	3,679	56.4	3,251	45.1	4,194	60.4
recycled [%]	n.a.		n.a.		95	

Scrap copper represents the overwhelming majority (95%) of non-hazardous waste, and is recycled. The increase of hazardous waste is due to a different classification by a South American plant, which, for the first time in 2001, used European criteria. This extended their previous definition of waste by including several new categories, thereby increasing the total reported.



Energy consumption by enamelled wire Production Units (2001) by energy source

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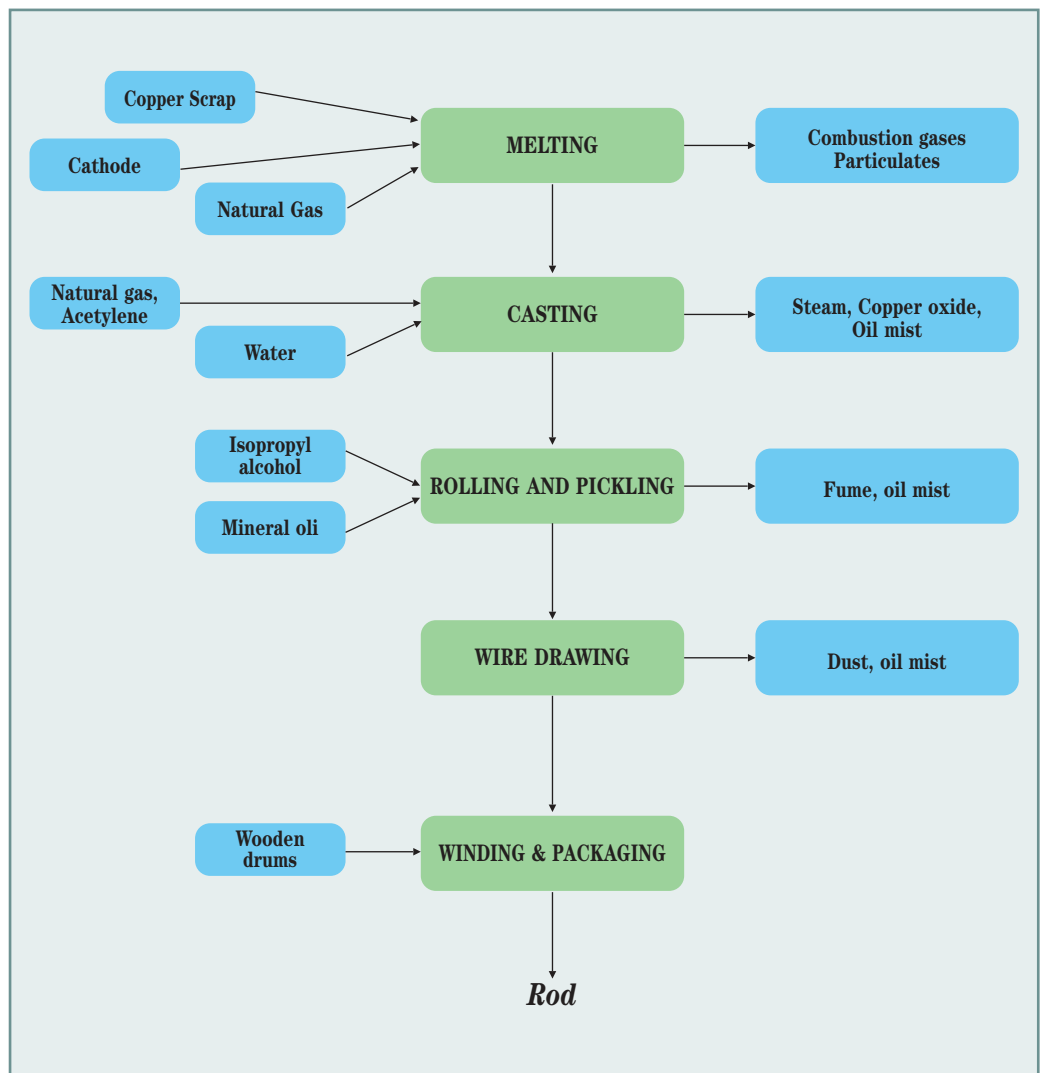
Copper Rod

Copper rod production is carried out in two Operating Units in South America (Argentina and Brazil) and in two recently acquired British plants which are included in this report for the first time. One of the British plants manufactures special wire using a process which differs significantly from the other three plants.

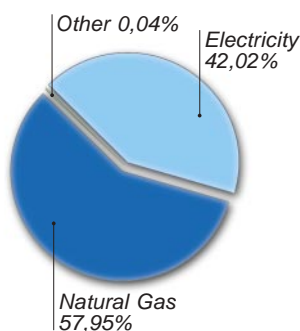


Reels of copper rod produced in Great Britain.

Copper Rod/Wire – Main production phases and main inputs and outputs



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Energy consumption by copper rod production Units (2001) by energy source

QUANTITATIVE DATA

The main resources used in the production of copper rod are water, energy, oils, and lubricants.

Water is used mainly to produce steam and for cooling, and is recovered in closed cycle plant; water discharges result only from non-production use (e.g. general and sanitary purposes) and are in any case regularly monitored.

Water consumption by copper rod and wire production units

1999		2000		2001	
1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product
23	0.31	24	0.32	72	0.28

Consumption of energy by copper rod and wire production units

1999		2000		2001	
1000 tep	tep/tonne product	1000 tep	tep/tonne product	1000 tep	tep/tonne product
5.3	0.07	5.9	0.08	19.42	0.07

Consumption of solvents by copper rod and wire production units¹²

1999		2000		2001	
tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
213	2.8	207	2.7	331	1.3

¹²1999: excluding South Africa (1 Operating Unit), and Hungary (3 Operating Units).

The major reduction in solvent consumption is due to an environmental improvement programme in a South American plant.

Hazardous Waste produced by copper rod and wire production units (classified according to the categories of the European Union)

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
total	345	4.5	200	2.6	1,144	4.4
% recycled	n.a.		n.a.		0.3	

Non-Hazardous Waste produced by copper rod and wire production units (classified according to the categories of the European Union)

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
total	241	3.2	195	2.6	1,868	7.2
% recycled	n.a.		n.a.		71	

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As described earlier, in 2001 Pirelli has redefined the basis of collection of data for waste. All waste is now included. While a proportion of the apparent increase in waste generation can be ascribed to the wider definition, it is also true that data collection has, with experience, improved considerably. Thus the data for 2001 represents a much more comprehensive picture.

In addition, as described, one of the new units has significantly different products and processes, and generates a higher proportion of hazardous waste. The principal non-hazardous waste stream is copper, of which almost all is sold for recycling.

Accessories

Production of accessories is carried out in three European Operating Units: France, Italy, and the United Kingdom. The data for these Operating Units is reported for the first time. All the three Operating Units are certificated to ISO 14001.

Pirelli produces a wide range of accessories which includes: joints and terminations for high and medium voltage energy cables, components for low voltage cables, glands for offshore and other hazardous areas, and modular power harnesses.

Production activities in the components units includes casting and turning of metals, production of resin packs, joint assembly, and preparation of joint kits. Due to the different and variable nature of this business, it is not useful to report the ratio of the environmental indicators per tonne of production, so absolute consumption only is reported. The increases in absolute consumption reported in 2001 are due to the inclusion of the recently acquired UK Operating Unit.



High voltage cable joint.

Consumption of water, energy and solvents by the operating units for accessories

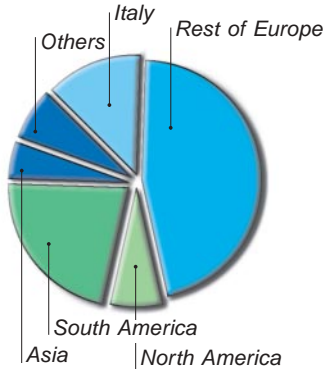
	1999	2000	2001
Water consumption (1000 m ³)	206	222	265
Energy consumption (tep)	1,265	1,243	3,840
Solvent consumption (tonne)	5.4	13.6	30.5

Waste production by the operating units for accessories

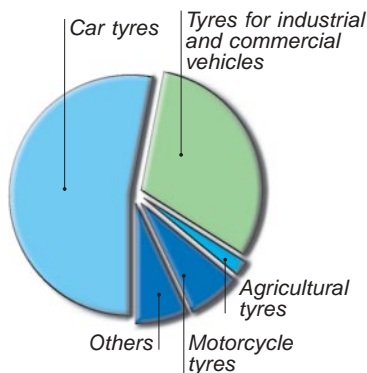
	1999	2000	2001
Hazardous (tonne)	7.8	6.3	43.5
Non-Hazardous (tonne)	156	199	470

**Tyre Sector
Sector Activities**

Production and quantitative data



Tyres: sales in 2001 by geographical area and product type



TYRE SECTOR

The Tyre Sector has 21 operating Units and 19,994 employees. The company is one of the top 5 producers worldwide, with 2,831 million euros of sales.

Investment specifically aimed at improving the working environment and for fire prevention totalled 4.5 million euros in 1999, 2.2 million euros in 2000, and 3.5 million euros in 2001. The high value in 1999 reflects concentrated investment in that year, targeted at the implementation of environmental management systems.

These numbers exclude investments carried out to improve industrial efficiency but which have coincidentally resulted in an improvement in environmental performance.

Further investment was made in Research and Development for new processes and products, some of which are described in the next section of this Report.

The following table gives some details of improvement projects.



The new Eufori@ Runflat tyre, produced by the new MIRS technology.

Operating Unit	Project	Objective/Results	Investment (Euro)
Merlo (Argentina)	Improved ventilation of the vulcanising area	Improvement of air quality in the working environment	60 k€
Settimo Veicoli Industriali (Italy)	Improved ventilation of the compound mixing room	Improvement of air quality in the working environment	210 k€
	Reduction of noise level in the semi-finished product area	Improvement of the internal working environment	39 k€

SECTOR ACTIVITIES

MIRS

In December 1999 Pirelli launched a completely new technology for the production of tyres: MIRS - Modular Integrated Robotized System. This is currently being rolled out into industrial production.

The entire production process is concentrated into a very small area, as there is no need for storage of work in progress between steps. In the traditional process, only 12% of materials are being worked at any given time, whereas with MIRS the process steps are seamless.

**Tyre Sector
Sector Activities**

Production and quantitative data

In the traditional process the time from raw materials to finished product is an average of 6 days. In MIRS just 72 minutes.

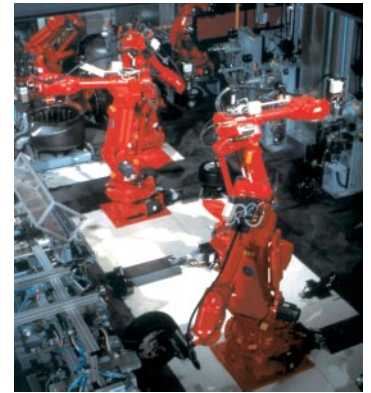
In the traditional process, (and excluding preparation of compound) there are 13 discontinuous steps using large items of plant. At the end of each operation, the semi-finished products are cooled and stored, often requiring anti-adhesive coating and protective wrapping.

In the MIRS process there are only 3 main, sequential, working steps: preparation of semi-finished goods, building & vulcanisation, and finishing.

The new mini-factories

MIRS technology is based on “mini factories” located strategically. During 2001 the first production lines of the first “mini-factories” commenced operations. By the end of 2001, the programme had achieved:

- Italy (Milan): 2 lines for car tyres, and 1 line for motorcycle tyres;
- Germany (Breuberg): 2 lines for car tyres, with a programme to increase this during 2002 to 7, plus 2 further lines for motorcycle tyres;
- United Kingdom (Burton-on-Trent): 2 lines for car tyres of which one is for SUV;
- United States (Georgia): a new factory is under construction with a programme to have 10 lines for car tyres in operation over 2002-2003.



MIRS: overview of the tyre build area.

The new compound mixing room

As part of the MIRS project a revolutionary new approach to compound mixing has been developed. This uses innovative production technologies which completely transforms the image of the traditional “rubber mixing room”. The process uses a closed loop cycle, with almost zero emissions. During 2001 an experimental line was developed in Bicocca Milan, adjacent to the MIRS mini-factory. This work has led to a programme for technology transfer and scale-up to full industrial process during the first half of 2002.



The new mixing room for MIRS compounds in Milan.

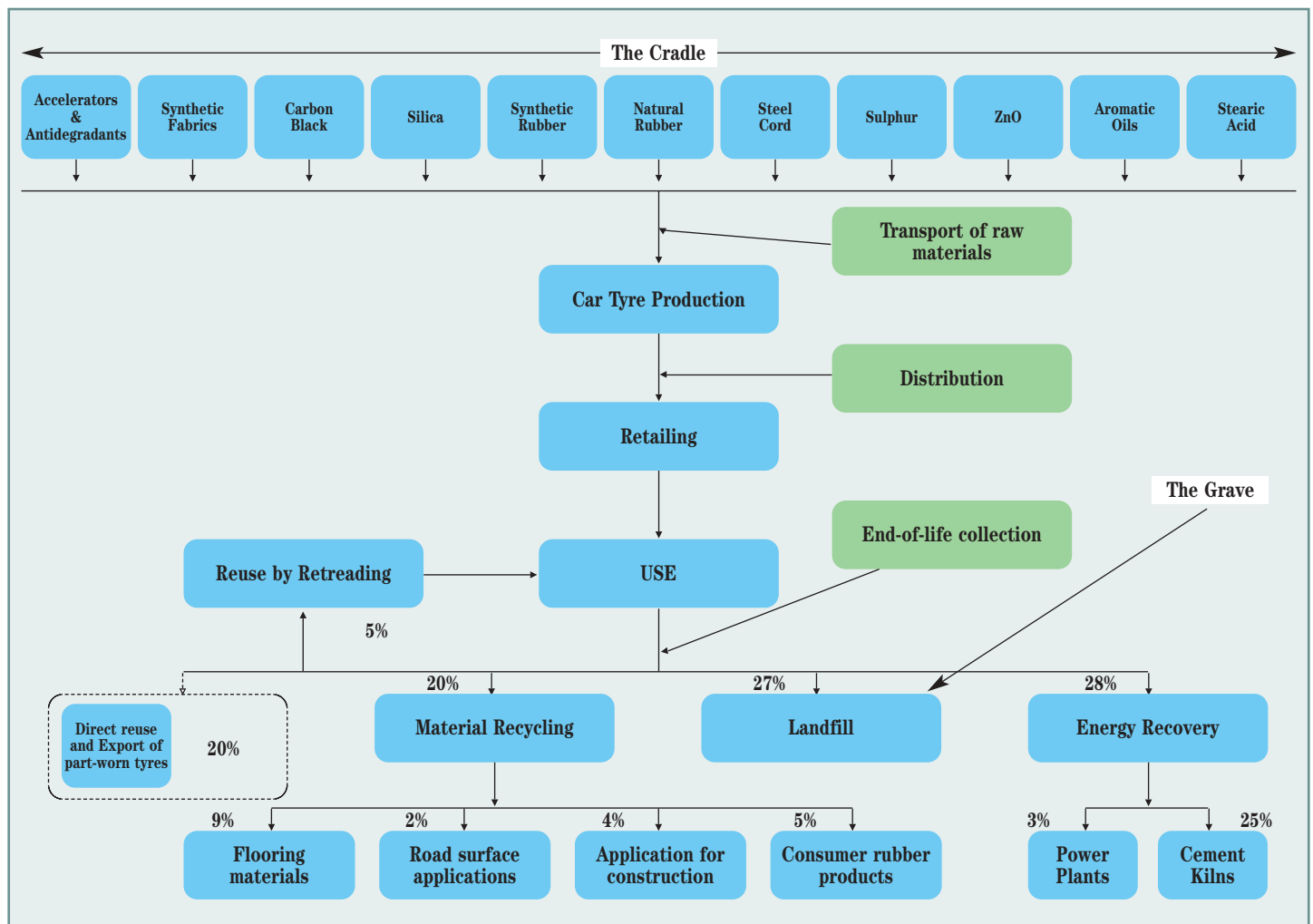
Tyre Sector
Sector Activities

Production and quantitative data

The Environmental Impact of the Product

During 2001, Pirelli has continued to develop experience in the field of Life Cycle Assessment with a new study commissioned with Pré Consultants. The study was developed jointly with the other major European tyre producers, and focused on the Total Life Impact of a typical “European car tyre”.

This study was finalised in May 2001, and resulted in a comprehensive picture, and an authoritative reference for increasing understanding of the environmental impacts due to car tyres during their whole life - from “Cradle to Grave”, as shown in the following diagram:



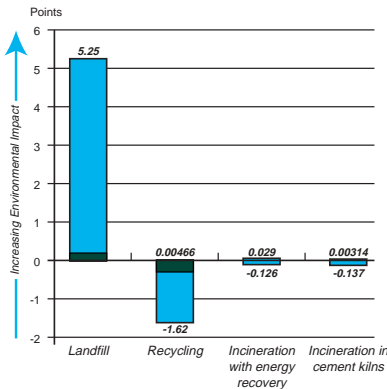
The conclusions of the study confirm the “Use phase” as the most critical, due essentially to fuel consumption as affected by tyre rolling resistance. Also, the particulates produced during use, “tyre debris”, has a noticeable impact, but moderate compared with the impacts due to fuel consumption.

**Tyre Sector
Sector Activities**

Production and quantitative data

The comparison between carbon black reinforced tread and silica reinforced tread confirms that the latter has a lower environmental impact, due to its lower rolling resistance which in turn leads to reduced fuel consumption during the life of the tyre (see “The Energy Tyre Range” below).

The environmental impact from tyres at end-of-life only contributes modestly to the overall global impact of the entire life cycle. Of the different disposal routes, landfill is the least preferred, as shown in the illustration below.



End-of-Life Tyres

Pirelli’s research activities for tyre end-of-life management of tyres is discussed in the Section covering Pirelli Labs.

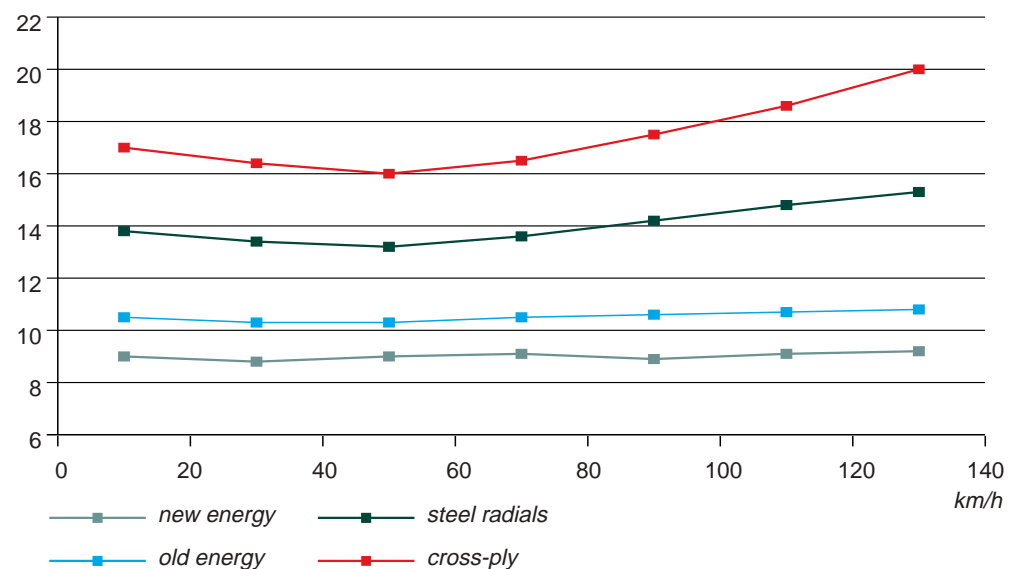
In Italy Pirelli, along with the other tyre producers, is a member of the voluntary Consortium Eco.Pne.Us. The scope of the Consortium is to contribute to the improvement of the processes of collection and recovery of end-of-life tyres, and to foster accords between the various entities involved in these activities. The consortium is encouraging the businesses who manage the collection, transport and recovery of end-of-life tyres to become certificated to UNI EN ISO9002, and is preparing information material to assist in appropriate management of the activities.

Comparison between the impacts of the different end of life scenarios for tyres

The ENERGY Tyre Range

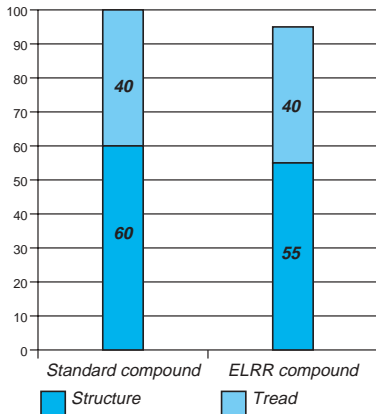
Rolling Resistance is the resistance of the tyre to the rotational movement of the wheel on a moving vehicle. As shown by the LCA study the life cycle phase of highest impact is the use phase of the tyre, due essentially to fuel consumption caused by rolling resistance. The lower the rolling resistance, the less energy is required to rotate the tyre, with a corresponding saving in fuel consumption.

Rolling resistance index



**Tyre Sector
Sector Activities**

Production and quantitative data



The value of Rolling Resistance differs depending on the type of tyre construction as shown in the chart. Since 1996 Pirelli has marketed reduced rolling resistance tyres, by using silica in place of carbon black in the tread compound. The resulting constructions allow a fuel saving of between 1 and 3%.

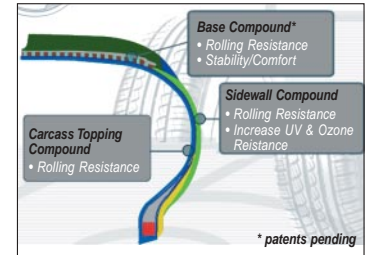
As well as the type of tread compound used, the level of rolling resistance also depends on:

- the composition of the compounds used internally in the tyre carcass¹³;
- other structural elements such as the belting, sidewall and carcass;
- the total weight.

The ELRR (Extra Low Rolling Resistance) technology package affects all tyre components, allowing a further reduction of between 60% and 55% in Rolling Resistance (as shown in the adjacent chart), as well as other customer benefits (see illustration above).

During 2001 the products *P6™*, *P6 four seasons™* and *P7™* were launched on to the market.

These new tyres are characterised by their reduced Rolling Resistance, a longer service life and a reduction in noise pollution (in particular, the reduced noise characteristics of the *P6™* is evident at all vehicle speeds).



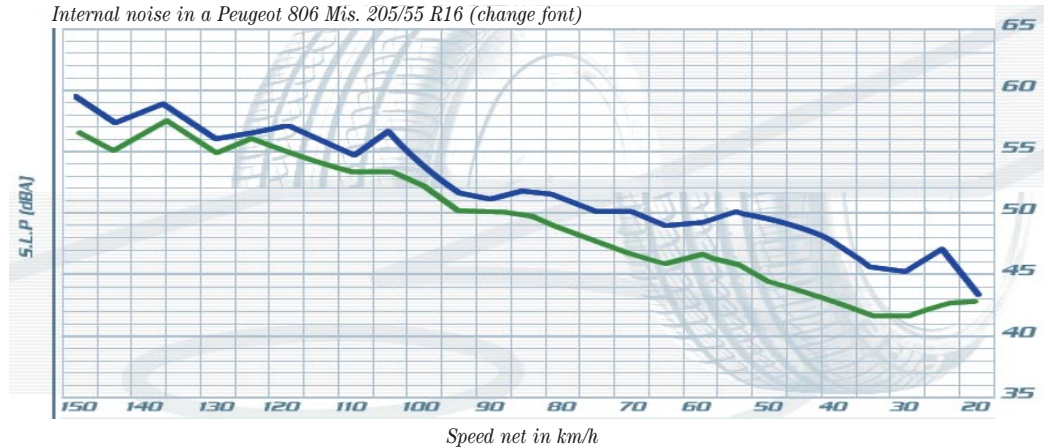
Tyre section showing relevance to "Rolling Resistance".



The new *P6™* and *P7™* launched in 2001.

P6 sound emission

Internal noise in a Peugeot 806 Mis. 205/55 R16 (change font)



¹³The "internal" compounds are used in the carcass, belting, and substrates.

Tyre Sector

Sector Activities

Production and quantitative data

Tyre-Debris

During its' use on the roads, the tread of a tyre wears and abrades to release microparticles, termed "tyre-debris". This loss over the life of the tyre amounts to some 10% of the tyre weight. The impact of these particles has been the subject of study for some years, with tests in independent laboratories showing that the tyre debris is substantially innocuous.

As stated in the previous Environmental Report, Pirelli has undertaken a research project on tyre debris with the Milan Bicocca University Department of Environmental Science.

This two year project came to a conclusion in May 2001, with the following results:

- 1) characterisation of the shape and dimensions of tyre debris by identifying the granular and morphological classes of the particles, and by determining their fractal indices;
- 2) chemical characterisation of tyre debris with the aim of identifying specific markers;
- 3) development of a protocol for the identification and quantification of tyre debris in the environment, by using the characterisation described in 1) and 2);
- 4) determination and calibration of a distributive model to simulate the dispersion of tyre debris on the ground and in the air;
- 5) assessment of the environmental impact of the debris, via the development of an elution test, followed by ecotoxicity tests on the eluate.

Zinc Oxide

Zinc oxide has a key role in tyre compounds as the initiator of the vulcanisation process. Recently concern has been expressed about the possible effects from release into the environment of zinc contained in rubber products, in particular release into the aquatic environment. At present the European Commission is carrying out a Risk-Assessment with the objective of understanding if any hazards are related to this substance. Pirelli, together with the main producers and other users of Zinc Oxide, is committed to give technical support to the Commission.

Environmental Vendor Rating

"Vendor Rating" is the Pirelli tool for qualifying suppliers, and the environmental performance of the supplier has a weighting amounting to 9% of the total. The assessment is carried out by questionnaire covering quality, R&D, commercial and technical assistance, etc as well as environmental performance. The objective of the assessment is to stimulate an increased concern for the environment along the supply chain, to support the environmental objectives of Pirelli.

In 2001 Vendor Rating was completed for the main suppliers of raw materials for the Tyre Sector (59 suppliers and 76 plants). The findings show that more than 30% of suppliers have plants certificated to ISO 14001. Among the remainder, about 60% already have an environmental management system, and certification is planned for 2002/2003. In addition, the majority of suppliers (more than 70%) have carried out environmental impact studies on the products supplied to Pirelli.

Tyre Sector
Sector Activities
Production and quantitative data

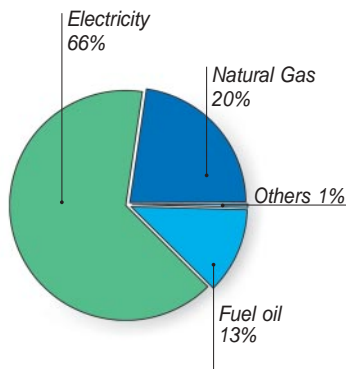
PRODUCTION AND QUANTITATIVE DATA

Tyre Sector

The range of Pirelli products includes car tyres (standard, high performance and sports), tyres for offroad vehicles, goods vehicles, buses, and motorcycles. The main process phases and the main inputs and outputs are shown in the figure.

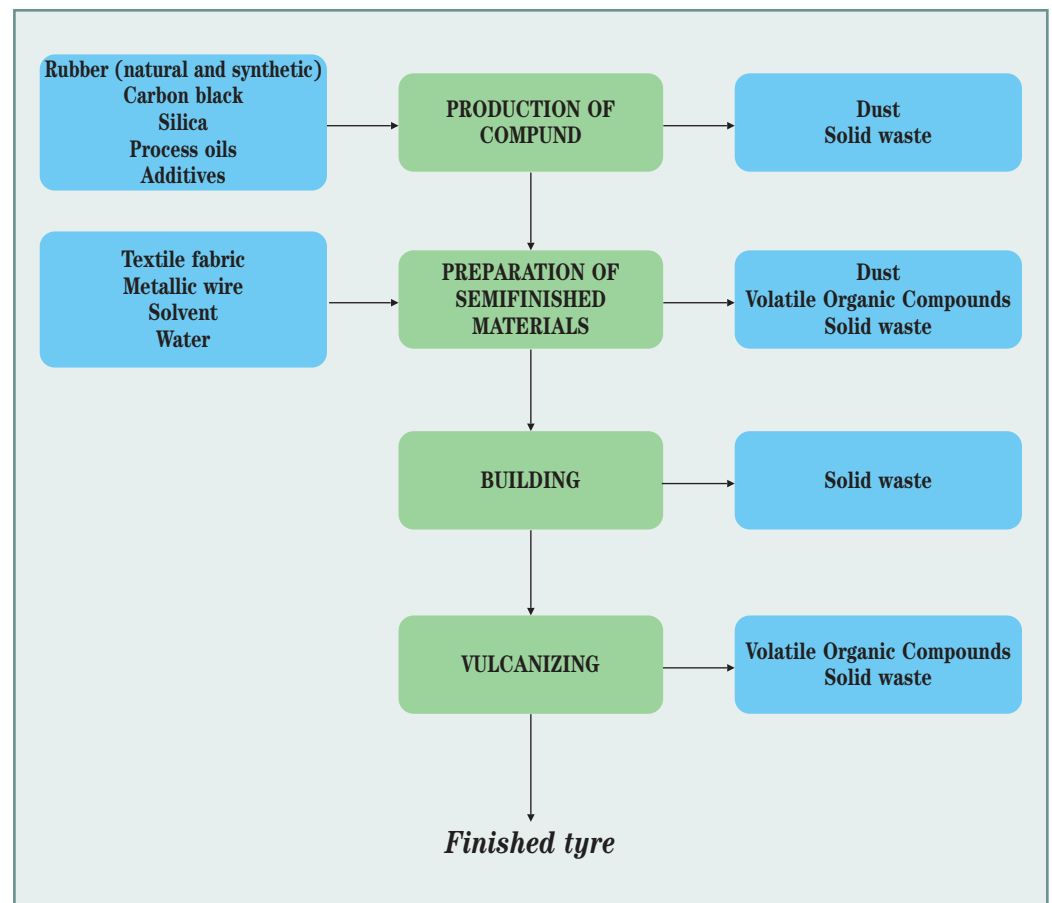


Pirelli is engaged at the single tyre manufacturer Ferrari Challenge championship.



Energy consumption by energy source for Tyre Production Units (2001)

Principal production phases and main inputs and outputs in tyre production



Tyre Sector

Sector Activities

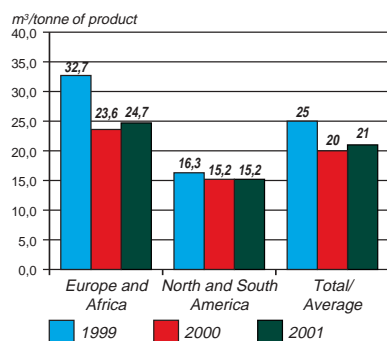
Production and quantitative data

QUANTITATIVE DATA

More than 95% of water consumption is used for cooling and the production of steam. The rest is used for general and sanitary purposes.

The differences in consumption of water per unit tonne of product in the different geographical areas results partly from the different production mixes, and in part from differences in the level of water recycling within the various units.

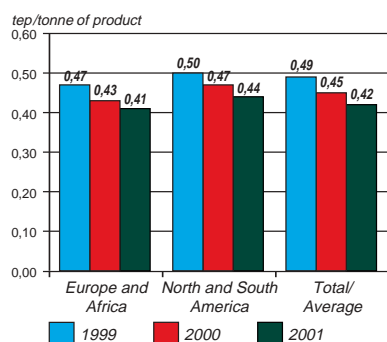
As there is no discharge of process water, the polluting impact is negligible. Nevertheless all Pirelli Tyre Sector Units carry out regular checks of waste water discharge to ensure conformity with regulations.


Water consumption by tyre production units¹⁴

	1999		2000		2001	
	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product
Europe and Africa	9,613	33	8,072	23.6	8,798	24.7
North and South America	4,118	16.3	4,284	15.2	3,865	15.2
Total/Average	13,731	25	12,356	20	12,663	21

¹⁴ 1999: excluding Egypt (1 Operating Unit) – a new acquisition.

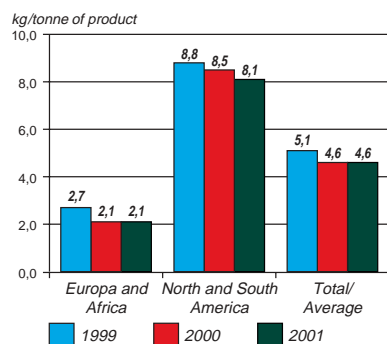
Energy consumption per tonne of product shows a trend of continuous reduction due to savings and maintenance in the plants.


Energy consumption in tyre production units¹⁴

	1999		2000		2001	
	1000 tep	tep/tonne product	1000 tep	tep/tonne product	1000 tep	tep/tonne product
Europe and Africa	138	0.47	148	0.43	146	0.41
North and South America	127	0.50	133	0.47	111	0.44
Total/Average	265	0.49	281	0.45	257	0.42

¹⁴ 1999: excluding Egypt (1 Operating Unit) – a new acquisition.

The process changes associated with the introduction of the new product ranges has brought with it a substantial reduction in solvent consumption, by eliminating them totally from the painting and building stages. In South America, where a large part of the market still demands cross-ply tyres as well as tyres for agricultural purposes, consumption of solvents is higher, even if the specific consumption shows a constant reduction.


Solvent consumption in tyre production units^{14 15}

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe and Africa	785	2.7	715	2.1	734	2.1
North and South America	1,997	8.8	2,164	8.5	2,047	8.1
Total/Average	2,782	5.1	2,879	4.6	2,781	4.6

¹⁵ 2000: excluding one American plant.

Tyre Sector
Sector Activities
Production and quantitative data

As already explained, for 2001 Pirelli has redefined the basis for the collection of data for waste. All waste is now included. In the past waste which was recycled (within Pirelli and externally) had been excluded, as had, in some cases, packaging waste. It has not been possible to revise the historical data, so the data for 2001 represents a discontinuity.

While a proportion of the apparent increase in waste generation can be ascribed to the wider definition, it is also true that data collection has, with experience, improved considerably. Thus the data for 2001 represents a much more comprehensive picture.

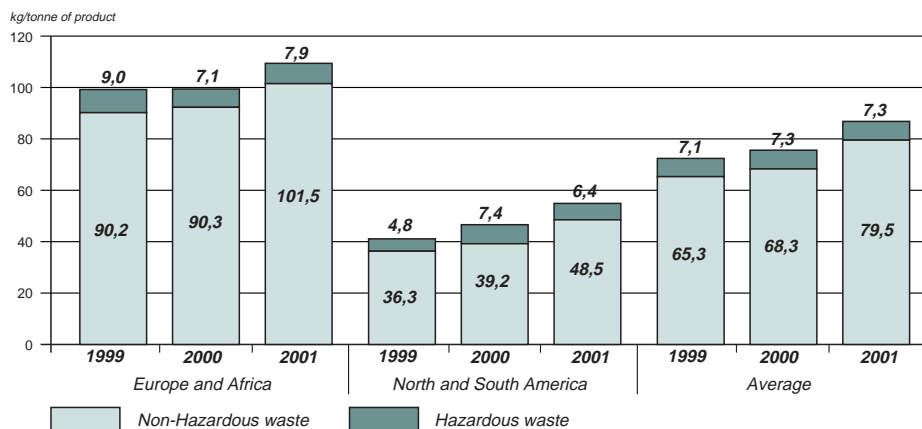
**Hazardous Waste produced by the tyre production units
(classified according to the categories of the European Union)¹⁴**

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe and Africa	2,639	9.0	2,442	7.1	2,823	7.9
North and South America	1,223	4.8	2,085	7.4	1,628	6.4
Total/Average	3,862	7.1	4,527	7.3	4,451	7.3
% recycled	n.a.		n.a.		6.2	

**Non-Hazardous Waste produced by the tyre production units
(classified according to the categories of the European Union)¹⁴**

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
Europe and Africa	26,525	90.2	31,537	92.3	36,207	101.5
North and South America	9,171	36.3	10,999	39.2	12,289	48.5
Total/Average	35,696	65.4	42,536	68.3	48,496	79.5
% recycled	n.a.		n.a.		23.7	

¹⁴ 1999: excluding Egypt (1 Operating Unit) – a new acquisition.



Tyre Sector

Sector Activities

Production and quantitative data

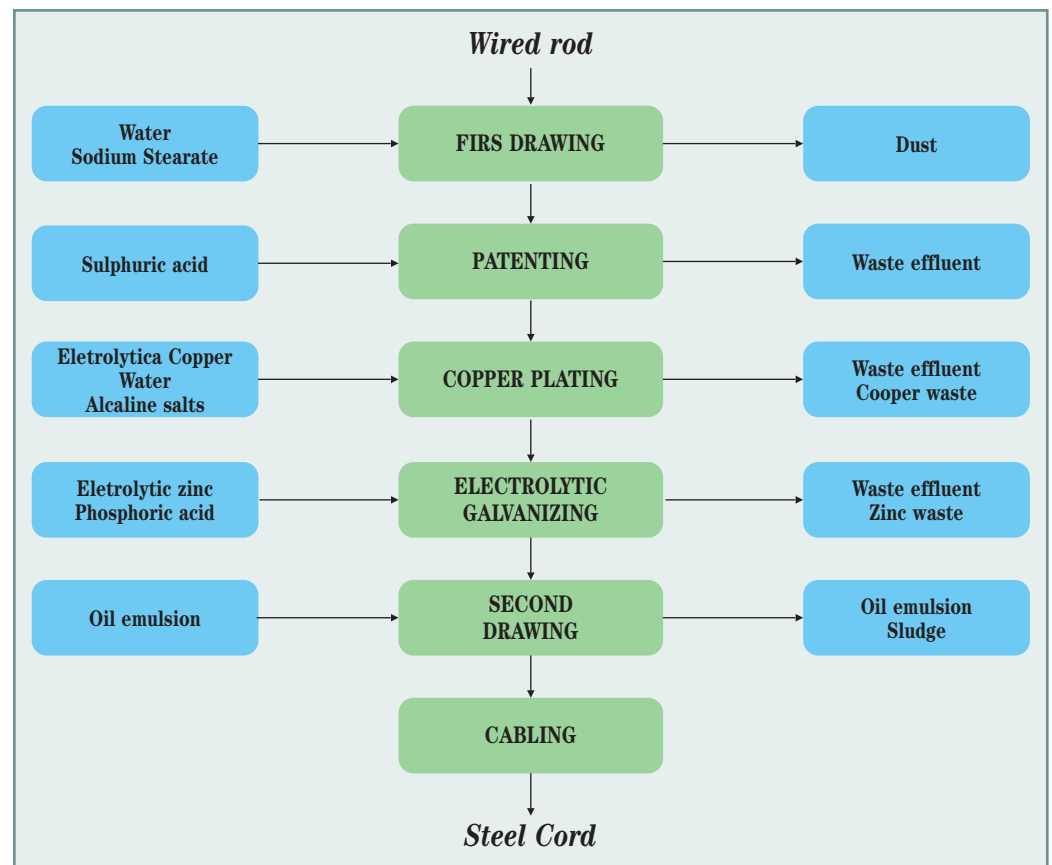
Steel Cord

Steel cord is an intermediate product used in metallic fabrics and beads. It is produced in 4 Operating Units - in Italy, Turkey, Germany and Brazil. Although this production represents only 4% of Tyre Sector revenues, it is included separately in the Report because of the environmental relevance of its manufacturing process.

Process water is one of the most significant environmental aspects of the production of steel cord. It derives mainly from washing the metal wire and from the galvanic baths for treatment of the wire surface. The potential impact on the environment, mainly due to heavy metals (copper, iron, lead), is limited through the use of purifying and recycling equipment, and treatment of waste water.

A study has been carried out by the Operating Unit in Figline Valdarno, Italy, of the environmental impact of waste water on the receiving body (the river Arno) in collaboration with the University of Milan. This has shown that the impact is, in practice, negligible.

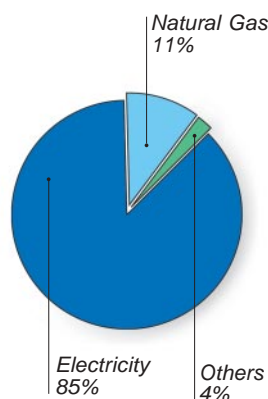
Principal production phases and main inputs and outputs for the production of steel cord



Tyre Sector

Sector Activities

Production and quantitative data



Energy sources used by Steelcord Production Units (2001)

QUANTITATIVE DATA

Steel cord production involves a substantial consumption of process water, in the galvanic baths.

Water consumption by the steelcord production units

	1999		2000		2001	
	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product	1000m ³	m ³ /tonne product
	1,413	12.4	1,420	11.6	1,502	11.7

For water discharge, to give an indicative value, the levels of the principal pollutants at the Operating Unit in Figline Valdarno, Italy, are reported.

Average values for the main pollutants in the water discharge from Figline Valdarno (Italy)

	Average values (mg/l)	Legal limits (mg/l)
COD	27.8	160
Copper	0.069	0.10
Zinc	0.124	0.50
Lead	0.075	0.20
Boron	1,458	2

The production technology also gives rise to higher energy consumption (especially of electricity) when compared with other Pirelli production technologies.

Energy consumption of the steelcord production units

	1999		2000		2001	
	1000 tep	tep/tonne product	1000 tep	tep/tonne product	1000 tep	tep/tonne product
	62	0.62	64	0.59	67	0.61

Waste

The figures reported in 1999 and 2000 have been updated with more precise values. The difference, compared with data published in 2000, is mainly due to the re-classification of some types of waste (previously considered hazardous, now reclassified as non-hazardous, following clarification of the law.) In addition, the redefinition by Pirelli of data collection principles for waste (previously described) applies also to steelcord.

Hazardous Waste produced by the steelcord production units (classified according to the categories of the European Union)

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
total	10,618	107	11,432	105	5,549	50
% recycled	n.a.		n.a.		20	

Tyre Sector
 Sector Activities
 Production and quantitative data

**Non-Hazardous waste produced by the steelcord production units
 (classified according to the categories of the European Union)**

	1999		2000		2001	
	tonne	kg/tonne product	tonne	kg/tonne product	tonne	kg/tonne product
total	861	8.7	943	8.7	7,920	71.4
% recycled					20	

The percentage of recycled non-hazardous waste is subject to considerable variation. This is due to the variability of demand by agriculture and the brick production industry for the sludge from the water treatment plant. If all had been recycled in 2001, the percentage recycle would rise to around 64%.



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