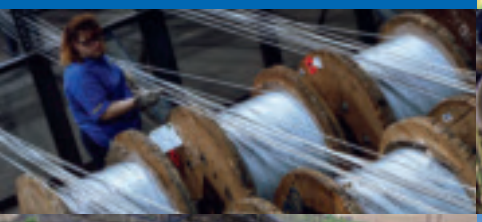
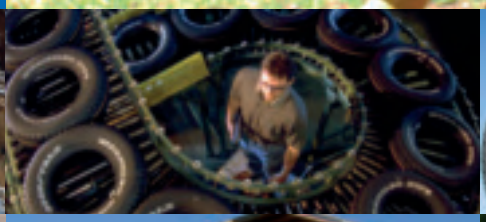
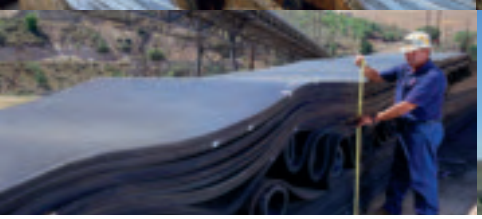
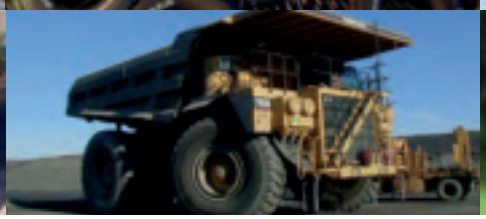
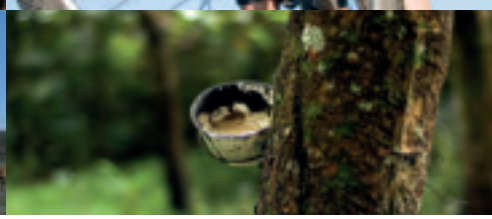
Managing End-of-Life Tires





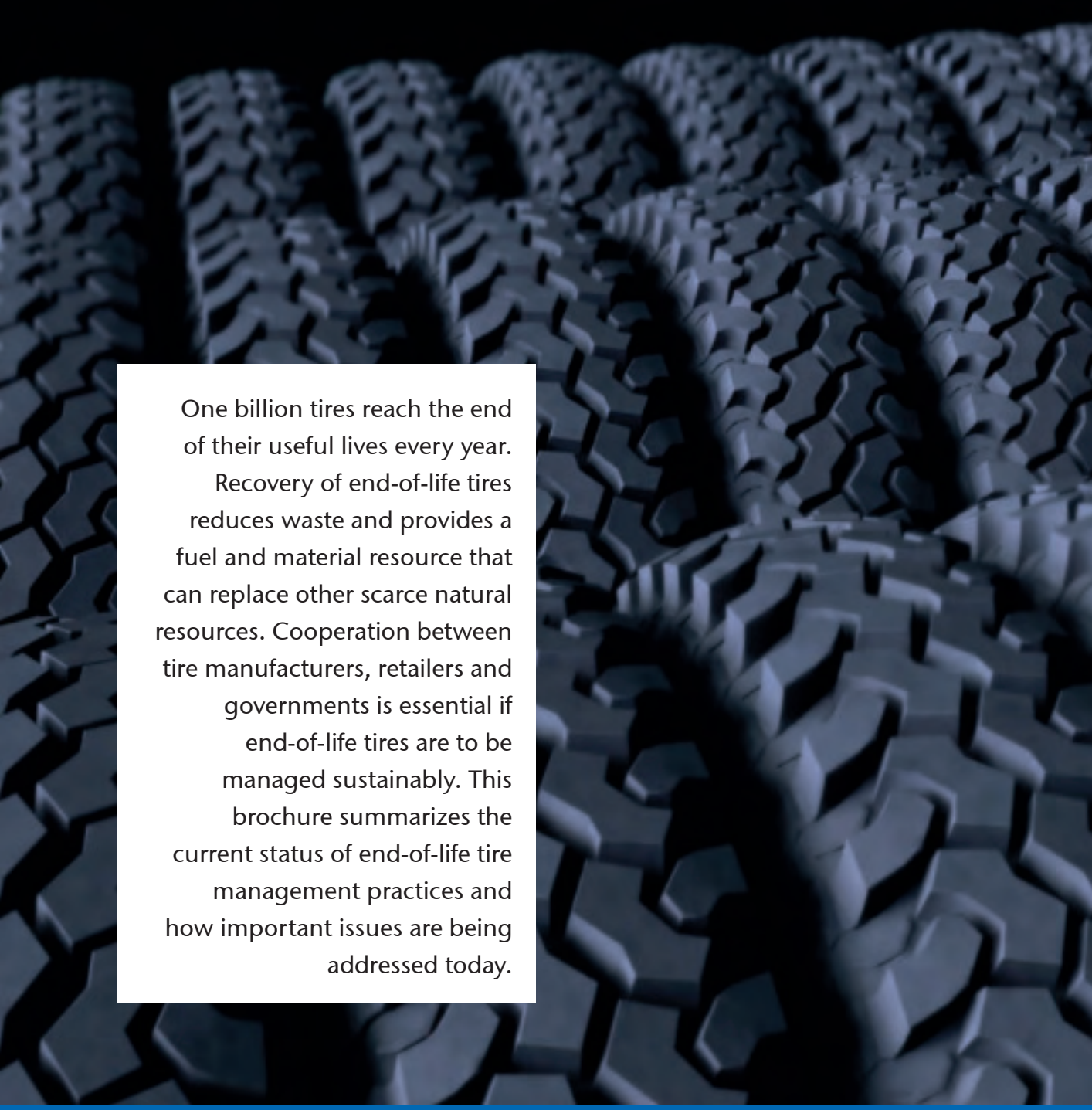






Summary

World Business Council for
Sustainable Development



One billion tires reach the end of their useful lives every year. Recovery of end-of-life tires reduces waste and provides a fuel and material resource that can replace other scarce natural resources. Cooperation between tire manufacturers, retailers and governments is essential if end-of-life tires are to be managed sustainably. This brochure summarizes the current status of end-of-life tire management practices and how important issues are being addressed today.

Fast facts on end-of-life tires (ELTs)

- One passenger tire per person is discarded each year in the developed world
- 1 billion end-of-life tires are generated globally each year
- An estimated 4 billion end-of-life tires are currently in landfills and stockpiles worldwide
- They are a resource that can be used in place of virgin materials, reducing natural resource depletion and lowering environmental costs associated with natural resource exploitation
- End-of-life tires can replace traditional fossil fuels in some applications and may reduce NOx, SOx and CO_2 emissions
- They can also be used in civil construction projects as ground or crumb rubber, and as a substitute for coal in steel plants
- Their recovery rate is now more than 85% for Europe, the US and Japan

Background

What are tires made of?

A typical passenger tire contains 30 types of synthetic rubber, eight types of natural rubber, eight types of carbon black, steel cord, polyester, nylon, steel bead wire, silica and 40 different kinds of chemicals, waxes, oils and pigments. Modern tires contain little or no recycled rubber as it limits performance and increases fuel consumption.

The environmental impact of a tire

Almost all of the environmental impact of a tire occurs during the use phase, primarily as a result of vehicle fuel consumption and carbon dioxide emissions due to rolling resistance. Tire wear and road wear debris contribute to a lesser degree to the environmental impact of the use phase. Raw materials production and tire manufacturing account for the next greatest impact. While recovering and reprocessing end-of-life tires (ELTs) have a small environmental impact (less than 5% of the total), it is a visible one, and of concern to many stakeholders. Distribution (transportation) has a small impact.

What is an ELT?

A tire is considered to be at the end of its life when it can no longer be used on vehicles (after having been re-treaded or re-grooved). All tires including passenger car, truck, airplane, two-wheel and off-road tires result in ELTs. However, the bulk of ELTs result from car and truck tires.

Why use ELTs?

ELTs can be a low-cost source of fuel when located near a major fuel consumer, such as a power plant or cement factory. They can also be readily processed for a diverse range of construction projects. Substituting ELTs in place of new raw materials reduces associated environmental and economic costs, such as:

- Exploration and mining for fossil fuels and other virgin raw materials, and the associated land-use impact
- Transportation requirements (as tires are usually plentiful everywhere)
- Processing requirements for many applications (as tires can often be used whole or shredded).

In many countries tires have been regarded as a waste and discarded in landfills or stockpiles. Poorly managed landfills and stockpiles create the potential for fires and infestation. Even if safe management practices are in place, tire landfilling and dumping are unsustainable practices that have a significant land-use impact, and are a missed opportunity to gain benefits from recovery and reuse of tires.

What is the world doing with ELTs?

Developed economies

Developed economies generate most of the ELTs, as they have a greater number of vehicles in use. Over the last 15 years, recovery rates for ELTs have dramatically increased in Europe, South Korea and the US. Japan started recovery programs even earlier. At the same time, the cost of recycling to the consumer has decreased due to increased efficiency in management structures and new recovery routes. Global recovery data is often not available and methods of data calculation differ between countries. See www.wbcsd.org/web/tires for data sources.

Developing economies

While high recycling/recovery rates are achieved in major developed economies, the same is not true for many developing economies where land-use and disposal regulations are weak and infrastructure for tire collection is missing. Many areas also receive imported ELTs that add further to already problematic stockpiles of ELTs from local sources. South Africa is currently faced with an estimated 800 million tires in piles in the Western Cape region. In Mexico the number of tires is thought to be around 1-2 billion. Most industry organizations in developed countries have ELT programs. Transferring expertise and "know-how" from these bodies to the developing world is key to encouraging better ELT management. Brazil has been particularly strong in assessing and working with ELT issues. Recent data from Brazil shows an 82% recovery rate.

How do ELT recovery rates compare with other products?

Waste generation in Europe stands at over 1.43 billion tons per year and is increasing at rates comparable to those of economic growth. ELTs make up about 0.2% of this waste.

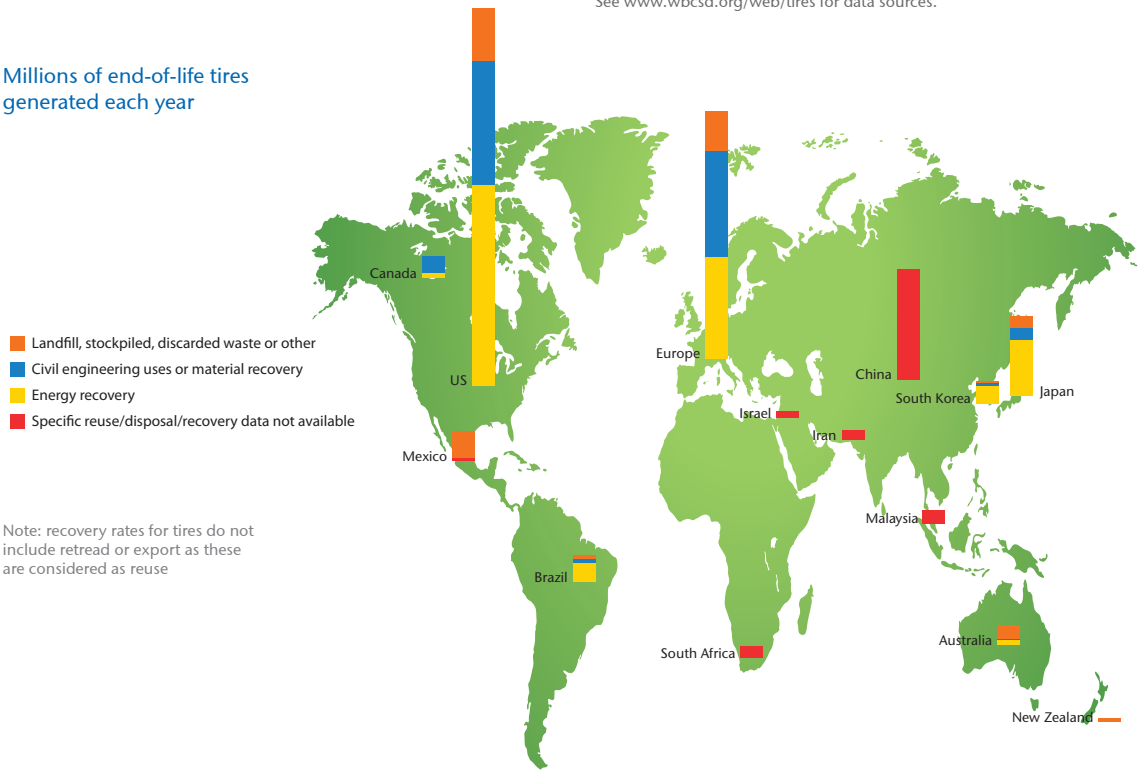
Recycling and recovery rates for ELTs are generally far higher than for most other consumer goods.

Estimated recycling rate in %
(Available data from 2003-2006)

Item	Europe	US	Japan
Tires	84	86	85
Glass	65	22	90
Car batteries	90 (UK)	99	--
Steel containers	63	63	88
Aluminium beverage cans	52	52	92
PET bottles	39	24	66
Paper/cardboard	64	50	66

See www.wbcsd.org/web/tires for data sources.

Millions of end-of-life tires generated each year



Note: recovery rates for tires do not include retread or export as these are considered as reuse

What can ELTs be used for?

Energy recovery

Tire-derived fuel (TDF) is the biggest use for ELTs in the US and Japan. It is about equal to material recovery in Europe. TDF is used mainly in cement kilns, but also in thermal power stations, pulp and paper mills, steel mills and industrial boilers. Tires have a high energy content and are as good as or a better source of energy than many other solid fuels.

TDF emissions, when tires are burned in a controlled environment, are no greater than those of other fuels. In some situations, using TDF instead of virgin fossil fuels reduces nitrogen oxide, sulfur oxide and carbon dioxide emissions. Natural rubber content in tires (25% or more) is regarded as carbon neutral, as rubber plantations sequester carbon from the atmosphere during their lifetime. Any ash created generally contains fewer heavy metals than ash from coal combustion. In cement kilns the rubber provides energy and the iron and sulfur are incorporated into the cement. (Iron is normally added to the cement making process; sulfur is absorbed and converted to sulfates.)

The cost of TDF is significantly lower than that of fossil fuels such as natural gas, coal and petroleum coke, especially when exploration, development and transport costs of virgin materials are taken into account. Provided that quality and supply can be maintained, users can incorporate TDF into long-term energy planning. Tires are frequently a low-cost fuel source for cement factories. Weight and volume limit transport distance and availability.

Cement kilns are able to use either whole or shredded tires. For other uses, the steel belts often need to be removed to allow the ash waste to be resold. However, even then, the recycled steel is a valuable by-product.

Material recovery

Whole or shredded tires can be used in civil engineering projects such as embankments, backfill for walls, road insulation, field drains, erosion control/rainwater runoff barriers, wetland and marsh establishment, crash barriers, jetty bumpers and sea breakwaters. ELTs can also be converted into ground or crumb rubber that can then be used for rubber-modified asphalt (resulting in reduced traffic noise), running tracks, sports fields, ground cover under playgrounds, molded rubber products and mulch in landscape applications. Tires are lightweight, permeable, good insulators, shock and noise absorbent and long lasting.

In most uses, tires present a low pollution risk. When compared with other alternative construction materials, using ELTs can help minimize a project's environmental impact.

Tires sent for co-processing in a cement plant where both fuel value and materials are recovered.

What management practices are used?

Landfilling and dumping are now often banned

Most, but not all, developed countries now view landfills (that is, waste piles and dumps) as the least desirable disposal option. Tires are banned from landfills in the European Union. Eleven states in the US place a total ban; a further 31 states have restrictions requiring shredding or monofilling. Three Canadian provinces ban landfilling. Many other jurisdictions have set non-binding goals to reduce or eliminate landfilling, especially of whole tires.

ELT management approaches vary. Three main frameworks, or combinations, are usually used:

Tire industry responsibility

Tire manufacturers (often in cooperation with distributors and retailers) take responsibility under stewardship schemes for the recovery and recycling or disposal of ELTs, and finance these schemes according to the number of units they sell within that country. Such schemes are typically administered by a not-for-profit body. Most often a separate fee is charged at the time of original sale, which increases public awareness of the program as well as funds the scheme.

Tire manufacturers have promoted ELT as a resource and consequently have proactively pursued producer-responsibility schemes. Most countries in Europe now have these schemes; accounting for over 50% of European volume. ELT management companies organize collection and recovery, participate in research and development activities for new recovery routes, liaise with local authorities, comply with reporting obligations and promote the introduction of product standards.

Stewardship schemes for the recovery and recycling of ELTs have existed in Japan for over 15 years. Programs have also focused on the removal of illegal legacy stockpile sites.

In Korea manufacturers and importers pay a deposit fee that is refunded if they collect the ELTs. Brazil requires importers to demonstrate the disposal of 20% more tires per annum than they import.

Stewardship schemes (often with government environment agency involvement), also exist in South Africa and about half of the Canadian provinces. Nigeria and Turkey have begun schemes and Russia is currently considering proposals.

Government/community responsibility

Specific taxes are levied on tire sales, and some taxpayer-funded schemes use general tax revenue. Governments have often taken a direct role in cleanup programs. In the US, many states have active programs to cleanup stockpiles and eliminate the creation of new ones. Government administered bodies responsible for ELTs have been established in the half of Canadian provinces not covered by stewardship schemes. Industry and other stakeholders are frequently involved. Denmark, Latvia, the Slovak Republic and Croatia also have tax funded schemes.

Free market approach

Scrap tire enterprises operate independently. Where suitable infrastructure exists, these companies can arrange recycling and recovery of ELTs with commercial benefits. The US, Germany, Switzerland, Austria, United Kingdom, Ireland and New Zealand operate on free market principles. Such countries usually have laws regarding the transportation, use, disposal and storage of scrap tires. Tire manufacturers and others involved in the industry voluntarily participate in schemes.

ELTs as waste?

The classification of ELTs as a waste often means greater reporting and permit requirements. Classifying ELTs and ELT-derived products as secondary raw materials and legally acceptable alternative fuels can facilitate transportation, lighten administrative paperwork and ease the introduction of new recovery routes that are both environmentally and economically friendly.

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More on end-of-life tires can be found at
www.wbcsd.org/web/tires or from tires@wbcsd.org

About the WBCSD

The World Business Council for Sustainable Development (WBCSD) brings together some 200 international companies in a shared commitment to sustainable development through economic growth, ecological balance and social progress. Our members are drawn from more than 30 countries and 20 major industrial sectors. We also benefit from a global network of about 60 national and regional business councils and partner organizations.

Our mission is to provide business leadership as a catalyst for change toward sustainable development, and to support the business license to operate, innovate and grow in a world increasingly shaped by sustainable development issues.

Our objectives include:

Business Leadership – to be a leading business advocate on sustainable development;

Policy Development – to help develop policies that create framework conditions for the business contribution to sustainable development;

The Business Case – to develop and promote the business case for sustainable development;

Best Practice – to demonstrate the business contribution to sustainable development and share best practices among members;

Global Outreach – to contribute to a sustainable future for developing nations and nations in transition.

Secretariat
4, chemin de Conches
CH-1231 Conches-Geneva
Switzerland

Tel: +41 (0)22 839 31 00
Fax: +41 (0)22 839 31 31

E-mail: info@wbcsd.org
Web: www.wbcsd.org

WBCSD North America Office
1744 R Street NW
Washington, DC 20009

Tel: +1 202 420 77 45
Fax: +1 202 265 16 62

E-mail: washington@wbcsd.org