International Specialised Skills Institute Inc



VEHICLE RECYCLING AND SUSTAINABILITY



Nova McNamara The Pratt Foundation/ISS Institute Overseas Fellowship

Fellowship supported by The Pratt Foundation

ISS Institute Inc. OCTOBER 2009 ©



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Published by International Specialised Skills Institute, Melbourne.

ISS Institute 101/685 Burke Road Camberwell 3124 AUSTRALIA

October 2009

Also extract published on www.issinstitute.org.au

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APRAA (Auto Parts Recyclers Association of Australia) estimates that over 500,000 end-oflife vehicles (ELVs) currently enter the waste stream in Australia each year.¹ It is estimated that by 2010 this number may exceed 750,000.²

In Australia, the current recycling practises are such that the ELV passes from the last owner to an automobile dismantler either directly or via insurance companies, used car dealers or car repairers. The useful parts that have commercial value are removed to be used in the second hand car market. The residual vehicles, particularly older vehicles, are taken directly to the metal shredders or intermediary scrap metal merchants. The parts are removed and the ELV shredded. The non-metal residual exits the shredder as waste residue, known as shredder 'fluff' or 'flock'. This fluff is mostly disposed as landfill.³

At present, there is no legislation for ELVs in Australia.

The most relevant legislated directive for ELVs, which pertains to the automotive industry worldwide, is the Directive 2000/53/EC of the European Parliament and of the Council.⁴

The legislation has been sanctioned as a framework directive addressing the 27 European member states after a consultative process to transpose it to national law. As stated, although there is presently no equivalent legislation in Australia, the issues face the automotive industry worldwide. Other directives include the Japanese Automobile Recycling Law established in 2002⁵ and a regulation for South Korea which was implemented on 1st January 2008 for re-use, recycling and recovery rates for hazardous substances.⁶ Taiwan has an end-of-life vehicles voluntary agreement that came into effect 1st January 2008, and China has announced a technical standard that is a mixture of the European and Japanese legislations and will become effective from 1st January 2010.⁷

The other aspect to ensuring that vehicles are sustainable is not only for vehicles to be designed with sustainable materials and disposed of correctly, but also to be designed in such a way the vehicle is posing minimal environmental impact while the vehicle is on the road.

At present, the European Union has implemented a new legislation to reduce CO₂ emissions from cars. The new guidelines propose that new vehicles must limit CO₂ emissions to an average of 130g/km for passenger cars by 2012, with 120g/km reached by vehicle motor technology and an additional 10g/km reached through complementary measures.

A specific benefit to having access to this knowledge in Australia is that Australian automotive companies are designing vehicles to be sold in regions affected by the European or similar legislation. Therefore, it is imperative that the Australian companies are aware of the impacts in these regions and apply the appropriate standards in a self-regulated manner.

¹ Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 3:12.

² Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 3:14.

³ Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 4:15, 4:16.

⁴ Directive 2000/53/EC of the European Parliament and of the Council of September 18, 2000 on end-of-life vehicles as amended by the commission decision 2002/525/EC, 2005/438/EC and 2005/673/EC.

⁵ JAIA/JAMA, Japan Recyclability Legislation

⁶ Kaida, South Korea – Legislation of Recycling of End-of-Life Vehicles

⁷ MC VRD 06A-014 dated 9 March 2006 (Announcement No. 9 of 2006 – Technical Policy for Recovery of Automotive Products.

It is also beneficial to the Australian automotive industry to be aware of the legislative requirements and trends that are emerging worldwide so that care can be taken in the vehicle design process which facilitates 'design for environment' strategies for all vehicle lines. Although there is no ELV legislation in Australia at present, it is likely that it may emerge in the future.

There have been a number of skills deficiencies determined in the Australian Automotive Industry. They can be outlined as follows:

- End-of-life type approval preparation, in line with the European Directive 2000/53/EC on ELVs
- 2. International Material Database System (IMDS), used by suppliers worldwide to conform with recyclability requirements, substance use restrictions and parts marking conformance for end-of-life recycling and environmental measures
- 3. Experience with introducing recycled and renewable materials content into motor vehicles
- 4. View of vehicle teardown facilities to support recycling activities
- 5. Design for environmental and sustainability methodology
- 6. Understanding of the CO₂ impending legislation affecting European vehicles and understanding CO₂ reduction strategies.

The Fellowship involved a three week overseas research program to Germany, Brussels and the UK.

The key findings, as a result of the Fellowship, can be outlined as follows:

Key findings regarding the European 'end-of-life' legislation:

- It is cheaper to put the shredder light fractions into landfill than to use them for energy recovery, or to use separation techniques to sort the materials. In the interests of environmental benefit, it would be better to ban sending the light fractions to landfill in order to make an impact.
- Different member states are at different stages, causing difficulties in implementing a standardised framework in Europe.
- Consultation with Original Equipment Manufacturers (OEMs) does occur when updating the addendums, however the European Commission Director General (DG) Environment does not take into account costing implications to OEMs.
- If a supplier comes forward to the European Commission and DG Environment with a new technology in favour of the environment, an addendum can be amended which does not take into account global supply solutions.
- When amending an addendum, the lack of infrastructure of other nations that are importing to Europe is not taken into consideration.

Key findings regarding the use of recycled material:

- In Europe, there is adequate infrastructure in place to support the use of recycled content in motor vehicles.
- Recycled content is predominantly used in B-surface⁸ components.
- Recycled content can be Post Consumer Recyclate (PCR) or Post Industrial Recyclate (PIR)
- Polypropylene and nylon are the most common materials using recycled content. Typical examples include wheel arch liners, fan shrouds and insulators.

Key findings regarding the use of renewable material:

- There is a growing trend to utilise renewable materials in Europe in an effort to improve sustainability.
- Renewable materials are materials that can be naturally regenerated such as paper, hemp, sisal, cotton, soy, etc.
- Renewable fibres can be used in polymer materials to reduce weight ie replacing glass fibres.
- Studies have indicated that renewable fibre polymer composites have equivalent strength characteristics.
- Polypropylene and nylon are the most common polymer materials that can utilise renewable content.

Key finding regarding the International Dismantling Information System (IDIS) dismantling manual:

• An interesting insight was that the use of IDIS system and recycling strategies are considered to be non-competitive issues in Europe.

Key findings regarding the site visits to recycling facilities:

- The economic crisis is definitely affecting the recycling industry.
- China has declined all of its contracts to another recycling company known as TSR GmBH and sent 50,000 tonnes of steel and 70,000 cables back to Germany.
- Steel works in Belgium will be closing down for two months due to the economic crisis. It is anticipated that things will be back on track in 2009.
- There is a catalytic converter black market which has created challenges for the industry. In some instances, fake catalytic converters are sold as end-of-life goods to genuine recycling facilities. The core of the shell has had all precious metals already removed and replaced with fake weights.

Key findings regarding the CO₂ legislation:

- Passenger vehicles target: 130g/km CO₂ homologated.
- Commercial vehicles target: 175g/km initially and 160g/km at some stage later.

⁸ B-surface definition: A component surface that is not visible to the consumer

In addition, complementary measures may deliver 10g/km of the 130g/km homologated target:

- Biofuels low blend
- Efficient mobile air conditioning system no details available yet
- Low rolling resistance tyres
- Mandatory Tyre Pressure Monitoring System (TPMS)
- Mandatory Shift Indicator Light (SIL)

Australia does not currently possess legislation in the ELV or CO₂ areas, however a series of actions can be taken by the OEMs to develop self-regulated strategies. These recommendations are included as result of the Fellowship trip for the following reasons:

- Some Australian OEMs and suppliers are supplying to regions which have legislation or pending legislation in the ELV and CO₂ area.
- Landfill is a global issue and alternatives to reduce it such as the use of recycled material should be investigated.
- Climate change is having significant effects on the earth and reduction in this area is likely to have more focus moving forwards.
- The demand for the use of renewable resources is likely to increase, providing manufacturers with alternatives.
- In the absence of any legislation in Australia there is an opportunity to develop selfregulated strategies within the Australian industry and a model that is appropriate to the Australian region.
- There are opportunities to develop systems within the end-of-life dismantling industry with a vision to create a closed loop recycling structure in Australia.

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Abbreviations and Acronyms

AAPRA	Auto Parts Recyclers Association of Australia
APESMA	The Association of Professional Engineers, Scientists and Managers, Australia
Auto CRC	Auto Commonwealth Research Centre
BOM	Bill of Material
CO_2	Carbon Dioxide
DG	Directorate General for Environment (European Commission)
DIIRD	Department of Innovation, Industry and Regional Development
ELV	End-of-life vehicle
EPA	Environmental Protection Authority
EC	European Commission
GMIR	Global Management Integration Reporting
GADSL	Global Automobile Declarable Substance List
IDIS	International Dismantling Information System
IMDS	International Material Database System
ISO	International Organisation for Standardisation
ISS Institute	International Specialised Skills Institute
OBD	On Board Diagnostic Connector – an automobile connector that reads fault codes from the various systems
OEM	Original Equipment Manufacturer, eg car companies
PCR	Post Consumer Recyclate, ie Coca Cola bottles reprocessed
PIR	Post Industrial Recyclate, ie nylon carpet off-cuts reprocessed
PACIA	Plastic and Chemicals Institute Australia Recyclate Material that is either post consumer or post industrial recyclate and that can be recycled or reused in a future manufacturing cycle
RMIT	Royal Melbourne Institute of Technology
RSMS	Restricted Substance Management System
SIL	Shift Indicator Light
SPE-ANZ	Society of Plastics Engineers Australia and New Zealand
TPMS	Tyre Pressure Monitoring System
VDA	Vehicle Deutsch Automobile Industry

Definitions

Biofuel	Fuels that are manufactured with a percentage of fuel generated from other sources, eg rapeseed or soybean oil	
B-surface	A component surface that is not visible to the consumer	
Recyclability	The potential for recycling of component parts or materials from an ELV	
Recoverability	The potential for recovery of component parts or materials derived from ELVs	
Renewable materials	Materials that can be naturally regenerated, such as paper, hemp, sisal, cotton or soy	
Shredder fluff/flock	Non-metal residue that exits the shredder	
Sustainability	The ISS Institute follows the United Nations NGO on Sustainability, "Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."	
	http://www.unngosustainability.org/CSD_Definitions%20SD.htm	

Acknowledgments

Nova McNamara would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide her throughout the Fellowship program.

Awarding Body - International Specialised Skills Institute (ISS Institute)

We know that Australia's economic future is reliant upon high level skills and knowledge, underpinned by design and innovation.

The International Specialised Skills Institute Inc (ISS Institute) is an independent, national organisation, which has a record of nearly twenty years of working with Australian industry and commerce to gain best-in-the-world skills and experience in traditional and leading-edge technology, design, innovation and management. The Institute has worked extensively with Government and non-Government organisations, firms, industry bodies, professional associations and education and training institutions.

The Patron in Chief is Sir James Gobbo AC, CVO. The ISS Institute Board of Management is Chaired by Noel Waite AO. The Board comprises Franco Fiorentini, John Iacovangelo, Lady Primrose Potter AC and David Wittner.

Through its CEO, Carolynne Bourne AM, the ISS Institute identifies and researches skill deficiencies and then meets the deficiency needs through its *Overseas Skill Acquisition Plan* (*Fellowship Program*), its education and training activities, professional development events and consultancy services.

Under the Overseas Skill Acquisition Plan (Fellowship Program) Australians travel overseas or international experts travel to Australia. Participants then pass on what they have learnt through reports, education and training activities such as workshops, conferences, lectures, forums, seminars and events, therein ensuring that for each Fellowship undertaken many benefit.

As an outcome of its work, ISS Institute has gained a deep understanding of the nature and scope of a number of issues. Four clearly defined economic forces have emerged out of our nearly twenty years of research. The drivers have arisen out of research that has been induced rather than deduced and innovative, practical solutions created - it is about thinking and working differently.

A Global Perspective. 'Skills Deficiencies' + 'Skills Shortages'

Skill deficiencies address future needs. Skill shortages replicate the past and are focused on immediate needs.

Skill deficiency is where a demand for labour has not been recognised and where accredited courses are not available through Australian higher education institutions. This demand is met where skills and knowledge are acquired on-the-job, gleaned from published material, or from working and/or study overseas. This is the focus of the work of ISS Institute.

There may be individuals or firms that have these capabilities. However, individuals in the main do not share their capabilities, but rather keep the IP to themselves; and over time they retire and pass way. Firms likewise come and go. If Australia is to create, build and sustain Industries, knowledge/skills/understandings must be accessible trans-generationally through nationally accredited courses and not be reliant on individuals.

Our international competitors have these capabilities as well as the education and training infrastructure to underpin them.

Addressing skill shortages, however, is merely delivering more of what we already know and can do to meet current market demands. Australia needs to address the *dual* challenge – skill deficiencies and skill shortages.

Identifying and closing skills deficiencies is vital to long-term economic prospects in order to sustain sectors that are at risk of disappearing, not being developed or leaving our shores to be taken up by our competitors. The only prudent option is to achieve a high skill, high value-added economy in order to build a significant future in the local and international marketplace.

The Trades

The ISS Institute views the trades as the backbone of our economy. Yet, they are often unseen and, in the main, have no direct voice as to issues which are in their domain of expertise. The trades are equal, but different to professions.

The ISS Institute has the way forward through its 'Master Artisan Framework for Excellence. A New Model for Skilling the Trades', December 2004. The Federal Government, DEEWR commissioned ISS Institute to write an Australian Master Artisan School, Feasibility Plan.

In 2006, ISS Institute Inc. set up a new ISS advisory body, the **Trades Advisory Council**. Members are Ivan Deveson AO; Martin Ferguson AM, MP, Federal Labor Member for Batman; Geoff Masters, CEO, Australian Council of Educational Research; Simon McKeon, Executive Chairman, Macquarie Bank, Melbourne Office; Richard Pratt, Chairman, Visy Industries and Julius Roe, National President Australian Manufacturing Workers' Union.

Think and Work in an Holistic Approach along the Supply Chain - Collaboration and Communication

Our experience has shown that most perceive that lack of skills is the principal factor related to quality and productivity. We believe that attitudes are often the constraint to turning ideas into product and a successful business; the ability to think laterally, to work and communicate across disciplines and industry sectors, to be able to take risks and think outside the familiar, to share – to turn competitors into partners.

Australia needs to change to thinking and working holistically along the entire Supply Chain; to collaborate and communicate across industries and occupations - designers with master artisans, trades men and women, Government agencies, manufacturers, engineers, farmers, retailers, suppliers to name a few in the Chain.

'Design' has to be seen as more than 'Art' discipline – it is a fundamental economic and business tool for the 21st Century

Design is crucial to the economic future of our nation. Australia needs to understand and learn the value of design, the benefits of good design and for it to become part of everyday language, decision making and choice.

Design is as important to the child exploring the possibilities of the world, as it is to the architect developing new concepts, and as it is to the electrician placing power points or the furniture designer working with a cabinet-maker and manufacturer. As such, design is vested in every member of our community and touches every aspect of our lives.

Our holistic approach takes us to working across occupations and industry sectors and building bridges along the way. The result has been highly effective in the creation of new business, the development of existing business and the return of lost skills and knowledge to our workforce, thus creating jobs - whereby individuals gain; industry and business gain; the Australian community gains economically, educationally and culturally.

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Fellowship Supporter

The Pratt Foundation was established in 1978 by Richard and Jeanne Pratt with the shared vision of supporting charitable enterprises and adding value to philanthropy. The Foundation is now one of the largest private sources of philanthropy in Australia. In the words of its mission statement, it aims *"to enrich the lives of our community"* and, in the words of Jeremiah, it works to fulfil this aim in a spirit of *"kindness, justice and equity"*. McNamara would like to thank them for providing funding support for this Fellowship.

Supporters

McNamara would like to acknowledge the following individuals for their support, guidance and assistance during the Fellowship process:

In Australia

- Carolynne Bourne, Paul Sumner and Ken Greenhill from the ISS Institute for their support throughout the Fellowship journey
- Paul Butcher, Vehicle Engineering Manager, Ford Australia
- Jeremy Welch, Weight, Recycling and Fuel Economy Manager, Ford Australia
- Tim Veenstra, GCP Business Director, Ford Australia
- Ashley Walsh, Materials Engineering Supervisor, Ford Asia Pacific & Africa
- Ray Doyle, Executive Director Industry Partnerships, Industry and Trade Division of Department of Innovation, Industry and Regional Development
- Professor Aleksandar Subic, Head of School, School of Aerospace, Mechanical & Manufacturing Engineering, RMIT University
- Neil Edwards, Chief Executive, Chifley Business School
- Kevin Thomson, President, Society of Plastic Engineers, Australia-New Zealand Section Ltd (SPE-ANZ)
- Nick Juniper, Industry Liaison Manager, Manufacturing Skills Australia

In Germany

- Dr Wulf-Peter Schmidt, '06 RMIT University/ISS Institute International Fellow, Manager Sustainability, Ford of Europe
- Kai Neborg, Supervisor Vehicle Recycling, Ford of Europe
- Yvonne Stephan, Analyst Vehicle Recycling, Ford of Europe
- Monica Sauerbier, Supervisor Fluids & Analyst Support, Ford of Europe
- Maira Magnani, Research Engineer, Ford of Europe
- Wolfgang Hennig, CO₂ Strategy/Communication, Ford of Europe
- Thilo Seibert, Manager Sustainability, Planning & CO₂ Technology Implementation, Ford of Europe
- Henning Honrath, CO2 PAT Leader, Ford of Europe
- Andreas Hagedorn, Materials Engineer, Ford of Europe
- Carl-Ludwig Voss, Materials Engineer, Ford of Europe

Acknowledgments

- Nicole Eikelenberg, Research Engineer (Design for Environment), Ford of Europe
- Thomas Schultz, Manager, Ford of Europe
- Alan Harrison, Supervisor, Materials Engineering, Ford of Europe
- Barry Hennessey, Senior Materials Engineer, Ford of Europe
- Petra Noethen-Maikath, Project Manager, Information Technology, Ford of Europe

In Belgium

Artemis Hatzi-Hull, Desk Officer, ELV Directive, European Commission

In the United Kingdom

- Valentina Cerato, Materials Engineer, Ford of Europe
- Ian Porter, FoE PT Strategy, Ford of Europe
- Professor Edward Kosior, Managing Director, Nextek Pty Ltd
- Robert Dvorak, Project Manager, Nextek Pty Ltd

Individuals Involved In the Development of the Overseas Program

McNamara would like to thank Paul Butcher, Jeremy Welch from Ford Australia and Dr Wulf-Peter Schmidt from Ford of Europe for their assistance in the development of the overseas training program. Dr Schmidt is the '06 RMIT University/ISS Institute International Fellow sponsored by RMIT University.

Individuals Involved in the Fellowship Submission

The following individuals are gratefully acknowledged for their support during the submission process:

- Paul Butcher, Vehicle Engineering Manager, Ford Australia
- Jeremy Welch, Weight, Recycling & Fuel Economy Manager, Ford Australia
- Dr Wulf-Peter Schmidt, Manager Sustainability, Ford of Europe
- Ray Doyle, Executive Director, Industry Partnerships, Industry & Trade Division of Department of Innovation, Industry and Regional Development
- Professor Aleksandar Subic, Head of School, School of Aerospace, Mechanical & Manufacturing Engineering, RMIT University
- Neil Edwards, Chief Executive, Chifley Business School
- Kevin Thomson, SPE-ANZ
- Nick Juniper, Industry Liaison Manager, Manufacturing Skills Australia
- Professor Edward Kosior, Managing Director, Nextek Pty Ltd

Australian Organisations Impacted by the Vehicle Recycling and Sustainability Industry

Government

- Australian Government, Department of Innovation, Industry and Regional Development (DIIRD)
- Australian Government, Department of the Environment, Water, Heritage and the Arts
- Victorian Government, Sustainability Victoria
- Environmental Protection Authority (EPA)

Industry

- Auto Parts Recyclers Association of Australia (AAPRA)
- End-of-life vehicle recyclers
- Ford Australia
- General Motors Holden
- Toyota Australia

Professional Associations

- Association of Professional Engineers, Scientists and Managers, Australia (APESMA)
- Plastic and Chemicals Institute Australia (PACIA)
- Society of Plastics Engineers (SPE)

Education and Training

- Chifley Business School
- Kangan Batman TAFE
- Royal Melbourne Institute of Technology (RMIT)
- Swinburne Institute of Technology

Community

• Community in general

Other

• Auto Commonwealth Research Centre (CRC) – research organisation

About the Fellow



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- Bachelor Engineering Polymer Engineering (Honours), RMIT, 1998
- Graduate Certificate in Management (Technology Management), APESMA/Latrobe University/Chifley Business School, 2003

Associations

• The Association of Professional Engineers, Scientists and Managers, Australia (APESMA)

McNamara has worked in the automotive industry in Australia for the past ten years after graduating with a Polymer Engineering degree at RMIT University at the end of 1998. She has since held various engineering and commercial roles, and spent eight years working for Tier 1 suppliers. She has been working for Ford Motor Company for two and a half years as Ford Australia's first 'Vehicle Recycling Engineer', specialising in end-of-life recycling and sustainability.

In addition to McNamara's engineering qualification, she has gained a Certificate in Management (Technology Management) through APESMA/Latrobe University and Chifley Business School in 2003. She has also studied one additional MBA subject in Environmental Management through Chifley Business School in 2007.

Previous credits include a published paper and presentation at the Society of Plastics Engineers, ANTEC conference in 1996 as an undergraduate.

McNamara has aspirations to develop the 'Recycling and Sustainability' attribute within Ford Australia and to create awareness among the Australian automotive industry in order to make an impact on landfill reduction and reduce climate change.

The Fellowship Program

Aim of the Fellowship

The aim of participating in the Fellowship program can be outlined as follows:

- 1. To become fully trained on all aspects of the European Directive 2000/53/EC on ELV and the requirements to gain 'type' approval.
- 2. To become skilled at conducting recyclability calculations through use of the International Material Database System (IMDS) and Ford's interface system.
- 3. To become skilled in identifying the opportunities for introducing recycled and renewable content into vehicle components as a result of the European experience.
- 4. To become skilled in design for environment/sustainability methodologies.
- 5. To have a full understanding of the CO₂ legislation and the strategies to reduce fleet CO₂.

A Brief Description of the Industry

Auto Parts Recyclers Association of Australia (AAPRA) estimate that over 500,000 ELVs currently enter the waste stream in Australia each year.⁹ It is estimated that by 2010 this number may exceed 750,000.¹⁰

In Australia, the current recycling practices are such that the ELV passes from the last owner to an automobile dismantler either directly or via insurance companies, used car dealers and car repairers. The useful parts that have commercial value are removed to be used in the second hand car market. The residual vehicles, particularly older vehicles, are taken directly to the metal shredders or intermediary scrap metal merchants. The parts are removed, the ELV shredded and the non-metal residual exits the shredder as waste residue, known as shredder 'fluff' or 'flock'. This fluff is mostly disposed as landfill.¹¹ At present there is no legislation in Australia for ELVs.



Current ELV recycling practices in Australia¹²

⁹ Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 3:12.

¹⁰ Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 3:14.

¹¹ Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 4:15, 4:16.

12 Environment Australia, 'Environmental Impact of End-of-life Vehicles: An information paper.' Pg 4:15

Prior to the Fellowship trip, the opportunity was taken to visit Total Auto Recyclers, an endof-life recycling facility in Dandenong, Victoria and interview the Owner/Director, Mike Third, in order to gain a better understanding of the industry in Australia.

The organisation had some impressive equipment to handle and treat ELVs in such a way that was safe for the environment.



Operator draining the fluids from an ELV



A vehicle crushed after all fluids have been removed, ready for transportation to the shredder

Some insights as a result of the visit revealed that the end-of-life recycling industry is handled by thousands of enterprises in Australia. It ranges from backyard operators to large scrap metal corporations. It is estimated that there are 2,300 auto recyclers in Australia and four scrap metal companies in Victoria alone – SIMMS, OneSteel, North Star and CMA.

Initial Feedback:

Some of the issues that the Australian industry faces (in its current setup) include:

- A number of unregulated enterprises that are pursuing self-interest and activities that have an unacceptable impact on community standards
- Activities that have a substantial impact on the environment
- Fosters illegal unlicensed trading in cars and rebirthing
- · Facilitates the trade in stolen cars and parts
- · Provides opportunities for tax avoidance and money laundering

SWOT Analysis – Recycling & Sustainability

Strengths

- Existing connections with OEMs from Europe for companies such as Ford, make knowledge/skills transfer possible
- Significant experience in Europe on ELV directive requirements which can be transferable to the Australian industry

Weaknesses

- Not many polymer suppliers offering resin with recycled or renewable material
- · Lack of experience with using recycled and renewable resins in Australia
- No sufficient training available in the higher education or TAFE sectors in the recycling area
- Water shortage in Australia could compromise the harvesting of renewable materials for use in automotive applications
- Some power-train technologies not currently being used in Australia
- Environmental issues regarding ELVs have not been historically of significant concern to the Australian Government

Opportunities

- There is legislation in place for ELV management in Europe that Australia can base selfregulated strategies
- Australia can begin to follow the leadership of Europe in CO₂ reduction strategies
- Extensive experience in ELV treatment & CO₂ reduction in Europe that Australia can draw upon
- Sufficient recycling infrastructure for plastic manufacturers to begin to obtain recycled waste-stream
- Competitive advantage for OEMs as being environmentally friendly
- Opportunities to potentially develop hybrid technologies in the Australian market
- Build knowledge obtained from Fellowship into existing course structures

Threats

- If legislation for ELVs in Australia is regulated, there may be an impact for OEMs due to lack of recycled and renewable resin availability in the Australian plastics industry & ELV take-back schemes
- Transportation of materials and lack of volume may make collection and recycling uneconomical or impact on Lifecycle CO₂
- If legislation for CO₂ reduction is regulated, there may be an impact for OEMs in having to develop and implement more complex power-train technologies

International Context

Vehicle Recycling and End-of-Life

The most relevant legislated directive for ELVs that pertains to the automotive industry worldwide is Directive 2000/53/EC of the European Parliament and of the Council.¹³

The legislation has been sanctioned as a framework directive addressing the 27 European member states after a consultative process to transpose it to national law. There is presently no equivalent legislation in Australia, however, the issues face the automotive industry worldwide. Other directives include the Japanese Automobile Recycling Law established in 2002¹⁴ and a regulation for South Korea that has been implemented from January 1st, 2008 for re-use, recycling and recovery rates for hazardous substances.¹⁵ Taiwan has an end-of-life vehicles voluntary agreement that came into effect 1st January, 2008 and China has announced a technical standard which is a mixture of the European and Japanese legislations and will become effective from 1st January, 2010.¹⁶

The average lifespan of a vehicle in Europe is 13 years before it enters the waste-stream.¹⁷ The average vehicle weighs approximately 964 kilograms¹⁸ and this weight is likely to increase to over 1,025 kilograms by 2015 and 1280 kilograms by 2019.¹⁹ Based on these estimates almost 14 million tonnes of this ELV waste will need to be treated in Europe by 2015.²⁰

¹³ Directive 2000/53/EC of the European Parliament and of the Council of September 18, 2000 on end-of-life vehicles as amended by the commission decision 2002/525/EC, 2005/438/EC and 2005/673/EC.

¹⁴ JAIA/JAMA, Japan Recyclability Legislation

¹⁵ Kaida, South Korea - Legislation of Recycling of End-of-Life Vehicles

¹⁶ MC VRD 06A-014 dated 9 March 2006 (Announcement No. 9 of 2006 – Technical Policy for Recovery of Automotive Products.

¹⁷ Commission of the European Communities Brussels, 16.01.2007, SEC (2007) 14, 'Report from the Commission to the Council and the European Parliament on the Targets contained in Article 7(2)(b) of Directive 2000/53/EC on Endof-life Vehicle.' Pg 7.

¹⁸ GHK/Bio Intelligence Service, 'A Study to examine the benefits of the End-of-Life Vehicles Directive and the costs and benefits of a Revision of the 2015 targets for Recycling, Re-use and Recovery under the ELV Directive,' May 2006. Pg 3.

¹⁹ Commission of the European Communities Brussels, 16.01.2007, SEC (2007) 14, 'Report from the Commission to the Council and the European Parliament on the Targets contained in Article 7(2)(b) of Directive 2000/53/EC on End-of-life Vehicle.' Pg 7.

²⁰ Commission of the European Communities Brussels, 16.01.2007, SEC (2007) 14, 'Report from the Commission to the Council and the European Parliament on the Targets contained in Article 7(2)(b) of Directive 2000/53/EC on End-of-life Vehicle.' Pg 7.

ELVs are a global problem. The European Parliament identified a need for national measures to be implemented which minimise the impact of end-of-life vehicles on the environment. A need was identified in that vehicles need to be designed in such as way that assists re-use, recycling and recovery, minimises toxic waste and facilitates appropriate collection and treatment at the end of the vehicles life. Hence a framework was developed which covered these areas and set legislative targets for automotive manufacturers. The next figure displays the ELV treatment process.



ELV Treatment Process 21

In Europe, there is a demand for recycled polymer that can be a substitute for virgin plastic. The use of recyclates are typically cheaper than virgin material. This provides an incentive for manufacturers to purchase recycled material as opposed to virgin material. The materials are treated in such a way that allows the resulting plastic to meet the material property requirements.²²

Vehicle CO₂ Legislation

The other aspect to ensuring that vehicles are sustainable is not only for vehicles to be designed with sustainable materials, but also to be designed in such a way the vehicle is posing minimal environmental impact while the vehicle is on the road.

At present, the European Union has implemented a new legislation to reduce CO₂ emissions from cars. The new guidelines are proposing that new vehicles must limit CO₂ emissions to an average of 130 grams/kilometre for passenger cars by 2012, whereby 120 grams/ kilometre is reached by vehicle motor technology and an additional 10 grams/kilometre is reached through complementary measures.

There would be penalties applied to OEMs for not meeting the targets, ie 20 EUR/gram/ vehicle sold in 2012, 35 EUR in 2013, 60 EUR in 2014 and 95 EUR from 2015.²³

²¹ GHK/Bio Intelligence Service, 'A Study to examine the benefits of the End-of-Life Vehicles Directive and the costs and benefits of a Revision of the 2015 targets for Recycling, Re-use and Recovery under the ELV Directive,' May 2006. Pg 2.

²² Commission of the European Communities, Commission Staff Working Document, Document Accompanying the 'Report from the Commission to the Council and European Parliament on the Targets Contained in Article 7(2)(b) of the Directive 2000/53/EC on End-of-Life Vehicle Impact Assessment', January 2007, Pg 23.

²³ ACEA website: Questions & Answers, http://www.acea.be/images/uploads/files/20071218_qa.pdf

Identifying the Skills Deficiencies

Definitions

Skills Deficiencies

The ISS Institute embarked on its initial market research in 1990. A result of this research was the identification of an important category, that of skill deficiency. This is the key emphasis of the ISS Institute.

As already established, the definition of a 'skill deficiency' is "where a demand for labour has not been recognised and where accredited courses are not available through Australian higher education institutions. This demand is met where skills and knowledge are acquired on-the-job, gleaned from published material, or from working and/or study overseas."²⁴

The Australian Government has identified a skills shortage in the 'Review of Australia's Automotive Industry Final Report', 22nd July 2008, in the environmental area, with the introduction of new technologies.²⁵ A skills shortage is defined as *"where there is a recognised and unmet demand for labour."* ²⁶

They also identified that the education and training for the automotive industry are provided through a combination of institutions which includes schools, universities and TAFEs. Other training is facilitated by employer on-the-job training and industry specific relationships with training providers.²⁷

Sustainability

ISS Institute follows the United Nations NGO definition of Sustainability: "Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (http://www.unngosustainability. org/CSD_Definitions%20SD.htm).

Identifying and Defining the Deficiencies

1. End-of-life 'type' approval preparation in line with the European Directive 2000/ 53/EC on ELVs.

It is imperative for the Australian industry to consider the global economy when designing vehicles; hence we need to comply with regulations applicable to certain regions. Up until recently, there has not been a need in Australia to comply with ELV legislation and policies. However, if OEMs wish to supply to regions that have end-of-life legislation, then they will be required to meet those requirements. As a consequence, there is a skills deficiency and there is no previous experience within Australia at dealing with meeting this legislation.

Aim: To become skilled in understanding the European Directive on end-of-life and the method in which to gain 'type' approval.

²⁴ http://www.issinstitute.org.au/about/about.html

²⁵ Commonwealth of Australia, 'Review of Australia's Automotive Industry Final Report', 22 July 2008. Pg 80.

²⁶ http://www.issinstitute.org.au/about/about.html

²⁷ Commonwealth of Australia, 'Review of Australia's Automotive Industry Final Report', 22 July 2008. Pg 80.

2. International Material Database System (IMDS) used by suppliers worldwide to conform with recyclability requirements, substance use restrictions and parts marking conformance for end-of-life recycling and environmental measures.

IMDS is a system used by suppliers worldwide. Car companies (OEMs) extract the data from this system in order to calculate recyclability, measure substance use restrictions and parts marking conformance for end-of-life purposes. There is a deficiency in knowledge within Australia in this area.

Aim: To become skilled in understanding the IMDS database and how suppliers report on their components to meet end-of-life requirements.

3. Experience with introducing recycled and renewable materials content into motor vehicles.

The Europeans are at the forefront of using recycled and renewable content in vehicle components. Consequently, there is a lot that can be learnt from the Europeans on how they have been successful at implementing the use of recycled and renewable content. This is an area that we do not really have experience with in Australia, but it presents a tremendous opportunity to address the increasing environmental concerns of landfill.

Aim: To become skilled at identifying components which have the potential to be manufactured from recycled and renewable materials

4. View of vehicle teardown facilities to support recycling activities.

Teardowns of vehicles to conform with recycling activities are not presently conducted in Australia. It is necessary to have some exposure in this area to understand the process. The Europeans are quite mature at conducting teardowns and reporting appropriately in support of the legislation.

Aim: To become skilled at understanding the process of teardown and reporting mechanisms to support recycling activities

5. Design for environment/sustainability methodology.

The methodology of suitable material selection is a concept in which engineers have not received a lot of training, including avoiding material mix in the one component, designing for disassembly and life cycle analysis. This is an area that the Europeans have spent a lot of time considering and developing.

Aim: To become skilled at understanding design for environment/sustainability methodologies

6. Understanding of the CO₂ impending legislation affecting European vehicles and understanding CO₂ reduction strategies.

The European Council is about to implement legislation to measure and reduce CO₂ emissions from European vehicles and the learnings from Europe can be translated into the design of future Australian vehicles. Opportunities to address climate change in this area, by closing this gap, will provide a more sustainable future.

Aim: To become skilled at understanding the impending legislation and future European power-train strategies for sustainability

Why the Deficiencies Need to be Addressed

A specific benefit to having access to this knowledge in Australia is that Australian automotive companies are designing vehicles that are sold in regions affected by the European legislation or similar. Therefore, it is imperative that the Australian companies are aware of the impacts in these regions and be applying the appropriate standards in a self-regulated manner.

It is also beneficial to the Australian Automotive Industry to be aware of the legislative requirements and trends that are emerging worldwide, so that care can be taken in the vehicle design process which facilitates 'design for environment' strategies for all vehicle lines. Although there is no ELV legislation in Australia at present, it is likely that it may emerge in the future. This Fellowship opportunity allowed the opportunity to bring back the intelligence to Australia to enable the Australian automotive industry the opportunity to better prepare for the future.

The number of ELVs is increasing and is a global problem. By re-skilling our workforce and creating awareness to be conscious of the environment through each phase of the design process will minimise the environmental impact at the end of the vehicles' lives and provide a more sustainable future.

With the impending legislation being generated in Europe regarding CO_2 limits, the Australian motor vehicle industry and its workforce need to be up to date with these legislative changes and put in place actions that move toward improving fuel economy and CO_2 emissions in an effort to make an impact on the global climate change issue.

With the recent review of the Automotive Industry, one of the key recommendations was by Hon Steve Bracks, to "bring forward and double the Green Car Innovation Fund combined with the inclusion of transportation in a new emissions trading scheme".²⁸ This Fellowship opportunity potentially allows the automotive industry to have access to the intelligence of the Europeans who are the leaders in CO₂ power-train strategies. The result will be that the Australian automotive industry can become internationally aware in order to move toward more fuel efficient and reduced CO₂ power-train technologies.

²⁸ Commonwealth of Australia, 'Review of Australia's Automotive Industry Final Report', 22 July 2008. Pre-letter to Senator the Hon Kim Carr from the Hon Steve Bracks.

The International Experience

Destinations and Objectives

Ford of Germany – Cologne and Merkenich

Tour of Recycling Plant

- Dr Wulf-Peter Schmidt, Manager Sustainability, Vehicle Environmental Engineering
- Kai Neborg, Supervisor Vehicle Recycling

IMDS Training

- Dr Carl-Ludwig Voss, Materials Engineer
- Petra M Noeth-Maikath, IMDS Trainer

Type Approval Legislation Training

Kai Neborg, Supervisor Vehicle Recycling

IMDS/GMIR Recyclability

• Kai Neborg, Supervisor Vehicle Recycling

Design for Environment/Sustainability

Dr Wulf-Peter Schmidt, Manager Sustainability, Vehicle Environmental Engineering

Product Sustainability Index

• Dr Wulf-Peter Schmidt, Manager Sustainability, Vehicle Environmental Engineering

Teardown Report Generation

Yvonne Stephan, Analyst, Vehicle Recycling

RSMS (Restricted Substance Management Standard)

Monika Sauerbier, Supervisor – Fluids and Analyst Support

ELV 2000/53 EC Legislation and Training

Dr Wulf-Peter Schmidt, Manager Sustainability, Vehicle Environmental Engineering

Recycled Material Target Setting

Antje Wingefeld, Administration, Vehicle Integration

Operational Aspects for ELVs

Juergen Rest, Co-ordinator ELV network

Recycled Materials Usage Component Experience

Andreas Hagedorn

European CO₂ Legislation

Dr Wulf-Peter Schmidt, Manager Sustainability, Vehicle Environmental Engineering

CO₂ Reduction Strategies

- Dr Wolfgang Hennig, Strategy/Communications, Vehicle Environmental Engineering
- Henning Honrath, Sustainability Planning
- Manfred Schlummer, Supervisor Weight

Ford Research & Design Facility – Aachen

Sustainable Materials Usage

- Maira Magnani, Research Engineer (Sustainability Studies)
- Nicole Eiklelenberg, Research Engineer (Sustainability Studies)

Powertrain Strategies – Hybrids

• Peter Schmitz, Technical Expert - Hybrid Vehicle Technologies

Alternative Fuel Technology – Biofuels and Hydrogen Vehicles

• Heiko Maas, Research Engineer (Environmental Science)

Site Visits – Germany

Environ GmbH

• Juergen Borgener, Plant Manager, Environ GmbH

Theo Stihl

• Dr Ing Christian Satlow, Director

Zimmer GmbH

• Frank Fassbender, Managing Director

Site Visits – Brussels

ACEA European Automobile Manufacturers Organisation

Rolf Stomberger, Director Environment and Economics

European Commission – Environment Directorate – General

• Artemis Hatzi-Hull, Senior Administrator

Ford of Europe – Dunton (UK)

Recycled Materials Usage and Target Setting

• Dr Valentina Cerato, Materials Engineer

CO₂ and Powertrain Strategies

 Ian Porter, Manager, Powertrain Strategy & Sustainability, Ford of Europe Product Planning

Meetings with External Companies – UK

Recycled Resin

• James Ballantyne, Sales Manager, Luxus Limited

Recycling Infrastructure Development and Closed Loop Recycling

• Edward Kosior, Managing Director, Nextek Limited

Outcomes: European End-of-Life Legislation

The most relevant legislated directive pertaining to the automotive industry worldwide is the Directive 2000/53/EC of the European Parliament and of the Council. It stipulates targets for:

- Heavy metal restrictions
- Recycling
- Recovery
- Recycled content usage
- Vehicle end-of-life take-back schemes

The opportunity presented itself to visit the desk officer who is responsible for the End-oflife Directive from the European Council, DG Environment.

Recycling and Recovery

The recycling aspect monitors the material flow and reuse, and looks at real world recycling and what can be reused and recycled at the end of the vehicle's life.

The recovery aspect looks at incorporating 85% recycling and reuse and 10% of material that can be utilised for energy recovery.

	Recovery	Recycling
	(% Veh. Wt)	(% Veh. Wt)
2006	85	80
2015	95	85

Recycling Targets

Key Findings

- It is cheaper to put the shredder light fractions into landfill than to use them for energy recovery or to use separation techniques to sort the materials. In the interests of environmental benefit, it would be better to ban sending the light fractions to landfill in order to make an impact.
- Different member states are at different stages which has caused difficulties in implementing a standardised framework in Europe.
- Consultation with OEMs does occur when updating the addendums, however DG Environment does not take into account costing implications to OEMs.
- If a supplier comes forward to the European Commission and DG Environment with a new technology in favour of the environment, an addendum can be amended which does not take into account global supply solutions.
- When amending an addendum, the lack of infrastructure of other nations that are importing to Europe are not taken into consideration.

Outcomes: Type Approval Legislation

In addition to the End-of-Life Directive 2000/53/EC, there is also the Directive 2005/64/ EC of the European Parliament and of the Council on the type-approval of motor vehicles with regard to their reusability, recyclability²⁹ and recoverability³⁰ and amending Council Directive 70/156/EEC.

This instruction in accordance with Directive 2000/53/EC is that vehicles may only be put on the market if they are reusable and/or recyclable to a minimum of 85% by mass and reusable and/or recoverable to a minimum of 95% by mass.³¹

The Directive outlines requirements for OEMs to demonstrate calculations of recyclability and recoverability rates and the process for the treatment of ELVs in compliance with ISO (International Organisation for Standardisation) 22628:2002. A materials breakdown must be provided.

The OEMs must make available to the authorities detailed calculations and information regarding the materials used in the construction of the vehicle and the components.

The marking of polymeric and elastomeric components is also a requirement of 'type' approval. This ensures that the materials used on polymeric and elastomeric parts are labelled through the use of material coding standards.³²

In order to gain 'type' approval, the manufacturer is also responsible for putting in place procedures to manage appropriately the reusability, recyclability and recoverability aspects.

Outcomes: International Material Database System (IMDS)

This system is used by suppliers worldwide to conform with recyclability requirements, substance use restrictions and parts marking conformance for end-of-life recycling measures and environmental measures

Suppliers are being affected by regulations in the automotive industry, particularly the ELV Directive, and OEMs are required to prepare dismantling information for recovery of materials.

The IMDS system is the automotive industry International Material Database System and was developed and funded by a consortium business model consisting of Electronic Data Systems (EDS), the company which developed the system with the following seven OEMs:

- BMW Daimler
- Ford Motor Company
 Opel
 - Porsche VW
- Volvo

²⁹ Recyclability is defined as the potential for recycling of component parts or materials diverted from a an end-of-life vehicle.

³⁰ Recoverability is defined as the potential for recovery of component parts or materials derived from end-of life vehicles.

³¹ Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005 on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability and amending Council Directive 70/156/ EEC. Item 1, Pg 1.

³² Directive 2005/64/EC of the European Parliament and of the Council of 26 October 2005 on the type-approval of motor vehicles with regard to their reusability, recyclability and recoverability and amending Council Directive 70/156/ EEC. Item 3.1 f, Pg 14.



Co-operative Business Model for IMDS

It was developed to create an electronic tool to replace the Vehicle Deutsch Automobile Industry (VDA). The VDA data sheet was an element of the German Quality Assurance System. It was originally called the Electronic Material Data System. The purpose of the system is to help facilitate recycling of vehicles in the future.

There are now 23 OEMs in the consortium. Peugeot and Citroen are not using IMDS in Europe, however Renault is now subscribing.

It is fair to say that the system is used globally. There are approximately 3,000 Chinese suppliers entering data.

The system allows for all material data to be archived and maintained in order to meet the obligations that are being placed on car manufacturers and suppliers to meet the national and international standards, laws and regulations.

The use of the IMDS system governs a process to identify the materials used and which ingredients are needed. There are two options for suppliers in how they enter their data. They can choose to make their entry publicly available or alternatively they can send it directly to the customer to support confidentiality of design.

The IMDS system also has a Recyclate declaration tab where suppliers can declare whether their component contains Post Consumer Recyclate (PCR) or Post Industrial Recyclate (PIR).

Restricted Substances

This leads into the Restricted Substance Management System (RSMS). This is a key document for Ford and the supply base. Historically, many suppliers assumed that they only had to abolish lead, mercury, hexavalent chromium and cadmium.



IMDS Snapshot

There is also the Global Automotive Declarable Substance List (GADSL). This was developed as a result of suppliers having to make their declarations in different ways to different OEMs. The development of GADSL commenced approximately five years ago and the first table was released two to three years ago.

Restricted Substance Management System (RSMS) compliance is a prerequisite to Ford's overall quality strategy. When a supplier makes a submission they need to declare whether they have provided IMDS input.

The IMDS system allows the suppliers to declare the materials and ingredients contained within the materials for either a material, semi-finished component or component.

The IMDS system will highlight to the user if the substance is under surveillance. All suppliers have a duty to declare restricted substances and the IMDS system maps directly to GADSL.

The system can help search in the nodes of the component Bill of Material (BOM) that has been created to identify the offending substances and spots of concern.

Ford is able to draw out information from the IMDS system and their BOM that interfaces to a system called Global Management Integration Reporting (GMIR). Recyclability calculations, substance use and parts marking conformance can be monitored for end-of-life purposes.



IMDS-GMIR map

Outcomes: Recycled and Renewable Materials Content

Experience With Introducing Recycled and Renewable Materials Content into Motor Vehicles

Recycled Materials

Since the legislation states that there must be an improvement in recycled content over the previous model, recycled material infrastructure is in place and there are a number of recycled resin suppliers servicing the automotive industry.

Key Findings

- In Europe there is adequate infrastructure in place to support the use of recycled content in motor vehicles.
- Recycled content is predominantly used in B-surface³³ components.
- Recycled content can be Post Consumer Recyclate (PCR) or Post Industrial Recyclate (PIR).
- Polypropylene and nylon are the most common materials using recycled content. Typical examples include wheel arch liners, fan shrouds and insulators.

Renewable Materials

Renewable materials covers an area that is slowly emerging in Europe and is likely to become more prominent worldwide as an opportunity for replacing glass in polymers with renewable fibre materials such as sisal, hemp or cotton. As the industry moves towards control of weight in vehicles the use of renewable materials is proving to be a viable option.

³³ B-surface definition: A component surface that is not visible to the consumer

Key Findings

- There is a growing trend to utilise renewable materials in Europe in an effort to improve sustainability.
- Renewable materials are materials that can be naturally regenerated such as paper, hemp, sisal, cotton, soy, etc.
- Renewable fibres can be used in polymer materials to reduce weight, ie replacing glass fibres.
- Studies have indicated that renewable fibre polymer composites have equivalent strength characteristics.
- Polypropylene and nylon are the most common polymer materials that can utilise Renewable content.

Outcomes: View of 'Vehicle Teardown' Facilities to Support Recycling

OEMs use computer programs to support their recycling activities. The program used to log all the teardown data at Ford of Germany is DeMap. The software provider also wrote the International Material Database System (IMDS) and International Dismantling Information System (IDIS). This system is also used by BMW and GM in Europe. OEMs are required to prepare dismantling documentation within six months of a vehicle's launch.

The vehicles are dismantled according to strict safety standards and all airbags are neutralised. At present Ford has a centrally deployed airbag solution. There has been an introduction of an ISO standard to make dismantling easier using a standard On Board Diagnostics (OBD) connector. This is an electrical connector that reads all the fault codes from the various systems.

IDIS was a system created for European and Korean members. It has 25 different languages. There are 23 members subscribed to IDIS.

The tool for airbag deployment is displayed in the IDIS system to support dismantlers.

Most European companies have teardown facilities to support them during the recycling process. IDIS supports them to ensure that they are meeting the legislative requirements.



Teardown facility in Europe

Teardown facility in Europe

Key Finding: An interesting insight was that the use of the IDIS system and recycling strategies are non-competitive issues in Europe.

Outcomes: Facilities Visited that Handle ELVs

Environ GmbH

In February 1999, Ford purchased Environ GmbH. It is a facility that dismantles the end-oflife prototype test vehicles and other ELVs. It dismantles ELVs to sell used parts to second hand dealers, scrap parts that cannot be resold and prepares vehicles for shredding. They also offer end-of-life treatment to the outside market.

Theo Stihl



Theo Stihl recycling plant

Theo Stihl is a metal shredding company based in a place called Trier in Germany. Theo Stihl receives scrap steel from household and industrial sources. Less than 10% of the metal received comes from ELVs.

The first part of the process involves transferring the scrap metal to a conveyor by tractors with claw like attachments.



Scrap metal at Theo Stihl

The metal is transferred to an enclosed area where hardened steel hammers break the steel into pieces of 180mm. If the pieces do not break down to small enough pieces, there is a process whereby the metal pieces are rejected and processed again. The hammers have to be replaced every two weeks and they cannot be put back into the steel recycling process.



Cranes removing metal

The next step is to sort ferrous and non-ferrous metals. This is done through use of magnets. This process is conducted in an enclosed area and was not visible to the Fellow.



Metal refinement area

The metals go through another process that cuts the pieces into finer pieces and flotation methods are used to separate the heavy and light fractions.

There are a lot of food remnants that come from household waste. The foodstuff is separated out and this material is so high in calorific value that steam comes off the dirt pile as the tractor operator is transporting the waste. This material is used for energy by way of combustion for power generation.

Zimmer GmBH

Zimmer GmBH is a recycling company that processes scrap metal, catalytic converters and cable recycling. The company was founded in 1949 and they are based in Huerth, Germany. Only 15 companies have the capacity to recycle cables in Germany.



Operator removing precious metals from an end-of-life catalytic converter

They intend to build a railway in the near future that will transport metal straight to the smelters.

A ball mill is used to grind the material from the catalytic converter and a lab sample will be retrieved. This is then sent for independent analysis and calculation of the amount of precious metals contained in the sample. Then the material can be directly sent to the smelter.

A company called Unicore smelt the ceramics and conduct a wet chemical process whereby the ceramics go into the slag and the plantinum, palladium and rodium are recovered.

Zimmer GmBH also granulate the wiring looms and the plastic is recycled for roadwork equipment. In the future it will be used for diesel fuel production. The copper is separated out via magnetic separation of the ferrous material.



Pile of granulated cables

Key Findings

- The economic crisis is definitely affecting the recycling industry.
- China have declined all of their contracts to another recycling company known as TSR GmBH and sent 50,000 tonnes of steel and 70,000 cables back to Germany.
- Steel works in Belgium closed down for two months due to the economic crisis. It is anticipated that things will be back on track in 2009.
- There is a catalytic converter black market which has created challenges for the industry. In some instances, fake catalytic converters are sold as end-of-life goods to genuine recycling facilities. The core of the shell has had all precious metals already removed and replaced with fake weights.

Outcomes: Design for Disassembly, Recycling, Environment and Sustainability Evolution

Systemic approaches have evolved in Europe which range from improving the environmental performance of a product/component over the lifecycle to ensuring good balance between environmental, social and economical aspects in the product development process.

The evolution of the recycling methodologies in Europe are outlined as follows:

Design for Disassembly (DfD): Early 90s

- Vehicles designed so that components could be removed and recycled at the end of the vehicle's life.
- Accessibility, type and number of fasteners, parts marking, consolidation of materials, ease of dismantling.
- Ease of dismantling strategies and reduction of material mix in one component.



Example of material mix in headrest
Design for Recycling (DfR): Mid 90s

- Combination of design for disassembly and material complexity/compatibility, recycled content
- Optimisation of end-of-life strategy



Above left: Door trims manufactured in one material for ease of recycling. Above right: The rear lamps are made from a combination of Acrylonitrile-Butadiene-Styrene (ABS), Polymethylmethacrylate (PMMA) and metal. The ABS and PMMA are compatible and can be mixed. The metal can be removed in the recycling process.

Design for Envrionment (DfE): Late 90s

- Shift of focus to a total life cycle based focus which includes use phase and material and part production phase
- Studies into 'post-shredder' treatment indicated that it was the most eco-efficient option for non-metals
- Real world time measurement indicated that dismantling times are largely influenced by non design aspects

Design for Sustainability: 2002-present

- Focus on weight rather than material selection
- Post shredder treatment, rather than dismantling approach
- Social and economical aspects are also included in design optimisation

Outcomes: The CO₂ Impending Legislation

Understanding of the CO₂ Impending Legislation Affecting European Vehicles and Understanding CO₂ Reduction Strategies

It was announced in 2006 that CO_2 emissions from motor vehicles were going to be regulated. The Fellow was offered the opportunity to visit ACEA, which is responsible for representing the automotive industry in Europe, to understand the aspects to this legislation.

Key Findings

- Passenger vehicles target: 130 grams/kilometre CO₂ homologated
- Commercial vehicles target: 175 grams/kilometre initially and 160 grams/kilometre at some stage later

In addition, complementary measures may deliver 10 grams/kilometre of the 130 grams/ kilometre homologated target:

- Mandatory Tyre Pressure Monitoring System (TPMS)
- Mandatory Shift Indicator Light (SIL)
- Efficient mobile air conditioning system no details available
- Low rolling resistance tyres
- Biofuels low blend

Mandatory Tyre Pressure Monitoring System (TPMS)

This strategy involves an indicator that is positioned in the driver instrumentation. It operates through a sensor that is placed in the tyre near the valve. A signal is transferred to the instrumentation so that when air is required in the tyres the driver is alerted. If a vehicle is driven with insufficient tyre pressure, the rolling resistance friction is increased which has a direct impact on fuel economy and CO₂.

Mandatory Shift Indicator Light (SIL)

This strategy involves an indicator that is positioned in the driver instrumentation which directs the driver to shift to a higher gear. This has an impact on fuel economy and CO_2 by lowering the engine speed.

Efficient Mobile Air Conditioning

Strategies with air conditioning are being discussed which looks at optimisation of the system by making it active only when required.

Low Rolling Resistance Tyres

The lower the rolling resistance of the tyres, the lower the drag and tyre friction, translating directly to fuel economy and CO_2 benefit.

Biofuels

These are fuels that are manufactured with a percentage of fuel generated from renewable sources. The concept is for the fuel to become carbon neutral and to reduce CO₂ emissions.

Rapeseed and soybean oil are most commonly used as biodiesel feedstock.³⁴

The finer details of the proposed legislation will be published by the European Commission later in 2009.

³⁴ http://en.wikipedia.org/wiki/Biodiesel

Knowledge Transfer: Applying the Outcomes

The following activities are recommended in order to transfer the knowledge gained during the Overseas Fellowship journey:

Industry Seminar

Type of Activity: Public seminar

Aim of Activity: Knowledge transfer of Fellowship learnings with recommendations of strategic directions that industry should follow

Target Audience: Targeted to polymer materials suppliers and automotive industries

Timeframe of Activity: February-March 2009 (completed)

Location: SPE Adelaide Seminar – Morphettville Racecourse, Adelaide; SPE Melbourne Seminar – Melbourne Motor Show, Melbourne

Think Tank

Type of Activity: Group brainstorming session

Aim of Activity: Create awareness and brainstorm concepts for progressing recycling in the Australian industry

Target Audience: Targeted to polymer material suppliers, automotive, end-of-life recyclers and Government

Timeframe of Activity: TBC

Location: Ford Australia Training Centre (TBC)

Formation of Working Group

Type of Activity: Working Group

Aim of Activity: Form an industry based team that can work on self-regulated strategies that promote the Automotive Recycling Industry in Australia

Target Audience: Targeted to polymer, automotive, end-of-life recyclers and Government

Timeframe of Activity: TBC

Location: Ford Australia Training Centre (TBC)

Government Seminar

Type of Activity: Presentation

Aim of Activity: To provide an insight into the learnings obtained from Europe and how the learnings may be adapted to the Australian industy

Target Audience: Targeted to DIIRD

Timeframe of Activity: TBC

Location: DIIRD

Knowledge Transfer: Applying the Outcomes

Post-Graduate Research Seminar

Type of Activity: Presentation

Aim of Activity: To provide an insight into the learnings obtained from Europe and how the learnings may be adapted to the Australian research and education sector

Target Audience: Targeted to research scientists at Auto CRC and RMIT who are currently participating in research into end-of-life activities and RMIT and Chifley Business School who have current course structures in Sustainability and Environmental Management

Timeframe of Activity: TBC

Location: Auto CRC, CSIRO and RMIT Bundoora

Recommendations

Australia does not currently possess legislation in the ELV or CO₂ areas, however a series of recommendations have been identified as a result of the Fellowship trip for the following reasons:

- Some Australian OEMs and suppliers are supplying to regions which have legislation, or pending legislation in the ELV and CO₂ area
- Landfill is a global issue and alternatives to reduce it such as the use of recycled material should be investigated
- Climate change is having significant effects on the earth and reduction in this area is likely to have more focus moving forwards
- The demand for the use of renewable resources is likely to increase, providing manufacturers with alternatives
- In the absence of any legislation in Australia there is an opportunity to develop selfregulated strategies within the Australian industry and a model that is appropriate to the Australian region
- There are opportunities to develop systems within the end-of-life dismantling industry with a vision to create a closed loop recycling structure in Australia

The following are specific recommendations to Government, industry, business firms, education and training, and the ISS Institute.

Government

- Financial support/incentives for OEMs to utilise upcoming technologies recycled materials, renewable materials, CO₂ reduction strategies
- · Financial support for material suppliers who wish to invest in recycling equipment
- Support to create a closed loop automotive recycling infrastructure

Industry

- Self-regulated strategies to use recycled and renewable materials to be implemented by all Australian OEM's
- Establishment of recycling and CO2 reduction working groups along the Value Chain

Business Firms

 Materials suppliers in Australia to offer more recycled and renewable polymer material options

Education and Training

- Training units to be developed in Automotive Environmental subjects covering vehicle recycling and sustainability options
- Universities to work closely with OEMs on research projects that are developing recycling and sustainability strategies

ISS Institute

• Support the establishment of a post-graduate short course covering vehicle recycling and sustainability targeted specifically at the automotive industry for Australia

Further Skills Deficiencies

• Universities to build into engineering courses a unit that focuses on environmental issues pertaining to the automotive industry

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2000/53 End-of-Life Vehicle Directive

COUN	ITRY :E.E.C. © InterRegs Ltd 2005
ORIG	INAL : O.J. L 269 of October 21, 2000
	DIRECTIVE 2000/53/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
	of September 18, 2000
	on end-of life vehicles
	As amended by Commission Decision 2002/525/EC, 2005/438/EC and 2005/673/EC
THE E	EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,
Having thereo	g regard to the Treaty establishing the European Community, and in particular Article 175(1) f,
Having	g regard to the proposal from the Commission ⁽¹⁾ ,
Having	g regard to the opinion of the Economic and Social Committee ⁽²⁾ ,
Having	g consulted the Committee of the Regions,
Acting approv	i in accordance with the procedure referred to in Article 251 of the Treaty in the light of the joint text ved by the Conciliation Committee on May 23, 2000 ⁽³⁾ ,
Where	eas
(1)	The different national measures concerning end-of life vehicles should be harmonised in order, first, to minimise the impact of end-of life vehicles on the environment, thus contributing to the protection, preservation and improvement of the quality of the environment and energy conservation, and, second, to ensure the smooth operation of the internal market and avoid distortions of competition in the Community.
(2)	A Community-wide framework is necessary in order to ensure coherence between national approaches in attaining the objectives stated above, particularly with a view to the design of vehicles for recycling and recovery, to the requirements for collection and treatment facilities, and to the attainment of the targets for re-use, recycling and recovery, taking into account the principle of subsidiary and the polluter-pays principle.
(3)	Every year end-of life vehicles in the Community generate between 8 and 9 million tonnes of waste, which must be managed correctly.
(4)	In order to implement the precautionary and preventive principles and in line with the Community strategy for waste management, the generation of waste must be avoided as much as possible.
(5)	It is a further fundamental principle that waste should be re-used and recovered, and that preference be given to re-use and recycling.
(6)	Member States should take measures to ensure that economic operators set up systems for the collection, treatment and recovery of end-of life vehicles.
(1) O (2) O (3) O Ju in	J C 337, 7.11.1997, p. 3 and OJ C 156, 3.6.1999, p. 5. J C 129, 27.4.1998, p. 44. pinion of the European Parliament of February 11, 1999 (OJ C 150, 28.5.1999, p. 420), Council Common Position of Jly 29, 1999 (OJ C 317, 4.11.1999, p. 19) and Decision of the European Parliament of February 3, 2000 (not yet published the Official Journal). Council Decision of July 20, 2000 and Decision of the European Parliament of September 7, 2000.

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- (7) Member States should ensure that the last holder and/or owner can deliver the end-of life vehicle to an authorised treatment facility without any cost as a result of the vehicle having no or a negative, market value. Member States should ensure that procedures meet all, or a significant part of, the costs of the implementation of these measures; the normal functioning of market forces should not be hindered.
- (8) This Directive should cover vehicles and end-of life vehicles, including their components and materials, as well as spare and replacement parts, without prejudice to safety standards, air emissions and noise control.
- (9) This Directive should be understood as having borrowed, where appropriate, the terminology used by several existing directives, namely Council Directive 67/548/EEC of June 27, 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances ⁽¹⁾, Council Directive 70/156/EEC of February 6, 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers ⁽²⁾, and Council Directive 75/442/EEC of July 15, 1975 on waste ⁽³⁾.
- (10) Vintage vehicles, meaning historic vehicles or vehicles of value to collectors or intended for museums, kept in a proper and environmentally sound manner, either ready for use or stripped into parts, are not covered by the definition of waste laid down by Directive 75/442/EEC and do not fall within the scope of this Directive.
- (11) It is important that preventive measures be applied from the conception phase of the vehicle onwards and take the form, in particular, of reduction and control of hazardous substances in vehicles, in order to prevent their release into the environment, to facilitate recycling and to avoid the disposal of hazardous waste. In particular the use of lead, mercury, cadmium and hexavalent chromium should be prohibited. These heavy metals should only be used in certain applications according to a list which will be regularly reviewed. This will help to ensure that certain materials and components do not become shredder residues, and are not incinerated or disposed of in landfills.
- (12) The recycling of all plastics from end-of life vehicles should be continuously improved. The Commission is currently examining the environmental impacts of PVC. The Commission will, on the basis of this work, make proposals as appropriate as to the use of PVC including considerations for vehicles.
- (13) The requirements for dismantling, re-use and recycling of end-of life vehicles and their components should be integrated in the design and production of new vehicles.
- (14) The development of markets for recycled materials should be encouraged.
- (15) In order to ensure that end-of life vehicles are discarded without endangering the environment, appropriate collection systems should be set up.
- (16) A certificate of destruction, to be used as a condition for the de-registration of end-of life vehicles, should be introduced. Member States without a de-registration system should set up a system according to which a certificate of destruction is notified to the relevant competent authority when the end-of life vehicle is transferred to a treatment facility.

⁽³⁾ OJ L 194, 25.7.1975, p. 39. Directive as last amended by Commission Decision 96/350/EC (OJ L 135, 6.6.1996, p. 32).

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⁽¹⁾ OJ 196, 16.8.1967, p. 1. Directive as last amended by Commission Directive 98/98/EC (OJ L 355, 30.12.1998, p. 1.)

OJ L 42, 23.2.1970, p. 1. Directive as last amended by Directive 98/91/EC of the European Parliament and of the Council (OJ L 11, 16.1.1999, p. 25).
 OJ L 42, 23.2.1970, p. 1. Directive as last amended by Directive 98/91/EC of the European Parliament and of the Council (OJ L 11, 16.1.1999, p. 25).

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- (17) This Directive does not prevent Member States from granting, where appropriate, temporary de-registrations of vehicles.
- (18) Collection and treatment operators should be allowed to operate only when they have received a permit or, in case a registration is used instead of a permit, specific conditions have been complied with.
- (19) The recyclability and recoverability of vehicles should be promoted.
- (20) It is important to lay down requirements for storage and treatment operations in order to prevent negative impacts on the environment and to avoid the emergence of distortions in trade and competition.
- (21) In order to achieve results in the short term and to give operators, consumers and public authorities the necessary perspective for the longer term, quantified targets for re-use, recycling and recovery to be achieved by economic operators should be set.
- (22) Producers should ensure that vehicles are designed and manufactured in such a way as to allow the quantified targets for re-use, recycling, recovery to be achieved. To this end the Commission will promote the preparation of European standards and will take the other necessary measures in order to amend the pertinent European vehicle type-approval legislation.
- (23) Member States should ensure that in implementing the provisions of this Directive competition is preserved, in particular as regards the access of small and medium-sized enterprises to the collection, dismantling, treatment and recycling market.
- (24) In order to facilitate the dismantling and recovery, in particular recycling of end-of life vehicle manufacturers should provide authorised treatment facilities with all requisite dismantling information, in particular for hazardous materials.
- (25) The preparation of European standards, where appropriate, should be promoted. Vehicle manufacturers and material producers should use component and material coding standards, to be established by the Commission assisted by the relevant committee. In the preparation of these standards the Commission will take account, as appropriate, of the work going on in this area in the relevant international forums.
- (26) Community-wide data on end-of life vehicles are needed in order to monitor the implementation of the objectives of this Directive.
- (27) Consumers have to be adequately informed in order to adjust their behaviour and attitudes; to this end information should be made available by the relevant economic operators.
- (28) Member States may choose to implement certain provisions by means of agreements with the economic sector concerned, provided that certain conditions are met.
- (29) The adaptation to scientific and technical progress of the requirements for treatment facilities and for the use of hazardous substances and, as well as the adoption of minimum standards for the certificate of destruction, the formats for the database and the implementation measures necessary to control compliance with the quantified targets should be effected by the Commission under a Committee procedure.

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- (30) The measures to be taken for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of June 28, 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission ⁽¹⁾.
- (31) Member States may apply the provisions of this Directive in advance of the date set out therein, provided such measures are compatible with the Treaty.

ARTICLE 1

OBJECTIVES

This Directive lays down measures which aim, as a first priority, at the prevention of waste from vehicles and, in addition, at the re-use, recycling and other forms of recovery of end-of life vehicles and their components so as to reduce the disposal of waste, as well as at the improvement in the environmental performance of all of the economic operators involved in the life cycle of vehicles and especially the operators directly involved in the treatment of end-of life vehicles.

ARTICLE 2

DEFINITIONS

For the purposes of this Directive:

- 1. **'vehicle'** means any vehicle designated as Category M₁, or N₁ defined in Annex IIA to Directive 70/156/EEC, and three wheel motor vehicles as defined in Directive 92/61/EEC, but excluding motor tricycles;
- 2. **'end-of life vehicle'** means a vehicle which is waste within the meaning of Article 1(a) of Directive 75/442/EEC;
- 3. **'producer'** means the vehicle manufacturer or the professional importer of a vehicle into a Member State;
- 4. **'prevention'** means measures aiming at the reduction of the quantity and the harmfulness for the environment of end-of life vehicles, their materials and substances;
- 5. 'treatment' means any activity after the end-of life vehicle has been handed over to a facility for de-pollution, dismantling, shearing, shredding, recovery or preparation for disposal of the shredder wastes, and any other operation carried out for the recovery and/or disposal of the end-of life vehicle and its components;
- 6. **'re-use'** means any operation by which components of end-of life vehicles are used for the same purpose for which they were conceived;
- 7. **'recycling'** means the reprocessing in a production process of the waste materials for the original purpose or for other purposes but excluding energy recovery. Energy recovery means the use of combustible waste as a means to generate energy through direct incineration with or without other waste but with recovery of the heat;

⁽¹⁾ OJ L 184, 17.7.1999, p. 23.

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- 8. **'recovery'** means any of the applicable operations provided for in Annex IIB to Directive 75/442/EEC;
- 9. **'disposal'** means any of the applicable operations provided for in Annex IIA to Directive 75/442/EEC;
- 10. **'economic operators'** means producers, distributors, collectors, motor vehicle insurance companies, dismantlers, shredders, recoverers, recyclers and other treatment operators of end-of life vehicles, including their components and materials;
- 11. **'hazardous substance'** means any substance which is considered to be dangerous under Directive 67/548/EEC;
- 12. **'shredder'** means any device used for tearing into pieces or fragmenting end-of life vehicles, including for the purpose of obtaining directly reusable metal scrap;
- 13. **'dismantling information'** means all information required for the correct and environmentally sound treatment of end-of life vehicles. It shall be made available to authorised treatment facilities by vehicle manufacturers and component producers in the form of manuals or by means of electronic media (e.g. CD-ROM, on-line services).

ARTICLE 3

SCOPE

- 1. This Directive shall cover vehicles and end-of life vehicles, including their components and materials. Without prejudice to Article 5(4), third sub-paragraph, this shall apply irrespective of how the vehicle has been serviced or repaired during use and irrespective of whether it is equipped with components supplied by the producer or with other components whose fitting as spare or replacement parts accords with the appropriate Community provisions or domestic provisions.
- 2. This Directive shall apply without prejudice to existing Community legislation and relevant national legislation, in particular as regards safety standards, air emissions and noise controls and the protection of soil and water.
- 3. Where a producer only makes or imports vehicles that are exempt from Directive 70/156/EEC by virtue of Article 8(2)(a) thereof, Member States may exempt that producer and his vehicles from Articles 7(4), 8 and 9 of this Directive.
- 4. Special-purpose vehicles as defined in the second indent of Article 4(1)(a) of Directive 70/156/EEC shall be excluded from the provisions of Article 7 of this Directive.
- 5. For three-wheel motor vehicles only Articles 5(1), 5(2) and 6 of this Directive shall apply.

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ARTICLE 4

PREVENTION

- 1. In order to promote the prevention of waste Member States shall encourage, in particular:
 - (a) vehicle manufacturers, in liaison with material and equipment manufacturers, to limit the use of hazardous substances in vehicles and to reduce them as far as possible from the conception of the vehicle onwards, so as in particular to prevent their release into the environment, make recycling easier, and avoid the need to dispose of hazardous waste;
 - (b) the design and production of new vehicles which take into full account and facilitate the dismantling, re-use and recovery, in particular the recycling, of end-of life vehicles, their components and materials;
 - (c) vehicle manufacturers, in liaison with material and equipment manufacturers, to integrate an increase quantity of recycled material in vehicles and other products, in order to develop the markets for recycled materials.
- (a) Member States shall ensure that materials and components of vehicles put on the market after July 1, 2003 do not contain lead, mercury, cadmium or hexavalent chromium other than in cases listed in Annex II under the conditions specified therein;
 - (b) in accordance with the procedure laid down in Article 11 the Commission shall on a regular basis, according to technical and scientific progress, amend Annex II, in order to:
 - (i) as necessary, establish maximum concentration values up to which the existence of the substances referred to in sub-paragraph (a) in specific materials and components of vehicles shall be tolerated;
 - (ii) exempt certain materials and components of vehicles from the provisions of sub-paragraph (a) if the use of these substances is unavoidable;
 - (iii) delete materials and components of vehicles from Annex II if the use of these substances is avoidable;
 - (iv) under Points (i) and (ii) designate those materials and components of vehicles that can be stripped before further treatment;. they shall be labelled or made identifiable by other appropriate means:
 - (c) the Commission shall amend Annex II for the first time not later than October 21, 2001. In any case none of the exemptions listed therein shall be deleted from the Annex before January 1, 2003.

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ARTICLE 5

COLLECTION

- 1. Member States shall take the necessary measures to ensure:
 - that economic operators set up systems for the collection of all end-of life vehicles and, as far as technically feasible, of waste used parts removed when passenger cars are repaired,
 - the adequate availability of collection facilities within their territory.
- 2. Member States shall also take the necessary measures to ensure that all end-of life vehicles are transferred to authorised treatment facilities.
- 3. Member States shall set up a system according to which the presentation of a certificate of destruction of the end-of life vehicle. This certificate shall be issued to the holder and/or owner when the end-of life vehicle is transferred to a treatment facility. Treatment facilities, which have obtained a permit in accordance with Article 6, shall be permitted to issue a certificate of destruction. Member States may permit producers, dealers and collectors on behalf of an authorised treatment facility to issue certificates of destruction provided that they guarantee that the end-of life vehicle s transferred to an authorised treatment facility and provided that they are registered with public authorities.

Issuing the certificate of destruction by treatment facilities or dealers or collectors on behalf of an authorised treatment facility does not entitle them to claim any financial reimbursement, except in cases where this has been explicitly arranged by Member States.

Member States which do not have a de-registration system at the date of entry into force of this Directive shall set up a system according to which a certificate of destruction is notified to the relevant competent authority when the end-of life vehicle is transferred to a treatment facility and shall otherwise comply with the terms of this paragraph. Member States making use of this sub-paragraph shall inform the Commission of the reasons thereof.

4. Member States shall take the necessary measures to ensure that the delivery of the vehicle to an authorised treatment facility in accordance with Paragraph 3 occurs without any cost for the last holder and/or owner as a result of the vehicle's having no or a negative market value.

Member States shall take the necessary measures to ensure that producers meet all, or a significant part of, the costs of the implementation of this measure and/or take back end-of life vehicles under the same conditions as referred to in the first sub-paragraph.

Member States may provide that the delivery of end-of life vehicles is not fully free of charge if the end-of life vehicle does not contain the essential components of a vehicle, in particular the engine and the coachwork, or contains waste which has been added to the end-of life vehicle.

The Commission shall regularly monitor the implementation of the first sub-paragraph to ensure that is does not result in market distortions, and if necessary shall propose to the European Parliament and the Council and amendment thereto.

5. Member States shall take the necessary measures to ensure that competent authorities mutually recognise and accept the certificates of destruction issued in other Member States in accordance with Paragraph 3. To this end, the Commission shall draw up, not later than October 21, 2001 the minimum requirements for the certificate of destruction.

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ARTICLE 6

TREATMENT

- 1. Member States shall take the necessary measures to ensure that all end-of life vehicles are stored (even temporarily) and treaded in accordance with the general requirements laid down in Article 4 of Directive 75/442/EEC, and in compliance with the minimum technical requirements set out in Annex I to this Directive, without prejudice to national regulations on health and environment.
- 2. Member States shall take the necessary measures to ensure that any establishment or undertaking carrying out treatment operations obtains a permit from or be registered with the competent authorities, in compliance with Articles 9, 10 and 11 of Directive 75/442/EEC.

The derogation from the permit requirement referred to in Article 11(1)(b) of Directive 75/442/EEC may apply to recovery operations concerning waste of end-of life vehicles after they have been treated according to Annex 1(3) to this Directive if there is an inspection by the competent authorities before the registration. This inspection shall verify:

- (a) type and quantities of waste to be treated;
- (b) general technical requirements to be complied with;
- (c) safety precautions to be taken.

in order to achieve the objectives referred to in Article 4 of Directive 75/442/EEC. This inspection shall take place once a year. Member States using the derogation shall send the results to the Commission.

- 3. Member States shall take the necessary measures to ensure that any establishment or undertaking carrying out treatment operations fulfils at least the following obligations in accordance with Annex I:
 - (a) end-of life vehicles shall be stripped before further treatment or other equivalent arrangements are made in order to reduce any adverse impact on the environment. Components or materials labelled or otherwise made identifiable in accordance with Article 4(2) shall be stripped before further treatment;
 - (b) hazardous materials and components shall be removed and segregated in a selective way so as not to contaminate subsequent shredder waste from end-of life vehicles;
 - (c) stripping operations and storage shall be carried out in such a way as to ensure that suitability of vehicle components for re-use and recovery, and in particular for recycling.

Treatment operations for de-pollution of end-of life vehicles as referred to in Annex I (3) shall be carried out as soon as possible.

- 4. Member States shall take the necessary measures to ensure that the permit or registration referred to in Paragraph 2 includes all conditions necessary for compliance with the requirements of Paragraphs 1, 2 and 3.
- 5. Member States shall encourage establishments or undertakings, which carry out treatment operations to introduce certified environmental management systems.

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ARTICLE 7

RE-USE AND RECOVERY

- 1. Member States shall take the necessary measures to encourage the re-use of components which are suitable for re-use, the recovery of components which cannot be re-used and the giving of preference to recycling when environmentally viable, without prejudice to requirements regarding the safety of vehicles and environmental requirements such as air emissions and noise control.
- 2. Member States shall take the necessary measures to ensure that the following targets are attained by economic operators:
 - (a) no later than January 1, 2006, for all end-of-life vehicles, the re-use and recovery shall be increased to a minimum of 85% by an average weight per vehicle and year. Within the same time the re-use and recycling shall be increased to a minimum of 80% by an average weight per vehicle and year;

for vehicles produced before January 1, 1980, Member States may lay down lower targets, but not lower than 75% for re-use and recovery and not lower than 70% for re-use and recycling. Member States making use of this sub-paragraph shall inform the Commission and the other Member States of the reasons therefor;

(b) no later than January 1, 2015, for all end-of-life vehicles, the re-use and recovery shall be increased to a minimum of 95% by an average weight per vehicle and year. Within the same time limit, the re-use and recycling shall be increased to minimum of 85% by an average weight per vehicle and year.

By December 31, 2005 at the latest the European Parliament and the Council shall re-examine the targets referred to in Paragraph (b) on the basis of a report of the Commission, accompanied by a proposal. In its report the Commission shall take into account the development of the material composition of vehicles and any other relevant environmental aspects related to vehicles.

The Commission shall, in accordance with the procedure laid down in Article 11, establish the detailed rules necessary to control compliance of Member States with the targets set out in this paragraph. In doing so the Commission shall take into account all relevant factors, inter alia the availability of data and the issue of exports and importers of end-of-life vehicles. The Commission shall take this measure not later than October 21, 2002.

- 3. On the basis of a proposal from the Commission, the European Parliament and the Council shall establish targets for re-use and recovery and for re-use and recycling for the years beyond 2015.
- 4. In order to prepare an amendment to Directive 70/156/EEC, the Commission shall promote the preparation of European standards relating to the dismantlability, recoverability and recyclability of vehicles. Once the standards are agreed, but in any case no later than by the end of 2001, the European Parliament and the Council, on the basis of a proposal from the Commission, shall amend Directive 70/156/EEC so that vehicles type-approved in accordance with that Directive and put on the market after three years after the amendment of the Directive 70/156/EEC are re-usable and/or recyclable to a minimum of 85% by weight per vehicle and are re-usable and/or recoverable to a minimum of 95% by weight per vehicle.
- 5. In proposing the amendment to Directive 70/156/EEC relating to the ability to be dismantled, recoverability and recyclability of vehicles, the Commission shall take into account as appropriate the need to ensure that the re-use of components does not give rise to safety or environmental hazards.

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ARTICLE 8

CODING STANDARDS/DISMANTLING INFORMATION

- 1. Member States shall take the necessary measures to ensure that producers, in concert with material and equipment manufacturers, use component and material coding standards, in particular to facilitate the identification of those components and materials which are suitable for re-use and recovery.
- 2. Not later than October 21, 2001 the Commission shall, in accordance with the procedure laid down in Article 11 establish the standards referred to in Paragraph 1 of this Article. In so doing, the Commission shall take account of the work going on in this area in the relevant international forums and contribute to this work as appropriate.
- 3. Member States shall take the necessary measures to ensure that producers provide dismantling information for each type of new vehicle put on the market within six months after the vehicle is put on the market. This information shall identify, as far as it is needed by treatment facilities in order to comply with the provisions of this Directive, the different vehicle components and materials, and the location of all hazardous substances in the vehicles, in particular with a view to the achievement of the objectives laid down in Article 7.
- 4. Without prejudice to commercial and industrial confidentiality, Member States shall take the necessary measures to ensure that manufacturers of components use in vehicles make available to authorised treatment facilities, as far as it is requested by these facilities, appropriate information concerning dismantling, storage and testing of components which can be re-used.

ARTICLE 9

REPORTING AND INFORMATION

1. At three-year intervals Member States shall send a report to the Commission on the implementation of this Directive. The report shall be drawn up on the basis of a questionnaire or outline drafted by the Commission in accordance with the procedure laid down in Article 6 of Directive 91/692/EEC⁽¹⁾ with a view to establishing databases on end-of-life vehicles and their treatment. The report shall contain relevant information on possible changes in the structure of motor vehicle dealing and of the collection, dismantling, shredding, recovery and recycling industries, leading to any distortion of competition between or within Member States. The questionnaire or outline shall be sent to the Member States six months before the start of the period covered by the report. The report shall be made to the Commission within nine months of the end of the three-year period covered by it.

The first report shall cover the period of three years from April 21, 2002.

Based on the above information, the Commission shall publish a report on the implementation of this Directive within nine months of receiving the reports from the Member States.

⁽¹⁾ OJ L 377, 31.12.1991, p. 48.

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- 2. Member States shall require in each case the relevant economic operators to publish information on:
 - the design of vehicles and their components with a view to their recoverability and recyclability,
 - the environmentally sound treatment of end-of-life vehicles, in particular the removal of all fluids and dismantling,
 - the development and optimisation of ways to re-use, recycle and recover end-of-life vehicles and their components,
 - the progress achieved with regard to recovery and recycling to reduce the waste to be disposed of and to increase the recovery and recycling rates.

The producer must make this information accessible to the prospective buyers of vehicles. It shall be included in promotional literature used in the marketing of the new vehicle.

ARTICLE 10

IMPLEMENTATION

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by April 21, 2002. They shall immediately inform the Commission thereof.

When Member States adopt these measures, these shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such a reference shall be laid down by Member States.

- 2. Member States shall communicate to the Commission the text of the main provisions of domestic law, which they adopt in the field governed by this Directive.
- 3. Provided that the objectives set out in this Directive are achieved, Member States may transpose the provisions set out in Articles 4(1), 5(1), 7(1), 8(1), 8(3) and 9(2) and specify the detailed rules of implementation of Article 5(4) by means of agreements between the competent authorities and the economic sectors concerned. Such agreements shall meet the following requirements
 - (a) agreements shall be enforceable;
 - (b) agreements need to specify objectives with the corresponding deadlines;
 - (c) agreements shall be published in the national official journal or an official document equally accessible to the public and transmitted to the Commission;
 - (d) the results achieved under an agreement shall be monitored regularly, reported to the competent authorities and to the Commission and made available to the public under the conditions set out in the agreement;
 - the competent authorities shall make provisions to examine the progress reached under an agreement;
 - (f) in case of non-compliance with an agreement Member States must implement the relevant provisions of this Directive by legislative, regulatory or administrative measures.

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ARTICLE 11

COMMITTEE PROCEDURE

- 1. The Commission shall be assisted by the committee established by Article 18 of Directive 75/442/EEC, hereinafter referred to as 'the Committee'.
- 2. Where reference is made to this Article, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

- 3. The Committee shall adopt its rules of procedure.
- 4. The Commission, according to the procedure laid down in this Article, shall adopt:
 - (a) the minimum requirements, as referred to in Article 5(5), for the certificate of destruction;
 - (b) the detailed rules referred to in Article 7(2), third sub-paragraph;
 - (c) the formats relating to the database system referred to in Article 9;
 - (d) the amendments necessary for adapting the Annexes to this Directive to scientific and technical progress.

ARTICLE 12

ENTRY INTO FORCE

- 1. This Directive shall enter into force on the day of its publication in the Official Journal of the *European Communities*.
- 2. Article 5(4) shall apply:
 - as from July 1, 2002 for vehicles put on the market as from this date,
 - as from January 1, 2007 for vehicles put on the market before the date referred to in the first indent.
- 3. Member States may apply Article 5(4) in advance of the dates set out in Paragraph 2.

ARTICLE 13

ADDRESSEES

This Directive is addressed to the Member States.

Done at Brussels, September 18, 2000.

For the European Parliament The President **N. FONTAINE** For the Council The President **H. VÉDRINE**

TITLE:	End-of	Life	Vehicles
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ISSUE: 1 Oct/2005 2000/53/EC PAGE: 12

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ORIGINAL :0.J. L 269 of October 21, 2000

ANNEX I

MINIMUM TECHNICAL REQUIREMENTS FOR TREATMENT IN ACCORDANCE WITH ARTICLE 6(1) AND (3)

- 1. Sites for storage (including temporary storage) of end-of-life vehicles prior to their treatment:
 - impermeable surfaces for appropriate areas with the provision of spillage collection facilities, decanters and cleanser-degreasers,
 - equipment for the treatment of water, including rainwater, in compliance with health and environmental regulations,
- 2. Sites for treatment:
 - impermeable surfaces for appropriate areas with the provision of spillage collection facilities, decanters and cleanser-degreasers,
 - appropriate storage for dismantled spare parts, including impermeable storage for oil-contaminated spare parts,
 - appropriate containers for storage of batteries (with electrolyte neutralisation on site or elsewhere), filters and PCB/PCT-containing condensers,
 - appropriate storage tanks for the segregated storage of end-of-life vehicle fluids: fuel, motor oil, gearbox oil, transmission oil, hydraulic oil, cooling liquids, antifreeze, brake fluids, battery acids, air-conditioning system fluids and any other fluid contained in the end-of-life vehicle,
 - equipment for the treatment of water, including rainwater, in compliance with health and environmental regulations,
 - appropriate storage for used tyres, including the prevention of fire hazards and excessive stockpiling.
- 3. Treatment operations for de-pollution of end-of-life vehicles:
 - removal of batteries and liquified gas tanks,
 - removal or neutralisation of potential explosive components, (e.g. air bags),
 - removal and separate collection and storage of fuel, motor oil, transmission oil, gearbox oil, hydraulic oil, cooling liquids, antifreeze, brake fluids, air-conditioning system fluids and any other fluid contained in the end-of-life vehicle, unless they are necessary for the re-use of the parts concerned,
 - removal, as far as feasible, of all components identified as containing mercury.

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ORIGINAL :0.J. L 269 of October 21, 2000

- 4. Treatment operations in order to promote recycling:
 - removal or catalysts,
 - removal of metal components containing copper, aluminium and magnesium if these metals are not segregated in the shredding process,
 - removal of tyres and large plastic components (bumpers, dashboard, fluid containers, etc), if these materials are not segregated in the shredding process in such a way that they can be effectively recycled as materials,
 - removal of glass.
- 5. Storage operations are to be carried out avoiding damage to components containing fluids or to recoverable components and spare parts.

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ANNEX II

MATERIALS AND COMPONENTS EXEMPT FROM ARTICLE 4(2)(a)

Materials and components	Scope and expiry date of the exemption	To be labelled or made identifiable in accordance with Article 4(2)(b)(iv)
Lead as an alloying element		
 Steel for machining purposes and galvanised steel containing up to 0,35% lead by weight 		
 Aluminium for machining purposes with a lead content up to 1,5% by weight 	July 1, 2008	
 b) Aluminium for machining purposes with a lead content up to 0,4% by weight 		
 Copper alloy containing up to 4% lead by weight 		
4. Bearing shells and bushes	July 1, 2008	
Lead and lead compounds in component	ts	•
5. Batteries		х
6. Vibration dampers		х
 A) Vulcanising agents and stabilisers for elastomers in fluid handling and powertrain applications containing up to 0,5% lead by weight 	July 1, 2006	
 b) Bonding agents for elastomers in powertrain applications containing up to 0,5% lead by weight 		
 Solder in electronic circuit boards and other electric applications 		X ⁽¹⁾
 Copper in friction materials of brake linings containing more than 0,4% lead by weight 	July 1, 2007	X
10. Valve seats	Engine types developed before July 1, 2003: July 1, 2007	
 Electrical components which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs 		X ⁽²⁾ (for components other than piezo in engines)
 Dismantling if, in correlation with entry 11, an this clause, electronic devices not installed by 	average threshold of 60 grams the manufacturer on the product	per vehicle is exceeded. For the application of ion line shall not be taken into account.
(2) Dismantling if, in correlation with entry 8, an a clause, electronic devices not installed by the	verage threshold of 60 grams pe manufacturer on the production I	r vehicle is exceeded. For the application of this ine shall not be taken into account.
TITLE: End-of Life Vehicles	ISSUE: 1 Oct/2005	2000/53/EC PAGE: 15

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ORIGINAL :0.J. L 269 of October 21, 2000

		ANNEX II (Cont'd)	
	Materials and components	Scope and expiry date of the exemption	To be labelled or made identifiable in accordance with Article 4(2)(b)(iv)
12.	Pyrotechnic initiators	Vehicles type-approved before July 1, 2006 and replacement initiators for these vehicles	
Hex	avalent chromium	•	
1 <mark>3</mark> .	a) Corrosion preventive coatings	July 1, 2007	
13.	b) Corrosion preventive coatings related to bolt and nut assemblies for chassis applications	July 1, 2008	
1 4 .	Absorption refrigerators in motorcaravans		Х
Mer	rcury		
1 <mark>5</mark> .	Discharge lamps and instrument panel displays		Х
Cad	lmium		
16.	Thick film pastes	July 1, 2006	
17.	Batteries for electrical vehicles	After December 31, 2008, the placing on the market of NiCd batteries shall only be allowed as replacement parts for vehicles put on the market before this date.	X
18.	Optical components in glass matrixes used for Driver Assistance Systems	July 1, 2007	X

Notes:

- A maximum concentration value up to 0,1% by weight and per homogeneous material, for lead, hexavalent chromium and mercury and up to 0,01% by weight per homogeneous material for cadmium shall be tolerated.
- The re-use of parts of vehicles which were already on the market at the date of expiry of an exemption is allowed without limitation since it is not covered by Article 4(2)(a).

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ORIGINAL :O.J. L 269 of October 21, 2000

COMMISSION STATEMENTS

Re Article 5(1), first indent

The Commission confirms that Article 5(1), first indent, authorises Member States to use existing collection systems for the collection of waste used components and does not oblige then to set up separate collection systems (for waste used components) with specific financial requirements.

Re Article 5(3), first sub-paragraph

The Commission considers that the registration contained in Article 5(3) first sub-paragraph authorises Member States to decide whether producers, dealers and collectors should be registered pursuant to the Framework Directive on Waste, or whether they should be entered in a new register established specifically for that purpose.

Re Article 7(1)

The Commission states that Article 7(1) does not introduce any additional requirements, measures or criteria with regard to technical controls.

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ORIGINAL :0.J. L170 of June 29, 2002

COMMISSION DECISION

of June 27, 2002

amending Annex II of Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles

(notified under document number C(2002) 2238)

(Text with EEA relevance)

(2002/525/EC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Directive 2000/53/EC of the European Parliament and of the Council of September 18, 2000 on end-of-life vehicles ⁽¹⁾, and in particular Article 4(2)(b) thereof,

Whereas:

- (1) Under Directive 2000/53/EC the Commission is required to evaluate certain hazardous substances prohibited pursuant to Article 4(2)(a) of that Directive.
- (2) Having carried out the requisite technical and scientific assessments the Commission has reached a number of conclusions.
- (3) Certain materials and components containing lead, mercury, cadmium or hexavalent chromium should be exempt or continue to be exempt from the prohibition, since the use of these hazardous substances in those specific materials and components is still unavoidable.
- (4) Some exemptions from the prohibition for certain specific materials or components should be limited in their scope and temporal validity, in order to achieve a gradual phase-out of hazardous substances in vehicles, given that the use of those substances in such applications will become avoidable.
- (5) Cadmium in batteries for electrical vehicles should be exempt until December 31, 2005 since, in view of present scientific and technical evidence and the overall environmental assessment undertaken, by that date, substitutes will be available and the availability of electrical vehicles will be ensured. The progressive replacement of cadmium should, however, continue to be analysed, taking into account the availability of electrical vehicles. The Commission will publish its findings and, if proven justified by the results of the analysis, may propose an extension of the expiry date for cadmium in batteries for electrical vehicles.
- (6) The exemption from the prohibition relating to lead for coating inside petrol tanks should be deleted, since the use of lead in these specific components is already avoidable.

⁽¹⁾ OJ L 269, 21.10.2000, p. 34.

TITLE: End-of Life Vehicles

ISSUE: 1 Nov/2002

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ORIGINAL :0.J. L170 of June 29, 2002

- (7) Since it is evident that a total avoidance of heavy metals is in some instances impossible to achieve, certain concentration values of lead, mercury, cadmium or hexavalent chromium in specific materials and components should be tolerated, provided that these hazardous substances are not intentionally introduced.
- (8) Directive 2000/53/EC should therefore be amended accordingly.
- (9) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 18 of Council Directive 75/442/EEC of July 15, 1975 on waste ⁽¹⁾, as last amended by Commission Decision 96/350/EC ⁽²⁾,

HAS ADOPTED THIS DECISION:

ARTICLE 1

All relevant amendments have been incorporated into Directive 2000/53/EC.

ARTICLE 2

Member States shall ensure that cadmium in batteries for electrical vehicles is not put on the market after December 31, 2005.

In the framework of the overall environmental assessment already undertaken, the Commission shall continue to analyse the progressive substitution of cadmium, taking into account the need to maintain the availability of electrical vehicles. The Commission shall finalise and make public its findings by December 31, 2004 at the latest and may make, if proven justified by the results of the analysis, a proposal to extend the deadline in accordance with Article 4(2)(b) of Directive 2000/53/EC.

ARTICLE 3

This Decision shall apply from January 1, 2003.

ARTICLE 4

This Decision is addressed to the Member States.

Done at Brussels, June 27, 2002.

For the Commission

Margot WALLSTRÖM

Member of the Commission

⁽¹⁾ OJ L 194, 25.7.1975, p. 39.

⁽²⁾ OJ L 135, 6.6.1996, p. 32.

TITLE: End-of Life Vehicles

ISSUE: 1 Nov/2002 Decision 2002/525/EC PAGE: 2

COUNTRY :E.E.C.		© InterRegs Ltd 2004
ORIGINAL : O.J. L53 of February 28, 2	2003	
С	OMMISSION DECISION	
	of February 27, 2003	
establishing componer pursuant to Directive 20 the Co	nt and material coding sta 000/53/EC of the Europea ouncil on end-of-life vehic	ndards for vehicles n Parliament and of les
(notified und	der document number C(20	03) 620)
(T	ext with EEA relevance)	
	(2003/138/EC)	
THE COMMISSION OF THE EUROPEA	N COMMUNITIES,	
Having regard to the Treaty establishing	the European Community,	
Having regard to Directive 2000/53/ September 18, 2000 on end-of-life vehicle	EC of the European P es ⁽¹⁾ , and in particular Artic	arliament and of the Council of le 8(2) thereof,
Whereas:		
(1) Under Directive 2000/53/EC, the standards, to be used by produce facilitate the identification of those recovery.	Commission is to establi ers and material and equip e components and materia	ish component and material coding oment manufacturers, in particular to als which are suitable for reuse and
(2) It would be appropriate to estat experience gained in the recycling	blish further coding stand and recovery of end-of-life	ards on the basis of the practical vehicles.
(3) The measures provided for in this referred to in Article 11 of Directive	Decision are in accordance 2000/53/EC,	e with the opinion of the Committee
⁽¹⁾ OJ L 269, 21.10.2000, p. 34.		
TITLE: End-of Life Vehicles	ISSUE: 1	Decision 2003/138/EC

Jun/2004

PAGE: 1

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COUNTRY :E.E.C.

ORIGINAL :0.J. L53 of February 28, 2003

HAS ADOPTED THIS DECISION:

ARTICLE 1

Without prejudice to Article 3(3) of Directive 2000/53/EC, Member States shall take the necessary measures to ensure that producers, in concert with material and equipment manufacturers, use the nomenclature of ISO component and material coding standards referred to in the Annex to this Decision for the labelling and identification of components and materials of vehicles.

ARTICLE 2

Two years after the entry into force of this Decision, on the basis of the practical experience gained in the recycling and recovery of end-of-life vehicles, the present Decision shall be reviewed in order to establish, if necessary, component and material coding standards for other materials.

ARTICLE 3

This Decision shall apply from July 1, 2003.

ARTICLE 4

This Decision is addressed to the Member States.

Done at Brussels, February 27, 2003.

For the Commission

Margot WALLSTRÖM

Member of the Commission

TITLE: End-of Life Vehicles

ISSUE: 1 Jun/2004

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COUNTRY :E.E.C.

ORIGINAL :0.J. L53 of February 28, 2003

ANNEX

For the labelling and identification of vehicle plastic components and materials having a weight of more than 100 grams, the following nomenclature applies:

- ISO 1043-1 Plastics symbols and abbreviated terms. Part 1: Basic polymers and their special characteristics.
- ISO 1043-2 Plastics symbols and abbreviated terms. Part 2: Fillers and reinforcing materials.
- ISO 11469 Plastics Generic identification and marking of plastic products.

For the labelling and identification of vehicle elastomer components and materials having a weight of more than 200 grams, the following nomenclature applies:

— ISO 1629 Rubbers and latices — Nomenclature. This shall not apply to the labelling of tyres.

The symbols '<' or '>' used in the ISO standards, can be substituted by brackets.

TITLE: End-of Life Vehicles

ISSUE: 1 Jun/2004

COUNTRY :E.E.C. © InterRegs Ltd 2005 ORIGINAL :0.J. L 25 of June 15, 2005 **COMMISSION DECISION** of June 10, 2005 amending Annex II to Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles (notified under document number C(2005) 1707) (Text with EEA relevance) (2005/438/EC) THE COMMISSION OF THE EUROPEAN COMMUNITIES, Having regard to the Treaty establishing the European Community, Having regard to Directive 2000/53/EC of the European Parliament and of the Council of September 18, 2000 on end-of-life vehicles ⁽¹⁾, and in particular Article 4(2)(a) thereof, Whereas: (1) Article 4(2)(a) of Directive 2000/53/EC prohibits the use of lead, mercury, cadmium or hexavalent chromium in materials and components of vehicles put on the market after July 1, 2003, other than in cases listed in Annex II to that Directive, under the conditions specified therein. As product reuse, refurbishment and extension of life-time are beneficial, spare parts need to be (2) available for the repair of vehicles which were already put on the market on July 1, 2003. The use of lead, mercury, cadmium or hexavalent chromium in spare parts put on the market after July 1, 2003 for the repair of such vehicles should thus be tolerated. (3) Directive 2000/53/EC should therefore be amended accordingly. (4) The measures provided for in this Decision are in accordance with the opinion of the Committee established by Article 18 of Council Directive 75/442/EEC⁽²⁾, HAS ADOPTED THIS DECISION: **ARTICLE 1** All relevant amendments have been incorporated into Directive 2000/53/EC. (1) OJ L 269, 21.10.2000, p. 34. Directive as last amended by Commission Decision 2002/525/EC (OJ L 170, 29.6.2002, p. 81). (2) OJ L 194, 25.7.1975, p. 39. Directive as last amended by Regulation (EC) No. 1882/2003 of the European Parliament and of the Council (OJ L 284, 31.10.2003, p. 1). TITLE: End-of Life Vehicles ISSUE: 1 Decision 2005/438/EC

Jun/2005

PAGE: 1



COL	INTRY :E.E.C. © InterRegs Ltd 2005
ORI	GINAL : O.J. L 254 of September 30, 2005
	COUNCIL DECISION
	of September 20, 2005
	amending Annex II of Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles
	(Text with EEA relevance)
	(2005/673/EC)
THE	COUNCIL OF THE EUROPEAN UNION,
Havi	ng regard to the Treaty establishing the European Community,
Havi Sept	ng regard to Directive 2000/53/EC of the European Parliament and of the Council of ember 18, 2000 on end-of-life vehicles ⁽¹⁾ , and in particular Article 4(2)(a) thereof,
Whe	reas:
(1)	Under Directive 2000/53/EC the Commission is required to evaluate the use of lead, mercury, cadmium or hexavalent chromium which are prohibited by Article 4(2)(a) of that Directive.
(2)	Having carried out the requisite technical and scientific assessments the Commission has reached a number of conclusions.
(3)	Certain exemptions from the prohibition should not be prolonged because the use of lead, mercury, cadmium or hexavalent chromium in those applications has become avoidable.
(4)	Certain materials and components containing lead, mercury, cadmium or hexavalent chromium should be exempt or continue to be exempt from the prohibition of Article 4(2)(a), since the use of these substances in those specific materials and components is still unavoidable. In some cases it is appropriate to review the expiry date of these exemptions in order to assess whether the use of the prohibited substances is still unavoidable in the future.
(5)	In the case of aluminium for machining purposes with a lead content up to 1,5% by weight, described in Point (2)(a) of the Annex, the Commission will assess, by July 1, 2007, whether the expiry date of that exemption has to be reviewed in relation to the availability of substitutes of lead.
(6)	In the case of lead-bearing shell and bushes, described in Point (4) of the Annex, the Commission will assess, by July 1, 2007, whether the expiry date of that exemption has to be reviewed in order to ensure that lead-free technology can be applied in all engines and transmissions without harming their proper functioning.
(7)	In the case of the use of hexavalent chromium in corrosion preventive coatings related to bolt and nut assemblies for chassis applications, described in Point (13)(b) of the Annex, the Commission will assess, by July 1, 2007, whether the expiry date of that exemption has to be reviewed in order to ensure that no accidental disconnection of essential mechanical parts can occur in the lifetime of the vehicle.
(1)	OJ L 269, 21.10.2000, p. 34. Directive as last amended by Commission Decision 2005/438/EC (OJ L 152, 15.6.2005, p. 19).

COUNTRY :E.E.C.		© InterRegs Ltd 2005
ORIGINAL :O.J. L 254 of September	30, 2005	
(8) In the case of the use of cadmiu Annex, the Commission will asse has to be reviewed in order to electrical vehicles.	im in batteries for electrical vess, by the end of 2007, when ensure the availability of	vehicles, described in Point 17 of the ther the expiry date of that exemption alternative battery technologies and
(9) Directive 2000/53/EC should ther	efore be amended according	gly,
HAS ADOPTED THIS DECISION:		
	ARTICLE 1	
Without prejudice to Commission Dir incorporated into Directive 2000/53/EC.	ective 2005/438/EC ⁽¹⁾ . A	Il relevant amendments have been
	ARTICLE 2	
This Decision shall apply from July 1, 2	005.	
TI: D :	ARTICLE 3	
This Decision is addressed to the Memi	ber States.	
Done at Brussels, September 20, 2005.		
	For the Commission	
	The President	
	MBECKETT	
⁽¹⁾ OJ L 152, 15.6.2005, p. 19.		
TITLE: End-of Life Vehicles	ISSUE: 1 Oct/2005	Decision 2005/673/EC PAGE: 2

Amendment to Annex 11 – 2000/53 End-of-Life Directive

L 225/10 EN Official Journal of t	the European Union 23.8.2008
	п
(A to adopted up do the EC Tract./Euroten	1
(Acts adopted under the EC Treaty/Euratom	Treaty whose publication is not obligatory)
DECI	SIONS
COMM	ISSION
COMMISSIO	N DECISION
of 1 Aug	gust 2008
amending Annex II to Directive 2000/53/EC of th of-life	e European Parliament and of the Council on end- vehicles
(notified under document	number C(2008) 4017)
(Text with E	EA relevance)
(2008/	689/EC)
HE COMMISSION OF THE EUROPEAN COMMUNITIES,	materials and components listed in Annex II to Directive 2000/53/EC.
Having regard to the Treaty establishing the European Community,	(3) Certain exemptions from the prohibition contained in Article 4(2)(a) of Directive 2000/53/EC should not be prolonged because the use of lead, mercury, cadmium or hexavalent chromium in those applications has become avoidable by technical progress.
arliament and of the Council of 18 September 2000 on nd -of-life vehicles (¹), and in particular Article 4(2)(b) thereof,	(4) Certain materials and components containing lead
Vhereas:	mercury, cadmium or hexavalent chromium should continue to be exempt from the prohibition o Article 4(2)(a), since the use of these substances in those specific materials and components is stil
 Article 4(2)(a) of Directive 2000/53/EC prohibits the use of lead, mercury, cadmium or hexavalent chromium in materials and components of vehicles put on the market after 1 July 2003, other than in cases listed in Annex II 	unavoidable. In some cases it is appropriate to review the expiry date of these exemptions in order to provid sufficient time to eliminate the prohibited substances in the future.
to that Directive and under the conditions specified therein. According to Article 4(2)(b) of Directive 2000/53/EC, Annex II to that Directive is to be adapted to scientific and technical progress by the Commission on a regular basis.	(5) Annex II to Directive 2000/53/EC as amended by Commission Decision 2005/438/EC of 10 June 2000 amending Annex II to Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles (²) provides, in the third indent of the Notes, that spare parts put on the market after 1 July 2003 which are used for vehicles put on the market before 1 July
2) Annex II to Directive 2000/53/EC lists vehicle materials and components exempted from the heavy metal ban contained in Article 4(2)(a) thereof. Several of these exemptions expire on dates specified in that Annex. Vehicles put on the market before the expiry date of a given exemption may contain heavy metals in	2003 are exempted from the provisions of Article 4(2)(a of Directive 2000/53/EC. This exemption allows for the repair of vehicles put on the market before the entry interforce of the heavy metal ban contained in Article 4(2)(a of Directive 2000/53/EC with spare parts meeting the same quality and safety requirements as the parts with which they were originally equipped.
OJ L 269, 21.10.2000, p. 34. Directive as last amended by Directive 2008/33/EC (OJ L 81, 20.3.2008, p. 62).	⁽²⁾ OI L 152, 15,6,2005, p. 19,

23.8	.2008 EN Official Journal of	the European Union L 225/11
6)	Spare parts for vehicles put on the market after 1 July 2003 but before the expiry date of a given exemption of Annex II to Directive 2000/53/EC are not covered by the third indent of the Notes thereto. Hence, spare parts for those vehicles must be heavy metal free, even if they are	 (10) Directive 2000/53/EC should therefore be amended accordingly. (11) The measures provided for in this Decision are in accordance with the opinion of the Committee established accordance with the opini
	used to replace parts which originally contained heavy metals.	lished under Article 18(1) of Directive $2006/12/EC$ of the European Parliament and of the Council of 5 April 2006 on waste (¹),
7) In certain cases it is technically impossible to repair vehicles with spare parts other than original ones as this would require changes in dimensional and functional properties of entire vehicle systems. Such spare parts		HAS ADOPTED THIS DECISION:
cannot fit into the vehicle systems, such spare p cannot fit into the vehicle systems originally ma factured with parts containing heavy metals and th vehicles cannot be repaired and may need to be pre- turely disposed of. As a result, Annex II needs to amended accordingly. This decision should affect on	cannot fit into the vehicle systems originally manu-	Article 1
	vehicles cannot be repaired and may need to be prema- turely disposed of. As a result, Annex II needs to be amended accordingly. This decision should affect only a	Annex II to Directive 2000/53/EC is replaced by the text set out in the Annex to this Decision.
	limited number of vehicles and vehicle materials and	Article 2
	components and for a minicu period of time.	This Decision shall enter into force on the third day following its publication in the Official Journal of the European Union
8) As consumer safety is essential and product reuse, refur- bishment and extension of life-time are beneficial for the environment energy parts should be environment.		A state
	repair of vehicles which were put on the market	Article 3 This Decision is addressed to the Member States
	exemption. The use of lead, mercury, cadmium or hexa- valent chromium in materials and components used in	This Decision is addressed to the member blacks.
	spare parts for the repair of such vehicles should thus be tolerated.	Done at Brussels, 1 August 2008.
9) It is appropriate to harmonize the wording of the		For the Commission
<i>,</i>	exemptions with the other environmental directives	Stavros DIMAS
	related to waste where similar exemptions are mentioned.	Member of the Commission
	—	

(1) OJ L 114, 27.4.2006, p. 9.
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	EN Official Journal of the I	European Union		23.8.200
	ANNEX	ζ.		
	'ANNEX	П		
	Materials and components exe	mpt from Article 4(2)(a)		
	- Materials and components	Scope and expiry date of the exemption	To be labelled or made identifiable in accordance with Article 4(2)(b)(iv)	
Lead	as an alloying element			
1.	Steel for machining purposes and galvanised steel containing up to 0,35 % lead by weight			
2(a).	Aluminium for machining purposes with a lead content up to 2 % by weight	As spare parts for vehicles put on the market before 1 July 2005		
2(b).	Aluminium with a lead content up to 1,5 % by weight	As spare parts for vehicles put on the market before 1 July 2008		
2(c).	Aluminium with a lead content up to 0,4 % by weight			
3.	Copper alloy containing up to 4 % lead by weight			
4(a).	Bearing shells and bushes	As spare parts for vehicles put on the market before 1 July 2008		
4(b).	Bearing shells and bushes in engines, transmissions and air conditioning compressors	1 July 2011 and after that date as spare parts for vehicles put on the market before 1 July 2011		
Lead	and lead compounds in components			
5.	Batteries		Х	
6.	Vibration dampers		Х	
7(a).	Vulcanising agents and stabilisers for elastomers in brake hoses, fuel hoses, air ventilation hoses, elastomer/metal parts in the chassis applications, and engine mountings	As spare parts for vehicles put on the market before 1 July 2005		
7(b).	Vulcanising agents and stabilisers for elastomers in brake hoses, fuel hoses, air ventilation hoses, elastomer/metal parts in the chassis applications, and engine mountings containing up to 0,5 % lead by weight	As spare parts for vehicles put on the market before 1 July 2006		
7(c).	Bonding agents for elastomers in powertrain appli- cations containing up to 0,5 % lead by weight	1 July 2009		
8(a).	Solder in electronic circuit boards and other electrical applications except on glass	Vehicles type approved before 31 December 2010 and spare parts for these vehicles (review in 2009)	X (¹)	
8(b).	Solder in electrical applications on glass	Vehicles type approved before 31 December 2010 and spare parts for these vehicles (review in 2009)	X (¹)	

Γ

_		1	
_	Materials and components	Scope and expiry date of the exemption	To be labelled or made identifiable in accordance with Article 4(2)(b)(iv)
9.	Valve seats	As spare parts for engine types developed before 1 July 2003	
10	. Electrical components which contain lead in a glass or ceramic matrix compound except glass in bulbs and glaze of spark plugs		X (²) (for components other than piezo in engines)
11	Pyrotechnic initiators	Vehicles type approved before 1 July 2006 and spare parts for these vehicles	
H	xavalent chromium	•	
12	(a). Corrosion preventive coatings	As spare parts for vehicles put on the market before 1 July 2007	
12	(b). Corrosion preventive coatings related to bolt and nut assemblies for chassis applications	As spare parts for vehicles put on the market before 1 July 2008	
13	Absorption refrigerators in motorcaravans		Х
M	rcury		
14	(a). Discharge lamps for headlight application	Vehicles type approved before 1 July 2012 and spare parts for these vehicles	Х
14	(b). Fluorescent tubes used in instrument panel displays	Vehicles type approved before 1 July 2012 and spare parts for these vehicles	Х
Ca	lmium	•	
15	. Batteries for electrical vehicles	31 December 2008 and after that date as spare parts for vehicles put on the market before 31 December 2008	
(¹) (²)	Dismantling if, in correlation with entry 10, an average threshold of 6 electronic devices not installed by the manufacturer on the producti Dismantling if, in correlation with entry 8, an average threshold of 60 electronic devices not installed by the manufacturer on the producti	0 grams per vehicle is exceeded. For the app ion line shall not be taken into account. 0 grams per vehicle is exceeded. For the app ion line shall not be taken into account.	lication of this clause, lication of this clause,
N	tes:		
A ar	maximum concentration value up to 0.1 % by weight and i d mercury and up to 0.01 % by weight in homogeneous m	in homogeneous material, for lead, he aterial for cadmium shall be tolerated	xavalent chromium
Tl W	e re-use of parts of vehicles which were already on the mark thout limitation since it is not covered by Article $4(2)(a)$.	tet at the date of expiry of an exempti	on shall be allowed
S _I be	are parts put on the market after 1 July 2003 which are used exempted from the provisions of Article 4(2)(a) (*).	d for vehicles put on the market befor	e 1 July 2003 shall
(*)	This clause shall not apply to wheel balance weights, carbon brushe	es for electric motors and brake linings."	

11.3 2005/64/EC Type Approval Legislation

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DIRECTIVE 2005/64/EC OF THE EUROPE	AN PARLIAMENT AND OF TH	HE COUNCIL
of 26 Oct	ober 2005	
on the type-approval of motor vehicles with recoverability and amending	regard to their reusability, re Council Directive 70/156/EEC	cyclability and
THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,	(3) This Directive constitute within the framework of type-approval system es 70/156/EEC of 6 Februar the laws of the Memb	s one of the separate directives f the Community whole vehicle stablished by Council Directive y 1970 on the approximation of er States relating to the type-
Having regard to the Treaty establishing the European Community, and in particular Article 95 thereof,	approval of motor venic	les and their trailers (*).
Having regard to the proposal from the Commission,	(4) That whole vehicle typ	e-approval system is currently
Having regard to the opinion of the European Economic and Social Committee (¹),	compulsory for vehicles will be extended, in the vehicle. It is therefore ne vehicle type-approval sys the re-usability, recycl vehicles.	belonging to category M_1 and near future, to all categories of eccessary to include in the whole stem those measures concerning ability and recoverability of
Acting in accordance with the procedure referred to in Article 251 of the Treaty $(^{2})$,		
Whereas:	(5) Accordingly, it is necess take into account the fa covered by the whole ver	sary to lay down provisions to cct that N ₁ vehicles are not yet hicle type-approval system.
(1) In accordance with Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles (³), appropriate provisions should be laid down to ensure that type-approved vehicles belonging to category M_1 and those belonging to category N_1 may be put on the market only if they are reusable and/or recyclable to a minimum of 85 % by mass and are reusable and/or recoverable to a minimum of 95 % by mass.	(6) The manufacturer should authority all relevant te constituent materials and to permit verification of in accordance with the s	I make available to the approval echnical information as regards I their respective masses in order the manufacturer's calculations itandard ISO 22628: 2002.
(2) Reusability of component parts, recyclability and recoverability of materials constitute a substantial part of the Community strategy for waste management. Therefore vehicle manufacturers and their suppliers should be requested to include those aspects at the earliest stages of the development of new vehicles, in order to facilitate the treatment of vehicles at the time when they reach the end of their life.	(7) The manufacturer's calcu at the time of the veh manufacturer has put in and procedures to man from his suppliers. Bef granted, the competen preliminary assessment procedures and should i they are satisfactory.	lations can be properly validated nicle type-approval only if the place satisfactory arrangements age all information he receives ore any type-approval can be t body should carry out a of those arrangements and ssue a certificate indicating that
 OJ C 74, 23.3.2005, p. 15. Opinion of the European Parliament of 14 April 2005 (not yet publiched in the Official Journal) and Council Decision of the Second Second	· · · ·	
 (³) OJ L 269, 21.10.2000, p. 34. Directive as last amended by Council Decision 2005/673/EC (OJ L 254, 30.9.2005, p. 69). 	 (⁴) OJ L 42, 23.2.1970, p. Commission Directive 20 p. 12). 	1. Directive as last amended by 05/49/EC (OJ L 194, 26.7.2005,

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(8) The the asses of en record	relevance of the different inputs in recyclability and recoverability sed in accordance with the proce nd-of-life vehicles. The manufacture mmend a strategy for the treatn	the calculations of rates has to be essess for treatment er should therefore nent of end-of-life	(14) The measures necessary for the and technical progress of this adopted in accordance with the provided for in Article 13(3) of E	adaptation to scientific Directive should be regulatory procedure Directive 70/156/EEC.
comj prov men	petent body. This strategy sho en technologies, which are availa t at the time of applying for the	uld be based on ble or in develop- vehicle approval.	(15) Since the objective of this Directive the impact of end-of-life vehicles requiring that vehicles be designed phase with a view to facilitating recovery, cannot be sufficiently ac States acting alone and can, there scale of the action be better ac	re, namely to minimise on the environment by d from the conceptior g reuse, recycling and chieved by the Member efore, by reason of the bieved at Community
9) Spect spect men man veral vehia men	ial-purpose vehicles are designation ific function and require special but ts which are not entirely under tur- ufacturer. Consequently, the recy- bility rates cannot be calculated cles should therefore be excluded ts concerning calculation.	ed to perform a bodywork arrange- the control of the clability and reco- l properly. Those from the require-	level, the Community may ado dance with the principle of sub Article 5 of the Treaty. In accord: of proportionality, as set out in the does not go beyond what is necess this objective.	ot measures, in accor sidiarity as set out ir ance with the principle at Article, this Directive sary in order to achieve
	-		(16) In accordance with paragraph 34 Agreement on better law-making be encouraged to draw up, for interest of the Community, their as far as possible, illustrate the community	of the Interinstitutiona (¹), Member States wil themselves and in the own tables which will orrelation between thi
10) Inco N ₁ v in a abilit	mplete vehicles constitute a signifi ehicles. The manufacturer of the position to calculate the recyclal ty rates for completed vehicles	cant proportion of base vehicle is not bility and recover- because the data	Directive and the transposition in them public,	neasures and to mak
conc avail there com	terning the later stages of con able at the design stage of the l efore appropriate to require only to ply with this Directive.	struction are not base vehicles. It is the base vehicle to	HAVE ADOPTED THIS DIRECTIVE:	
	. ,		Article 1	
			Subject matter	
11) The are v envin is th prov	market shares of vehicles produc very limited, so that there will be ronment if they have to comply wi terefore appropriate to exclude t isions of this Directive.	eed in small series little benefit to the th this Directive. It hem from certain	This Directive lays down the admin provisions for the type-approval of Article 2, with a view to ensuring that and materials can be reused, recycled minimum percentages set out in Anne	istrative and technica vehicles covered by their component part and recovered in the x I.
(12) In ac meas	ccordance with Directive 2000/5 sures should be taken, in the inter protection of the environment to	3/EC, appropriate rests of road safety prevent the reuse	It lays down specific provisions to en component parts does not give rise to s hazards.	sure that the re-use o safety or environmenta
of co from restr	ertain component parts which ha n end-of-life vehicles. Such me icted to the reuse of parts in th	ave been removed asures should be as construction of	Article 2	
new	vehicles.		Scope	
13) The	provisions set out in this Directi ufacturers the supply of new dat	ve will impose on a relating to type-	This Directive shall apply to vehicles M_1 and N_1 , as defined in Part A of 70/156/EEC, and to new or reused co vehicles.	pelonging to categorie Annex II to Directiv mponent parts of sucl
man appr refle	cted in Directive 70/156/EEC, wh	ich establishes the		

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	Article 3 Exemptions	8.	'multi-stage construction' means the process by which a vehicle is produced in several stages by adding component parts to a base vehicle or by modifying those component parts;
Wit Arti	hout prejudice to the application of the provisions of icle 7, this Directive shall not apply to:	9.	'reuse' means reuse as defined in point 6 of Article 2 of Directive 2000/53/EC;
(a)	special purpose vehicles as defined in part A, point 5, of Annex II to Directive 70/156/EEC;	10.	'recycling' means recycling as defined in the first sentence of point 7 of Article 2 of Directive 2000/53/EC;
(b) (c)	multi-stage built vehicles belonging to category N_1 , provided that the base vehicle complies with this Directive; vehicles produced in small series, referred to in Article 8 (2)(a) of Directive 70/156/EEC.	11.	'energy recovery' means energy recovery as defined in the second sentence of point 7 of Article 2 of Directive 2000/53/EC;
	Article 4	12.	'recovery' means recovery as defined in point 8 of Article 2 of Directive 2000/53/EC;
For	Definitions the purposes of this Directive, the following definitions ll apply:	13.	'reusability' means the potential for reuse of component parts diverted from an end-of-life vehicle;
1.	'vehicle' means a motor vehicle;	14.	'recyclability' means the potential for recycling of component parts or materials diverted from an end-of- life vehicle;
2.	'component part' means any part or any assembly of parts which is included in a vehicle at the time of its production. It also covers components and separate technical units as defined in Article 2 of Directive $70/156/\text{EEC}$;	15.	'recoverability' means the potential for recovery of component parts or materials diverted from an end-of- life vehicle;
3.	'vehicle type' means the type of a vehicle as defined in part B, points 1 and 3, of Annex II to Directive $70/156/EEC$;	16.	'recyclability rate of a vehicle (R_{cyc}) ' means the percentage by mass of a new vehicle, potentially able to be reused and recycled;
4. 5.	'end-of-life vehicle' means a vehicle as defined in point 2 of Article 2 of Directive 2000/53/EC; 'reference vehicle' means the version within a type of vehicle, which is identified by the approval authority, in	17.	'recoverability rate of a vehicle (R_{cov}) ' means the percentage by mass of a new vehicle, potentially able to be reused and recovered;
6.	consultation with the manufacturer and in accordance with the criteria laid down in Annex I, as being the most problematic in terms of reusability, recyclability and recoverability; 'multi-stage built vehicle' means a vehicle resulting from	18.	'strategy' means a large-scale plan consisting of coordi- nated actions and technical measures to be taken as regards dismantling, shredding or similar processes, recycling and recovery of materials to ensure that the targeted recyclability and recoverability rates are attain- able at the time a vehicle is in its development phase;
7.	a multi-stage construction process; 'base vehicle' means a vehicle as defined in Article 2, fourth indent of Directive 70/156/CEE, which is used at the starting stage of a multi-stage construction;	19.	'mass' means the mass of the vehicle in running order as defined in point 2.6 of Annex I to Directive 70/156/EEC, but excluding the driver, whose mass is assessed at 75 kg;

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20. 'competent body' means an entity, e.g. a technical service or another existing body, notified by a Member State to carry out preliminary assessment of the manufacturer and to issue a certificate of compliance, in accordance with the prescriptions of this Directive. The competent hody, may be the time approval authority, provided its	2. In the framework of the preliminary assessment of the manufacturer, Member States shall ensure that the materials used for the construction of a vehicle type comply with the provisions of Article $4(2)(a)$ of Directive $2000/53/EC$.
competence in this field is properly documented.	The Commission shall, in accordance with the procedure referred to in Article 9, establish the detailed rules necessary to verify compliance with this provision.
Article 5	
Type-approval provisions	3. For the purpose of paragraph 1, the manufacturer shal recommend a strategy to ensure dismantling, reuse o component parts, recycling and recovery of materials. Th strategy shall take into account the proven technologie available or in development at the time of the application for a vehicle type-approval.
1. Member States shall grant, as appropriate, EC type- approval or national type-approval, with regard to reusability, recyclability and recoverability, only to such vehicle types that satisfy the requirements of this Directive.	4. Member States shall appoint a competent body, in accordance with point 2 of Annex IV, to carry out the preliminary assessment of the manufacturer and to issue the certificate of compliance.
2. For the application of paragraph 1, the manufacturer shall make available to the approval authority the detailed technical information necessary for the purposes of the calculations and checks referred to in Annex I, relating to the nature of the materials used in the construction of the vehicle and its component parts. In cases where such information is shown to be covered by intellectual property rights or to constitute	5. The certificate of compliance shall include the appropriat documentation and describe the strategy recommended by the manufacturer. The competent body shall use the model set ou in the Appendix to Annex IV.
specific know-how of the manufacturer or of his suppliers, the manufacturer or his suppliers shall supply sufficient informa- tion to enable those calculations to be made properly.	6. The certificate of compliance shall remain valid for no les than two years from the date of deliverance of the certificat before new checks shall be conducted.
3. With regard to reusability, recyclability and recoverability, the Member States shall ensure that the manufacturer uses the model of the information document set out in Annex II to this Directive, when submitting an application for EC vehicle type-approval, pursuant to Article 3(1) of Directive 70/156/EEC.	7. The manufacturer shall inform the competent body of any significant change that could affect the relevance of the certificate of compliance. After consultation with the manufacturer, the competent body shall decide whether new checks are necessary.
4. When granting an EC type-approval pursuant to Article $4(3)$ of Directive $70/156/EEC$, the type-approval authority shall use the model of the EC type-approval certificate set out in Annex III to this Directive.	8. At the end of the period of validity of the certificate of compliance, the competent body shall, as appropriate, issue new certificate of compliance or extend its validity for further period of two years. The competent body shall issue new certificate in cases where significant changes have been brought to the attention of the competent body.
Article 6	Article 7
Preliminary assessment of the manufacturer	Reuse of component parts
1. Member States shall not grant any type approval without first ensuring that the manufacturer has put in place	The component parts listed in Annex V shall:
satisfactory arrangements and procedures, in accordance with point 3 of Annex IV, to manage properly the reusability, recyclability and recoverability aspects covered by this Directive. When this preliminary assessment has been carried	 (a) be deemed to be non-reusable for the purposes o calculating the recyclability and recoverability rates;
out, a certificate named 'Certificate of Compliance with Annex IV' (hereinafter the certificate of compliance) shall be granted to the manufacturer.	(b) not be reused in the construction of vehicles covered b Directive 70/156/EEC.

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Article 8

Amendments to Directive 70/156/EEC

Directive 70/156/EEC shall be amended in accordance with Annex VI to this Directive.

Article 9

Amendments

Amendments to this Directive which are necessary to adapt it to scientific and technical progress shall be adopted by the Commission in accordance with the regulatory procedure referred to in Article 13(3) of Directive 70/156/EEC.

Article 10

Implementation dates for type-approval

1. With effect from 15 December 2006, Member States shall not, in respect of a type of vehicle which complies with the requirements of this Directive:

(a) refuse to grant EC or national type-approval,

(b) prohibit the registration, sale or entry into service of new vehicles.

2. With effect from 15 December 2008, Member States shall, in respect of a type of vehicle which does not comply with the requirements of this Directive:

- (a) refuse to grant EC type-approval;
- (b) refuse to grant national type-approval.

3. With effect from 15 July 2010, Member States shall, if the requirements of this Directive are not met:

- (a) consider certificates of conformity which accompany new vehicles as no longer valid for the purposes of Article 7(1) of Directive 70/156/EEC;
- (b) refuse the registration, sale or entry into service of new vehicles, save where Article 8(2)(b) of Directive 70/156/EEC applies.
- 4. Article 7 shall apply with effect from 15 December 2006.

Article 11

Transposition

1. Member States shall adopt and publish, not later than 15 December 2006, the laws, regulations and administrative provisions necessary to comply with this Directive. They shall forthwith communicate to the Commission the text of those measures.

They shall apply those measures from 15 December 2006.

When Member States adopt these measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. The methods of making such reference shall be laid down by Member States.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

Article 12

Entry into force

This Directive shall enter into force on the 20th day following its publication in the Official Journal of the European Union.

Article 13

Addressees

This Directive is addressed to the Member States.

Done at Strasbourg, 26 October 2005.

For the European Parliament The President J. BORRELL FONTELLES For the Council The President D. ALEXANDER

25.11.2005

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	ANNEX	
	LIST OF ANNEXES	
Annex I:	Requirements	
Annex II:	Information document for EC vehicle type-approval	
Annex III:	Model of the EC type-approval certificate	
Annex IV:	Preliminary assessment of the manufacturer	
Appendix:	Component parts deemed to be non reusable	
Annex VI:	Amendments to Directive 70/156/EEC	

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		ANNEX I	
		REQUIREMENTS	
	1.	Vehicles belonging to category \boldsymbol{M}_1 and those belonging to category \boldsymbol{N}_1 shall be so constructed as to be:	
		— reusable and/or recyclable to a minimum of 85 % by mass, and	
		— reusable and/or recoverable to a minimum of 95 % by mass,	
		as determined by the procedures laid down in this Annex.	
	2.	For the purposes of type-approval, the manufacturer shall submit a data presentation form duly completed established in accordance with Annex A to the standard ISO 22628: 2002. It shall include the material breakdown.	l, s
		It shall be accompanied by a listing of the dismantled component parts, declared by the manufacturer with respect to the dismantling stage, and the process he recommends for their treatment.	h
	3.	For the application of points 1 and 2, the manufacturer shall demonstrate to the satisfaction of the approva authority that the reference vehicles meet the requirements. The calculation method prescribed in Annex B to the standard ISO 22628: 2002 shall apply.	l o
		However, the manufacturer must be in a position to demonstrate that any version within the vehicle type complies with the requirements of this Directive.	e
	4.	For the purposes of the selection of the reference vehicles, account shall be taken of the following criteria:	
		— the type of bodywork,	
		— the available trim levels (¹),	
		— the available optional equipment (1) which can be fitted under the manufacturer's responsibility.	
	5.	Should the type-approval authority and the manufacturer fail jointly to identify the most problematic version within a type of vehicle, in terms of reusability, recyclability and recoverability, one reference vehicle shall be selected, within:	n e
		 (a) each 'type of bodywork', as defined in point 1 of part C of Annex II to Directive 70/156/EEC in the case o M₁ vehicles; 	f
		(b) each 'type of bodywork', i.e. van, chassis-cab, pick-up, etc., in the case of N_1 vehicles.	
	(1)	i.e. leather upholstery, in-car radio equipment, air-conditioning, alloy wheels, etc.	

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6.	For the purposes of calculations, tyres shall be considered as recyclable.	
7.	Masses shall be expressed in kg with one decimal place. The rates shall be calculated in percent with one decimal place, then rounded as follows:	
	(a) if the figure following the decimal point is between 0 and 4, the total is rounded down;	
	(b) if the figure following the decimal point is between 5 and 9, the total is rounded up.	
8.	For the purposes of checking the calculations referred to in this Annex, the approval authority shall ensure that the data presentation form referred to in point 2 is coherent with the recommended strategy annexed to the certificate of compliance referred to in Article $6(1)$ of this Directive.	
9.	For the purposes of checks of the materials and masses of component parts, the manufacturer shall make available vehicles and component parts as deemed necessary by the type-approval authority.	

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		ANNEX II	
		INFORMATION DOCUMENT FOR EC VEHICLE TYPE-APPROVAL	
	in acco	rdance with Annex I to Council Directive 70/156/EEC (¹) relating to EC type-approval of a vehicle with regard to its reusability, recyclability and recoverability	
	The follo must be any, mus	owing information, if applicable, must be supplied in triplicate and include a list of contents. Any drawings supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, it st show sufficient detail.	S [
	0.	GENERAL	
	0.1.	Make (trade name of manufacturer):	
	0.2.	Туре:	
	0.2.0.1.	Chassis:	
	0.2.1.	Commercial name(s) (if available):	
	0.3.	Means of identification of type, if marked on the vehicle (^b):	
	0.3.1.	Location of that marking:	
	0.4.	Category of vehicle (^c):	
	0.5.	Name and address of manufacturer:	
	0.8.	Address(es) of assembly plant(s):	
	1.	GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE	
	1.1.	Photographs and/or drawings of a representative vehicle:	
	1.2.	Dimensional drawing of the whole vehicle:	
	1.3.	Number of axles and wheels:	
	1.3.1.	Number and position of axles with double wheels:	

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-	1.3.3.	Powered axles (number, position, interconnection):	
-	1.7.	Driving cab (forward control or bonneted)(^z):	
:	3.	POWER PLANT (9) (In the case of a vehicle that can run either on petrol, diesel, etc., or also in combination with another fuel, items shall be repeated (*))	
	3.1.	Manufacturer:	
	3.2.	Internal combustion engine	
:	3.2.1.	Specific engine information	
:	3.2.1.1.	Working principle: positive ignition/compression ignition, four-stroke/two stroke (1)	
	3.2.1.2.	Number and arrangement of cylinders:	
	3.2.1.3.	Engine capacity (*):cm ³	
:	3.2.2.	Fuel: diesel oil/petrol/LPG/NG/ethanol: (1)	
	4.	TRANSMISSION (*)	
	4.2.	Type (mechanical, hydraulic, electric, etc.):	
	4.5.	Gearbox	
	4.5.1.	Type (manual/automatic/CVT (continuously variable transmission)) (1)	
	4.9.	Differential lock: yes/no/optional (1)	
9	9.	BODYWORK	
9	9.1.	Type of bodywork:	
9	9.3.1.	Door configuration and number of doors:	
9	9.10.3.	Seats	
9	9.10.3.1.	Number:	

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	15.	REUSABILITY, RECYCLABILITY and RECOVERABILITY	
	15.1.	Version to which the reference vehicle belongs:	
	15.2.	Mass of the reference vehicle with bodywork or mass of the chassis with cab, without bodywork and/or coupling device if the manufacturer does not fit the bodywork and/or coupling device (including liquids, tools, spare wheel, if fitted) without driver:	
	15.3.	Masses of materials of the reference vehicle	
	15.3.1.	Mass of material taken into account at the pre-treatment step (##):	
	15.3.2.	Mass of material taken into account at the dismantling step (##):	
	15.3.3.	Mass of material taken into account at the non-metallic residue treatment step, considered as recyclable (##):	
	15.3.4.	Mass of material taken into account at the non-metallic residue treatment step, considered as energy recoverable (##):	
	15.3.5.	Materials breakdown (^{##}):	
	15.3.6.	Total mass of materials, which are reusable and/or recyclable:	
	15.3.7.	Total mass of materials, which are reusable and/or recoverable:	
	15.4.	Rates	
	15.4.1.	Recyclability rate 'R _{cyc} (%)':	
	15.4.2.	Recoverability rate 'R _{cov} (%)':	

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	ANNEX III	
	MODEL OF EC TYPE-APPROVAL CERTIFICATE	
	Maximum format: A4 (210 x 297 mm)	
	EC TYPE-APPROVAL CERTIFICATE	
	Stamp of EC type-approval authority	
	Communication concerning:	
	— EC type-approval (¹) of a type of vehicle	
	— extension of EC type-approval (1)	
	— refusal of EC type-approval (1)	
	with regard to Directive 2005/64/EC	
	EC type-approval number:	
	Reason for extension:	
	SECTION I	
	0.1. Make (trade name of manufacturer):	
	0.2. Type:	
	0.2.1. Commercial name(s) (²):	
	0.3. Means of identification of type, if marked on the vehicle:	
	0.3.1. Location of that marking:	
	 (¹) Delete where not applicable. (<i>i</i>) If any analytic data the last of a state of	

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	0.4.	Category of vehicle (1):			
	0.5.	Name and address of manu	facturer:		
	0.8.	Name(s) and address(es) of	assembly plant(s):		
	[]				
	SECT	ION II			
	1.	Additional information:			
		Recyclability rate(s) of the r	eference vehicle(s):		
		Recoverability rate(s) of the	reference vehicle(s):		
	2.	Technical service responsibl	e for carrying out the tests:		
	3.	Date of test report:			
	4.	Reference of test report:			
	5.	Remarks (if any):			
	6.	Attachments: the index and	information package		
	7.	The vehicle meets/does not	meet (2) the technical requirements of this Direct	ctive:	
		(Place)	(Signature)	(Date)	
	Attac	hments: Information package.			

 $^(^{1})$ As defined in part A of Annex II to Directive 70/156/EEC.

^{(&}lt;sup>2</sup>) Delete where not applicable.

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		ANNEX IV	
		PRELIMINARY ASSESSMENT OF THE MANUFACTURER	
	-		
1.	Pur	pose of this Annex	
Th ma	nis Ann anufact	ex describes the preliminary assessment that must be carried out by the competent body to ensure that the urer has put in place the necessary arrangements and procedures.	
2.	Сот	npetent body	
Th for ma	ne comp r certifi anufact	betent body shall comply with standard EN 45012: 1989 or ISO/IEC Guide 62: 1996 on the general criteria cation bodies operating quality system certification as regards the management systems implemented by the urer.	
3.	Che	ecks to be performed by the competent body	
3.1	1. The	competent body shall ensure that the manufacturer has taken the necessary measures to:	
	(a)	collect appropriate data through the full chain of supply, in particular the nature and the mass of all materials used in the construction of the vehicles, in order to perform the calculations required under this Directive;	
	(b)	keep at his disposal all the other appropriate vehicle data required by the calculation process such as the volume of the fluids, etc.;	
	(c)	check adequately the information received from suppliers;	
	(d)	manage the breakdown of the materials;	
	(e)	be able to perform the calculation of the recyclability and recoverability rates in accordance with the standard ISO 22628: 2002;	
	(f)	mark the component parts made of polymers and elastomers in accordance with Commission Decision 2003/138/EC of 27 February 2003 establishing component and material coding standards for vehicles pursuant to Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles (¹);	
	(g)	verify that no component part listed in Annex V is reused in the construction of new vehicles.	
3.2	2. The part	manufacturer shall provide the competent body with all relevant information, in documentary form. In ticular, recycling and recovery of materials shall be properly documented.	

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	Appendix to Annex IV	
	MODEL OF CERTIFICATE OF COMPLIANCE	
[7
	No [Reference number]	
	[the competent body]	
	Certifies that	
	(Manufacturer):	
	(Address of the manufacturer):	
	complies with the provisions of Annex IV to Directive 2005/64/EC.	
	Checks have been performed on:	
	by (name and address of the competent body):	
	Number of report:	
	The certificate is valid until [date]	
	Done at [Place]	
	On [Date]	
	[Signature]	
	ન્સન્સન્સ્ સ્વર્સ્ટન્સ્ટ્	
	Attachments: Description of the strategy recommended by the manufacturer in the area of reuse,	
	recycling and recovery.	

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	ANNEX V	
	COMPONENT PARTS DEEMED TO BE NON-REUSABLE	
1	. Introduction	
T w	his Annex addresses the component parts of vehicles belonging to category M ₁ and those belonging to cate hich must not be reused in the construction of new vehicles.	gory N ₁
2	. List of component parts	
_	- All airbags (1), including cushions, pyrotechnic actuators, electronic control units and sensors	
_	- Automatic or non-automatic seat belt assemblies, including webbing, buckles, retractors, pyrotechnic a	ctuators
_	- Seats (only in cases where safety belt anchorages and/or airbags are incorporated in the seat)	
_	- Steering lock assemblies acting on the steering column	
_	- Immobilisers, including transponders and electronic control units	
-	- Emission after-treatment systems (e.g. catalytic converters, particulate filters)	
_	- Exhaust silencers.	
_		
(1) When the airbag is inserted inside the steering wheel, the steering wheel itself.	

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			ANNEX VI	
			AMENDMENTS TO DIRECTIVE 70/156/EEC	
	Direc	ctive 70	/156/EEC is amended as follows:	
	1.	the foll	lowing points shall be added in Annex I:	
		'15.	REUSABILITY, RECYCLABILITY and RECOVERABILITY	
		15.1.	Version to which the reference vehicle belongs:	
		15.2.	Mass of the reference vehicle with bodywork or mass of the chassis with cab, without bodywork and/or coupling device if the manufacturer does not fit the bodywork and/or coupling device (including liquids, tools, spare wheel, if fitted) without driver:	
		15.3.	Mass of materials of the reference vehicle	
		15.3.1.	Mass of material taken into account at the pre-treatment step (##):	
		15.3.2.	Mass of material taken into account at the dismantling step (##):	
		15.3.3.	Mass of material taken into account at the non-metallic residue treatment step, considered as recyclable (##):	
		15.3.4.	Mass of material taken into account at the non-metallic residue treatment step, considered as energy recoverable (##):	
		15.3.5.	Materials breakdown (^{##}):	
		15.3.6.	Total mass of materials, which are reusable and/or recyclable:	
		15.3.7.	Total mass of materials, which are reusable and/or recoverable:	
		15.4.	Rates	
		15.4.1.	Recyclability rate "R _{cyc} (%)":	
		15.4.2.	Recoverability rate "R _{cov} (%)":	
		(##) Th	uese terms are defined in the standard ISO 22628: 2002.';	

2.	the	following ite	m shall be addee	l in Part	I of Annex I	V:										
							Applicability									
		Subject	Directive No	Official J	ournal reference	M ₁ M ₂ M ₃		N	N ₂	N ₃	0,1	02	0,3	04		
	'59.	Recyclability	2005/64/EC	L 310, 20	25 November 05, p. 10	Х	_	_	X	—	_				,	
3.	Anı	nex XI is ame	nded as follows:													
	(a)	the following	ng item shall be	added ii	1 Appendix 1	:										
		Item	Subject	Γ	irective No	M ₁	≤ 2 50 (¹) kg	00	M ₁ :	> 2 500) kg		M ₂		M ₃	3	
		'59	Recyclability	2	005/64/EC		N/A		I	N/A		_			,	
	(b)	the following	ng item shall be	added in	n Appendix 2	:										
		Item	Subject		Directive nun	ıber	M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	D ₁ O ₂	0,3	04	
		'59	Recyclabil	ity	2005/64/H	C	N/A	-	_	N/A	_			_	_'	
	(c)	the following	ng item shall be	added ii	n Appendix 3	:										
		Item	Subject		Directive number	Ν	[]	М ₃	N ₁	N ₂	N ₃	0,	0_2	0,3	04	
		'59	Recyclability	y	2005/64/EC	-	-	-	N/A	-	_	—	—	_	_'	