

## CHAPTER 2

### Current status of automobile recycling in the targeted countries

#### **1. Overview of the current status of End-of-Life Vehicle recycling in the targeted member countries of the Association of Southeast Asian Nations**

This chapter presents the current status of automobile recycling in Myanmar, Viet Nam, Thailand, Malaysia, Indonesia, Philippines, India, and Japan. The discussion will focus on (1) the design for recycling (DfR) and regulations; (2) end-of-life vehicle (ELV)/service of vehicle, including inspection systems relating to the state of use of old cars, disposal of ELVs, and registration and deregistration; (3) ELV dismantling facilities relating to the current status of dismantling, shredding, and pollution control; (4) reuse of vehicle parts associated with the sales and usage of used parts, regulation on import and export as well as licensing and quality management; and (5) downstream recycling and treatment facility concerning the current status resource utilisation, waste treatment, and regulation on licensing and waste treatment.

##### **1.1 Design for recycling in targeted countries**

In Viet Nam, Thailand, Indonesia, Philippines, and Japan, DfR is promoted by major manufacturing companies according to their global standard developed in the countries where their headquarters are located. In Malaysia, Proton is promoting DfR by themselves to achieve the requirement of the European Union (EU) ELV directive<sup>1</sup>. Multinational companies in India are promoting DfR as per their global standards. Two major Indian car companies also design and produce their vehicles for export in compliance with EU standards. The entire production of Maruti Suzuki Limited complies with DfR standards. In Japan, major manufacturing companies are promoting DfR not only according to their global standards but also according to their domestic initiatives, in accordance to Article 3 of the Japanese ELV law, which requires manufacturing companies to adopt measures to promote DfR.

Most Association of Southeast Asian Nations (ASEAN) member countries have no regulations on DfR on ELVs. In Japan, the Law for Promotion of Effective Utilization of Resources specifies the responsibility of business entities for implementing 3R – reduce, reuse, and recycle – measures. Manufacturing companies are required by the Japanese ELV law to adopt DfR measures in car design and selection of recyclable components and materials, and to provide relevant information to relevant parties.

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<sup>1</sup> Based on the result of our interview.

## 1.2 End-of-Life/Service of Vehicle

### *End-of-Life/Service of Vehicle and generation of ELVs*

Table 2 shows the number of ELVs disposed in targeted countries. Many countries do not have official statistics on the number of ELV disposals. Therefore, the study group mainly used the estimates of the private consulting firm.

**Table 1. Disposal of ELVs**

	<b>Cambodia</b>	<b>Lao PDR</b>	<b>Myanmar</b>	<b>Viet Nam</b>	<b>Thailand</b>
Total estimated number of ELVs	No information	No information	138,184 (2014)	6,000 (2012)	164,934 (2014)
	Malaysia	Indonesia	Philippines	India	Japan
Total estimated number of ELVs	61,430 (2013)	124,002 (2013)	17,866 (2013)	5,047,205 (2013)	3,430,000 (2013)

ELV = End-of-Life Vehicle.

Source: Yano Research Institute.

Car owners in most of the ASEAN countries continue to use old cars for as long as possible. In many countries such as Thailand, Malaysia, and Indonesia, cars likely circulate from urban to rural areas or they are exported to neighbouring countries. While most countries have inspection systems, the systems do not work successfully. For example, in India, inspection and maintenance systems are not effective. Vehicle owners continue to use old vehicles for much longer than the term of safety use.

When cars are used for a long time and cannot be repaired, cars are considered as ELVs, treated, and disposed. Cars that have figured in accidents are sold to auction companies and auction companies sell them by auction. Some imported used cars and accident cars are sold by insurance companies and broken up for parts to be taken off by vehicle dismantlers.

In Indonesia, there are small-scale car repair shops called 'bengkel'. They repair cars to be used as long as possible by using used parts.

In Malaysia, old cars in the city area generally tend to be sent to rural areas where they continue to be utilised. In case cars cannot be repaired, they are sent to recycling companies. When accident cars cannot be repaired, the ownership of the car is transferred to the insurance company and then the car owner receives the insurance payment. The insurance company sells accident cars to the junk shops through auctions.

In Yangon, Myanmar, if a car owner sends a used car older than 20 years to ELV facilities, the car owner can receive permission to import a new car<sup>2</sup>. This programme provides incentives to stop using too old cars. Hence, the number disposed ELVs increased recently.

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<sup>2</sup> This information was confirmed during the field survey.

In the Philippines, ELVs would first flow to repair shops where usable parts are taken out. Then, along with accident cars, they would be sent to junk shops. In case cars cannot be repaired, parts are removed and bodies are sold to junk shops as scrap.

In Thailand, in case cars cannot be repaired, parts are removed from the cars and the bodies are sold as scrap to waste traders. In case of accident cars that cannot be repaired, the ownership of the car is transferred to the insurance company and then car owner receives the insurance payment. The insurance company sells accident cars to the repair shops or car dealers through auctions.

In Viet Nam, car owners tend to use their vehicles until they are broken<sup>3</sup>. Consequently, the number of ELV is low. In case cars cannot be repaired, parts are removed and other automobile parts are sold to recycling villages such as the village called 'Te Lo village' located in the north of Hanoi.

In India, parts are removed from cars that cannot be repaired and their bodies are sold as scrap to waste traders. Accident cars are sold to auction companies that in turn sell these cars. Currently, small informal sectors are taking in ELV recycling.

In Japan, in accordance with the existing Japanese ELV law, car owners cannot continue to use too old cars since there are strict safety provisions in the inspection system. An e-manifest scheme is introduced for preventing ELVs to be handed to improper traders and to be used as second-hand cars illegally. Japan has a deregistration system. After being deregistered, ELVs are sent to dismantling companies. There is also a nation-wide auction system in Japan. Most ELVs, including accident cars, are sold at auctions.

### ***Regulations on ELVs and service of vehicle***

Most ASEAN countries have inspection and deregulation systems. However, many of these inspection systems do not work properly and many vehicles that fall short of the standard continue to be used. Regulations on service of vehicle are implemented in some countries. Viet Nam introduced the regulation on service of vehicles to prevent the use of too old cars. Expiration periods (end-of-service of vehicles) are set by regulation: 25 years for private cars and 22 years for commercial vehicles. In Thailand, taxis that are more than 10 years old are not allowed to be used for taxi service.

## **1.3 ELV dismantling**

### ***Manual dismantling***

Dismantling activities in most of the target countries are conducted manually. Generally, the informal sector plays a central role in the operation of waste collection/recycling. These activities threaten occupational health and labour safety.

For example, in Indonesia, small companies, mainly those in informal sectors, manually dismantle car parts using gas burners. Non-ferrous metal is sent to aluminium product

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<sup>3</sup> This information was confirmed during the field survey.

manufacturers. 'Lapak', the intermediaries between collectors and informal dealers, collect, select, separate, cleanse, and pre-treat these metals.

In Viet Nam, ELVs generated near Hanoi are dismantled by the informal sector in recycling villages. There is no registered ELV dismantling facility in the country. Steel scraps are sent to steel recycling plants in recycling villages while non-ferrous metals and plastics are sent to plants in recycling villages.

In the Philippines, vehicle dismantling is mainly conducted by repair shops and junk shops. Steel scraps, aluminium, catalysers inside mufflers, including rare metals and plastics, are sent to specialised collectors.

In Thailand, ELVs generated domestically and imported vehicles are dismantled in dismantling companies. Steel scraps are sent to recyclers and catalysers inside mufflers, including rare metals, are sold to recyclers.

In India, vehicle dismantling is mainly conducted by small low-technology units with low yield and capacity. The working condition is quite poor for the estimated 100,000 recycling workers who face severe health threat. There is not enough space for facilities and the facilities are located in residential areas/city centres. An estimated 410,700 tons of scrap (metal, aluminium and plastic) are sent to scrap dealers, while around 7,800 tons of rubber and plastics that cannot be recycled are dumped in open dumping sites.

The situations in Cambodia and Lao PDR seem to be the same and dismantling activities are generally conducted manually in rural areas.

### ***Shredding***

Most countries in ASEAN such as Cambodia, Lao PDR, Viet Nam, Indonesia, Philippines, and India have no shredding processes. However, some advanced countries have introduced shredders.

In Myanmar, the Myanmar Economic Committee (MEC) operates two dismantling facilities. One is located in Thilawa, which is in the south of Yangon, and the other is located in Myingyen, which is southwest of Mandalay. ELVs generated in Yangon, Myanmar are sent to these MEC dismantling facilities. Used auto parts are taken off and their bodies are dismantled manually by gas burners, pressed by guillotine shear, and shredded. The steel is sent to a steel plant of MEC. We could not get information on where the Automobile Shredder Residue (ASR) from the shredding process is disposed.

In Malaysia, the existing shredding and sorting plant is added to authorised treatment facilities (ATFs). ASRs are sent to ASR incinerators. Amsteel Mills, which is a private steel manufacturing company in Malaysia, installed shredding facilities to treat soft press imported from other countries. However, it became difficult to import and now it works much less than its capacity.

In 2013 in Japan, there were 1,083 shredding operations and 1,364 shredding sites. Shredding operators follow the framework set up by the ELV law: crushing of frame and exterior,

recovery of useful metals, handover of shredder dust to the manufacturers, and the recycling fee is supported by car users.

### ***Pollution control***

In Cambodia, Lao PDR, Indonesia, Myanmar, Philippines, and India, hazardous materials such as oil and waste liquid emitted from the dismantling process are not properly treated because the dismantling facilities do not have appropriate pollution control measures. This is because of the lack of implementation capacity of environmental legislation. Inappropriate dismantling causes air, water, and soil pollution. In addition, unsellable materials are illegally dumped in undesignated areas like roadsides or rivers and generate environmental pollution.

In Japan, in accordance with existing Japanese ELV law, ELV dismantling facilities have to introduce pollution control measures. Local governments are responsible for checking whether they are properly introduced when they issue licences to dismantlers. Local governments in Japan are also in charge of preventing the illegal disposal of ELVs and waste generated from the ELV dismantling process.

### ***Licence regulations for dismantling operation***

In many countries in Asia, there is no specific licence regulations for dismantling operations. For example, we could not acquire information on licence regulations for Cambodia, Lao PDR, and the Philippines. In Myanmar, there is no licence regulation but only MEC is allowed to operate ELV dismantling facilities.

However, in some countries, dismantling companies have to require a licence for waste treatment operation. In Indonesia, only certified dismantling facilities, certified and authorised recycling workshops, or collection points that have been nominated by the manufacturers are permitted to issue these certificates.

Malaysia's ATFs will have to get a waste management licence from the appropriate environmental agency and must meet standards to ensure that they store and treat ELVs in a way that does not harm the environment; remove all hazardous components and liquids (known as 'depollution'); and recycle, store, and dispose the parts appropriately.

In Thailand, recycling companies have to acquire a licence according to Notification of Ministry of Industry (MOI) No. 15 (B.E. 2544 (2001)).

In Viet Nam, batteries and liquid wastes from ELVs are in the hazardous waste list, and the recycling and treatment facilities must possess hazardous waste management permits to operate.

In Japan, ELV dismantlers are required to introduce pollution control measures in compliance with relevant environmental regulations. Dismantlers have to dismantle in compliance with requirements under the Japanese ELV law<sup>4</sup>.

### ***Pollution control regulation***

On the definition of hazardous waste in pollution control regulations, ELVs are categorised as hazardous waste in Thailand<sup>5</sup>. Some parts such as batteries are categorised as hazardous waste in Malaysia, Thailand, and Japan.

Pollution control regulations for ELV dismantling differ between countries. Cambodia and Lao PDR seem to have no regulation on pollution control of ELV dismantling because there is no information on it. Myanmar introduced the Environmental Conservation Law and related regulations to prevent environmental pollution. Even though Viet Nam environmental protection laws are introduced, environmental pollution from recycling villages are not properly controlled.

In Thailand, there are various MOI notifications on the control of environmental pollution from dismantling facilities. One example is Notification of MOI B.E. 2548 of 2005 which controls pollution from industries. Thai municipalities monitor the implementation.

In Malaysia, regulations include the 'Environmental Quality (Scheduled Wastes) regulation 2005<sup>6</sup>' and the 'Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989', which prescribe the types of waste treatment, disposal facilities, and licence, as well as the procedure when owners of facilities change and the obligation of informing the amount of waste accepted, treated, stored, and disposed.

In Indonesia, Law No. 32/2009<sup>7</sup> controls pollution from all sectors. Law No. 18/2008 covers certain sectors for industrial waste. Government regulation No.101/2014 regulates hazardous waste. The Basel Convention on hazardous wastes as well as the Convention on Climate Change international treaties, provincial environmental legislation, and local environmental legislation are also applicable.

In India, Automotive Industry Standard (AIS) 129 requests collection centres and dismantling centres to conduct depollution treatment for the dismantling of ELVs.

In Japan, dismantlers are requested to comply with environmental conditions in obtaining the licence in the ELV law.

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<sup>4</sup> Under the Japanese ELV law, dismantlers have to receive a licence from the prefecture in order to operate. To acquire a licence, dismantlers have to show that they comply with the requirements prescribed by the Japanese ELV law.

<sup>5</sup> Notification of the Ministry of Industry, Industrial Waste Disposal, B.E. 2548 (2005).

<sup>6</sup> Malaysia revised the Environmental Quality (Scheduled Wastes) Regulation 1989 as Environmental Quality (Scheduled Wastes) Regulation 2005.

<sup>7</sup> Indonesia is revising Law No. 23/1997.

## **1.4 Reuse of parts**

### ***Sale of used parts***

Many used parts are traded and sold in ASEAN countries, India, and Japan.

In Cambodia, majority of parts dealers sell small parts, but some dealers sell used engines and half-cut bodies.

There are many used parts dealers in Myanmar, Thailand, and Malaysia who mainly sell Japanese car parts. These dealers specialise in specific parts. For example, some dealers sell only body parts and some dealers sell mainly driveshafts.

In Viet Nam, there are used parts markets called as 'Gioi' where many used parts dealers are located. The demand for car parts is met by imitation parts from China and the market size for domestically generated used parts is relatively small. Even though imports of used parts are prohibited, used parts are imported from neighbouring countries.

There are many used parts dealers in Indonesia. Used parts are sold in agglomerated markets of car repair shops and parts dealers called as 'Bengkel'.

In the Philippines, used parts are sold through auction in the form of parts packages in the container.

In India, used parts are recovered, refurbished, and sold by dismantlers to second-hand spare outlets located in the same scrap yards.

In Japan, used parts and rebuilt parts are sold in the domestic market. The information on stocks and orders are exchanged through the information system. At the same time, those products are exported to foreign countries, mainly Malaysia, United Arab Emirates (UAE), Russia, and others.

Imports of used parts are prohibited in many countries but sometimes, used parts are imported illegally.

### ***Remanufacturing***

There are no remanufacturing facilities in Myanmar. In Viet Nam and Indonesia, some remanufacturing companies reuse parts such as alternators, drive shafts, and starters. There are some existing remanufacturing companies that reuse parts. In Malaysia, some companies like the members of the Malaysia Automotive Recyclers Association (MAARA) remanufacture transmission and the like. Some companies in the Philippines like the ITO MFG Philippine Corporation remanufacture the chassis, body, or engine among others.

In India, the informal sector remanufactures motors, starters, alternators and the like in a crude manner. There is no organised industry for remanufacturing used car parts.

There is huge market of remanufactured parts in Japan for parts such as alternators and starters.

### ***Quality management regulation***

Generally, there is no quality standard for used parts in ASEAN countries and this has caused safety problems. In Indonesia, remanufacturers are required to register the year of the product, which controls a certain level of quality. The India Automotive Industry Standard 129 (AIS129) for ELVs controls the quality listing of the component parts deemed non-reusable. Japan has no specific regulation on quality assurance of used parts.

Assurance provisions are different between countries. In Viet Nam, there is generally no assurance of quality for used parts, but some companies in Viet Nam use assurance for a few years. In Malaysia, used parts are sold domestically with one to three months' warranty and the quality of the product is assured to some extent. In Japan, many dealers provide a certain quality guarantee for a fixed period to the buyers. A uniformed standard for the quality guarantee was established among three related associations. The expansion of scope of the guarantee is under consideration.

### **1.5 Downstream recycling and treatment facility**

#### ***Resource utilisation (recycle of material from ELVs)***

Most of the countries do not have official statistics on the existing treatment of steel scrap, non-ferrous metal scrap, and plastic scrap. However, we could presuppose the situation through field surveys, including the results of the field survey conducted in existing studies.

In Cambodia, Myanmar, and Viet Nam, steel scraps, non-ferrous scraps, and plastics are exported while wire harnesses are retrieved from half-cut bodies and reused. In Lao PDR, wastes such as plastics, aluminium, and copper are recycled domestically, and recyclable wastes are exported to neighbouring countries. Plastics are sent to China or Viet Nam and aluminium and copper are sent to Viet Nam. In Myanmar, scraps dismantled by MEC are also utilised by the steel manufacturing facilities of MEC.

In Indonesia, the remnant car body is manually cut into steel scraps. Iron recyclers buy and process these scraps. Recyclable materials such as glass, tires, large plastic parts and the like are processed using separate recycling techniques.

In Malaysia, steel scraps from ELVs are sent to scrap trading companies. Scrap trading companies sell them to steel manufacturing companies and then steel manufacturing companies recycle them. Non-ferrous metals are also sent to scrap trading companies and scrap trading companies sell them to manufacturing companies for recycling.

In the Philippines, valuable metals from ELVs are recovered from scrapped cars manually. Retrieved metals are sold to metal factories. Other wastes such as wire harnesses, plastics, and rubbers are recycled.

In Thailand, steel scraps from ELVs are recycled in steel manufacturing companies. Steel scraps are sent to scrap trading companies and then sold to steel manufacturing companies. Non-ferrous metals are recycled in manufacturing companies. These non-ferrous metals are then sent to scrap trading companies and sold to manufacturing companies. Recyclers collect



wastes either from car owners nearby or from brokers. Then, after separating recyclable waste and processing it, recyclers sell processed waste to steel plants and plastic recyclers.

In Viet Nam, steel taken from ELVs are sent to relatively modern large-scale steel plants in industrial zones or small plants in Craft Villages that are specified for metals or other resources. Recycling of non-ferrous metals is also carried out in Craft Villages.

In India, ELV scrap metal items such as sheet metal, aluminium, and plastics are generally retrieved and reused. Unusable items such as rubber parts, excluding tires, insulation materials, glass, and the like are disposed in municipal garbages.

The Law for Promotion of Effective Utilisation of Resources in Japan specifies the responsibility of the business entity to adopt the 3R measures. Steel scraps and non-ferrous metals, catalysts, and tires are reused or recycled.

### ***Hazardous waste treatment***

Hazardous waste treatment and disposal is one of the major challenges for ASEAN countries and India.

In Cambodia, Lao PDR, and Myanmar, lead battery is not properly treated, and this causes the emission of hazardous wastes. Some of the hazardous wastes are not properly treated.

In Viet Nam, there are seven permitted battery recycling facilities with a capacity of around 100 tons per day. Only some batteries are recycled and the others are not. Even when batteries are recycled, they are done in an environmentally unfriendly way. Waste oil is recycled but not all waste oil is collected. Some oil wastes are disposed in the sewage. Some informal sector members collect waste oil but treat or recycle them inappropriately. Chlorofluorocarbons (CFCs) are not properly treated in Viet Nam.

In Thailand, Malaysia, and Indonesia, batteries are recycled but not all batteries are recycled. Waste oil and CFCs are not recycled and not properly treated, and may cause soil and air pollution. In Malaysia, all fluids are being drained and stored for the respective recyclers. Hazardous wastes such as mercury are removed to storage at this stage. In Indonesia, waste oils are accumulated and resold to recycling shops, while CFC is generally not recovered and released in the air without processing even though recovery instruments are distributed to some factories.

In the Philippines, batteries are sold to specialised battery stores or junk shops and the like. Waste oils are not retrieved or resold and are mostly dumped. CFC is not retrieved during processing and released in the air, as there are no CFC collecting facilities.

In India, batteries are sold to spare shops and the like though there are formal regulations concerning disposal of used batteries. Regulations exist for return and recycling of batteries but these are not strictly enforced. Hazardous materials are not properly treated, and it causes air, water, and soil pollution in recycling facilities. Testing of the formal mechanised recycling process has been started at the recycling demonstration unit of the Global Automotive Research Centre, which can properly treat batteries, oil, airbags, and others.

In Japan, the ELV law was introduced and manufacturing companies have the responsibility to properly process the three parts designated for proper treatment (fluorocarbons, airbags, and ASRs). The Law for Promotion of Effective Utilization of Resources specifies the responsibility of business entities to adopt the 3R measures. Lead-acid battery is properly collected and treated by the system-established initiative of the battery manufacturing association. The Waste Management and Public Cleansing Act specifies the responsibility of business entities to adopt the 3R measures and to conduct proper treatment of ASRs, discarded tires and half-cuts containing airbags, and the like. The downstream retrieval of ELVs in Japan requires the proper treatment of the three items designated as specific negative cost components. There are approximately 20,000 recovery places and 8 collection/neutralisation plants for CFCs; 26 airbag collection centres and 5 recycling plants for airbags; 54 recycling facilities; and 33 incineration and landfill sites for ASRs. The Japan Auto Recycling Partnership Limited. (JARP) is in charge of the management of the destruction of CFCs and airbags.

### ***Licence regulation for the treatment of hazardous wastes***

The development of licence regulations differs between countries. There is no adequate legal system for the treatment of hazardous wastes in Cambodia. In Viet Nam, some companies receive recycling licences from the Ministry of Natural Resources and Environment (MONRE) but most of the companies operate without licences.

In Thailand, recycling companies have to acquire a licence in accordance with the Notification of MOI No. 15 B.E. 2544 (2001).

In Malaysia, the Environmental Quality (Scheduled Wastes) Regulation 2005<sup>8</sup> and the Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 prescribe a licence for waste treatment and disposal facilities. Both regulations also prescribe the procedures when owners of facilities change and the obligation of informing the amount of waste accepted, treated, stored, and disposed.

In Indonesia, only certified dismantling facilities and authorised recycling workshops or collection points that have been nominated by the manufacturer are permitted to operate.

In India, AIS 129 incorporates the provision for accreditation of dismantling standards after they meet specific standards.

In Japan, industrial waste disposal operators are required to obtain a licence under the Waste Management and Public Cleansing Act. Fluorocarbon collectors and shredding operators are required to obtain the licence under the ELV law.

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<sup>8</sup> Malaysia revised its Environmental Quality (Scheduled Wastes) Regulation 1989 as Environmental Quality (Scheduled Wastes) Regulation 2005.

### ***Waste treatment regulation***

Some countries, in particular least developed countries (LDCs) in this study, regulate waste treatment by general environmental law while other countries have specific regulations for waste treatment. Some countries also have specific regulations for the treatment of waste from automobile dismantling.

Lao PDR, Myanmar, and Indonesia control waste treatment under the general environmental law. In Lao PDR, the Environmental Protection Law stipulates that waste disposal sites must be allocated; and that waste should be separated before disposal. Governments support the implementation of technologies for waste treatments, reuse, and recycling. In Myanmar, the Environmental Conservation Law and related regulations have been introduced to prevent environmental pollution. In Indonesia, Law No. 32/2009 on Environmental Protection and Management Act No. 32<sup>9</sup> prescribes the treatment of hazardous wastes.

Malaysia, Philippines, and Thailand control waste by specific regulations, orders, and notifications for waste management. In Malaysia, various regulations such as the 'Environmental Quality (Scheduled Wastes) Regulation 2005<sup>10</sup>' and the 'Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989', prescribe the storage and treatment procedures.

In the Philippines, DAO 2004-36<sup>11</sup> prescribes the responsibility of polluters of the hazardous wastes such as sulfuric acid, waste oils, and ozone-depleting substances (CFCs and halon).

Thailand has a regulation on waste treatment, Notification of MOI B.E. 2548 (2005), which controls pollution from industries. The notification indicates the responsibility of dismantlers and polluters, and lists hazardous wastes such as waste oil and liquid, CFC, lead battery, and catalyst.

Viet Nam, India, and Japan have specific regulations for waste from automobile dismantling. In Viet Nam, Decision 50/2013 of the Prime Minister on the retrieval and treatment of end-of life products was introduced, and specific scheme for waste oil will be introduced in 2016. A specific scheme for batteries and tires will be introduced in 2016, and a specific scheme for ELVs will be introduced in 2018. Take back schemes for batteries and waste oil are considered under the decision. The Environmental Protection Law was introduced to prevent environmental pollution. Waste treatment companies are also controlled under this Act.

In India, AIS 129 requires collection and dismantling centres to possess equipment and facilities for hazardous wastes.

In Japan, the polluter is responsible for the treatment of industrial wastes generated from its business under the Waste Management and Public Cleansing Act. The ELV law prescribes ASR

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<sup>9</sup> Originally, this Act was introduced as Act of the Republic of Indonesia concerning Basic Provisions for the Management of the Living Environment (No.4/1982) in 1982 and revised as Environmental Management Act (No. 23/1997) in 1997.

<sup>10</sup> Malaysia revised its Environmental Quality (Scheduled Wastes) Regulation 1989 as Environmental Quality (Scheduled Wastes) Regulation 2005.

<sup>11</sup> Order for implementing Republic Act No. 6969 'An Act To Control Toxic Substances and Hazardous and Nuclear Wastes, Providing Penalties for Violations Thereof, and for Other Purposes'

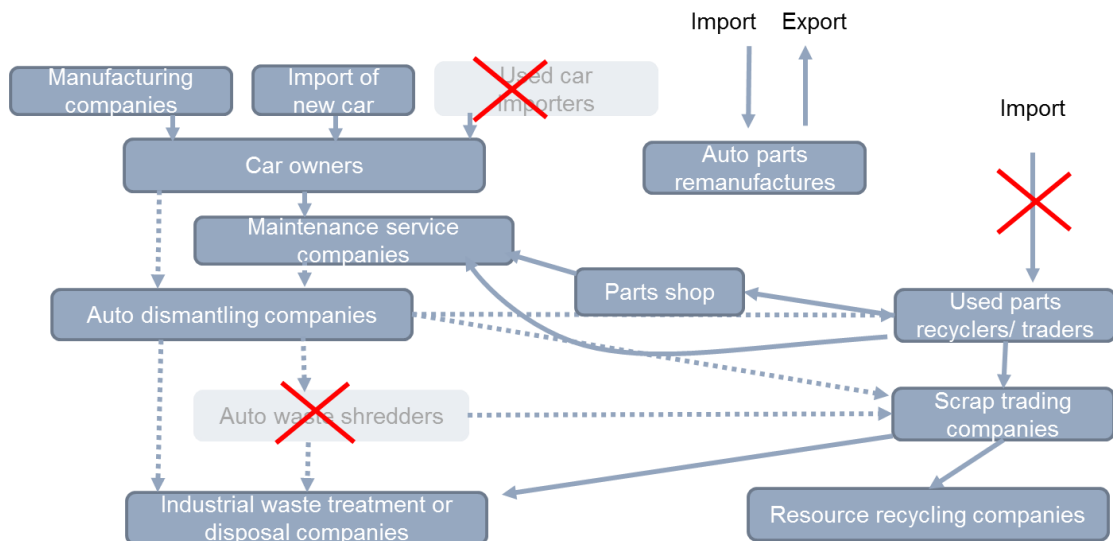
recycling targets as follows: 30 percent in 2005, 50 percent in 2010, 70 percent in 2015; and airbags recycling target: 85 percent.

## 2. Indonesia

### 2.1. Overview

The overview of ELV recycling in Indonesia is illustrated in Figure 1. Overview of ELV recycling in Indonesia. Indonesia's automotive society is currently growing rapidly. Indonesia prohibits the importation of used cars and used parts. The main source of ELV is domestic generation. There are approximately 20 informal sector dismantlers in Jakarta. They collect ELV from car owners among others. They dismantle ELV manually and take used parts, segregate materials, and sell scraps to scrap trading companies.

**Figure 1. Overview of ELV recycling in Indonesia**



ELV = End-of-Life Vehicle.

Source: Study Team.

### 2.2. Status of trade of used cars and used parts

#### (1) Importation of used cars

The importation of used cars is prohibited in Indonesia. Since 28 February 2007, the Government of Indonesia has suspended the importation of used vehicles (Minister of Trade Document No.1311 of 29 December 2006). The Minister of Trade Regulation (57/M-DAG/PER/12/2008) concerning Provision of Import of Non New Capital Goods did not include automotive vehicles.

## (2) Importation of used parts

The import of used car parts is prohibited in Indonesia. However, some traders import illegally.

### **2.3. Generation, flow, and treatment of ELVs, used parts, and resources**

#### (1) Generation of ELVs

In Jakarta, there are small dismantling companies. They register their business with the municipality. These small dismantling companies originally belonged to the informal sector. They collect and buy ELVs by themselves or sometimes, the owners bring them to the company. They buy ELVs at Rp3,900 per kilogram. The study group's interview found that the number of purchases of ELVs has decreased. Sometimes, they do not buy ELVs for a month because of lack of money.

ELVs are used as used cars or sold as scrap. Before selling them as scrap, dismantlers take parts such as engines, suspensions, interiors, among others, and sell them to used parts shops, repair shops, and car owners. However, most of the parts are too old to be bought. Therefore, most of the parts of ELVs are sent to scrap trading companies or recycling companies, or the steel plant in Pulogadun. Aluminium is sold to companies in Jakarta. When dismantlers sell ELVs as scrap, they dismantle ELVs using gas burners, divide them as small parts, and segregate them by material types. They often hire people to dismantle but in case the amount is small, they dismantle it themselves. Batteries are reused if they still work or they are sold to battery recyclers if they do not work. Waste oil is disposed in junk yards. Tires can be sold. Tires are reused or recycled as rubber products such as cushion materials and flip-flops, and the like. Airbags of cars that have figured in accidents are destructed but airbags of non-accident cars can be reused. Therefore, air bags are sold in some cases.

Recently, the price of steel scrap has decreased. Previously, steel scrap can be sold at Rp7,000 per kilogram but now it is Rp3,800 per kilogram. Recently, dismantlers have been storing ELVs without selling. They are waiting for the price of steel scrap to increase. Used cars can be sold as second-hand cars. However, such are rare cases.

According to Yano Research Institute, the number of ELV generated was 124,002 in 2013.

**Table 2. Estimate of ELV Generation in Indonesia**

<b>Year</b>	<b>Estimated number of ELVs</b>
2010	114,689
2011	116,516
2012	119,972
2013	124,002
2014	152,723
2015	178,524
2016	176,370
2017	160,389
2018	175,493
2019	218,337
2020	248,676

ELV – end-of-life vehicle.

Source: Yano Research Institute.

As an example, a pickup truck from the 1980s was priced at Rp11,000,000 including repair cost. In Indonesia, the existence and necessity of automobile dismantling industries is not recognised. Old vehicles deemed unusable are still treated as ‘repairable’ for years without repairing. Some vehicles are used to take up parts, and the remaining car bodies are manually cut into steel scraps, which are re-sold to iron recyclers.

### **Registration and Inspection**

#### 1) Vehicle registration

The Directorate General of Land Communications is in charge of registration and inspection in Indonesia. The base law is Indonesian Law No. 22 of 2009 on Road Transport and Traffic.

#### New Car Registration

According to Indonesian Law No. 14 on Traffic and Land Transportation of 1992, all motor vehicles are required to be registered. The Indonesian National Police is the agency responsible for motor vehicle and driver registration/identification. Compulsory insurance is also required.

In addition, prior to the sales and use of motor vehicles, manufacturers and importers must subject vehicles to the vehicle type approval system, also in accordance with Indonesian Law No. 14. This includes document application, vehicle testing and inspection, and certification by the Directorate General of Land Transportation.

On registration, the Surat Tanda Nomor Kendaraan (STNK)/Vehicle Registration Number, Buku Pemilik Kendaraan Bermotor (BPKB)/Proof of Car Ownership book), and Plat Nomor (licence plates) are issued to the car owners. The issuer of STNK and BPKB is the local police office.

#### Transfer or Selling Licence

In case of change of car ownership, the car owner is required to follow the procedure of BPKB and the new owner is required to pay the registration fee.

#### Re-registration

The car owner is required to renew annually the car registration. The STNK and Plat Nomor are valid for five years and should be renewed after five years.

#### Deregistration

Car owners need to deregister their cars at police stations. In practice, car owners often sell ELVs to repair shops instead of following the deregistration procedure. In the process of deregistration, car owners are required to change ownership described in the BPKB. The process is done on a written basis only and the car owners are not required to return the Plat Nomor.

#### 2) Car inspection system

Commercial vehicles and public vehicles are required to be inspected every six months. However, personal vehicles are currently not the target of compulsory inspection. The introduction of the inspection system for all vehicles is currently under discussion. There are 130 inspection centres in Indonesia.

#### (2) Dismantling of ELVs

Generally, the informal sector plays a central role in the operation of waste collection/recycling. Used parts are taken off and bodies are dismantled manually using gas burners. In Indonesia, there is no official vehicle shredder location.

#### (3) Flow of resources: steel and non-ferrous metals

Interviews with ELV dismantling companies revealed that steel scraps from ELVs are sent to steel plants in Indonesia. In Jakarta, there are many steel plants. In particular, the Pulogadun stores steel scraps and makes steel from scraps. Domestic car scraps occupy only a small

fraction of raw materials used in Indonesian ironworks in which cheaper imported scraps dominate.

Other metals are recovered in crude ways such as open incineration for wire harnesses.

#### (4) Flow of resources: plastics

Plastic scraps are traded in the informal sector in Indonesia.

### **2.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, etc.)**

In Indonesia, the informal sector plays a central role in the operation of waste collection/recycling. The formal sector collectors are in charge of industrial and hazardous wastes, which are sent to formal recyclers. Other wastes such as municipal wastes go through a complex system of informal waste management where mobile door-to-door scavengers (*pemulung*) and community-based crews collect them and then sell them to *lapaks* along with traded recyclable items (cans, plastics, and others). *Lapaks* function as intermediaries between collectors and the *bandar*, the informal dealers from whom the wastes eventually reach formal and informal recycle factories. These intermediaries perform the function of collection, selection, separation, cleansing, and pre-treatment.

#### (1) Batteries

There are many battery recyclers in Indonesia, and many of them are in the informal sector. Only parts of the batteries are recycled. Battery is treated as a valuable resource. There are some recyclers who dismantle the batteries into lead and plastic, and fabricate ingots from the lead that has been dismantled.

#### (2) Tires

Used tires are recycled in Indonesia. Recycling is mainly conducted by the informal sector but companies such as Xinxiang Huayin Renewable Energy Equipment Company Limited introduced advanced technology to change waste tires into fuel oil.

#### (3) Waste Oils

Approximately 529 tons of oil is accumulated and resold to recycling shops. Waste oil is treated as a valuable resource. According to the research conducted by EX Research Institute, collected oils are accumulated and reach four waste oil recyclers, including Pennzoil, an American company, and Agip, an Italian company. Waste oil recyclers are required to have a licence from the Department of Transportation, Indonesia.



#### (4) CFCs

CFC is generally not recovered even though recovery instruments are distributed to some factories. Narogong factory of PT Holcim Indonesia is the first factory of cement kilns that directly destroys CFCs.

#### 2.5. Generation, flow and, treatment of end-of-life motorcycles

The flow of end-of-life motorcycles could not be identified by the research. Based on the interview, they are brought to repair shops and repair shops sell them to scrap companies.

#### 2.6. Recycling companies and industry

Scavengers are typically paid Rp15,000 to Rp25,000 per day. Quite often, scavengers rely on credit from *lapaks* who would pay beforehand for future transactions. *Lapaks* have warehouses, vehicles, and a small number of workers, many of which were started by former scavengers and junkmen (waste traders). *Lapaks* desire to be brokers or even dealers (*bandars*) who enjoy a relatively large scale of operation including pre-treatment. One iron and metal dealer can yield a profit of Rp5,000,000 per month, equivalent to 30-50 percent of the revenue. Some *bandars* even conduct industry-level recycling.

There are many battery recyclers in Indonesia. Examples of battery recyclers are as follows:

##### **Example of battery recyclers**

##### **Pt Gramitrama Battery**

Pt Gramitrama Battery in Sidoarjo is a national private-owned company that has been established since 1975. It first produced battery plates and it now supplies both domestic and international customers with good raw materials through the use of the latest technology.

##### **Pt Baretec Indonesia**

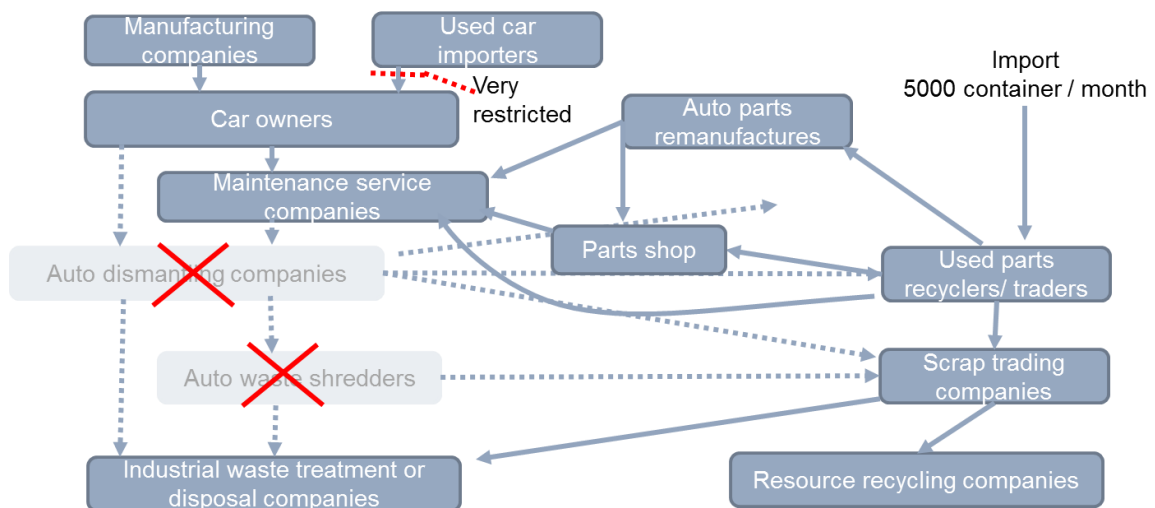
Pt Baretec Indonesia has the most innovative and advanced technology for the refurbishing battery technology. We have a patent for the production method and chemicals. Pt Baretec Indonesia can supply all kinds of refurbished lead acid batteries (for car, ship, heavy equipment, golf cart, and many others).

### 3. Malaysia

#### 3.1. Overview

The overview of ELV recycling in Malaysia is illustrated in Figure 2. Overview of ELV recycling in Malaysia. Malaysia is the centre of used car parts trade in Asia. Malaysia imports many half-cuts and used parts from other countries, mainly from Japan. Many used car parts recycler/traders dismantle half-cuts. Used parts recyclers/traders export about 70 percent to other countries and sell 20 percent domestically. The number of ELV generation in Malaysia is not recorded but based on interviews; the number seems to be small. As a result, there are no ELV dismantling companies. Amsteel introduced auto waste shredders before to shred soft press from Japan. However, as soft press importation from Japan is not allowed, shredders do not work at full capacity.

**Figure 2. Overview of ELV recycling in Malaysia**



ELV – End-of-life vehicle.

Source: Study Team.

#### 3.2. Status of trade of used cars and used parts

##### (1) Importation of used cars

The importation of used cars is restricted in Malaysia. The importation licence is only for personal, government use and the like. Import duty must be paid on any vehicle imported into Malaysia. These rates can be quite high and excise duties can be up to 100 percent when importing a foreign vehicle. To import a car, an application must be made to the Ministry of International Trade and Industry (MITI) for an import licence called 'Approved Permit'. The car to be imported must have been registered in the home country of the person applying

(in case of foreigners). The system of approved permit is expected to be abandoned and a ban on used car importation for commercial purposes from 2016 will be introduced.

Malaysia allows its local ELV recycling companies to import ELVs from other countries. These vehicles require clearance from the Royal Malaysian Customs office. According to the law, an importation approval permit is required for vehicle import. Normally, ELV recyclers will choose and import the vehicle using their own means of transportation.

All businesses need to obtain a business licence to import and/or export scrap materials. The Malaysian Government takes measures to prevent resources from going out of the country. The measure states that any resource used in Malaysia should be processed and recycled in the country. Therefore, scrap purchase prices in Malaysia are low.

The estimate of Malaysia's total used car imported from Japan in 2013 was 35,879. In 2012, it was 23,370 and in 2013, it was 27,835<sup>12</sup>.

**Table 3. Number of imported used cars in Malaysia**

Year	2009	2010	2011	2012	2013
Total	22,285	28,678	24,006	25,666	35,879

Source: Malaysia's Trade Statistics.

**Table 4. Number of used vehicles exported from Malaysia**

Year	2009	2010	2011	2012	2013
Total	297	377	325	701	800

Source: Malaysia's Trade Statistics.

## (2) Importation of used parts

The importation of used parts to Malaysia is very huge. It is the hub of trade of used parts. According to Malaysia's Trade Statistics, used parts worth around \$4,907,442 were imported from the world in 2013, \$951,494 of which was from Japan.

In Malaysia, used parts factories are centred in Klang and Kepong, and more than 5,000 companies deal with used parts. Some of the factories have roofs and concrete floors. They import approximately 5,000 containers per month. The imported used parts are half-cuts or parts such as engines, gearboxes, transmissions, and the like. They have a network with the dismantling companies and used parts traders in other countries.

Based on interviews with used parts companies, 90 percent of the total used parts are imported from overseas. Of those, approximately 30 percent are sold in Malaysia and 70

<sup>12</sup> Source: Planetcars site, Yano Research Institute.

percent are re-exported to the ASEAN region (14 percent), Africa (24 percent), Middle East (24 percent), and other countries (8 percent). Imported parts from Japan occupy about 90 percent of used parts circulated in the market in Malaysia. The amount of traded used parts in Malaysia is the most in the world. In the past, many used parts were traded in Singapore but because of increased prices, the centre of trading moved to Malaysia. As there are many Muslim people in Malaysia, it is easier for Malaysian traders to trade with the Middle East and North African countries.

Many Daihatsu and Mitsubishi Motors' used parts are traded in Malaysia because they collaborated with Perodua, Proton and both cars have many common parts. Remanufacturing companies for these parts also exist in Malaysia. The amount of import is larger than the domestic generation of used parts in Malaysia.

#### **Example of used parts factory**

Around 70 percent of used parts are re-exported and 30 percent are sold in Malaysia. Countries of destination are Nigeria, Egypt, Jordan, Pakistan, China, Thailand, Indonesia, Myanmar, and Russia. Used parts are also exported to the Maldives once or twice per year. Used parts are sold domestically as follows:

- Wire cable: Sold to local companies both with peeling cover and without peeling.
- Catalyser: Sold to local companies. The price is RM100 for each part.
- Engine: Sold to engine dealers. The engine dealers manually separate engines into steel and aluminium, and sell them to electrical furnace steel manufacturers. Gearboxes are sold to the other companies. The companies buy aluminium from construction companies and can manufacturing companies and sell it to metal refinery.
- Battery: treated as industrial waste.

### **3.3. Generation, flow, and treatment of ELVs, used parts, and resources**

#### **(1) Generation of ELVs**

The importation of used cars is very limited in Malaysia. Broken cars that have figured in accidents are sent to workshops, which have contracts with insurance companies. Car insurance provides incentives for car owners/workshops to use used parts. The number of ELVs is estimated at 61,430 per year (2013). The prices of used cars range from RM4,000 for a 1990 model, RM60,000 for a 2005 model (Toyota Carole), RM6,500 for a 1998 model (Perodua Kancil), and RM7,786 for a 1992 model Honda Accord 2.0.

According to the field survey conducted by EX Research Institute, the purchasing prices of ELVs range from RM500 to RM5,000. According to a dismantler in Kuala Lumpur, ELVs are sold to dismantlers for about RM480 per unit.

Older models of cars are sold as used cars many times after repairing and changing parts, without being dismantled as ELVs. With the introduction of 'Cash for clunkers'<sup>13</sup>, the number of ELVs dismantled in Malaysia is expected to increase.

### Registration and Inspection

#### 1) Vehicle registration

##### a) Vehicle registration

Any new or imported vehicle is required to be registered with the Malaysian Road Transport Department, which is in charge of the registration of all motor vehicles and trailers, and the licensing of drivers of in Malaysia. The registered owner's address and registration number are connected.

The Road Transport Department under the Ministry of Transport controls the registration of new cars, change of registration, change of registered information, and deregistration under the Road Transport Act 1987 and the Motor Vehicles (Registration and Licensing) Rules 1959. If a vehicle meets the standard (weight, size, equipment, and so on), the registration certificate is issued. Every year, car owners renew their registration and pay the Road Tax (LKM) on the registration. The LKM depends on engine size (see Table 6). If renewal is not done for a certain period, caution is sent to the owner. If the owner does not follow, penalties will be imposed on the owner. In case of new registration and re-registration, the owners have to pay the registration fee in addition to the LKM. Under the Road Transport Act, owners have to buy insurance. Owners also have to buy insurance in case of re-registration.

**Table LKMs for general cars**

Size of engine	LKM
Less than 1,000CC	RM20.00
1,001CC to 1,200CC	RM55.00
1,201CC to 1,400CC	RM70.00
1,601CC to 1,800CC	RM90.00
1,801CC to 2,000CC	RM200.40-280.00
2,001CC to 2,500CC	RM280.50-380.00
2,501CC to 3,000CC	RM882.50-2130.00
3,001CC to 5,000CC	RM2,134.50-11,130.00

LKM – Road Tax.

Source: Road Transport Department.

<sup>13</sup> Proposed by Malaysian Automotive Institute.

b) Transferring or selling used cars

In case of selling or transferring ownership of used cars, the owners have to inform the registration agencies and the registration certificate is passed on to the new owner.

c) Deregistration

The owners can deregister their vehicles. In addition, if a car is not renewed for more than 2 years, a car is automatically deregistered. No certification of disposal of car is required for deregistration.

2) Car inspection system

Only commercial vehicles are required to be inspected annually under the Road Transport Act. Random inspection is conducted on the road and penalty is imposed on a commercial vehicle if it does not have a sticker indicating that it has been inspected annually. There is no inspection system for private vehicles. However, plans to introduce an inspection system for private cars are often proposed in connection with the deregistration policy. It is highly possible that an inspection system for private vehicles will be introduced in Malaysia.

(2) Dismantling of ELVs

There are very few companies dismantling ELVs in Malaysia. Used parts sellers generally dismantle used cars. Used parts sellers have press equipment and the like.

ELVs will be generated after four to five years. Proton started production from 1984 and the number was tens of thousands. However, from early 2000s, Proton began to produce more than 100,000 units. If the lifetime of cars is assumed to be 20 years, many ELVs will be generated from 2020.

(3) Flow of resources: steel and non-ferrous metals

Steel and non-ferrous metals are collected by scrap trading companies such as Thanam Industry Sdn Bhd, YS Metal auto parts, Sdn Bhd and many others. There are many scrap trading companies in Malaysia. Collected copper and iron are mainly recycled domestically because these companies are located in Malaysia. There are also aluminium companies in Malaysia, but aluminium scraps are used domestically and exported.

(4) Flow of resources: plastic

Plastics are collected by scrap trading companies. There are many scrap trading companies in Malaysia and some of them appear to be in the informal sector. Collected plastics are used domestically and exported.

### **3.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, etc.)**

The 'Environmental Quality (Scheduled Wastes) Regulations 1989', which was revised in 2005, regulates hazardous waste such as batteries, catalysts, and waste oils.

#### **(1) Tires:**

Waste tires are not categorised as scheduled waste. Tire dealers usually employ private rubbish collectors to dispose their waste tires. They do not have any guidance or assistance from their principals or authorities for the proper management and disposal of waste tires. Private rubbish collectors collect waste tires. However, the extent to which these tires are disposed in an environmental friendly and legal manner is unknown.

Scrap tire collectors and traders collect and transport scrap tires from tire shops to retreading and recycling facilities or to the nearest landfill sites. Although collectors charge a fee to discard scrap tires, the extent to which these tires are disposed in an environmental friendly and legal way is unknown. In addition, high transportation fees are required when there is undefined coverage of collection.

Scrap tire traders identify and sort scrap tires according to their usage, either to send them to tire retreading or recycling centres. Traders are the brokers who buy tires that can be retreaded either from collectors or directly from the tire workshops. These traders then resell the tires that can be retreaded to the retreading facilities, both locally and internationally. The remaining tires go to the treatment facilities of scrapped tire or for other uses.

The ways to recycle and dispose tires are through: 1) recovery of rubber granules/rubber powder steel wires from the scrap tires, 2) production of reclaimed rubber, 3) pyrolysis treatment, 4) used for the cement industry, and/or 5) disposal.

#### **(2) Batteries:**

Batteries are categorised as scheduled waste—SW102 waste of lead-acid batteries in whole or crushed form. According to the Environmental Quality (Scheduled Wastes) Regulations (1989/2005), every waste generator of battery shall ensure that the scheduled waste generated is properly stored, treated on-site, recovered on-site for material or product from such scheduled wastes, or delivered to and received at prescribed premises for treatment, disposal, or recovery of materials or products from scheduled wastes. Recovery of materials or products from waste batteries is done at prescribed premises or at on-site recovery facilities. Residuals from the recovery of materials or products from scheduled wastes shall be treated or disposed at prescribed premises.

Generally, used batteries are collected and sold to recycling companies.

(3) Waste oils:

Waste oil is also categorised as scheduled waste—SW312 oily residue from automotive workshops, service stations, oil or grease interceptors. Every generator of waste oil shall ensure that the scheduled waste generated is properly stored, treated on-site, recovered on-site for materials or products from such scheduled wastes, or delivered to and received at prescribed premises for treatment, disposal, or recovery of materials or products from scheduled wastes. Waste oils are stored and reused for waste generator sites or collected and sold by waste oil collectors.

The recovery of materials or products from waste oils is done at prescribed premises or at on-site recovery facilities. Residuals from the recovery of materials or products from scheduled wastes are treated or disposed at prescribed premises.

### **3.5. Generation, flow, and treatment of end-of-life motorcycles**

The flow of end-of-life motorcycles cannot be identified by the research. Based on the interviews conducted, they are brought to repair shops and the repair shops sell them to scrap companies.

### **3.6. Recycling companies and industry**

(1) Dismantling companies

The generation of ELVs is limited. Therefore, there seems to be no ELV dismantling companies. However, there are more than 5,000 dismantling companies that dismantle imported half-cuts. For example, the Malaysia Automotive Recyclers Association (MAARA) has member companies that are: 70 percent used parts sellers and 30 percent scrap sellers. About 20 companies have licence to dismantle ELVs. Between 30 to 40 used parts companies are located in Kepong. Each company handles on average about one to two 40-foot containers per day.

There used to be two shredder companies in Malaysia before but now, Malaysia only has Amsteel (Mega Steel). Mega Steel is the only one with blast furnace and buys scrap from construction. Four electrical furnace steel production companies exist in Malaysia but there are no casting companies. Steel production is top in Southeast Asia.

(2) Downstream recycling companies

There are many scrapping traders for iron, copper, aluminium scrap, and plastic.

For iron, there is an association called 'The Malaysian Iron and Steel Industry Federation (MISIF)'. MISIF is the national industry association for manufacturers of iron and steel products. It has 152 member companies. There are other companies that are not members of MISIF like Amsteel.

For copper, there is the VCS Copper Industries Sdn Bhd, one of the largest manufacturers and exporters of high-quality copper wire produced from recycling of scrap copper. In 2006, VCS set up a state-of-the-art recovery cum manufacturing plant at Bukit Raja in Malaysia,



Malaysia's only manufacturer to recover scrap copper and use it for producing different forms of copper wire. VCS copper is producing at 18,000 MT/s per year.

Regarding aluminium, there are many companies like Press Metal Berhad and Daiki Aluminium Industry (Malaysia) Sdn Bhd. Press. Metal Berhad was established in 1986. They have a smelting capacity of 440,000 tons and an extrusion capacity of 190,000 tons per annum. They are the largest integrated aluminium producer in Southeast Asia.

Regarding plastic, there are many recyclers in Malaysia. However, it is difficult to identify which companies deal with plastic scrap from ELVs.

**Table 5. Number of plastic manufacturers and plastic recyclers in Malaysia**

Region	State	Plastics Manufacturers (PM)		Plastics Recyclers (PR)	
		Numbers of Industries	Recommended Sample Size	Numbers of Industries	Recommended Sample Size
Northern	Perlis	-	-	-	-
	Kedah	47	12	5	5
	Pulau Pinang	199	49	47	47
	Perak	129	32	14	14
Central	Kuala Lumpur	164	41	16	16
	Selangor	414	102	53	53
Eastern	Pahang	5	1	2	2
	Terengganu	2	0	1	1
	Kelantan	5	1	2	2
Southern	Negeri Sembilan	26	6	3	3
	Melaka	26	6	1	1
	Johor	201	50	29	29
<b>TOTAL</b>		<b>1218</b>	<b>301</b>	<b>173</b>	<b>173</b>

<sup>1</sup> Yamane Table can be sourced from Statistics, An Introductory Analysis, 2<sup>nd</sup> Ed., New York: Harper and Row.

Source: National Solid Waste Management Department, Ministry of Housing and Local Government, Malaysia 'A Study on Plastic Management in Peninsular Malaysia', December 2011.

### (3) Management situation of recycling-related companies

Based on the interviews conducted by the study team, the number of employees of recycling-related companies (used parts factory) is from 15 to 120. The revenues vary depending on the size and domain of business. The revenue ranges from RM1 million to RM 20 million for the above companies.

## 4. Myanmar

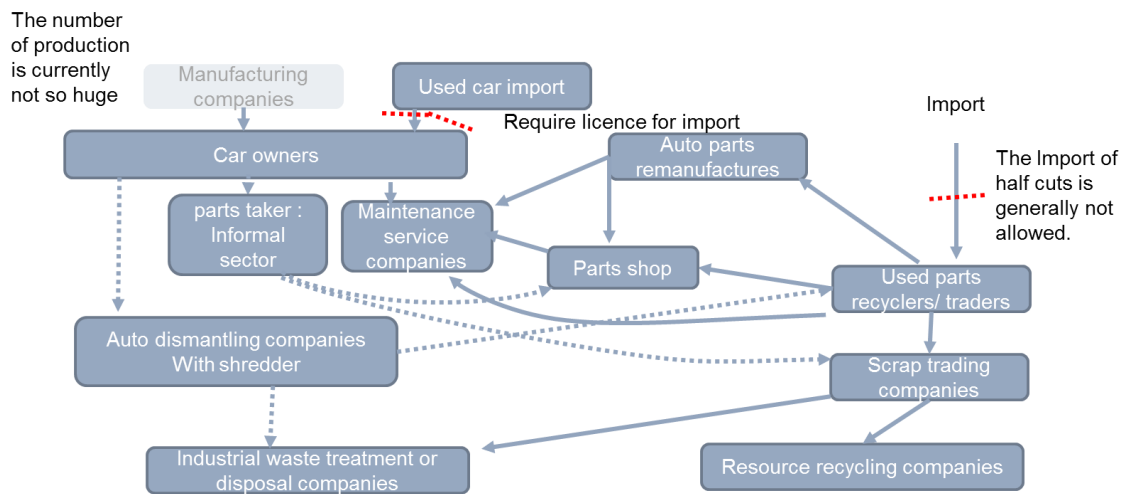
### 4.1. Overview

The overview of ELV recycling in Myanmar is illustrated in ELV – End-of-life vehicle.

Source: Study Team.

The importation of commodities in Myanmar requires an import licence. Import licences for used cars are issued in case the previous car is dismantled or is of a foreign currency account. There is no specific law for the importation of car parts. The importation of used parts is allowed, but the import of half-cuts is prohibited. Imported used parts are used domestically. The Myanmar Economic Corporation has two ELV dismantling sites. Car owners bring ELVs to these sites to get a new licence to import a used car.

**Figure 3. Overview of ELV recycling in Myanmar**



ELV – end-of-life vehicle.

Source: Study Team.

#### 4.2. Status of trade of used cars and used parts

##### (1) Importation of used cars

The importation of commodities requires an importation licence in Myanmar. Importation licences for used cars are issued in case the previous car is dismantled or is of foreign currency account. The total number of imported cars was 149,621 in 2013. The number of cars imported from Japan was 120,836 in 2012, and 134,659 in 2013.

##### (2) Importation of used parts

There are no specific laws for the importation of car parts. The importation of used parts is allowed but the importation of half-cuts is prohibited. Imported used parts are used domestically. The Myanmar Economic Corporation has two ELV dismantling sites. Car owners bring ELVs to these sites to get new licences for the importation of used cars.

The exportation of used cars from Japan to Myanmar has been rapidly increasing since 2011, when the government announced a replacement programme for cars aged at least 40 years. Import licences became obtainable for cars made between 1995 and 2005. In 2012, the number reportedly went up to six times the number for the previous year. Although there are no public data by the Myanmar Government, estimates from other sources show that the number of used cars in Myanmar would be about 150,000 cars, of which approximately 90 percent come from Japan. However, this number may decrease in the future because of the prohibition of right-hand drive cars announced in 2013.

When analysed from a money-based perspective, the market size of used cars imported in 2011 was about \$9,300,000,000. Japan took up 40 percent of the whole market, which was about \$3,677,000,000.

The total sum of automobile car parts imported from Japan in 2013 was approximately ¥1,400,000,000, which includes new and used parts. This means the market is not large enough. However, because the cars had been coming into the country rapidly lately, the demand for used parts would possibly increase as a result of the rise in demand for maintenance of the imported cars.

Many of the recycled parts were imported from Malaysia and Thailand. Since Malaysia and Myanmar do not share a land border, some of the items are imported via Thailand. Moreover, because majority of cars in Myanmar are Japanese made, many recycled parts are for Japanese cars, which explains why the user's manual are often in Japanese. However, there are engines that have been imported from Dubai and Indian dealers import their parts from India. Based on these, we could conclude that part stores have their own way of buying their parts, depending on their race and connection.

One of the places where sold used parts end up is Ahlone district where many maintenance service dealers from Yangon gather and fix cars.

Used engines are sold in the Yadana area at \$450 for Toyota Probox, and \$1,000 for Toyota Vitz. Doors are approximately \$5,000 for Toyota Probox (\$8,000 for those with window glasses). Used Japanese front lights (set of two for left and right) cost approximately \$20,000. However, there are some new imitation parts imported from China and they are about \$3,500 each, which is cheaper than the Japanese used ones.

#### **4.3. Generation, flow, and treatment of ELVs, used parts, and resources**

##### **(1) Generation of ELVs**

The government controls the disposal of ELVs. The government also collects metals. On the other hand, the Ministry of Industry in Myanmar does not own a recycling facility for non-ferrous valuable metals and these metals are not supposed to be collected there.

##### **(2) Dismantling of ELVs**

Because of the replacement programme announced by the Myanmar Government in 2011, there are overwhelming amounts of cars, making a 3-km line, waiting to be scrapped in scrap

car plants. Before sending ELVs to dismantling facilities, the car owners request the informal sector to take off used parts. Brokers come to buy used parts from car owners.

The research team could not get much information from the scrap car plants. The reason is that they are operated and supervised by the Myanmar Economic Corporation, which is a corporation under the Myanmar Government. However, according to a dealer in Yangon, the plants also deal with used parts, making the process slower. Thus, not many cars are processed every day.

### (3) Flow of resources: steel and non-ferrous metals

Scrapped cars taken to Myingyen are taken to an iron factory supervised by the Myanmar Ministry of Technology and put in an electric furnace. This iron factory is temporarily stopping its work, but it is estimated that the factory can deal with about 20 tons of iron annually.

Although iron is recycled under the strict control of the ministry system, it seems many other valuable metals are not recycled at all. Data shows that there are no government-related facilities for copper and aluminium recycling. Many people were not even aware that there were rare metals in catalysers inside muffler parts, and that those rare metals are put in electric ovens with other scrapped parts as iron scrap. Although rare metals might not be used in old modelled cars made in Myanmar, if the same process were to be conducted in the future, this could become an enormous loss of resource.

## **4.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, etc.)**

### (1) Batteries

The Yangon Metal Industry Company Limited is Myanmar's pioneer industrial lead smelter. It produces 99.9 percent pure lead and other various lead alloys, antimony, and calcium for industrial applications. Every day, they take in deliveries of used batteries, lead scraps, and other lead wastes from collection points, which are later sorted, smelted, and refined into quality lead products for industrial partners.

### (2) Tires

There are informal sector recyclers of tires in Yangon. They turn discarded tires into flip-flops<sup>14</sup>, buckets, and hard-to-find spare parts for used cars. Old truck tires are transformed into rubber washers and bushings for cars and rice mills. Around 300,000 cars, most of which are second-hand, are now on the roads and they need rubber bushings and washers.

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<sup>14</sup> The most popular footwear in the rural areas.

#### **4.5. Generation, flow, and treatment of end-of-life motorcycles**

The study team could not acquire information on end-of-life motorcycles in Myanmar.

#### **4.6. Recycling companies and industry**

##### **(1) Dismantlers**

The dismantling of ELVs is operated and supervised by MEC), which is a corporation under the Myanmar Government. MEC launched two ELV dismantling plants in Myanmar. Before sending ELVs to the dismantling facilities of MEC, the car owners request the informal sector to take off used parts. Brokers come to buy used parts from car owners. In this case, recycling is mainly conducted by hand. The wastes are ultimately sold to recycling facilities.

On the other hand, household waste collectors and waste pickers collect waste products and sell to wholesalers, sometimes through brokers. Wholesalers subsequently sell to recycling facilities.

##### **(2) Other Related Companies**

##### **(3) Batteries**

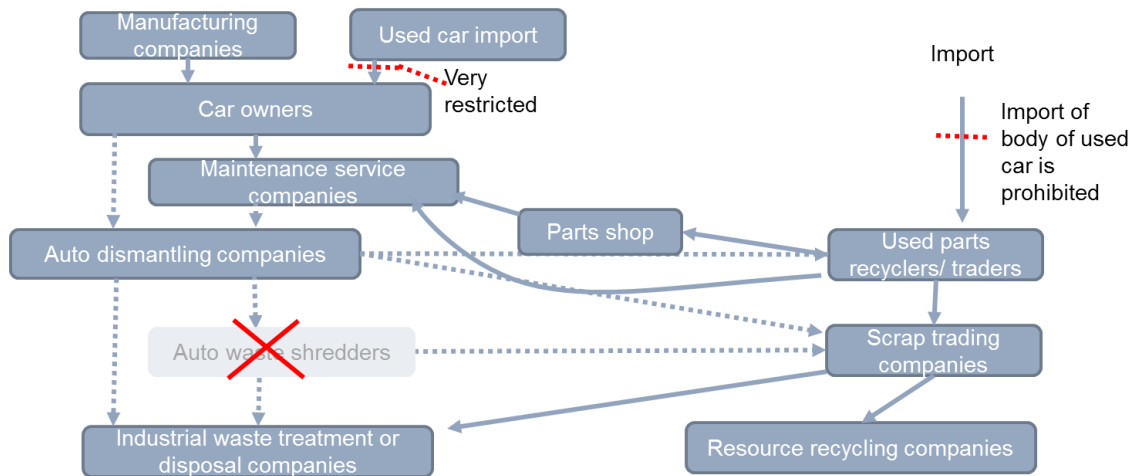
As previously mentioned, there is a pioneer industrial lead smelter in Myanmar, the Yangon Metal Industry Company Limited. They produce 99.9 percent pure lead and other various lead alloys, antimony, and calcium for industrial applications.

## **5. Philippines**

### **5.1. Overview**

The overview of ELV recycling in the Philippines is illustrated in Figure 4 Overview of ELV recycling in the Philippines. The importation of used cars is very restricted and is only allowed for special cases. The importation of used parts is also under control and the importation of bodies of used cars is prohibited. ELVs in the Philippines would first flow to repair shops where usable parts are taken out. After that, the remaining scraps are sent to junk shops.

**Figure 4. Overview of ELV recycling in the Philippines**



ELV = End-of-life vehicle.

Source: Study Team.

## 5.2. Status of trade of used cars and used parts

### (1) Importation of used cars

In the Philippines, the importation of used private cars is prohibited under Executive Order No. 156, series of 2002 (EO 156), except for special cases (personal use or official use).

#### **Executive Order No. 156, series of 2002 (EO 156)**

##### **Section 3. Used motor vehicles.**

3.1 The importation into the country, inclusive of the Freeport, of all types of used motor vehicles is prohibited, except for the following:

3.1.1 A vehicle that is owned and for the personal use of a returning resident or immigrant and covered by an authority to import issued under the No-Dollar Importation Program. Such vehicles cannot be resold for at least 3 years;

3.1.2 A vehicle for the use of an official of the Diplomatic Corps and authorized to be imported by the Department of Foreign Affairs;

3.1.3 Trucks excluding pick-up trucks:

1. with gross vehicle weight (GVW) of 2.5–6.0 tons covered by an authority to import issued by the Department of Trade and Industry (DTI).

2. with GVW above 6.0 tons.

3.1.4 Buses:

1. with GVW of 6–12 tons covered by an authority to import issued by DTI;
2. with GVW above 12 tons.

3.1.5 Special purpose vehicles:

1. fire trucks
2. ambulances
3. funeral hearses/coaches
4. crane lorries
5. tractor heads or truck tractors
6. boom trucks
7. tanker trucks
8. tank lorries with high pressure spray gun
9. reefers or refrigerated trucks
10. mobile drilling derricks
11. transit/concrete mixers
12. mobile radiological units
13. wreckers or two trucks
14. concrete pump trucks
15. aerial/bucket flat-form trucks
16. street sweepers
17. vacuum trucks
18. garbage compactors
19. self-loader trucks
20. man lift trucks
21. lighting trucks
22. trucks mounted with special purpose equipment
23. all other types of vehicles designed for a specific use.

(2) Importation of used parts

The importation of used parts is restricted by Customs and Border Protection (CBP) Circular No. 1389, series of 1993, and Customs Memorandum Order (CMO) 21-2008. According to CMO 21-2008, all items classified as stock lots, side runs, cull rolls, seconds, mill lots, off grade, B-grade, C-grade, used, second-hand, off specs, substandard, off-quality, overruns,

sweepings, overflow, recycled, waste, reconditioned, refurbished, refashioned, surplus, scrap, scrap metals, metal waste, cut up, bath roll, odd lengths, and unbranded are subjected to 100 percent inspection in the presence of technical experts. Importers should also have an authorised manufacturer's or supplier's certificate of quality as to the actual condition of the articles, including the standard for the product being imported, and its deviation from such standards.

### **5.3. Generation, flow, and treatment of ELVs, used parts, and resources**

#### **(1) Generation of ELVs**

End-of-life cars in the Philippines would first flow to repair shops where usable parts are taken out. Afterward, the remains, along with cars that have figured in accidents, are sent to junk shops.

#### **Registration and Inspection**

The main law governing vehicles in the Philippines is Republic Act (RA) No. 4136, the National Law on Traffic, which controls vehicle operations such as the registration and inspection of vehicles. The Department of Transportation and Communications (DOTC) is in charge of the use of vehicles and the operation of traffic rules.

#### **New Car Registration**

Starting April 2015, DOTC and the Land Transportation Office (LTO) strictly enforced the 'No Registration-No Travel Policy' for motor vehicles. This means all vehicles must be registered to be on the road. The prescribed procedure of registration is conducted at the LTO. Vehicle registration must be renewed every year. In order to renew the registration, users need to pay a Motor Vehicle Usage Charge (MVUC).

The rates of MVUC set by RA 8794, an Act imposing MVUC on owners, differs depending on the Gross Vehicle Weight (GVW) and vehicle classification as below. The rate is also different for specific vehicles such as taxis and cars registered before RA 8794 was enforced.

#### **Licence to Transfer or Sell**

Ownership of a car can be changed with required documents such as the original copy of the Deed of Sale at the LTO district office. However, according to the provisions of Batas Pambansa Blg. 43, an Act Providing Number Plates to Owners of Motor Vehicles and Trailers, change of licence plate is not allowed.



**Re-registration**

Owners can re-register at any LTO District Office. The schedule of re-registration depends on the plate number. The last digit of the plate number indicates the month of the registration, while the middle digit indicates the weekly deadline.

The LTO issued new standard licence plates in January 2015. Car owners who need to renew their registrations have to prepare an additional P450 for the licence plate fee. These new plates are claimed 45 days after the LTO registration renewal.

**Deregistration**

There is a deregistration system which is utilised by a few people. Registered vehicles are basically required to be renewed every year, however, it is not applied for inactive cars. If the owners want such cars to be activated again, they need to renew the registration and pay accumulated renewal fees.

**Inspection**

All motor vehicles, including passenger and commercial cars, are subjected to mandatory inspection prior to registration as per Memorandum Order (MO) No. 86-003 dated 3 June 1986. No motor vehicle is accepted for registration unless it is fully inspected in accordance with the standards and procedures for motor vehicle inspection. The three venues of inspection are LTO District Offices, Motor Vehicle Inspection Stations (MVIS) and Private Emission Testing Centres (PETC).

Annual inspection is mandatory, and a report of inspection is required to be submitted at the renewal registration. Owners of brand-new cars can skip the safety inspection for the first 3 years, but they need to take the emission inspection from the first year.

**(2) Flow of resources: used parts**

Used parts are sold in specific areas such as Evangelista in Metro Manila. In this area, many repair shops and used parts dealers have shops. They buy parts at the auction held in the port area. Such parts are imported from Japan, China, and Thailand,

**(3) Flow of resources: steel and non-ferrous metals**

Retrieved metals are sold to junk shops. Junk shops segregate metals. There, valuable metals are recovered from scrapped cars by hand. Copper is retrieved from wire harness by open incineration. These activities cause environmental pollution. Steel and non-ferrous metals are sold to scrap dealers.

(4) Flow of resources: plastic

Plastics and rubbers are also collected and recycled.

#### **5.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, and the like)**

(1) Batteries

Batteries are recycled by the formal licensed and government-regulated sector, primarily the Philippine Recyclers Incorporated (PRI), and the informal sector.

According to Mr Brian Wilson, the International Lead Management Centre (ILMC) Programme Manager, the formal licensed sector, primarily PRI, produced 23,000 tons of secondary lead, whereas the informal sector produced 12,000 tons. These statistics mean that the informal sector accounts for 30 percent of the secondary lead production in the Philippines.

(2) Used tires

Used tires are mainly recycled by informal sectors. Used tires are remanufactured as various rubber products such as cushion materials, flip-flops, and many more.

#### **5.5. Generation, flow, and treatment of end-of-life motorcycles**

Flow of end-of-life motorcycles cannot be identified during the research.

#### **5.6. Recycling companies and industry**

(1) Dismantlers

There is no specific registration scheme for vehicle dismantling and there is difficulty in the effective regulation of the industry. Dismantlers do not exist and dismantling is mainly conducted by repair and junk shops. Vehicle dismantling is mainly conducted by small low-technology units with low yield and capacity.

(2) Lead batteries

PRI is the largest and most advanced battery recycling facility in the Philippines. It supplies all the lead requirements of the Ramcar Battery group, the largest battery manufacturer in the Philippines. The company is certified to ISO 14001 and ISO9002, and has received numerous local awards and recognition for its environmental management efforts. However, PRI is no longer operating.

(3) Tires

Danglos Eco Systems invested in a modern tire recycling plant to help rid the Philippines of the waste tires and convert them into a useful bi-product known as rubber crumb.

(4) Waste oils

There are more than dozens of waste oil treatment companies in the Philippines and they are listed in the List of Registered Treatment/Storage/Disposal facilities for Hazardous Waste of the Department of Environment and Natural Resources.

<b>Recyclers in Metro Manila</b>			
<p>In Metro Manila, more than 50 percent of waste collected is organic/biodegradable, and 44 percent is recyclable or factory-returnable. The latter is comprised mostly of scrap paper (19%), plastics (17%), iron/metals (3%), aluminium (2%), glass (3%), and special hazardous waste (1%).</p> <p>The National Solid Waste Management Commission (NSWMC) has a database of recyclers. According to the database, there are 24 plastic recycling companies, 1 used lead-acid batteries recycling company, and 6 tire recycling companies in the Philippines. The number seems to be smaller than the real activities.</p>			
<b>Recyclers Locations (based on NSWMC database)</b>			
Type or Recyclables	No. of Recyclers	Locations (in Luzon / around Metro Manila)	Locations (other than Metro Manila/ Luzon)
Plastics (HDPE, LDPE, PP, PS, PET, HIPS, PVC, Others)	24	Valenzuela (14) Manila (2) Quezon City (2) Caloocan Laguna Mandaluyong Muntinlupa Parañaque	Cebu
Paper (newsprint, office paper, other white grades, corrugated cartons, paper boxes)	14	Makati (2) Pasig (2) Quezon City (2) Caloocan Cavite Laguna	Davao

		Malabon Marikina Pampanga		
		Parañaque		
Used Lead-Acid Batteries	1	Bulacan		
Computers/ Electronics	1	Laguna		
Tin Cans	1	Mandaluyong		
Metals	2	Cavite Quezon City		
Container Glass	6	Cavite (2) Laguna Makati Manila	Cebu	
Flat Glass	1	Pasig		
Tetra Pak	*Usually also by paper recyclers			
Tires	6	Bulacan Las Piñas Manila Marikina Pasig Quezon City		
Total	56	53	3	

HDPE - High Density Polyethylene, HIPS - High Impact Polystyrene, LDPE - Low Density Polyethylene, NSWMC - National Solid Waste Management Commission, PET - Polyethylene terephthalate, PP - Polypropylene, PS - Polystyrene, PVC - polyvinyl chloride.

Note: Some Locations (e.g. Makati) are those of headquarters rather than plant facilities.

Source: National Solid Waste Management Commission Database.

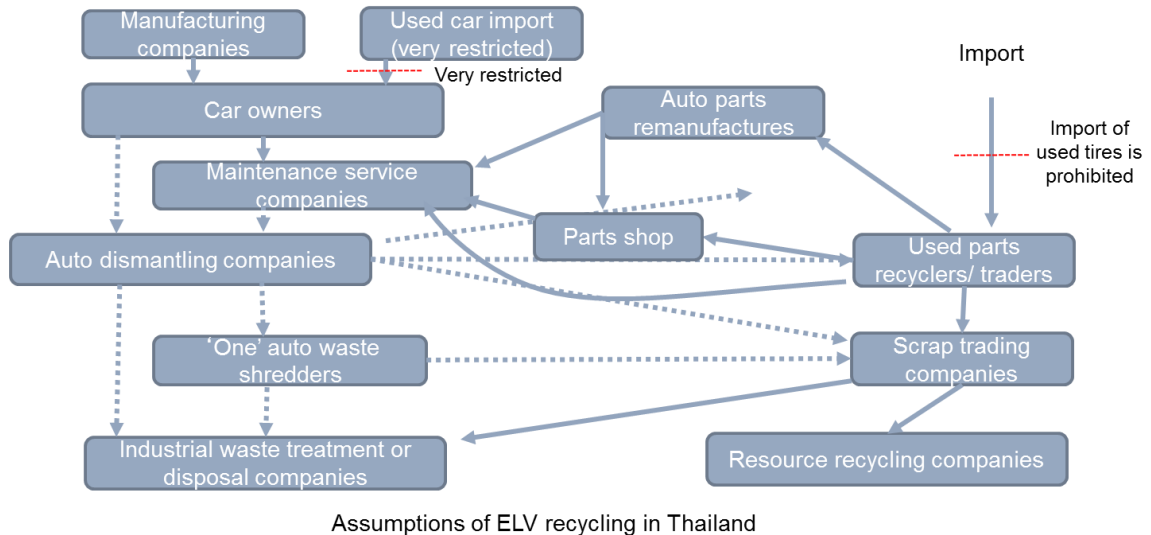
## 6. Thailand

### 6.1. Overview

The overview of ELV recycling in Thailand is illustrated in Figure 5. Overview of ELV recycling in Thailand. There are huge hubs of used car parts trade in Thailand. Thailand imports many half-cuts and used parts from other countries, but mainly from Japan. Many used parts recyclers/traders dismantle half-cuts. Some are domestically used and others are exported.

Locally generated ELVs are dismantled by auto dismantling companies. Some of the auto dismantling companies are in the informal sector. ELV shredders have already been introduced in Thailand. However, the number of ELV generation in Thailand is not so many to generate the need for dismantling by shredders. ELVs are dismantled manually.

**Figure 5. Overview of ELV recycling in Thailand**



Source: Study Team.

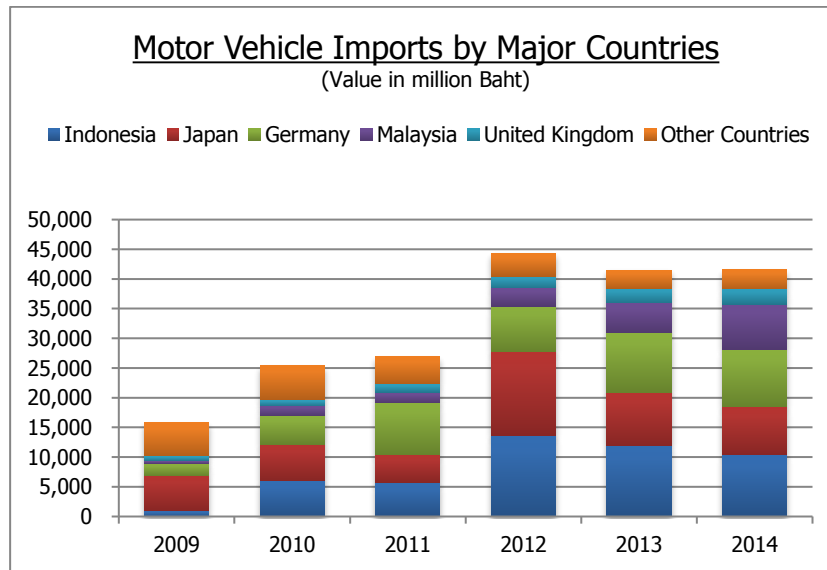
## 6.2. Status of trade of used cars and used parts

### (1) Importation of used cars

The importation of used cars is strictly regulated in Thailand. Used/second-hand vehicles need to obtain an import permit from the Foreign Trade Department of the Ministry of Commerce. For vehicles less than 3,500 kilograms, the importers need to obtain an import permit from the Industrial Standard Institute as well. The total number of imported cars in Thailand in 2013 was 16,357.

The cumulative bar graph shows automobile (HS code: 870321 - 870390) imports, including used cars, to Thailand from 2009 to 2014. The total volume of imports in 2012 grew 16 percent from the previous year due to the Thai Government incentive programme for first-time car buyers.

**Figure 6. Thailand's automobile imports**



Source: Thailand Ministry of Commerce.

## (2) Importation of used parts

Thailand prohibits the importation of some used parts such as used tires, used engines and parts for motorcycles. The importation of used diesel engines requires an import permit. As mentioned, Thailand imports many half-cuts and used parts from other countries, mainly from Japan. Many used parts recyclers/traders dismantle half-cuts. Some of the used parts are domestically used and the others are exported.

According to the estimate of Yano Research Institute, a total of ¥9.25 billion of used parts were imported from around the world. Among these, about ¥8.25 billion was from Japan.

## 6.3. Generation, flow, and treatment of ELVs, used parts, and resources

### (1) Generation of ELVs

In Thailand, drivers continue to use even old types of used cars. If used cars become older and older, they are likely to be resold from urban to rural areas or from Thailand to neighbouring countries such as Myanmar, Lao PDR, and Cambodia. Therefore, ELVs can be seen in rural areas in Thailand. Some of the industrial scrap trading companies are considering the introduction of shredders, but according to them, the amount of generation is not enough.

The price range of used cars is from B300,000 to B800,000. According to the report, used cars ranging from B350,000 to B400,000 (¥1.14 million to ¥1.3 million approximately) are popular.

In 2014, the number of ELVs was 164,934. The number of used car distribution was about two million in 2013.

**Role of Department of Land Transport**

The Department of Land Transport (DLT) under the umbrella of the Ministry of Transport is in charge of new car registration, transfer or selling of licences, re-registration, suspension, and deregistration.

**New Car Registration**

In Thailand, all types of vehicles must be registered. DLT is in charge of car registration and inspects vehicles in the following manner:

- Private inspection stations authorised by DLT carry out inspections of motorcycles and taxis i.e. vehicles registered under the Motor Vehicle Act (MVA).
- Car owners have to pay a road tax.
- Compulsory insurance is also required.

DLT administers two relevant pieces of legislation:

- Motor Vehicle Act (MVA) for smaller vehicles, including cars, pickups, and motorcycles, taxis and so on.
- Land Transport Act (LTA) for heavy-duty diesel vehicles, including buses and trucks.

A motor vehicle shall be registered at a Land Traffic Office over the car owner's registered address. If the owner mostly wants to use the vehicle at some other area, he/she may have it registered at a Land Traffic Office with such a jurisdiction.

The tax fee for the registration depends on the type and age of the vehicle. Typically for a motorbike, it is around B300 to B400. For a car, the fee starts at around B1,000 (for engines up to 2,000 cubic centimetre). The average price is about B2,000 but it can go up to B6,000 to B7,000 for a four-door pickup. The fee is the same each year for the first 5 years and it is reduced by 10 percent every year up to a maximum of 50 percent.

At present, motorcycles and cars aged more than 5 and 7 years respectively must be inspected before their registration can be renewed. The registration system relies on a logbook which is tied to the vehicle or motorcycle.

**Transfer or Selling of Licence**

Car owners are required to transfer the registration in case of change of ownership, colour and/or engine.

**Re-registration**

Registered cars are required to renew their registration every year after registration and car owners have to present certifications of automobile tax, inspection, and compulsory insurance at the time.

**Suspension**

In case of suspension of use of registered car over 15 days, the car owner is required to submit an application.

**Deregistration**

Deregistration is obligatory within 15 days after the owner has stopped to use the vehicle

in Thailand. If a car owner does not pay the registration fee for more than 3 years, the car will be automatically deregistered.

### **Inspection**

The responsibilities of owners for periodic inspection of in-use vehicles are divided as follows:

- DLT inspects vehicles regulated under the LTA; and
- Private inspection stations authorised by DLT carry out inspection of motorcycles and taxis (vehicles registered under the MVA).

The Ministry of Industry supported the improvement of automotive testing centres, enabling them to conduct testing according to international standards as well as testing related to non-tariff measures to trade (for example, ELV management).

DLT established privately operated inspection stations in 1994. At present, there are 225 centres in Bangkok Metropolitan Region (BMR). The distribution of centres is as follows: 169 centres in Bangkok, with a further 56 in the surrounding provinces that make up the balance of the BMR. About 70 percent of the centres also do repairs.

Personal vehicles are required to be inspected every year after seven years of its new registration. Commercial vehicles have to be inspected every year after registration. DLT has 13 staff in Bangkok who are responsible for monitoring the quality of inspections. Each station is only monitored on average three times per year. There is no centralised reporting.

### **(2) Dismantling**

ELVs generated domestically and imported are dismantled in dismantling companies in Thailand. Dismantling is conducted mainly by hand and the waste oils and CFCs are not properly treated, which threatens labour safety.

Steel scraps generated in the process of dismantling are sent to recyclers and catalysers inside mufflers, including rare metals, are sold to recyclers.

### **(3) Flow of resources: used parts**

Areas where used parts dealers gather are dotted in Thailand. Small-scale dealers conduct their business in those areas. There are dealers specified in specific items, and they deal with used parts coming from both inside and outside of the country. Those dealers send their dismantling skilled staff to dismantling work places in Japan, and then the dealers import used parts from Japanese dismantling sites where their staff work. In addition to automotive repairers and parts' brokers, end users sometimes purchase the parts directly.

The parts can be re-exported. Thailand allows dealers to import only those which can be sold as parts if they are valuable as resources.



(4) Flow of resources: steel and non-ferrous metals

Steel scraps and unsold mufflers are pressed by steel recyclers and then re-refined after selling to electric furnace operators and steel mills.

Used parts that cannot be sold are recycled by metal recyclers who can handle parts other than automobiles. Harness, for example, is refined to copper by dealers other than dismantlers.

Dismantlers break used cars into parts. Waste oils and CFCs are not recycled.

(5) Flow of resources: plastics

Plastics from ELVs are collected and pelletised. Plastic scraps are sold to plastic manufacturing companies or traders.

**6.5. Generation, flow, and treatment of hazardous waste from ELVs (batteries, tires, etc.)**

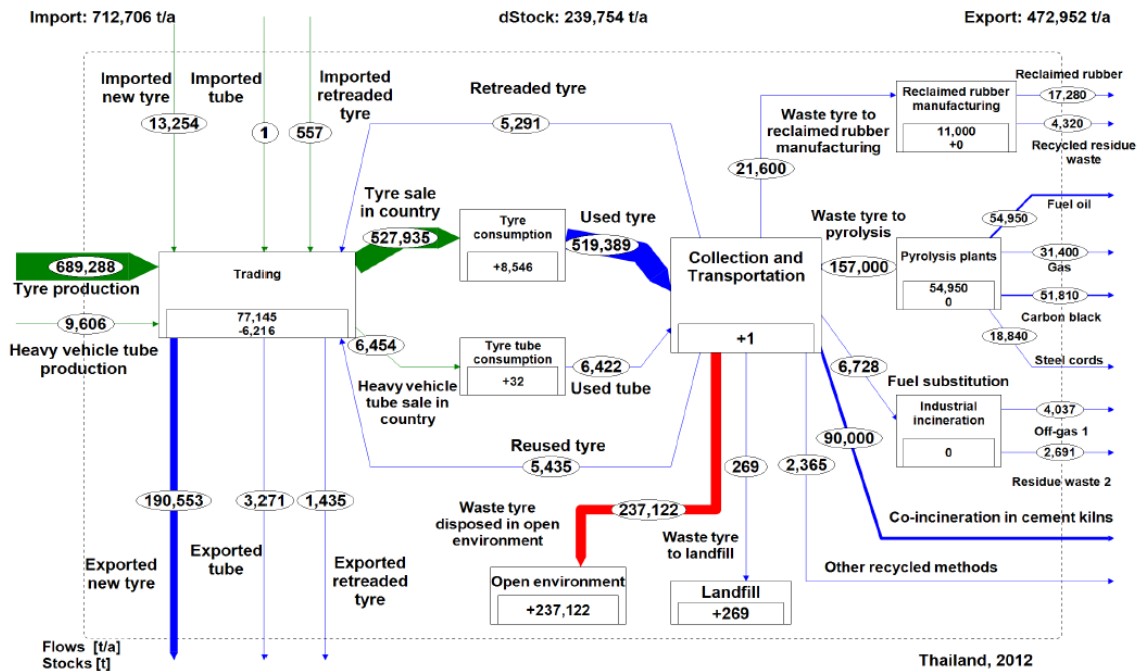
(1) Batteries

Batteries are collected by the informal sector, recycling companies (for example, T.K. Metal Trading Limited Partnership), and trading companies among others. Some of the collected batteries are recycled domestically, and the others are exported, mainly to China.

(2) Used tires

Approximately 529,000 tons of used tires are collected annually. Nearly 50 percent of waste tires goes into the open environment without proper collection and treatment, while very less is recycled as reclaimed rubber, and energy contained in the tire is recovered through co-incineration and pyrolysis processes. Cement kilns are identified as one of the potential industries to utilise waste tires as fuel substitution in their energy intensive cement production processes.

Figure 7. Tire recycling in Thailand



Source: Tasawan Suparat (2013), Waste Tyre Management in Thailand: A Material Flow Analysis Approach.

### 6.6. Generation, flow, and treatment of end-of-life motorcycles

There is no reliable estimate of generation of end-of-life motorcycles. End-of-life motorcycles are sent to junk shops and parts are taken out and recycled as steel and the like.

### 6.7. Recycling companies and industry

#### (1) Dismantling companies

Dismantlers commonly offer to buy damaged automobiles and ELVs. At the same time, they sell imported used parts and brand new parts. Dismantling seems to be conducted mainly by hand. Waste oils and CFCs are not properly treated so these may cause soil and air pollution. In Thailand, recyclers collect wastes and people either bring them to recyclers nearby or brokers bring them to recyclers after buying waste.

Dismantlers and used parts traders who import half-cuts and used parts are located in specific areas such as Bang Na, Ptatumwang, and Phaholyothin Frontage Road. Originally, such dismantlers and used parts traders were mainly located in Ptatumwang, a real estate of Chulalongkorn University. Chulalongkorn University rents apartments at very cheap prices and, therefore, people come to gather in these areas. In 1990, the contract between dismantlers and used parts traders and Chulalongkorn University expired. Then, in 2000, Chulalongkorn University requested dismantlers and used parts traders to leave the area. At

first, there was huge objection from dismantlers and used parts traders but recently, the dismantlers have left Ptathumwang and moved to Bang Na and Phaholyothin Frontage Road.

(2) Downstream recycling companies

After separating and processing recyclable wastes, recyclers sell processed wastes to steel plants and plastic recyclers. The exact number of dealers is unknown because special registration or permission is not required when conducting automotive businesses. Permission for antiquary is required in order to sell used parts.

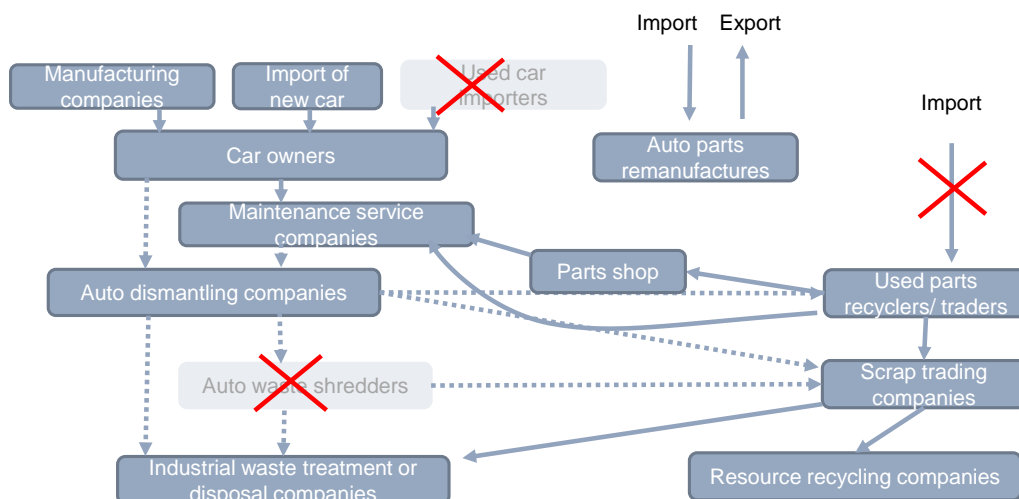
Regarding batteries, AP Honda is now collecting batteries from used motorcycles and sends them to T.K. Metal Trading Limited Partnership.

7. Viet Nam

7.1. Overview

The overview of ELV recycling in Viet Nam is illustrated in Figure 8. Overview of ELV recycling in Viet Nam. The importation of commodities requires an import licence in Viet Nam. Import licences for used cars are issued when the previous car is dismantled or of a foreign currency account. There is no specific law for the importation of car parts but for the acquisition of licences. The importation of used parts is allowed but the importation of half-cuts is prohibited. Imported used parts are domestically used. Car owners bring ELVs to the sites to get a new licence for the importation of used cars.

Figure 8. Overview of ELV recycling in Viet Nam



ELV = End-of-life vehicle.  
Source: Study Team.

## **7.2. Status of trade of used cars and used parts**

### **(1) Importation of used cars**

A used automobile can be imported into Viet Nam, although import duties are high and the procedure is complicated. The present owner of the vehicle must be the original owner. If the automobile has changed ownership, the vehicle cannot be imported into Viet Nam. The vehicle must have been legally registered in the owner's home country for at least six months, have a minimum mileage of 10,000 kilometres, and cannot be more than five years old.

Vehicles may enter the country through one of four ports: Cai Lan in Ha Long City, Hai Phong, Danang and Ho Chi Minh City. Viet Nam Customs is in charge of the import of any vehicle into Viet Nam. Two- or three-wheel vehicles of 175 cubic centimetres and above are required to have an import licence.

Types of vehicles banned from import (according to the government's Decree No. 12/2006/ND-CP dated 23/1/2006) are right-hand drive vehicles (including converted drive vehicles or disassembled vehicles), except for special purpose vehicles with right-hand drive operating in a small area such as: crane lorries, breakdown lorries, road sweeper lorries, spraying lorries, rubbish lorries, passenger buses at airports, pick-up trucks, concrete-mixer lorries, and vans working in parks and golf courses.

The total number of imported cars in 2013 was 17,692. Because the trading data in Viet Nam does not separate categories into used cars and new cars, the study team could not confirm the accurate number of total used car imports. However, the team was able to estimate the rough number by adding up the number of used cars exported to Viet Nam from over 32 countries.

It can be concluded that the number of used car imports are few because it is technically impossible to import used cars for business. On the other hand, considering the data that there are certainly a few used cars exported from Japan to Viet Nam and from other countries, the team cannot deny the possibility that there might be some illegal used car imported.

### **(2) Importation of used parts**

In Decree No. 12/2006/ND-CP, dated 23/1/2006, second-hand vehicles include:

- Engines, frames, inner tubes, tires, accessories, and suspensions of cars, tractors, and two-wheeled and three-wheeled vehicles;
- Under-carriage frames of motorised cars and tractors (including new underframes with second-hand motion and/or second-hand underframe with new motion);
- Motorised two-wheeled and three-wheeled vehicles;
- Ambulances; and
- All types of cars with structures and functions altered from the original design.

### **7.3. Generation, flow, and treatment of ELVs, used parts, and resources**

#### **(1) Generation of ELVs**

In Viet Nam, there is a law on the limitation of service of cars (expiration period). Commercial cars cannot be used for more than 22 years, and private cars cannot be used for more than 25 years.

In Viet Nam, vehicles' penetration rate is low. Besides, drivers tend to use their vehicles until they are broken. Therefore, the number of ELVs is low. ELVs are broken into parts informally and sold as parts. Some resources from ELVs are recycled. Automobile recycling business is mainly conducted in areas such as 'Te Lo' village. Operators collect ELVs and bring them to the areas where ELVs are broken into pieces by hand.

Waste disposal and recycling is conducted in 'Craft Villages', which are industry integrated areas located mainly in the Red River Delta and South Central Coast region in Viet Nam. Craft villages tend to deal with one type of item in industrial clusters such as Da Tien village for tires, and Mansart or Quan Do villages for aluminium.

#### **(2) Flow of resources: used parts**

There is a used parts market called 'Gioi', which is likely to be illegal. New parts are possibly made in China and brought in by land.

The demand for automobile parts is met because, in addition to imitation parts made in China, the number of cars itself is low in Viet Nam. Therefore, in many cases, used auto parts are reused in agricultural machinery.

#### **(3) Flow of resources: steel and non-ferrous metals**

Recycling of non-ferrous metals is carried out in 'Craft Villages', which are specified for metals or resources. Like other wastes, after sorting out the metals brought by recyclable collectors manually, they are refined.

There are many small-scale steel plants in Da Hoi village. They recycle steel into construction materials from steel scraps by using small electronic furnace. Small-scale steel plants do not have appropriate pollution prevention equipment. As a result, they cause air pollution.

There are also many household businesses recycling non-ferrous metals such as aluminium. In Bac Giang Province, there is an area where many such companies are gathering. Workers do not work with appropriate equipment such as masks. Therefore, there might be an occupational health risk.

As for circuit boards, since there are no facilities that can deal with rare metals, the substrate is exported to China as it is.

#### (4) Flow of resources: plastics

Plastics from ELVs are collected and pelletised. Plastic scraps are sold to plastic manufacturing companies or traders.

#### **7.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, etc.)**

'Decision 50/2013/QĐ-TTg', issued by the Prime Minister, prescribes that, from 1 January 2015, enterprises producing waste products are responsible for the retrieval and disposal of discarded products, which include hazardous substances such as batteries. Before the decision was issued, there were no facilities that could collect CFCs, discarded products were manually dismantled, CFCs collection facilities did not exist, and waste oils were not collected.

##### (1) Batteries

Batteries are collected and dismantled by small household businesses, which are mainly in the informal sector. Batteries are cut without appropriate pollution prevention measures. In many cases, sulfuric acid is discharged to rivers without treatment. In addition, occupational health risk is a huge problem because the workers cut batteries without masks and gloves. Workers face the risk of lead poisoning. By an initiative of the Vietnamese Government, recycling facilities of batteries and lead have been established. There are seven permitted battery recycling facilities in Viet Nam with capacity of around 100 tons per day.

##### (2) Used tires

Used tires are collected by small companies, mainly in the informal sector. After being cut into small parts, used tires are sold to traders or companies using them as fuels for manufacturing companies, e.g. cement companies.

##### (3) Waste oils

There are 23 permitted facilities in Viet Nam with capacities of around 10 tons per day, besides other illegal recycling facilities. One of them is Long Hung Company. Their characteristics are as follows:

- Oil distillation (fractional distillation and simple distillation);
- Oil water separation by mechanical method (centrifugation) and heat;
- Simple distillation technology (simple equipment, easy to manufacture, install, and operate, low investment); and
- Fractional distillation technology (produce diesel oil).

### **7.5. Generation, flow, and treatment of end-of-life motorcycles**

In Viet Nam, motorcycles are dismantled in the recycling villages. In Te Lo village, there are motorcycle dismantlers and traders. Used motorcycles are collected, and some are sold as second-hand motorcycles, or dismantled by taking out the available parts. The scraps that have been dismantled are sold.

Steel scraps and aluminium generated in the dismantling process are sold to electric furnace companies. Tires and plastics are sent to specialised traders. Tires are recycled into asphalt and sandals. A motorcycle dismantler interviewed by the study team handled 10 to 30 units per month.

### **7.6. Recycling companies and industry**

Among all disposal wastes, the volume of automotive parts to be treated is low. Various wastes, including home appliances, are dismantled and sorted manually. Afterwards, metals retrieved in the process go to the craft villages that specialise in the item.

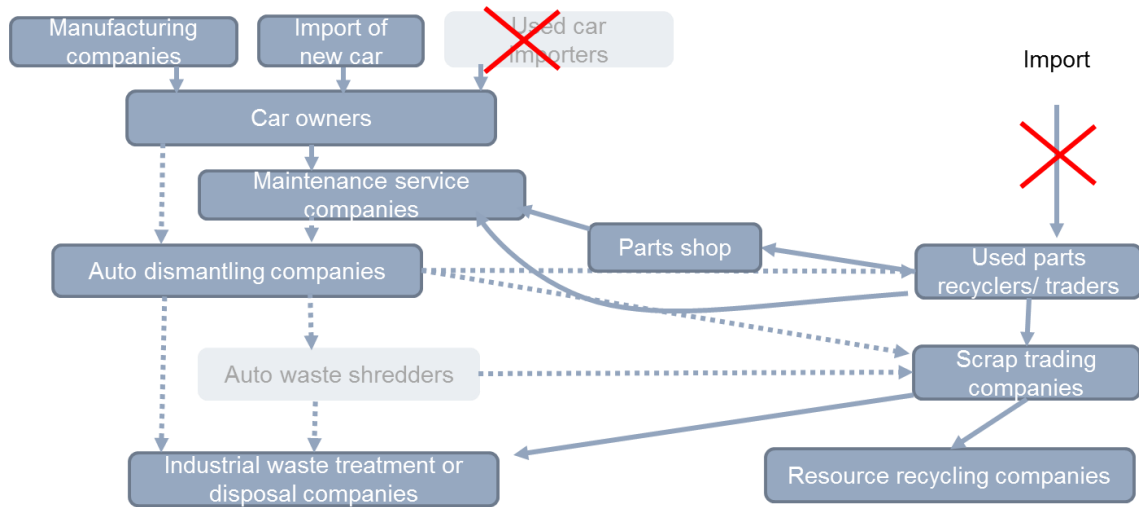
Viet Nam is in the process of introducing legislation to control ELV recycling and making preparations for the introduction of an ELV legislative management system.

## **8. India**

### **8.1. Overview**

The overview of ELV recycling in India is illustrated in Figure 9. Overview of ELV recycling in India. The importation of used cars and parts is prohibited in India. The number of automobile is increasing, and more and more ELVs are being generated. Vehicle dismantling is mainly conducted by small low-technology units with low yield and capacity. Used parts are dismantled, refurbished, and sold by dismantlers to second-hand spare outlets located in the same scrap yards. Scrap metals, aluminium, and plastics from ELVs are collected by dealers and used as materials.

**Figure 9. Overview of ELV recycling in India**



ELV = End-of-life vehicle.  
Source: Study Team.

## 8.2. Status of trade of used cars and used parts

### (1) Importation of used cars

Used car importation is very limited in India due to harsh trade barriers. The domestic used car market is large, as the number of transactions for used cars equals that for new ones.

### (2) Importation of used parts

The importation of remanufactured, rebuilt, and/or used motor vehicle parts is not permitted.

## 8.3. Generation, flow, and treatment of ELVs, used parts, and resources

### (1) Generation of ELVs

The registration of motor vehicles in India is governed by the country's Motor Vehicles Act of 1988. Motor vehicles cannot be used unless they are registered. Every owner of a motor vehicle must have it registered by a registering authority in his or her residence or place of business where the vehicle is normally kept. Section 41 of the Act details the steps to register a motor vehicle in India.

Cars that have figured in accidents are auctioned off in India. Currently, the informal sector is taking in ELVs, but the industry is reported to have many problems. The working condition is very bad for the estimated 100,000 recycling workers who face severe health threats. Little treatment is done for hazardous materials, resulting in air, water, and soil pollution in these informal recycling centres situated in city centres. Testing of the formal mechanised recycling process has been started at the Recycling Demonstration Unit of the Global Automotive Research Centre, which can properly treat batteries, oils, airbags, and other materials.



Old vehicles are repaired by the informal sector and those that cannot be repaired are sent to dismantling centres as ELVs. Bulk disposers such as companies and government institutions sell ELVs at auctions. Individual owners trade in their old cars for new ones at car dealers or they go to the local dismantling centres.

Used cars used to be traded by small-scale dealers or acquaintances in India. However, the situation has changed these days. Major automobile manufacturers such as Maruti Suzuki, Toyota, and Tata have launched programmes to deal with used cars, which support the expansion of the ELV market.

Vehicle dismantling is mainly conducted by small low-technology units with low yield and capacity. The working condition is very bad for the estimated 100,000 recycling workers who face severe health threats. Furthermore, there is not enough space for a facility. Vehicles are dismantled in scrap yards located inside the cities with the use of hand tools, hammers, and the like. Historically, these locations were in the city outskirts but they are now in busy residential areas, often in the heart of the city.

Currently, dismantling is centred in the informal sector, offering employment to nearly 15,000 people directly and 80,000 people indirectly.

There is not a single shredder in operation in India for ELVs. The small volumes are not enough to make the operation of shredder economically viable. The Ministry of Steel is proposing to install shredders where ELV volumes are guaranteed.

#### (2) Flow of resources: used parts

Used parts are recovered, refurbished, and sold by dismantlers to second-hand spare outlets located in the same scrap yards. Used parts such as bumpers, headlamps, bonnets, steering wheels, batteries, among others, are used.

#### (3) Flow of resources: steel and non-ferrous metals, and plastics

An estimated 410,700 tons of metal, aluminium, and plastic scraps are sent to scrap dealers. Around 700-800 tons of rubber and plastic that cannot be recycled are dumped in open garbage areas.

### **8.4. Generation, flow, and treatment of hazardous wastes from ELVs (batteries, tires, among others)**

Generally, little treatment is done for hazardous materials, resulting in air, water, and soil pollution in recycling facilities.

#### (1) Batteries

Battery is sold to spare shops and the like, though there are formal regulations concerning the disposal of used batteries. Regulations exist for the return and recycling of batteries, but these are not strictly enforced.

#### (2) Tires

Scrap tires are either retreaded, sold to small industries, or discarded into garbage dumps. Scrap tire collectors and traders collect and transport scrap tires from tire shops to retreading and recycling facilities, or to the nearest landfill sites.

#### (3) Engine Oils

Engine oil is used as fuel for industrial furnaces and boilers or as recycled oil after distillation. Oil without the process of distillation is used as lubrication for crane wire and gear oil.

#### (4) Waste Oils

Several kinds of waste oils such as transmission oil, coolant, power steering oil, brake oil, hydro oil, and gear oil are mixed and treated by heat. Afterwards, they are used as lubrication for gears after chemical congelation.

The testing of the formal mechanised recycling process has been started at the Recycling Demonstration Unit of the Global Automotive Research Centre, which can properly treat batteries, oil, airbags, and other materials.

### **8.5. Generation, flow, and treatment of end-of-life motorcycles**

While sales of new cars and commercial vehicles declined in the country, powered two-wheelers saw modest growth of 2.3 percent during the financial year 2012-13.

In the 12 months to the end of March 2014, the demand for two-wheeled transportation climbed 7 percent to 16.9 million units. According to the Society of Indian Automobile Manufacturers (SIAM), in the first half of this financial year, growth more than doubled to 16 percent, to a record sale of 8.17 million units. That figure represents nearly one-fifth of the world's total motorcycle, scooter, and electric bicycle sales.

According to automotive supplier Bosch, the volume will continue to grow. The company expects the two-wheeler market in India to reach 27 million units by 2020.

The study team could not get information on end-of-life motorcycles. However, as the motorcycle is one of the subjects of the Draft Automotive Industry Standard for ELVs, drafted by SIAM, the regulation on end-of-life motorcycle is expected to be concretised and strengthened.

## **8.6. Recycling companies and industry**

Both large-scale organised companies and small-scale informal sector businesses deal with ELVs in India. The former buys and sells bulk ELVs at auctions and sells them to scrap dealers once they have picked the reusable parts. The latter manually deals with picked parts that cannot be reused.

### **(1) Batteries**

Small recyclers dominate the Indian market. Most rely on coal to fuel crude furnaces. Furthermore, the quality of lead derived from these operations is insufficient to be used in producing high-quality long-life lead batteries.

According to a study of the Occupational Knowledge International 2010, there are 336 registered recyclers for lead batteries in India. However, most of these facilities are small scale, and very few are likely to operate efficiently and with sufficient pollution control measures.

### **(2) Tires**

In India, waste tire recycling plant companies exist.

Fab India is a manufacturer of recycled waste tires and a pioneer in the field of designing, developing, and quality manufacturing recycled tires with more than 20 years' experience. It is located in Ahmedabad, Gujarat.

Divya International is a manufacturer of recycled waste tires and equipment spare parts with a professional approach that is aimed at result orientation. The company installs quality pyrolysis machineries across India. Divya International today is one of the leading manufacturers of pyrolysis in India.

S&J Granulate Solutions Pvt. Limited is a company that started production in their new fully automated Eldan tire recycling plant in 2012. The plant, which is located in the Vapi region, Gujarat, India, currently has the highest capacity of any such facility in India. The production line is capable of processing up to 5,000 kilograms of shredded used tires per production hour.