# Project Formulation Survey under the Governmental Commission on the Projects for ODA Overseas Economic Cooperation in FY2013

## Summary Report

Republic of Kenya

# Project Formulation Survey on the Battery Recycling with Environmental Management System in Republic of Kenya

March, 2014

Joint Venture of Evergreen Co., Ltd. and IMG Inc.

The content of this report is a summary of the project formulation survey, which was commissioned by the Ministry of Foreign Affairs of Japan in the FY 2013 and is carried out by the consortium (Joint Venture of Evergreen Co., Ltd. and IMG Inc.). It does not represent the official view of the Ministry of Foreign Affairs.

# Introduction

This survey was conducted to formulate future Official Development Assistance (hereafter "ODA") projects in the Republic of Kenya (hereafter "Kenya") by introducing the proposed system, technologies and expertise of Evergreen Co. Ltd. (hereafter "Evergreen") to the country as a solution addressing the increasing environmental damages caused by inappropriate waste battery recycling in Kenya. Evergreen has many experiences in the waste battery recycling in Japan, applying management system and technologies that conform to the Japanese environmental standards. During the survey, Evergreen's various knowledge and information, including the plan of the battery disassembly plant that Evergreen had operated in Japan, the procedure of the company's battery recycling, and the operational rules of its Environmental Management System (hereafter "EMS"), were introduced to the potential Kenyan partners. This survey concludes that a future project, under the Japan's ODA scheme entitled "Pilot survey for disseminating SME's technologies" of Japan International Cooperation Agency (hereafter "JICA"), will create a significant development impact on the waste management issues in Kenya, and Evergreen's mid-term business expansion plan is expected to be highly feasible.

# I. Description of the current situation and development needs of the development issues concerned in the surveyed country

Kenya underwent the general election in March 2013 for the first time since the establishment of the new Constitution in 2010. The result of the election did not provoke any major conflicts or violence, and seems to be widely accepted by the Kenyan citizens. Under the new Constitution, the country is now divided into 47 counties, to which large part of the authority of the central government was devolved. Given this devolution, county governments' authority has rapidly increased, notably in public utility projects and management of the economy in each county. Despite its recession in 2012, the Kenyan economy is expected to grow again. The country's economic growth will be 5.5 – 6.0 % or even more in the next two years.

Meanwhile, Kenya's automobile market is also rapidly expanding as the result of the increasing middle class and the country's high population growth rate. Many global automobile manufacturers are entering the Kenyan market and developing their local business. Likewise, the telecommunication market has been showing an explosive growth too, being one of the driving forces for Kenya's expansion of consumer expenditure.

Under these circumstances, Kenyan society is now generating a large amount of waste battery. From individuals to large companies, many have been collecting and disassembling waste batteries, since the lead inside the waste batteries is considered as a valuable resource. However, in most cases, the battery disassembling and lead extraction processes are unsafe as they are carried out manually. The disassemblers are always at the high risk of waste acid[1] exposure to their skin and eyes, especially because most of them work without wearing gloves, masks, goggles and protective clothes. This is extremely dangerous as it can result in the loss of eyesight and chemical burn. Moreover, waste acid is discharged on the ground of scrap yard, roads and drains, which damages soil and ground water. Consequently, the health of neighboring residents is also harmed, not only due to the acidity, but also the heavy metals contained in the acid, including lead. This negatively affects agriculture and fishery in surrounding areas, in addition to the well or surface water that residents depend on to live.

Regarding the problems of unsafe acid disposal, governmental agencies in Kenya recognize the necessity of an accurate control. They also consider that the current business practice, in which only "drained" batteries[2] are traded in the market, is a serious problem. Nevertheless, decisive actions to solve this issue, such as the establishment of regulations and the development of organizational capacities for law enforcement , have not been taken largely for the following two facts: appropriate technologies and procedures of waste acid disposal are not widely introduced in Kenya; and the government does not have enough technical knowledge and human resources in the relevant field.

## II. Possible applicability of the SME's products and technologies, and prospects for future business development

Evergreen has remarkable advantages in the establishment and operation of the facilities for waste battery disassembly that thoroughly integrates a reliable EMS. With the facilities, including an automatic battery cutting machine and waste acid treatment equipment, Evergreen plans to launch a business to collect and disassemble waste batteries in a way that is harmless to both environment and human health. This is expected to reduce the environmental damages that are currently caused by the inappropriate business operations by local recyclers. The business plan is designed that the extracted scrap lead plates will be sold to local and global customers for further recycling processes into refined lead ingots or other materials.

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1 Many types of lead batteries contain dilute sulfuric acid inside.

2 "Drained" batteries refer to waste batteries whose acid had been drained and discharged beforehand.

The business is anticipated to begin its operation in 2016. The company's past experience and expertise in battery collection will be effective in developing and maintaining the collecting network in Kenya, that will be a key for the stable profit structure of the business.

In addition to this basic business structure, Evergreen plans to profit from its advanced level of environmental compliance to create competitive advantage. For instance, the company plans to cooperate with National Environmental Management Authority (hereafter "NEMA") to improve and promote the environmental regulations. Other plans include the issuing of the certificate of completion of recycling that supports supplier's environmental accountability on disposed batteries.

During the survey period, potential counterparts in Kenyan government have already expressed their intention to collaborate in the project. Machakos County Government , one of the most important potential counterparts, has agreed to earmark a plot of land for the disassembly plant, and NEMA, as another key counterpart, has agreed to collaborate to develop subordinate legal regulations on waste battery management.

## III. Verification of adaptability of the SME's products and technologies to the surveyed country (Demonstration and pilot survey)

First, the most remarkable findings through the survey were the inappropriate disposal of waste acid. In today's Kenyan waste battery market, "drained" batteries are preferred, and therefore, the acid is discharged before they are traded. This is one of the fundamental factors to determine success of the business, since the cost structure of plant operation changes depending on whether the plant procures "drained" waste batteries or those "non-drained." The latter cost more for waste acid treatment in the plant. As the findings above had not at all been anticipated before the survey, it was vital to clarify every detail during the field interviews in order to avoid misunderstanding or confusion.

As the result, the current situation of waste battery management in Kenya has been revealed at the later phase of the survey, and it was determined that the biggest problem of current waste battery recycling system is the disposal of waste acid. In addition, the survey team found out that the technology to properly manage waste acid and reinforcement of environmental regulations are highly needed by the people in the market, as well as by the governmental authorities, and that Evergreen has a potential to make a significant impact in the market by satisfying the both needs.

Furthermore, the survey team reached the conclusion that the management system for battery collection and the customer relationship management method that Evergreen had already

practiced in Hokkaido, Japan, will differentiate the company from other competitors. This is because Kenyan waste battery market has been formed spontaneously by informal collectors, whereas that of Japan was initiated and organized by battery manufacturers and the government authority. In other words, Kenyan informal collectors currently do not "plan and manage" the collecting activities; hence, there is still a potential to explore the more efficient, customer-oriented approaches. Evergreen's method, therefore, could be an ideal one to be applied.

## IV. Expected development impact and effect on business development of the proposing SME in the surveyed country through proposed ODA projects

Categorized as hazardous waste, waste batteries cause serious damages to the environment and human bodies if they are not treated in an appropriate manner. Currently in Kenya, many problems are detected in the current recycling practice on both of the two major toxic substances contained in batteries; waste diluted acid and lead.

Regarding the waste acid, the survey revealed that "drained" batteries are widely preferred in the Kenyan waste battery market. Many collectors, therefore, are forced to sell "drained" batteries and acid is discharged in various locations. Consequently, the people who drain the acid are always at the high risk, and the health of neighboring residents are also in danger as acid can affect them through soil and ground water.

Lead is also treated unsafely in Kenya. If waste batteries are not disassembled and stored in an appropriate way, lead particles spread around in the air. Battery disassemblers and neighboring residents of disassembly sites breathe the contaminated air, and in fact, some health damages are already reported in Mombasa, a coastal city of Kenya.

The inappropriate battery recycling has been perpetuated due to the lack of legal regulations. Despite the fact that lead procurers, such as lead recyclers and battery manufacturers, legally operate their business with the license issued by NEMA, acid is discharged in their supply chains. NEMA also acknowledges the lack of establishment of environmental regulations and legal enforcement. The same can be stated of other relevant problems, including the treatment of lead after the battery disassembly.

The Evergreen's proposed battery disassembly business can offer a solution to these series of problems.

First, the Evergreen' supply chain model is going to procure "non-drained" batteries, and treat the waste acid in its own recycling process with the specialized machine. The company will advertise this new practice to the public, aiming at the establishment of a battery collection

network with a long-term vision. It is expected that the new business practice to trade "non-drained" batteries will soon be accepted and practiced in the market, as it will drastically mitigate the health risks for waste battery traders. This will, in the end, also lead to the reduction of the damages to environment and people's health around the sites where waste acid is currently discharged.

Second, Evergreen's expertise and experiences in Japan will be fully utilized for the operation and maintenance of the disassembly facilities, and the EMS will be applied, including the appropriate treatment of lead and acid, and the ensuring of occupational safety. As a result, this business will contribute to reduce or solve the negative effects that have been recognized in the current recycling process in Kenya, since these parts of recycling market of waste batteries will be largely taken up by Evergreen.

Third, the proposed business model aims to establish the subordinate environmental regulations[3] and its enforcement under the partnership with NEMA. Evergreen also plans to assist NEMA in its capacity building in terms of waste battery recycling. With the development of environmental regulations, it is estimated not only that the solution to current problems with acid and lead will diffuse considerably, but also that the public awareness toward the hazard of waste batteries and proper recycling process will be raised, contributing to the improvement of recycling rate of the waste batteries in the country.

The regulation of import and export of waste batteries and lead are expected to be eased in years to come. With this trend, the proposed battery recycling system will expand to cover nearby countries, and hence, its environmental impact will spread to such countries. In addition, there is a high possibility that this will influence on the development of environmental regulations in member states of East African Community.

## V. Proposals for formulating ODA projects

For the formulation of ODA projects, Evergreen currently considers proposing a project under the scheme of "Pilot survey for disseminating SME's technologies" (hereafter "the pilot project"). By applying this scheme, the pilot project is expected to be conducted so as to validate the profitability of waste battery recycling business. Meanwhile, the pilot project will enable the local counterparts and Evergreen to enforce and diffuse environmental regulations of a battery recycling market, which is expected to result in the development of the market where the environmental-friendly way of waste battery treatment will be a determinant competitive advantage.

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[3] The subordinate regulations assumed here are similar to the Japanese ministerial ordinance, notification and directive.

During the pilot project, Evergreen first plans to collect waste batteries in order to establish a stable and efficient network with informal collectors and to examine the most suitable buying prices. The company also intends to investigate the possibility of localization of the business by demonstrating the operation of battery disassembly facilities with the local human resource. Moreover, the extracted lead is planned to be sold in both local and global markets so as to determine the profitability of the business model.

At the same time, environmental regulations concerning waste batteries recycling are expected to be developed under the collaboration of NEMA and Evergreen, and it is aimed that the business will become a model project to provoke the wide diffusion of EMS to the relevant industry.

Apart from Machakos County Government and NEMA, the Ministry of Devolution and Planning and the Ministry of Environment, Water and natural Resources have already expressed their intent of cooperation. The ministries will become the signers when the proposed ODA project shall reach an agreement, and will arrange some relevant issues with the Government of Japan.

# Project Formulation Survey/Republic of Kenya, Project Formulation Survey on the Battery Recycling with Environmental Management System in Republic of Kenya

## SME and Counterpart Organization

- Name of SME : Evergreen Co. Ltd.
- Location of SME : Hokkaido , Japan
- Survey Site /Counterpart Organization : Nairobi, Machakos County / Machakos County Government, National Environmental Management Authority (NEMA)

## Concerned Development Issues

- The lack of capacity in waste management that is recognized as a development issue by both Kenyan and Japanese governments.
- Unsafe management of lead and dilute sulfuric acid, which is contained in waste batteries, causes damages to the environment widely and to the health of both recyclers and residents of neighboring areas of recycling processes.

## Products and Technologies of SMEs

- An environmental-friendly battery disassembly facilities with high-quality management system, installing: automatic battery cutting machine; and waste acid treatment equipment.
- Legal and regulatory knowledge on battery recycling.
- Expertise for establishing and maintaining of the efficient, customer-oriented battery collection network system.

## Proposed ODA Projects and Expected Impact

- The operation and diffusion of the proposed products and technologies, that is expected to reduce and solve the concerned development issues.
- The establishment and enforcement of environmental regulations with the collaboration with NEMA, that is expected to result in the Improvement of the environmental standards in the waste battery recycling.

## Future Business Development of SME

The following are the first steps for the further business development;

- Dissemination of new business practice and regulatory environment to all over the Kenya to cover all the Kenyan waste battery collection market.
- Expand the business area to the East African Community member countries.
- Contribute to Kenya's opening of the market for import and export of batteries/scrap lead.