



# Environmental Commitment and Performance

**Bridgestone Europe**



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## BRIDGESTONE EUROPE ENVIRONMENTAL REPORT

**Bridgestone Europe** has always strived to improve the **environmental performance** of both its manufacturing processes and products. Thanks to this commitment, Bridgestone Europe has been able to respond better and faster to the growing demand from customers and stakeholders for environmentally sensitive factories and tyres. **The aim of the company is to provide high quality products, where environmental performance is achieved without compromising safety and product service levels.**

With this report, Bridgestone Europe intends to communicate to its stakeholders the **commitment** and **efforts** it has made to guarantee the environmental quality of its products.



The data are based on Bridgestone Europe tyre design and production only.





1. Bridgestone Europe Headquarters, Brussels
2. European Proving Ground, Rome
3. Nong Khae Proving Ground, Thailand.
4. Bridgestone Corporation, Headquarters, Tokyo



## BRIDGESTONE IN BRIEF

### BRIDGESTONE CORPORATION:

Established in 1931 and headquartered in Tokyo, Bridgestone Corporation is the parent company of the group. Its subsidiaries Bridgestone Americas Holding, Inc. and **Bridgestone Europe NV/SA** have extensive operations in their markets.

Bridgestone has also built a large presence throughout the world, with tyres accounting for 80 percent of group sales. In diversified operations, the group's business spans industrial rubber and chemical products, office equipment components, sporting goods, and bicycles. The Bridgestone Group markets its tyres and other products in more than 150 nations.

Bridgestone operates 58 tyre plants, 107 plants for diversified products and raw materials, and 5 technical centres in 26 nations around the world. (01-04-2007)

Bridgestone employees number **126.326 worldwide** (31-12-2006).

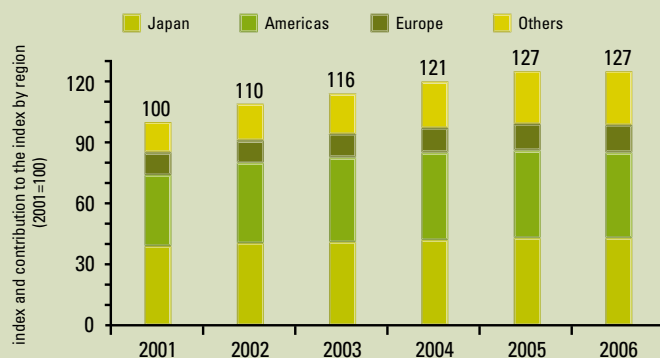
### BRIDGESTONE EUROPE:

**Bridgestone Europe NV/SA** is a key regional division of Bridgestone Corporation and develops, manufactures, tests and sells tyres, both as original equipment to vehicle constructors and for the replacement market. Products are also exported outside Europe, including to Japan.

Bridgestone Europe employs **12.181** staff in 17 European countries and achieved a turnover of **€2.67 billion in 2006**.

- > 17 national sales companies
- > 6 tyre manufacturing plants in France (1), Italy (1), Spain (3), Poland (1). Two new plants are under construction in Hungary (2008) and Poland (2009)
- > 2 intermediate product factories (Spain and Belgium) and 7 retreading facilities
- > a major R&D and testing centre in Italy and state-of-the-art Proving Ground opened in 2004
- > 3 European logistics centres (Belgium, Czech Republic and Spain)
- > European headquarters in Brussels

### Recent years production index



### FINANCIAL HIGHLIGHTS

(million US\$)	2006
<b>Net sales</b>	25.100
<b>Operating income</b>	1.602
<b>Net income</b>	714

TYRE PLANT LOCATION	START OF OPERATIONS	PLANT SITE AREA	PRODUCTS
1. <b>Béthune</b> , France	1960	351.000 m <sup>2</sup>	Tyres for passenger cars
2. <b>Bari</b> , Italy	1962	310.000 m <sup>2</sup>	Tyres for passenger cars
3. <b>Bilbao</b> , Spain	1932	102.000 m <sup>2</sup>	Tyres for trucks and buses
4. <b>Puente San Miguel</b> , Spain	1965	100.000 m <sup>2</sup>	Tyres for light truck vehicles, trucks and buses, agricultural machines and construction and mining vehicles.
5. <b>Burgos</b> , Spain	1967	297.000 m <sup>2</sup>	Tyres for passenger cars and light trucks
6. <b>Poznan</b> , Poland	2000	140.000 m <sup>2</sup>	Tyres for passenger cars
7. <b>Tatabanya</b> , Hungary	2008	660.000 m <sup>2</sup>	Tyres for passenger cars
8. <b>Stargard</b> , Poland	2009	1.000.000 m <sup>2</sup>	Tyres for trucks and buses



1 - 2. Following more than a year of design and rebuilding, Bridgestone Corporation engineers used their skills and knowledge of rubber products to create a prosthetic fin which has brought a dolphin (Fuji) back to life.

## THE ENVIRONMENTAL COMMITMENT

Bridgestone manages environmental, health and safety issues as integral and important parts of all its business activities.

All tyres manufactured by Bridgestone Europe NV/SA are from plants certified according to the **ISO14001\*** standard, where environmental improvement programmes are defined annually.

Bridgestone Europe is one of the leading companies implementing an ISO14001 certified "**Product Oriented Environmental Management System (POEMS)**" in its European Tyre Design Centre. POEMS was introduced in 2002 to identify tyre design environmental features and apply continuous improvement activity in product environmental performance.

The commitment of Bridgestone to the environment is set out in the Environmental Policy Statement, available at:

<http://www.bridgestone.eu>

### GLOSSARY

#### \*ISO14001

The ISO (International Organisation for Standardisation), is the world's largest developer of standards: a voluntary, non-governmental network of national standards bodies from 157 countries. The ISO 14001 standard specifies requirements for an Environmental Management System (EMS) to enable an organisation to develop and implement environmental policy and programmes.



# ECO-DESIGN: “POEMS”

## Product Oriented Environmental Management System

The environmental impact of tyres (from raw material processing to final disposal of the product) depends mostly on product **design** and **use**.

The Bridgestone **Product Oriented Environmental Management System (POEMS)** organises the efforts of different functions, competencies and resources towards a common goal: to continuously improve the environmental performances of our tyres. This tool has the required effectiveness, flexibility and simplicity to be applied in the dynamic and challenging working environment associated with the design activity of a key safety product such as the tyre.

### WHAT DOES POEMS DO?

POEMS starts with the identification and assessment of the environmental impact of a tyre. This “picture” of the situation is called **LCA** (Life Cycle Assessment) and was created in 2001. The tyre **LCA\*** shows that the **use** of the tyre is a key phase affecting the environment and POEMS has since been implemented to improve the design of tyre environmental parameters affecting tyre use (noise, rolling resistance, wear).

### HOW DOES POEMS WORK?

Some examples of POEMS applications are:

- Continuous monitoring and identification of environmental **requirements and expectations from customers**.
- Identification of responsibilities and operational activities for verifying and maintaining the product in line with **all applicable laws** and even **anticipating** future environmental requirements.
- Setting up practical **programmes for environmental improvement** outlining the responsibilities, time frame and necessary resources, while continuously setting challenging goals.
- Applying procedures to environmental **material and compound design**, in addition to the continuous control of environmental aspects of tyre ingredients in co-operation with suppliers.
- Effective **training** on environmental aspects for all personnel working in tyre design.

### HOW DOES BRIDGESTONE EUROPE ENSURE THE EFFECTIVENESS OF THIS SYSTEM?

Environmental performances connected with tyre use are tracked and continuously assessed using accurate measures (e.g.: tyre noise, wear index,...).

This activity is carried out in accordance with the ISO14001:2004 standard applied for design activities implemented in the European Design Centre, and certified by Lloyd's Register Quality Assurance.

By applying the POEMS approach, Bridgestone Europe ensures that tyre environmental impact is reliably controlled from the beginning of the product concept through to completion of the entire design process, including key factors such as material selection and tyre geometry.



## GLOSSARY

### \*LCA

Life Cycle Assessment is a technique to evaluate the total environmental impact, in terms of resources used and releases, of the product from cradle to grave: raw materials extraction, manufacturing, transportation, distribution, use, re-use, maintenance, recycling, and final disposal of the product.



# THE ENVIRONMENTAL BALANCE OF A TYRE

The Life Cycle Assessment (LCA) study conducted by the European Tyre and Rubber Manufacturers' Association in 2001 applies to a representative European passenger car tyre, based on data from various countries and tyre brands in Europe. It does not therefore apply to truck tyres or specific Bridgestone car tyres although, as a member of the Technical Working Group, Bridgestone played an active role in the study.

## THE LIFE CYCLE PHASES

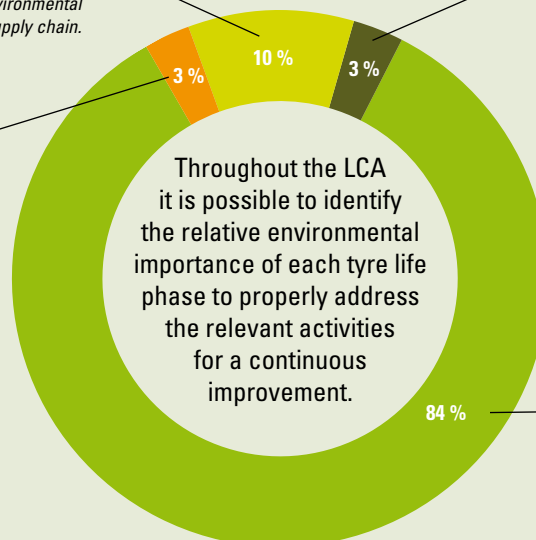
RAW MATERIALS

PRODUCTION

USE

END OF LIFE

- 1. Impact of tyre Raw Materials**  
The choice of ingredients is very important, including the promotion of an environmental oriented supply chain.
- 4. Impact of End of Life tyres**  
New uses for old tyres through the responsible involvement of users, dealers, tyre manufacturers, waste transporters and recyclers.



- 2. Impact of Tyre Production**  
Environmental improvements in the Bridgestone manufacturing process are continuously reducing the environmental load at production.

- 3. Impact of Tyre Use**  
Eco Design is the Bridgestone approach: special technologies developed to minimise the environmental impact during tyre use (fuel consumption, wear, noise), while continuing to maximise safety performance (braking in both wet and dry conditions, handling...). The user also plays a role in this phase, by constantly verifying tyre condition.

Throughout the LCA it is possible to identify the relative environmental importance of each tyre life phase to properly address the relevant activities for a continuous improvement.

The **use phase** makes the largest contribution to the environmental load in the life of a car tyre. The **end of life-phase** makes a relatively low contribution to the overall load of the life cycle and has a lower impact than the **raw material** and tyres **production phases** as a whole.

## THE EUROPEAN TYRE Life Cycle Assessment (LCA) STUDY

### Is the study available?

Yes, the study is available upon request.

### Where can I get it?

Do not hesitate to contact us for a copy, by simply writing to [environment@bridgestone.eu](mailto:environment@bridgestone.eu)

The contribution of new tyre distribution transport and end-of-life collection transport has little significance compared to the other stages of the life cycle.

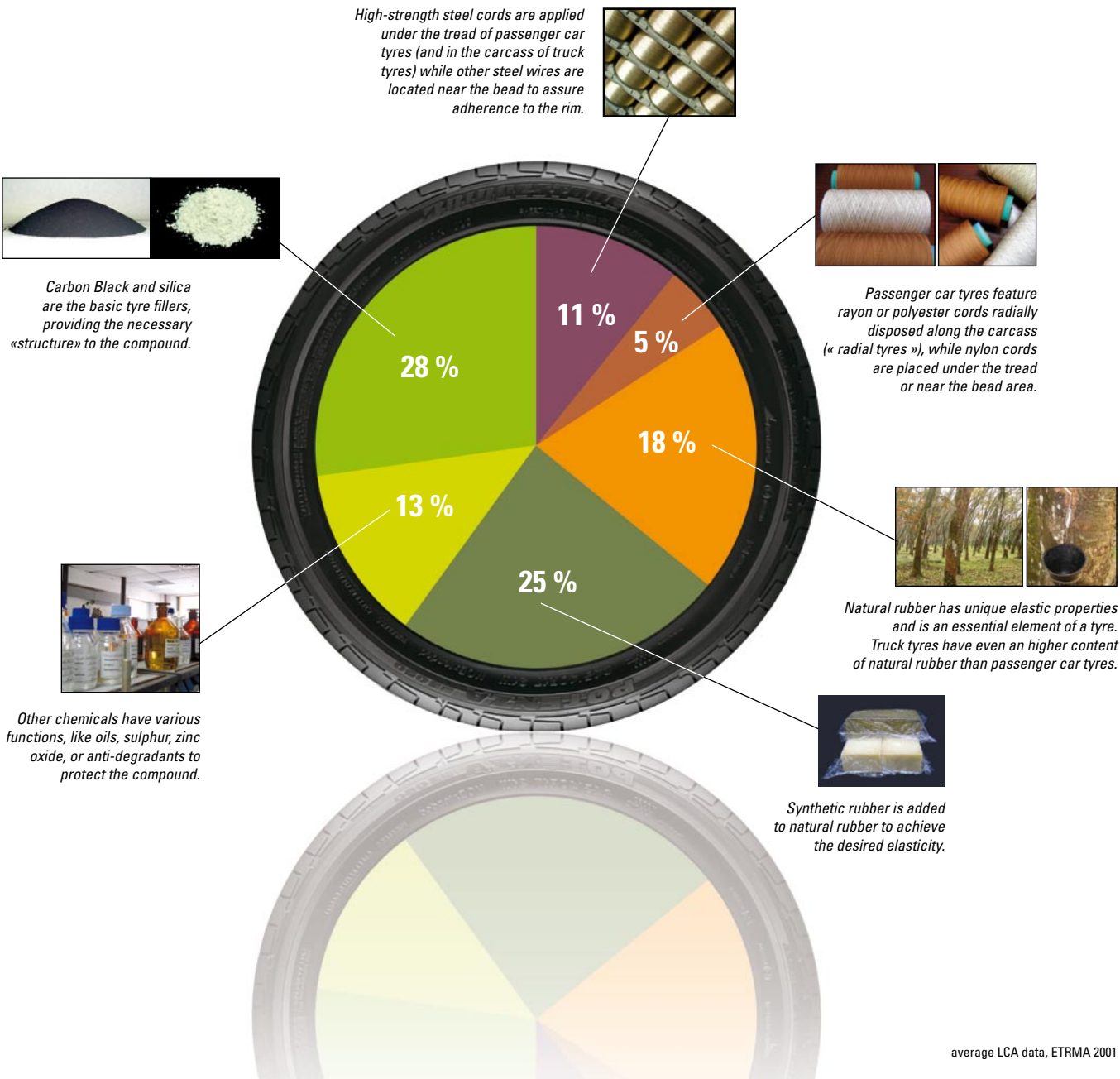
The following sections describe the environmental impact of each life phase of a tyre.





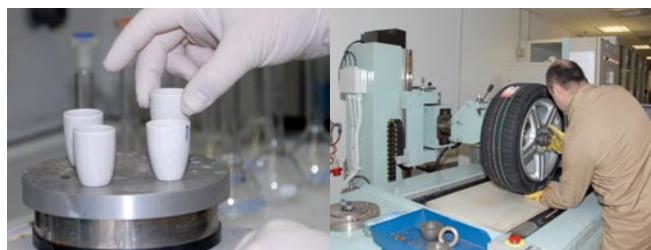
# 1. ECO-DESIGN: THE CHOICE OF INGREDIENTS

A passenger car tyre consists of synthetic and natural rubber, to which a range of specific substances is added, to ensure performance, durability and safety.



average LCA data, ETRMA 2001





## RAW MATERIALS IN BRIDGESTONE TYRES

Bridgestone relies on **in-house** supply capabilities for a part of its natural rubber, synthetic rubber, carbon black and steel cord.

Raw materials used in the manufacturing process:

- > Natural rubber
- > Synthetic rubber
- > Carbon black
- > Textile
- > Vulcanising agents
- > Softening agents (oil)
- > Steel wire
- > Synthetic silica
- > Zinc oxide
- > Sulphur
- > Other substances, anti-degradants

Rubber represents more than **40% of all components** used in passenger car tyres.

Natural rubber is obtained from rubber trees; synthetic rubber is generally produced from petroleum and natural gas.

Within the framework of POEMS, environmental criteria are a factor in the selection of suppliers and their compliance with legal and other requirements through the chain is strictly verified by Bridgestone Europe. A supplier with ISO14001 certification receives a selection advantage through a ranking system.

European legislation prohibits the use of so-called "aromatic" oils in tyres from January 2010 (Directive 2005/69/EC of 16 November 2005, see section on "Regulatory framework"). This has induced oil and tyre producers to research and develop alternative extender oils (see section 4, page 15).

**Bridgestone Europe is striving towards more environment-friendly materials by continuously implementing programmes aimed at developing new materials with lower environmental impact.**

## THE RECYCLED CONTENTS IN NEW TYRES

### How do we make material from a recycled tyre ?

*Crumb rubber is generated by grinding the waste rubber of used tyres. This material can then be used in several ways, including as raw material for new tyres.*

### Can tyres made from recycled materials guarantee the same performance as tyres made from new raw materials?

*Using a level of recycled contents in tyres generally shows negative effects on tyre wear and rolling resistance, and thus on fuel consumption, due to a loss of chemical reaction in the material. The limited and unstable supply of high-quality crumb rubber, and recycled materials in general, restricts the recycled content in tyres. It should be noted however that most of the zinc oxide used in tyres comes from recycled zinc.*

### Does Bridgestone use recycled material in its tyres?

*Bridgestone Corporation utilises a small proportion of post-consumer recycled tyre material in its tyre lines.*



## CAREFUL CONTROL

*The development of new materials is a core task at the European Design Centre. The aim is to develop new compounds and reinforcing materials that are able to offer outstanding on-road performance while respecting our high environmental standards in terms of fuel consumption, wear and noise level (see following pages). The use of innovative chemicals in this process is carefully controlled by detailed procedures that verify their suitability in terms of environmental and legislative requirements. Maintaining a vision over the full product life cycle is essential to drive and correctly prioritise design choices.*

RAW MATERIALS

PRODUCTION

USE

END OF LIFE

## 2. ENVIRONMENTAL IMPROVEMENTS IN THE BRIDGESTONE MANUFACTURING PROCESS...

The trends shown in the following charts refer to the four Bridgestone Europe passenger car tyre plants located in Spain, Italy, France and Poland.

Data refer to Bridgestone Europe passenger car tyre factories for the year 2006.

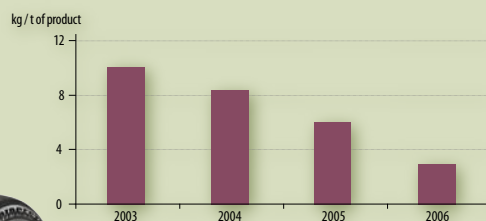
### INPUT

#### Energy

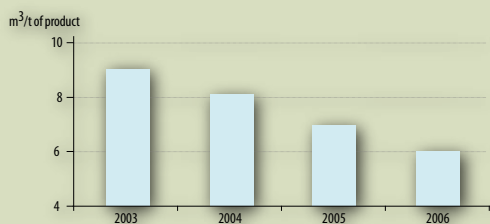


### OUTPUT

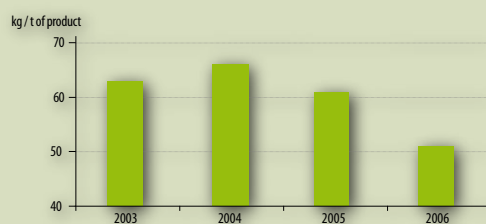
#### Volatile Organic Compounds emissions\*



#### Water



#### Wastes



**Source:** Data Bridgestone (Technical Center Europe).

The environmental management system allows Bridgestone to:

- > identify the environmental aspects of its products
- > determine those aspects with significant impact on the environment
- > control them by internal procedures.

All Bridgestone Europe tyre plants are ISO 14001:2004 certified by Lloyds' Register Quality Assurance and the above improvement programmes are carried out and verified within the framework of this standard.

\*Volatile Organic Compounds as defined by the EU Directive 1999/13/EC («Solvents Emission Directive»)



1. High efficiency co-generation facilities (heat & electricity production) are being installed in many Bridgestone factories worldwide

2. Bridgestone also produces energy from end-of-life tyres in its power plant in Tochigi, Japan (Bridgestone patent)

## PRINCIPAL ENVIRONMENTAL FEATURES OF BRIDGESTONE EUROPE TYRE PLANTS

### Energy consumption

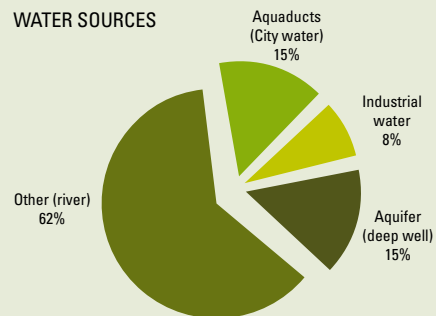
Bridgestone Europe attaches great importance to energy management and the research of efficient energy use.

The introduction of co-generation (the production of electricity and useful energy simultaneously from a common fuel source) enabled energy consumption per ton of finished product to decrease in all plants from 17 GJ/t in 1990 (Kyoto Protocol reference year) to approximately 8,9 GJ/t in 2006. This reduction has contributed to the reduction of greenhouse gas emissions associated with manufacturing.

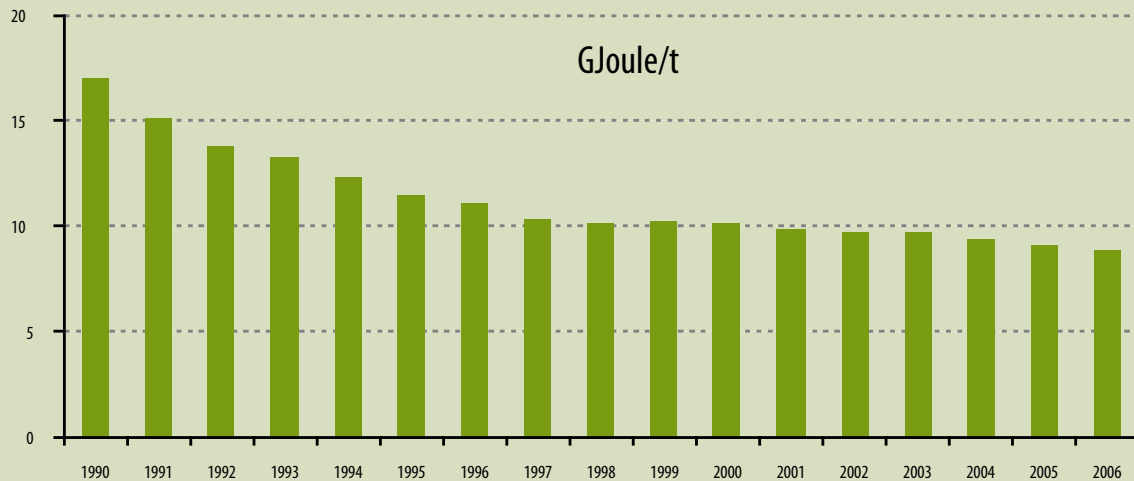
### Water consumption

In 2006, Bridgestone Europe utilised 6 m<sup>3</sup>/t of water.

Only 15% of this piped water came from deep wells. Other sources included surface water, aqueducts and industrial water.



Energy consumption/tons of product since 1990, all European tyre factories (passenger and truck tyres)



## GLOSSARY

### **GJ:**

GigaJoule is the unit of measurement for energy.

### **GJ/t:**

the amount of energy used to produce one ton of tyres.





### **Industrial wastes**

The main typologies of waste produced by Bridgestone Europe plants are out-of-spec rubber, textile and metallic wastes, vulcanised tyres, raw material packaging, dust from indoor testing and trimming, and wood from pallets and other materials.

In 2006, almost **64%** of waste was recycled or thermally valorised.

### **Use of solvents: emissions of VOC (Volatile Organic Compounds)**

In 2006, Bridgestone Europe tyre plants produced an average of less than **3 kg VOC\*/ton** of tyre. The European Directive 1999/13/EC of March 1999 sets a limitation for VOC emissions due to the use of organic solvents in stationary commercial and industrial sources, including rubber industry plants, when their consumption exceeds threshold levels set by the Directive. As a consequence, the quantity of emissions from Bridgestone Europe plants has continuously decreased in recent years, by investing in technologies that lead to reduction in the use of solvents, rather than installing VOC burning devices (consuming fuel and generating CO<sub>2</sub>).



### ***THE EUROPEAN SEVESO DIRECTIVE***

*As a consequence of a major environmental disaster in Italy in 1976, and following other accidents in several types of industries, the European Union issued legislation that requires special accident prevention and control measures for factories storing certain levels of defined chemicals. Recently (European Directive 2003/105/EC), these limits have been further reduced and Bridgestone tyre plants have successfully implemented a storage optimisation programme in order to minimise the warehousing of chemicals specified by the Directive.*

<b>2006</b>	<b>%</b>
<b>Total industrial wastes sent to</b> material recycling + energy recovering	<b>63,6</b>

**Source:** Bridgestone data

### **GLOSSARY**

#### **\*VOC:**

VOC Volatile Organic Compounds are those associated with the evaporation of solvents used in rubber processing as defined by EU Directive 1999/13/EC.



### 3. ECO-DESIGN: THE RESULTS OF THE POEMS PROCESS. BRIDGESTONE ENVIRONMENTAL TECHNOLOGIES FOR YOUR TYRES

#### NOISE

***Noise Reduction Technology** has been introduced by Bridgestone to achieve the lowest possible noise emission by optimisation of the tread pattern design.*



#### WEAR PERFORMANCE

Wear is the result of friction between the tyre and the road surface. It causes loss of tyre tread depth.

***JOINTLESS Technology** improves high-speed handling, durability and uniformity.*



***FLAT FORCE BLOCK Technology** features an improved tread-block design that provides more uniform contact pressure, resulting in a smoother ride.*



#### ROLLING RESISTANCE

*Tyre rolling resistance, affecting fuel consumption, is related to both tyre design and tyre inflation pressure.*

***SILICA Technology** improves grip and road holding, especially in wet or low temperature conditions. Silica also significantly reduces energy loss from the tread compound, thus reducing rolling resistance.*



***HA OIL-FREE COMPOUND** is an environment-friendly compound in which the extender oil is compliant with EU legislation applicable starting 2010 (so called High Aromatic oil has been eliminated.)*



Additional information available at [www.bridgestone.eu/tyres/](http://www.bridgestone.eu/tyres/)

#### Environmental effects in use phase

The LCA study for passenger car tyres assessed the following key tyre environmental aspects related to the use phase:

- > Rolling resistance
- > Wear performance
- > Noise

Bridgestone Europe's tyre design process is under the umbrella of ISO 14001: 2004, certified by Lloyds' Register Quality Assurance and the above improvement programmes

are carried out and verified within the framework of this standard. This certification implies striving for continuous evolution in the environmental performance of the product.

The above environmental technologies are available on several Bridgestone tyres, together with other performance related technologies. Check the Bridgestone Tyre Range at the above web link for identifying your ideal tyre.



## FOCUS ON HEAVY-DUTY VEHICLE ENVIRONMENTAL PERFORMANCE: HOW BRIDGESTONE TYRES HELP REDUCE FUEL CONSUMPTION.

Recent studies by Bridgestone on truck tyre performance reveal how longer tyre wear-life reduces fuel consumption.

For example, fuel accounts for approximately 21% of commercial fleet operating costs in Europe, with tyres representing around 2%. So in addition to benefiting the environment, reduced fuel consumption is also important to fleet operators.

Major factors which can reduce fuel consumption include:

- > vehicle and tyre maintenance standards
- > vehicle aerodynamics
- > driving style
- > operational variables (speed, route, load, ...)
- > uncontrollable variables (weather, road surface, ...)
- > tyre rolling resistance



### WHAT IS TYRE ROLLING RESISTANCE?

Rolling resistance is the force required just to roll a tyre. It exists because a tyre deforms when rotating, resulting in energy losses in the form of heat. Air resistance and friction between tyre and road add further to the rolling resistance.

- > The higher the tyre rolling resistance, the more fuel is required to move the vehicle forward.

### BRIDGESTONE SOLUTIONS

For example, with Bridgestone truck tyres:

- > rolling resistance significantly decreases over the full tyre service life
- > high performance of tyre service life: commercial fleets need fewer new tyres, reducing the disposal of end-of-life tyres.

Bridgestone truck tyres are designed to provide a longer service life. Long-term testing shows that Bridgestone tyres last around 10% longer than comparable tyres from Bridgestone's competitors. This leads to lower average rolling resistance over the life of the tyre, with consequent benefits in terms of fuel consumption and vehicle emissions.



1. Just two in five consumers check their tyre pressure each month.

## 4. ECO-DESIGN: WE ARE ALL INVOLVED TOGETHER. YOUR CONTRIBUTION TO THE ENVIRONMENT

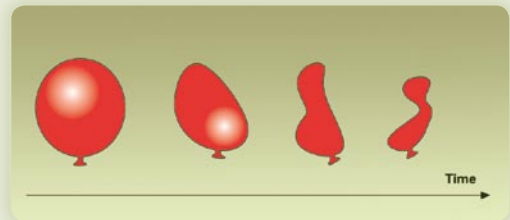
### ROLLING RESISTANCE

Through a joint initiative with the [FIA Foundation](#) in the “**Think Before You Drive**” campaign, Bridgestone Europe performed checks on **almost 30.000 vehicles in 19 European countries** in 2005 and 2006 and distributed tyre pressure and tread depth gauges. In addition, Bridgestone Europe distributed leaflets to encourage drivers to be more aware of basic safety measures, including the need to monitor their tyres and maintain them in good condition.

From the 30.000 inspections, Bridgestone Europe revealed that a significant proportion (42%) of vehicles had at least one tyre under-inflated and that only 6% of the vehicle population surveyed had correct pressures on all four tyres.

Unless it is regularly and properly maintained over a period of time, **a tyre tends to deflate** naturally. The general lack of attention to tyre pressure maintenance is the reason for a high proportion of cars having one or more tyres with lower than recommended inflation pressure. Under-inflation results in **increased rolling resistance** and consequently higher fuel consumption. Based on the above research results, 42% of vehicles have **increased fuel consumption** of 2.80%. As a result of under-inflation, 8,1 billion litres of extra fuel are burned per year, representing 9,5 billion euros on a yearly basis.

In Europe, the above total extra fuel consumption is equivalent to **18.4 million tons of CO<sub>2</sub> emission/year or 93.2 kg/year/car or 6,9 gr/km on average.**



### HOW DOES BRIDGESTONE IMPROVE TYRE ROLLING RESISTANCE PERFORMANCE?



Energy saving is an environmental aspect of primary importance for Bridgestone. Great efforts have been made to raise fuel economy by focusing on lowering tyre rolling resistance while ensuring good traction and handling at the same time. Bridgestone has developed and continues to develop new approaches to tyre design and innovative materials to reduce rolling resistance without compromising safety.

SILICA Technology improves grip and road holding, especially in wet or low temperature conditions. Silica also significantly reduces energy loss from the tread compound, thus reducing rolling resistance. Silica is an innovative reinforcing material in the tread compound, used wholly or partially as a substitute for carbon black.

### WHAT CAN YOU DO TO REDUCE ROLLING RESISTANCE?



#### > Maintain tyre pressure

You should inspect your tyres at least once a month as well as before every long journey and more frequently if specified in the vehicle manual. The correct pressure information can usually be found on the edge of the driver's door. Pressure should be corrected if it does not correspond to the recommended level. Pressure should be checked on cold tyres (tyres not having run for at least two hours or having run for less than 3 km at low speed). Hot tyres will show an increased pressure of approximately 0,3 bar. New technology featuring the innovative Tyre Pressure Monitoring System (TPMS) helps motorists maintain correct tyre pressure. A sensor inside the wheel or ABS system of the car measures the actual pressure and immediately warns the driver of low inflation via a dashboard display.





## WEAR PERFORMANCE

Friction of the tyre on the road surface ensures adherence (or “grip”) but results in wear which generates particles from the tread (“tyre debris”). The wear rate depends on both the design of the tyre and the driving style, as well as the micro-roughness of the road, the maintenance level of the vehicle and the tyre inflation pressure.

Incorrect tyre inflation pressure, especially **under-inflation in comparison to the manufacturer’s recommendations, accelerates the phenomenon of wear, and increases fuel consumption.**

Based on research conducted by Bridgestone Europe in 2006, **55,6 million** tyres/year are lost due to under-inflation representing **5 billion euros/year**. The higher the wear rate, the higher the generation of both tyre debris and end-of-life tyres.

In general, tyre debris adds little to the environmental load over the tyre life cycle and the contribution of tyre wear to total fine particle debris is known to be low.<sup>1</sup> Nevertheless, in an effort to further reduce the potential impact of tyres containing substances of special concern to the environment, European legislation prohibits the use of so-called “aromatic” oils in tyres from January 2010 (Directive 2005/69/EC of 16 November 2005, see section on “Regulatory framework”). This has induced oil and tyre producers to research and develop alternative extender oils.



Bridgestone Europe has developed **HA-oil free compounds** and is in the process of converting to aromatic-oil-free production within the timeframe set by the Directive<sup>2</sup>.

Oils are added to tyres to allow processing of the rubber compound. They are also an essential component of the tyre’s technical performance, particularly in the area of wear and grip properties.

The improvement of wear performance, while maintaining a balance in overall tyre performance, remains an environmental target.



### WHAT DOES BRIDGESTONE EUROPE DO TO IMPROVE WEAR PERFORMANCE?

Some Bridgestone products feature **FLAT FORCE BLOCK Technology**, where an improved tread-block design provides more uniform contact pressure, resulting in a smoother ride.



Moreover **JOINTLESS Technology** improves high-speed handling, durability and uniformity. It consists of a spiral winding of nylon overlays which constrains the belt package under the tyre tread.

### WHAT CAN YOU DO TO IMPROVE WEAR PERFORMANCE?



- > All tyres have tread wear indicators. These indicators appear in the main grooves when the tread has worn down to 1,6 mm, showing that the tyre needs to be replaced.
- > Responsible driving behaviour: most tyre wear is associated with severe cornering and high speed.
- > Checking tyre pressure is very important also for a good tyre wear performance.

1. About 1% of primary respirable particles (so called PM10: those below 10 µm diameter) emitted by all anthropogenic sources. In particular the contribution to total polycyclic aromatic hydrocarbons (PAHs) is regarded as not significant by the European Commission «Scientific Committee on Toxicity, Ecotoxicity and the Environment (CSTEE)» Opinion of 12-13/11/2003.

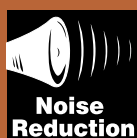
2. The HA oil free compound does not contain oils as identified in the European directive 2005/69/EC. These oils will be banned due to their content of certain PAHs.



## NOISE

Noise is an important effect of the tyre use phase. In Europe, tyre noise level is bound to comply with limits set by Directive 2001/43/EC.

Noise generated by tyres contributes to total vehicle noise but **its specific impact magnitude cannot yet be determined** because available data sets do not give a complete overview of the average noise emissions of model car tyres during the use phase. The differing results obtained by various studies show that there is a lot of uncertainty in the methods that have been used. However, traffic noise, of which car tyre noise is a partial cause, is a relevant environmental issue.

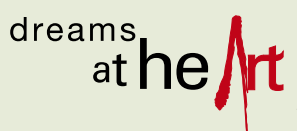


### WHAT DOES BRIDGESTONE DO TO REDUCE NOISE?

- > **Noise Reduction Technology** has been introduced by Bridgestone to achieve the lowest possible noise emission by optimisation of the tread pattern design.

### OTHER ADVICE....

- > Choose the right tyre. The choice of tyre should be made on the basis of vehicle characteristics (go to [www.bridgestone.eu](http://www.bridgestone.eu) to find the right tyre for your car).
- > Any repair must be performed by a tyre professional (go to [www.bridgestone.eu](http://www.bridgestone.eu) to find your nearest dealer).
- > Remember that irregular fuel consumption can be caused by mechanical anomalies, such as imperfect tyre balance, faulty brakes, inefficient shock absorption or incorrect geometry of the vehicle.



## TYRE SAFETY

Bridgestone Europe promotes initiatives to educate motorists on road safety. Some of these messages also have environmental significance, such as making the public aware of the importance of correct tyre maintenance to ensure optimal fuel consumption and wear performance.

### THINK BEFORE YOU DRIVE

is a global road safety initiative of the FIA Foundation, Bridgestone Corporation and national motoring associations. The campaign promotes simple road safety messages:

- > highlighting actions that take a few seconds but could save your life;
- > identifying the main risk factors that can result in serious or fatal crashes.

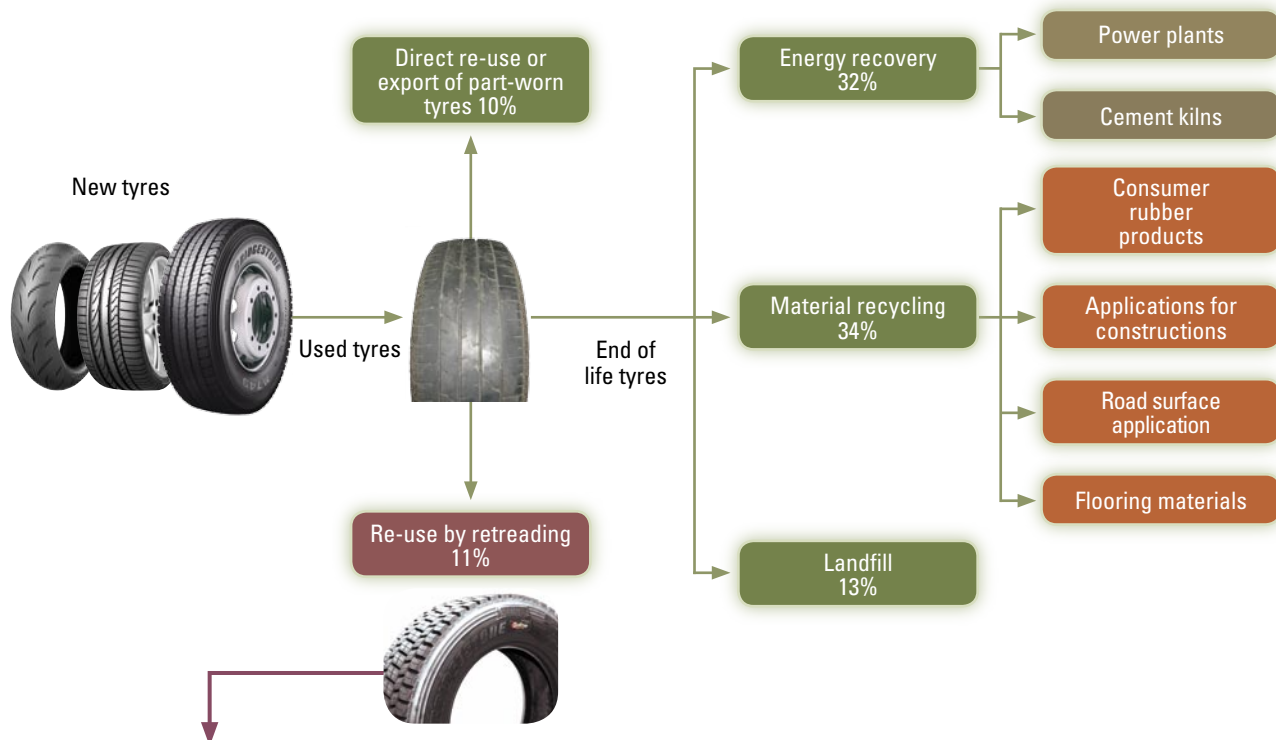
More information can be found at:  
at: <http://www.safetyatheart.eu/> and <http://www.dreamsatheart.eu>



## 5. NEW USES FOR OLD TYRES...

After the first use, a tyre still has a long way to go:

Source: EU25 tyre data, ETRMA, 2006



### What is a retreaded tyre?

A retreaded tyre is a tyre which has been given a second life. This is achieved by applying a new tread to the worn tyre.

### What are the features and advantages of a retreaded tyre?

- > **safety:** retreaded tyres are manufactured to very high standards, using highly sophisticated machinery and processes to ensure safety and performance.
- > **economy:** by re-using the worn out tyre, production costs are significantly reduced. Retreaded tyres are sold 25% to 50% below the price of a comparable new tyre.
- > **environment:** benefits from the extended life span of the tyre. Around 2/3 of a truck tyre are re-used before the material needs to be recycled or disposed of.



Bridgestone Europe aims to provide transport fleets with retreaded truck tyres that closely replicate the features of new Bridgestone tyres.

To meet this goal, the Qualitread product line – a wide range of sophisticated retreaded tyres – uses the best of Bridgestone compound and process technology to maximise the benefits of using Bridgestone tyres... Twice!

Visit [www.qualitread.com](http://www.qualitread.com) for any further information.





With appropriate processing,  
end-of-life tyres can be used as surfacing systems

#### Energy recovery

##### **How is energy recovered from tyres?**

A tyre can be used as alternative fuel thanks to its specific heat. Moreover this fuel has a low cost in comparison with classical fuels. The main utilisation of tyres in energy recovery is in cement plant furnaces, thermal power stations and incineration units. From the complete combustion of 1 ton of end of life tyres, 647 kg of the generated CO<sub>2</sub> is from biomass (natural rubber).

#### Material recycling

**Civil engineering** applications are the main recovery route for whole tyres. The applications vary from coastal protection, erosion barriers, artificial reefs, slope stabilisation, road embankments and landfill construction operations, sound barriers and insulation.

**Shredded tyres:** whole tyres are mechanically cut into shreds ranging in size from about 25 to 300mm. The Tyre Derived Aggregate (TDA) is used as foundation for roads and railways, as a draining material replacement for sand and gravels, landfill construction, subgrade fill and embankments, backfill for walls and bridges, and subgrade insulation for roads.

**Crumb and powdered rubber:** after the removal of the steel and fabric components, the remaining rubber is reduced to granular rubber and used in the manufacturing process of moulded objects such as the wheels of wheelbarrows or waste containers, sports facility and games area flooring, flexible parts for the car industry, noise barriers, road signs and accessories, roofing materials and camping equipment. Use in road surfaces has proved itself in terms of driving-noise reduction, aquaplaning risk reduction and service-life guarantee.

#### Landfill

##### **Is it possible to landfill tyres?**

The Landfill European Directive (1999/31/EC) prohibits the disposal in landfills of both whole and shredded tyres, from, respectively, July 2003 and July 2006, for tyres having a diameter of less than 1.4m. Countries have now improved their end-of-life tyre management systems to comply with this legal requirement. As a result, over the past decade, there has been a decline of landfilling in Europe from 62% of all tyres in 1994 to 13% in 2006.

In Europe «End-of-Life Tyres» are classified as non-dangerous waste. The management of end-of-life tyres varies depending on the individual country's legal framework. In general 3 schemes are in place in European countries:

- > **Producer Responsibility:** the tyre producer shall collect and organise the recovery/recycling.
- > **Liberal system:** after an end-of-life tyre is generated, the dealer shall select an authorised waste collection company for delivering the end-of-life tyre to recovery/recycling.
- > **Government responsibility:** the authority organises the collection and treatment of end-of-life tyres, financing the system through a tax.

Bridgestone Europe is a founding member of end-of-life tyres management joint companies in all countries where Bridgestone directly sells tyres and where the legal framework assigns the responsibility to the producers (e.g. ALIAPUR in France, SIGNUS in Spain, SDAB in Sweden,...). Producers or importers contribute to the common fund of the end-of-life-tyres management company (or consortium), which covers the cost of collecting and recycling or recovery of non-usable tyres, within the framework of local legislation, while often also promoting studies and research of new methods for a better use of scrap tyres.

In other countries, Bridgestone Europe also continuously promotes environmentally effective management of end-of-life tyres through its subsidiaries within local tyre industry associations (e.g. WDK in Germany). The aim of these associations is to assist in the creation of schemes for nationwide recovery of scrap tyres when needed, and to promote responsible tyre disposal also by encouraging agreements between the distribution sector and individuals or bodies involved in disposal activities. Please contact us for any further information on end-of-life tyres or download the relevant European Industry End of Life Tyre Report at [www.etrma.org](http://www.etrma.org).

##### EUROPEAN END-OF-LIFE-TYRES MANAGEMENT COMPANIES





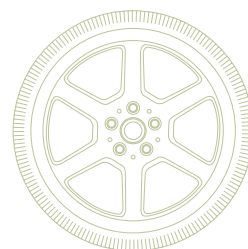
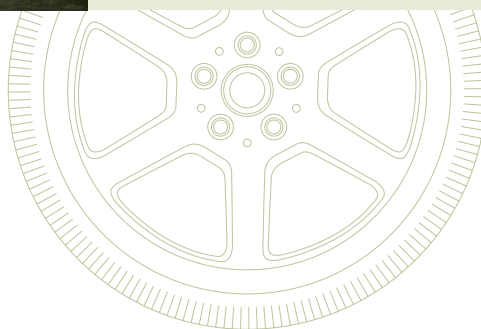


## REGULATORY FRAMEWORK

Several European Directives regulate the environmental aspects of both tyre design and production.  
The main acts directly involving the tyre industry are listed below:



LEGISLATIVE ACT	OBJECTIVES AND REQUIREMENTS FOR TYRE PRODUCERS
<p><b>Dir. 1999/13/EC 11 March 1999 (VOC Directive)</b>  <i>On the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations.</i></p>	<p>The purpose of the directive is to reduce the direct and indirect effects of emissions of volatile organic compounds into the environment, mainly into the air, and the potential risks to human health, by providing measures and procedures to be implemented for some activities, including rubber industry plants, consuming solvents over specific threshold levels set by the Directive.</p>
<p><b>Dir. 1999/31/EC of 26 April 1999</b>  <i>On the landfill of waste.</i></p>	<p>Ban of land filling of whole tyres from July 2003 and of shredded tyres from July 2006 (excluding in both instances bicycle tyres and tyres with an outside diameter above 1400mm).</p>
<p><b>Dir. 2000/53/EC - 18 September 2000</b>  <i>End-of-Life Vehicles</i></p> <p>and the following relevant Decisions:            Dec. 2005/673/EC 20 September 2005            Dec. 2003/138/EC 27 February 2003            Dec. 2005/438/EC 10 June 2005</p>	<p>Aims at the prevention of waste from vehicles and, in addition, at the re-use, recycling and other forms of recovery of end-of-life vehicles and their components so as to reduce the disposal of waste, as well as the improvement in environmental performance of all the economic operators involved in the life cycle of vehicles.</p> <p>Establishes that the use of lead, cadmium, mercury and chromium hexavalent in car components is forbidden except for some limited exceptions (Annex II)</p>
<p><b>Dir. 2001/43/EC 27 June 2001 (tyre noise Directive)</b>  <i>Amending Council Directive 92/23/EEC relating to tyres for motor vehicles and their trailers and to their fitting.</i></p>	<p>Requires noise homologation: depending on the category of tyres (passenger cars, vans, truck tyres,...) there are specified levels of dB which have to be met by tyre producers</p>
<p><b>Dir. 2005/69/EC 16 November 2005</b>  <i>Amending for the 27th time Council Directive 76/769/EEC on the approximation of the laws, regulation and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (polycyclic aromatic hydrocarbons in extender oils and tyres).</i></p>	<p>Certain extender oils (so called «High Aromatic oils» or even «PAH-rich extender oils») cannot be placed on the market or used for the production of tyres as from 2010.</p> <p>Tyres and treads for retreading manufactured after 1 January 2010 may not be placed on the market if featuring these extender oils.</p>



## CONTACTS

If you wish to contact Bridgestone Europe for information, comments or suggestions about its environmental activities, please send your messages to:

[environment@bridgestone.eu](mailto:environment@bridgestone.eu)



*Worldwide attention to the environment: ten thousand acres of wild forest donated by Bridgestone/Firestone, Inc. to the people of Tennessee, USA, creating the Bridgestone Firestone Centennial Wilderness, one of the last large untouched wilderness areas east of the Mississippi.*







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