House of Lords Science and Technology Select Committee:
Waste Reduction Inquiry

Written Submission from Ford Motor Company

1. Ford Motor Company (FMC) welcomes the opportunity to submit written evidence to the House of Lords Science and Technology Committee's inquiry on Waste Reduction.

Ford Motor Company in Britain

2. FMC group companies in Britain employ around 30,000 people – approximately one third of all Ford Motor Company employees in Europe. 15,500 of these people are employees of Jaguar and Land Rover. Three Ford Motor Company brands build vehicles in the country – Ford "Blue Oval", Jaguar and Land Rover.

3. Research and development forms an important part of FMC's activity in the UK and accounts for 80 per cent of automotive industry R&D in Britain. FMC employs around 9,500 people at its three main technical centres in the country: the Ford of Britain technical centre at Dunton, Essex, and the Gaydon and Whitley complexes responsible for Jaguar and Land Rover engineering development. R&D is also conducted into diesel engine engineering at the Ford Dagenham Diesel Centre and among the technical teams working in FMC manufacturing facilities. Spending on R&D in the UK for Ford Motor Company brands is around £800 million annually.

Summary of Key Messages

4. Ford is proactive in its use of recycled, renewable and low life-cycle impact materials and we are looking at ways of increasing use where appropriate.

5. Ford's approach to the environmental impacts of its products and processes has evolved from "designing for disassembly" to "designing for recycling" and finally to "designing for sustainability".

6. Ford of Europe's Product Sustainability Index (PSI) is a result of this learning process. The report is a comprehensive model-by-model approach to addressing the environmental, social and economic impact of vehicles from the earliest stages of their development.

7. Designing for waste reduction or recycling does not necessarily optimise environmental impacts – a life-cycle approach must be adopted. 85 per cent of a vehicle's life-cycle CO_2 is associated with the in-use phase. A recycling-driven change that detrimentally affects this phase could have a net negative effect over the life-cycle.

8. Article 7.2 of the End-of-Life Vehicle Directive requires new targets of 85 per cent recycling and 95 per cent recovery by 2015. According to ACEA, a more efficient approach is to send stronger signals to the waste treatment market by further restricting the availability of landfill.

9. End-of-Life Vehicle recycling targets can limit the auto industry's ability to meet legislation in other areas, importantly CO_2 emissions and the regulated tailpipe emissions, and may discriminate against weight reduction measures.

Background

10. Ford has applied Design for Environment principles since the early 90s. Then, the focus was on improving disassembly of vehicles by taking into account accessibility of parts to be disassembled, the type and number of different fasteners used and the marking of parts for easy identification. At that time disassembly was seen as the preferred End-of-Life strategy.

11. In the mid-90s the possibilities of mechanical recycling were increasingly taken into account in the strategy, leading to design guidelines that covered aspects such as material complexity and material compatibility. In the late 90s there was a shift in design philosophy from end-of-life to a total life-cycle focus. The material and component production phase as well as the in-use phase appeared on the Design for Environment agenda.

12. The reason for this shift was that several studies had shown that recycling only contributes a small amount to the total life-cycle impact, that the in-use phase is clearly dominant and that a focus solely on the end-of-life phase could have a net negative effect over the whole life-cycle. Since 2002 social and economic aspects in addition to the environmental aspects have been included in the design optimisation. Ford refers to the new approach as Design for Sustainability.

13. Ford is proactive in its use of recycled, renewable and low life-cycle impact materials and we are looking at ways of increasing use where appropriate. European Ford vehicles contain between 8 to 15 kg recycled non-metals each depending on the model type.

14. Example parts include:
    - Housings for air-conditioning systems made of recycled polypropylene bottle caps;
    - Engine covers made of recycled polyamide;
    - Wheelhouse linings made of recycled polypropylene;
    - Sound damping / insulation materials made of recycled textile waste / scrap and recycled bitumen;
    - Fan wheels and frames made of recycled carpets and packaging tapes;
    - Air filter housings made of recycled car battery casings;
    - Door mirrors made of various types of recycled housings;
    - Radiator grilles made of recycled bumper material.

15. Ford Motor Company was the UK's first vehicle manufacturer to offer free take back of all qualifying end-of-life vehicles. A network comprising approximately 130 treatment facilities and 20 collection points has been established UK-wide. Ford's end-of-life vehicle network now extends across all EU Member States and beyond.

16. Information about the UK disposal network is made available to the last customer via the Ford website,[1] or via our contracted network partner - Cartakeback.com Ltd.[2]

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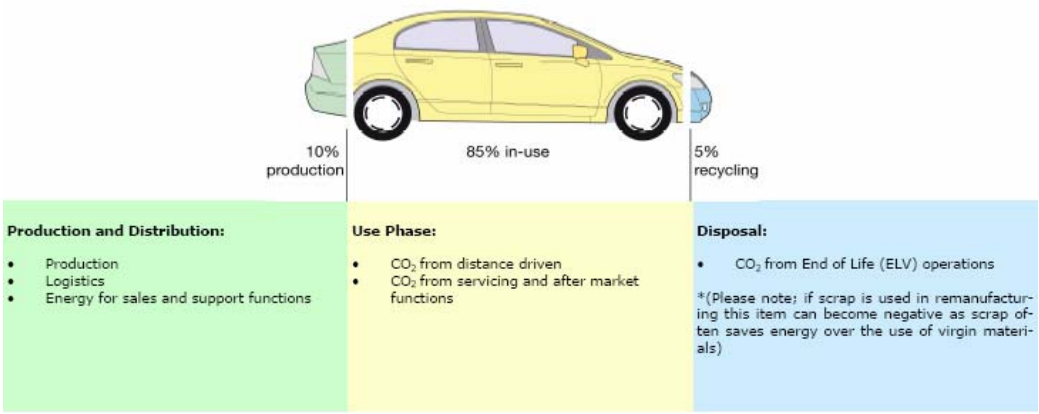
1 www.ford.co.uk
2 www.cartakeback.com

Better design and the use of materials

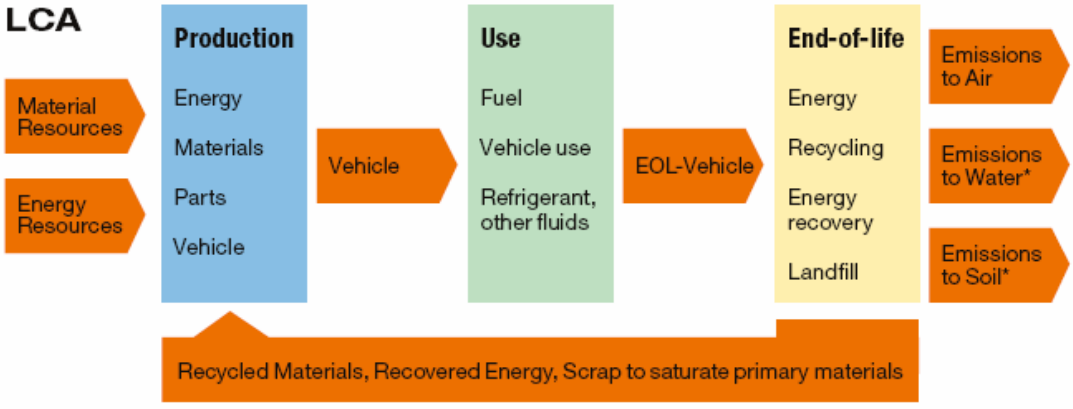
What role can better design and materials play in minimising the creation of waste? Are there any barriers to how knowledge in this area can best be translated and applied?

17. Ford's approach to assessing the impacts of waste from its products and processes has evolved from "designing for disassembly" to "designing for recycling" and finally to "designing for sustainability". The life-cycle approach is far more important than focusing only on one particular aspect of the life-cycle.

18. In the case of vehicles, design changes to improve disassembly and recycling have no significant environmental benefit due to the relatively small contribution of the end-of-life phase to the overall life-cycle impact. The figure below illustrates that 85 per cent of a vehicle's environmental impact is generated in the in-use phase.



19. Taking a more holistic life-cycle approach to design and materials selection can optimise the environmental impact. The Ford Product Sustainability Index (example attached) report is a comprehensive model-by-model approach to addressing the environmental, social and economic impact of vehicles from the earliest stages of their development. The figure below illustrates the components of the whole life-cycle approach to sustainable design.

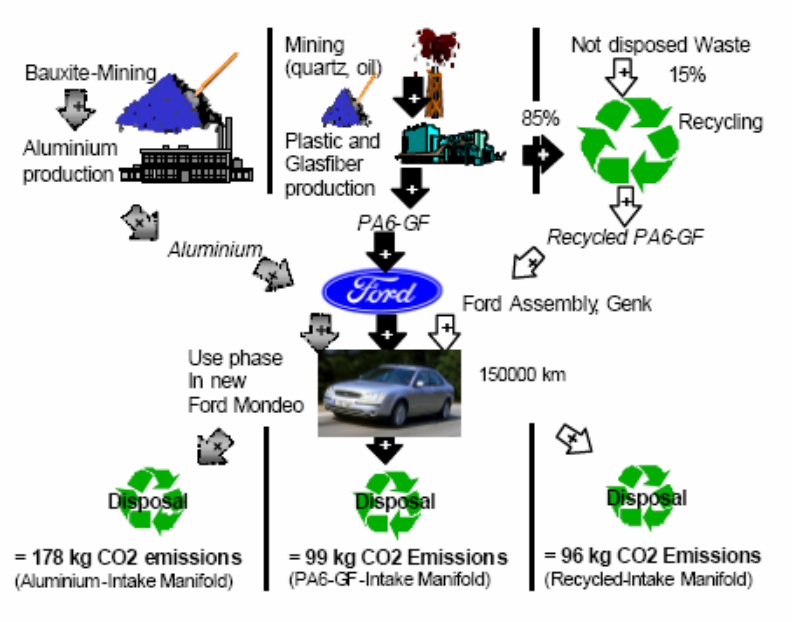


20. Automotive manufacturers use significant proportions of steel and other alloys, plastics and some precious metals in their products. The cost of these materials is sufficient incentive to minimize waste in the production process itself. Cars are one of society's most recycled products due to the high value of the vehicle at the end of its life. This is evident by the widespread absence of abandoned vehicles throughout the UK.

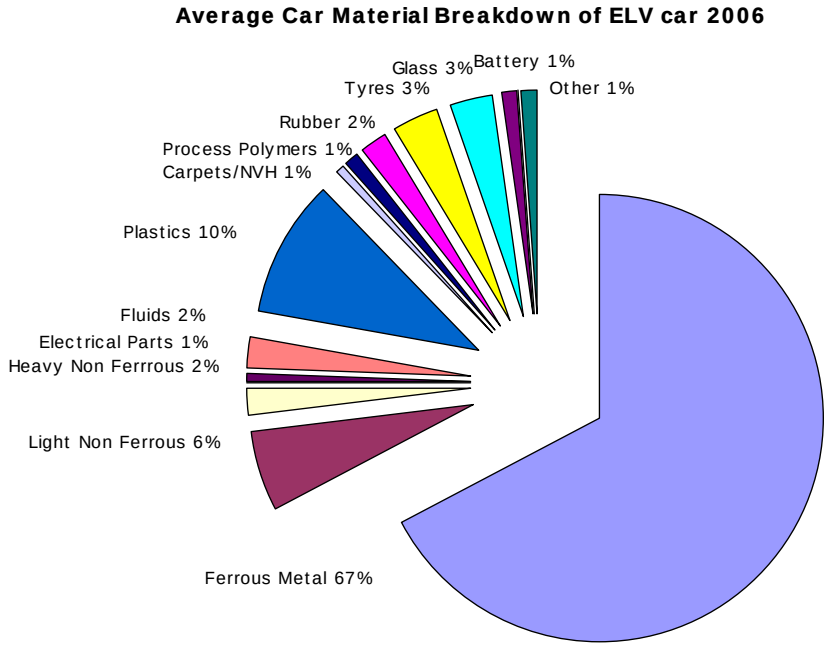
What factors influence the use of materials? In what way do considerations of sustainability feature in the selection of most commonly used materials?

21. Cost, technical and environmental performance, manufacturability, durability, substance restrictions (voluntary and regulated) and weight are some common examples of factors influencing such decisions, although others will come into play depending on the particular application.

22. Ford Motor Company has established within its global Ford Product Development System (FPDS), a vehicle product system which strives to minimise the total environmental impact of vehicles. This approach is illustrated with the intake manifold example below where a recycled product generates the lowest lifetime CO_2 emissions. It should be noted that the improvement in lifetime CO_2 from utilising recycled content is not as significant as that from discontinuing the use of aluminium. This, in turn, makes recycling targets more difficult to achieve.



23. Understanding the overall life-cycle benefits when selecting materials is key. Focusing only on recycling can be detrimental. For example, reducing material complexity to improve recyclability may lead to over-engineering of materials resulting in increased weight, leading to greater fuel consumption in the in-use phase and increasing the overall environmental impact. Conversely, engineering lighter vehicles with composite panels or aluminium body structures can reduce environmental impacts in the in-use phase but may make mass-based recycling targets more difficult to achieve. The figure provided by the SMMT below illustrates the proportion of metals in an average UK end-of-life vehicle.



To what extent do product designers and engineers take into account the availability and the end-of-life impacts of raw materials?

24. Automotive industry past practice was to enable reuse and recycling through ease of dismantling of targeted parts as well as through material selection (e.g. to improve material compatibility). Recent scientific studies have shown that while such an approach imposes severe design constraints (e.g. on craftsmanship, weight, packaging), it delivers few, if any, of the perceived benefits.

25. There is a fundamental difference between *vehicle assembly* where workers are trained to assemble few parts for one or two vehicles and *vehicle disassembly* where workers have to cope with hundreds of different vehicle types, of all ages and some damaged or with damaged fasteners.

26. Real-world dismantling tests have shown that only a small portion of the dismantling time can be addressed by product design. Most theoretical linkages between design aspects as length of screws, accessibility, visibility, etc. are overruled in practice by issues such as operator experience and work organisation. This means Design for Disassembly is not really an effective approach. From an environmental perspective dismantling is clearly not preferable compared to Post-Shredder Treatment separation.

27. From a purely environmental perspective - when taking the whole vehicle life-cycle into account - the end-of-life phase of certain types of non-metals does not play any significant role in terms of potential environmental impacts or recycling credits. These efforts result in no remarkable improvement for the environment.

28. Advanced recycling methods (Post-Shredder Treatment) exist that allow the recycling and recovery of literally all materials for vehicles in the end-of-life stage. Thus a focus on life-cycle impact is more relevant on material selection than a focus specifically on end-of-life. The general waste hierarchy (recycling is better than energy recovery is better than landfilling) has also been shown not to apply in the case of automotive non-metals.

What impact does the development of new materials have on design? How much interaction is there between material scientists and designers?

29. Any impacts will be application-specific, affecting any number of parameters (for example weight, strength, stiffness, manufacturability, and cost).

Can better designed products offset the increase in consumption?

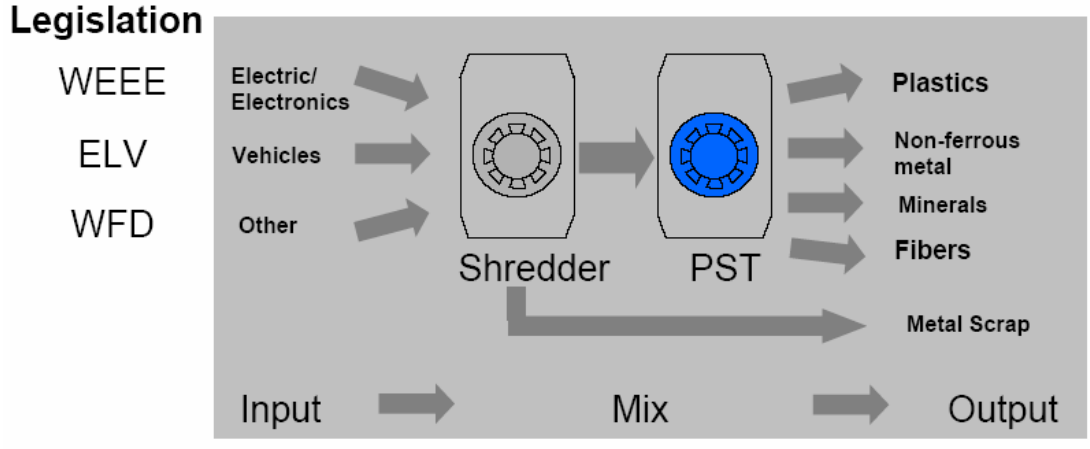
30. Recycling-driven changes to product design can sometimes jeopardize the overall environmental performance (see Q.2). In consequence, design needs to be more holistic. The Ford approach has evolved from "designing for disassembly" to "designing for recycling" and finally to "designing for sustainability". Ford of Europe's Product Sustainability Index (PSI) is a result of this learning process.

31. Vehicles are highly recyclable (the European average is approximately 85 per cent). Only 5 per cent of the life-cycle energy is used at the end-of-life stage and 10 per cent during its manufacture. It is therefore most important to address the remaining 85 per cent of life-cycle energy consumption from the in-use phase. Reduction in consumption is therefore best tackled by a series of low CO_2 vehicle technologies such as efficiency improvement, weight reduction, reduced parasitic energy loss and new low-carbon fuels.

Business framework

Does the current policy, regulatory and legal framework support and incentivise the development of better, more sustainable products and processes? How is the framework communicated to businesses and what is the level of awareness and understanding among businesses?

32. Processing of end-of-life vehicles is already heavily regulated. Article 7.2 of the End-of-life Vehicle Directive requires new targets of 85 per cent recycling and 95 per cent recovery by 2015, up from the current 80 and 85 per cent respectively. The environmental aspects of the Directive already control potential pollution risks and the use of heavy metals, and the global economic demand for metals of all types ensures their efficient recycling. The remainder (mainly plastics) can be efficiently recycled based on Post-Shredder Treatment (PST) techniques. Thus we would propose in the case of end-of-life vehicles that greater emphasis be placed on PST rather than recycling or recovery targets.



33. According to the European Automotive Manufacturer's Association, ACEA, the most effective policy instrument to achieve the goal of waste reduction (and the promotion of PST) is a restriction of landfilling of automotive shredder residue. Investments in advanced recycling processes are not being made because the landfilling alternative is both available and affordable. Regulation can help further by establishing markets for the automotive residues which are currently landfilled. Setting increasingly stringent end-of-life vehicle recycling targets for automotive manufacturers to meet will not create such a market.

How central is sustainable design to business thinking? What initiatives are in place to encourage this and are they meeting business needs?

34. The Ford Product Sustainability Index (example attached) report is a comprehensive model-by-model approach to addressing the environmental, social and economic impact of vehicles from the earliest stages of their development. It includes a foreword from John Fleming, President and CEO of Ford of Europe stressing the importance of sustainable design for business thinking.

What other measures can promote a focus on waste reduction among businesses?

35. An exclusive focus on waste reduction can sometimes be detrimental to the environment.

What lessons can business learn from international experience?

36. An exclusive focus on waste reduction can sometimes be detrimental to the environment.

Government policy

What is and should be the role of Government in addressing the issue of waste reduction?

37. The role of Government is to ensure that the market mechanisms can work. Increased raw material prices and the limiting options of cheap landfilling are already creating a natural business incentive for a change. Creating markets for waste streams not already recycled will clearly reduce waste further, as will incentives for automotive shredders to invest in the latest Post-Shredder Technologies.

38. End-of-Life Vehicle recycling targets, alongside safety and air quality regulations, limit the auto industry's ability to meet its principle environmental focus of reducing CO_2 emissions. Recycling targets penalise manufacturers that include a light-weighting approach in their low-CO2 strategies.

How does Government policy link up with European strategies and action plans?

39. The end-of-life vehicle experience has been uniform across the EU and other countries. As a global business the automotive industry needs a common and consistent approach. Piecemeal national solutions will elicit a sub-optimal response.

What lessons can be learnt from other countries – within the EU and globally?

40. The end-of-life vehicle experience has been uniform across the EU and other countries.

Consumer behaviour

How can better product design be used to effect a change in consumption patterns and behaviour?

41. Fuel economy indicators and gear shift indicators can support the right change in driving behaviour and use of vehicles. Consumers demand increased durability and longevity – slowing the rate of penetration of more efficient products into the market.

What role do marketing strategies play in influencing more sustainable design?

42. The in-use phase of the product life-cycle has the greatest impact in environmental terms. Fuel consumption, as a proxy for CO2 emissions, is already an important factor in the consumers purchase consideration. As well as meeting our legal obligations to disclose the CO2 emissions of our products, we further advise our consumers on a voluntary basis through printed media and at our dealerships. Further research into consumer attitudes to the environment would be welcomed.

Are there any gaps in knowledge in this area?

43. Consumers are the key to success. Their demand triggers production and consumption. Therefore research activities around the establishment and maintenance of sustainable consumer behaviour would be welcomed.

Skills

To what extent are considerations of sustainable waste reduction part of broader industrial training courses?

44. These considerations are already integral to the Ford product design philosophy.