END OF LIFE VEHICLES IN IRELAND

A Sectoral Report

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ENVIRONMENTAL PROTECTION AGENCY
An Ghníomhaireacht um Chaomhnú Comhshaoil

Environmental Protection Agency

Establishment
The Environmental Protection Agency Act, 1992, was enacted on 23 April, 1992, and under this legislation the Agency was formally established on 26 July, 1993.

Responsibilities
The Agency has a wide range of statutory duties and powers under the Act. The main responsibilities of the Agency include the following:

- the licensing and regulation of large/complex industrial and other processes with significant polluting potential, on the basis of integrated pollution control (IPC) and the application of best available technologies for this purpose;

- the monitoring of environmental quality, including the establishment of databases to which the public will have access, and the publication of periodic reports on the state of the environment;

- advising public authorities in respect of environmental functions and assisting local authorities in the performance of their environmental protection functions;

- the promotion of environmentally sound practices through, for example, the encouragement of the use of environmental audits, the setting of environmental quality objectives and the issuing of codes of practice on matters affecting the environment;

- the promotion and co-ordination of environmental research;

- the licensing and regulation of all significant waste disposal and recovery activities, including landfills and the preparation and periodic updating of a national hazardous waste management plan for implementation by other bodies;

- implementing a system of permitting for the control of VOC emissions resulting from the storage of significant quantities of petrol at terminals;

- implementing and enforcing the GMO Regulations for the contained use and deliberate release of GMOs into the environment;

- preparation and implementation of a national hydrometric programme for the collection, analysis and publication of information on the levels, volumes and flows of water in rivers, lakes and groundwaters; and

- generally overseeing the performance by local authorities of their statutory environmental protection functions.

Status
The Agency is an independent public body. Its sponsor in Government is the Department of the Environment and Local Government. Independence is assured through the selection procedures for the Director General and Directors and the freedom, as provided in the legislation, to act on its own initiative. The assignment, under the legislation, of direct responsibility for a wide range of functions underpins this independence. Under the legislation, it is a specific offence to attempt to influence the Agency, or anyone acting on its behalf, in an improper manner.

Organisation
The Agency's headquarters is located in Wexford and it operates five regional inspectorates, located in Dublin, Cork, Kilkenny, Castlebar and Monaghan.

Management
The Agency is managed by a full-time Executive Board consisting of a Director General and four Directors. The Executive Board is appointed by the Government following detailed procedures laid down in the Act.

Advisory Committee
The Agency is assisted by an Advisory Committee of twelve members. The members are appointed by the Minister for the Environment and Local Government and are selected mainly from those nominated by organisations with an interest in environmental and developmental matters. The Committee has been given a wide range of advisory functions under the Act, both in relation to the Agency and to the Minister.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Bunú
Achtaíodh an tAcht fán nGníomhaireacht um Chaomhnú Comhshaoil ar an 23ú lá d'Aibreán, 1992 agus faoin reachtaíocht seo bunaíodh an Ghníomhaireacht go hoifigiúil ar an 26ú lá d'lúil, 1993.

Cúraimí
Tá réimse leathan de dhualgais reachtúla ar an nGníomhaireacht agus de chumhachtaí reachtúla aici faoin Acht. Tá na nithe seo a leanas san áireamh i bpríomhfhreagrachtaí na Gníomhaireachta:

- ceadúnú agus rialáil próiseas mór/ilchasta tionsclaíoch agus próiseas eile a d'fhéadfadh a bheith an-truaillitheach, ar bhonn rialú comhtháite ar thruailliú (Integrated Pollution Control-IPC) agus cur chun feidhme na dteicneolaíochtaí is fearr atá ar fáil chun na críche sin;
- faireachán a dhéanamh ar cháiliocht comhshaoil, lena n-áiritear bunachair sonraí a chur ar bun a mbeidh rochtain ag an bpobal orthu, agus foilsiú tuarascálacha treimhsiúla ar staid an chomhshaoil;
- comhairle a chur ar údaráis phoiblí maidir le feidhmeanna comhshaoil agus cuidiú le húdaráis áitiúla a bhfeidhmeannas caomhnaithe a chomhlíonadh;
- cleachtais atá fónta ó thaobh an chomhshaoil de a chur chun cinn, mar shampla, trí úsáid iniúchtaí comhshaoil a spreagadh, cuspóirí cáilíochta comhshaoil a leagan síos agus cóid chleachtais a eisiúint maidir le nithe a théann i bhfeidhm ar an gcomhshaol;
- taighde comhshaoil a chur chun cinn agus a chomhordú;
- gach gníomhaíocht thábhachtach diúscartha agus aisghabhála dramhaíola, lena n-áirítear líontaí talún, a cheadúnú agus a rialáil agus plean náisiúnta bainistíochta um dhramháil ghuaiseach, a bheidh le cur i ngníomh ag comhlachtaí eile, a ullmhú agus a thabhairt cothrom le dáta go tréimhsiúil;
- córas a fheidhmiú a chuirfidh ar ár gcumas astúcháin COS (Comhdhúiligh Orgánacha Sho-ghalaithe) a rialú de bharr cáinníochtaí suntasacha peitril a bheith á stóráil i dteirminéil;
- na rialúcháin OMG (Orgánaigh a Mionathraíodh go Géiniteach) a fheidhmiú agus a ghníomhú maidir le húseaid shrianta a leithéad seo d'orgánaigh agus iad a scaoileadh d'aon turas isteach sa timpeallacht;
- clár hidriméadach náisiúnta a ullmhú agus a chur i ngníomh chun faisnéis maidir le leibhéil, toirteanna agus sruthanna uisce in aibhneacha, i lochanna agus i screamhuiscí a bhailiú, a anailisiú agus a fhoilsiú; agus
- maoirseacht i gcoitinne a dhéanamh ar chomhlíonadh a bhfeidhmeanna reachtúla caomhnaithe comhshaoil ag údarás áitiúla.

Stádas
Is eagras poiblí neamhspleách í an Ghníomhaireacht. Is í an Roinn Comhshaoil agus Rialtais Áitiúil an coimirceoir rialtais atá aici. Cinntítear a neamhspleáchas trí na modhanna a úsaidtear chun an tArd-Stiúrthóir agus na Stiúrthóirí a roghnú, agus tríd an tsaoirse a dhearbhaionn an reachtaíocht di gníomhú ar a conlán féin. Tá freagracht dhíreach faoin reachtaíocht aici as réimse leathan feidhmeannas agus cuireann sé seo taca breise lena neamhspleáchas. Faoin reachtaíocht, is coir é iarracht a dhéanamh dul i gcion go míchuí ar an nGníomhaireacht nó ar aon duine atá ag gníomhú thar a ceann.

Eagrú
Tá ceanncheathrú na Gníornhaireachta lonnaithe i Loch Garman agus tá cúig fhoireann chigireachta aici, atá lonnaithe i mBaile Átha Cliath, Corcaigh, Cill Chainnigh, Caisleán an Bharraigh agus Muineachán.

Bainistíocht
Riarann Bord Feidhmiúcháin lánaimseartha an Ghníomhaireacht. Tá Ard-Stiúrthóir agus ceathrar Stiúrthóirí ar an mBord. Ceapann an Rialtas an Bord Feidhmi úcháin de réir mionrialacha atá leagtha síos san Acht.

Coiste Comhairleach
Tugann Coiste Comhairleach ar a bhfuil dáréag ball cunamh don Ghníomhaireacht. Ceapann an tAire Comhshaoil agus Rialtais Áitiúil na baill agus roghnaítear iad, den chuid is mó, ó dhaoine a ainmníonn eagraíochtaí a bhfuil suim acu i gcúrsaí comhshaoil nó forbartha. Tá réimse fairsing feidhmeannas comhairleach ag an gCoiste faoin Acht, i leith na Gníomhaireachta agus i leith an Aire araon.

An Ghníomhaireacht um Chaomhnú Comhshaoil

End of Life Vehicles in Ireland

A Sectoral Report

Authors:
Ms Caitríona Collins, Mr Andrew Fanning, Dr Matthew Crowe and Mr Brian Meaney

Environmental Protection Agency
PO Box 3000, Johnstown Castle Estate, County Wexford, Ireland.
Telephone : +353-53-60600 Fax : +353-53-60699
Email: info@epa.ie Website: http://www.epa.ie/

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List of Acronyms

ABS	Acrylonitrile Butadiene Styrene
ACORD	Automotive Consortium On Recycling and Disposal (UK)
ARN	Auto Recycling Nederland
ASR	Auto Shredder Residue
CARE	Consortium for Automotive Recycling and the Environment (UK)
DoELG	Department of the Environment and Local Government
DTI	Department of Trade and Industry (UK)
ELV	End of Life Vehicle
ETC/W	European Topic Centre on Waste
EWC/HWL	European Waste Catalogue and Hazardous Waste List
PE	Polyethylene
PP	Polypropylene
PSVs	Public Service Vehicles
PU	Polyurethane
PVC	Polyvinylchloride
SMMT	Society of Motor Manufacturers and Traders (UK)
VRU	Vehicle Registration Unit

Executive Summary

The European Parliament and Council Directive on End of Life Vehicles[1] entered into force on 21 October 2000 and its implementation date was set for 21 April 2002. It contains a number of requirements in relation to recycling of end of life vehicles and producer responsibility. Specific targets are set out in relation to reuse, recycling and recovery of end of life vehicles, and Member States are required to provide a collection network in such a way that last owners are not required to pay the cost of delivery to authorised treatment facilities.

The vehicle fleet in Ireland has increased steadily over the years, with a total of 1,682,221 vehicles, including 1,319,250 private cars, under current licence in 2000. The total vehicle fleet increased by almost 60 per cent between 1990 and 2000, with a 66 per cent increase in private cars in the same period.

The Directive provides for vehicles and end of life vehicles used for the carriage of passengers and comprising no more than eight seats in addition to the driver seat, as well as those used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes. Three-wheeled vehicles are included also.

The uncontrolled disposal of end of life vehicles can pose a threat to the environment, due to the materials contained in them and also the method in which they are managed. They are often illegally abandoned to the environment, representing environmental degradation and a net financial loss to society. It has been estimated that abandoned vehicles may account for up to 7 per cent of total end of life vehicles in Europe (CEC, 1997).

Traditionally, end of life vehicles have undergone relatively high levels of recycling. They contain up to 75% ferrous metal, which is easily recycled. There are a number of routes that an end of life vehicle may take in Ireland. At dismantling facilities, parts may be removed and sold for re-use. The rest of the end of life vehicle may be delivered to a metal merchant or directly to a metal shredder. Metal merchants often process the end of life vehicle by crushing, before delivery to one of the shredding facilities. Metal shredders process the metal to a required standard before it is shipped to a metal recycling company. In order to meet the targets set out in the Directive, it will be necessary to increase the recycling of the non-metal components in end of life vehicles, plastics in particular.

From the 1 January 2002, end of life vehicles are classified as hazardous waste unless they have been de-polluted, according to the revised European Waste Catalogue and Hazardous Waste List (EWC/HWL)[2,3,4,5,6]. The revised EWC/HWL now contains two entries relating to end of life vehicles, one hazardous and one non-hazardous. Similarly, shredder residue also now has two entries in the EWC/HWL, one hazardous and one non-hazardous.

Since there is no definitive way of estimating end of life vehicle arisings in Ireland in the absence of a system of de-registration, several methods of estimation are used in this report. These consist of direct and indirect methods. The direct methods involve surveying metal recovery operators and the single metal recycler in Ireland which was in operation until June 2001. The indirect methods consist of using formulae developed by the European Topic Centre on Waste. Statistics provided by the Department of Environment and Local Government's Vehicle Registration Unit are also used.

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[1] OJ L 269, 21 October 2000, p. 34.
[2] Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste.
[3] Commission Decision 2001/118/EC amending Decision 2000/532/EC as regards the list of wastes.
[4] Commission Decision 2001/119/EC amending Decision 2000/532/EC replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste.
[5] Council Decision 2001/573/EC amending Commission Decision 2000/532/EC as regards the list of wastes.
[6] EPA, 2001, European Waste Catalogue and Hazardous Waste List – Valid from 1 January 2002

The results indicate that the number of vehicles arising as waste in the year 2000 is between 100,343 and 217,203. In the absence of a definite method of determining end of life vehicle arisings, two methods are considered to provide the most accurate estimates. The survey of the metal shredding facilities provides an estimate of 176,632 end of life vehicles in 2000. The adjusted ETC/W method provides an estimate of 217,203 end of life vehicles in 2000.

Chapter 1 Legislation and Environmental Concerns

1.1 Introduction

In the absence of any existing published information on end of life vehicles in Ireland, it was decided to carry out a study of the current situation with regard to their arisings and management in this country. With the arrival of the Directive on End of Life Vehicles, it became important for such information to be available, in order that Ireland would be able to meet the requirements of the Directive in the best manner possible.

Vehicle registration statistics give a clear picture of the growth in vehicle numbers in Ireland and an indication of the pressures likely to arise through the wastage of vehicles in future years. The total number of vehicles under current licence has grown from 1,054,259 in 1990 to 1,682,221 vehicles in 2000, an increase of almost 60 per cent in ten years. The corresponding increase in private cars under current licence is from 796,408 in 1990 to 1,319,250 in 2000, an increase of almost 66 per cent over the period (DoELG, 2000). Figure 1 shows the trend in vehicle numbers in Ireland for private cars, goods vehicles and small public service vehicles from 1990-2000. Appendix A contains the detailed information on vehicle numbers.

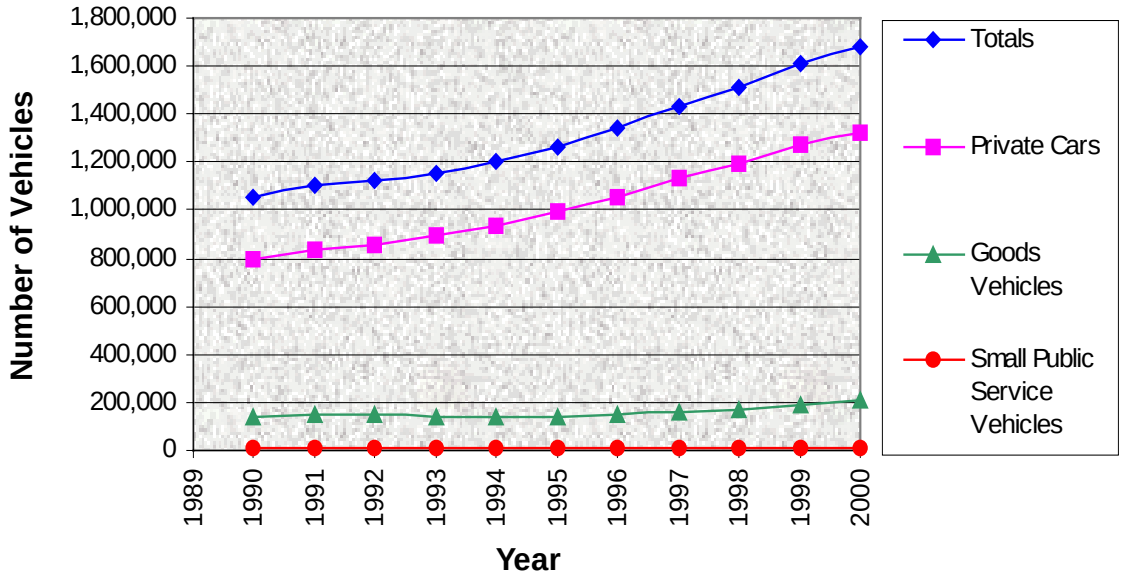

Figure 1 Vehicles under current licence 1990 to 2000

Following the Council Resolution of 7 May 1990 on waste management policy[7], the European Commission proposed various measures to combat certain categories of waste. Several waste streams have already been the subject of Community regulation on foot of this Resolution including waste oil, waste batteries and accumulators, waste packaging and sewage sludge. The European Parliament then called on the Commission to legislate on waste streams, and in particular on end of life vehicles, on the basis of product liability. The Commission took the view that a specific directive was necessary given the importance of this type of waste.

On 9 July 1997, the Commission put forward a proposal for a directive, and on 18 September 2000 a European Parliament and Council Directive on End of life Vehicles (2000/53/EC) was adopted[8]. A copy of the Directive can be downloaded from the European Union website[9]. The Directive sets out a series of progressive targets to

[7] OJ C 122, 18 May 1990, p. 2.
[8] OJ L 269, 21 October 2000, p. 34.
[9] http://www.europa.eu.int/eur-lex/en/search/search_oj.html

be met by each Member State for the reuse and recovery of end of life vehicles and their components. The targets are outlined in detail below.

In order to achieve the targets, the Directive also outlines accompanying measures, such as the use of common coding standards for vehicle components and materials and the preparation of dismantling manuals. At present, most of the metal fraction of end of life vehicles is recycled or reused, with the majority of the other fractions going to waste. The metal fraction accounts for approximately 75 per cent of a vehicle's weight. Recycling other materials, such as plastic, glass and rubber, is more difficult for technical and economic reasons.

Photo 1 **The number of vehicles on Irish roads is increasing every year**

1.2 Quantities of End of Life Vehicles and Components

It is estimated that between 8 and 9 million vehicles are discarded yearly in the European Union (CEC, 1997), resulting in about 8 to 9 million tonnes of waste. It is estimated that the number of scrapped cars will increase to about 17 million per annum in 2015 (EEA, 2001). Scrapped vehicles are generally dismantled, baled and/or shredded and typically give rise to three major waste streams: ferrous metal, other metal and auto shredder residues. About 25 per cent by weight of each end of life vehicle currently gives rise to "auto shredder residues" (ASR), on average in Europe about 250 kg of auto shredder residue per vehicle. In general, auto shredder residue contains plastic, rubber, fabric, dirt, foam, rust, glass, wood and stones together with some heavy metals (Source: www.salyp.com). Recovery operators in Ireland estimate that the average ferrous metal content in cars is 600 kg. Other metals account for a smaller proportion of the total.

1.3 Legislation

1.3.1 Directive on End of life Vehicles

The Directive on End of Life Vehicles (2000/53/EC)[10] entered into force on 21 October 2000 and its implementation date was set for 21 April 2002. While waste prevention from vehicles is the Directive's primary

[10] OJ L 269, 21 October 2000, p. 34.

objective, it also contains a number of provisions in relation to recycling of end of life vehicles and producer responsibility, as outlined in Article 1 of the Directive. The Directive defines "producer" as the vehicle manufacturer or the professional importer of a vehicle into a Member State.

1.3.2 Definitions and Articles

Article 2 of the Directive on End of Life Vehicles provides the following definitions:

Producer – the vehicle manufacturer or the professional importer of a vehicle into a Member State.

Reuse – any operation by which components of end of life vehicles are used for the same purpose for which they were conceived.

Recycling – the reprocessing in a production process of the waste materials for the original purpose or for other purposes but excluding energy recovery.

Recovery – any of the applicable operations provided for in Annex IIB to Directive 75/442/EEC[11], including for example recycling/reclamation of metal compounds, recycling/reclamation of other inorganic materials and recovery of components from catalysts.

The Directive defines end of life vehicles as follows:
- "a vehicle which is a waste within the meaning of Article 1(a) of Council Directive on Waste (75/442/EEC)".

Waste in Directive 75/442/EEC, as amended by Directive 91/156/EEC[12], is defined as follows:
- "any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard".

The Directive defines a vehicle as any vehicle designated as category M1 (vehicles used for the carriage of passengers and comprising no more than eight seats in addition to the driver seat) or N1 (vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes) as defined in Directive 70/156/EEC[13], and three-wheeled vehicles as defined in Directive 92/61/EEC[14]. Motor tricycles and special purpose vehicles, as defined in Directive 70/156/EEC, are excluded from the provisions of the Directive on End of Life Vehicles.

Article 3 provides the scope of the Directive, which covers vehicles and end of life vehicles, including their components and materials.

Article 4, dealing with waste prevention, lays down a number of measures, including:
- Limiting the use of hazardous substances in vehicles from design onwards so as to prevent their release to the environment;
- Designing new vehicles to take into account and facilitate the dismantling, reuse and recovery, particularly recycling, of end of life vehicles, their components and materials;
- Increasing the use of recycled materials in vehicle manufacture;
- Excluding mercury, hexavalent chromium, cadmium and lead, except for certain specified applications (listed in Annex II of the Directive, as amended by Commission Decision 2002/252/EC[15]), from 1 July 2003;

[11] OJ L 194, 25 July 1975, p. 49.
[12] OJ L 78, 26 March 1991, p. 32.
[13] Directive 70/156/EEC[13] on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers – OJ L 42, 23 February 1970, p. 1 as last amended by Directive 98/91/EC of the European Parliament and of the Council (OJ L 11, 16 January 1999, p. 25)
[14] Directive 92/61/EEC[14] relating to the type-approval of two or three-wheel motor vehicles – OJ L 225, 10 August 1992, p. 72.
[15] OJ L 170, 27 June 2002, p. 81.

Article 5 introduces provisions for the collection of end of life vehicles. Member States are required to develop an economically profitable system for the collection of end of life vehicles that shall not be a burden on public authorities but shall be borne by the economic operators of the automotive chain, i.e. the producers. This collection system should be in place by 1 July 2002 for all vehicles put on the market from that date and by 1 January 2007 for vehicles put on the market before 1 July 2002. In addition, owners of non-recyclable end of life vehicles, therefore having a zero or negative market value, must be entitled to transfer the vehicles to an authorised treatment facility free of charge. This cost, or a significant part of it, must be met by the producer. Alternatively, producers themselves may take back end of life vehicles. This will provide producers with further incentives to increase the recyclability of new vehicles.

In order to de-register vehicles from national registers, last owners will, under Article 5 (3) of the Directive, receive a "certificate of destruction" which will prove that the end of life vehicle has been handed over to an authorised facility for dismantling and treatment. Facilities will be authorised only if they comply with a number of requirements aimed at protecting the environment. The vehicle will be deleted from the national register only on presentation of this certificate. Member States must adopt a system for the mutual recognition of such certificates so as not to affect free movement within the internal market. Commission Decision (2002/151/EC)[16] lays down minimum requirements for the certificate of destruction.

Photo 2 Stockpile of end of life vehicles awaiting shredding at Hammond Lane Metal Company, Dublin

The storage and treatment of end of life vehicles is subject to control in accordance with the requirements of the Waste Framework Directive (75/442/EEC) and the End of Life Vehicles Directive (Article 6). Establishments or facilities carrying out treatment operations must have a permit and de-pollute[17] end of life vehicles before further treatment. Priority must be given to the re-use and recycling of vehicle components (e.g. batteries, tyres, oil).

Article 7, dealing with reuse and recovery, lays down the following specific targets:

- By 1 January 2006, re-use and recovery of the components of end of life vehicles shall be increased to a minimum of 85 per cent and re-use and recycling shall be increased to a minimum of 80 per cent, measured

[16] OJ L 50, 21 February 2002, p. 94.
[17] Annex I of the Directive describes treatment operations for the de-pollution of end of life vehicles.

by the average weight per vehicle. For vehicles produced before 1 January 1980, Member States may lay down lower targets, but not lower than 75 per cent for reuse and recovery and 70 per cent for reuse and recycling.

- By 1 January 2015, re-use and recovery shall be increased to a minimum of 95 per cent, and re-use and recycling shall be increased to a minimum of 85 per cent.

The Directive provides for the review of targets by the European Parliament and the Council by 31 December 2005 at the latest. Based on the waste hierarchy established by the Community Strategy for Waste Management (CEC, 1996), material recycling is given a clear priority over energy recovery in the Directive.

The reuse and recovery of the components of end of life vehicles may be facilitated by creating methods of marking which allow the identification of different materials during dismantling. This is provided for in Article 8 of the Directive. The Commission is required to establish coding standards not later than 21 October 2001. To date, no decision has been made by the Commission with regard to this requirement.

Article 9 states that the verification of the implementation of the Directive will be the responsibility of Member States which must facilitate the development of databases containing information on end of life vehicles and their treatment. By Commission Decision of 17 October 2001[18], a questionnaire was issued to all Member States for the purposes of reporting on the implementation of the Directive in Member States. The first report to the Commission will cover the three-year period beginning on 21 April 2002, and the report is required to be submitted to the Commission within nine months of the end of the three-year period. Manufacturers will be obliged to publish the rates of recycling, re-use and recovery of their vehicles and components during the previous year. Table 1 summarises the key dates in the development and implementation of the Directive on End of Life Vehicles.

Article 10 states that the implementation date of the Directive is 21 April 2002 and states that Member states must communicate to the Commission the main provisions of relevant domestic law adopted. Certain provisions may be met by agreements made between the competent authorities and the economic sectors concerned.

Table 1 Significant dates in the Directive on End of Life Vehicles

Date	Article	Action	Responsible
21 Oct 2000	***Publication in Official Journal of the European Communities***		
21 Oct 2001	5 (5)	Draw up minimum requirements for the certificate of destruction ***Complete – Commission Decision of 19 Feb 2002 (2002/151/EC)***	Commission
21 Oct 2001	8 (2)	Establish coding standards for components and materials	Commission
1 Jan 2002	***End of life vehicles and auto shredder residue classified as hazardous waste***		
21 Apr 2002	10 (1)	Implementation of Directive	Member States
1 Jul 2002	12 (1)	Article 5 (4) compliance for vehicles put on market from 1 July 2002 – cost free take back for the last holder/owner of a vehicle with zero or negative value	Member States
21 Oct 2002	7 (2)	Establish detailed rules necessary to control compliance of Member States with the targets established for reuse, recovery and recycling	Commission
1 Jul 2003	4 (2) (a)	Restrictions on lead, mercury, cadmium and hexavalent chromium	Member States
31 Dec 2005	7 (2)	Re-examination of targets	European Parliament and Council
1 Jan 2006	7 (2) (a)	Reuse/Recovery minimum 85%* Reuse/Recycling minimum 80%** * 75% for vehicles produced before 1 Jan 1980 ** 70% for vehicles produced before 1 Jan 1980	Member States and economic operators
1 Jan 2007	12 (1)	Article 5 (4) compliance for vehicles put on market before 1 July 2002 (Cost free take back)	Member States
1 Jan 2015	7 (2) (b)	Reuse/Recovery minimum 95% Reuse/Recycling minimum 85%	Member States and economic operators

[18] OJ L 282, 26 October 2001, p. 77.

1.3.3 Implementation in Ireland

The Department of the Environment and Local Government is currently working towards the preparation of legislation to meet the requirements of Article 5 of the End of Life Vehicles Directive and is in negotiation with the relevant industry sectors. It is expected that legislation will be in place in late 2002 for enforcement from January 2003 (pers. comm. DoELG).

The Waste Management Acts, 1996 and 2001, is the primary instrument used to manage and control waste in Ireland. It provides measures for controlling all links in the waste chain. Under the Waste Management (Permit) Regulations, 1998 (S.I. 165 of 1998), a waste permit is required from a local authority for all activities within its functional area involved in *the recovery of scrap metal and other metal waste* or *the dismantling and recovery of vehicles*. Only 52 permits for such activities have been notified to the Agency from a total of 15 local authorities. A significant number of such facilities are known to exist around the country. Increased implementation of the Permit Regulations by local authorities is required if all end of life vehicle and scrap metal processors are to be regulated as required by the legislation.

The Waste Management (Collection Permit) Regulations, 2001 (S.I. 402 of 2001) require all waste collectors and hauliers to apply for a waste collection permit. A total of ten local authorities act as "nominated authorities" for the issuing of waste collection permits. Permits must be reviewed by local authorities every two years.

1.4 Environmental Concerns

It has been estimated that, in some Member States, up to 7 per cent of end of life vehicles are illegally dumped, representing potential environmental degradation and a net financial loss to society (CEC, 1997). When a vehicle reaches the end of its useful life, either because of its age (natural end of life vehicles, typically around 12-14 years) or because of heavy damage in an accident (premature end of life vehicles), a number of environmental concerns are raised. These are briefly outlined below.

1.4.1 Dangerous Substances

The body shell of a motor vehicle may be fitted with anything between 8,000 and 10,000 different components. Figure 2 illustrates the average composition of a car (DTI, 2000).

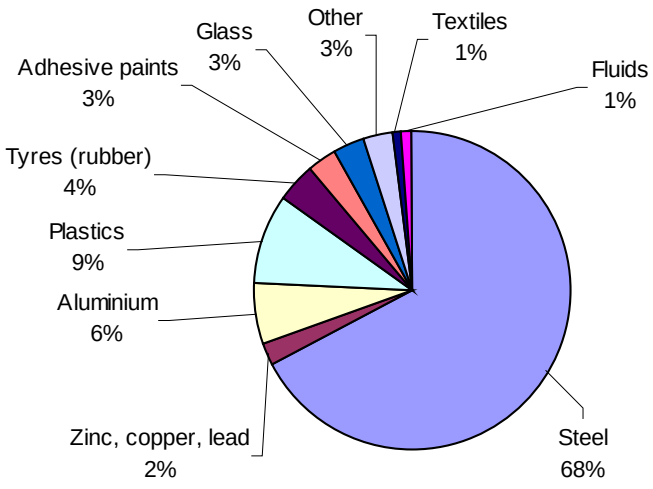

Figure 2 Average composition of a car

Many components of end of life vehicles are classified as dangerous substances. Lead acid batteries typically weigh 13.5 kg and contain 8.6 kg lead, 3.8 kg sulphuric acid and 0.7 kg polypropylene (DTI, 2000). In the year 2000, a total of 4,392 tonnes[19] of lead acid batteries were exported to the UK for lead recovery. Catalytic converters contain a combination of precious metals, alumina, ceria and other oxides. Recovery of precious metals from catalytic converters in the US is well established. However, in the UK, and presumably in Ireland also, most cars with catalytic converters are still in use and consequently, recovery is currently limited (DTI, 2000). Vehicle operating fluids, such as lubricating oils, hydraulic fluids, radiator coolant, brake fluids and fuels, represent 1 per cent of the average car composition. These are a main source of potential pollution from end of life vehicles, either due to spillage at the point of dismantling, inappropriate disposal or contamination of auto shredder residue. All end of life vehicle fluids should be collected, safely stored and given to a specialist contractor for recovery or disposal. In Ireland in the year 1999, approximately 11,485 tonnes of waste oil was collected for treatment, from an estimated total of 16,204 tonnes of oil generated as waste[20]. It is thought that a considerable quantity of oil removed from vehicles by DIY motorists is not collected for recovery. Inappropriate management of oil filters can also lead to environmental pollution. Both oil and metal can be recovered from redundant oil filters.

1.4.2 Classification of End of Life Vehicles and Auto Shredder Residue as Hazardous Waste

Since 1 January 2002, end of life vehicles are classified as hazardous waste, according to the European Waste Catalogue and Hazardous Waste List, unless they contain neither liquids nor other hazardous components. The relevant classifications are as follows (an asterisk indicates a hazardous waste):

16 01 04* – End of life vehicles

16 01 06 – End of life vehicles, containing neither liquids nor other hazardous components

The waste arising from the shredding process is commonly referred to as auto shredder residue (ASR). Traditionally, shredder operators supplement the shredder feed with white goods and other light iron scrap. The proportion varies but is typically between 25 and 45 per cent non-end of life vehicle waste. The following waste classifications apply to auto shredder residue (an asterisk indicates a hazardous waste):

19 10 03* – Fluff - light fraction and dust containing dangerous substances

19 10 04 – Fluff - light fraction and dust other than those mentioned in 19 10 03

19 12 11* – other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances

19 12 12 – other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11

[19] Information from Transfrontier Shipment of Waste notifications.

[20] Information submitted to Department of the Environment and Local Government in relation to the implementation of Council Directive on the disposal of waste oils (75/439/EEC, as amended by 87/101/EC)

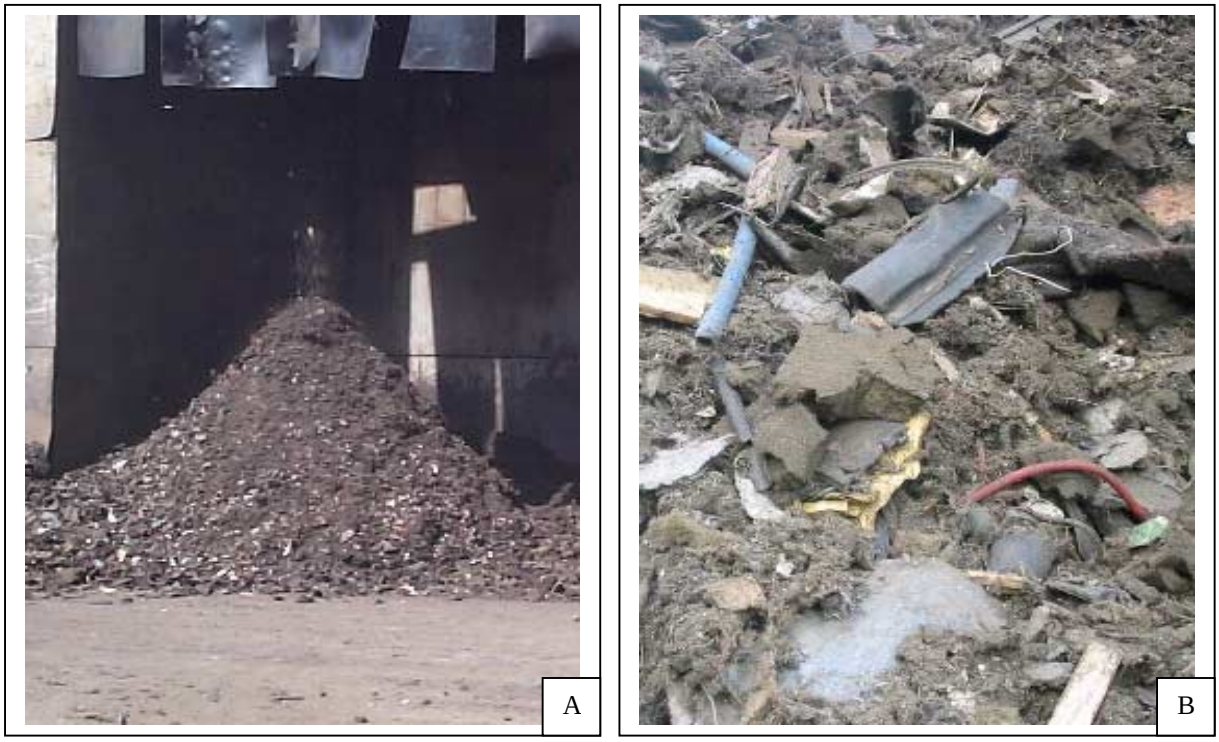

Photo 3 Auto shredder residue, as seen at Clearway, Belfast, accounts for approximately 25 per cent of the shredder output – A: Output from shredding machine; B: Close-up view of auto shredder residue

It does not appear to be possible to remove all hazardous substances from car bodies before shredding. Auto shredder residue is therefore likely to contain dangerous substances and to be classified as hazardous waste. The burden of proof rests with the generators of auto shredder residue to show that auto shredder residue does not contain dangerous substances or does not display the properties of hazardous waste. If all auto shredder residue was to be regarded as hazardous waste it would represent up to 10 per cent of the total amount of hazardous waste generated yearly in the European Union (CEC, 1997). Table 3 shows the typical composition of auto shredder residue in Europe. Auto shredder residue is typically disposed of to landfill as cover material. However, the current classification of auto shredder residue as hazardous waste may halt this practice. This creates obvious difficulties for vehicle shredders as no alternative disposal or recovery route for auto shredder residue currently exists in Ireland.

Table 2 Composition of European automobile shredder residue (Source: www. salyp.com)

Fraction	Percentage
Polyurethane foam	5%
Plastics/Elastomers	31%
Fines	44%
Fibres	10%
Stones/wood/dirt etc.	10%
Total	**100%**

1.4.3 Tyres

Tyres are mentioned in Annex I of the Directive on End of Life Vehicles, in relation to the minimum technical requirements for the treatment of end of life vehicles. The best estimate for waste tyres arising in Ireland in 1998 is 29,033 tonnes, which includes tyres from cars, buses, trucks, aircraft, motorcycles and bicycles and a number

of other categories. The best estimate for waste tyres from cars in 1998 is 15,381 tonnes. Figure 3 illustrates the estimated quantities of waste car tyres arising between 1990 and 1998 (EPA, 2000).

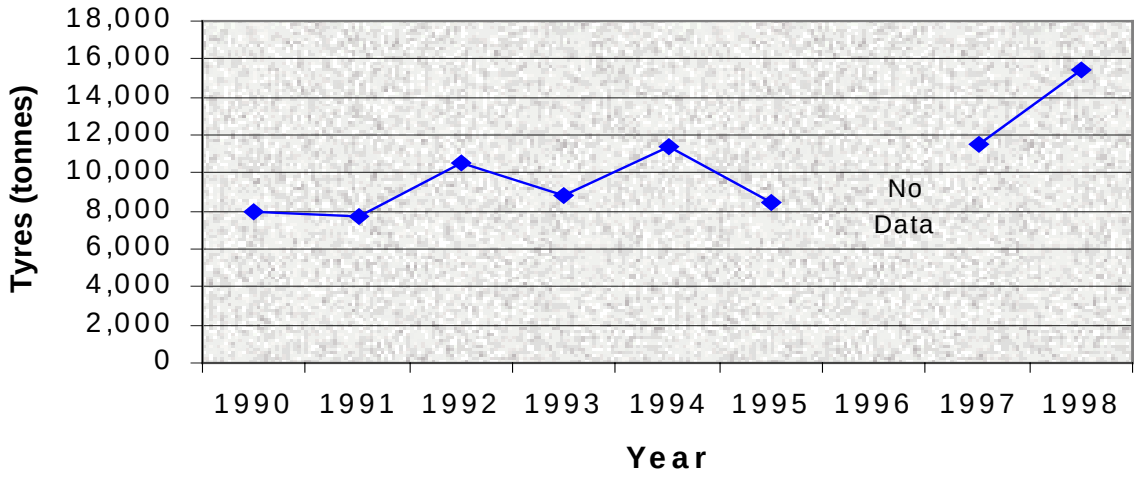

Figure 3 Scrap tyres arising from cars in Ireland 1990 to 2001 (EPA, 2000)

An increase in the quantity of used tyres arising is likely in line with the increase in the number of vehicles on the road. Waste tyres are collected by a number of collectors, who grade the tyres and return a certain quantity for retreading/remoulding. There are two remoulders in the Republic of Ireland for car tyres and six retreaders for truck tyres. The collection system developed as a result of demand from farmers for tyres to hold down silage pit covering. However, this use is diminishing with the increased use of baled silage (EPA, 2000). Old tyres are also used as fenders to protect sides of boats and in gardens as plant pots and building blocks. There have been no reports of widespread fly tipping of tyres (DoELG, 2002). The landfill disposal of tyres will eventually cease, as the Landfill Directive (1999/31/EC)[21] places a ban on the landfilling of whole used tyres by 16 July 2003 and shredded used tyres by 16 July 2006. This ban does not include tyres used in landfills as engineering material.

1.4.4 Resource Depletion

In addition to the environmental pollution potential from dangerous substances contained in end of life vehicles, there is also the issue of a net loss of energy and resource depletion. As can be seen from Figure 2, the average vehicle contains a variety of substances. While about 75 per cent of the vehicle's weight consists of metal, the remaining weight consists largely of materials such as plastics and rubber, which are difficult to recycle. According to the Association of Plastics Manufacturers in Europe, plastics account for 9.3 per cent (105 kg) of the total weight of an average car (APME, 1999). Polypropylene (PP) may account for approximately 40 per cent of all car thermoplastics, while polyethylene (PE), acrylonitrile butadiene styrene (ABS), polyurethane (PU) and polyvinylchloride (PVC) are also used abundantly. PP, PE and PU can all be recycled relatively easily (www.wastewatch.org.uk). Most of the recoverable and recyclable plastics in end of life vehicles are thermoplastics, which can be repeatedly melted through heating and thus are suitable for mechanical recycling. Thermoplastics are mainly used in bumpers, interior trim, wheel arch liners and some under-bonnet parts. 10-20 kg of rigid plastics can be removed with relative ease. However, recovery of additional plastic becomes more time consuming and therefore, less economically viable (Charles Trent Ltd., 2000). While rubber in its natural form is a renewable resource, both metals and oil (from which plastics and synthetic rubber are produced) are finite resources. The rubber used in vehicle manufacture is a mixture of natural and synthetic products (DTI, 2000).

[21] OJ L 182, 16 July 1999, p. 1.

The extraction of primary resources can have a number of adverse impacts on the environment. For example, the mining industry has many negative environmental impacts. Combined with this, smelting and further processing of metals leads to high energy use and the production of polluting wastes. Therefore the use of recycled metals can often help to reduce the environmental impact of mining. Most plastics are manufactured from petrochemicals, and therefore contribute to the depletion of non-renewable resources. However, their manufacture is a less energy intensive process than metal production. Overall, car manufacturing uses 7.5 per cent of all plastics produced. The use of recycled plastics in car manufacture also has potential economic benefits, for example by increasing markets for recycled plastic products or reduced resource depletion. Recycled plastics enjoy a fixed price, as they are not affected by the fluctuations in oil prices (DTI, 2000).

1.4.5 Material Recycling

Despite the complexity of the components and materials in an end of life vehicle, an average of about 75 per cent of its weight is already recycled or reused. Figure 4 shows the proportions recycled, reused and disposed of in the UK, as reported by the Automotive Consortium on Recycling and Disposal (ACORD) in 1998 (SMMT, 1999).

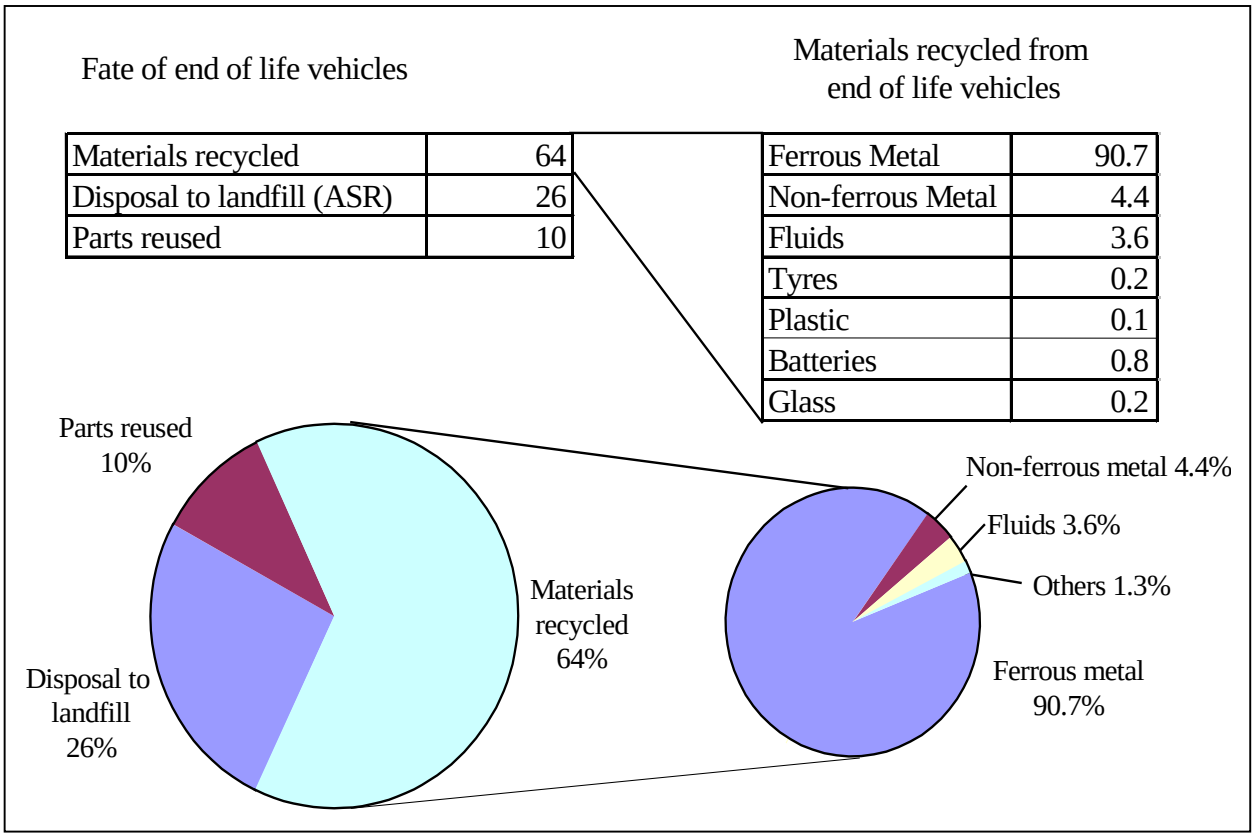

Figure 4 Material recycled from end of life vehicles (SMMT, 1999)

1.4.6 Abandoned Vehicles

Abandoned vehicles are a major blight on the environment and they can cause considerable concern to the public and can be a strain on local authority resources. Section 71 of the Waste Management Acts, 1996 and 2001, states that a vehicle must not be abandoned on any land and that both a person who abandons a vehicle and the registered owner shall be guilty of an offence. However, it is often difficult for local authorities to establish or track down the last registered owner of abandoned vehicles. There are no national statistics accounting for abandoned vehicles. However, in the UK, it has been estimated that up to 350,000 cars were abandoned in 2000, compared to 1.8 million cars scrapped in the same year. In effect, this means that almost 23

per cent of total end of life vehicles in the UK in 2000 were abandoned. Applying this proportion to Ireland, it may be estimated that up to 30,000 vehicles are abandoned in Ireland each year. However, it is not possible to verify this.

Photo 4 **Abandoned vehicles are a blight on Ireland's environment**

Chapter 2 The ELV Industry in Ireland and EU Countries

2.1 The End of Life Vehicle Industry in Ireland

2.1.1 Dismantlers

There are several players in the end of life vehicle and metal recovery business in Ireland and there are many facilities in Ireland engaged in vehicle dismantling. End of life vehicles are delivered to dismantling facilities and parts are often sold for reuse at this point. A limited amount of processing may also be carried out at dismantling facilities and the scrap metal is then delivered either to a metal merchant or directly to a metal shredder.

Photo 5 Stockpile of shredder feed at Clearway, Belfast

2.1.2 Metal Merchants

There are a large number of companies engaged in the collection and sorting of scrap metal and these are known as metal merchants. A certain amount of processing, for example crushing, is sometimes carried out by such companies before the material is delivered to a shredding facility.

2.1.3 Shredders

Two companies operate shredders in Ireland, with three facilities, plus one facility in Northern Ireland. These companies are engaged in the collection of scrap metal and also accept material delivered to their facilities. Table 2 indicates the companies and facilities carrying out metal shredding.

Table 3 Location and ownership of the five shredding facilities operating in Ireland

Company Name	Trading As	Location
Clearway	Clearway	Belfast
Clearway	Hammond Lane Metal Company Ltd.	Dublin
Clearway	Hammond Lane Metal Company Ltd.	Cork
Hegarty Metal Recycling Ltd.	Hegarty Metal Recycling Ltd.	Limerick

Photo 6 Shredding machine at Clearway, Belfast

2.2 The End of Life Vehicle Industry in Europe

The annual quantity of end of life vehicle waste arising in the European Union is estimated to be in the region of 8 to 9 million tonnes (CEC, 1997, EEA, 1999). The quantity of end of life vehicles differs from country to country due to a number of factors. For climatic reasons, cars in Northern Europe will corrode faster than cars from warmer and drier countries. As well as this, differences in legislation relating to safety, environment, air emissions and noise lead to differences in the lifetime of cars from country to country, thus leading to varied quantities of end of life vehicles arising (EEA, 1998b). The EU currently produces about 2 to 2.5 million tonnes of auto shredder residue from vehicle recycling. It is generally contaminated with heavy metals, oil and other lubricating fluids. It is landfilled in most Member States as incineration can be problematic due to the heavy metal and PVC content (EEA, 1999).

2.2.1 United Kingdom

Over 1.8 million vehicles become end of life vehicles each year in the UK, either due to their age, usually around 12 years for cars, or due to heavy accidental damage (Charles Trent Ltd., 2000). The Automotive Consortium on Recycling and Disposal (ACORD)[22] was set up in 1991 and includes vehicle and material

[22] Signatories of the ACORD Agreement are as follows: the Society of Motor Manufacturers and Traders; the British Metals Federation (now the British Metals Recycling Association); the Motor Vehicle Dismantlers Association; the British Plastics Federation; and the British Rubber Manufacturers Association.

manufacturers, dismantlers and material recyclers. In a voluntary inter-sectoral agreement on the treatment of end of life vehicles, ACORD established targets to increase the recovery of materials to 85 per cent by 2002 and 95 per cent by 2015. ACORD reported in its 2001 Annual Report (SMMT, 2001) a recovery rate of 80 per cent in 2000. This had increased from 77 per cent in 1999 and 74 per cent in 1998. The 80 per cent recovery rate in 2000 included 11 per cent material reuse and 69 per cent material recycling. ACORD recognises that significant actions must be taken to achieve the 85 per cent material recovery rate in the ACORD Agreement, including for example (SMMT, 2001):

1. Develop applications/markets for recycled plastics.
2. Increase recovery of fluids by better de-pollution.
3. Reduce residual metallic content of auto shredder residue and develop energy recovery processes for auto shredder residue.
4. Improve tyre recovery processes and initiate other rubber recovery processes.
5. Initiate glass recovery processes.

Auto shredder residue is disposed of to landfill, and currently accounts for about 0.3 per cent of total UK waste.

The Department of Trade and Industry published a Government Consultation Paper proposing three options for meeting the recycling targets set out in the Directive (DTI, 2001). The three options are very briefly summarised as follows:

- Option 1

Producers would be made legally responsible for putting in place adequate national collection systems for their own vehicles which have become end of life vehicles, ensuring treatment to required standards and that recycling targets are met. This could be done individually or on a collective basis. Problems are foreseen to arise with regard to so called "orphan vehicles" where the producer no longer exists, and with vehicles which are sold by professional importers rather than importers that are affiliated with manufacturers.

- Option 2

Facilities holding a permit would be required to take back any end of life vehicle. Producers, either individually or through a compliance scheme, would be required to meet all or a significant part of the cost of take back and treatment for negative or zero-value vehicles of their own make, in addition to a proportion of orphan vehicles. Producers, or their compliance schemes, would be responsible for ensuring that targets are met and such targets could be set per producer, either according to current market share, or the number of their vehicles scrapped in the previous year, or a combination of both.

- Option 3

The third option proposed combines options 1 and 2 and differentiates between vehicles sold before 2002 and new vehicles sold from 2002 onwards.

2.2.2 Denmark

The Danish Government's Waste Management Plan 1998-2004, *Waste 21* (Danish Ministry of Environment and Energy, 1999), sets out measures for the management of certain waste streams. In June 1999, the Danish Parliament adopted the "Scrap-Car Package". This comprised three main elements:

- A Statutory Order on how to manage cars as waste.
- Introduction of environmental taxes on cars and allowances for dismantling and scrapping – car owners must pay DKK 90 (€12.11) annually. When the car reaches the end of its life and is delivered to a waste management operator the owner may be reimbursed, the amount of the reimbursement to be fixed by the Minister for Environment and Energy[23].

[23] Act No. 372 of June 2, 1999 on Environment Premiums and Reimbursement in Connection with Dismantling and Scrapping of Vehicles.

- The necessary authority to introduce initiatives such as a certification scheme for enterprises which manage end of life vehicles[24].

Plans were outlined for a Statutory Order for the management of end of life vehicles and the introduction of a certification scheme for enterprises involved in the reprocessing of end of life vehicles. Special schemes have been introduced for tyres, waste oils and batteries. In Denmark, 95 per cent of all shredder waste is currently landfilled, with the remaining 5 per cent incinerated (Danish Ministry of Environment and Energy, 1999). The objective is to achieve 75 per cent recovery of shredder waste by 2004, ensuring recycling of heavy metals and utilisation of energy. In 1997, around 130,000 tonnes of vehicles were scrapped. Windscreens and tyres are prioritised for recycling. Local authorities must ensure that end of life vehicles are assigned to authorised plants.

2.2.3 Austria

In Austria, about 200,000 end of life vehicles arise for recovery and disposal on an annual basis. A system of free end of life vehicle take back when the consumer purchases a new or used vehicle, was set up as a voluntary agreement between the Austrian Chamber of Commerce and the Federal Ministry of the Environment, Youth and Family Affairs. This agreement ran from 1992 to 1995, after which it was extended indefinitely, and further expanded to include measures to achieve proper recovery and qualitative improvements regarding management of end of life vehicles. This expansion establishes “minimum requirements for the recovery of end of life vehicles” and builds in an evaluation of the efficiency of the agreement. It also provides for the issuing of a certificate of proof of recovery for the vehicle’s final owners (FMEYFA, 1998).

2.2.4 The Netherlands

About 270,000 passenger cars and about 60,000 commercial vehicles were scrapped in the Netherlands in 1996. Auto Recycling Nederland (ARN) was set up in 1993 to implement the plan for the management of passenger car wrecks, and became operational in 1995. ARN has a nationwide network of 269 affiliated car dismantling companies. These companies are certified and receive a fee from ARN for dismantling specific materials such as rubber, glass, liquids, seat foam and various other plastics. Prior to the formation of ARN, these materials were not removed and formed part of the shredder waste which was disposed of to landfill or by incineration. In 1994, over 26 per cent (by weight) of passenger car wrecks was disposed of as auto shredder residue. By 1997, this was reduced to just 14 per cent. Hazardous materials are also now removed. The cost of the system is covered by a scrapping levy, which must be paid by the first owner on the purchase of a new car. The levy, which is linked to the issuing of the registration certificate, is collected by the Netherlands Road Traffic Department.

[24] Statutory Order No. 860 of November 29, 1999 on Management of Waste in the Form of Motor Vehicles and Derived Waste Fractions.

Chapter 3 Estimates of End of Life Vehicle Waste

3.1 Introduction

Results from the Government scrappage scheme provide the only definite information in relation to end of life vehicle arisings in Ireland. In the absence of a system of de-registration in Ireland estimates to date have been made using information provided by the metal recycling industry. It is important to be able to obtain the most accurate estimates of end of life vehicle arisings in order that the most appropriate and effective systems may be put in place to meet the requirements of the Directive on End of Life Vehicles.

3.2 Existing Information

Estimates of end of life vehicles arising have been made in the National Waste Database Reports for 1995 and 1998 (EPA, 1996, 2000). The estimate for 1995 was 52,154 tonnes which, based on a weight of 0.6 tonnes per vehicle, equates to approximately 87,000 cars. This estimate was based solely on the assumption that each new car was a replacement for an existing one. In the absence of other information this method of estimate can only be considered as an indicative value, as the assumption of replacement is not a true representation of reality. This approach is also invalidated by the continuing rise in national vehicle stocks, as illustrated in Figure 5.

No specific estimate of waste arising from end of life vehicles was contained in the 1998 National Waste Database Report. The 1998 report contained a figure for scrap metal and end of life vehicles based on recovery of metal in Ireland and abroad. The total amount of scrap metal recovered in 1998 was reported to be 187,484 tonnes. This was predominantly steel and iron scrap with other metals accounting for 17,484 tonnes. An estimated 30,000 tonnes of ferrous scrap arose from end of life vehicles. Based on 0.6 tonnes ferrous metal per end of life vehicle in Ireland, this accounts for some 50,000 end of life vehicles.

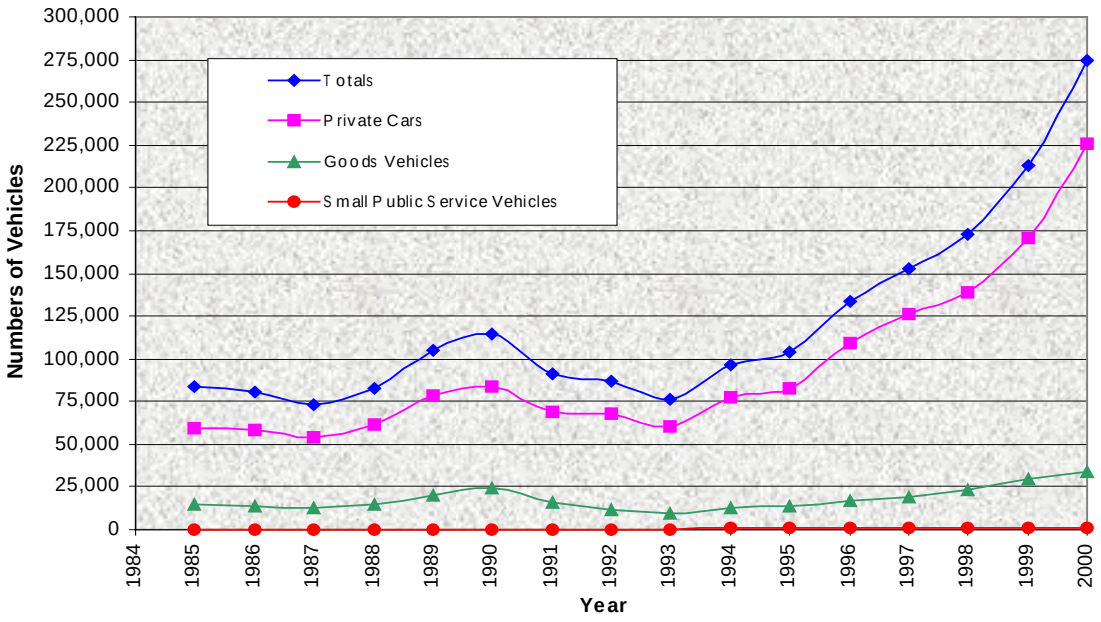

Figure 5 Number of vehicles first licensed 1985 to 2000

The 1998 National Waste Database Report (EPA, 2000) also detailed the number of cars removed under the Government scrappage scheme. During the Government scrappage scheme the numbers of cars scrapped were 5,140 in 1995, 19,407 in 1996 and 36,062 in 1997. Such figures underestimate the true number of end of life

vehicles arising in those years as they only indicate the number of cars scrapped and replaced by new cars. A considerable number of cars would also have become end of life vehicles, having been replaced by used cars.

3.3 Available Approaches for Estimating End of Life Vehicles

A number of methods exist for estimating the number and weight of end of life vehicles. These methods can be classed as direct or indirect methods.

Throughout this report all calculations for Ireland are based on an average ferrous metal content of 0.6 tonnes for an end of life vehicle (Institut pour une politique Européenne de l'Environnement, 1996). Recovery operators in Ireland also use this factor as the average ferrous metal content in cars. Where estimates have been determined using real vehicle numbers, the 0.6 tonnes ferrous metal factor has also been used to estimate tonnage of end of life vehicles arising, so that results will be comparable.

3.3.1 Direct Methods

The most direct method of estimating end of life vehicles arising is a survey of the two operators of shredding facilities and one metal recycling company. Information was not sought from the metal merchants as experience from surveying for the National Waste Database indicates that obtaining information directly from scrap metal merchants is extremely difficult.

Photo 7 Shredded ferrous metal at Clearway, Belfast – A: Awaiting shipment; B: Close-up view of shredded ferrous metal

Method 1 - Shredding Facilities

There are a number of associated difficulties in using information from the shredding facilities, including the need for additional detail on the mix of material being shredded. This can vary depending on the type of shredding facility, its capacity and on the raw material supply available to the processor. In addition, material going into the shredder can vary from hour to hour as well as from day to day and the material composition may

vary in single categories due to product brands. As there are only two companies involved in this activity in Ireland, indicative information from both sources was used to quantify the amount of fragmentised scrap[25] derived from vehicular sources. It was possible to obtain an estimate of the proportion of end of life vehicle and other metal content of the shredder feed. The ferrous output is usually 75 per cent of the shredder feed. The remaining 25 per cent is accounted for by auto shredder residue, made up of material such as plastic, rubber, glass and other non-ferrous materials (commonly called "dirt").

Shredding facilities in Ireland supplement the shredder feed with anything between 25 and 45 per cent other metal waste. Company-specific factors were applied to the quantities of ferrous metal waste reported to be recovered by each of the shredding facilities. Table 4 provides a summary of the reported ferrous metal processed. These figures include ferrous metal arising in the Republic of Ireland and recovered either in the Republic or Northern Ireland. End of life vehicle arisings are estimated from the quantities of ferrous scrap recovered. Also taken into account are end of life vehicles from the Republic of Ireland which are exported unprocessed from Northern Ireland, which occurred in 1999 only.

The two companies operating four shredding facilities in the Republic of Ireland and Northern Ireland reported 84,438 tonnes and 145,489 tonnes ferrous scrap recovered in 1999 and 2000 respectively. In relation to the recovered ferrous scrap, 75-80 per cent was estimated as coming from end of life vehicles at the Republic of Ireland shredding facilities, with a smaller proportion at the Northern Ireland shredding facility, accounting for 63,512 tonnes end of life vehicle-derived scrap in 1999 and 105,979 tonnes in 2000. The fragmentised scrap was reported to be recycled in Cork and in the UK[26].

Table 4 End of life Vehicles arising in the Republic of Ireland and processed in the Republic and Northern Ireland

	Fragmentised scrap recovered at shredding facilities (tonnes)		**End of life vehicle derived scrap (tonnes)**		**Number of end of life vehicles (1 end of life vehicle = 0.6 tonnes ferrous metal)**	
	1999	**2000**	**1999**	**2000**	**1999**	**2000**
Total	84,483	145,489	63,512	105,979	105,855	176,632

Method 2 – Recyclers

Irish Ispat was the only company involved in the recycling of ferrous metals in Ireland until its closure in June 2001. It processed fragmentised scrap from the shredding facilities located in the Republic of Ireland. Since the closure of Irish Ispat, all scrap processed by the shredding facilities in the Republic of Ireland is exported for recovery abroad. Information for 2000 was available only from January to June and in this report, the assumption was made that the total quantity of metal processed in 2000 was double that which was processed in the first six months. This may not be a true reflection of the actual processing that was carried on by Irish Ispat in that year. Table 5 indicates the quantities of ferrous scrap recycled in Ireland. These figures are considerably lower than those reported by the shredder operators as being recovered in the Republic of Ireland. Given that Irish Ispat is now closed, this methodology becomes invalid for future use and is not considered further.

Table 5 Fragmentised scrap recycled in Ireland in 1999 and 2000

	1999	**2000**
Total Ferrous Metal Scrap	68,158	80,274[27]
Of which domestically sourced	62,310	80,274
End of life vehicle-Derived Ferrous Scrap[28]	46,733	60,206
Number of end of life vehicles[29]	**77,888**	**100,343**

[25] When processed, the shredded metal becomes known as fragmentised scrap.
[26] Since the closure of Irish Ispat in June 2001, the majority of scrap produced in Ireland is sent to Spain for recycling.
[27] The quantity of fragmentised scrap arising in January-June 2000 (40,137 tonnes) is doubled to account for the 12-month period.
[28] Using a factor of 75 per cent for end of life vehicle derived scrap.
[29] 1 end of life vehicle = 0.6 tonnes ferrous metal content.

3.3.2 Indirect Methods

In addition to direct methods, the European Topic Centre on Waste (ETC/W) proposed indirect methods for the estimation of the quantity of end of life vehicle waste (EEA, 1998b). It proposed three different methods based on:

- Projections of the car stock
- Historical numbers of end of life vehicles
- Life time parameters

An estimate based on a projection of the car stock is the preferred approach by the ETC/W, as it is the only one of the three methods that takes likely economic development into account. An additional indirect method, the "vehicle inactivity method" is also proposed in this report.

The Department of the Environment and Local Government's Vehicle Registration Unit publishes the *Irish Bulletin of Vehicle and Driver Statistics*[30] on an annual basis. While the Bulletin contains no specific information relating to end of life vehicles, the information contained in the Bulletin is used below in applying the methodologies for estimating the number of end of life vehicles arising in Ireland.

Table 6 contains the source data, obtained from the Vehicle Registration Unit, for all the calculations below. As outlined in Section 1.3.2, the Directive defines a vehicle as any vehicle designated as category M1 (vehicles used for the carriage of passengers and comprising no more than eight seats in addition to the driver seat) or N1 (vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes).

Table 6 Source data for calculations used in indirect methods

(Compiled from Bulletins of Vehicle and Driver Statistics, DoELG, 1986-2001)

	Vehicles Under Current Licence			New Registrations			Imported Vehicles[31]	
Year	**Private Cars**	**Small PSVs**	**Goods vehicles under 3.5 tonnes***	**Private Cars**	**Small PSVs**	**Goods vehicles under 3.5 tonnes***	**Private Cars**	**Goods vehicles under 3.5 tonnes***
1982	709,000	3,453	55,695	73,330	282	8,313	2,886	332
1983	718,555	3,960	57,242	61,094	240	9,414	2,676	297
1984	711,098	4,329	68,796	55,893	222	10,807	2,233	299
1985	709,546	4,358	72,797	59,592	273	11,702	2,691	873
1986	711,087	4,710	80,647	58,760	299	11,040	3,352	1,479
1987	736,595	4,826	89,833	54,341	251	10,141	4,890	1,955
1988	749,459	4,952	97,411	61,888	288	11,940	6,238	1,713
1989	773,396	5,061	108,340	78,383	467	16,767	10,069	2,069
1990	796,408	4,977	120,657	83,420	436	20,209	22,429	4,039
1991	836,583	5,363	124,946	68,533	514	13,387	21,053	3,439
1992	858,498	5,711	121,328	67,861	469	9,957	17,631	3,135
1993	891,027	6,144	111,374	60,792	383	8,143	26,560	2,684
1994	939,022	6,925	110,995	77,773	620	10,498	38,863	2,861
1995	990,384	8,086	115,425	82,730	728	11,226	41,865	3,185
1996	1,057,383	9,219	118,984	109,333	759	13,347	44,500	3,999
1997	1,134,429	10,340	128,344	125,818	633	15,333	41,554	3,967
1998	1,196,901	11,249	138,982	138,538	991	19,368	39,565	4,383
1999	1,269,245	13,076	152,583	170,322	1,109	24,297	36,878	7,503
2000	1,319,250	13,637	168,323	225,269	873	27,516	24,003	5,718

[30] DoELG, 1986-2001. *Irish Bulletin of Vehicle and Driver Statistics*.

[31] Imported used vehicles licensed for the first time are not already included in the figures for new registrations.

*The number of goods vehicles under 3.5 tonnes reported in Table 6 is derived from information in relation to total goods vehicles contained in the Bulletins of Vehicle and Driver Statistics, DoELG, 1986-2001. Goods vehicles under 3.5 tonnes represent an average of approximately 82% of total goods vehicles.

Method 3 – Projections of the Vehicle Stock

A formula for determining projections of the car stock was proposed by the ETC/W (EEA, 1998b). The formula has been adjusted to accommodate the format in which data is reported and, in particular, to account for the import of vehicles, as follows:

End of life vehicles (year t) = (Vehicles under current licence in year t-1) - (Vehicles under current licence in year t) + (New registrations in year t) + (Imported vehicles in year t)

Equation 1

Table 7 summarises the estimates of end of life vehicle numbers from the application of the Equation 1 to the VRU data in Table 6.

Table 7 Results from Method 3 – Projections of the Vehicle Stock

Year	Estimated number of end of life vehicles
1979	65,839
1980	52,264
1981	77,072
1982	148,772
1983	62,111
1984	64,989
1985	73,272
1986	65,553
1987	36,900
1988	61,462
1989	72,435
1990	94,575
1991	61,590
1992	80,097
1993	75,480
1994	82,230
1995	82,850
1996	100,383
1997	99,932
1998	128,960
1999	152,726
2000	217,204

Method 4 – Historical Numbers of End of Life Vehicles

This method relies on knowing the quantity of end of life vehicles arising in past years. This data is unavailable and consequently the method cannot be applied. A variation of the method, the vehicle inactivity method, is applied below in Method 6.

Method 5 – Life Time Parameters

This method estimates the quantity of end of life vehicles based on the average lifetime of an average vehicle. CARE (Consortium for Automotive Recycling) in the UK collected data from dismantlers on more than 135,000 vehicles between 1995 and 1999. Analysis of the data showed that the most common age for an end of life

vehicle was 13 years (Charles Trent Ltd., 2000). Thus with an average lifetime of e.g. 13 years, the number of end of life vehicles in 2011 roughly matches the number of vehicles registered in 1998

Assuming the lifetime of an average vehicle in Ireland is the same as in the UK, the expected number of end of life vehicles can be estimated from the number of 13-year old vehicles in any year, including imported vehicles. An assumption is made that the average lifetime of goods vehicles under 3.5 tonnes is the same as for average cars i.e. 13yrs. The age profile of small public service vehicles is not available prior to 1998, due to an older system of data recording. Equation 2 estimates the number of vehicles aged 13 years:

End of life vehicles (year t) = (Number of cars @ 13yrs in yr t) + (Number of goods vehicles <3.5 tonnes @ 13yrs in yr t) + (Number of small public service vehicles @ 13yrs in yr t)

Equation 2

Information on the age profile of vehicles is available from VRU published data. Results obtained using this method, presented in Table 9, proved to be far outside the range of results obtained using the other methods. Therefore they are disregarded and not considered further.

Table 8 Number of 13 year old vehicles 1985 to 2000 (DoELG, 1985-2000)

Year	Number of cars = 13 yrs in year t	Number of goods vehicles <3.5t = 13 yrs in year t	Small PSVs = 13 yrs in year t	Number of end of life vehicles
1985	8,122	627		**8,749**
1986	9,138	722		**9,860**
1987	7,272	495		**7,767**
1988	7,062	575		**7,637**
1989	11,038	888		**11,926**
1990	16,481	1,108		**17,589**
1991	24,111	1,555		**25,666**
1992	23,442	1,677		**25,119**
1993	27,368	1,166		**28,534**
1994	34,603	1,351		**35,954**
1995	28,441	1,348		**29,789**
1996	25,262	1,670		**26,932**
1997	27,496	1,839		**29,335**
1998	29,963	2,528	131	**32,622**
1999	25,505	2,366	182	**28,053**
2000	15,987	2,394	148	**18,529**

Method 6 – Vehicle Inactivity Method

When a vehicle is being used it must be taxed. The Vehicle Registration Unit holds records on the number of vehicles that are taxed at any given time. If a vehicle becomes waste it is considered inactive from a taxation point of view. All end of life vehicles become inactive and, while there are other reasons for temporary inactivity, a measure of inactive vehicles could also be considered an appropriate measure of end of life vehicles. Information was requested directly from the VRU to determine how many vehicles became inactive over a number of 12-month periods, that is, their tax was not renewed. Following consultation with the VRU, a list of body types was drawn up which covers the vehicles designated as category M1 and N1, as required by the Directive. The list is shown in Table 9.

Table 9 List of body types relevant to the requirements of the Directive

Other Vehicles	Non-goods vehicles	Goods vehicles < 3.5 tonnes
Saloon	✓	✓
Estate/Jeep	✓	✓
Van	✓	✓
Hearse	✓	✓
Invalid Vehicle	✓	✓
Hatchback	✓	✓
Convertible	✓	✓
Sports/Coupe	✓	✓
Limousine	✓	✓
Van with side windows	✓	✓
Other light goods	✓	✓
Box Van	✓	
Luton Van	✓	
Insulated/Refrigerated Van	✓	
Other Van	✓	
Jeep	✓	
Estate/Jeep	✓	
Liftback	✓	
All Terrain Vehicle	✓	

Table 10 shows the numbers of vehicles which became inactive in the calendar years 1997 to 2000. Using the assumption that vehicles which did not renew tax is equivalent to those that became end of life vehicles, this is an indication of the quantity of end of life vehicles arising during each of the 12 month periods. The table shows that there was a steady increase in the number of vehicles which became inactive, from 116,886 in 1997 to 197,987 in 2000.

Table 10 Numbers of vehicles which became inactive during the years 1997 to 2000

Year	Non goods vehicles	Goods vehicles < 3.5 tonnes	Total inactive vehicles per annum (end of life vehicles)
1997	108,159	8,727	116,886
1998	108,752	10,548	119,300
1999	149,865	12,912	162,777
2000	181,755	16,232	197,987

3.3.3 Summary of Results

Table 11 gives an overview of results from methods 1 to 6 for the years 1997 to 2000. As may be seen, the estimates from methods 1,3 and 6 are broadly in agreement. A full set of results from all tested methods is given in Appendix B. The figures presented in Table 12 are derived directly from those presented in Table 11, using the factor of 0.6 tonnes ferrous content in each end of life vehicle to derive estimates of tonnes of end of life vehicles arising.

Table 11 Summary of results 1997-2000 – number of end of life vehicles

Year	Direct Methods (Number of end of life vehicles)		Indirect Methods (Number of end of life vehicles)			
	Recovery Operators – Shredding Facilities	Recyclers – Irish Ispat	Projections of the Vehicle Stock – ETC/W Adjusted Methodology	Historical Numbers of End of Life Vehicles	Lifetime Parameters	Vehicle Inactivity (Non-renewal of tax)
	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6
1997	-	-	99,932	-	29,335	116,887
1998	-	-	128,960	-	32,622	119,300
1999	105,855	77,888	152,727	-	28,053	162,777
2000	176,632	100,343	217,203	-	18,529	197,987

Table 12 Summary of results 1997-2000 – weight of end of life vehicles (tonnes)

Year	Direct Methods (Tonnes)		Indirect Methods (Tonnes)			
	Recovery Operators – Shredding Facilities	Recyclers – Irish Ispat	Projections of the Vehicle Stock – ETC/W Adjusted Methodology	Historical Numbers of End of Life Vehicles	Lifetime Parameters	Vehicle Inactivity Method (Non-renewal of tax)
	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6
1997	-	-	59,959	-	17,610	70,132
1998	-	-	77,376	-	19,573	71,580
1999	63,513	46,733	91,636	-	16,832	97,666
2000	105,979	60,206	130,322	-	11,117	118,792

From the results presented above, it appears that the most reliable estimates are available using the recovery operators method (Method 1), the projections of the vehicle stock method (Method 3) and the vehicle inactivity method (Method 6) for the following reasons:

- Data from recovery operators is collected on an annual basis and is easily adapted for use in Method 1;
- The VRU publish annually the information needed for Method 3;
- The VRU can provide information on vehicle inactivity (Method 6) upon request;
- Each method is easy to use and intuitively gives an accurate estimate of end of life vehicle arisings.

Figure 6 illustrates the tonnage of end of life vehicles arising from 1990 to 2000, as estimated using the different methods and based on Table 12. As can be seen, each method illustrates a steady increase in end of life vehicles arising since the mid 1990's. As various waste streams are generally discussed in terms of tonnes of waste arising, this discussion will centre around the information presented in Table 12, end of life vehicles arising in terms of tonnes ferrous metal.

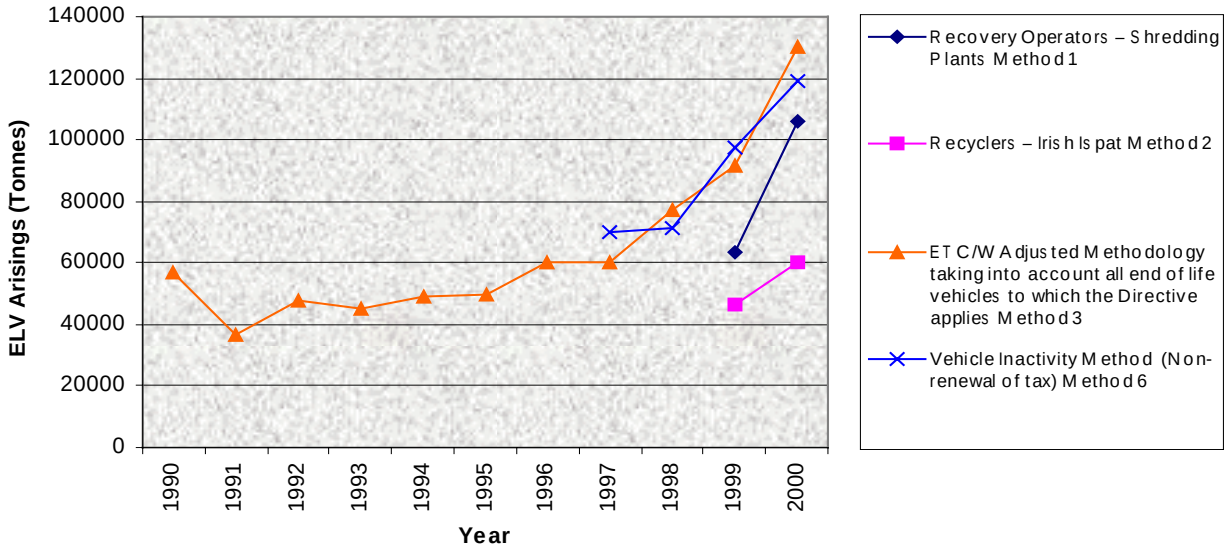

Figure 6 Estimate of tonnes of end of life vehicles 1990 to 2000

The survey of the shredding facilities, Method 1, produced results which show a 66.9 per cent increase from 63,513 tonnes in 1999 to 105,979 tonnes in 2000. The results obtained by surveying Irish Ispat, Method 2, the only metal recycler in Ireland show a smaller increase of just 28.8 per cent between 1999 and 2000. This information relates to actual material being processed. However, the accuracy of the estimate depends largely on the information supplied relating to the mix of shredder feed between end of life vehicles and other metal such as white goods.

The estimate resulting from the ETC/W adjusted methodology, projections of the vehicle stock (Method 3), indicates 91,636 tonnes end of life vehicles arising in 1999 and 130,322 tonnes in 2000, representing an increase of 42 per cent between the two years.

Method 4 was not further investigated as it required historical information in relation to end of life vehicles and this information was not available. A variation of the method was applied in Method 6. The lifetime parameters method (Method 5) produced estimates which were far outside the range of estimates produced by other methods. Therefore, the lifetime parameters method is not considered to be an effective method of estimating end of life vehicles arising in Ireland.

The vehicle inactivity method (Method 6) indicated end of life vehicle arisings of 97,666 tonnes in 1999 and 118,792 tonnes in 2000, an increase of 21.6 per cent. There are however a number of reasons given why this method may not necessarily be a true reflection on actual numbers of vehicles arising as waste. It is assumed that the non-renewal of tax is a definite indicator of a vehicle becoming waste. This is obviously not the case for various reasons. The year 2000 proved a record year for new car sales and many used vehicles proved difficult to sell. As a result of this, it is suspected that certain vehicles for which tax was not renewed may be lying idle without having been recycled and in this way, overestimating the number of end of life vehicles being recycled.

Chapter 4 Conclusions and Recommendations

4.1 Conclusions

1. The number of licensed vehicles is increasing from year to year, with an increase of almost 60 per cent between 1990 and 2000. During the same period, there was a 139 per cent increase in the number of new vehicles licensed for the first time.

2. There is currently no accepted method of determining the quantity of end of life vehicles arising in Ireland. In the absence of a system of de-registration, it is impossible to obtain accurate estimates. The methodologies used in this report have been used to generate estimates and there is significant variation between estimates.

3. One of the requirements of the Directive on End of Life Vehicles is the establishment of a system whereby a certificate of destruction is issued for each end of life vehicle. Once certificates of destruction begin to be issued, accurate data will be available on end of life vehicle arisings in Ireland.

4. Information obtained directly from the metal recovery operators (shredding facilities) is considered to provide a reliable method of estimating the annual quantity of vehicles arising as waste in Ireland. The best estimate for the number of end of life vehicles arising in Ireland is 105,885 in 1999 and 176,632 in 2000. This represents an increase of almost 67 per cent in one year. The accuracy of this estimate depends on the actual proportion of end of life vehicle waste used in the shredder feed and this information is not always available.

5. The ETC/W proposed a number of methods for determining end of life vehicles arisings. An adjusted version of the ETC/W methodology for projections of the vehicle stock was used, resulting in estimates of 152,727 end of life vehicles arising in 1999 and 217,203 in 2000. This represents an increase of almost 48 per cent in one year. This methodology requires information from the Vehicle Registration Unit.

6. The introduction of the Directive on End of Life Vehicles and the reclassification of end of life vehicles and auto shredder residue as hazardous waste under Commission Decision 2000/532/EC, as amended, are likely to have major implications for the way end of life vehicles will be handled and treated and the way in which auto shredder residue will be disposed.

7. End of life vehicles must now be de-polluted prior to further processing. The Directive on End of Life Vehicles sets out standards and requirements for de-pollution.

8. Auto shredder residue, although not exclusively resulting from processing of end of life vehicles, has traditionally been landfilled. Its reclassification as hazardous waste has cast doubt over the future of this activity, thus creating difficulties for shredder operators in the absence of alternative recovery and disposal options.

9. Information in relation to the arisings of scrap tyres and their management is available only in terms of quantities imported. The best estimate for waste tyres arising in 1998 is 29,033 tonnes, of which 15,381 tonnes were car tyres.

4.2 Recommendations

1. This report includes estimates of the numbers and the quantity of waste arising from end of life vehicles in Ireland. A more practical method for producing and validating statistics will be facilitated by the introduction of a system of de-registration and the issuing of certificates of destruction, as required by the Directive on End of Life Vehicles. These systems should be set up without delay to ensure that coherent information on end of life vehicle arisings will be available in future years.

2. Until the system of de-registration is in place, surveys of metal shredders should provide baseline information to be used in estimating end of life vehicle arisings. These estimates should be supplemented by VRU data on numbers of vehicles and new registrations. Annual estimates based on data from the VRU and metal shredding facilities should continue to be prepared and should in time be verified against the more reliable data expected from the proposed de-registration system.

3. The Directive on End of Life Vehicles sets out the requirements for the de-pollution of end of life vehicles. The EU Commission's views on whether this de-pollution satisfies the classification of "end of life vehicles, containing neither liquids nor other hazardous components" (EWC Code 16 01 06) set out in the European Waste Catalogue (i.e. non-hazardous waste) will be sought.

4. Auto shredder residue containing dangerous substances is classified as a hazardous waste. The shredding organisations should address this issue in terms of (a) providing definitive evidence of the presence or absence of dangerous substances and (b) seeking alternative recovery or disposal outlets for auto shredder residue.

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Appendix A

Table A1 Numbers of licensed vehicles in each year, 1974 – 2000

Year	Private Cars	Goods Vehicles	Small Public Service Vehicles	Totals[32]
1974	487,483	52,910	3,852	662,583
1975	510,651	52,367	3,807	681,151
1976	551,117	53,532	4,143	724,816
1977	572,692	53,251	3,674	747,670
1978	638,740	59,585	2,879	814,571
1979	682,958	61,543	2,716	853,211
1980	734,371	65,052	2,444	911,031
1981	774,594	67,014	2,366	949,819
1982	709,000	68,087	3,453	882,140
1983	718,555	69,978	3,960	897,381
1984	711,098	84,103	4,329	906,109
1985	709,546	93,369	4,358	914,758
1986	711,087	101,475	4,710	922,484
1987	736,595	111,023	4,826	959,753
1988	749,459	118,764	4,952	981,296
1989	773,396	130,020	5,061	1,019,560
1990	796,408	143,166	4,977	1,054,259
1991	836,583	148,331	5,363	1,105,545
1992	858,498	144,798	5,711	1,126,473
1993	891,027	135,225	6,144	1,151,238
1994	939,022	135,809	6,925	1,202,273
1995	990,384	141,785	8,086	1,262,503
1996	1,057,383	146,601	9,219	1,338,616
1997	1,134,429	158,158	10,340	1,432,330
1998	1,196,901	170,866	11,249	1,510,853
1999	1,269,245	188,814	13,076	1,608,156
2000	1,319,250	205,575	13,637	1,682,221

[32] Total figures include: private cars, motor cycles, Goods vehicles, Tractors, excavators, dumpers, etc., public services vehicles (small and large), exempt vehicles and others.

Appendix B

Table B1 Overall summary of results for numbers of end of life vehicles arising in Ireland 1990 – 2000

Year	Direct Methods (Number of ELVs)		Indirect Methods (Number of end of life vehicles)				
	Recovery Operators – Shredding Facilities	Recyclers – Irish Ispat	Institut pour une Politique Européenne de l'Environne-ment[33]	ETC/W Methodology		Life Time Parameters (13 years)	Vehicle Inactivity Method (Non-renewal of tax)
				As published	Projections of the Vehicle Stock – ETC/W Adjusted Methodology[34]		
	Method 1	Method 2			Method 3	Method 5	Method 6
1979				51,692	65,840		
1980				40,315	52,265		
1981				64,422	77,072		
1972				138,923	148,772		
1983				51,538	62,112		
1984				63,350	64,988		
1985				61,010	73,272	8,740	
1986				57,218	65,553	9,860	
1987				28,833	36,900	7,767	
1988				49,023	61,462	7,637	
1989				54,447	72,435	11,927	
1990			84,263	60,408	94,575	17,588	
1991			44,792	28,358	61,590	25,667	
1992			56,040	45,947	80,097	25,118	
1993			46,325	28,263	75,480	28,533	
1994			64,540	29,778	82,230	35,953	
1995			86,923	31,368	82,850	29,788	
1996				42,333	100,383	26,932	
1997				48,772	99,932	29,350	116,887
1998				76,067	128,960	*32,622	119,300
1999	105,855	77,888		97,978	152,727	*28,053	162,777
2000	176,632	100,343		175,263	217,203	*18,529	197,987

* These figures include small public service vehicles.

[33] Institut pour une Politique Européenne de l'Environnement, July 1996 in EEA, 1998b (unpublished).
[34] EEA, 1998a

Table B2 Overall summary of results for tonnage of end of life vehicles arising in Ireland 1990 – 2000

Year	Direct Methods (Tonnes)		Indirect Methods (Tonnes)				
				ETC/W Methodology[36]		Life Time Parameters (13 years)	Vehicle Inactivity Method (Non-renewal of tax)
	Recovery Operators – Shredding Facilities	Recyclers – Irish Ispat	Institut pour une Politique Européenne de l'Environne-ment[35]	As published	Projections of the Vehicle Stock – ETC/W Adjusted Methodology		
	Method 1	Method 2			Method 3	Method 5	Method 6
1979				31,015	39,504		
1980				24,189	31,359		
1981				38,653	46,243		
1982				83,354	89,263		
1983				30,923	37,267		
1984				38,010	38,993		
1985				36,606	43,963	5,244	
1986				34,331	39,332	5,916	
1987				17,300	22,140	4,660	
1988				29,414	36,877	4,582	
1989				32,668	43,461	7,156	
1990			50,558	36,245	56,745	10,553	
1991			26,875	17,015	36,954	15,400	
1992			33,624	27,568	48,058	15,071	
1993			27,795	16,958	45,288	17,120	
1994			38,724	17,867	49,338	21,572	
1995			52,154	18,821	49,710	17,873	
1996				25,400	60,230	16,159	
1997				29,263	59,959	17,610	70,132
1998				45,640	77,376	*19,573	71,580
1999	63,513	46,733		58,787	91,636	*16,832	97,666
2000	105,979	60,206		105,158	130,322	*11,117	118,792

*These figures include small public service vehicles

[35] Institut pour une Politique Européenne de l'Environnement, July 1996 in EEA, 1998b (unpublished).
[36] EEA, 1998a