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A Comparison of End of Life Vehicles' Recycling Systems in Japan, Korea, and Taiwan.

Ken'ichi TOGAWA [1)]
[1)] Research Center For Coal Mining Materials, Kyushu University, Japan.

Until the 1980s, the disposal of End of Life Vehicles (ELV) was considered unproblematic in Japan, Korea, and Taiwan. But in recent years, as environmental problems have attracted increasing attention, the processing of ELV has become one of the most critical environmental issues. Discarded ELV represent a serious source of waste generation and pollution. In this paper, I will analyze the ELV problem from three view points: 1) ELV abandoned in the environment; 2) Significant environmental hazards caused by dismantling operations; and 3) Problems of how to deal with Automobile Shredder Residue (ASR).

Keywords: End of Life Vehicles (ELV) , Automobile Shredder Residue (ASR), Extended Producer Responsibility (EPR)

Introduction

Japan currently disposes of approximately 4.2-4.3 million automobiles every year, and except for a significant number that is bound for export as used cars, approximately 75% to 80% by vehicle weight is reused for parts and raw materials. The current 75%-80% rate for motor vehicles is high compared to the recycling rates of other manufactured products. In order to reduce emissions and disposal of vehicles inherent in the production-use-disposal life cycle of automobiles even further, it is necessary to implement plans for effective recycling.
In EU countries the policy for the ELV problem is characterized by following three principles. They are
1) Preference for waste prevention,
2) Transfer of responsibility to handle discarded products to vehicle manufacturers, the so-called Extended Producer Responsibility (EPR) principle,
3) Stimulation of environmentally conscious product development.
In this paper, I analyze to what extent these policy initiatives are observed in Japan, Korea, and Taiwan. Furthermore I will analyze the ELV problem from the following three view points:
1) Abandoned ELV in the environment,
2) Significant environmental hazards caused by dismantling operations,
3) Problems of how to deal with Automobile Shredder Residue (ASR).

Abandoned ELV in the environment

Few reliable figures are available on the number of abandoned ELV (not delivered to dismantlers), but it is generally agreed that this phenomenon is significant in various countries and regions and create adverse environment impacts. For this reasons, the perfect collection of ELV is one of the key objectives of EU Directive.
The system for handling ELV in Korea is governed by 'Motor vehicle Control Act'. The Act places the responsibility for vehicle scrapping directly on the vehicle owners. A vehicle owner can only cancel a vehicle registration after he gets a certificate from an authorized vehicle dismantler showing that his vehicle was properly scrapped according to the law. However, the take back rate of ELV is not so good.
The number of abandoned ELV in the environment per year in Japan, Korea, and Taiwan is about 25,000, 60,000, and 30,000 respectively. The reason why the figure for Japan is relatively small is that the trade-in system in auto market works well.

Significant environmental hazards caused by dismantling operations

The dismantling industry has an essential role in ELV for reaching substantial increases of recycling rates.
The first step taken by dismantlers with an ELV is the removal of all vehicle fluids, followed by disassembly of the vehicle into its component parts. All reusable parts and all parts destined for material recycling are then dispatched for appropriate processing.
The market structure of dismantling industry is characterized by a great number of workers most of which is small and technically back-warded. In some cases, especially in Japan and Taiwan, dismantling industry has been characterized as being "shady" as well as being limited by technical and environmental requirements. Thus a significant amount of illegal dismantling operation happens. There is, however, also a core of more efficient and well-organized dismantlers, and the development of ELV initiatives by government tends to enlarge this core.
In Taiwan, the deposit-refund system is introduced in order to increase competent dismantlers. The dismantlers could receive refunds according to proper dismantling. The Taiwan's system is similar to that of the Dutch. The Dutch system, introduced in 1995, is based on a disposal fee paid by first owner of new car registered in the Netherlands. The fee is deposited in a fund which reimburse the dismantlers and shredders for the extra costs incurred in properly draining and dismantling automobiles. In Taiwan in order to receive such refunds, dismantlers must be registered. The number of registered dismantlers

was 210 in October 2000. In Korea the dismantlers are also registered. The number of registered was 277 in December 2000. But in Japan, there is no registration system for dismantlers. It is believed that 4,500 to 5,000 dismantlers exist in Japan.

Problems of how to deal with Automobile Shredder Residue (ASR)

When the sorting process by dismantlers is completed, all remaining parts and materials are dispatched to a shredding facility where they are turned into Automobile Shredder Residue (ASR). Steel and nonferrous metal particles in the residue are separated for recycling, and the remaining shredder residue is finally disposed of as landfill.

The number of entrepreneurs using shredder machine in Japan, Korea, and Taiwan is about 180, 5, and 2 respectively (in April 2001). From the international point of view, the Japanese number is quite high. In Japan, shredder residue from ELV amounts to about 800,000 tons a year, most of which is disposed of in landfills. However, shrinking landfill availability underscores the need to address this problem.

In considering this problem, the following points must be kept in mind:

1) The price of scrap has been falling for last 20 years;

2) After the illegal disposal trouble at Teshima island, landfill space for ASR is being limited and the disposal cost of ASR has been increasing.

In Taiwan the same problem has become serious, but in Korea this problem has not been tangible.

Results and Discussion

The points are summarized in following table.

		Japan	Korea	Taiwan
1	the number of ELV per year	about 4,200,000	about 500,000	about 400,000
2	the number of ELV abandoned in the environment per year	about 25,000?	about 60,000	about 30,000
3	Significant environmental hazards caused by dismantling operations	serious	serious	serious
4	the number of dismantlers	4,500- 5,000	277=all of them are registered	210=resistered
5	the problems of how to deal with ASR	serious	not so serious	increasingly serious
6	the nember of entrepreneurs using Shredder Machines	about 180	5	2
7	are ELV goods or wastes?	case by case	goods	goods
8	who pays for the dispose of ELV?	decided by market mechanism	decided by market mechanism (deposit- refund systems for tires and lubricants)	decided by market mechanism (deposit- refund systems for automobiles)

Conclusion

After the EU Directive on ELV was published, Japanese government has started to examine the ELV Recycling Act. In EU Directive, producers should take back the ELV itself free of charge. In order to solve the above-mentioned problems, especially how to treat ASR, Japanese government requested car producers to take back ASR in the framework of EPR.

EPR is the concept that manufacturers and importers of products should bear a significant degree of responsibility for environmental impact of their products throughout the product life-cycle, including upstream impacts inherent in the selection of materials for the products, impacts from manufacturers' production process itself, and downstream impacts from the use and disposal of the products. Therefore, producers need to accept their responsibilities when they design their products to minimize life-cycle environmental impacts, and also accept legal, physical or socio-economic responsibilities for environmental impacts that cannot be estimated by design. Under this circumstance the car manufacturers have begun to take part in the ELV treatment market in many OECD countries.

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