

EPR in the aviation industry

Summary

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This research was based on the anticipated introduction of the Extended Producer Responsibility (EPR) principle into the aviation industry. Lindhqvist (2000) defines EPR as:

" A policy principle to promote total end-of-life cycle environmental improvements of products systems by extending the responsibilities of the manufacturers of the product's life cycle, and especially to the take-back, recovery and final disposal of the product"

The underlying goal of the EPR policy is to place the responsibility for waste management with the producers or OEMs of the products, this creates a strong incentive for the producers to think about their current designs. Responsibility is placed with the manufacturers with the idea that the manufacturers have the capacity to make changes at the source. Changes with the objective to reduce the environmental impacts of their products throughout their entire life cycle, including end-of-life waste disposal.

A growing world economy, world trade, and airline competition in liberalized markets are factors which will generate an increase in annual passenger growth rates in the commercial aircraft industry. A growth in air travel demand forecasted by one of the two commercial aircraft manufacturers, commercial aircraft being defined as aircraft which accommodate 100 passenger seats or more, The Boeing Company indicates a 4.9% growth in air traffic demand over the next 20 years. In order to accommodate the anticipated growth, new aircraft enter operational service. New aircraft will also replace older less fuel-efficient and noisier aircraft. Airbus estimates that between the year 2006 and 2023, 7.229 commercial aircraft will be definitely retired from service or will be converted into freighters or non-airline roles such as museums. The Boeing Company estimates that by the year 2025, 7.360 commercial aircraft will be definitely retired from passenger service.

These observations lead to the following problem definition. The volume of commercial aircraft expected to be retired over the next two decades is creating important challenges for current EOL management activities. With the anticipated introduction of the EPR policy in the aviation industry, the question arises what the possible impacts on current ELA management activities will be. Since to this day it is not clear yet if, and if so when the EPR policy will be introduced. The

objective of this research is providing a first assessment of the possible impacts of the EPR policy on current end-of-life aircraft management activities. Related to the objective of the research question the following research question is presented:

“What are the anticipated impacts of the introduction of Extended Producer Responsibility on current end-of-life aircraft management activities?”

The contribution of this paper is expanding the EPR principle to the aviation industry, which has not been discussed as of yet. In addition to de Brito et al., (2007) the current available academic literature on the specific topic of EPR in the aviation industry is very limited. However, the available literature related to the issues of this research was studied, in order to get a better understanding of the main and related research topics. In order to find an answer to the main research question and related sub-questions qualitative case studies were conducted. These case studies were conducted in related transport sectors, being the automotive and shipping industry. The automotive industry was selected because in this industry the EPR policy was recently introduced through the ELV Directive (Directive 2000/53/EC). The shipping industry was selected because there is an increasing international focus for the development and introduction of sustainable environmental friendly methods for ship-breaking. In completion of the case studies, a selection of personal interviews was conducted. These interviews were conducted with actors involved in the EOL management of all three industries. The purpose of these case studies was to first identify relevant observations related to the expectations and outcomes, based on the introduction of the EPR policy. Through the relevant observations identified in each case study, lessons to be learned for the aviation industry were identified. By doing so, the lessons to be learned served as a benchmark for making a first impact assessment of the anticipated impact of the EPR policy on current EOL management activities.

Research found that there are strong differences but also close similarities between the three studied industries. However, it is the core activity as being conducted in all three industries which has lead, is leading or is anticipated to lead to similar environmental, social and economic issues. An important observation from the automotive case study is that EOL legislation as introduced for the automotive industry is **not directly transferable** to the aviation industry. This is mainly caused by the specific industry characteristics as present within the automotive industry. The shipping industry brings forward a similar observation, complemented with another barrier contributing to none direct transferability possibilities. This barrier is created by the fact that

currently there is no international or EU binding legislation present for the regulation of EOL activities as conducted in the shipping industry.

However, both industries brought forward important lessons to be learned for the aviation industry, mainly based on responsibility, monitoring and control issues. In their study, Gerrard and Kandlikar (2005) identified three categories of change expected to occur if legislation has been effected in the automotive industry. Based on these anticipated changes, two categories of change are also expected to occur in the aviation industry. These changes are; *design changes* and *an expected increase in the extent of ELA material recovery*. One additional expected change is added in this research. This additional change is related to the treatment of unnecessary parked aircraft and is based on the desire expressed by the EC to reduce the use of virgin resources. The anticipated outcomes of the expected changes were based on the identified lessons to be learned derived from both case studies, and the conducted interviews with actors involved in ELA management.

A decisive factor contributing to the introduction of the EPR policy is the aviation industry's environmental awareness and capabilities in managing current and future EOL challenges. Currently environmental awareness is strongly expressed through the establishment of two separate industry initiatives. These initiatives, set forward by The Boeing Company and Airbus, set out to develop and establish best practice standards and codes of conduct for the environmental friendly management of retired aircraft. The continuous development of setting forward best practice standards, strongly questions both the need and likelihood of a governmental initiative. Especially if made clear that the current EC standpoint states that there are **no immediate plans** to implement aircraft recycling legislation. However, after the recent focus on related transport sectors the aviation industry seems next to follow at some point in time.

What becomes clear is that the future of ELA management will be structured through one of two initiatives. Either through a governmental initiative or through the continuous development and implementation of the best practices and codes of conduct established through the industry initiatives.

The industry initiatives have one major benefit over the governmental initiative. The current industry initiatives are based on the obvious issues faced by actors active in ELA management for many years. Through the continuous development of these best practices, new levels of dismantling, recycling and disposal techniques, with a maximum of respect to environmental, economic and social considerations are set forward. Furthermore, an industry wide impact is

expected to be created, anticipated to influence any legislation likely to emerge. However, one must consider that the industry initiative is **more vulnerable to transgressors** due to the absence of a legislative body. In the absence of a legislative body, the control over the conducted processes should become a matter of self regulation.

The vulnerability of industry initiatives can be limited through the collaboration between a third party and governmental body. This also provides a means to increase the development, introduction and control of any proposed legislation. The issuing of rewards and acknowledgements increases the possibility of compliance with best practice standards for aircraft owners.

Likely or unlikely, this research brings forward an overall conclusion based on the anticipated outcomes of the expected changes related to the governmental initiative, which are as follows; When applied across the EU or global, legislation may bring substantial environmental benefits. However these benefits are expected to be moderate in proportion to the total life cycle impact. The economic benefits are expected to be similarly substantial, but may be overshadowed by the total lifetime expenditure, if changes in material composition away from composites shall occur. Therefore, in the future, incorporating recyclability into the design will become more important. However, a drive toward achieving **operational costs efficiency and safety considerations** will remain the main drivers for aircraft design. Since a movement away from composites is found not to occur, it is clear that innovations in recycling are needed in order to meet potential future legislative targets. Research found that innovations in recycling are occurring. However it is not clear if these innovations are primarily driven by the anticipation of recycling legislation. Economics and social corporate responsibility are also decisive factors driving current aircraft material recycling techniques. Economics expressed through the desire to reclaim as much of the EOL materials based on the anticipation that raw materials are going to become more expensive. And social corporate responsibility expressed through the thought that manufacturers want to become a part of the solution.

If introduced, it is expected that the introduction of the EPR policy in the aviation industry will be less complicated compared to the introduction in the automotive industry. This is expected based on the fact that lower volumes of EOL waste streams create better monitoring and control possibilities. Furthermore, the limited number of manufacturers provides the opportunity to better identify and place responsibility amongst actors. This also creates better coordination and controlling possibilities which contributes to better introduction possibilities.

This research also provides three recommendations which will contribute to a successful introduction of governmental introduced aircraft recycling legislation.

- 1) During the development process it is recommended that the current industry initiatives are taken into account. This is recommended because the current industry initiatives are based on the obvious issues facing today's current and future challenges related to EOL management activities in the aviation industry. Incorporating this knowledge into the development process will form the basis which prevents pointless and unenforceable legislation. In this way the content and the design of aircraft recycling legislation is based on the industry characteristics and foremost its capabilities. Resulting in an optimal solution in order to achieve what is best for the **planet** as for the **industry**.

An issue related to the interaction during the design phase, is that the actors in the aviation industry are expected to be more willing to accept the purposed legislative requirements. This because the actors were able to participate in the design stage, making it more achievable (making sure that the specific targets are achievable) and therefore do not see the legislative requirements as a threat for their business practices.

- 2) Optimally aircraft recycling legislation would be introduced on a global level. This because the introduction on a global level would contribute to a global unified objective to reduce environmental impacts from ELA handling. Furthermore global binding recycling legislation would aid in preventing the uncontrolled movement of retired aircraft, including EOL waste streams throughout the globe.
- 3) Monitoring and control systems should be put in place, as these are important to control compliance with legislative requirements. Furthermore, it must be made clear what the responsibilities are for each actor involved. By doing so, the introduction and most importantly complying with regulations are made more achievable.

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