The status of post-consumer tyres in the European Union

Summary report based on work by Dr V L Shulman
(European Tyre Recycling Association)
This project was funded by Biffaward under the Landfill Tax Credit Scheme, with contributions from, REG UK and Waste Tyre Solutions. This forms an extension to the ‘Tyre Waste and Resource Management: A mass balance approach’ and is available as a separate publication. This report is a summary of a report completed by Dr Valerie Shulman of the European Tyre Recycling Association. All of the reports are available for download from the Viridis website (www.viridis.co.uk)

Viridis was the Entrust Approved Environmental Body (AEB) responsible for the project and the work was undertaken by Viridis.

TRL and Viridis are committed to optimising energy efficiency, reducing waste and promoting recycling and re-use. In support of these environmental goals, this report has been printed on recycled paper, comprising 100% post-consumer waste, manufactured using a TCF (totally chlorine free) process.
Biffaward Programme on Sustainable Resource Use

This report forms part of the Biffaward Programme on Sustainable Resource Use. The aim of this programme is to provide accessible, well-researched information about the flows of different resources through the UK economy based either singly or on a combination of regions, material streams or industry sectors.

Information about material resource flows through the UK economy is of fundamental importance to the cost-effective management of the flows, especially at the stage when the resources become ‘waste’

In order to maximise the Programme’s full potential, data is being generated and classified in ways that are consistent both with each other, and with the methodologies of other generators of resource flow/waste management data

In addition to the projects having their own individual means of dissemination, their data and information will be gathered together in a common format to facilitate policy making at corporate, regional and national levels.
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Executive Summary

Official reports indicate that more than 2,500,000 tonnes of post-consumer tyres are permanently removed from vehicles each year in the 15 Member States of the European Union and must be disposed in an environmentally sound and sustainable manner. However, in almost every State, both collectors and those who provide alternative treatment and disposal routes vigorously dispute these figures.

The problem is exacerbated by the potential effects of three recent Directives that will require greater accountability concerning disposition and valorisation. The Directives have exerted increased pressure on government and industry alike to expand existing markets and to find new ones to accommodate the increased flow.

The need for reliable, consistent data on post-consumer tyre arisings is indisputable. They are critical to the elaboration of national policy and to the development of effective strategies for long-term planning towards the environmentally sound and sustainable management of these products. However, the data available today appear to be neither reliable nor consistent.

The purpose of this report is to describe the status quo across the European Union (EU) concerning the practices and procedures currently used to collect, interpret and report information on post-consumer tyres and to present the current situation in terms of tyre flows and the valorisation of post-consumer tyres.

Conclusions:

Until now, data on arisings have been inextricably tied to new tyre sales. However, it has become apparent that those data are flawed and do not produce an accurate base for the calculation of future arisings. It would appear that:

- Statistics on replacement tyre sales, which account for ±71% - 84% of the European market, could be available from EU manufacturers’ groups.

- Statistics on original equipment tyres, which account for ±16% - 29% of the European market, could be available from vehicle manufacturers but are not generally included in EU tyre sales data.

- Statistics on imported tyre sales, which could account for up to ±30% of the total European market, are not generally included in EU tyre sales reports.

- Statistics on retreaded tyres are glaringly absent.

Recommendations:

The future of post-consumer tyre valorisation is dynamic. It reflects the mandate expressed in Art. 3, 1. of the framework directive which states ‘Member States shall take appropriate measures to encourage: (b) (i) “the
recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials....’ In order for further progress to be made, several issues must be resolved (alphabetical order):

1 **Barriers:** The barriers to material recycling must be analysed and discussed within the industry as well as with principal stakeholders – including government agencies and tyre manufacturers.

2 **Capacity:** Information must become available concerning existing treatment facilities and their current and projected capacity to assist in identifying areas which are un-or-under-served.

3 **Image:** Post-consumer tyres must be perceived as a valuable resource rather than waste. The change could affect the way in which consumers, including governments, see the products and applications created from these materials and could facilitate their increased use.

4 **Information:** Data collection and reporting on post consumer tyre arisings must be improved to provide a more accurate view of the quantities and types, as well as current means of utilisation as the basis for government policy and increased private sector investment.

5 **Relationships:** Efforts must be made to improve relationships between the new tyre producers and post-consumer tyre valorisers to facilitate the flow of information and to work together to develop materials which could be reintroduced into the tyre Industry.

6 **Stakeholders:** A broader base of stakeholders must be included in the decision-making process concerning post-consumer tyres in order for material recycling to progress and increase proportionately.

7 **Waste definition:** Efforts must continue to revise or amend the existing definition of waste to provide greater latitude for the utilisation of post-consumer tyre materials as a raw material without penalty.

An effort should be made to determine the quantities currently accommodated by each principal means of valorisation. It has been suggested that in order to accomplish that goal, each of the treatment facilities should be identified and their estimated consumption defined in order to determine the extent to which they provide for the needs of more remote areas. It was also suggested that if feasible, it would be valuable to examine the quantities of arisings, by region/area, in comparison to the available treatment facilities and to prepare an assessment of the environmental rehabilitation and civil engineering needs in each place.

Thirteen States have indicated their interest in working together to develop an improved data collection and reporting system for post-consumer tyres.

This document is a summary of a detailed report by ETRA entitled ‘Tyre flows and valorisation of post-consumer tyres in Europe: state-of-the-art report’. The full report is available from ETRA.
1 Introduction

Official reports indicate that more than 2,500,000 tonnes of post-consumer tyres are permanently removed from vehicles each year in the 15 Member States of the European Union and must be disposed in a sustainable manner. However, both collectors and those who provide alternative disposal routes vigorously dispute these figures. Almost every Member State reports a similar problem, citing discrepancies in some instances of more than 20% between reported and actual arisings.

Table 1 illustrates the often vast differences reported from year to year – generally due to a change in policy and/or calculation formula –, as is the case for 2000 in the UK and Ireland. Nevertheless, the net change, with the exception of Ireland, is +5.65%, the equivalent of +141,733 tonnes of post-consumer tyres – enough to provide raw material to +20 material recycling facilities or +5 energy recovery plants, per year.

The problem is exacerbated by the effects of three recent EU Directives, which will require greater accountability concerning the disposal of these products. The Directives have exerted increased pressure on government and industry alike to expand existing markets and to find new ones to accommodate the increased flow. Specifically, the Landfill Directive will exclude both whole and shredded tyres from landfills while the End-of-Life Vehicle Directive will require the removal of tyres from vehicles destined for destruction to ensure that they will not find their way into landfills, and the Incineration of Waste Directive could limit the use of tyres for energy, particularly in older facilities. Table 2 illustrates the projected effect of each.

Table 2 Potential impacts of the new directives

<table>
<thead>
<tr>
<th>Directive</th>
<th>Effective date</th>
<th>Potential impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill directive</td>
<td>2003</td>
<td>Ban on landfilling whole tyres.</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>Ban on landfilling shredded tyres.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The total number of tyres that will be affected:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~768,750 tonnes of tyres currently landfilled.</td>
</tr>
<tr>
<td>End-of-life vehicle</td>
<td>2007</td>
<td>Tyres from ~7,589,000 vehicles will have to be treated.*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The total number of tyres that will be affected:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~30,356,000 tyres or potentially.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~300,000 additional tonnes.</td>
</tr>
<tr>
<td>Waste incineration</td>
<td>2008</td>
<td>Compliance with lower emission standards could effectively close <code>wet kilns</code> which treat ±20% of tyres used in cement kilns, or:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~111,706 tonnes of tyres could return to market.</td>
</tr>
</tbody>
</table>

*IDSE/CNR Study 1999

Based upon current projections, it is anticipated that taken together, the Directives will require the treatment of a minimum of +1,000,000 additional tonnes of post-consumer tyres – each year – with commercially viable, environmentally sound and cost-effective methods. It is important to note that these projections do not include the anticipated annual growth of ±2% in tyre sales estimated during the next decade (Tyretrade, 1998). The

Table 1 Reported post-consumer tyre arisings 1992-2000 by Member State (tonnes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>–</td>
<td>–</td>
<td>40,000</td>
<td>41,000</td>
<td>50,000</td>
<td>+ 22.0 %</td>
</tr>
<tr>
<td>Belgium</td>
<td>70,600</td>
<td>70,600</td>
<td>65,000</td>
<td>70,000</td>
<td>70,000</td>
<td>+ 7.6 %</td>
</tr>
<tr>
<td>Denmark</td>
<td>27,800</td>
<td>26,200</td>
<td>38,000</td>
<td>38,500</td>
<td>37,500</td>
<td>+ 2.6 %</td>
</tr>
<tr>
<td>Finland</td>
<td>–</td>
<td>–</td>
<td>30,000</td>
<td>30,000</td>
<td>30,000</td>
<td>–</td>
</tr>
<tr>
<td>France</td>
<td>400,000</td>
<td>363,000</td>
<td>480,000</td>
<td>380,000</td>
<td>370,000</td>
<td>–</td>
</tr>
<tr>
<td>Germany</td>
<td>600,000</td>
<td>600,000</td>
<td>650,000</td>
<td>650,000</td>
<td>650,000</td>
<td>–</td>
</tr>
<tr>
<td>Greece</td>
<td>27,000</td>
<td>27,000</td>
<td>58,000</td>
<td>58,500</td>
<td>58,500</td>
<td>–</td>
</tr>
<tr>
<td>Ireland</td>
<td>19,000</td>
<td>19,000</td>
<td>7,640</td>
<td>7,640</td>
<td>32,000</td>
<td>+ 318.8 %</td>
</tr>
<tr>
<td>Italy</td>
<td>331,000</td>
<td>320,000</td>
<td>360,000</td>
<td>360,000</td>
<td>350,000</td>
<td>- 2.7 %</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>–</td>
<td>4,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,550</td>
<td>+ 27.5 %</td>
</tr>
<tr>
<td>Netherlands</td>
<td>65,000</td>
<td>65,000</td>
<td>65,000</td>
<td>65,000</td>
<td>67,000</td>
<td>+ 3.1 %</td>
</tr>
<tr>
<td>Portugal</td>
<td>30,000</td>
<td>30,000</td>
<td>19,820</td>
<td>45,000</td>
<td>52,000</td>
<td>+ 15.6 %</td>
</tr>
<tr>
<td>Spain</td>
<td>139,000</td>
<td>139,000</td>
<td>115,000</td>
<td>330,000</td>
<td>244,000</td>
<td>- 26.0 %</td>
</tr>
<tr>
<td>Sweden</td>
<td>–</td>
<td>–</td>
<td>65,000</td>
<td>65,000</td>
<td>60,000</td>
<td>- 7.7 %</td>
</tr>
<tr>
<td>UK</td>
<td>466,000</td>
<td>292,000</td>
<td>400,000</td>
<td>380,000</td>
<td>435,000</td>
<td>+ 14.5 %</td>
</tr>
<tr>
<td>Total EU</td>
<td>2,175,400</td>
<td>1,955,800</td>
<td>2,430,640</td>
<td>2,522,640</td>
<td>2,508,550</td>
<td>± 5.65 %</td>
</tr>
</tbody>
</table>

1 EC data; 2 ETRA data; 3 Austria, Finland, Sweden entered the EU in 1995; 4 Viridis questionnaire responses; 5 Over-estimation of 40,000t; 6 Net change exclusive of Ireland.
implementation timeframe is brief, with all of the Directives coming fully on-line before 2008. Few States are prepared to meet the challenge.

The need for reliable, consistent data on post-consumer tyre arisings is indisputable. These data are crucial to national and local as well as EU reports on accountability, transparency and traceability. They are critical to the elaboration of national policy and to the development of effective strategies for long-term planning towards the environmentally sound management and use of these post-consumer products. However, the data available today appear to be neither reliable nor consistent.

The mandates and goals are clear: existing markets must be maintained and expanded and new ones must be created in order to accommodate the increasing volumes of end-of-life products and materials which can no longer be disposed of in landfills. Attainment of these objectives will not be easy – particularly in the face of continually decreasing market shares for exports and retreading and new threats for certain forms of energy use.

As indicated in Figure 1, landfilling is still a preferred route in many States. However, expansion of the rapidly growing recycling and energy recovery markets could provide long-term outlets. Figure 1 illustrates the utilisation routes as reported by the industries involved, which differ somewhat from those reported by the States.

In order to attain the objectives enunciated in the Directives, public and private investors will have to be motivated to dedicate vast sums of new financing and resources for research and development, construction and equipment as well as training and marketing. The first questions posed by public and private financial institutions are often ‘how many tyres are and will become available?’ and, ‘what is the current and projected competition for those supplies?’ Today, with the data available, those fundamental questions cannot be answered with any accuracy.

Both small and large-scale projects will have to be conceived and developed. Many of the larger projects will involve inter-regional and inter-state planning, development and, potentially, implementation and even funding. This data will, of necessity, have to be consistent across Member States.

Nonetheless, today each EU Member State utilises its own means of collecting and interpreting information on post-consumer tyres. The results are often not only inaccurate internally, but inconsistent from State to State, and at times even vary from region to region within the same State.

The enabling legislation and regulations as well as the stakeholders and their responsibilities can be vastly different. As an example, in some States, statistics on post-consumer tyres are amassed in a central office by a government designated agency with responsibilities defined under law, while in others a combination of up to seven NGOs and government agencies are involved and given free rein.

The methods used to calculate arisings are dissimilar, and often incompatible. The basic elements used for calculation, i.e., definitions and classifications, tyre weight, among others, can also vary greatly. In order for reliable, consistent data to be available for planning development or investment purposes, it is imperative to have a consensus among the Member States on how those data are calculated and reported.

2 The problem: Post-consumer tyre arisings in the EU

In June 2000 VIRIDIS, the waste management research centre of the Transport Research Laboratory, was awarded a Biffaward under the UK Entrust programme to undertake a wide-ranging Mass Balance study on the tyre industries. The study undertook to investigate the totality of environmental impacts of the entire sector from design and production through end-of-life.

A sub-section of the study derived from the need for improved information about post-consumer tyre arisings.
and current disposal patterns as the basis for future development in the sector. It became apparent that the most effective approach would be to launch an investigation that would include all 15 Member States.

2.1 Project purpose

The purpose of this report is to describe the status quo across the EU concerning the practices and procedures currently used to collect, interpret and report information on post-consumer tyres and to present the current situation in terms of tyre flows and the valorisation of post-consumer tyres.

Specifically, it sought to define the similarities and differences between and among the measures currently taken by each State in order to identify those with a potential to enhance the overall flow and accuracy of information across States.

2.2 Potential limitations and assumptions of the project

It is important to note that all of the 15 States participated in the project. With the exception of Belgium, all of the respondents have agreed to participate in a meeting to discuss the development of an EU calculation formula. This would constitute a new and separate project.

A limitation was the lack of information from European tyre manufacturers concerning new tyre production and sales within the EU. It should be noted that the imported tyre manufacturers contributed to the project.

Five assumptions were made regarding the information necessary to facilitate discussion:

1. National demographics could provide an insight into the patterns of current and potential vehicle, hence tyre use.
2. National/regional regulatory frameworks could provide an indication of the over-riding policy and actions taken concerning post-consumer tyres – identifying potential constraints and/or flexibility.
3. The stakeholders identified to participate in the decision-making process could provide insights into potential directions that are taken.
4. Member States utilise the same basic categories to prepare reports on tyre arisings and destination – distinguishing between passenger cars, utility vehicles, trucks and others.
5. The total number of registered vehicles in circulation (private, commercial, government) could provide a baseline for determining the number of tyres on the road and the framework for the calculation of annual post-consumer tyre arisings.

2.3 Methods

The study relied principally upon a written questionnaire, e-mail and follow-up telephone interviews to collect the information from the Member States (see Appendix A). Background information on new tyre sales and imports, and new vehicles and vehicles in circulation was collected from Eurostat, the OECD, local and regional governments, public and private organisations representative of government and industry. Each of the Directives was obtained and reviewed.

Two data grids were prepared to analyse the information. The first grid focused on the legislative and regulatory framework in each State:

- General waste management legislation including unique features which could facilitate recycling and recovery activities.
- Specific legislation and regulations concerning post-consumer tyres.
- The type of post-consumer management plan that has been put into action.
- The financial structure put in place to support the post-consumer tyre programme.
- The way in which the principle of ‘producer responsibility’ has been interpreted including the identification of ‘economic operators’ or stakeholders and their role in the decision-making process concerning post-consumer tyres.

The second grid focused on the reporting of information, specifically concerning the issues surrounding post-consumer tyres and was divided into five key components:

- The regulatory framework.
- Stakeholders.
- Information sources.
- Tyre classifications (car, truck, bus, other) and weights used.
- Current uses of post-consumer tyres (where available).

Data were reviewed to determine existing patterns in each State as the basis for proposing recommendations. As the work got under way, it became apparent that a number...
of issues and questions had to be revised and pursued in greater depth than originally anticipated in order to provide the most accurate and insightful results. Five subjects required more intense scrutiny.

First, it seemed appropriate to include a summary of the EU legislative and regulatory framework within which tyres are addressed in order to provide the context for discussion of the ways in which the individual States have addressed the issues.

Second, the examination of the ‘legislative framework’ in each State yielded new questions about the ‘unique features’ that had been included and the ways in which they could impact upon potential actions concerning post-consumer tyres.

Third, the review of ‘official information sources’ led to further queries about the types and extent of the data included or inadvertently omitted.

Fourth, the above point precipitated a further examination of the stakeholders included in the decision-making process as well as the basis for their inclusion or exclusion.

Finally, members of the Viridis Advisory Committee suggested that the problems confronted by States with larger quantities of tyres are considerably different from those of smaller States, which led to a more detailed examination of the variations in treatment among the States, by size.

A glossary of terms used in the report is given in Appendix B.

The project commenced in September 2000 and the final report was completed in June 2001.

3 The legislative and regulatory framework

3.1 The legislative and regulatory infrastructure of the Member States

The Framework Directive on Waste (75/442/EEC as amended by 91/156/EEC) created the legislative infrastructure for the environmentally sound management of wastes within the European Union. It spells out the primary requirements that must be met to establish a viable community-wide waste management system, identifying the roles and responsibilities of all of the stakeholders. Although tyres are not specifically mentioned in the framework, they are among five priority waste streams identified by the Commission for consideration and are listed in the Waste Catalogue (94/3/EC) which accompanies the framework.

A fundamental principle, which transcends all waste treatment options focuses on the re-use and recovery of waste. It is addressed in Art. 3, 1. which states ‘Member States shall take appropriate measures to encourage: (b) (i) ‘the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials….’

Equally important is the polluter-pays principle, which focuses on the chain of responsibilities of the producers of waste from manufacturer to consumers. Manufacturers’ accountability for their products are far-reaching – from design through end-of-life. States’ responsibilities focus on implementing the system by creating the waste management environment and facilitating the collection, movement and treatment of wastes. Specifics include planning, permitting, implementation and reporting, as well as the designation of a competent authority to take charge.

Of particular importance to this project is the reference made in Art. 14 to maintaining records of the ‘quantity, nature, origin, and where relevant, the destination, frequency of collection, mode of transport and treatment method in respect to waste referred to in Annex I and the operations referred to in Annex II A or B’. Within the context of the Framework Directive, it would appear that accurate data on tyres should be maintained.

While many individual waste streams have been the subject of a separate directive, tyres have not. However, tyres have been singled out as wastes to be banned from landfills and are included as ‘components….as well as spare and replacement parts’ to be treated as part of end-of-life vehicles, with potentially significant impacts.

The intent of the framework is to harmonise waste management across the EU rather than to impose a single model – with a tacit goal of reducing barriers between States. While the EU Treaty requires the States to transpose directives into national law, each has the latitude to adapt them to comply with existing national law, culture, customs, etc. Adaptations have led to a panoply of diverse regulations, which could inhibit the creation of broad-based, interstate valorisation projects unless efforts are made to develop a common denominator.

Although bound together by the common goal of attaining sustainable, environmentally sound and commercially viable waste management procedures and practices – differences in policy, available technologies and resources, culture and/or size among others, have led to a great disparity in approach within the EU. A review of the legislative and regulatory infra-structure offers critical insights into the ways in which different States mandate the response to the problems and issues surrounding waste, including tyres. In the EU environmental management
programmes are generally administered by central government with the exception of Belgium and Spain, which delegate the responsibility to regional government.

Table 3 is an overview of when and how each State transposed the Framework Directive.

While each State has transposed the Framework Directive, eleven have adapted it by incorporating unique features that clarify selected points in order to conform to national law, policy, priorities or resources. The modifications impact upon the ways in which the regulations are interpreted and pursued. In the majority of cases, the revisions foster the development of valorisation activities. However, in some instances, they have the potential to create barriers to co-operative efforts between States.

Many of the issues raised in national legislation, e.g., the definition of the criteria to determine when a waste is no longer a waste, or the characteristics of a secondary raw material, among others, can only be resolved at the Commission level in consultation with the States and stakeholders involved. These discussions are currently under way. Other similar issues have become the subjects of lengthy discussions by the Commission while others have been integrated into special focus strategies.

### 3.2 The regulatory framework for post-consumer tyres

Twelve States have created ancillary legislation or regulations that focus specifically on the management of post-consumer tyres. The actions are varied, some have dealt with the entire problem, i.e., identification and collection through allocation to valorisation options, while others have focused on one or more specific facet, e.g., transport, treatment, etc. Many newer laws, notably in Portugal, Ireland and several regions in Spain, integrate tyre management and regulations concerning end-of-life vehicles. These States appear to be better prepared to accommodate the mandates inherent within the new directives.

Table 4 illustrates the range of legislation concerning post-consumer tyres. Column 5: Priority, refers to the preferred means of valorisation.

Ten States now opt for mandatory compliance with these laws, which for France and Spain reflect a major change from earlier voluntary programmes. Italy, which has a mandatory system, is in the process of improving enforcement to ensure compliance. Neither Austria nor Luxembourg stipulates the type of obligation; Greece and Ireland have not as yet taken the decision but appear to support mandatory programmes.

### Table 3 Legislative and regulatory framework

<table>
<thead>
<tr>
<th>State</th>
<th>Date</th>
<th>Coverage and applicability</th>
<th>Obligation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1990/1992</td>
<td>Waste management law/plan</td>
<td>None</td>
</tr>
<tr>
<td>Austria</td>
<td>1996 amended</td>
<td>Priorities for waste management</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Denmark</td>
<td>1995, 1997</td>
<td>Clear goals for collection and recycling</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Finland</td>
<td>1993</td>
<td>Waste Act</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Germany</td>
<td>1994 Art. 14</td>
<td>Waste Act RWMA Goals and priorities for recycling</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Greece</td>
<td>1986</td>
<td>Framework law (others from 1912, 1940)</td>
<td>–</td>
</tr>
<tr>
<td>Ireland</td>
<td>1990</td>
<td>Framework law on waste</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Ireland</td>
<td>1996</td>
<td>Environmental Protection Act</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Italy</td>
<td>1997 Decree</td>
<td>Legislation enabling government to facilitate recycling in lieu of landfilling</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>1993</td>
<td>Environmental protection/waste management</td>
<td>None</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1993</td>
<td>Waste Management Law – priorities stated</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1998-2000</td>
<td>Environmental control act</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Portugal</td>
<td>1987</td>
<td>Waste management legislation</td>
<td>–</td>
</tr>
<tr>
<td>Spain</td>
<td>1993</td>
<td>Waste Management Law</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Sweden</td>
<td>Supreme Court 94</td>
<td>Waste defined</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Sweden</td>
<td>1994</td>
<td>Waste Act</td>
<td>Mandatory</td>
</tr>
<tr>
<td>UK</td>
<td>1990</td>
<td>Environmental Protection Act</td>
<td>Mandatory</td>
</tr>
<tr>
<td>UK</td>
<td>1994</td>
<td>Waste management regulations</td>
<td>Mandatory</td>
</tr>
</tbody>
</table>

2. Regional rather than national legislation.
A growing number of States are re-examining their post-consumer tyre management policies and programmes in anticipation of the forthcoming deadlines. Newer programmes are being presented in greater detail — more frequently discussing the implications of proposed actions within a broader context — from collection to valorisation — and including the necessary financial support, management and control.

The components of post-consumer tyre management programmes vary considerably among the States. The most minimal programmes focus strictly on collection while the most integrated systems are expanded to encompass collection, sorting, temporary storage, routing and delivery for treatment, as well as administration. The administrative function generally comprises the collection and allocation of fees, licensing or permitting and reporting although several States also provide for surveillance. The surveillance function has become progressively important as fly-tipping has increased.

Seven States have imposed some form of tyre disposal fee. Four States require a mandatory fee — three of which ensure that the funds are deposited in a designated account and used to defray the costs of transport, storage and treatment. Three States provide for voluntary fees that are paid either into the general treasury or directly to the tyre fitter who must arrange to have the tyres removed by a licensed collector. France, Greece, Ireland and Portugal are in the process of determining a fee structure.

Based upon the information provided above, there are indications that the most successful tyre valorisation programmes tend to occur in those States that have:

- Enunciated specific goals for this waste stream.
- Devised explicitly defined regulations.
- Provided a means to defray the costs of tyre collection.
- Provided for the most inclusive, broadest base of economic stakeholders involved in government/industry consultations.

### 3.3 The stakeholders

‘Stakeholders’ are comprised of all the ‘economic operators’ who have an economic interest in the resolution...
of the problem under consideration, in other words, all of the public and private bodies – entities, industries or individuals (including NGOs and consumers) who are involved either directly or indirectly in resolving the problem. The stakeholders participate in the decision-making processes. In terms of tyre recycling, the role has far-reaching implications for the evolution of the management infrastructure, definition of needs and priorities, facilitation of the flow of tyres and development of treatment facilities. The stakeholders help to interpret national policy in order to implement the actions that will be taken by all sectors of the industry to attain the required results.

It is generally accepted that the intent of the authors of the Directives was to involve as many of the stakeholders as possible in the decision-making process. This would identify a broad range of solution alternatives in keeping with national policy, local priorities, available technologies and resources. However, in terms of post-consumer tyres, that has not generally been the case.

Nineteen potential categories of stakeholder were identified by the respondents to the questionnaire and from follow-up discussions with respondents and other interested parties. The 19 categories have been organized into 5 principal groups:

- Government bodies including a broad range of departments and agencies.
- Those involved with new or retreaded tyres: manufacturers, new tyre importers, retreaders, distributors, sellers.
- Those involved with post-consumer tyres: collectors, landfill operators, cement kiln operators, energy producers, material recyclers and material users.
- Those involved with new or end-of-life vehicles: manufacturers, importers, distributors, sellers, dismantlers.
- Others: trade unions, used tyre sellers and exporters.

Table 5 provides an overview of the stakeholders included in the decision-making process in each State.

The full gamut of the new tyre and retreading industries are represented in all States that have advisory bodies. The singular exception within the new tyre sector is the companies who manufacture tyres that are imported into the EC. These companies, who are primarily non-European, are included in only three States (Finland, Sweden, and UK).

Government departments and agencies are included in eight States, as either the co-ordinators and responsible bodies or as participants in a wider group.

While post-consumer tyre collectors and casings dealers are represented in all States, and used tyre exporters appear in more than half (8), the majority of those who are responsible for the valorisation of these products appear to be considerably under-represented:

- Only 3 States include recyclers or material users in the decision making process concerning the destination of post-consumer tyres.
- Only 3 States include cement kiln operators although all 15 States include energy producers in the decision making process for the destination of post-consumer tyres.
- On the other hand, all 15 States include used tyre exporters.
It is generally accepted that as the recent directives are implemented, greater quantities of post-consumer tyres will have to be treated by two principal sectors – material recyclers and energy producers. It would appear that it will become increasingly important to have greater input from those who are directly involved in those industries in order to plan effectively for development.

Increasingly accurate information will be required concerning existing capacity as the basis for determining the need for new facilities and/or treatment centres or the renovation of existing plants. Beyond data, insights will be sought regarding site placement, the flow of tyres, transport access, manpower and investment requirements, etc. The experiences and expertise of those involved in material recycling are valuable resources which can impact upon the cost-effectiveness and efficacy of national programmes. Unfortunately, one of the two key sectors is particularly un-or-under represented at State level, and appears to be increasingly omitted from planning at the EU level subsequent to the end of the Recycling Forum (1999).

### 3.4 Reporting mechanisms

Each of the EU Directives refers to a reporting function, which should include information on quantity as well as type and destination of wastes. However, while it is generally accepted that reporting is a key to the improvement of waste management practices and procedures, relatively few States have created well-defined reporting mechanisms that focus on post-consumer tyres. The majority of States do not specify reporting procedures or provide the bases for a system of checks and balances between different industry sectors.

### 4 Data sources and the European market

#### 4.1 General

The Framework Directive stresses the importance of accurate data as a planning and management tool at several points. Specifically, Art. 7., requires each State ‘...to draw up waste management plans...' based upon ‘the type, quantity and origin of waste to be recovered or disposed of...'. It could be assumed that at minimum, the priority waste streams – including tyres – would be covered.

Art. 14. reinforces the point, for the first time introducing a clearer focus on the type and extent of the information required. It mentions the need to maintain records of the ‘quantity, nature, origin.....and treatment method in respect to waste....’ which would suggest that transparency is a key goal. Again, it could be assumed that the priority waste streams would be included.

None of the referenced Directives or key articles recommends either the appropriate reporting mechanism or format. Neither the hierarchy of government
departments or stakeholders involved in the process are mentioned – nor is a proposed system of communication which could convey the information to other interested parties. Nonetheless, there is a procedure for providing periodic, generalised information. Each State is required to complete a questionnaire at three year intervals which seeks to update statistics on the principal waste streams – their growth or diminution, valorisation or disposal, etc. However, three related questions can be raised:

- What bodies have provided the data?
- What is the process of checks and balances?
- How is the information accessed?

Reliable statistics are frequently the cornerstone upon which policies, strategies and priorities are built. As pressures to respond to the Directives intensify, data on post-consumer tyres have become increasingly critical to the identification of appropriate treatment alternatives within the context of current and projected arisings, perceived needs and priorities, available technologies and resources as well as new investments. In order to be effective, the data on tyre arisings must be both reliable as well as transparent, affording the opportunity to trace entry into the market and follow their progression through their end-of-life and subsequent treatment.

4.2 Data sources

A first step towards improving the accuracy and transparency of statistics on post-consumer tyre arisings is to assess the flow of new tyres, the current sources of information and the databases utilised. However, information on the flow of tyres within the EU is neither readily available nor transparent.

The context and the need for reliable data in the EU are exceptional. In the EU, tyre manufacturers have additional responsibilities – they are held accountable for the environmentally sound and sustainable management of their products from design, materials selection and production through treatment at their end-of-life.

Lacking information for their reports, Deutsche Bank, publishers of the World Tyre Report, have commented that for their periodic market reports on tyre production and sales, they have had to generate their own estimates ‘as the industry provides little information.’ The same has been done in this project which has relied upon information made available by Deutsche Bank, the European Rubber Journal, Eurostat and the Imported Tyre Manufacturers’ Association.

Table 7 presents an overview of the EU tyre market as compared to world sales based upon figures provided by ERJ and Deutsche Bank. Tonnage has been estimated on the basis of the weight calculations presented in Table 2.

Figure 2 provides the estimated distribution for new tyre sales within the EU (Deutsche Bank 2000). Both original equipment and replacement tyres are included.

Table 7: Estimated world tyre sales in units - 2000

<table>
<thead>
<tr>
<th>Classification</th>
<th>World sales</th>
<th>EU %age</th>
<th>Share in units</th>
<th>Tonne equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger cars</td>
<td>750,000,000</td>
<td>33%</td>
<td>247,500,000</td>
<td>1,980,000</td>
</tr>
<tr>
<td>Van, light utility</td>
<td>100,000,000</td>
<td>33%</td>
<td>33,000,000</td>
<td>297,000</td>
</tr>
<tr>
<td>Truck tyres</td>
<td>91,000,000</td>
<td>21%</td>
<td>19,110,000</td>
<td>1,031,940</td>
</tr>
<tr>
<td>Sub-total</td>
<td>941,000,000</td>
<td></td>
<td>299,610,000</td>
<td>3,308,940</td>
</tr>
<tr>
<td>Other tyres</td>
<td>59,000,000</td>
<td>18%</td>
<td>10,620,000</td>
<td>n/a²</td>
</tr>
<tr>
<td>Total</td>
<td>1,000,000,000</td>
<td>26%</td>
<td>310,230,000</td>
<td>–</td>
</tr>
</tbody>
</table>

¹ n/a = Information not available. Deutsche Bank 2000, ETRA 2001

Table 8: Weight ranges of new tyres

<table>
<thead>
<tr>
<th>Category</th>
<th>Range</th>
<th>Ave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger car tyres</td>
<td>±7-9kg</td>
<td>8kg</td>
</tr>
<tr>
<td>Vans and light utility vehicles</td>
<td>±8-11kg</td>
<td>9kg</td>
</tr>
<tr>
<td>Trucks² (load index &lt;121 and &gt;121)</td>
<td>40-75kg</td>
<td>56kg</td>
</tr>
<tr>
<td>Other (bicycle, motor cycle, agriculture, aircraft, construction, mining)</td>
<td>0.5-2.5-1000kg</td>
<td>n/a¹</td>
</tr>
</tbody>
</table>

¹ n/a = Information not available.
² The average of the category ‘trucks’ reflects the preponderance of smaller truck tyres.
4.3 The European tyre market

The flow of tyres within the EU derives from two principal streams – those manufactured domestically by the European Rubber Manufacturers Council (ERMC) companies, and those that are imported into the EU from other world regions including non-community member countries in Europe. Penetration of the EU market by non-European manufacturers as well as extra-European sourcing by EU manufacturers has increased considerably in recent years. Estimates are that in 2000, approximately one-third of all tyres sold within the Member States originated outside of the Community. It is anticipated that this trend will continue in the future as both European and other producers develop and establish stronger global strategies.

Figure 3 provides an overview of the EU tyre market from production through end-of-life.

New tyres are marketed as original equipment (OE) i.e., purchased with the vehicle and as replacement tyres (RE) i.e., purchased separately from the vehicle, generally when the original tyres are worn or special purpose tyres are required (e.g., winter tyres). Replacement tyres are sold to consumers via national and pan-European distribution networks. A growing share of the replacement market has been taken by vans and small utility vehicles and winter tyres. It is estimated that the OE market for passenger cars, vans and light utility vehicles represents ±29% of annual sales, while RE sales are ± 71%.

Truck tyres are frequently sold with a lifelong contract that covers retreading and regrooving as part of the strategic maintenance of the tyre. The market for truck tyres is different than for cars and vans. First, it is considerably smaller in terms of units – approximately 9% of overall production, as compared with ±90% for cars and vans. It is estimated that the OE market for trucks represents ±16% of annual sales while RE represents 84%.

In recent years, the division between domestically produced and imported tyres has become progressively more blurred as manufacturers have begun to implement global production strategies. The Michelin-Stomil (Eastern Europe) and Goodyear Sumitomo (Japan) alliances provide good examples.

It is apparent that non-European manufacturers have become progressively more aggressive in their marketing approach within the EU. As a result, the European market has begun to shift and market share for non-European manufactured tyres, predominantly from Asia and other areas of Europe, has increased considerably. It is anticipated that this trend will continue as more players enter into the global marketplace.

Table 9 is an overview of the current market in the EU States for imported passenger car, van, utility vehicle, bus, and truck tyres from five principal world regions including Eastern Europe.

The volume of imported tyres reported herein represents approximately one third of the total EU original equipment and replacement markets. The tyres imported from EE, EFTA and Other European countries represent ±415,443 tonnes or ±40% of the total sales. It is assumed that a large percentage of these tyres are included in the reports of both the ERMC and BLIC. Several of the leading EU as well as non-EU manufacturers have expanded into Eastern European countries in recent years.

There is some evidence that there is an internal shift underway in European production – with many manufacturers investing and moving from Western to Eastern regions. Assumably, production costs and recent acquisitions have a bearing.

There are discrepancies between some of the figures in Table 9 and estimates of imports from figures provided by European manufacturers’ organisations. This anomaly can be explained. It would appear that official EU reports

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**Figure 3** The flow of tyres within the EU
include tyres which are produced by member companies and their affiliates, as well as Eastern European members of the organisation. The remainder would appear to be produced by non-affiliated companies. Nevertheless, these data leave a large gap in the information necessary for those preparing to treat post-consumer tyres at their end-of-life. They are neither complete nor transparent. While the statistics on European tyre sales are not definitive, they do provide the opportunity to develop more accurate and transparent information. The same nominal checks and balances do not exist concerning tyres produced in other world regions. It would appear that today, the data reported by official tyre manufacturers’ bodies do not offer a full and/or accurate picture of the new tyre market within the EU. At minimum, only 71% of passenger car and van tyre sales and 84% of truck tyre sales are reported – and those figures take into account only tyres produced in Europe.

### 5 Responses by the Member States

The European Directives on waste have created the framework within which each State is required to develop the infrastructure and means of managing the problems and issues surrounding waste – with specific attention paid to five priority waste streams – including tyres. The Directives clearly enunciate a seven-point strategy that must be adopted by each State. However, it is sufficiently flexible so as not to conflict with existing national laws, customs, cultures, needs, goals, resources, or potential capacity, etc. The ultimate goal of the combined Directives is to ensure that waste will be prevented and reduced and that the wastes that do arise are managed in a sustainable, environmentally sound manner. Responsibilities are also delineated for the producers of waste – as well as for the governments that are obliged to control and manage it.

The Directives neither propose a specific format nor provide directions as to the actions that must be taken. No distinctions are made concerning the type or programme that is implemented as long as the goals put forth are achieved within a designated timeframe.

The deadlines for both the Landfill and End-of-Life Vehicle Directives are rapidly approaching. As both Directives impact either directly or indirectly upon post-consumer tyres, and place specific restrictions upon their destination, it would seem to be an appropriate time to determine the current level of readiness in each of the States and to assess their current capacity to accommodate the anticipated surge.
Progress among the States has been uneven. Several have already attained their goals, while others are in the process of initiating their programmes. Further, each State has devised its own unique means of response. Some have enacted broad, encompassing legislation on waste that could facilitate the treatment of all waste streams and, subsequently, have developed integrated waste management programmes to fulfil that goal. An equal number of States have opted to create separate, often parallel legislation specifically directed to the unique characteristics of post-consumer tyres. They have constructed programmes that take account of the full extent of the problem – from the stakeholders and decision-making processes, to collection and treatment, as well as financing and reporting. Several States have concentrated on one or more specific aspects of the problems surrounding post-consumer tyres.

The vast majority of States have created some form of special focus legislation to address the issues and problems surrounding post-consumer tyres – beginning as early as 1993, while many of the most recent actions are still in process of being modified or revised in 2001. The laws themselves vary considerably from those which include detailed explications to those which have provided general goals and objectives which are to be interpreted by those who implement them.

Table 10 provides a more detailed view of the ways in which the States have complied with the strategy criteria as presented herein, and the results that have been achieved.

As can be seen from the above, although progress has been uneven, each of the States has met at least three of the criteria proposed in the waste strategy presented herein.

The above profiles were reviewed in greater depth to determine if there were significant differences between the results attained by larger versus smaller States. It is apparent that no significant or systematic differences have occurred between the results achieved by larger States and those of smaller States. The differences appear to be attributable to the different ways in which the States have approached the problem and defined the infrastructure and/or the type of management system set in place for post-consumer tyres. Further, more representative stakeholder involvement was discerned in the most successful States.

Figure 4 illustrates in greater detail the status of each State in 2001. The category ‘valorisation’ includes reuse as part-worn, retreading, material recycling as well as energy recovery.

Considerable progress has been made since the early 1990s when only 5% of post-consumer tyres were recycled and only 14% were used for energy recovery. However, to progress further, many programmes will have to be refined and move to a higher level of achievement.

5.2 Post-consumer tyre management

Generally, information on post-consumer tyres is collected from one or more alternative sources at different points along the continuum from production through end-of-life, and compiled at a central point to provide the overall picture. As many as 19 different information sources can be discerned – reflective of the stakeholders identified earlier.

The procedures for collecting information vary as a function of the type of programme, its participants and goals. While some of the programmes are detailed with

<table>
<thead>
<tr>
<th>Item</th>
<th>Au</th>
<th>Be</th>
<th>De</th>
<th>Fi</th>
<th>Fr</th>
<th>Ge</th>
<th>Ir</th>
<th>It</th>
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<td>O</td>
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<td>×</td>
<td>×</td>
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<td>×</td>
<td>×</td>
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<tr>
<td>Stakeholders</td>
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<td>4</td>
<td>10</td>
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<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Monitoring of tyres</td>
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<td>×</td>
<td>□</td>
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<td>Destination of tyres</td>
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<td>export</td>
<td>10%</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
<td>5%</td>
<td>17%</td>
<td>O</td>
<td>O</td>
<td>2%</td>
<td>95%</td>
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<td>1%</td>
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<td>valorisation</td>
<td>50%</td>
<td>84%</td>
<td>88%</td>
<td>86%</td>
<td>43%</td>
<td>73%</td>
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<td>–</td>
<td>7%</td>
<td>5%</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>12%</td>
<td>–</td>
</tr>
<tr>
<td>landfill/silage</td>
<td>40%</td>
<td>4.5%</td>
<td>O</td>
<td>4%</td>
<td>45%</td>
<td>5%</td>
<td>83%</td>
<td>95%</td>
<td>66%</td>
<td>O</td>
<td>O</td>
<td>60%</td>
<td>80%</td>
<td>3%</td>
</tr>
<tr>
<td>Reporting</td>
<td>□</td>
<td>□</td>
<td>×</td>
<td>×</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>×</td>
<td>□</td>
<td>□</td>
<td>×</td>
</tr>
</tbody>
</table>

O = Does not include this element.
□ = In process, partial fulfilment or unspecified.
× = Fulfils the function.
% = Percentage of total.
1 Retreading, recycling, energy.
specific information needs as well as the reporting hierarchy identified, others are less formal and require only general information which is integrated into the overall waste management report. It would appear that the most transparent information results from the inclusion of a broad array of sources – including third parties – that can provide cross-references for the data.

A co-ordinating body is generally responsible for integrating the information received from the various points of reference in order to provide a transparent overview of the tyre flow. In some instances, the body that integrates the information is a government agency or affiliate, or one designated by the government to assume responsibility for the post-consumer tyre programme. In a number of States, the tyre manufacturers have either secured or are attempting to secure that role.

Figure 5 illustrates the relationships between and among the different sectors and the potential flow of information.

5.3 Calculation of post-consumer tyres

The bodies that collect information on post-consumer tyres vary as a function of the type of system that has been established, the regulatory requirements and the defined roles and responsibilities of the participants. As illustrated earlier, the data collection network can include the new tyre producers, sales and distribution networks, independent specialised tyre collectors or those sub-contracting to the tyre management body, as well as the entities that receive the tyres for treatment and/or disposal.

The methods used to collect information and the ways in which it is reported also vary considerably from State to State. While some States take a direct count, others estimate potential arisings based upon recorded replacement tyre sales or on an estimate based upon the projected number of vehicles in circulation. Reporting procedures vary from unit counts by specified category, to total tonnage for all of the categories combined. There

![Figure 4 Export, valorisation, miscellaneous uses and landfill (2001)](image)

![Figure 5 Sources of information on post-consumer tyres (ETRA 2001)](image)
does not currently appear to be an agreement among the States on the definitions of the categories involved.

For the most part, manufacturers, importers and distributors limit their reporting to a maximum of four principal categories: ‘passenger’, ‘light truck’, ‘heavy or long haul truck’, and ‘other’. Sub-categories can also be subsumed, e.g., ‘cars’ can include ‘estate wagons’ and/or vans as well as light utility vehicles, ‘light trucks’ can also include vans, buses or utility vehicles, ‘trucks’ often include buses and/or a breakdown by weight and/or function. There can be some confusion and overlapping.

On the other hand, those responsible for reporting on post-consumer tyre arisings tend to include a greater variety – 11 or more separate categories. It is important to note that some of the categories included in these reports will not be covered under new Directives and could tend to confuse the issue of the quantity of tyres available for different treatments.

Table 11 presents the categories of post-consumer tyres most commonly reported by those who collect the data. The categories in italics are less common, often grouped under the heading ‘other’ and are generally excluded from coverage under the Directives.

With the exception of Germany, each State utilises a minimum of three principal categories to describe post-consumer tyre arisings: car, light utility and truck. The majority mingle van tyres with passenger car or light utility vehicles, and bus tyres with trucks. Each has its own means of determining categorical weights.

While the principal categories can be discerned, there does not currently appear to be a common means of defining them. There are no generally accepted definitions of the parameters of the different categories, e.g., range of weights that could be included, etc. Final tallies are often reported in overall tonnes, as a global commodity – without distinction between categories.

At present, manufacturers’ production figures are generally expressed in units while statistics on end-of-life tyres, with the exception of those selected for retreading, are generally expressed in tonnes – often in mixed categories. This distinction could cause a fundamental error when attempts are made to calculate and/or project post-consumer tyre arisings, which would further affect the accuracy of reports.

Official reports by Member States on arisings utilise seven different weights to define the category ‘car tyre’. They range from 5.5kg to 7.1kg per unit – a variation of more than 20% – that could result in a difference of more than 40 units per tonne. A parallel situation is evident for truck tyres. Fourteen States report truck tyres within a range from 43kg to 60kg per unit – a variation of more than 20%, virtually the same as for passenger car tyres.

### Table 11 Tyre reporting categories by Member State

<table>
<thead>
<tr>
<th>State</th>
<th>Car</th>
<th>Truck</th>
<th>Utility</th>
<th>Van</th>
<th>Bus</th>
<th>Off-nd</th>
<th>Hanger</th>
<th>Agri.</th>
<th>Mcycle</th>
<th>Bicycle</th>
<th>Other</th>
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<td>UK</td>
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<tr>
<td>Total</td>
<td>15</td>
<td>14</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
</tbody>
</table>

<sup>1</sup> Austria: off-road includes front and rear agricultural tyres.
<sup>2</sup> Denmark: the category utility includes small vans.
<sup>3</sup> Denmark: the category utility includes small vans.
<sup>4</sup> Finland: the category off-road covers agricultural tyres.
<sup>5</sup> Ireland: the category other includes plane, motorcycle and bicycle tyres.
An error of this magnitude could result in an under-or-over counting of close to 25%, when calculated across States. The total sales of new passenger car tyres within the EU are estimated at ±1,980,000 tonnes. As it is assumed that a tyre loses ±20% of its weight by the time it reaches end-of-life, annual yield of post-consumer car tyre arisings could be expected to be ±1,584,000 tonnes. Based upon the potential for error noted above, that figure could actually be from ±1,267,200 to ±1,900,800 – a range of 633,600 tonnes per year – or more than is currently used by either material recycling or energy recovery.

The preponderance of States utilise a weight of ±6.5kg per unit for post-consumer car tyres, while those further North tend to use tend to use ±7kg. However, variations at the lower extreme are not systematic, and do not appear to follow a climatic or vehicle size trend.

These figures would tend to indicate that the weight of the new tyres from which they were generated was between ±6.8kg to ±9kg per unit. It is important to note that reports on new tyre sales indicate that the bulk of passenger car tyres sold in the EU are identified as having an average weight of ±8. The inclusion of van tyres in that category could increase the weight to ±9kg, inclusion of the smaller ‘city-car’ tyres, e.g., Fiat, Mini, Smartcar, could reduce the weight to ±7.5kg.

As indicated earlier, the overall data on new tyre sales within the EU are not readily available for comparison. However, Eurostat provides current information regarding imported tyres – by category (see Table 10). The data are presented as combined tonnage and in units, by State, allowing the calculation of average unit weight by category.

The weights recorded for new tyres range from 6.7kg per to 10.54kg. However, the weight used in official reports by Member States on post-consumer tyres utilises the standard, 6.5kg, which does not reflect the inclusion of smaller vehicles. For most states, the range of weight for the category ‘new tyre’ is between 7.9kg and 8.65kg, which supports the generally accepted view of ±8+kg, with slightly higher weights for winter and van/light utility vehicle tyres.

As noted earlier, the average weight utilised for post-consumer tyres is 6.5kg, which appears to have little relationship to the size of the new tyre in a number of instances – as if there is a generally accepted figure for the final weight as well. The average loss over time has been estimated by the new tyre industry at ±20-25%. The range of weight loss described herein is from 0.2kg to 4.54kg – or from 2% to 43.1% of the total weight of the tyre. The preponderance of States report an overall loss of ±18% to 25%. Figure 6 provides a more detailed view of the reported changes in the average weight of passenger car tyres from new to post-consumer status.

Table 12 illustrates the differences between and among the reported weights applied for new (columns 1-3) and post-consumer tyres (columns 4-6) and the potential impact that could derive from apparently nominal variations when applied to large quantities.

As discussed above, official reports on post-consumer tyre arisings would appear to be less than accurate. Significant errors could inadvertently lead to an under-or-over estimation of available resources. Nevertheless, several industries are competing for the raw material – for reuse, recycling or energy. As the deadlines approach for the implementation of the Landfill and End-of-Life-Vehicle Directives, greater pressures will be exerted on each of these industries to accommodate greater quantities. The principal questions are:

![Figure 6](image_url)
5.4 Valorisation of post-consumer tyres

Annual reports on the disposition of post-consumer tyres are an integral part of the process. In many States, these reports are prepared almost exclusively on the basis of the information gleaned from calculations of the arisings. The reports describe the status and results of the actions that have been taken during the year, providing the basis for assessing target attainment. The specificity of the reports vary considerably among the States, generally as a function of the extent to which national policy and priorities have been defined in the management plan, and reflective of the breadth of stakeholder participation.

Post-consumer tyres are currently consigned to five different outlets for valorisation or disposal: reuse and export, retreading, material recycling, and energy recovery as well as the soon to be eliminated landfill. Every State reports at least one form of valorisation – eleven also rely to some extent on landfill.

Table 13 presents the information reported by the States concerning the efforts made to move from reliance on landfilling towards a higher level of valorisation.

In general, the five valorisation options can be classified into three categories:

- Non-treatments, which includes export, silage and landfilling.

### Table 12 Passenger car tyres per tonne

<table>
<thead>
<tr>
<th>Weight (tonne)</th>
<th>Reported new tyre weights</th>
<th>Reported post-consumer tyre weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (tonne)</td>
<td>Units/ 1000</td>
<td>Units/ 1000</td>
</tr>
<tr>
<td>6.7</td>
<td>149.25</td>
<td>149,250</td>
</tr>
<tr>
<td>7.23</td>
<td>138.3</td>
<td>138,300</td>
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<td>7.9</td>
<td>126.58</td>
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<td>7.91</td>
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<tr>
<td>8.1</td>
<td>123.46</td>
<td>123,460</td>
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<td>8.17</td>
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<td>122,400</td>
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<td>8.28</td>
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<td>8.3</td>
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<td>120,500</td>
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<tr>
<td>8.6</td>
<td>116.28</td>
<td>116,280</td>
</tr>
<tr>
<td>9.0</td>
<td>111.11</td>
<td>111,110</td>
</tr>
</tbody>
</table>

NB: Member States report post-consumer tyres in tonnes

- Whether or not there are sufficient numbers of facilities to meet those needs.
- Whether or not they can be adapted and/or expanded to meet potential needs.
- Whether or not there is a need for additional facilities.
- Where and how many?
- Temporary treatments, which includes reuse and retreading.
- Permanent treatments, which includes material recycling and energy recovery.

While retreading is generally considered temporary treatment, it is a valuable means of extending the life of a tyre and, although not considered a permanent resolution, it is one that contributes significantly to the attainment of EU sustainable goals. Following is a brief review of the current status of the different means of destination.

**Landfill:** Evidence indicates that landfilling has declined from a high of ±62% in 1992, and from 49% to ±32% during the past 2 years, a greater reduction than throughout the past decade. Landfill operators have begun to divert post-consumer tyres from internment to utilisation in a number of different ways that benefit from the inherent characteristics of the tyre. They are used in landfill construction engineering, ongoing maintenance, and more recently, as temporary roads within the sites.

**Reuse and export:** The combined figures for domestic reuse and export to non-EU countries have remained virtually stagnant at 11% during the past 5 years. Every State appears to have a small market for ‘part-worn’ tyres, accounting for ±4% of the overall total. There are some indications that this market is declining slightly due in part to increased competition from imported budget tyres.

With the exception of Greece and Ireland, all States export some quantity of post-consumer tyres to countries outside of the EU, which have less rigorous road use standards. Exports account for ±7% of the total. There are some indications that this market is slowly declining. While data are maintained on exports from the EU, there is little official information on the quantities of post-consumer tyres circulating within the Community.

**Retreading:** All 15 States have retreading facilities that account for ±13.5% of the annual total. Retreading is composed of two distinct markets, each of which is based upon different tenets.

1 Retreaded passenger car tyres are sold as replacement tyres – in competition with new tyres. Increasingly, budget tyres imported from other world regions and part-worn tyres are threatening market share. Estimates are that this market has declined on average across States by at least 20% over the past five years.

2 Truck tyre retreading has improved slightly during the same period. It is increasingly perceived as a strategic maintenance procedure to increase on-road life. However, while retreading is available in all of the States, only 3 States actually include them on government procurement lists.

**Material recycling:** Material recycling has increased by more than 12% to ±18% in recent years and is treating a sizeable share of the tyres which are no longer disposed in landfills. Material recycling is composed of two separate sectors:

- Size reduction.
- The use of whole and size reduced materials in an array of products and applications.

A CEN Workshop Agreement standardisation process has been initiated to ensure that the quality and consistency of tyre material recycling is maintained throughout the EU as the basis for market expansion and development.

Increasingly, post-consumer tyres and materials are being sought as an inexpensive, durable, lightweight raw material for numerous applications that benefit from the inherent properties and characteristics of tyre ingredients. A majority of the 13 States which include recycling as an option refer exclusively to basic size reduction technologies (ambient and cryogenic), and do not include more sophisticated multi-process technologies which produce reclaim, pyrolytic and devulcanised materials. Few products or applications are reported although some reference is made to civil engineering, while strategic environmental rehabilitation applications and consumer and industrial products are ignored. In recent years an array of products created from post-consumer tyre materials have entered the mainstream and are no longer identified as ‘recycled’. It could, thus, become difficult to trace them.

**Silage:** Silage is used on farms in only six States accounting for ±4% of the total. The tyres are generally used as ‘silage clamps’ to hold down crop coverings, etc. As tyres do not deteriorate readily, they need not be replaced frequently. It is, thus, unusual to note that in two States, tyres used for silage are the principal means of utilisation – accounting for 25% and 40% of the total arisings, while the remaining four States utilise nominal amounts, generally less than 5%.

**Energy recovery:** Energy recovery has increased by more than 8% to almost 22% in recent years and is consuming a sizeable share of the tyres which are no longer disposed in landfills. Two principal sectors are included: cement kilns and energy generation:

- Use is in cement kilns provides benefits from the ingredients in the tyres which substantially reduce emissions to air and help to maintain them at a consistent level.
Tyre-to energy and co-generation facilities have been less successful although indications are that the next generation of technologies could be better adapted to tyre use.

A small percentage of post-consumer tyres, which are not suitable for retreading are used to generate steam and energy for retreading production processes.

Twelve States currently rely upon energy recovery facilities to accommodate large quantities of tyres. There are indications that several States with larger quantities of arisings are investigating vast increases in the utilisation of this treatment within the near future.

Miscellaneous uses: Approximately 4% of post-consumer tyres are reported under the heading ‘miscellaneous’. In some States this category includes part-worn as well as ‘disappeared’ tyres which have been included in the overall tally, but for which there is no evidence of utilisation or landfilling. The ‘miscellaneous’ category underscores some of the reporting problems discussed earlier concerning accuracy and transparency.

It is evident that retreading, material recycling and energy recovery will have to accommodate the tyres which are currently going to landfill, or ±764,015 tonnes – virtually equivalent to the current combined totals for export, retreading, silage and miscellaneous. While retreading has a well-defined, existing but under-used capacity, the current capacity for the latter two will, necessarily, have to be expanded and built upon. However, little is known about current capacity for these two or about the accuracy of the information received on utilisation. It would appear that these data will require the same scrutiny as those on arisings.

All three of these treatments produce limited negative environmental impacts. Each provides valuable outputs and is an effective means of valorising post-consumer tyres and helping to attain the imminent goal of zero landfilling. However, specific information about existing capacity for development of the utilisations is relatively limited and generally concerns the capacity of the equipment and the efficacy of the materials produced, rather than existing sites.

In order for any of these facilities to operate efficiently and cost-effectively, they must be assured of a continuous flow of tyres. The quantity and location of the post-consumer tyres must be known and available, collectors must have access to them and be able to procure and deliver them in an uninterrupted flow. That does not appear to be the case at present: in terms of the current flow and utilisation of post-consumer tyres, the information appears to be unavailable or inaccurate.

5.5 Strengths, Weaknesses, Opportunities, Threats: retreading, recycling, recovery

As stated earlier, it is evident that the preponderance of post-consumer tyres which are currently consigned to landfills will have to be treated by one, or more, of the three options identified earlier: retreading, recycling, recovery. Following is a brief summary of the principal strengths and weaknesses of each.

Retreading

Strengths:
1. Retreading goes to the core of the Framework Directive by preventing and reducing waste and to other Directives by reducing reliance upon fossil fuel.
2. Each retreaded passenger car tyre saves the equivalent of ±18 litres of petroleum by vulcanising new tread to a suitable carcass.
3. Each retreaded truck tyre can save the equivalent of up to ±60 litres of petroleum.
4. Retreading is comprised substantially of SMEs and generates employment.

Weaknesses:
1. EU and State governments do not appear to support retreading as a first step towards demonstrating sustainable development goals.
2. The passenger car tyre sector does not appear to be pro-active in seeking ways to expand use and acceptance.
3. The costs of updating and retooling are high.

Opportunities:
1. In a slowing economy greater cost savings are sought by the public at large as well as by governments.
2. Governments are seeking environmentally sound means of diverting post-consumer tyres from landfills – the retreading infrastructure exists and is underused and could provide an excellent example – and means.

Threats:
1. High quality casings appear to be in short supply.
2. Part-worn tyres often with minimal remaining tread are stiff competition in some States.
3 Imported budget tyres are increasingly impinging upon market share.

**Suggestions:**
1 Build upon the existing RMA structure, which has high visibility, an excellent reputation and contacts in many, if not all, Member States.

2 Maintain and circulate annual data on production and sales of retreaded tyres in each of the States.

3 Lobby State governments to include retreaded tyres on procurement lists and propose other uses which could help States to demonstrate sustainable actions.

**Material recycling**

**Strengths:**
1 Material recycling goes to the core of the Framework Directive, fulfilling the objectives of the fundamental principle stated in Art. 3, 1. regarding the need to recycle, and to other directives concerning reduced reliance on fossil fuel.

2 Post-consumer tyres can be utilised in whole, shredded, granulated and powdered form in consumer and industrial products, environmental rehabilitation and construction.

3 The materials are currently being standardised by the CWA Workshop Agreement, as is a range of selected applications.

**Weaknesses:**
1 There is a general lack of awareness of the benefits that can accrue from the materials in their many forms.

2 There are limited funds available from government agencies to pursue research on new products and applications.

3 Several States do not include products and applications made from post-consumer tyre materials on their procurement lists for local construction, furnishing or maintenance.

4 Consistent, reliable data are not available on annual arisings, which make it difficult to plan for the future, particularly for expansion and development.

**Opportunities:**
1 Recycling facilities can be small and inexpensive, dependent upon the product, and can respond to local needs.

2 Markets for many products and applications can be expanded to meet capacity needs.

3 New markets are being created for a broad range of consumer and industrial products including solid wheels, footwear, anti-vibration mats, stock mattresses, soil enhancers, among very many others.

**Threats:**
1 Potential limited availability of raw materials due to the vast quantity requirements by energy facilities could put many existing small companies out of business.

2 Governments increasingly require covered storage for post-consumer tyres, potentially adding to the costs of using these materials.

3 Material recycling depends upon a consistent flow of a single feedstock.

**Suggestions:**
1 Undertake a census in each State to determine the locations of existing tyre collection centres.

2 Undertake a census in each State to determine the locations of existing material recycling facilities.

3 Prepare an overview to determine the gaps in service, primarily in remote communities.

4 Prepare a taxonomy of traditional materials used in selected industries to determine those for which post-consumer tyre materials would provide a viable, environmentally sound and sustainable alternative.

5 Perform needs assessments in areas that are underdeveloped in terms of material recycling to determine the products and applications that would meet existing needs.

**Energy recovery and cement kilns**

**Strengths:**
1 Energy recovery goes to the core of several Directives by reducing reliance upon fossil fuels – 1kg of post-consumer tyres produce ±28,600BTUs of energy.

2 Tyres provide cleaner energy than traditional alternatives, with reduced ash.

3 Emissions to air are reduced, enabling facilities to maintain constant emissions levels, below defined standards.
4 In cement plants post-consumer tyre ingredients enhance end-product quality.

5 Energy recovery and cement plants can ensure the annual consumption of large quantities of post-consumer tyres per facility (±50,000-200,000 tonnes per year).

6 Energy recovery and cement kiln companies have direct links to tyre producers, which could ensure a continuous, direct flow of tyres.

7 Energy recovery and cement plants have the capacity to dilute or substitute the use of post-consumer tyres with other feedstock, dependent upon market conditions.

Weaknesses:

1 Initial investments for new facilities or redevelopment of existing facilities are very costly relative to other facilities and permits are difficult to obtain.

2 Tyre storage requires considerable space, e.g., 1,500 m$^3$ for 15,000 tonnes of tyres, for which owners are beginning to calculate the costs.

3 There is little information available about the long-term efficacy and sustainability of energy recovery facilities.

Opportunities:

1 Energy recovery facilities provide a means of diminishing existing stockpiles.

2 Energy recovery and cement facilities could become the recipient of part-worn tyres that are not suitable for retreading or recycling.

3 Energy recovery facilities could be the direct recipient to utilise products and materials that have been recycled at least once.

Threats:

1 At its 6 July meeting the Community’s Technical Adaptation Committee on Waste Management discussed the recommendation that ‘untreated used tyres would not be considered a recovery operation for cement kilns’, which would have a significant negative impact on post-consumer tyre markets.

2 Public sentiment concerning the ‘NIMBY’ principle.

3 Governments are placing increased restrictions on post-consumer tyre storage and in some areas have 1,000 tyre – 1,000 tonne limits, when 1 month of feedstock can necessitate ±15,000 tonnes, requiring more frequent deliveries.

4 Governments increasingly require covered storage for post-consumer tyres, potentially adding to the costs of using these materials.

5 The long payback period necessary for the required conversions to facilitate the use of tyres as fuel.

Suggestions:

1 Investigate the availability of tapping ‘historic’ tyre stockpiles as a source.

2 Create a network to receive any and/or all tyres that have been fly-tipped or abandoned.

6 Conclusions and recommendations

It is apparent from the above that each of the principal valorisation routes has crucial strengths and meets key criteria established in the Directives on waste management and on the decrease of reliance on fossil fuels. Each provides outputs that have varying levels of economic value and, further, fulfill the three levels of the waste management hierarchy proposed in 1991:

- Extension of life through reuse (including retreading).
- Recycling to benefit from the value of the material; followed by
- Energy recovery to extract the energy value when it can no longer be used for a product.

It is important to note that the hierarchy was conceived as a cascade – materials that could not be accommodated at each level flowing to the next for treatment.

While it is evident that a full disclosure and examination of the different market segments for post-consumer tyres is not currently feasible, progress is being made towards establishing the necessary mechanisms. Considerable progress is being made by collectors, material recyclers and energy recoverers, who are increasingly defining their roles and have assumed the responsibilities necessary to ensure that they are fulfilled. During the past two years, there have been indications that they are beginning to work in tandem to examine existing markets in order to effectively meet the objectives of the Directives as they come on-line.

The timing could now be appropriate to assess in detail the specific costs and benefits of each of the principal modes of valorisation – including the values inherent in attaining objectives beyond zero landfilling, i.e., job opportunities, enhanced product wear, environmental
rehabilitation, among others. A review of the amounts of fuel that could be saved by retreading could be timely and relevant.

In order for further progress to be made, several issues must be resolved (alphabetical order):

1 **Barriers:** The barriers to material recycling must be analysed and discussed within the industry as well as with principal stakeholders – including government agencies and tyre manufacturers.

2 **Capacity:** Information must become available concerning existing treatment facilities and their current and projected capacity to assist in identifying areas which are un-or-under-served.

3 **Image:** Post-consumer tyres must be perceived as a valuable resource rather than waste. The change could affect the way in which consumers, including governments, see the products and applications created from these materials and could facilitate their increased use.

4 **Information:** Data collection and reporting on post consumer tyre arisings must be improved to provide a more accurate view of the quantities and types, as well as current means of utilisation as the basis for government policy and increased private sector investment.

5 **Relationships:** Efforts must be made to improve relationships between the new tyre producers and post-consumer tyre valorisers to facilitate the flow of information and to work together to develop materials which could be reintroduced into the tyre Industry.

6 **Stakeholders:** A broader base of stakeholders must be included in the decision-making process concerning post-consumer tyres in order for material recycling to progress and increase proportionately.

7 **Waste definition:** Efforts must continue to revise or amend the existing definition of waste to provide greater latitude for the utilisation of post-consumer tyre materials as a raw material without penalty.

The future of post-consumer tyre valorisation is dynamic. It reflects the mandate expressed in Art. 3, 1. of the Framework Directive which states ‘Member States shall take appropriate measures to encourage: (b) (i) ‘the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials…’

The initial objectives of the project have been met. The majority of participants have arrived at a general consensus that the current system of calculating and reporting post-consumer tyre arisings must be revised. It is further agreed that an effort should be made to determine the quantities currently accommodated by each principal means of valorisation. It has been suggested that in order to accomplish that goal, each of the treatment facilities should be identified and their estimated consumption defined in order to determine the extent to which they provide for the needs of more remote areas. It was also suggested that if feasible, it would be valuable to examine the quantities of arisings, by region/area, in comparison to the available treatment facilities and to prepare an assessment of the environmental rehabilitation and civil engineering needs in each place.

As a result of this part of the Tyre Mass Balance project, thirteen States have indicated their interest in working together to develop an improved data collection and reporting system for post-consumer tyres.

### 7 References


**IRSG (1999).** Proceedings.

**OCDE (1997).** *Examens des performances environnementales.* France, 1997

**Shulman V (2000).** *Introduction to tyre recycling.* European Tyre Recycling Association (ETRA).


**European legislation concerning waste**


Decision 94/3/EC establishing a list of wastes pursuant to Article 1 (a) of Council.


**Journals**

ETRA News, diverse issues.

European Rubber Journal, diverse issues.

Rubber World, diverse issues.

Tire Technology International, diverse issues.

TRIB, diverse issues.

Tyretrade, diverse issues.

UTA, diverse issues.
Appendix A: The ETRA Questionnaire

European Tyre Recycling Questionnaire

Please complete the form by providing the information which most accurately describes the current status of end-of-life tyres and tyre recycling in your State.

We would appreciate it if you would return the completed form by 15 September 2000

Yes No

1. ☐☐ There is currently national legislation which specifically covers end-of-life tyres.
   Date enacted:________________________________________
   Title:________________________________________________

2. ☐☐ There are currently non-legislative regulations which specifically cover end-of-life tyres.
   Date:________________________________________________
   Title:________________________________________________

3. ☐☐ There is currently a national/local policy which specifically addresses end-of-life tyres.
   Date:________________________________________________
   Title:________________________________________________

4. ☐☐ National/local policy defines the priorities for the disposal of end-of-life tyres.
   Indicate how end-of-life tyres are currently disposed and the percentage used for each.
   ☐ landfill __________ % ☐ silage/boat fenders __________ %
   ☐ export __________ % ☐ landfill engineering __________ %
   ☐ retreading __________ % ☐ granulation/size reduction __________ %
   ☐ product manufacture __________ % ☐ other:________________________

5. ☐☐ An advisory body has been formed to assist in policy development for end-of-life tyres.
   Date created:________________________________________
   Title of body:________________________________________
   ☐ tyre manufacturers/importers ☐ tyre distributors/sellers
   ☐ tyre retreaders ☐ tyre collectors/casing dealers
   ☐ tyre granulators ☐ post-consumer tyre material users
   ☐ tyre-to-energy producers ☐ other:________________________

6. ☐☐ Statistics on end-of-life tyres have been collected annually beginning in ________.
   The official estimate of tyres arising in 1998-9 (or most recent) was _______ tonnes
   Statistics are collected by:_______________________________
   Statistics are reported to:_______________________________

7. ☐☐ Government, non-government and industry bodies contribute information and statistics.
   Mark the industry bodies which contribute information to the estimate.
   ☐ vehicle registration offices ☐ government import/export offices
   ☐ environment agencies/offices ☐ department of trade, industry, development
   ☐ vehicle manufacturers/importers ☐ vehicle distributors/resellers
   ☐ tyre manufacturers/importers ☐ tyre distributors/sellers (new, retread, used)
   ☐ retreaders ☐ used tyre collectors/casing dealers
   ☐ used tyre exporters ☐ vehicle dismantlers
   ☐ landfill operators ☐ other:______________________________
8. ☐☐ Statistics on end-of-life tyres are reported in principal categories which describe their use. 
Mark the box and provide the estimated weight for each category used in your State:

<table>
<thead>
<tr>
<th>category</th>
<th>weight estimate</th>
<th>new kg.</th>
<th>end-of-life kg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ passenger car tyres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ utility vehicle tyres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ truck/lorry tyres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ bus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ off-road vehicles/ agricultural tyres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. ☐☐ There are currently national/local regulations guiding the collection of end-of-life tyres.
Date: ____________________________________________
Title: ___________________________________________

10. ☐☐ There are national/local regulations which stipulate who may collect end-of-life tyres.
Date: __________________________________________
Title: __________________________________________

11. ☐☐ Tyre collectors must be licensed and or registered with a government office/agency.
Name of office/agency: ___________________ Cost and duration of license: __________

12. ☐☐ Tyre collection is administered/monitored by a government agency or designated affiliate.
Name of agency/affiliate: _____________ Principal responsibility: ______________

13. ☐☐ National/local regulations define where and or how end-of-life tyres may be disposed.
Date: ________________________________ Title: ___________________________

14. ☐☐ Consumers pay a mandated fee for the removal and disposal of end-of-life tyres.
Fee per passenger car tyre: __________ Fee per truck/bus tyre: __________

15. ☐☐ Consumers pay a voluntary fee for the removal and disposal of end-of-life tyres.
Fee per passenger car tyre: __________ Fee per truck/bus tyre: __________

16. ☐☐ Tyre removal fees are put into a designated government account for tyre recycling.
Department responsible: ___________ Type of account: _______________________

17. ☐☐ Tyre removal fees are collected and placed in the general treasury.
Department responsible: ___________ Restrictions for use: _______________________

18. ☐☐ Tyre removal fees are specifically earmarked for use in tyre recycling/recovery projects.
Department responsible: ___________________________________________________
Restrictions for use: ___________________________________________________

19. ☐☐ Public funds are available to research/develop new uses for end-of-life tyre materials. Funding level: __________________________
Types of research: ________________________________________________________
20. ☐☐ Public funds are available to help private companies to start new material recycling projects.
   Funding level: ____________________________
   Types of projects: ____________________________

21. ☐☐ Public funds are available to help private companies to start new tyre-to-energy projects.
   Funding level: ____________________________
   Types of projects: ____________________________

22. ☐☐ The government owns/operates or participates in one or more material recycling project.
   Type of project: ____________________________ % ownership: ____________

23. ☐☐ The government owns/operates or participates in one or more tyre-to-energy project.
   Type of project: ____________________________ % ownership: ____________

24. ☐☐ The government participates in one or more public/private joint venture project.
   Type of project: ____________________________ % ownership: ____________

25. ☐☐ The most recent official estimate of registered vehicles was approximately

   Passenger cars: ____________________________ Utility vehicles: ____________________________
   Trucks/lorries: ____________________________ Buses: ____________________________
   Off-road: ____________________________ Other: ____________________________
   Name: ____________________________
   Title: ____________________________ Department: ____________________________
   Address: ____________________________ Code: ____________________________
   City: ____________________________ State: ____________________________
   Phone: ____________________________ Fax: ____________________________ e-mail: ____________________________
Appendix B: Glossary

The terms used in this project are adopted from the Framework Directive on Waste, the Landfill and End-of-life Vehicle Directives as well as those agreed by consensus in the CEN Workshop Agreement on Post-consumer Tyre Materials and Representative Applications (CEN 2000, W28A). It is important to note that within the tyre recycling industry, a distinction is made between ‘recycling’ and ‘recovery’. The former is employed when the focus of the operation is the material benefits produced, while the latter refers to operations that focus on the energy benefits derived:

1. **Civil engineering applications**: use of whole, baled, cut, shredded, chipped, granulated or powdered tyres in construction projects.

2. **Directive on End-of-Life Vehicles 2000/53/EC**: created to harmonise measures concerning end-of-life vehicles in the EU. The Directive covers vehicles, which includes their component parts and materials, as well as spare and replacement parts (including tyres).

3. **Directive on the Landfill of Waste 1999/31/EC**: created to ensure that landfills, as any other type of waste treatment, is adequately monitored and managed. Art. 5, 3, on waste treatment not accepted in landfills, (d) excludes whole tyres other than those used as an engineering material, and shredded tyres, bicycle tyres and those with an outside diameter above 1,400mm.

4. **Disposition**: the arrangement of post-consumer tyres (or other materials) among the various end-uses to which they can be put (see Table 13).

5. **Economic operators**: as in 2000/53/EC means producers, distributors, collectors, motor vehicle insurance companies, dismantlers, shredders, recoverers, recyclers and other treatment operators of end-of-life vehicles, including their component parts and materials.

6. **End-of-life tyre**: a tyre that has been permanently removed from a vehicle without the possibility of being remounted for further road-use.

7. **Energy recovery**: extraction of heat or fuel value from whole or processed tyres.

8. **Framework Directive on Waste 75/442/EEC**: as amended by 91/156/EEC created the legislative infrastructure within which later directives are enunciated. The principles included in this directive are inherent in all of the directives that concern waste.

9. **Fundamental principle under the Framework Directive**: waste should be reused or recovered, and that preference is given to reuse and recycling.

10. **Landfill**: a disposal site for the deposit of waste onto or into land, excluding facilities where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere and temporary deposit of waste prior to recovery, treatment or disposal.

11. **Material recycling**: any process by which materials or products which can no longer be used for their original purpose are converted or transformed into new raw materials or products other than for use as fuel or other means of generating energy.

12. **New tyre**: a newly manufactured tyre that meets industry specifications and standards for its intended purpose and national criteria for road use.

13. **Original equipment**: are the tyres that are purchased with, or as part, of the vehicle sale. They represent ±29% of the passenger car and van tyre markets and ±16% of the truck tyre market.

14. **Part-worn tyre**: a post-consumer tyre which retains a minimum of 1.6mm of visible tread depth in its most worn groove and which when subjected to inspection of the structural soundness of the casing and/or proper repair, can be safely returned to its originally intended purpose.

15. **Post-consumer tyre**: a tyre that has been permanently removed from a vehicle without the possibility of being remounted for further road-use.

16. **Recycling (ELV Directive)**: in a production process, reprocessing of waste materials for the original purpose or for other purposes by excluding energy recovery.

17. **Replacement tyres**: are generally purchased separately from the vehicle, principally when the original tyres are worn or special purpose tyres are required (e.g., winter tyres). They represent ±71% of the passenger car and van tyre markets and ±84% of the truck tyre market.

18. **Retreaded tyre**: a post-consumer tyre casing which has been subjected to inspection to ensure its structural soundness and which has been reprocessed whereby new tread has been vulcanised to the body and it can be safely returned to its originally intended purpose.
19 **Re-use**: (ELV Directive) any operation by which components of end-of-life vehicles are used for the same purpose for which they were conceived.

20 **Stakeholders**: all of the economic operators.

21 **Sustainable development**: meeting the needs for economic, social and industrial development of the present without compromising the future by reducing consumption, preventing waste, reusing and recycling materials and minimising pollution and risk.

22 **Tyre derived fuel**: a fuel produced from whole or processed tyres of any kind.

23 **Tyre recycling**: any process by which post-consumer tyres or materials derived from post-consumer tyres are converted into useable material.

24 **Valorisation**: a term used to describe the methods of utilisation of post-consumer tyres or other secondary materials/by-products, often collectively (i.e. Chapter 5.4 Valorisation of post-consumer tyres). It has connotations of increasing the value of the material by means of the utilisation.

25 **Whole tyre applications**: use of whole tyres without physical or chemical transformation to create such projects as artificial reefs, sound barriers, temporary roads, stabilisation, etc.
Abstract

Official reports indicate that more than 2,500,000 tonnes of post-consumer tyres are permanently removed from vehicles each year in the 15 Member States of the European Union and must be disposed in an environmentally sound and sustainable manner. However, in almost every State, both collectors and those who provide alternative treatment and disposal routes vigorously dispute these figures and official reports on tyre arisings are not consistent across the Member States.

The report is a summary of a detailed report produced by the European Tyre Recycling Association (ETRA) entitled ‘Tyre Flows and Valorisation of Post-consumer Tyres in Europe: State of the Art report, available direct from ETRA. The purpose of this report is to describe the status quo across the European Union (EU) concerning the practices and procedures currently used to collect, interpret and report information on post-consumer tyres and to present the current situation in terms of tyre flows and the valorisation of post-consumer tyres.

The report concludes that tying post-consumer tyre arisings to new tyre sales is a flawed collection method. Better data can be collected directly through the tyre manufacturers, vehicle manufacturers and sellers. However, there are glaring absences of information on retreaded tyres and imported tyre sales.

The report recommends that a number of issues must be resolved for further progress to occur, including amongst others, reviews of the barriers to recycling, existing treatment capacity, image, and waste definition. Currently 13 States have indicated their interest in working together to develop an improved data collection and reporting system for post-consumer tyres.

Related publications

VR2 Tyre waste and resource management: A mass balance approach by A B Hird, P J Griffiths and R A Smith. 2002 (price £55, code LX)

TRL200 Re-use of scrap tyres in highway drainage by J Carswell and E J Jenkins. 1996 (price £25, code E)

CT100.2 Vehicle tyres - design and safety update (2000-2002) Current Topics in Transport: selected abstracts from TRL Library’s database (price £20)

CT130.1 Rubber in bituminous pavements update (1998-2001) Current Topics in Transport: selected abstracts from TRL Library’s database (price £20)

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