

# End-of-Life Tires



**A framework for effective  
management systems**

Appendix



# End-of-Life Tires (ELTs): a Framework for Effective Management Systems

## Prepared by WBCSD Tire Industry Project

### APPENDICES

## Appendix 1

### References and Resources

This appendix provides a non-exhaustive list of resources available on ELT management. Other materials can be found online or within tire companies or Trade Associations.

#### General Resources

- *Considerations for Starting a Scrap Tire Company* (Rubber Manufacturers' Association): [www.rma.org/publications/scrap\\_tires/index.cfm?PublicationID=11299](http://www.rma.org/publications/scrap_tires/index.cfm?PublicationID=11299)
- *Glossary of Scrap Tire Terminology* (Scrap Tire Management Council, 1994): [www.rma.org/getfile.cfm?ID=566&type=publication](http://www.rma.org/getfile.cfm?ID=566&type=publication)
- *Tire Recycling Handbook* (Japan Automobile Tire Manufacturers' Association): [www.jatma.or.jp](http://www.jatma.or.jp)

#### Stockpile Abatement and Storage Guidelines

- *USEPA Region 5 Stockpile Abatement Guide*: [www.epa.gov/reg5rcra/wptdiv/solidwaste/tires/guidance/](http://www.epa.gov/reg5rcra/wptdiv/solidwaste/tires/guidance/)

#### End-Use Markets for ELTs

- Aliapur website (France): [www.aliapur.fr](http://www.aliapur.fr)
- *Managing End-of-Life Tires Full Report* (World Business Council for Sustainable Development, December 2008) [www.wbcd.org/web/tires](http://www.wbcd.org/web/tires)
- *Guidelines for the Selection and Use of Alternative Fuels and Raw Materials in the Cement Manufacturing Process* (World Business Council for Sustainable Development, December 2005): [www.wbcdcement.org/pdf/tf2\\_guidelines.pdf](http://www.wbcdcement.org/pdf/tf2_guidelines.pdf)
- *Reports on air emissions from the USEPA, the State of California*
- *Report on the Use of TDF in Rotary Cement Kilns* (Rubber Manufacturers Association, 1992) [www.rma.org/getfile.cfm?ID=522&type=publication](http://www.rma.org/getfile.cfm?ID=522&type=publication)
- *Five Year Field Study of Leachate from Tire Shred Placed Below the Ground Water Table* (University of Maine, 2002): [www.rma.org/scrap\\_tires/scrap\\_tires\\_and\\_the\\_environment/field\\_study.pdf](http://www.rma.org/scrap_tires/scrap_tires_and_the_environment/field_study.pdf)
- *An Assessment of Chemical Leaching Releases to Air and Temperature at Crumb-Rubber In-filled Synthetic Turf Fields* (New York State Department of Environmental Conservation, 2009): [www.dec.ny.gov/docs/materials\\_minerals\\_pdf/crumbrubfr.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/crumbrubfr.pdf)
- *Air Quality Survey of Synthetic Turf Fields Containing Crumb Rubber Infill* (New York City Department of Health and Mental Hygiene, 2009): [www.nyc.gov/html/doh/downloads/pdf/eode/turf\\_agq\\_report0409.pdf](http://www.nyc.gov/html/doh/downloads/pdf/eode/turf_agq_report0409.pdf)
- *Review of the Human Health & Ecological Safety of Exposure to Recycled Tire Rubber found at Playgrounds and Synthetic Turf Fields* (ChemRisk, 2008): [www.rma.org/publications/scrap\\_tires/index.cfm?PublicationID=11496](http://www.rma.org/publications/scrap_tires/index.cfm?PublicationID=11496)
- *Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products* (California Department of Resources Recycling and Recovery (CalRecycle), 2007): [www.calrecycle.ca.gov/Publications/default.asp?pubid=1206](http://www.calrecycle.ca.gov/Publications/default.asp?pubid=1206)

- *A Scoping Level Field Monitoring Study of Synthetic Turf Fields and Playgrounds* (United States Environmental Protection Agency, 2009): [www.epa.gov/nerl/documents/tire\\_crumbs.pdf](http://www.epa.gov/nerl/documents/tire_crumbs.pdf)

#### **Joint Industry Activity**

- European Tire and Rubber Manufacturers' Association (ETRMA): [www.etrma.org/public/activities/etel/etelts.asp](http://www.etrma.org/public/activities/etel/etelts.asp)
- Japan Automobile Tire Manufacturers' Association (JATMA): [www.jatma.org.jp](http://www.jatma.org.jp).
- Korean Tire Manufacturers' Association, (KOTMA): [www.kotma.org](http://www.kotma.org)
- Rubber Manufacturers Association (RMA): [www.rma.org/scrap\\_tires](http://www.rma.org/scrap_tires)
- World Business Council for Sustainable Development (WBCSD) Tire Industry Project: [www.wbcd.org/web/tires](http://www.wbcd.org/web/tires)

#### **Related Stakeholder Activity**

- Rubber Pavements Association: [www.rubberpavements.org](http://www.rubberpavements.org)
- United States Environmental Protection Agency: [www.epa.gov/osw/conservation/materials/tires](http://www.epa.gov/osw/conservation/materials/tires)

#### **Tire Industry Project Contacts (June 2010)**

- Bridgestone: eco-Activities Promotion Department, Tokyo, Japan (Shunishi Usui)
- Goodyear: Global Environmental Engineering, Department 110F, Akron, USA (Mark Whitmore)
- Michelin: ELT, Clermont-Ferrand, France (Dominique Bronner)
- WBCSD: Tire Industry Project, Geneva, Switzerland (Lucy Butler, Caroline Twigg, Howard Klee)

## Appendix 2

### ELT Management: Existing Models

Different global regions and countries have adopted different types of ELT management systems to respond to cultural and political needs, as well as to address the specific ELT situation facing the region. Nevertheless, three different existing options are identified here: the free market model, the tax-based model, and the producer responsibility model. Many countries have adopted a hybrid of these approaches. Depending on the situation in your region, you may wish to draw from a variety of these management types to create the system best suited for your region. The case studies provided below give an overview of the various models and are provided to give you an initial view. To learn more, contact information and internet resources are provided.

	Existing ELT Management Models		
	Producer Responsibility Model	Free Market Model	Tax Model
<b>Disposal fee and how the fee is collected (flow of the fee)</b>	Consumer pays fee at tire purchase: all fees transferred to join organization	Consumer pays fee at tire purchase: fee is then transferred along management chain	Consumer pays fee at tire purchase: fees transferred to government
<b>Disposal route</b>	Recycling/recovery. Some governments may require minimum material & of recycling or retreading	Recycling/recovery without targets	Recycling/recovery, eventually with targets managed by government
<b>Tire manufacturers' responsibility</b>	... until final disposal documentation is received by appointed recycler	... in some cases must report ELT recovery trends to government	... to grant that the tax is transferred from consumer to government
<b>Government enforcement</b>	Legal framework around PR model, identifying relevant responsibilities	Same as for any non-hazardous waste	Governments' and producers/importers' responsibilities established by law
<b>Responsibility for illegal dumping</b>	Person performing the illegal dumping	Person performing the illegal dumping	Person performing the illegal dumping
<b>Responsibility for historical stockpiles</b>	Tire industry not responsible, but often voluntary oversees disposal to maintain good relationship and credibility with authorities	Government responsibility if the directly responsible person is not identified	Government responsibility

**NOTE:** these are not the only models possible: a hybrid of these may be more appropriate to certain situations. Detail on these models is included here to show the characteristics of some existing models, and to help stakeholders to learn from existing experiences.

## **Appendix 3            ELT Management Systems: Case Studies**

### **1. Developing a Producer Responsibility Model: Chile**

The government is promoting Producer Responsibility (PR) model (2010), in a joint effort with recently-formed Chilean Tire Chamber (CINC). It is hoped that this voluntary agreement can later be used as the basis for a law on ELT management. The voluntary program started by Goodyear Chile in 2004 is being shown by the authorities as a good example to follow. The government has asked Goodyear to perform an exhibition of their ELT work, and is preparing a law under the extended producer responsibility concept. It is also promoting a voluntary agreement like Goodyear's for other companies, to be used before the law is enforced. The government intention is that the costs and responsibility to dispose correctly the used tires be aggregated on the value of the tires.

*(Source: Goodyear Chile)*

### **2. Changing to an Extended Producer Responsibility Model: Korea**

In 1991, the Ministry of Environment in Korea started a deposit-refund scheme, run by KOTMA, the Korean Tire Manufacturers' Association. In this scheme, producers or importers had to deposit some money with the government for tire waste disposal (based on quantity of tires), money which was refunded after the completion of the actual recycling of their products. This was because some producers / importers paid the deposit yet did not recycle the tires – presumably because the deposit was not high enough.

This was replaced by an Extended Producer Responsibility (EPR) model in January 2003. Producers or importers now take full responsibility for recycling and disposal of their products, in a system based on individual tire weight. The Ministry of Environment charges mandatory recycling amounts on producers and importers every year related to their ELT generation, business condition for recycling, etc. If their actual results for ELT recycling do not live up to the mandatory amount, additional cost of recycling is charged. There are 28 collection companies (designated by KOTMA) and 48 recycling companies.

*(Source: Korean Tire Manufacturers' Association, KOTMA)*

### **3. Promoting the Producer Responsibility Model: the European Union**

In the European Union (EU), landfilling ELTs has been prohibited since 2006 following the European directive 1999/31/EC. By 2008, the European ELT recovery rate had reached an average of 95% across all 27 states. Today, 60% of the volume is managed under a Producer Responsibility system, promoted by the tire industry, which endorses its benefits related to sustainability, efficiency and transparency for the consumers, the operators and the administration.

In 2010, 14 different ELT management companies were operating, set up by the tire manufacturers, and mandated by the producers to collect and organise the treatment of 100% of the volumes of tires sold collectively by these companies on the national market. An environmental fee is charged to the consumers, usually through a separate line on the invoice and independently of the location of the collection point. It has been observed that this fee is decreasing overtime. The chain is managed by the ELT company from collection to recovery or recycling, with the support of a reliable and transparent traceability or auditing system. Following the new waste framework directive (2008/98/EC), ELT-derived products will be studied according to certain criteria to potentially be recognized as a secondary raw material or an alternative energy source, and may no longer be considered as a waste in the future.

*(Source: European Tyre and Rubber Manufacturers' Association, ETRMA)*

### **3.1 Changing from Tax to Producer Responsibility Model: Hungary**

The Eco Tax System for several waste streams (e.g. tires, oils, packaging, electrical equipment ...) was introduced in Hungary in 1995. In 2003, following much dissatisfaction, the government changed the law to replace this with a producer responsibility scheme. By the end of 2005, the Hungarian tire industry had decided to establish its own ELT company to manage this. Established in 2006, first by one manufacturer and rapidly joined by 4 others, the company, Hurec, is now fairly efficient in managing the stream of ELTs to the benefit of its clients (manufacturers, tire importers, car dealers) and also actively provides support to the government on further legal improvements.

*(Source: European Tyre and Rubber Manufacturers' Association, ETRMA)*

### **3.2 Rapid Progress within the Producer Responsibility Model: Spain**

In Spain, a producer responsibility scheme has been in place since 2006. Confronted with huge landfill rates throughout the country (in 2004 over 70% of ELTs were sent to landfill), the government introduced producer responsibility obligations by law. This was following the similar existing laws and practices in other European countries. The Signus ELT management company owned by the 5 largest tire manufacturers was set up in May 2005, began operating in 2006 and reached its 100% collection and recovery target in 2008, a very short period of time. This rapid progress was made possible with strong cooperation between Signus and other European experienced ELT companies who shared learning and best practice with Signus.

*(Source: European Tyre and Rubber Manufacturers' Association, ETRMA)*

### **3.3 Further Progress within the Producer Responsibility Model: France**

In France, the Aliapur ELT management company, owned by the 5 largest tire manufacturers, has been in operation since 2004. Over its 6 years of experience, Aliapur has become a clear and credible reference case, with two recent progresses:

- (1) Historic stockpiles: according to the French decree on used tire disposal, tire producers have been responsible for the treatment of annual ELT generation since 2004, with allocation of responsibility determined by volume of sales on the national market. This decree does not include any reference to the treatment of abandoned ELT stockpiles (approximately 200,000 tonnes). In order to progress on the treatment of those stockpiles, in 2005 Aliapur financed an abatement program to deal with 30,000 tonnes. An important agreement was signed in February 2008 between the manufacturers, the distributors and the government aiming to treat all remaining stockpiles over the next 10 years.
- (2) Aliapur supports different R&D projects for the promotion of new, sustainable, and valuable recycling and recovery routes. Such projects, generally lasting 2-3 years, are collaborative and involve different industries, the government, laboratories and Aliapur. One of the projects recently clarified the biomass fraction of ELTs used as an alternative energy (about 20%), and, as a consequence, this value related to the decrease of the CO<sub>2</sub> emissions is now officially recognized in France, with the support of the administration.

*(Source: European Tyre and Rubber Manufacturers' Association, ETRMA)*

#### **4. Free Market System: United States of America**

The United States based tire manufacturers started a “shared product responsibility” ELT management program in 1990: this is a free market system. This approach is based on the concept that all entities that have contact or control of or over the tire are responsible for their portion of their management scheme. This includes the tire manufacturer, the tire retailer, the consumer, collectors/transporters, tire processors, the company that uses tire-derived material and the state regulatory agency.

ELTs are not regulated by the federal government, but by individual US states. Most states have some type of regulatory system governing ELT management. Many conduct market development activities. States have played an integral role in providing funding and management to significantly reduce the number of tires in stockpiles. In 1990, over 1 billion ELTs were stockpiled across the US. Now, fewer than 130 million ELTs remain stockpiled. More detail on one state’s experience can be found here: [www.ciwmb.ca.gov/Tires](http://www.ciwmb.ca.gov/Tires) (California Integrated Waste Management Board)

*(Source: Rubbers Manufacturers’ Association, RMA)*

#### **5. An Evolving Free Market System: Japan**

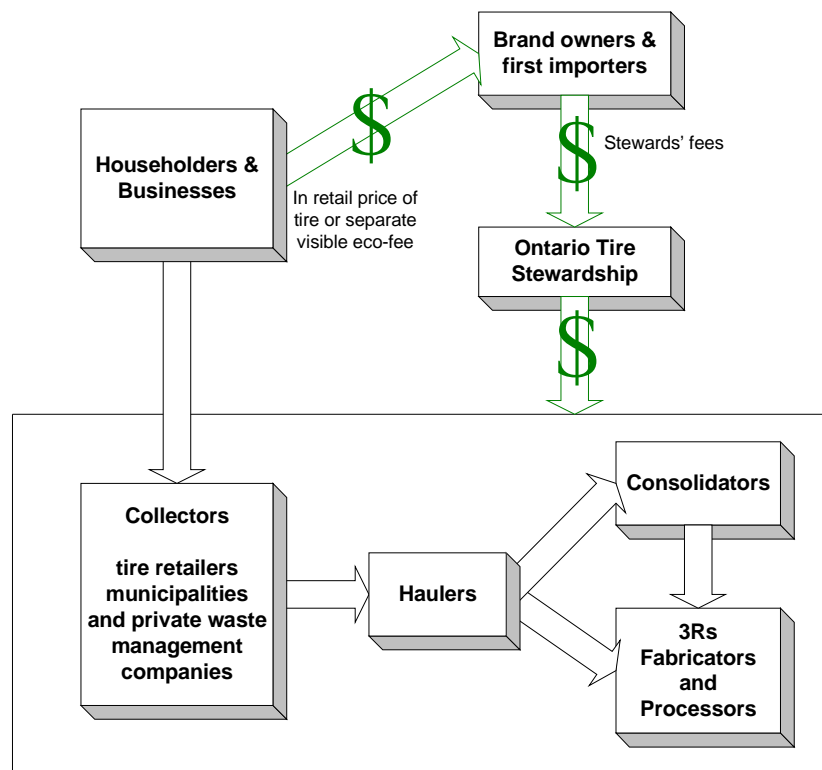
In the 1960s, End-of-Life Tires had a monetary value in Japan. This changed in the 1970s with soaring demand for tires and therefore more ELTs being generated annually, and a major revision of the Waste Management Law in Japan for controlling waste treatment. Therefore in the mid-1970s, fees were levied on the collection of End-of-Life Tires, and JATMA developed an End-of-Life Tires Control Committee in 1971. In the 1980s, increased energy demands boosted ELT demand, used as effective alternative fuels because of their high heat potential. From the 1990s to the year 2000, the demand of ELTs has been affected by the changing oil price. The tire industry has begun strengthening tire disposal measures and, from 2001, the tire industry sought to cultivate large-scale and interregional users, including paper mills, gasification furnaces and biomass power reactors. Even in a country where the free market system is used for ELTs, tire associations and the tire industry needs to cooperate closely to ensure high recovery rates required by governmental regulations.

*(Japan Automobile Tire Manufacturers’ Association, JATMA)*

## 6. Shared Responsibility: Ontario, Canada

In 2009, Ontario changed its ELT management legislation, to shift the costs from the government and taxpayer to the industry and its consumers. This is different from much of the rest of Canada where fees are collected by the retailer. From 1 September 2009, the tire industry had legal responsibility to pay fees based on what they sell in Ontario (but not on ELTs that leave Ontario). Different stakeholder responsibilities are:

- Provincial Government/Ministry of the Environment
  - Establishes diversion policy & sets program requirements
  - Provides guidance during program development
  - Approves or rejects program
- Waste Diversion Act Board
  - Establishes Industry Funding Organization (IFO) to co-ordinates industry initiatives
  - Monitors IFO performance
- Industry Funding Organization (called Ontario Tire Stewardship, OTS)
  - IFO manages program development & implementation
  - Stewards contribute to plan development through participation in consultation process
  - Stewards register, report & pay fees to OTS
  - OTS uses fees to pay for “collecting, storing, transporting, processing, marketing” ELTs



More detail: [www.ene.gov.on.ca/envision/env\\_reg/er/documents/2009/010-6037.pdf](http://www.ene.gov.on.ca/envision/env_reg/er/documents/2009/010-6037.pdf)



## 7. Accountability and Traceability: Examples of Manifest Systems

See page 10 ('Accountability throughout the whole system) in '*End-of-Life Tires (ELTs): a Framework for Effective Management Systems*' (WBCSD, June 2010) for information on why a manifest system is important for effective ELT management. More detail on manifests is supplied here:

A minimum four-part system is generally practiced in the free market system, in which there are four copies of the individual manifest:

1. Copy 1 given to the UT owner on disposal
2. Copy 2 given to the distributor / retailer
3. Copy 3 sent to the state regulatory agency
4. Copy 4 kept by the collector

A copy for the processor and / or recovery and recycling companies could also be required.

However, in Korea a 3 part manifest system works effectively:

- 1) The collectors/transporters issue 3 copies of the individual manifest when they collect ELTs from the UT owners or distributors/retailers:
  - copy 1 given to the UT owner or the distributors/retailers
  - copy 2 kept by the collectors/transporters
  - copy 3 sent to KOTMA
- 2) The recovery or recycling companies issues 3 copies of the individual manifest when the collectors/transporters supply them with ELTs:
  - copy 1 given to the collectors/transporters
  - copy 2 kept by the recovery/recycling companies
  - copy 3 sent to KOTMA

KOTMA manages the collection and provision of ELTs with the manifest copies given by the collectors/transporters and by the recovery/ recycling companies. This system is generally in place in countries operating a Producer Responsibility model.

In Japan, a 7 part manifest system works effectively:

- 1) The distributors/retailers issue 7 copies of the individual manifest when they discharge ELTs to the collectors/transporters:
  - copy A kept by the distributors/retailers
  - copy B1 kept by the collectors/transporters
  - copy B2 signed by the collectors/transporters and sent to the distributors/retailers
  - copy C1 kept by the tire shredder
  - copy C2 signed by the tire shredder and sent to the collectors/transporters
  - copy D signed by the tire shredder and sent to the sent to distributors/retailers
  - copy E signed by the tire shredder after receiving second manifest copy D from the recovery/recycling companies and sent to the distributors/retailers
- 2) The tire shredder issues 6 copies of the individual manifest when they discharge ELTs to the collectors/transporters:
  - copy A kept the tire shredder
  - copy B1 kept by the collectors/transporters
  - copy B2 signed by the collectors/transporters and sent to the tire shredder
  - copy C1 kept by the recovery/recycling companies
  - copy C2 signed by the recovery/recycling companies and sent to the collectors/transporters
  - copy D signed by the recovery/recycling companies and sent to the tire shredder.

JATMA developed this manifest system in accordance with the Japanese Waste Management Law.

