An EU funded project

Second Workshop

Development of the Waste Management Plan for end of life vehicles

2nd of December 2016




An EU funded project

Assessment of Needs for Proper Hazardous Waste Management in Serbia, Investment and Operational Costs

Content

Specific WMP on ELVs

I. **Options for collection;**

II. **Options for treatment, recovery and disposal;**

III. **Estimated investment and operational costs for appropriate waste management**

Options for Collection

An end-of-life vehicle is a specified vehicle which is discarded or is to be discarded as waste by its registered owner. Vehicles normally reach the end of their useful lives, either due to age (typically around 12-14 years), or because of heavy damage following an accident. Therefore, there is **no fixed age** at which a vehicle can be considered an end-of-life vehicle.

Producers of vehicles bear the obligation to organize or participate in **individual or collective** systems for the alternative management of the vehicles and to promote the most appropriate method of management.

Options for Collection (MS examples)

The German example: Car producers have to take back all the vehicles of their brand in an authorized collection facility or an authorized dismantling facility designated by the car producer. At the collection or dismantling facility, the owner is given a CoD. The take back system for end-of life cars is explicitly required to be cost free. The German legislation also requires for a "sufficiently comprehensive network of authorized collection facilities or authorized dismantling facilities".

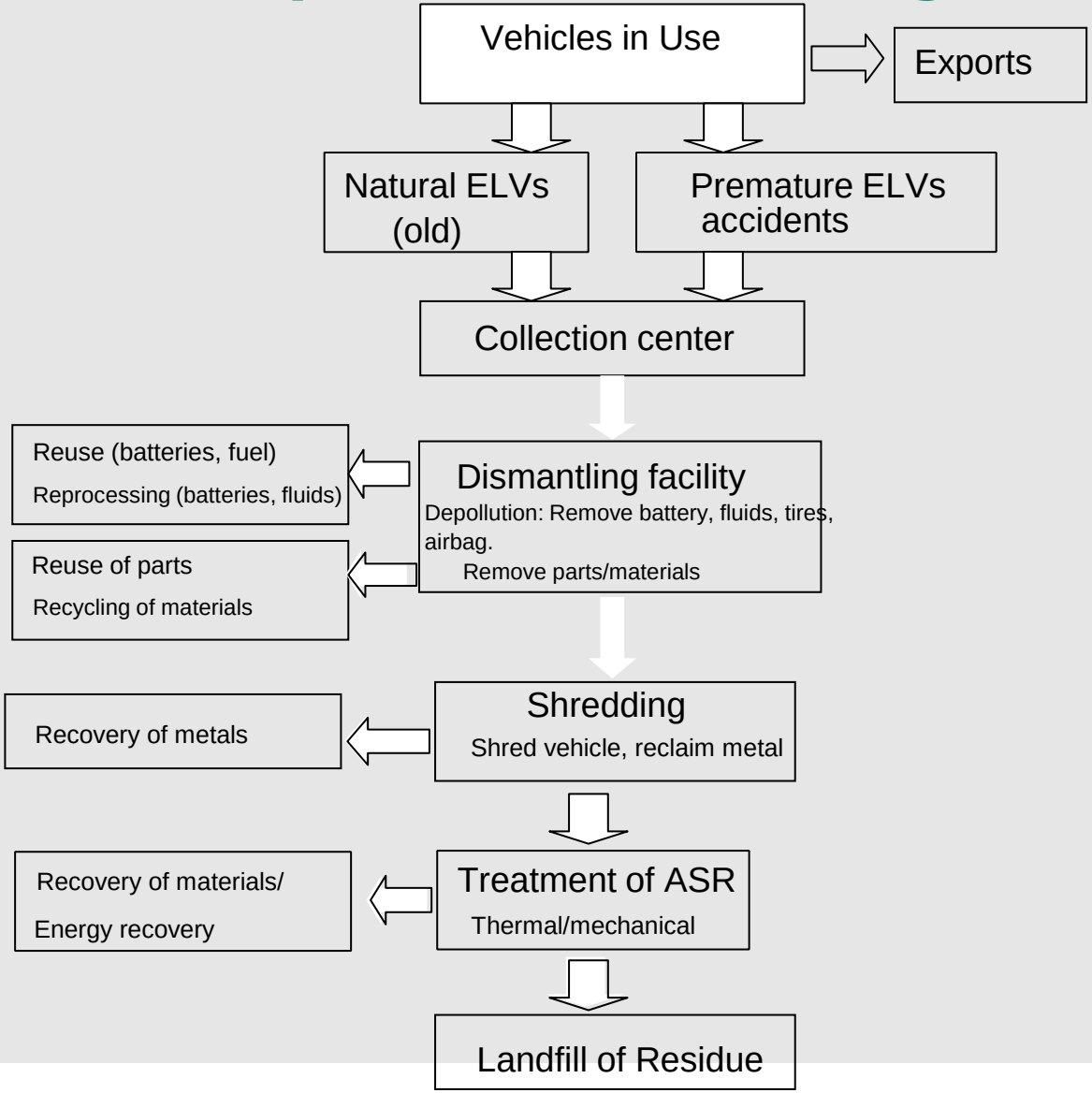
The Dutch example: The last owner of a vehicle can deliver it free of charge to a recognized garage, dismantler or vehicle repair company. It is interesting to note that, unlike most MS, the Dutch legislation provides for free take-back regardless whether the vehicle is complete or not. Dismantling companies are free to trade among themselves before disassembly.

Options for Treatment, Recovery and Disposal

Processing of ELVs includes the following stages:

- Depollution and dismantling;
- Shredding;
- Post shredding technologies.

Description of ELV Arisings and Treatment



Depollution and Dismantling

The first stage of processing includes the removal of hazardous substances and liquids from the vehicle. More specific, depollution includes removal, separate collection and temporary storage of:

- Fuel
- Brake fluid
- Engine oils
- Power steering oil
- Gearbox oils
- Antifreeze liquid
- Hydraulic oil
- Coolant - Heat liquids (air condition)
- Windscreen washer

Depollution and dismantling

Depollution also includes the removal or neutralization of hazardous parts of the vehicle, such as airbags (potentially explosive elements).

The next stage of ELVs management is dismantling. The dismantling of a vehicle depends on the volume and weight of the parts/pieces that are removed and the ease of their removal from the main part of the vehicle.

Depollution and dismantling

From dismantling of vehicle after depollution result parts such as:

- Engine;
- Gear box;
- Ignition;
- Batteries (may contain lead);
- catalysts (contains precious metals)
- Electronic devices;
- Tyres and
- Transmission system.

Which can be for repair and reuse.

According to the ELV-Directive glass and big plastic components have to be separated for recycling. But in practice in many countries this is not done because of the labour costs and the hulk sent to the shredder still contains glass and plastic.

Shredding - Separation

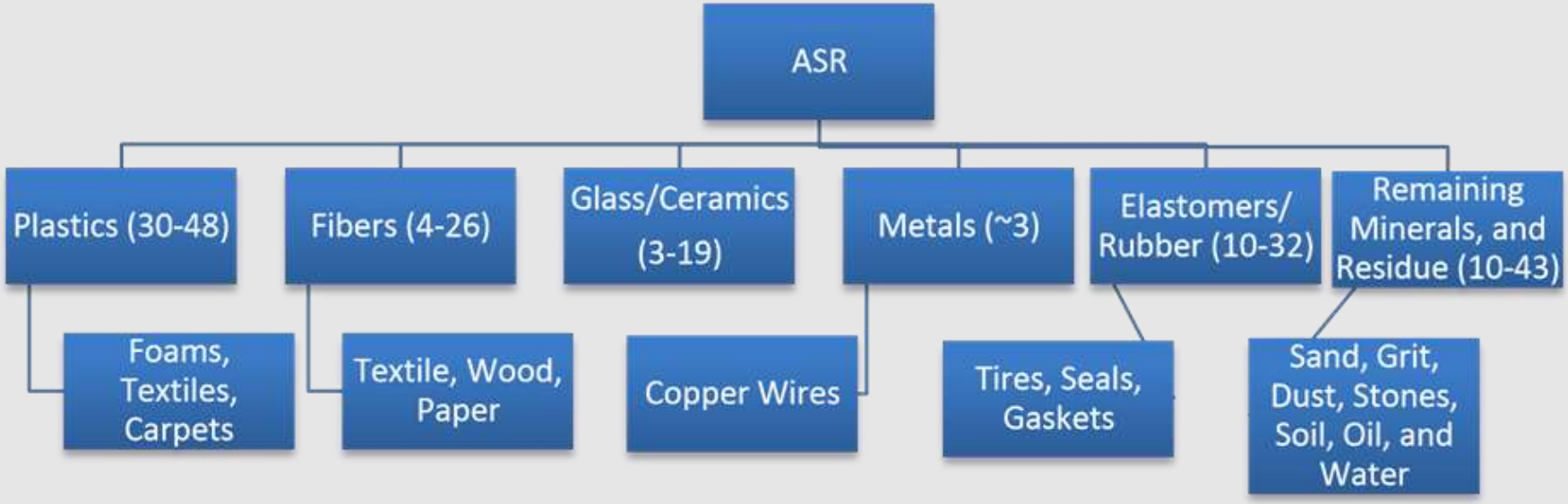
The subsequent stage of ELVs management includes shredding and then separation of materials, into three separate streams:

- ferrous metals
- non-ferrous metals and
- Automotive Shredder Residue (ASR)

ASR can be managed, as follows:

- Final disposal in a landfill;
- Treatment of ASR: Thermal/Mechanical (Recovery of materials/ Energy recovery)

Distribution of Materials within ASR



ASR Material Distribution, % by weight (Modified from Hjelmar, 2009)

Plastics are the main component with fibers, elastomers, and mineral residue all contributing with large portions to the ASR composition. There are several heavy metals that are difficult to extract, leading ASR to be labeled as hazardous waste.

Landfill of Automotive Shredder Residue (ASR)

According to the waste hierarchy landfilling should be the last option for ASR.

In order to avoid landfilling of ASR, is recommended to increase the cost of landfilling, to an extent where treatment of ASR can became more viable as an alternative solution, because it can bring out valuable materials on one hand and it reduces the mass and volume of ASR while, on the other hand, it may also recover energy.

To achieve the targets of the ELV-Directive for 2006 (reuse + recycling = 80%; reuse + recovery = 85%) may be still possible without any PST. To achieve the targets of the ELV-Directive for 2015 (reuse + recycling = 85%; reuse + recovery = 95%) will be possible either with more intensive dismantling operations or with PST

Post Shredder Technologies

Mechanical treatment:

Mechanical separation processes are based on the different physical properties of the materials within ASR. The main fractions of ASR include plastics, fibers, rubber, dust, sand and residual metals.

Post Shredder Technologies

Thermal treatment:

Incineration of ASR uses mainly the energy content of plastic components, but also destroys organic pollutants.

The thermal treatment reduces the volume of wastes, transforms a large part of them to inert materials and reuses their energy.

Thermal treatment of the shredder residues is an option, but comparably expensive.

Estimated investment and operational costs for appropriate waste management

Cost for collection of ELV

The take back system for end-of life vehicles has to be cost free for the owners of the ELV's. It is necessary to install a sufficiently comprehensive network of authorized collection facilities or authorized dismantling facilities across the country taking into consideration the population density.

Cost for treatment, recovery and disposal of ELV

Article 6 of Directive 2000/53/EC requires ELVs to be depolluted prior to any other treatment. Annex 1 specifies the treatment required, which includes:

- removal of batteries and liquefied gas tanks;
- removal or neutralization 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;
- removal, as far as feasible, of all components identified as containing mercury.

Cost for treatment, recovery and disposal of ELV

These materials together account for around 3% of ELVs by weight. Batteries may be reused, if in good condition, or sent for reprocessing. Fluids are generally reprocessed or sold for use as fuel.

In France ADEME has estimated the cost of depollution at 30 euro per ELV.

The Stakeholder Group for the "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, reuse and recovery under the ELV Directive" place the average cost of depollution and essential dismantling at 40-80 euro per ELV, including administration costs.

Cost for treatment, recovery and disposal of ELV

Annex I of the Directive specifies that certain materials must be removed from an ELV at the dismantling stage to promote recycling. These include:

- Catalysts;
- Metal components containing copper, aluminum and magnesium;
- Tyres and large plastic components (bumpers, dashboard, fluid containers, etc.);
- Glass.

According to the ARN system in the Netherlands, the labour costs involved in removing glass and plastics from ELVs exceed the revenues received from the selling as secondary raw materials.

However, the total revenue for selling parts and materials make the system to self-financing.

Cost for treatment, recovery and disposal of ELV

The shells of all ELVs treated are eventually **shredded**, after depollution and after removal of valuable parts through dismantling.

BRA (British Metals Recycling Association) estimates that 1.8m tones of ELVs are processed by UK shredders, producing 1.3m tones of ferrous product (72%), 72,000 tones of non-ferrous product (4%) and 428,000 tones of shredder residue (24%);

ADEME estimated an **income** of 90-95 €/t for ferrous metals and 200-350 €/t of non-ferrous mix recovered from shredders, representing an average of 86-95 €/t of body shell entering the shredder.

Cost for treatment, recovery and disposal of ELV

Landfill of ASR

Auto shredder residue (ASR) accounts for between 15% and 25% of the weight of an ELV, depending on the proportion of materials recovered, and mainly landfilled in the past in the EU.

Landfill cost of ASR are in France estimated at 50-55 €/t; in Hungary app. 40 €/t; in the Netherlands, the rate charged for landfill of ASR is €84/t; and in the UK, current cost of landfilling ASR is app. £35-£40/t (the cost of landfill of ASR £15-£20/t plus the Landfill Tax of £18).

Cost for treatment, recovery and disposal of ELV

Post Shredder Technologies as mechanical separation and thermal treatment

- mechanical separation – there are different technologies used, which have an average gate fee of 90 – 100 euro/t of ASR;

- thermal treatment - different technologies/average have gate fees of 120 – 200 euro/t of ASR.

Investment costs

In the National Waste Management Strategy from 2010 the situation of the management of ELV is analyzed. For the year 2019 a quantity of 124,000 t ELV is expected and for the period 2010 – 2019 an amount of 30 Mio € is estimated to be necessary for the management of ELV.

From the estimations realized in the SWMP for ELV it can be concluded that the annually generated quantity of ELV in Serbia is between 40,000 and 42,000 tons only.

Investment costs

This implies investment costs of one third of the above mentioned costs which is 10 Mio €. Dismantling and shredding infrastructure for ELV should develop progressively with increasing demand.

It is expected that systems and facilities for the management of ELV, being under the responsibility of private sector, will almost completely be funded by private sector from its own capital and/or long term commercial loans.

Thank you!

Ion NAE-MUSETOIU

MSE, Romania