

A GLOBAL COMPARISON OF END-OF-LIFE VEHICLES POLICIES

E. EL HALABI¹, M. DOOLAN², AND B. NEWELL³

¹*The Australian National University, Faculty of Engineering, Canberra, ACT 2601 Australia,
Email: ezzat.elhalabi@anu.edu.au*

²*The Australian National University, Faculty of Engineering, Canberra, ACT 2601 Australia,
Email: matthew.doolan@anu.edu.au*

³*The Australian National University, Fenner School of Environment and Society, Canberra, ACT
2601 Australia, Email: barry.newell@anu.edu.au*

Waste generated by End-of-Life-Vehicles (ELV) has been a driver for several industrialised countries, typically in Europe, to adopt active management policies and regulations. In this paper, we will examine the ELV policies implemented in the following countries: Germany; Japan; Sweden; Netherlands; and United Kingdom. We will present the context in which these policies were created, and highlight some of the aspects of these policies. Comparisons will be drawn between the different policies identifying and contrasting the resulting effects. We conclude by highlighting the need to address used-car-export, which can be viewed as transferring waste to other countries. We also emphasize the importance of having a reliable data collection and reporting framework for the disposal stream, as means to evaluate ELV policies effectiveness.

1. Introduction

Over the past two decades, governments in several countries around the world have been working on minimizing the car's impact on the environment throughout its lifecycle. By setting, for example, increased fuel efficiency or stricter emission targets, legislators hope that their ever growing national car fleets will have a smaller footprint on the dwindling fossil fuel supply, and perhaps will contribute less to continuously increasing air pollution and green-house gas concentrations. Similarly, legislators who enacted End-of-Life Vehicles (ELV) policies are anticipating better extraction of materials and/or energy from ELV waste; leading to less ELV waste ending up in scarcer landfills, with the waste itself being less harmful to the environment. But, are these policies really working? Furthermore, are there policy-induced secondary effects offsetting the anticipated reductions in ELV waste and hence, making it harder to reach the intended goals?

Most recent research in the field has looked into technological and business aspects of ELV policies: such as exploring technological barriers to achieving recyclability goals (Gerrard & Kandlikar, 2007) and examining market adaptation to new regulations (Ogushi & Kandlikar, 2005) and (Unknown, 2002). There have been a number of comparative studies of countries' specific ELV practices (Nakajima & Vanderburg, 2005), but they often concentrate on the effectiveness of these policies in a single dimension, often that of percentage reduction in waste sent to landfill. Limited research was found that analyzes secondary effects induced by these policies; the work of Kumar

and Yamaoka (2006) shows that Japan's ELV regulation is likely to be linked to increased used car export if no remedial action is taken.

By analyzing used car export data and other statistics from a number of countries (Germany, Sweden, United Kingdom, Netherlands and Japan) that enacted ELV policies, this paper suggests that these policies are indirectly encouraging the export of ELV to other countries where ELV treatment (de-pollution, dismantling, etc.) may be environmentally unsound or non-existent. From a global environmental perspective, these ELV policies could simply be moving the ELV issue across the border. This paper also highlights the gaps between relevant data collection and reporting mechanisms that are crucial to assess the effectiveness of these policies.

2. Background and Contrast of Policies

The European Union (EU) ELV Directive of 2000 (Directive 2000/53/EC) mandated that all Member States transpose the directive into laws and regulations by April 2002. The EU ELV directive addressed several key areas in vehicle life cycle from cradle to grave. The key areas included:

- Prevention (Relative to car manufacturers and associated suppliers): Dictated limiting the use of hazardous materials in car manufacturing. It also set out provisions for design, dismantling, reuse and recovery. It also encouraged an increase in the use of recycled materials. Lead, Mercury, Cadmium and Hexavalent Chromium were to be banned by January 1, 2003.
- Collection: Provision of an adequate collection system which insures that all ELV are taken up by authorized treatment facilities. It calls for a deregistration process which issues a certificate of destruction for every dropped-off ELV. The last owner of an ELV bore no cost associated with ELV treatment, except where main parts, such as engine/transmission, of the vehicle are missing.
- Treatment: ELV storage and treatment must be done in an environmentally sound manner which implies regulating the treatment. The adoption of certified environmental management systems was encouraged.
- Reuse and Recovery: Through reuse, recovery and recycle of car parts. General targets for reuse/recovery were set at 85% by 2006, and 95% by 2015.
- Coding standards and dismantling information: Car manufacturers and part-makers must use component and material coding standards to help identify parts that are suitable for reuse and recovery when dismantling the vehicle. Car manufacturers must also provide dismantling information on new models and the location of hazardous materials and make the information available to authorized dismantling businesses.

The EU ELV Directive was transposed, with slight variations to recycling goals, zero liability conditions, and reporting frameworks into most member nations of the European Union. (Fergusson, 2006). However, the process has been slow even though some countries already had laws or voluntary industrial agreements that dealt with the ELV predicament (Zoboli *et al.*, 2000); furthermore, the implementation proved problematic in

regards to measurement of recycling/reuse rates as well as on collection of associated statistics throughout the reverse supply chain (Lucas, 2001).

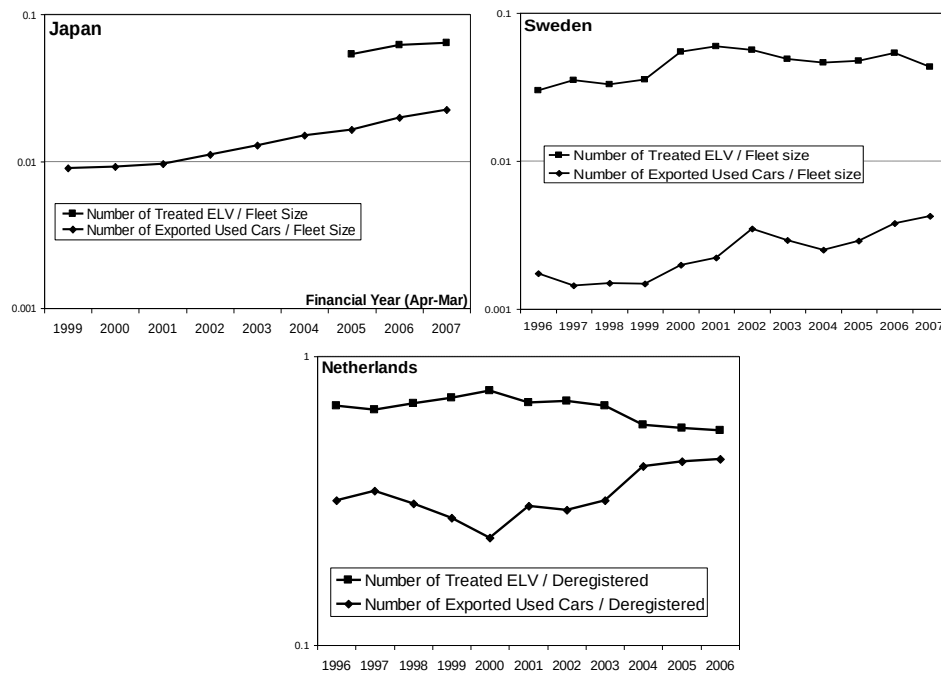
On the other side of the world, Japan's historical concern with landfill availability and waste generated by Automotive Shredded Residue (ASR) lead to passing the Automobile Recycling Law in 2002, which took effect from January 2005. The law covered all forms of four-wheeled vehicles irrespective of size or weight, whereas the European ELV directive only covered vehicles designed for carrying less than 9 passengers, and with gross weight of 3.5t or less.

Under Japan's ELV law, car manufacturers were assigned the responsibility of handling only ASR, Fluorocarbons, and airbags generated by ELV dismantling and shredding. Vehicle owners were to cover the cost of ELV treatment via a fee collected at the time of new car purchase, or at the time of vehicle inspection for older vehicles. The Japanese law placed heavy emphasis on the information management required for funding and reporting purposes. The law also set the ASR recycling targets to 30%, 50%, and 70% to be reached by 2005, 2010, and 2015, respectively. In addition, 85% of airbags must be recovered from the total number of ELV treated. It is worthwhile mentioning that several Japanese car manufacturers (like Nissan) have already met or exceeded the 2015 recycling targets.

The EU's ELV directive was specifically directed at standardizing the then-present (pre-1999) policies and voluntary agreements in 10 Member States, and extending this framework to other Member States. Most of those previously followed policies, as well as Japan's Automotive Recycling Law, were originally motivated by the emerging need to reduce the car's impact on the environment throughout its lifecycle (as part of a global move towards sustainable development Kanari *et al.* (2003) and Kim (2002)); another motivation factor was the desire to reduce ASR volumes ending up in landfills.

3. The Used Car Export Issue

When comparing (a) the number of ELV treated in Japan, Sweden and Netherlands, to (b) used-car export figures in these countries, a common trend is identified; that of increasing exports. Keeping in mind Janischewski *et al.* (2003)'s suggestion that "Old Car Regulation" or ELV regulation is an important factor driving an increase in used-car export, a correlation can be made between the years of implementation of ELV policies and an upward trend in used car export, even though Sweden and Netherlands previously had ELV regulations. In the case of Japan (Figure 1), the annual increase in used-car exports since 2002 (the year when the ELV law was passed) has been 16.7% on average (JUMVEA, 2008). In the case of Sweden and Netherlands, both of which previously had ELV legislations, once the EU's ELV Directive was being adopted (in 2000/2001) there has been a correlated increase in used-car exports from these counties. The Netherlands ELV treatment trend could be of a concern because, while used-car exports are increasing, no comparable increase in treated ELV's is found (Figure 3). It is interesting to note the slight decrease in treated ELV and the slight increase in used-car export in 2007 in Sweden when the 'vehicle disposal premium' (an incentive paid to last owner for delivering an ELV) was abolished (Figure 2).



Figures 1 2 & 3, Logarithmic scale comparison of Japan's, Sweden's and Netherlands' used cars export and ELV treatment data normalised against fleet size, and in the case of Netherlands, normalised against vehicle deregistration data (Sources for Japan JARC, JAMA, and JUMVEA; for Sweden SIKa, for Netherlands ARN).

4. Statistics Control and Information Management Issue

In the case of Germany's used car export as shown in Figure 4, there is a significant gap between the estimates and the actual figures. While the gap can be attributed to criteria in the export-reporting criteria, it also raises concern about the adequacy of the system in tracking deregistered vehicles; compounded with absence of official figures of ELVs, this issue makes it difficult to assess the success of the ELV policy (Rainer, 2001).

There is also a similar problem in the case of the UK's ELV de-registration figures; that is, there is a significant gap between official data on ELV treated cars (763,000 reported destroyed in 2006 via issuance of a CoD - Certificate of Destruction) and the 2 million car estimate. This indicates a major compliance-prompting revision to legislation in order to overcome the shortfall in reporting of and the operation of unlicensed dismantlers/shredders (letsrecycle.com, 2007).

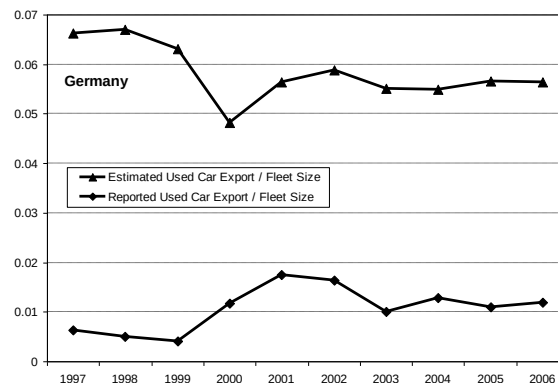


Figure 4, Comparison of Germany's reported used car export data and estimation (70% of exports) based on vehicle deregistration data, normalised against fleet size (Source: Federal Statistical Office of Germany via personal contact)

5. Conclusion

Looking back at the ELV policies considered in this study, no provision was found regarding export of ELVs; as a matter of fact, the recycling fee in Japan is reimbursed to the last owner or entity if the vehicle is exported. This can be viewed as incentive to export rather than to process the vehicle locally; not to mention the obvious revenue to be derived from selling a used car into an export market.

While not all used-car exports are ELVs, we can reasonably suggest that these hidden incentives are moving the ELVs across the borders, often to countries that lack the resources and legislations for environmentally safe end-of-life treatment. Export statistics from countries analyzed in this study suggest that the bulk of used-car exports are heading to Africa (Algiers, Nigeria), and to the eastern states of Europe (Russia).

An evaluation of the success or effectiveness of ELV policies largely depends on statistical control of the ELV system, and data collection at various intervals in the disposal stream. This includes de-registration, dismantling, and shredding. It also includes an export component where whole cars, car parts and even shredded metal/residue could be shipped abroad. Reporting on implementation progress is mandatory by the EU ELV Directive, but we could not locate official statistics for Germany or UK on the number of treated ELV. Add to this is the issue of compliance (unlicensed dismantlers and shredders). Given the complexity of the mix, and the poverty of the data, it is difficult to judge whether the adopted ELV legislations around the world are delivering on their promising recycling targets, both from national and global environmental perspectives. The indications are, however, that the main aims of the ELV programs are not being met when looked at globally.

Acknowledgments

The authors would like to thank the Commonwealth of Australia and the Cooperative Research Centre for Advanced Automotive Technology (AutoCRC) for the financial support to this research. Also, the authors would like to thank Professor Aleksandar Subic for, without his vision and support, this project would not have materialized.

References

- ARN – Auto Recycling Nederland (2008) Results (In Dutch) (online). Available: <http://www.arn.nl/engels/3resultaten/32.php>. (Accessed 30 April, 2008).
- Fergusson M. (2006) End of Life Vehicles (ELV) Directive: An assessment of the current state of implementation by Member States, Policy Department Economy and Science, European Parliament.
- Gerrard J. and Kandlikar M. (2007) Is European end-of-life vehicle legislation living up to expectations? Assessing the impact of the ELV Directive on ‘green’ innovation and vehicle recovery, *Journal of Cleaner Production*, 15/1, 17-27.
- JAMA – Japan Automobile Manufacturers Association (2008) Motor Vehicle Statistics (online). Available: http://www.jama.org/statistics/motorvehicle/inuse/mv_use_year.htm. (Accessed 30 April, 2008).
- Janischewski J., Henzler M. and Kahlenborn W. (2003) The export of second-hand goods and the transfer of technology: An obstacle to sustainable development in developing countries and emerging markets?, *Adelphi Research*.
- JARC – Japan Automobile Recycling Promotion Center (2008) *Status for Recycling* (In Japanese) (online). <http://www.jarc.or.jp/automobile/manage/>. (Accessed 30 April, 2008).
- JUMVEA – Japanese Used Motor Vehicle Exporters Association (2008) *Used Car Exports* (In Japanese) (online). Available: http://www.jumvea.or.jp/up_img/info/36/if_f01.pdf. (Accessed: 30 April, 2007).
- Kanari N., Pineau J.-L. and Shallari S. (2003), End-of-Life Vehicle Recycling in the European Union, *JOM*, 55/8, 15-19.
- Kim N. (2002), Exploring Determinant Factors for Effective End-of-Life Vehicle Policy. MA Diss. Lund University, Lund, Sweden.
- Letsrecycle.com (2007) Evidence problems for UK vehicle recycling system (online). Available: <http://www.letsrecycle.com/materials/metals/news.jsp?story=6791>. (Accessed 30 April, 2008)
- Nakajima N. and Vanderburg W. (2005) A Failing Grade for the German End-of-Life Vehicles Take-Back System, *Bulletin of Science Technology and Society*, 25/2, 170-186.
- Ogushi Y. and Kandlikar, M. (2005) *The Impact of End-of-Life Vehicle Recycling Law on Automobile Recovery in Japan*, Fourth International Symposium on Environmentally Conscious Design and Inverse Manufacturing. Tokyo, 12-14 Dec.
- Rainer L. (2001), End-of-life vehicle regulation in Germany and Europe – problems and perspective, *Wuppertal Papers*, 113.
- SIKA – Swedish Institute for Transport and Communications Analysis (2008) *Fordon enligt vägtrafikregistret kvartal 4 och helår 2007* (online). Available: http://www.sika-institute.se/Doclib/2008/Statistik/ss_2008_4.pdf. (Accessed 30 April, 2008).
- Unknown Author (2002) Waste not, want not [EU End-of-Life Vehicle Directive], *Manufacturing Engineer*, 81/2, 54-58.
- Zoboli R., Barbiroli G., Leoncini R., Mazzanti M. and Montresor S. (2000) *Regulation and Innovation in the Area of End-of-Life Vehicles*, IDSE-CNR.