No.

# THE STUDY
# ON
# RECYCLING INDUSTRY
# DEVELOPMENT
# IN
# THE REPUBLIC OF THE PHILIPPINES
# FINAL REPORT
# (SUMMARY)

FEBRUARY 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

EX CORPORATION

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# PREFACE

In response to a request from Government of the Republic of the Philippines, the Government of Japan decided to conduct a study on Recycling Industry Development and entrusted to the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr.Satoshi Sugimoto of EX CORPORATION between July 2006 and February 2008.

The team held discussions with the officials concerned of the Government of the Republic of the Philippines and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the study.

February 2008

Seiichi NAGATSUKA,
Deputy Vice President
Japan International Cooperation Agency

FEBRUARY 2008

Seiichi NAGATSUKA
Vice President
Japan International Cooperation Agency

# LETTER OF TRANSMITTAL

"The Study on Recycling Industry Development in the Republic of the Philippines" has been conducted as the technical cooperation of Japan International Cooperation Agency with the following objectives:

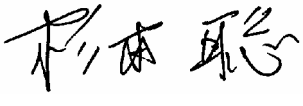
（１） Policy Enhancement of the Board of Investments, Department of Trade and Industry of the Philippines (BOI/DTI) through formulation of the Master Plan and Action Plan for Recycling Industry Development;
（２） Conduct of the case studies for evaluating the feasibility and effectivity of the policies and actions recommended in the Master Plan and Action Plan; and
（３） Development of the policy formulation and implementation capacity of BOI/DTI and building partnership among the various key stakeholders (government, industry, and general public) in promotion of recycling industry in the Philippines.

Herewith, we officially inform successful completion of the Study with submission of the Final Report.

We would like to send our deepest appreciation to the Natural Resources and Energy Conservation Team of Economic Development Department, JICA Headquarters, JICA Philippines Office, Embassy of Japan in the Philippines, and all the other organizations in the Philippines and Japan who provided us great help in completing this Study.

We hope that the output of study and our technical cooperation help development of recycling industry and also contribute to sustainable development in the Philippines and further cooperation and friendship with Japan.

JICA Study Team
Team Leader
Satoshi SUGIMOTO



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# Abbreviations

| Abbreviation | Description |
|---|---|
| ADB | Asian Development Bank |
| AFTA | ASEAN Free Trade Area |
| ASEAN | Association of South East Asian Nations |
| BIS | Bureau of Importation Services |
| BOC | Bureau of Customs |
| BOT | Build-Operate-and-Transfer |
| BPS-DTI | Department of Trade and Industry-Bureau of Product Standard |
| CAR | Cordillera Administrative Region |
| CBO | Community-Based Organization |
| CCP | Carbonless Copy Paper |
| CDC | Clark Development Corporation |
| CEPT | Common Effective Preferential Tariff |
| CHRP | Commission on Human Rights of the Philippines |
| CIDA | Canadian International Development Agency |
| CIS | Commonwealth of Independent States |
| CLF | Countryside Loan Fund |
| COD | Chemical Oxygen Demand |
| CPA | Cebu Ports Authority |
| CPU | Central Processing Unit |
| CRT | Cathode Ray Tube |
| DA | Department of Agriculture |
| DANIDA | Danish International Development Assistance |
| DBP | Development Bank of the Philippines |
| DENR-EMB | Department of Environment and Natural Resources-Environmental Management Bureau |
| DILG | Department of the Interior and Local Government |
| DOF | Department of Finance |
| DOH | Department of Health |
| DOST | Department of Science and Technology |
| DTI-BOI | Department of Trade and Industry-Board of Investments |
| ELPB | National Ecolabelling Program Board |
| EO | Executive Order |
| EPS | Expandable Polystyrene |
| EU | European Union |
| FIES | Family Income and Expenditure Survey |
| GDP | Gross Domestic Products |
| GNP | Gross National Products |
| HDD | Hard Disk Drive |
| HDPE | High Density Polyethylene |
| HIPS | High Impact Polystyrene |
| HS Code | Harmonized Commodity Description and Coding System |
| I/A | Implementing Arrangement |
| IEC | Information, Education and Communication |
| IPP | Investment Priority Plan |
| IPP | Independent Power Provider |
| IRR | Implementing Rules and Regulations |

| Abbreviation | Description |
|---|---|
| ISO | International Organization for Standardization |
| ITDI | Industrial Technology Development Institute |
| ITH | Income Tax Holiday |
| IWEP | Industrial Waste Exchange Program |
| JBIC | Japan Bank For International Cooperation |
| KfW | Kreditanstalt für Wiederaufbau |
| LBP | Land Bank of the Philippines |
| LCD | Liquid Crystal Display |
| LDPE | Low Density Polyethlene |
| LGSP | Local Governance Support Program |
| LG-SWM | Local Government Solid Waste Management Plan |
| LGU | Local Government Unit |
| Li-Ion | Lithium-ion rechargeable battery |
| Li-polymer | Li-Polymer rechargeable battery |
| LSRM | Locally Sourced Recyclable Material |
| MEA | Metropolitan Electricity Authority |
| MERALCO | Manila Electric Company |
| MFN | Most Favored Nation |
| MICT | Manila International Container Terminal |
| MIRDC | Metal Industry Research and Development Center |
| MMDA | Metro Manila Development Authority |
| MMFEMPC (LINIS- GANDA) | Metro Manila Federation of Environment Multi-Purpose Cooperative |
| MOU | Memorandum of Understanding |
| MRF | Materials Recovery Facility |
| MT | Metric Ton |
| NCR | National Capital Region |
| NEA | National Electrification Administration |
| NEC | National Ecology Center |
| NEDA | National Economic Development Authority |
| NGO | Non Governmental Organizations |
| Ni-Cd | Nickel-Cadmium rechargeable battery |
| Ni-MH | Nickel-metal hydride battery |
| NPC | National Power Company |
| NPO | Non-Profit Organization |
| NSC | National Steel Corporation |
| NSCB | National Statistics Coordination Board |
| NSO | National Statistic Office |
| NSWMC | National Solid Waste Management Commission |
| NTC | National Telecommunications Commission |
| OFW | Overseas Filipino Workers |
| PCBs | Polychlorinated biphenyl |
| PET | Polyethylene Terephthalate |
| PHP | Philippine Peso |
| PNRI | Philippine Nuclear Research Institute |
| PNS | Philippine National Standards |
| PP | Polypropylene |
| PPA | Philippine Ports Authority |
| PPIA | Philippines Plastics Industry Association |
| PS | Polystyrene |

| Abbreviation | Description |
|---|---|
| PSCC | Philippine Standard Commodity Classification |
| PSIC | Philippine Standard Industrial Classification |
| PULPAPEL | Pulp and Paper Manufacturers Association of the Philippines |
| PVC | Polyvinyl Chloride |
| RA7942 | Mining Act |
| RA9003 | Ecological Solid Waste Management Act |
| RCE | Recyclable Collection Event |
| REC | Regional Ecology Center |
| RTWPB | Regional Tripartite Wages and Productivity Board |
| SC | Steering Committee |
| S/W | Scope of Work |
| SBMA | Subic Bay Metropolitan Authority |
| SEAISI | South East Asia Iron and Steel Institute |
| SME | Small and Medium-sized Enterprise |
| SWM | Solid Waste Management |
| TRM | Total Raw Material |
| TS | Task Force |
| TWC | Technical Working Group |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| USAID | United States Agency for International Development |
| WHO | World Health Organization |

# Introduction

## 1. Background and Objectives of the Study

The Ecological Solid Waste Management Act of 2000 (RA 9003), which was promulgated in January 2001 in the Philippines, officially declares to minimize solid waste all through its process, starting from generation followed by collection and treatment and ended with final disposal at landfills, without utilization of incineration technologies for the purpose of ensuring the safety of human health and protection of the environment as well as maximizing the efficient use of scarce natural resources.

RA9003 provides extensive measures of waste minimization including waste reduction at sources, reuse, recycling, and composting while it requires collaborative efforts of all the relevant stakeholders, i.e. government, business, NGOs, and citizens under the leadership of local government unit (LGU), who holds the primary responsibility for solid waste management (SWM) to achieve this common goal.

"The Local Government Solid Waste Management Plan", which is provided in RA9003 to be formulated by each LGU, must include the implementation plan of the concrete measures to achieve the minimum target of diverting 25 percent of solid waste disposal amount within 5 years after the enforcement of the Act through reuse, recycling, composting and so forth.

Responding to enactment of RA9003, community-based collection system of recyclable materials has started to widely tested for full-scale implementation at some local and barangay levels, some of which have shown success and good examples for further application.

As to the recycling industries, the end-users of collected recyclable materials, their status of development varies with types of materials as well as localities. Domestic trade market of recyclable materials also fluctuates with the trend of international supply and demand of such materials, so that the domestic circulation of recyclable materials is not yet firmly established in the Philippines. Due to the dominant role of informal sector in distribution of recyclable materials, it is difficult to accurately capture the current material flow of major recyclables in terms of their quantity as well as quality. Lack of data and information on such recyclable materials impedes the development of stable trade market for these materials.

The dominance of small and medium recyclers in the Philippines is also problematic in terms of material consumption efficiency, proper management of work safety and environment, and pollution control. There are many potential areas of improvement in the current recycling practices for resource use efficiency and environmental management.

The Board of Investments, Department of Trade and Industry (BOI-DTI), as a core member of the National Solid Waste Commission (NSWMC), is mandated in RA9003 to carry out the following tasks in relation to promotion of recycling industries as well as creation and expansion of the recyclable materials market in the Philippines:

- Preparation of the inventory of existing markets for recyclable materials and examination of the measures to expand recyclable materials market;
- Examination of product standards for recyclables and recycled materials;
- Examination of the policies and measures to develop and promote recycling industries such as eco-labeling, green purchasing/procurement policies, labeling of product information, and so forth.

To formulate policies and measures to promote recycling industries in the Philippines for enforcement of RA9003, DTI-BOI made an official request for providing technical assistance to the Government of Japan (GOJ), that has enough experience in creating the partnership among the government, business, and general public to establish the material-cycle society as well as currently promotes 3R (Reduce, Reuse, Recycle) Initiative in the international society.

In response to the request of the Government of the Philippines (GOP), GOJ conducted the "Project Formulation Study" in October 2005 to validate the necessity of technical assistance based on the identification of current status and issues on recycling industry through data collection and discussions with relevant organizations in the Philippines. As a result, the Implementation Arrangement (I/A) has been signed between GOP and GOJ to conduct the current study with the following objectives:

(1) Assisting GOP to formulate "the Master Plan and Action Plan for Development of Recycling Industry in the Philippines" in accordance with RA9003;

(2) Conducting case studies to examine applicability of the Master Plan and Action Plan for Development of Recycling Industry in the Philippines; and

(3) Capacity development of DTI-BOI all through the implementation of the Study.

## 2. Scope of the Study

In accordance with the Implementation Arrangement (I/A) signed in April 2006, the scope of the Study is determined as shown in Table Introduction - 1.1.1

Table Introduction - 1.1.1 Scope of the Study

| | | |
|---|---|---|
| Region/Area Covered by the Study | All over the Philippines | |
| Target Recyclable Materials | Category I | Used papers (old newspaper, old magazine, cardboard, etc.), scrap metals (iron and aluminum), glass bottles, scrap plastics (PET, HDPE, LDPE, PVC, PP, PS) |
| | Category II | Cell-phone batteries, personal computers (PC), TV, refrigerator |
| Target Industries | All the industries potentially receiving and utilizing the recyclables defined above | |

## 3. Organizational Framework for Implementation of the Study

The counterpart of the Study in the Philippines is DTI-BOI. The Study will also establish the Steering Committee (S/C) to be organized by the representatives from the following organizations for the purpose of obtaining the necessary consultation and assistance from the relevant authorities in the Philippines. The Steering Committee will be periodically informed of the progress of the Study and consulted with concerning the methods of study implementation.

- Board of Investments, Department of Trade and Industry (DTI-BOI)
- Environment Management Bureau, Department of Natural Resources and Environment (DENR-EMB)
- National Solid Waste Management Commission (NSWMC)
- Department of Interior and Local Government (DILG)

The S/C will be chaired by the representative from DTI-BOI while BOI will function as the Secretariat of S/C.

The Study will also organize the Technical Working Group (TWG) under the S/C. TWG will be organized by working-level officials from the similar member organizations of S/C and the JICA Study Team (JST) while BOI will chair TWG and function also as its secretariat. TWG will, when necessary, invite representatives from other organizations such as local government unit (LGU), private sector, NGOs, and so forth as the temporary member of TWG so that the Study can be conducted under the partnership between private and public sectors.

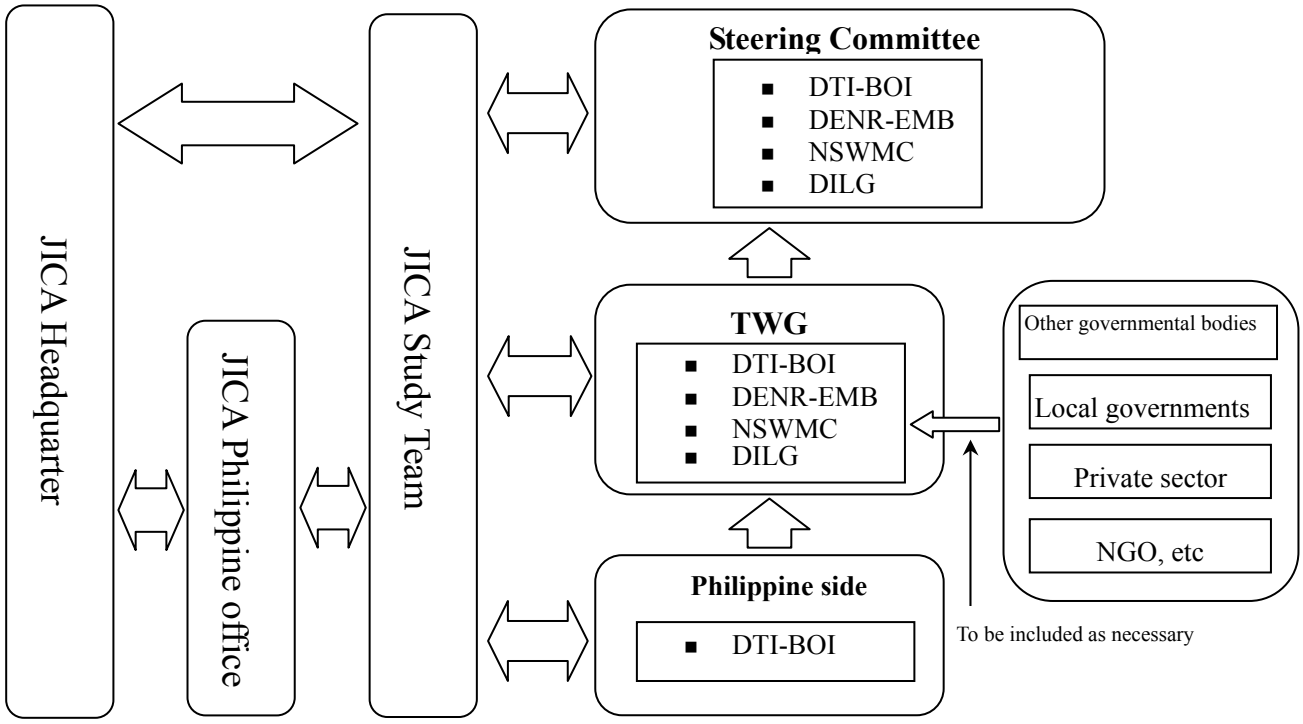



Figure Introduction -1.1.1 Organizational Framework for Implementation of the Study

# 1. Current Status and Issues on Recycling Industry Development in the Philippines

## 1.1 Issues on Current Distribution Mechanism of Recycling

### 1.1.1 Issues in Separation and Discarding of Recyclable Materials at Generation Sources

Proper separation of recyclable materials at the sources of generation is the fundamental key to their efficient collection and utilization through material recycling. Mixed discarding of recyclable materials with other non-recyclable waste makes it difficult to collect and properly utilize recyclable materials. In this regard, discarding behavior of waste generators is of great importance in establishing the firm recycling system in the Philippines.

In the case of the Philippines, segregation of recyclable materials at the sources of waste generation strongly depends upon the monetary value of such materials in the market.

According to the result of interview surveys to the major waste generators, i.e. household and business entities, the ratio of households who separate recyclable materials at sources is as shown in the tables below.

Table 1.1.1 Segregation of Recyclable Materials at Households

(Unit: %)

| Survey Area | Recyclable Material | A | B | C | D | Separation Ratio (B+C) |
|---|---|---|---|---|---|---|
| Metro Manila | Paper | 47.25 | 29.52 | 4.12 | 19.11 | 33.64 |
| | Aluminum | 64.71 | 25.13 | 6.42 | 3.74 | 31.55 |
| | Other Metals | 74.85 | 16.36 | 4.24 | 4.55 | 20.61 |
| | Plastic | 56.48 | 19.83 | 3.71 | 19.99 | 23.54 |
| | Glass | 58.86 | 24.13 | 4.58 | 12.42 | 28.71 |
| Metro Cebu | Paper | 25.28 | 27.88 | 1.13 | 45.71 | 29.01 |
| | Aluminum | 24.32 | 64.86 | 6.76 | 4.05 | 71.62 |
| | Other Metals | 46.70 | 42.86 | 5.49 | 4.95 | 48.35 |
| | Plastic | 33.24 | 34.37 | 4.65 | 27.74 | 39.02 |
| | Glass | 31.56 | 46.91 | 5.06 | 16.48 | 51.97 |
| Southern Mindanao | Paper | 21.31 | 9.51 | 11.24 | 57.94 | 20.75 |
| | Aluminum | 50.00 | 31.03 | 5.17 | 13.79 | 36.21 |
| | Other Metals | 31.79 | 49.23 | 9.23 | 9.74 | 58.46 |
| | Plastic | 31.08 | 30.83 | 11.29 | 26.80 | 42.12 |
| | Glass | 20.86 | 51.69 | 8.54 | 18.91 | 60.23 |

(A) Discarding into waste bin for municipal waste collection.
(B) Sell or give to door-to-door collectors.
(C) Bring to recycling centers
(D) Others

Clearly conscious behavior of segregating recyclable materials falls into category B and C. Segregation ratio is comparatively lower in Metro Manila than other regions except for the paper. Percentage of the households who sell or give to door-to-door collectors is high in Metro Cebu and Southern Mindanao. The highest ratio of segregation is found in aluminum scrap in Metro Cebu, which is about 70% of the interviewed households.

Meanwhile, the table below shows the behavior of segregating recyclable materials by business entities.

Table 1.1.2 Segregation of Recyclable Materials at Business Entities

(Unit: %)

| Survey Area | Recyclable Material | A | B | C | D | Separation Ratio (B+C) |
|---|---|---|---|---|---|---|
| Metro Manila | Paper | 37.79 | 32.34 | 5.84 | 24.02 | 38.19 |
| | Aluminum | 51.58 | 31.58 | 14.74 | 2.11 | 46.32 |
| | Other Metals | 40.24 | 29.27 | 19.51 | 10.98 | 48.78 |
| | Plastic | 52.40 | 24.89 | 8.02 | 14.69 | 32.92 |
| | Glass | 46.85 | 21.45 | 7.19 | 24.51 | 28.64 |
| Metro Cebu | Paper | 22.72 | 31.65 | 1.26 | 44.36 | 32.91 |
| | Aluminum | 41.18 | 47.06 | 0.00 | 11.76 | 47.06 |
| | Other Metals | 47.83 | 47.83 | 0.00 | 4.35 | 47.83 |
| | Plastic | 32.09 | 30.64 | 7.97 | 29.30 | 38.61 |
| | Glass | 36.92 | 42.88 | 6.35 | 13.85 | 49.23 |
| Southern Mindanao | Paper | 41.68 | 21.06 | 0.00 | 37.26 | 21.06 |
| | Aluminum | 44.44 | 44.44 | 11.11 | 0.00 | 55.56 |
| | Other Metals | 46.43 | 39.29 | 3.57 | 10.71 | 42.86 |
| | Plastic | 46.34 | 29.70 | 3.21 | 20.76 | 32.91 |
| | Glass | 38.33 | 23.81 | 6.67 | 31.19 | 30.48 |

(A) Discarding into waste bin for municipal waste collection.
(B) Sell or give to door-to-door collectors.
(C) Bring to recycling centers
(D) Others

In the case of Metro Manila, the ratio of separating recyclable materials is higher than the case of households. It may reflect higher awareness of recycling in business entities. In the case of other regions, the difference between households and business entities is mixed.

Comparatively lower separation of papers in Metro Cebu and Southern Mindanao is estimated to be the no or limited users of nearby waste/scrap papers since most of them are located at nearby area of Metro Manila.

The issues that were raised from households and business entities regarding the separation of recyclables are as follows:

a Households and business establishments mentioned the different problems when it comes to segregation of recyclables. It was mentioned that some households and even business entities do not segregate because it is time-consuming and at the same time a very tedious activity. They feel that they have far better things to do rather than spend time with this kind of activity. It was also mentioned that some recyclable materials are hard to segregate. The lack of extra garbage receptacles or bins for recyclables was also mentioned wherein household members or employees would like to have a particular container to dispose or place these recyclable materials.

b The lack of discipline by the people was also stated as well as the manner of garbage collection. Household members said that even if they segregate, the

garbage collectors would still mix them inside the collection trucks.

c Several issues were also stated with regard to the sale of recyclable materials. Household members mentioned that most of the time, Eco-aides would have very low buying prices or been also choosing what to buy. Sometimes, there would be no buyers resulting in the stockpiling of materials on households or at offices.

d Other problems mentioned are the infrequent garbage collection as well as the need for information dissemination among communities and business establishments to further promote recycling activities.

e Suggestions vary from creating programs to advance the recycling activities as well as the improvement of the garbage collection covering the residential and commercial establishments. A stricter implementation of the provisions of RA 9003 in particular with the recycling activities is also strongly suggested by households and business entities.

Regarding the issues that must be addressed in further promoting waste minimization and recycling, the following were mentioned in the interview survey; 79% of interviewed business entity and institution respondents answered that raising awareness on recycling is the main issue that must be addressed; 70% answered that strict enforcement of the regulation must be implemented; and 58% are in favor of establishment of clear policies and regulations as the majority. The minor issues raised includes that 30% agree that there should be more material recycling facilities; 25% are in favor of consistent collection of wastes and implementation of buy-back system; 12% affirm that there should be provision of incentives; 10% answered that there should be an introduction of waste collection and disposal taxes; and 5% cited other issues that should be addressed.

### 1.1.2 Issues in Collection and Distribution of Recyclable Materials

In the Philippines, various informal/formal players are involved in collection and distribution of recyclable materials. Such players include primary collectors such as street collectors, collection truck crew and disposal site scavengers and middleman/traders including Eco-aides, junkshops and consolidators. Table below shows the collection rate of individual primary recyclers interviewed in the survey.

Table 1.1.3 Collection of Recyclable Materials by Primary Collectors

(Unit: kg/psn/day)

| Recyclable Material | Primary Collector | Metro Manila | Metro Cebu | Southern Mindanao |
|---|---|---|---|---|
| Paper | Street Collectors | 3.18 | 3.59 | 2.45 |
| | Collection Workers | 21.83 | 1.81 | 0.62 |
| | Disposal Site Scavengers | 22.01 | 8.21 | 12.86 |
| Aluminum | Street Collectors | 0.76 | 0.35 | 0.40 |
| | Collection Workers | 0.78 | 0.13 | 0.02 |
| | Disposal Site Scavengers | 2.50 | 0.05 | 1.79 |

| Recyclable Material | Primary Collector | Metro Manila | Metro Cebu | Southern Mindanao |
|---|---|---|---|---|
| Other Metals | Street Collectors | 1.39 | 5.04 | 14.76 |
| | Collection Workers | 12.35 | 0.94 | 0.64 |
| | Disposal Site Scavengers | 16.75 | 6.34 | 13.75 |
| Plastic | Street Collectors | 1.63 | 3.94 | 3.50 |
| | Collection Workers | 9.79 | 0.50 | 0.63 |
| | Disposal Site Scavengers | 20.32 | 4.48 | 25.00 |
| Glass | Street Collectors | 0.85 | 0.58 | 6.65 |
| | Collection Workers | 6.58 | 0.26 | 0.94 |
| | Disposal Site Scavengers | 9.96 | 0.32 | 49.64 |

As shown in the table above, the amount of recyclables collected are also dominant by disposal site scavengers. It indicates that still a large amount of recyclable materials is brought into landfills although some of them are collected by street collectors and collection workers on the way to the landfills. The next table below shows the collection of recyclable materials by middleman and traders.

Table 1.1.4 Collection of Recyclable Materials by Middleman and Trader

(Unit: kg/day/dealer)

| Recyclable Material | Trader | Metro Manila | Metro Cebu | Southern Mindanao |
|---|---|---|---|---|
| Paper | Eco-aides | 12.76 | 12.76 | 12.76 |
| | Junkshops | 167.94 | 95.31 | 103.26 |
| | Consolidators | 385.71 | 709.82 | 661.43 |
| Aluminum | Eco-aides | 0.88 | 0.88 | 0.88 |
| | Junkshops | 17.03 | 7.37 | 8.38 |
| | Consolidators | 127.14 | 2.34 | 20.00 |
| Other Metals | Eco-aides | 11.79 | 11.79 | 11.79 |
| | Junkshops | 137.76 | 250.94 | 87.52 |
| | Consolidators | 1242.86 | 959.82 | 500.00 |
| Plastic | Eco-aides | 5.20 | 5.20 | 5.20 |
| | Junkshops | 266.39 | 160.53 | 330.31 |
| | Consolidators | 114.29 | 550.25 | 442.86 |
| Glass | Eco-aides | 3.56 | 3.56 | 3.56 |
| | Junkshops | 49.12 | 183.76 | 48.86 |
| | Consolidators | 74.29 | 0.00 | 532.36 |

Eco-aides is the organized door-to-door collectors of recyclable materials under the management of NGOs, LGUs, or Barangay offices. Therefore, the collection amount by Eco-aides is much higher than informal street collectors. Junkshops are the receivers of recyclables from primary collectors inc. Eco-aides and also the traders to the bigger traders such as consolidators or final users of the products. Consolidators are the biggest traders of recyclable materials receiving them from large-scale generators of recyclable materials such as factories, commercial facilities, and office buildings as well as from smaller junkshops and even from individual primary collectors. Most of the consolidators are the suppliers of recyclable materials to their final users as well as importers/exporters of such materials.

The issues that are raised by primary collectors and middleman/traders are as follows:

a Primary collectors and eco-aides experience various problems in collecting recyclable materials from different sources. Some of them complain on the quality of materials that they are collecting, which in most cases are either dirty or damaged. These damaged recyclables are most of the time not being bought by junkshops.

b Big junkshops and consolidators also experience problems regarding the collection and transport of recyclable materials. In particular, the collection vehicles are often caught by traffic enforcers for overloading. This is a common dilemma for junkshops considering that a vital part of their operations is the transport of materials to different trading partners.

c In terms of segregation of collected recyclable materials, this particular activity is conducted within the premises of each junkshop or consolidator. This is an important process for scrap dealers for it is a must that each material should be segregated accordingly before selling to a bigger consolidator or recycling industry. However, there are problems that occur in the conduct of this activity such as the difficulty in the proper segregation because of the presence of different compounds that are mixed together with the recyclable materials. Most often, the recyclables become unusable due to the difficulty in removing the unwanted parts. Also, the discipline among the workers is a problem as well. The proper segregation also depends on the effectiveness of the workers in the junkshops.

d In relation to the sale or trading of recyclable materials, most junkshops cited the mode of payment of their partners as one of their problems. As mentioned in the questionnaire, the issuing of checks delays the capital circulation. Some payments are also made on an installment basis which does not contribute well in the day to day operations of the junkshops.

e Another problem stated is the bribery of some local government officials. This problem is a common practice in the Philippines. Even small players are victimized by this practice that brings forth the failure of businesses, in some cases.

f Various other problems were mentioned by junkshops, focusing mainly on their dilemma with consideration to their daily operations. One major problem is the presence of illegal or underground junkshops which are quite rampant. These establishments serve as competitors to legitimate junkshops, wherein they enjoy the same trading activities despite not paying the proper taxes for their operations. High business taxes are also a problem for this adds up to the capital expenses of the junkshop owners.

g Junkshop owners would also like to recommend the strict implementation of RA 9003. They are still hoping that the government would support them in their efforts and that policies would be implemented accordingly in order to create more programs for recycling activities.

h The collectors on the other hand would like to have a standardization of prices for recyclable materials. They are quite uneasy with the fluctuating rates which happen very often.

## 1.2 Issues on Current Recycling Industries

### 1.2.1 Waste/Scrap Papers and Paper Industry

#### (1) Import and Export of Waste/Scrap Paper and Paper/Paper Products

In the year 2004, the import of waste/scrap paper was 370 thousand tons in the Philippines while its export was only about 7.5 thousand tons. Major country origins of waste/scrap paper import are Australia, USA and Japan in 2004.

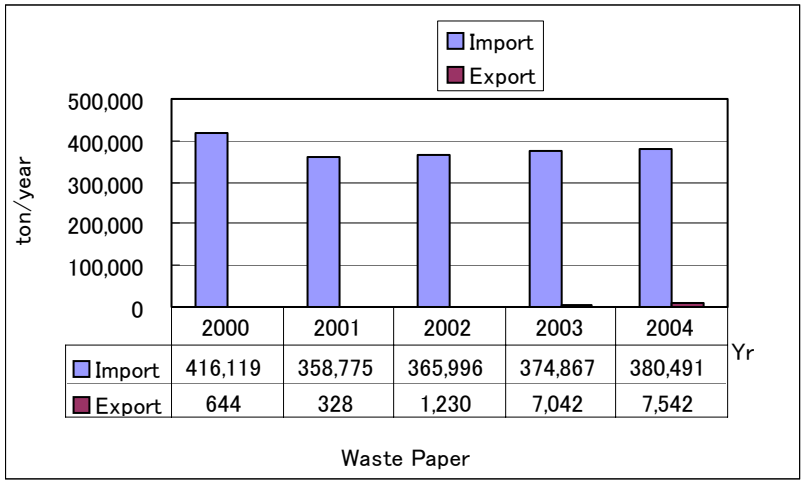



Figure 1.2.1 Trend of Waste/Scrap Paper Trade (2000-2004)

As to the international trade of paper and paper products, the import in the Philippines was 610 thousand tons in 2004 while its export was 137 thousand tons. Major country origins of paper and paper products import are USA occupying about 20% in 2004.

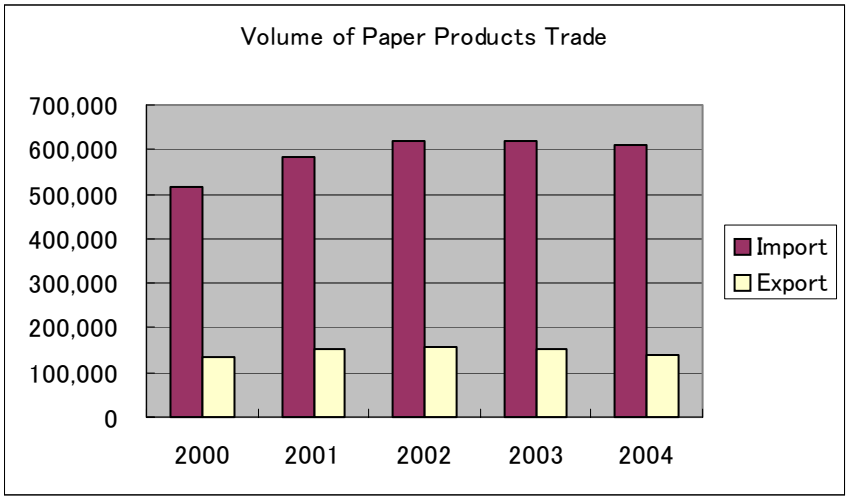



Figure 1.2.2 Trend of Paper/Paper Products Trade (2000-2004)

### (2) Domestic Production, Consumption and Material Flow of Papers and Paper Products

Figure 1.2.3 shows the estimated material flow of papers and paper products in the Philippines.

The annual domestic production of paper and paper products reached approximately 1.1 million tons in the Philippines in the year 2004, which is only about one thirtieth of Japan. Although the total production capacity of existing paper mills in the Philippines is about 1.6 million tons annually, its capacity usage ratio only reaches 70% in 2004.

Most of paper manufacturers in the Philippines utilize waste/scrap papers as raw material except a few manufacturers producing special papers such as Abaca pulp and so forth (30 to 40 thousand tons/year). The ratio of waste/scrap papers for paper production is about 80%, of which 40 to 60% depends upon import from overseas. The ratio of waste/scrap paper collection is estimated around 40% (60% in Japan in 2005)

On the other hand, the annual consumption of paper is estimated around 1.5 to 1.6 million tons or 16kg/person/year, which is as small as 1/15 of Japan or 1/3 of Thailand.

In the Philippines, most of paper and paper product manufacturers are located in Metro Manila or CALABARZON area except for a few ones in Mindanao. Therefore, most of the domestic demand for papers comes from CALABARZON area.

According to the interview surveys to various paper manufacturers, the roughly estimated cost structure of paper manufacturers is as shown in the Table 1.2.1.

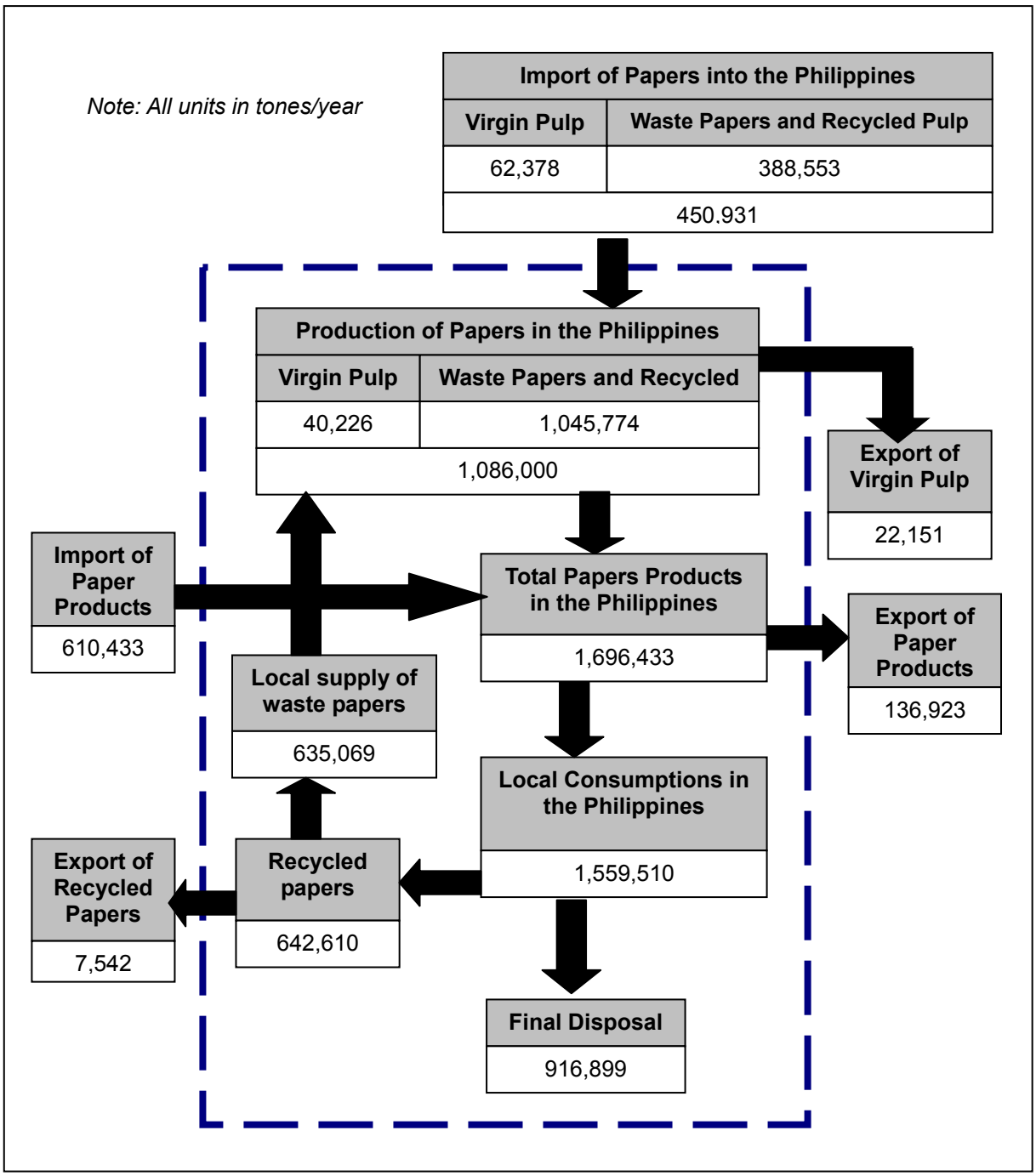



Figure 1.2.3 Estimated Material Flow of Papers and Paper Products (2004)

Table 1.2.1 Estimated Cost Structure of Paper Manufacturing in the Philippines

| Item | Percentage to the total cost |
|---|---|
| Raw material cost | 47% |
| Electricity cost | 26% |
| Fuel cost | 13% |
| Manpower cost | 5% |
| Others | 9% |

### (3) Key Issues of Paper Recycling in the Philippines

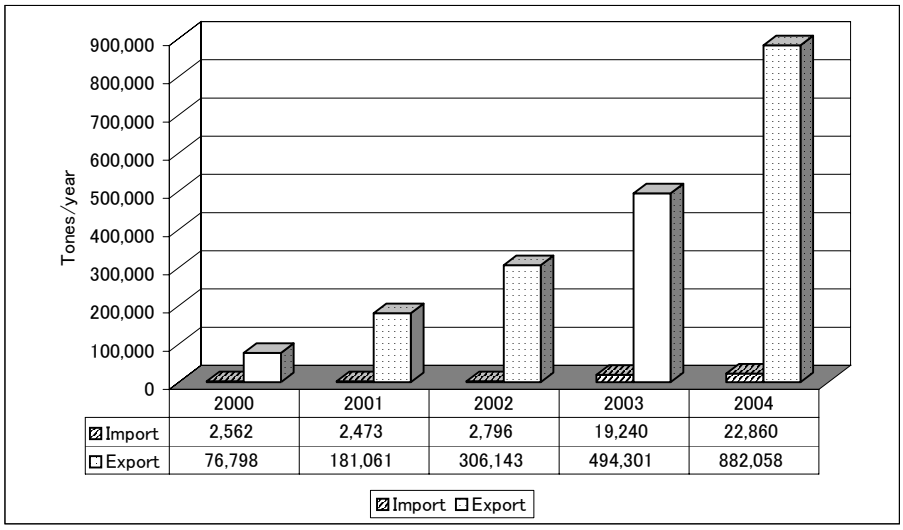
The key issues in paper recycling in the Philippines are identified as follows:

- Replacement of old equipment is required for increasing production efficiency in many paper manufacturing industries
- Increase demand for waste/scrap papers in the international market and increase its trading price, which becomes heavy financial burden to domestic paper industry.
- Due to concentration of paper industry in Metro Manila and CALABARZON area, waste/scrap papers generated outside such area are not well-utilized and stockpiled because of high transportation cost.
- High cost of electricity and fuel in paper production in comparison with other ASEAN countries.
- Incremental cost for water use and wastewater pollution control with the strict enforcement of relevant laws.

## 1.2.2 Iron Scrap and Iron & Steel Industry

### (1) Import and Export of Iron Scrap and Iron/Steel Products

In 2004, the import of scrap iron was only about 23 thousand tons while its export was 882 thousand tons. Major country origins of iron scrap export are Taiwan, Thailand, and Singapore.




| | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| Import | 2,562 | 2,473 | 2,796 | 19,240 | 22,860 |
| Export | 76,798 | 181,061 | 306,143 | 494,301 | 882,058 |

Figure 1.2.4 Trend of Iron Scrap Trade (2000-2004)

As to the trade of iron and steel products, the import was about 2.8 million tons in 2004 while its export was only about 100 thousand tons. Major country origins of iron and steel product import are Russia (about 40% of total import), followed by Japan, China and Ukraine. Import of semi-finished products such as billets occupies 1/3, while the remaining are finished products.

Most of semi-finished products come from Russia and Ukraine while the finished ones are imported from various countries.

### (2) Domestic Production, Consumption and Material Flow of Iron and Steel

Figure 1.2.5 shows the estimated material flow of iron and steel in the Philippines.

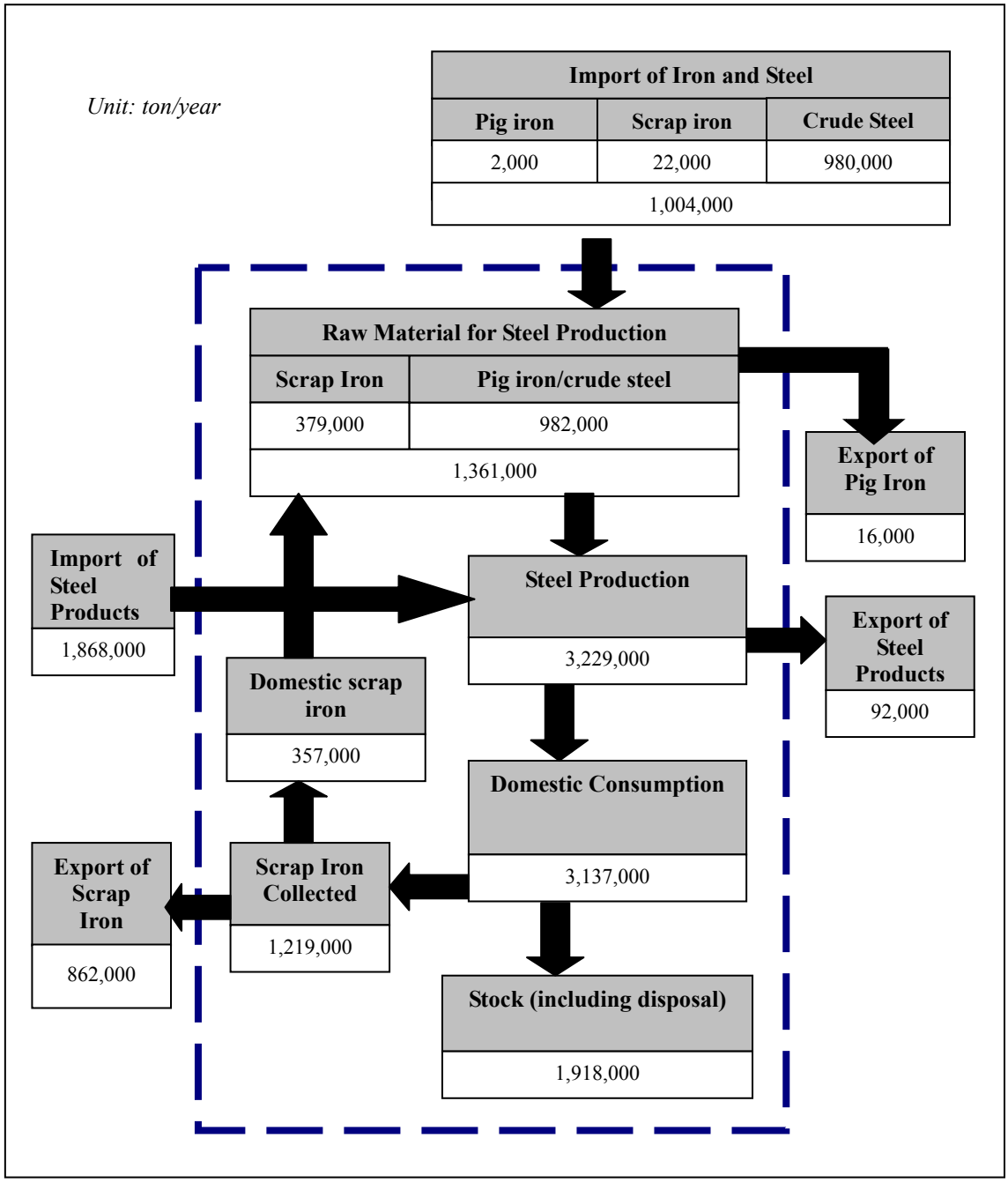



Figure 1.2.5 Estimated Material Flow of Iron and Steel (2004)

The annual production of crude steel in the Philippines was about 400 thousand tons in 2004, which only occupied 3% of the total production in ASEAN countries. The total production also drastically decreased from 1 million tons in 1997. All the steel making operations are currently carried out at electric furnace.

The annual production of steel products, on the other hand reached 1.9 million tons in 2004, which is much bigger than crude steel. However, due to limited domestic procurement of raw material (billet), totally about 1 million tons of ingots, billets and other semi-finished products were imported also in 2004.

In addition, because of the limited production capacity of iron & steel products in the Philippines, approximately 1.8 million tons were also imported in 2004 to meet the domestic demand.

The annual consumption of steel products was about 3.7 million tons in the Philippines in 2004. In terms of per capita consumption, it only reached 37kg per year, which is much smaller than neighboring countries. About 60% of the total consumption is for construction while the consumption of high-grade steel products (for cars and home appliances) is limited and depends upon import.

In the Philippines, the export of iron scrap has been drastically increasing due to shout down of large domestic billet makers, increase of iron scrap price resulting from the increasing demand in China, and increase in generation of scrap iron with the reconstruction and demolition of the buildings since 2002.

#### (3) Key Issues of Iron Scrap Recycling in the Philippines

The key issues in iron scrap recycling in the Philippines are identified as follows:

- Limited capacity of existing billet maker and severe competition in price with the imported billet. The existing capacity is about 900 thousand tons per year, but current operation remains at 400 thousand due to severe competition with the imported billet.
- High cost of electricity especially for steel making industry with electric furnaces.
- Severe competition in iron and steel products manufacturers with the imported ones. With the reduction/elimination of import duties, the competition is estimated to be severer.
- High cost of domestic transportation of iron scrap due to concentration of steel industry in Luzon and adjacent area of Metro Manila.

### 1.2.3 Scrap Aluminum and Aluminum Industry

#### (1) Import and Export of Aluminum Scrap and Aluminum Products

In 2004, the import of scrap aluminum was only about 1.2 thousand tons while its export was 19 thousand tons. Major country origins of scrap aluminum export are Malaysia, South Korea, China, and Japan.

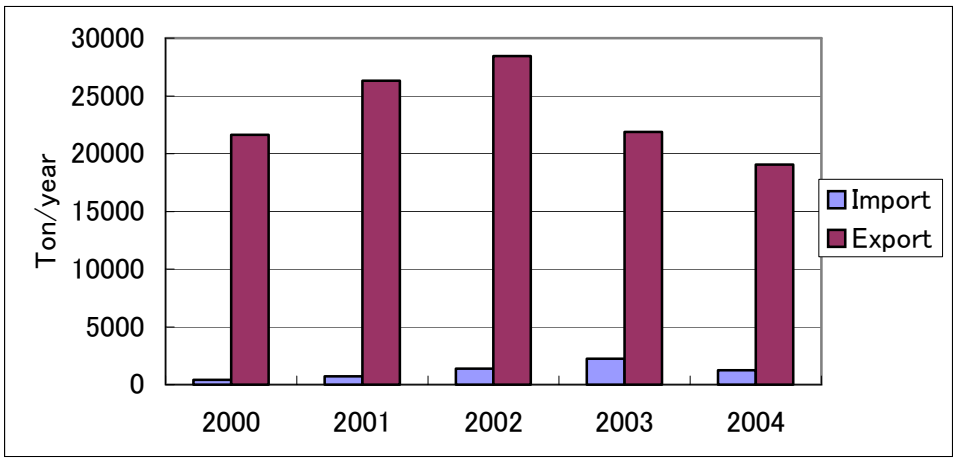



Figure 1.2.6 Trend of Aluminum Scrap Trade (2000-2004)

As to the aluminum products, the import (inc. semi-finished ones) was more or less 70 thousand annually during 2000-2004 while its export was less than one thousand tons in 2004. Major country origins of aluminum products import are Australia, followed by South Korea, Indonesia and China.

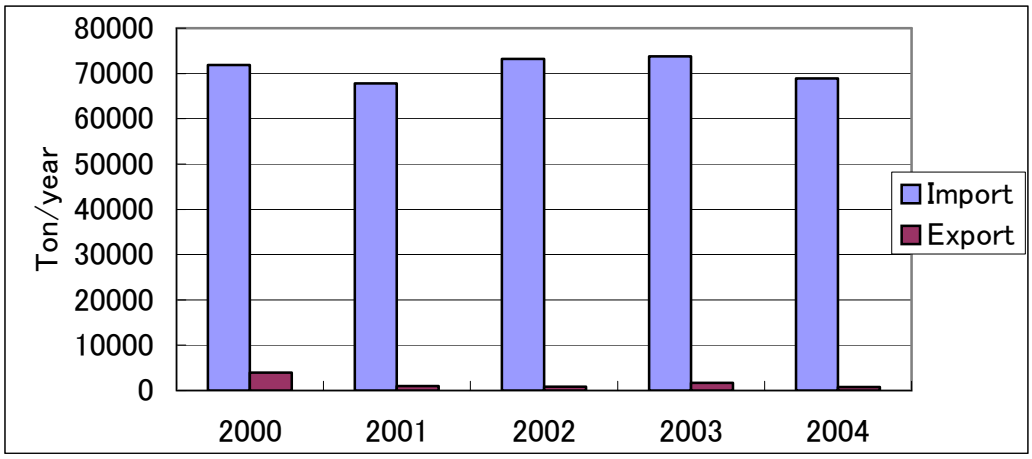



Figure 1.2.7 Trend of Aluminum Products Trade

## (2) Domestic Production, Consumption and Material Flow of Aluminum

The Figure below shows the estimated material flow of aluminum in the Philippines.

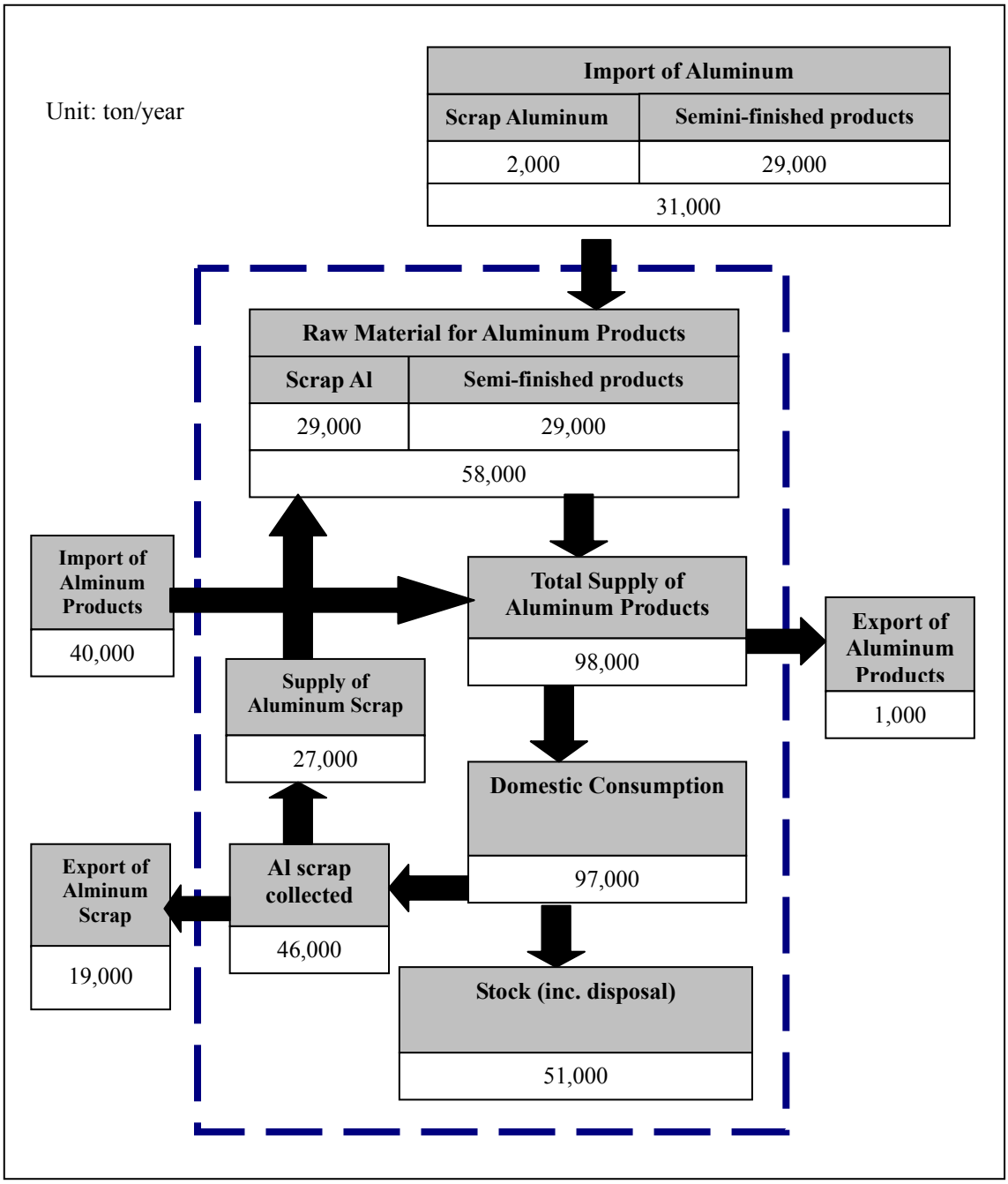



Figure 1.2.8 Estimated Material Flow of Aluminum (2004)

The annual aluminum production in 2004 is estimated 60 to 70 thousand tons, which has been drastically decreased from 300 thousand tons in 1997 as well as from 120 thousand tons in 2002 due to severe competition with import products.

The Philippines has no primary aluminum smelter and depends upon import of aluminum ingots (approx. 30 thousand tons in 2004) and domestic procurement of aluminum scrap (estimated around 50 thousand tons, but about 20 thousand tons were exported in 2004). Import of finished aluminum product was 40 thousand tons in 2004 and Annual aluminum products consumption is approx. 1 to 1.1 million tons in 2004.

### (3) Key Issues of Aluminum Scrap Recycling in the Philippines

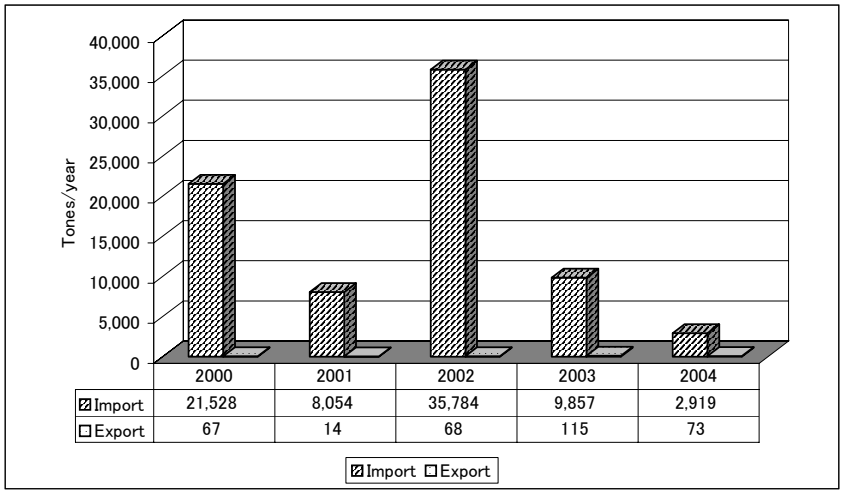
The key issues in aluminum scrap recycling in the Philippines are identified as follows:

- Small-scale aluminum smelters, extruders, and product manufacturers and limited production and financial capacity to compete with import products.
- Dependence upon import of aluminum ingots and domestic procurement of aluminum scrap and instable factory operation.

## 1.2.4 Scrap Glass and Glass Manufacturers

### (1) Import and Export of Glass Scrap and Glass/Glassware

In the Philippines, both import and export of scrap glass and cullet are small, which was less than 5 thousand tons in 2004.




| | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| Import | 21,528 | 8,054 | 35,784 | 9,857 | 2,919 |
| Export | 67 | 14 | 68 | 115 | 73 |

Figure 1.2.9 Trend of Glass Scrap Trade (2000-2004)

On the other hand, the import of glass was 47 thousand tons while its export was 32 thousand tons in 2004. Major country origins of glass import are China, Indonesia and Taiwan while major export destinations of glass are Malaysia, Hong Kong and Thailand.

In addition, the import of glassware was 152 thousand tons while its export was only 16 thousand tons in 2004. The major country origins of glassware import are similar with the case of glass import, i.e. China, Indonesia, and Taiwan.

### (2) Domestic Production, Consumption and Material Flow of Glass Bottles

The Figure below shows the estimated material flow of glass in the Philippines.

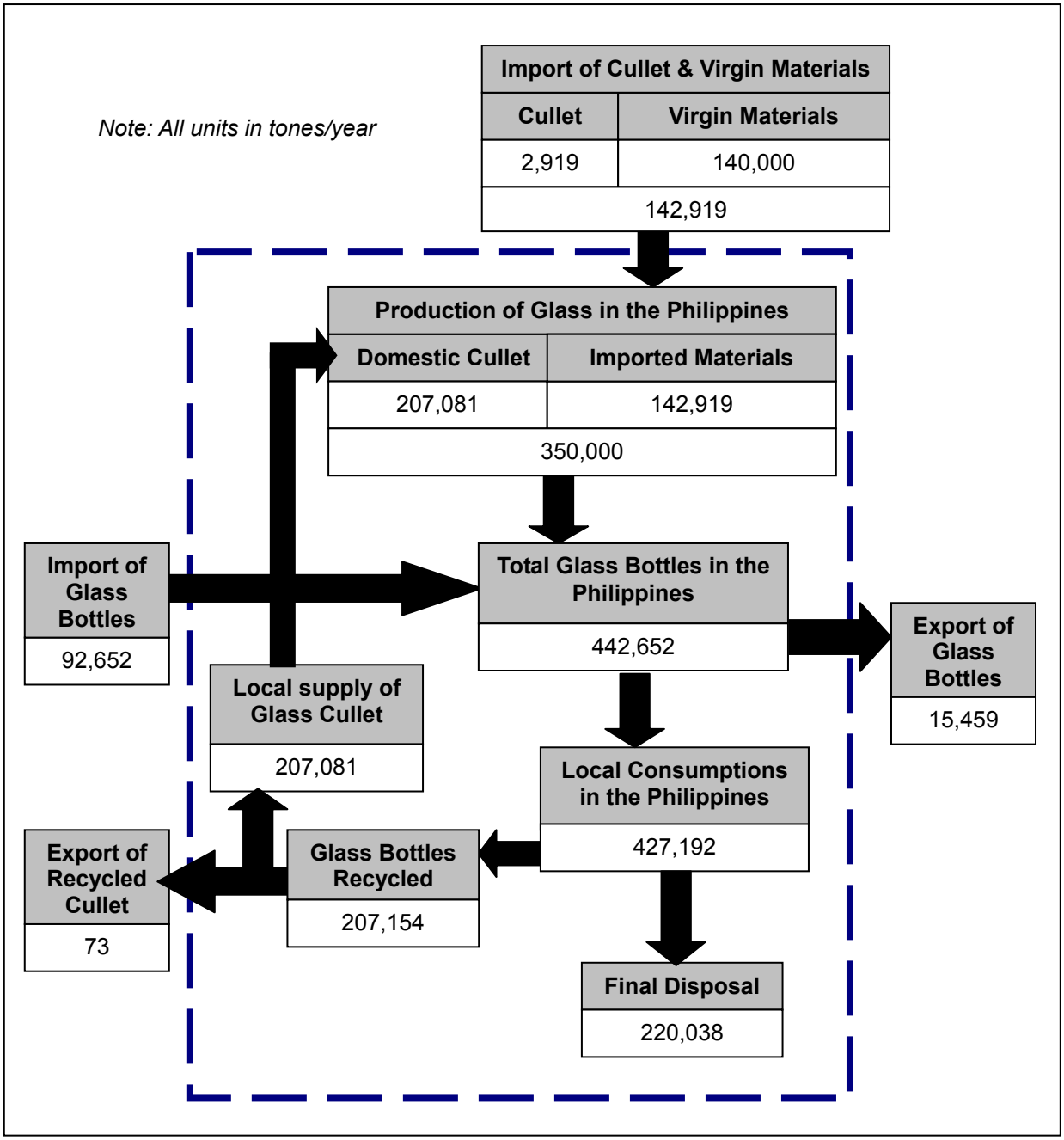



Figure 1.2.10 Estimated Material Flow of Glass (2004)

The annual glass bottle production in the Philippines was estimated as 350 thousand tons in 2004, of which 70 to 75% of the total production come from one big beverage company in the Philippines. The cullet use ratio is 60% for glass bottle production in 2004. Although it was formerly 80-90%, it was decreased due to limited supply of domestic cullet from local market.

### (3) Key Issues of Aluminum Scrap Recycling in the Philippines

The key issues in glass scrap recycling in the Philippines are identified as follows:

- Difficulty in handling the scrap glass bottles and comparatively low price and low ratio of collection of non-returnable bottles
- Limited number of domestic users of scrap glass and high cost of transportation due to geographical concentration of glass bottle manufacturers
- Demand for the use of cullet will increase with the increased price of fuels in glass bottle manufacturers

## 1.2.5 Waste/Scrap Plastics and Plastic Industry

### (1) Import and Export of Scrap Plastic and Plastic Products

In 2004, the import of scrap plastic was 15 thousand tons while its export was 44 thousand tons in 2004. Major country origins of scrap plastic export are Hong Kong and China.

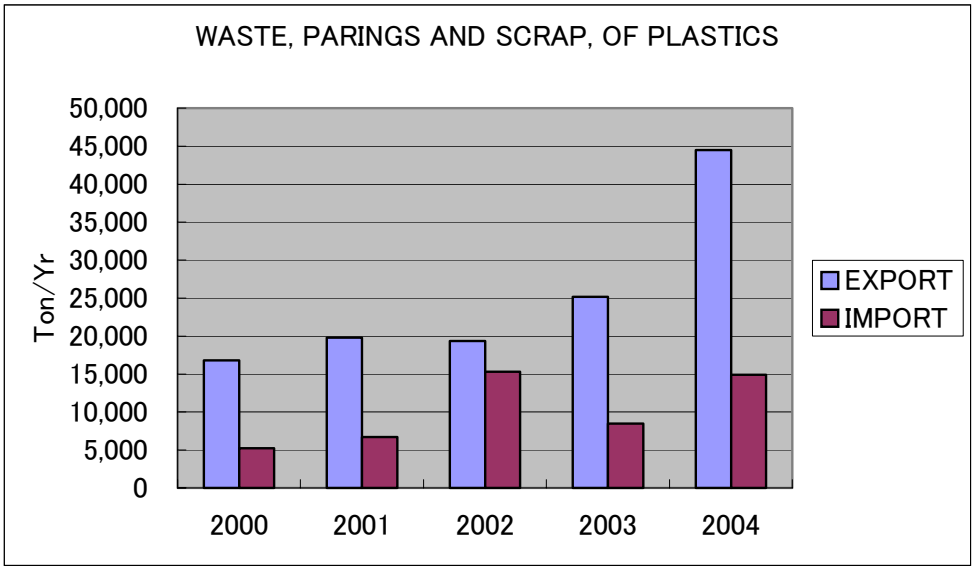



Figure 1.2.11 Trend of Scrap Plastic Trade (2000-2004)

Import of plastic resins was 567 thousand tons while its export was only 39 thousand tons in 2004. Major country origins of plastic resins import are Singapore, followed by South Korea, Taiwan, and Japan.

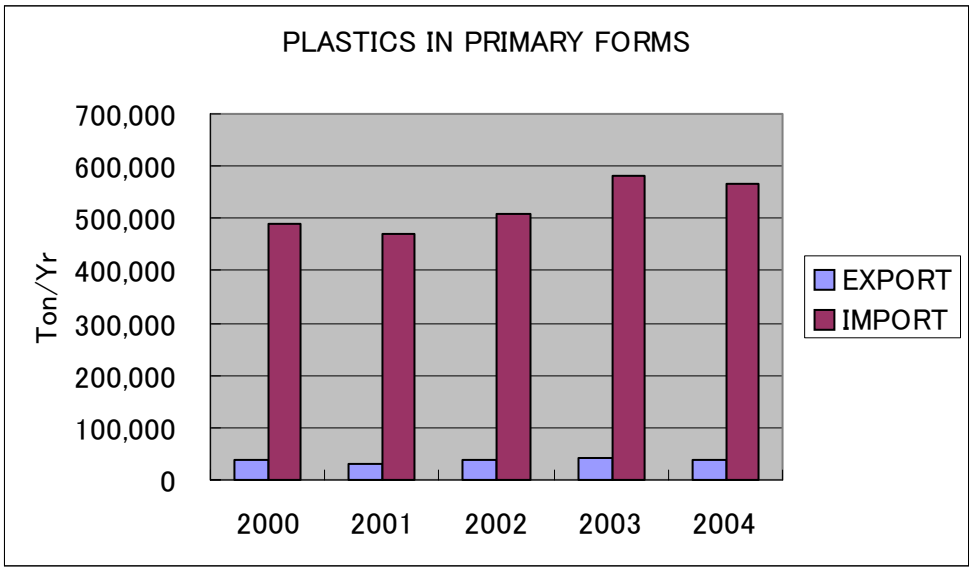



Figure 1.2.12 Trend of Plastic Resins Trade

On the other hand, the import of plastic products was 183 thousand tons while its export was only 40 thousand tons in 2004. Major country origins of plastic products import are China, and followed by Taiwan and Malaysia.

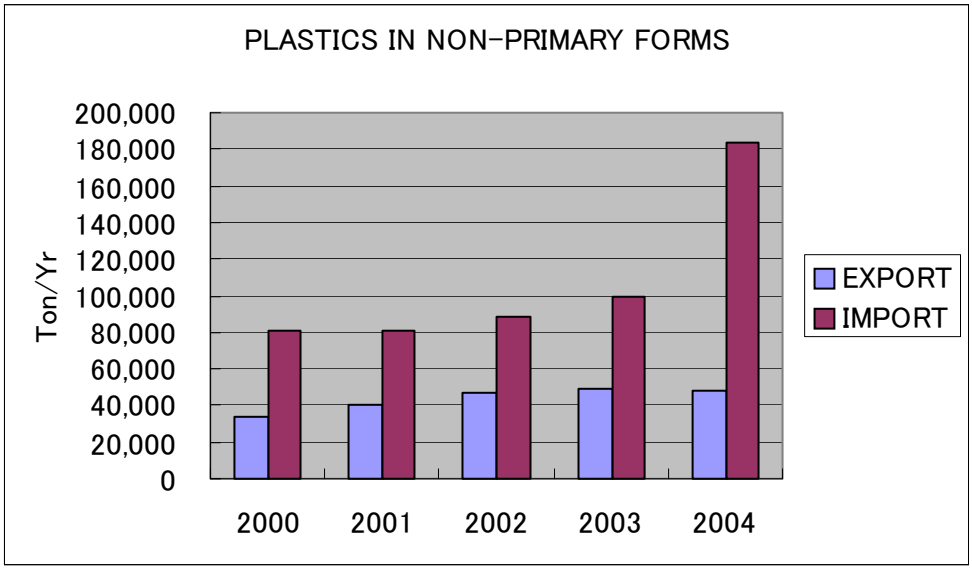
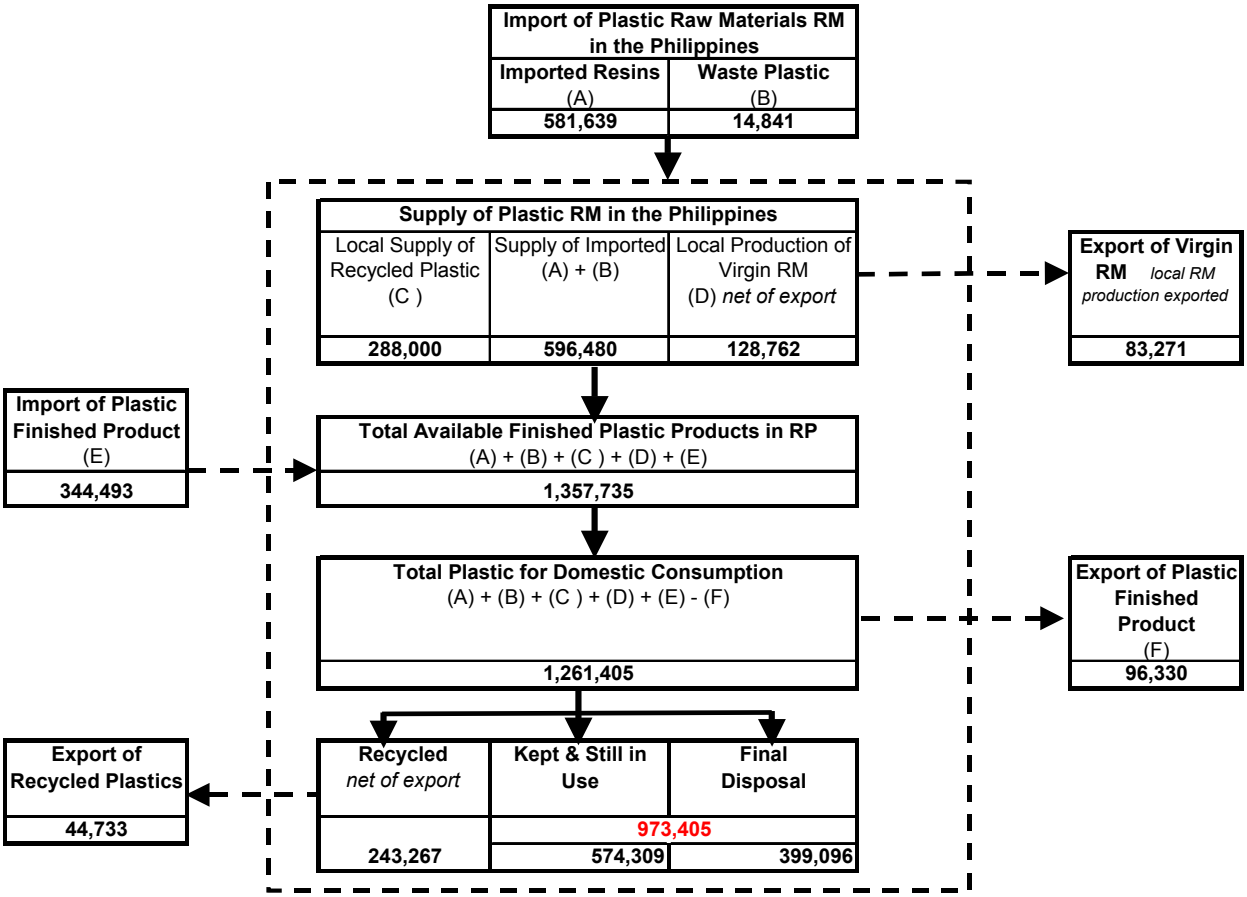



Figure 1.2.13 Trend of Plastic Products Trade

## (2) Domestic Production, Consumption and Material Flow of Plastics

The Figure below shows the estimated material flow of plastics in the Philippines.




*Source: National Statistics Office*
*Data on Recycling are PPIA estimates on MPRAI and Non-MPRAI operating capacities*

Figure 1.2.14 Estimated Material Flow of Plastics (2004)

The annual plastic production in the Philippines was approximately 1 million tons in 2004. This domestic production largely depends upon imports of plastic resins and other semi-finished products due to no existence of ethylene plant (naphtha cracking plant)

The annual plastic consumption, on the other hand, reached about 1.3 million tons in 2004. In addition to the import of plastic resins, about 344 thousand tons of final plastic products were imported to meet the domestic demand in the Philippines in 2004.

## (3) Key Issues of Scrap Plastic Recycling in the Philippines

The key issues in scrap plastic recycling in the Philippines are identified as follows:

- Low ratio of the use of scrap plastics. According to the estimation from the available data, the ratio of the use of scrap plastics for plastic production is very limited. (less than 10%)

- Strong dependence upon foreign procurement of plastic resins and products to meet the domestic demand.
- Low ratio of scrap plastic utilization for manufacturing plastic products.
- Difficulty in collecting high quality scrap plastic materials due to mixed discharge with other waste at generation sources.

### 1.2.6 Used Electric/Electronic Home Appliances and Recycling Industry

#### (1) Cellular Phone

Cellular Phone Services in the Philippines are mainly occupied by two major network providers, i.e. PLDT (Philippine Long Distance Telephone Company) and Globe Group. Introduction of the "Prepaid Card System" and "Short Message Service" in 1999 drastically increased the number of subscribers and exceeds the number of land-line subscribers in 2000, reaching 34 million in 2003 with the dissemination ratio of 42%.

In the Philippines, trade-in of used cellular phones is widely disseminated, in which the traded cellular phones are repaired or refurbished with spare parts for resale as second-hand ones. For those which cannot be sold as second-hand, recyclable and reusable parts are disassembled for resale in the market or traded with junk shops. Most of the non-recyclable materials are disposed with municipal solid waste.

As to the cellular phone batteries, most of the replacement batteries sold in the Philippines come from China. Different form the other electric/electronic appliances, no strict quality control has been carried out for cellular phone batteries. Therefore, the quality of batteries largely depends upon the consciousness of importers and producers.

In case the replacement batteries are found broken or defect, the wholesalers can send them back to China for exchange within the 6 months. On the other hand, the batteries that have already been expired of their guarantee period are currently sold at 3 PhP per kg while the used battery chargers are sold at 10 PhP per kg.

Cellular phone providers such as Nokia, Motorola, and Sony Ericsson also provide replacement services of genuine batteries at the price of 900 PhP per battery while non-genuine batteries widely sold in the market are much cheaper than the branded genuine batteries.

General subscribers of cellular phones in the Philippines seldom buy the branded genuine batteries for replacement. There are also imitated genuine batteries sold in the market, of which the durable period is about 1 year. Since some of the imitated batteries do not have capacitor control device for recharging, it can possible ignite or explode. In September 2006, there was a report on ignition of cellular phone batteries that are sold at 50 PhP on the street.

#### (2) Personal Computers

In the Philippines, about 90 thousand units of new computers are annually imported while 40 to

50 thousand second-hand computers are also imported, as shown in the table below.

Table 1.2.2 Number of New PCs Imported to the Philippines (2004)

| Import Origins | PC | | |
|---|---|---|---|
| | Desktop | Laptop | Total |
| Hong Kong | 18,017 | 10,207 | 28,224 |
| Singapore | 14,096 | 315 | 14,411 |
| Japan | 11,791 | 158 | 11,949 |
| China | 8,216 | 3,577 | 11,793 |
| USA | 6,857 | 385 | 7,242 |
| Malaysia | 4,478 | 10 | 4,488 |
| Korea | 998 | 1,973 | 2,971 |
| Ireland | 2,588 | 12 | 2,600 |
| Taiwan | 1,296 | 41 | 1,337 |
| Indonesia | 1,319 | 3 | 1,322 |
| Others | 1,509 | 592 | 2,101 |
| Total | 71,165 | 17,273 | 88,438 |

Source: 2004 Importation data recorded by Bureau of Importation Services (BIS)

Table 1.2.3 Number of Used PCs Imported to the Philippines (2004)

| Import Origins | PC | | |
|---|---|---|---|
| | Desktop | Laptop | Total |
| Korea | 16,520 | 0 | 16,520 |
| Japan | 13,339 | 1,014 | 14,353 |
| USA | 3,674 | 1,999 | 5,673 |
| Australia | 2,681 | 1,706 | 4,387 |
| Canada | 1,810 | 0 | 1,810 |
| Singapore | 343 | 0 | 343 |
| Taiwan | 7 | 0 | 7 |
| Total | 38,374 | 4,719 | 43,093 |

Source: 2004 Importation data recorded by Bureau of Importation Services (BIS)

The second-hand PCs sold in the Philippines are mostly imported from abroad while almost no domestically used PCs in the market. The imported used PCs are first check with the function and operation conditions for resale. As to those which cannot be resold due to malfunction, valuable materials are disassembled for selling to the recyclers or sent back to the origins of imports.

### (3) Television

decreased in 2005 due to price increase and related VAT. However, in the mid and long term, there are still big potential market for TV, taking into account the current limited dissemination.

In addition, a large amount of second-hand TVs are imported from the major ports in the Philippines such as Manila, Batanagas, and Davao. About 60 to 70% of the imported TVs are from Japan. The imported TVs are adjusted with the voltage for resale by second-hand dealers. The TVs that cannot be sold as second-hand due to its malfunction are disassembled for resale of valuable parts and materials.

### (4) Refrigerators

Import of second-hand refrigerators are very limited in comparison with TVs. The imported second-hand refrigerators are refurbished through exchange or injection of refrigerant for resale. CFCs are still utilized as the replacement refrigerant for old-type refrigerators.

### (5) Issues of Recycling Used Electric/Electronic Appliances

a Potential health and environmental impacts arising from improper treatment and disposal of the used E-appliances

- Environmental Impacts resulting from improper disposal non-recyclable materials such as cellphone batteries, printing circuits and refrigerant, and other potentially hazardous substances
- Safety risk arising from improper adjustment or replacement of spare parts for resale

b Identification of the use, disposal and treatment of used electric/electronic appliances

- Due to complex distribution of second-hand appliances by informal dealers, it is very difficult to trace the process of use, disposal and treatment of used electric/electronic appliances in the Philippines.

c Current used electric/electronic recycling system without consideration on appropriate safety and environmental protection.

Currently most E-items are traded as valuables commodities; however, most second-hand dealers and repair factories pay minimum attentions on safety or environmental protection.

# 2. Necessity of the National Master Plan for Recycling Industry Development in the Philippines

## 2.1 Urgency of Waste Minimization and Proper SWM in the Philippines

According to the National Solid Waste Management Framework 2004, prepared by the National Solid Waste Management Commission (NSWMC), the Philippines is estimated to generate 19,700 tons of garbage daily in 2000 or about 7.2 million tons annually. It also projects that waste generation will increase up to more than 10 million tons annually by the year 2010.

As a national policy on SWM, the Ecological Solid Waste Management Act (RA9003) requires LGU to prepare the Local Government Solid Waste Management Plan (LG-SWM), in which **LGU should include its own implementation schedule of diverting at least 25% of all solid waste from waste disposal facilities through re-use, recycling, composting, and other resource recovery activities.**

According to the Study done by the Asian Development Bank in 2003, the total cost of solid waste management in Metro Manila, ranging from collection to final disposal, reached about 3.5 billion PhP (8.5 to 9 billion JPY) or 1,700 PhP (about 4,250 JPY) per ton of waste in 2001. Considering the required improvement of final disposal to sanitary landfill and reduction of waste by intermediate treatment, the cost of SWM is expected to further increase and bear heavily upon local budget. Although the estimation of ADB Study showed that approximately 2 million tons of SW was generated in Metro Manila alone in 2001, it also indicates that reduction of SW generation by 10% can save about 340 million PhP (850 million JPY) in terms of SWM cost. It clearly demonstrates the possible positive impacts of promoting recycling upon national as well as local budget.

Waste minimization is of great importance and urgency with respect to mitigation of heavy burden of national and local budget for SWM.

## 2.2 Big Potential of Resource Recovery, but Limited Utilization by Domestic Industries

Although the results of prior surveys on waste composition clearly show the big potential of resource recovery from SW, its utilization is still limited in the domestic industries potentially receiving it as raw material. The major limiting factors of recycling development in the Philippines include:

- Lack of proper segregation of recyclable/recoverable waste materials at sources of generation and low collection ratio and low quality of such materials as its result;
- Limited technological and financial capacity of domestic industries that can receive recyclables as raw materials and their outflow to international big market such as China;

- Strong dependence of collection and trading of recyclable/recoverable materials upon price fluctuation based on market mechanism and unstable domestic supply of recyclables to the receiving industries as its result; and
- Fragmented information and network for optimizing the flow of recyclable/ recoverable materials from generators to the final users.

## 2.3 Potential Socio-Economic Benefit of Recycling Industry Development

In the Philippines, many people has been earning its daily needs by so-called informal activities surrounding SWM such as primary collection of recyclable materials from generation sources, running of junkshops, and waste picking at final disposal sites. Many of them obtain their daily income from these activities at the risk of unsafe and unsanitary working conditions.

Development of recycling industry is expected to contribute to reformation and reemployment of such people involved in the informal SWM activities as the workers or employees of legitimate recycling industry so that they can work under safer and more sanitary conditions as well as under a certain social security.

In fact, the workers currently engaged in sorting and washing of recyclable materials at paper and plastic recycling factories in the Philippines are in much safer and sanitary conditions with a certain social security provided by the factory owners.

Promotion of recycling industry has a significant potential of increasing social welfare of the people currently engaged in the informal business activities.

# 3. Goals of the Master Plan for Recycling Industry Development in the Philippines

The Master Plan for Recycling Industry Development in the Philippines is formulated for the purpose of achieving the goals as shown below.

1) Waste minimization through establishment of collection and utilization system of recyclable resources based on the proper segregation of waste at sources of generation;

2) Development and promotion of the domestic industries contributing to maximizing the domestic use of recyclable materials for resource and energy saving;

3) Promotion of environmentally sound and sustainable utilization of recyclable resources

4) Reorganization and formalization of informal sector involved in recycling as the key players of promoting recycling industry in the Philippines

# 4. Master Plan for Development of Recycling Industry in the Philippines

The Master Plan for Development of Recycling Industry in the Philippines is discussed here. This Master Plan clarifies the policies, measures and actions to be taken by the Government to further promote and develop recycling industry in the Philippines to achieve the minimization of SW as prescribed in RA 9003, as well as to realize the material cycle society by enrooting the concept of 3R (Reduce, Reuse, and Recycle) among all the sectors and people in the Philippines.

The national policies, measures, and actions discussed here are mainly focused on the following critical issues on development of recycling industry in the Philippines that are identified in the previous sections of this Master Plan, i.e.

1) Proper distribution of information on domestic recyclable materials and recycling industries among all the relevant players and stakeholders;

2) Establishment of local-based recycling system based on proper segregation at sources and strong sustainable linkage from the sources to the final receivers;

3) Introduction of policy incentives (financial and non-financial) to promote recycling industries and other supporting activities

## 4.1 Policies and Programmes on Proper Distribution of Information on Domestic Recyclable Materials and Recycling Industries

### 4.1.1 Background and Necessity of the Policies

Proper distribution of information on domestic recyclable materials and recycling industries is the foundation of creating the domestic market for recyclable materials in the Philippines. However, the current mechanism of information distribution in the Philippines still depends upon various informal communications among the recycling players while the information itself becomes fragmented, arbitrary and speculative among them. Due to this current situation, the Philippines is facing the difficulty in development of recycling industry for the following aspects:

1) Misperception and misunderstanding among the recycling players on the needs or required quantity and quality, price of recyclable materials by the domestic recycling industry, which causes the mixed disposal of a considerable amount of recyclable materials at landfills;

2) Difficulty in formulating the recycling plan at national as well as local level due to no available complete data on recyclable materials as well as recycling industries, which also discourages the private investment in recycling because of the uncertainty in relation to such information.

### 4.1.2 Formulation and Enforcement of Recycling Guidelines for Specific Recycling Players

The Recycling Guidelines are prepared for proper handling of recyclable materials at all levels of relevant players ranging from waste generators to collectors, various dealers (MRF, middleman, junkshop, and consolidators) and recycling industries that finally receive them to produce semi-finished or finished recycled products. The Recycling Guidelines have to be designed to meet specific needs and requirement of local recycling industry in terms of quantity and quality so that domestic use of recyclable materials can be maximized.

#### (1) Measures for Dissemination and Enforcement of Recycling Guidelines

The measures for dissemination of recycling guidelines are recommended as follows:

1) Distribution through various media

Recycling guidelines can be disseminated through various media including publication and distribution in the form of booklets, uploading at relevant government website, holding dissemination seminars, and so forth. These public relations activities have to be made under the initiative of the government working together with recycling industry that is expected to obtain the most benefit by their dissemination among all the recycling players.

### 2) Formalization of Recycling Guidelines under RA 9003

Following the dissemination activities above, the Philippines Government will formalize the recycling guidelines under RA 9003 so that the guidelines can complement the provision of RA 9003 regarding segregation of waste at sources as well as roles and responsibilities of various recycling players.

### 3) Adjustment of the Recycling Guidelines to local conditions of recycling activities

The contents of recycling guidelines need to be revised to meet the local conditions of recycling activities. Especially the guidelines for waste generators need to be reviewed and revised in view of local conditions of recycling activities. These national level guidelines should be used as the guidance for each local authority so that they can have their own guidelines.

### 4) Regular Updates of the Recycling Guidelines

The contents of recycling guidelines also need to be periodically updated in accordance with the development and dissemination of recycling technologies in the Philippines.

## (2) Actions to be Taken by Stakeholders for Implementation of the Programme

The actions to be taken by each stakeholder for implementation of this programme are shown in the table below.

Table 4.1.1 Actions to be Taken by Each Stakeholder

| Stakeholder | Required Actions |
|---|---|
| National Government (DTI-BOI, NSWMC) | 1. Dissemination of the national guidelines through various media<br>▪ Publication and distribution of PR materials<br>▪ Uploading of the guidelines on websites of the relevant government departments and agencies<br>▪ Holding of seminars and workshops in cooperation with business/industries for local governments<br>▪ Implementation of the guidelines within its premises (Government buildings, public facilities, etc.)<br>2. Legislation of the guidelines as the Implementation Rules and Regulations of RA9003<br>3. Revision and renewal of the guidelines<br>▪ Regular review of the guidelines based on the development and dissemination of relevant recycling technologies and systems<br>4. Financial support for development of local recycling system<br>▪ Provision of necessary facilities and equipment (collection vehicles, MRFs, processing machinery and equipment, etc.) |
| Local Government (Province, LGU, Barangay) | 1. Preparation of and dissemination of local recycling guidelines<br>▪ Adjustment of national recycling guidelines to local conditions of recycling<br>▪ Publication and distribution of PR materials for guidelines<br>▪ Holding of seminars and workshops in cooperation with locally available recycling business/industries for the local communities and residents |

| Stakeholder | Required Actions |
|---|---|
| | ▪ Implementation of local guidelines within its premises (local government buildings, facilities, etc.)<br>2. Preparation and regular review of the local guidelines<br>▪ Preparation and regular review of the local guidelines based on the development and dissemination of relevant recycling technologies and systems at its localities<br>3. Establishing the local recycling system in accordance with the local guidelines to be prepared<br>▪ Establishment of recyclables collection/haulage system<br>▪ Networking with takers of recyclables (MRF, junkshop, consolidators, recyclers, exporters, etc.) |
| Business/industry | 1. Dissemination of national guidelines through various media<br>▪ Technical/financial support for production of PR materials<br>▪ Technical/financial support for holding the seminars and workshops<br>▪ Uploading the guidelines on their website<br>▪ Implementation of the guidelines at their premises (offices, factories)<br>▪ Dissemination of the guidelines to the suppliers of recyclables (contracted junkshop, consolidators, collectors, dealers)<br>2. Preparation of regular review of national/local guidelines<br>▪ Provision of information about the requirement of the quantity, quality and price of recyclable materials from the end-user side<br>3. Establishing the local recycling system in accordance with the local guidelines to be prepared<br>▪ Provision of assurance on acceptance of collected recyclable materials as end-users by contract with local authorities or relevant organizations.<br>▪ Technical/financial support for establishment of local recycling system as end-users<br>4. Compliance with the recycling guidelines for recyclers<br>5. Examining and investigating the possibility of introducing new recycling technologies as the end-users of recyclables in accordance with the guidelines. |
| General Public | 1. Implementation of the guidelines as the source of recyclable materials<br>▪ Proper segregation and discarding of recyclables in accordance with the guidelines at sources (household, workplace, public place, etc.)<br>▪ Voluntary support for collection of recyclable materials (community-based collection of recyclables, operation of MRFs, etc.)<br>2. Participation in the process of planning and establishing local recycling system (community leaders, etc). |

### (3) Implementation Schedule

The proposed implementation schedule of dissemination and enforcement of recycling guidelines for the next 5 years are as shown in the table below.

Table 4.1.2 Implementation Schedule of Recycling Guidelines

| Activity | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|
| 1. Preparation of Recycling Guidelines | ▬ | ▬ | | | | |
| 2. PR activities | | ▬ | ▬ | | | |
| 3. Formalization under 9003 | | | ▬ | ▬ | ▬ | ▬ |
| 4. Updates of Recycling Guidelines | | | ▪ | ▪ | ▪ | ▪ |
| 5. Formulation of Local Recycling Guidelines | | | ▬ | ▬ | ▬ | ▬ |

### 4.1.3 Establishment of Nation-Wide Recycling Information System

The objectives of the nation-wide recycling information system are:

- Promoting recycling business by indicating the potential market of recycling through provision of reliable and detail information on generation and utilization of recyclable materials;
- Contributing to formulation of national and local recycling plan through provision of proper information and data on the current flow of recyclable materials; and
- Providing reliable information on currently available recycling industry that can utilize recyclable resources as raw material, whereby contributing to establishment of the optimum recyclable resource utilization mechanism at local and national levels based on the partnership among relevant stakeholders.

#### (1) Basic Structure of the Nation-Wide Recycling Information System

The basic structure and contents of the nation-wide recycling information system are respectively as follows:

##### 1) Information on Recyclable Materials

###### a Recyclable materials covered

The System will cover the recyclable materials targeted in the Study including:

- Waste/scrap papers
- Scrap metals (iron and aluminum)
- Scrap glass
- Scrap plastic
- Used electric and electronic home appliances (cellular phone batteries, personal computers, TV sets, and refrigerators)

Each of the above recyclable materials will be further divided into sub-categories depending upon the necessity of its use and types of recycling industry to be developed in the Philippines.

b Information and data to be collected

- Import and export of recyclable materials (amount and value by types and major ports)
- Final domestic consumptions of relevant materials and products (by types)
- Generation and collection of recyclable materials (by types, sources)
- Domestic consumption of recyclable materials (by types)

2) Information on Recycling Industry

a Recycling industry covered

The industries covered in this system are:

- Importers and exporters of recyclable materials
- Domestic end-users of recyclable materials

The data on primary collectors and secondary dealers of recyclable materials are not subject to collection in this database because it is not necessary to capture the macro trend of recycling industry in the Philippines. In examining the recycling mechanism at micro level such as in a certain LGU, however, identification of the activities of such stakeholders will be required, taking into account the limited access to such end-users and exporters at local level and much dependence upon traders of recyclable materials.

b Information and data to be collected

The information and data to be collected from the above recycling industries are illustrated in the table below.

Table 4.1.3 Information and Data to be Collected from Recycling Industry

| Types of Recyclers | Required Information and data |
|---|---|
| Importer/exporters | ▪ Address and contact information<br>▪ Types of recyclable materials handled<br>▪ Amount of export and import (by types)<br>▪ Price of the recyclable materials handled (by types)<br>▪ Import and export destination (by country and by types) |
| End-users | ▪ Address and contact information<br>▪ Type of industry (in accordance with PSIC)<br>▪ Manufacturing products profile<br>▪ Production/manufacturing process detail (Production capacity, amount, process yield, etc.)<br>▪ Types of recyclable materials used<br>▪ Amount of recyclable materials input for production (by types), ratio between domestically and foreign procurement of recycled materials, and virgin/recycled material ratio<br>▪ Buying price and conditions of recycled materials |

## (2) Development of Nation-Wide Recycling Information System

The nation-wide recycling information system will be developed and operated in accordance with the process illustrated below.

### 1) Identification of information/data sources and development of information/data collection system

Identification of the information/data sources is the key in the development of database. The information and data must be collected in the most efficient way, and from the most reliable sources. In this respect, we must first consider the current flow of recyclable materials. The current flow of recyclable materials in the Philippines can be estimated as illustrated in the figure below.

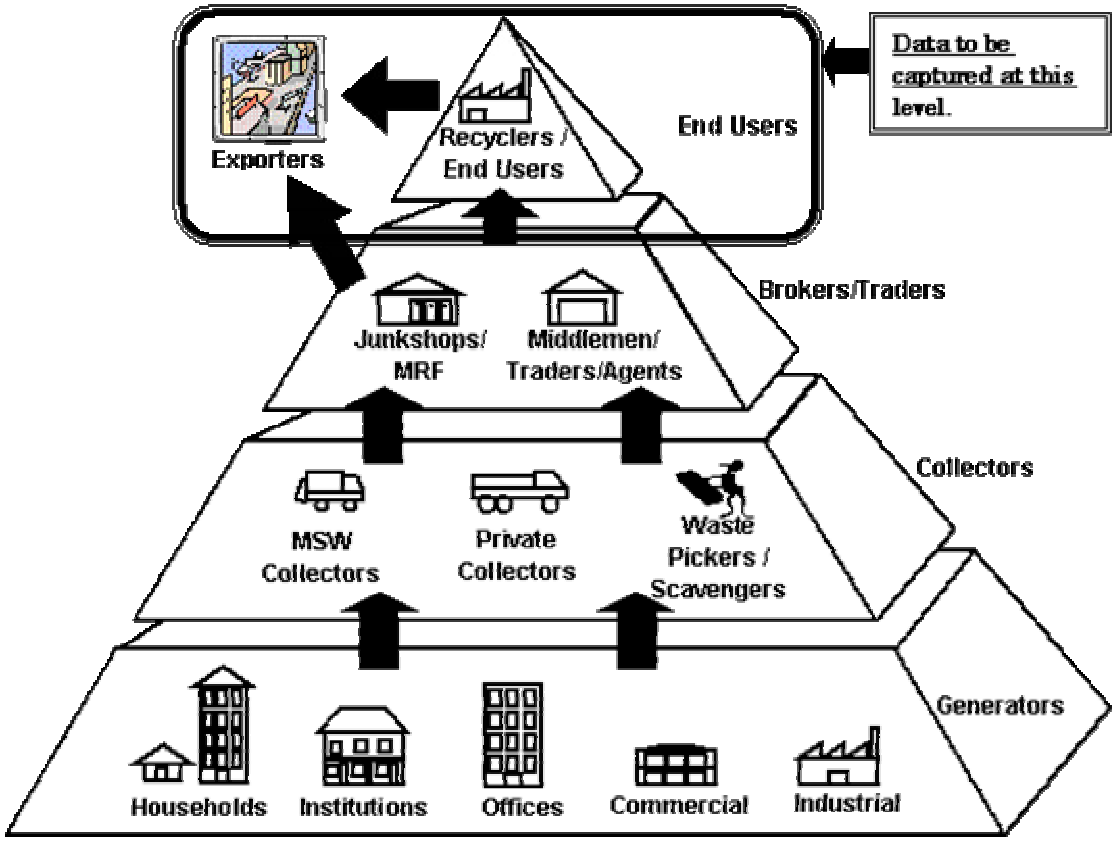



Figure 4.1.1 Basic Flow of Recyclable Materials in the Philippines

Recyclable materials are generated from various sources such as households, offices, public and commercial facilities, industries and so forth, collected by primary collectors, and transferred to intermediate dealers like junkshops, MRFs, etc. and finally brought to end users or exporters. The materials not collected in the above process are disposed as waste at final disposal landfills.

To properly and efficiently capture the amount of recyclable materials collected and utilized in

the Philippines, end-users and exporters must be targeted as the sources of information and data. Therefore, how to develop the information and data collection system from end-users and exporters is the key to truck down the collection and utilization of recyclable materials.

The method of collecting data and information from these stakeholders is as follows:

a Information/data collection from the end-users of recyclable materials

In developing information/data collection system from end-users, the role of industry groups and/or associations is of great importance. As the industry groups and associations have a good network of member companies, it should be utilized at its maximum to efficiently collect required information and data from individual recycling industries. For the industry groups and associations, it can be a good publicity to show their industries' recycling performance to the public.

In the case of the Philippines, a considerable number of industry associations and groups have been playing important roles in representing their member companies' interests and opinions. In this regard, industrial association is the most suitable focal point to collect information and data on the use of recyclable materials by their industries.

b Information/data collection from exporters of recyclable materials

The recyclable materials collected from the sources are finally transferred to domestic end-users or exported through the hands of exporters. Therefore, the total amount of recyclable materials collected can be captured by properly identifying these two routes of recyclable materials. The export data of recyclable materials can be obtained either from exporters or custom offices dealing with export of recyclable materials.

2) Preparation of Reporting Forms for Information/Data Collection

To obtain accurate and useful information and data from the relevant sources, several sets of reporting forms need to be prepared by types of information/data sources. Provision of reporting guidelines/manuals as well as the short training programs may also be required to make sure proper reporting by the relevant sources.

In this case, the reporting forms need to be prepared for the following key information/data sources:

- End-users of recyclable materials (Recycling industry)
- Offices of customs dealing with import/export of recyclable materials
- Importers/exporters of recyclable materials

### 3) Mandatory Registration of Recycling Players and Information Provision

For proper collection of information and data, the Government should create a mechanism to **obtain information** from relevant recycling players on **mandatory basis** (such as upon renewal of business license). A **mandatory registration system** for recycling players is also essential, so that necessary information and data can be available for the recycling information system.

Mandatory registration of recycling players will be appropriate to be carried out within the LGUs where the Barangays in the LGUs should be responsible for the registration. Simple and effective registration system should be prepared, with easy reporting format for the recycling players to provide necessary information as requested.

### 4) Periodical Update of Recycling Information

The recycling information needs to be regularly updated, preferably every year so that the government can always identify the latest status of recycling activities in the country. Therefore, the above information collection activities need to be annually carried out to update the recycling information.

## (3) Dissemination Measures of Collected Recycling Information

Dissemination of recycling information will be made by the following measures:

### 1) Dissemination through media

The collected recycling information can be disseminated through various media, e.g. uploading the information at website of relevant government organizations, publication of recycling information handbook, announcement of the key information through radio, TV and other media, and so forth.

As an output of the Study, the Fact Book of Recycling in the Philippines will be published in cooperation with BOI-DTI, NSWMC and other member organizations of Steering Committee of the Study. This is a good example of disseminating the recycling information to the public. It is also useful to disseminate the country's achievement of recycling activities as a country news topic in the broadcasting media by announcing the key figures on recycling such as recycling/recovery rate of solid waste, reduction or increase in the amount of waste disposed, etc. Announcement of the recycling achievement of specific materials such as waste papers, plastics may also encourage the relevant industry to utilize more recyclable materials.

### 2) Creation of Recycling Information Database

The collected recycling information can be processed into database so that it can be used for analysis of recycling business market, national and local level plans on SWM and recycling,

and so forth. In the mid and long term future, the database may be connected with terminal computers in the relevant industry associations, exporters and the offices of customs that provide the information and data to the database.

### (4) Actions to be Taken by Stakeholders for Implementation of the Programme

The actions to be taken by each stakeholder for implementation of this programme are shown in the table below.

Table 4.1.4 Actions to be Taken by Each Stakeholder

| Stakeholder | Required Actions |
|---|---|
| National Government (DTI-BOI, NSWMC) | 1. Collection of information and data on recyclable materials and recycling industries<br>▪ Legislation of mandatory registration of recycling industry (end-users and international traders of recyclable materials) and regular reporting (data provision) about recycling activities from them.<br>▪ Preparation of user-friendly guidelines and manual for reporting recycling activities by end-users and international traders of recyclables<br>▪ Establishment of data/information collection mechanism from end-users and international traders<br>2. Compilation and provision of recycling data and information<br>▪ Compilation of recycling data and information for public disclosure through publication of data book, announcement of the country's recycling achievement by various media.<br>▪ Analysis of data and information for policy making in relation to development of recycling market and industry.<br>▪ Provision of region or local-wise recycling data to help local governments develop their own recycling plan.<br>3. Establishment of recycling information/data network system<br>▪ Development of recycling information/database<br>▪ Networking with relevant stakeholders (Recyclers, LGUs, etc.)<br>4. Technical/financial assistance to the local governments<br>▪ Training of local government staff for collection of information and data<br>▪ Financial assistance for establishment of information/data network system |
| Local Government (Province, LGU, Barangay) | 1. Collection of information and data on recyclable materials and recycling industries at local level<br>▪ Establishment of data/information collection mechanism at local level.<br>2. Compilation and provision of local recycling data and information<br>▪ Compilation of local recycling data and information for public disclosure through publication of data book, announcement of local recycling achievement by various media.<br>▪ Analysis of data and information for formulation of local recycling plan and establishment of local recycling system<br>3. Establishment of recycling information/data network system<br>▪ Development of local recycling information/database<br>▪ Networking with National Government as well as local key stakeholders in recycling |

| Stakeholder | Required Actions |
|---|---|
| Business/industry | 1. Collection of information and data on recyclable materials and recycling industries<br>▪ Registration and regular submission of recycling data and information to local government in accordance with the registration and reporting procedure provided by the National Government<br>▪ Establishment of data/information collection system by types of recyclable materials under the leadership of sector-wise industry associations.<br>2. Compilation and provision of sector-wise recycling data and information<br>▪ Compilation of sector-wise recycling data and information for public disclosure through publication of data book, announcement of sector-wise recycling achievement by various media.<br>▪ Analysis of data and information for further development and enhancement of recycling by each sector<br>3. Establishment of recycling information/data network system<br>▪ Development of sector-wise recycling information/database<br>▪ Networking with National Government |
| General Public | 1. Proper understanding of the national and local situation of recycling<br>2. Active cooperation in collection of information and data on recycling |

### (5) Implementation Schedule

The proposed implementation schedule of establishing the nation-wide recycling information system for the next 5 years are as shown in the table below.

Table 4.1.5 Implementation Schedule of Nation-Wide Recycling Information System

| Activity | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|
| 1. Publication of 1st Recycling Fact Book | | ■ | | | | |
| 2. Collection of Information and Data | | ■ | ■ | ■ | ■ | ■ |
| 3. Update of the Recycling Fact Book and Dissemination | | | ■ | ■ | ■ | ■ |
| 4. Creation of Recycling Database | | | ■ | ■ | | |
| 5. Building Recycling Information Network | | | | ■ | ■ | ■ |

## 4.2 Policies and Programmes on Establishment of Local-Based Recycling System

### 4.2.1 Background and Necessity of the Policies

The overall recycling system has to be different among localities depending upon the conditions of socio-economic and industrial activities, consumption patterns, lifestyles, and so forth. Taking into such differences, each province and/or LGU will have their own unique recycling system. National policies on recycling industry development must properly consider the local uniqueness of socio-economic, cultural and industrial set-up for each province and LGU and support them building their own unique recycling system.

On the other hand, the government support is also required to complement the limited capacity of recycling industry at provincial as well as local level since recycling industry is not always available within or near its jurisdiction. This kind of shortage at provincial and local level has to be properly taken care of by the national government.

To realize local-based Recycling System with attention to these issues, the Master Plan sets the following policy measures to be taken by the National Government to support local authorities:

1) Provision of the Guidelines for Formulation of Provincial/Local Recycling Plan

2) Policy Support for Implementation of Provincial/Local Recycling Plan

### 4.2.2 Basic Procedure and Priority for Formulation of Local Recycling Plan

#### (1) Basic Unit of Local Recycling Plan

Although RA9003 requires that the ecological solid waste management plan should be formulated by each LGU, the basic unit of local recycling will be put at each province or region. It is because of the fact that Regional Ecology Center, which is established at each province or region level, will be the most suitable institutional base for formulating local recycling plan.

#### (2) Priority of Local Recycling Plan Formulation and Implementation among Regions

Every region differs in conditions of existing recycling industry, amount of recyclable materials, as well as urgency of waste minimization. In this respect, the priority for formulation and implementation of local recycling plan has to be determined considering such conditions of each region.

The Master Plan will put the priority of formulating and implementing local recycling plan upon major cities such as Metro Manila (National Capital Region: NCR), Metro Cebu, and Davao, where population is and socio-economic activities are concentrated. The necessary information and data on the amount of recyclable materials and recycling industry are also more available in the above cities than the others, so that they can start formulation and implementation of local recycling plan earlier than the others.

As to the other regions, the Regional Ecology Centers is expected to take the initial step for formulation of local recycling plan through identification of the amount of recyclable materials and recycling industry in their respect regions. Based on this identification, they will determine the scope of local recycling plan, in which what types of recyclables are treated within the regions and how they cooperate and coordinate with the other regions to complement with each other to maximize the use of regionally/locally available recyclable materials and industries.

### 4.2.3 Policy Support for Formulation and Implementation of Local Recycling Plan

Possible recycling activities at regional and local level will be limited due to various technical as well as financial constraints. In this regard, policy support by national government is required for all levels of recycling activities at regional and local level.

The table below identifies the potentially required assistance by national government for formulation and implementation of local recycling plan at regional and local level.

Table 4.2.1 Types of Policy Support Required for Formulation and Implementation of Local Recycling Plan

| Stages of Recycling | Types of Assistance Required |
|---|---|
| Segregation at Sources | (IEC)<br>▪ PR and IEC materials (posters, pamphlets, guidebooks)<br>▪ Trainers for segregation of recyclables<br>(Equipment)<br>▪ Segregation bins, containers |
| Collection and haulage | (Facility and Equipment)<br>▪ Collection vehicles (trucks, push carts)<br>▪ Storage for recyclables（MRF）<br>▪ Primary processing machinery and equipment (sorting, shredding, washing, baling)<br>(Procurement of recycling players)<br>▪ Primary collectors (Eco-aides)<br>▪ Junkshops, dealers, consolidators |
| Recycling | (Facility and Equipment)<br>▪ Recycling facility and machinery/equipment<br>(Final users)<br>▪ Recyclers, exporters |

Based on the review and evaluation of local recycling plans formulated, the national government is expected to identify the needs of assistance for their implementation and provide the assistance at its utmost possible.

### 4.2.4 Actions to be Taken by Stakeholders for Implementation of the Programme

The actions to be taken by each stakeholder for implementation of this programme are shown in the table below.

Table 4.2.2 Actions to be Taken by Each Stakeholder

| Stakeholder | Required Actions |
|---|---|
| National Government (DTI-BOI, NSWMC) | 1. Dissemination of the guidelines for formulation of provincial/local recycling plan<br>▪ Publication and distribution of the guidelines to local governments<br>▪ Training of local government staff for formulation of provincial/local recycling plans<br>2. Technical/financial support for formulation of provincial/local recycling plan<br>▪ Formulation of model provincial/local recycling plan by types of localities (big, medium, small cities, rural areas, remote areas) under the national initiative. |

| Stakeholder | Required Actions |
|---|---|
| | ▪ Financial support for formulation of provincial/local recycling plan.<br>3. Technical/financial support for implementation of provincial/local recycling plan<br>(Segregation of recyclables at sources)<br>▪ PR materials (posters, pamphlets, guidebook, etc.)<br>▪ Training of trainers for segregation of recyclables at local level<br>▪ Procurement of segregation bins and containers<br>(Recyclable collections, storage and haulage)<br>▪ Procurement of recyclable collection vehicles (collection trucks, pushcarts, etc.)<br>▪ Financial assistance for establishment of MRF (Material Recovery Facility)<br>▪ Primary processing equipment of recyclables (sorting, crushing, shredding, baling, washing, etc.)<br>(Recycling, manufacturing of recycled products)<br>▪ Financial assistance for development of recycling facilities<br>▪ Financial assistance for procurement of recycling equipment for producing semi-finished or finished recycled products |
| Local Government (Province, LGU, Barangay) | 1. Formulation of provincial/local recycling plan in accordance with the guidelines<br>2. Implementation of the provincial/local recycling plan<br>3. Periodical monitoring and evaluation of the plan implementation |
| Business/industry | 3. Participation in formulation of provincial/local recycling plan as end-users and/or final takers of recyclable materials collected.<br>▪ Provision of input to the plan in terms of the requirement for accepting the collected recyclables (quantity, quality, cost sharing, etc.)<br>▪ Definition of its own roles in implementation of the plan as end-users and/or final takers of collected recyclable materials<br>4. Participation in implementation of provincial/local recycling plan as end-users and/or final takers of recyclable materials collected.<br>5. Technical/financial assistance in implementing the provincial/local recycling plan<br>▪ Assistance in IEC (to general public, collectors, dealers, MRFs, consolidators for proper collection and treatment of collected recyclables in accordance with the acceptance criteria)<br>▪ Investment in construction of recycling facilities or equipment, depending upon the feasibility of provincial/local recycling plans. |
| General public | 1. Participation in formulation of provincial/local recycling plan<br>▪ Proper understanding of the provincial/local recycling plan<br>▪ Definition of its own roles in implementation of the plan as the sources of recyclable materials<br>2. Participation in implementation of the plan<br>▪ Compliance with segregation and discarding methods provided in the plan<br>▪ Voluntary participation in implementation of the plan (community-based collection, operation of MRFs, etc.) |

### 4.2.5 Implementation Schedule of Establishment of Local-Based Recycling System

The proposed implementation schedule of establishing the local-based recycling system for the next 5 years are as shown in the table below.

Table 4.2.3 Implementation Schedule of Local-Based Recycling System

| Activity | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|
| 1. Preparation of Guidelines for formulation of local recycling plan | ▬ | ▬ | | | | |
| 2. Formulation of Local Recycling Plan | | ▬ | ▬ | ▬ | ▬ | ▬ |
| 3. Provision of support for implementation of local recycling plan | | | ▬ | ▬ | ▬ | ▬ |
| 4. Implementation of Local Recycling Plan | | | ▬ | ▬ | ▬ | ▬ |
| 5. Monitoring and evaluation | | | | ▬ | ▬ | ▬ |

## 4.3 Policies and programmes for provision of incentives (financial and non-financial) to promote recycling industries and other supporting activities

### 4.3.1 Background and Necessity of the Policies

Recognizing the significant roles and contributions of recycling industries in the Philippines in terms of efficient utilization of recyclable materials as well as reduction of solid waste by their production activities, the government will review and reform the current incentive mechanism so that the recycling activities can be further promoted.

On the other hand, recycling industries are currently facing common as well as different issues that hamper continuation and/or expansion of their recycling operations as mentioned earlier. The incentive policies and programmes must properly address these issues with different approach and incentive mechanisms based on the proper identification of such issues.

Taking the above conditions into account, the Master Plan establishes the policies and programmes for provision of incentives for promotion of recycling industries and other supporting activities.

### 4.3.2 Issues to be addressed in provision of economic incentives

The current economic incentives well cover the needs of recycling industries in terms of capital investment as well as their recycling operations by making preferential finance and tax/duty incentives available to the investors and industrial entrepreneurs. On the other hand, it does not yet address the issues that the recycling industry is currently facing in their recycling operation such as the higher cost of electricity, collection and transportation of domestic recyclable materials, stable procurement of recyclable materials in terms of its quantity and quality, and comparative disadvantage in competing procurement of recyclable materials with in the international market due to higher cost of recycling operations.

Considering the above specific issues that the Philippines recycling industries are facing now, the following types of incentive schemes in need to be examined for their possible introduction and application.

Table 4.3.1 Potential Areas of Economic Incentives and their schemes for Promotion of Recycling Industry

| Potential Areas | Possible Schemes of Economic Incentives |
|---|---|
| Energy and Electricity | ▪ Subsidized electricity rate to the recycling industries<br>▪ Tax incentives and preferential finance to the investment in private power generation facility<br>▪ Tax incentives and preferential finance to the investment in energy and power saving. |
| Collection and transportation of domestic recyclable materials | ▪ Tax incentives and preferential finance to the investment in distribution/logistic facilities of recyclable materials<br>▪ Tax incentives to the logistics expenses of recyclable materials<br>▪ Tax incentives and preferential finance to the investment in relocation and/or concentration of recycling industries in the strategic locations. |
| Quantity/quality assurance of recyclable materials | ▪ Tax incentives and preferential finance to the investment in primary processing machinery and equipment of recyclable materials (e.g. sorting, crushing, shredding, washing, baling, etc.)<br>▪ Tax incentives and preferential finance to the investment in storage facilities for recyclable materials |
| Domestic procurement of recyclable materials | ▪ Subsidized price application for domestic supply of recyclable materials<br>▪ Imposing of export duties upon recyclable materials<br>▪ Tightened/controlled tax policies for exporters of recyclable materials |
| Development of recycling industry | ▪ Subsidiaries/financial assistance or investment tax reduction/tax benefits on relocation of recycling industries<br>▪ Developing recycling industry complex (through funds from national government, financing/investment tax reduction.)<br>▪ Grant/subsidiaries/investment tax reduction for development of new recycling industry complex. |

### 4.3.3 Development of Non-Economic Incentives in relation to Recycling

The focus of non-economic incentives should focus on development and expansion of the market for recycled products. Such non-financial incentives include:

- Government Initiative on Procurement of Recycled Products (Green Purchasing Initiative)
- Environmental Labeling (Green choice)
- Green Consumer Initiative (Guidelines for Selecting Recycled Products)

## 4.4 Policies for Enhancement of Institutional Mechanism to Promote Recycling Industries in the Philippines

The existing recycling performance of each particular recyclable material (papers, plastics, scrap iron, scrap aluminum and glass) in the Philippines is different due to various factors, especially the market demands and prices, as well as other technical aspects.

Detailed investigation was carried out to identify the issues and obstacles faced in the recycling industries in the Philippines through discussions and actual field surveys. Based on the analysis, strategies are developed to enhance the recycling performance of recyclable materials in the Philippines as a whole. These strategies focus on 3 key actions, namely:

(1) To **strengthen** the existing **institutional frameworks** – identify issues and obstacles, establish intervention measures at the government level;

(2) To **enhance** the existing **recycling system** by various recycling stakeholders – understand the current situation, develop specific approach to improve collection and processing of recyclable materials at the recycling player level; and

(3) To **increase** the **recycling practices** by the waste generators – recognize the inadequacy, promote recycling practices and boost up the participation by awareness raising at the base level.

### 4.4.1 At Government Level - To Strengthen the Existing Institutional Frameworks

#### (1) Reinforce the Existing Institutional Setup

For NSWMC that develop and implement solid waste management policies/plans at national level, an institutional mechanism at provincial or local level is necessary to support its functions. In this regard, the **Recycling Unit should be formed to closely monitor the recycling activities** within the LGU areas, particularly dealing with the recycling players and associations. All recycling players within the LGU areas are required to register to the Recycling Unit directly or through any relevant associations such as Scrap Collectors Association or other business associations. In addition, this Recycling Unit plays role to **collect and update recycling information** from the recycling players and submit to the national focal point for further action, besides being the **focal point for any programs related to waste management and recycling at the local level.** The information to be collected includes information from waste generators, through NGOs or residents associations.

The reinforcement of this institutional setup aims to strengthen the data collection and management on waste and recycling as a whole, as well as to smoothen the institutional framework between the National and local levels.

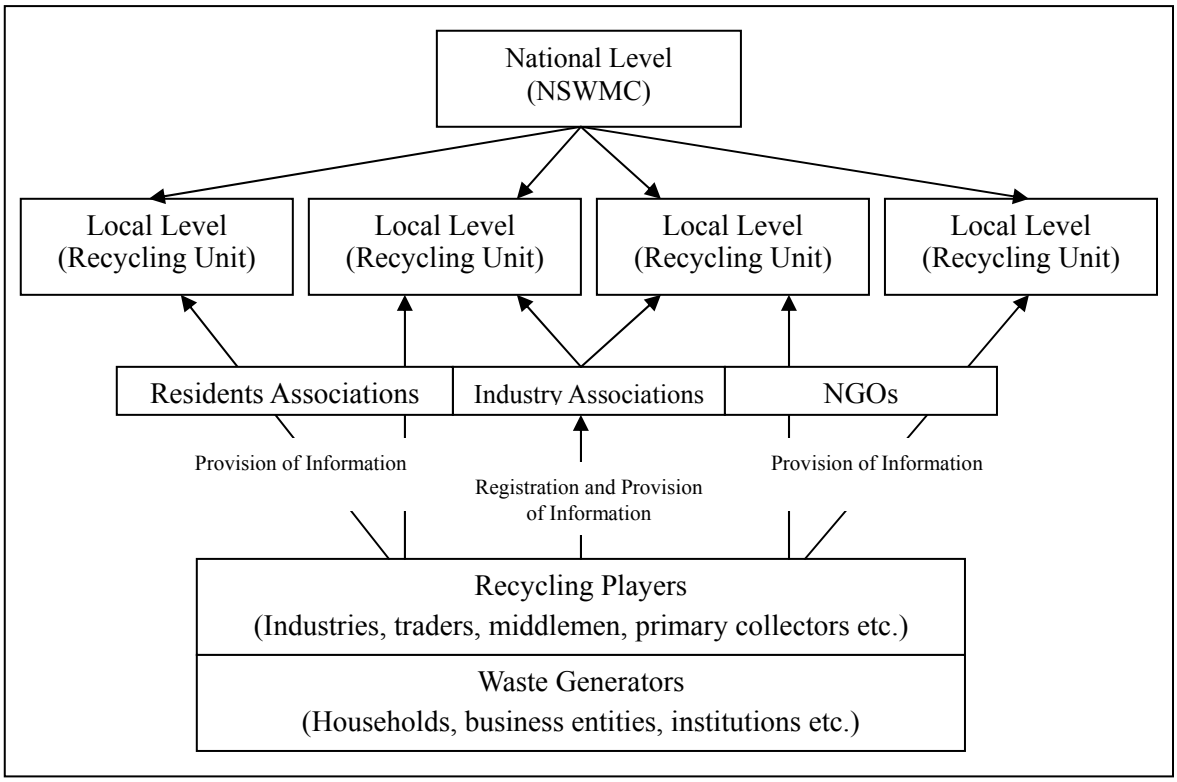



Figure 4.4.1 Recommended Institutional Set Up for Promoting Recycling

### (2) Capacity Building

Capacity building to the officers of government agencies at National level as well as local level (LGU) should be carried out. The **capacity building programs** include not only training of government officers, but also other specific training targets such as **community leaders** for promotion of recycling, as well as top management of private entities.

## 4.4.2 At Recycling Player Level - To Enhance the Existing Recycling System

The current situation of recycling industry in the Philippines shows that some industries are relying on domestic supply of recyclable materials. Therefore, the recycling players should play important roles to increase the collection of recyclable materials in the domestic markets, by the following approaches:

- **Regular and close communication** between the Government and the recycling players through relevant associations, to discuss on updated issues and seek for countermeasures
- **Close collaboration** between the Government, the recycling players and other recycling stakeholders to implement recycling programs and activities
- **Partnership** between the Government and relevant recycling players to establish and operate the regional transfer stations for recyclables collection
- Establishment of more **localized recycling stations**, support eco-aide, provide more larger coverage areas to serve the community needs

- **Promote collection** of various recyclable materials by the recycling collectors to the largest extend, following the determined market prices

- **Sharing of recycling information** and experiences between the LGUs and the recycling players or any other authorized organization

- **Provide guidance** to the middlemen, junkshops and traders, on proper operation of business especially proper handling of recyclable materials to ensure better quality of supply to the recycling industries (In accordance to Recycling Guidelines if applicable)

### 4.4.3 At Base Level - To Increase the Recycling Practices by the Waste Generators

Awareness and cooperation at the base level or waste generators are crucial in order to achieve better recycling performance and support the recycling system as a whole. Some strategies to increase the recycling practices by the waste generators are summarized as follows:

- Promote **segregation of the recyclable materials** from the wastes generated at source in accordance to Recycling Guideline (if applicable)

- Educate **proper handling of recyclable materials** at source to ensure better quality of the materials before collected or sold to the recyclable collectors (following the Recycling Guideline if applicable)

- Provide support or **partnership** with the NGOs, residential association or charity organizations to support and enhance participation at the recycling programs and activities organized

- Collect **information** in relation to **wastes and recycling** from the waste generators (such as households, business entities and institutions)

- **Educate the next generation** particularly the children on recycling practice at home through awareness programs

In summary, the strategies formulated for enhancement of the recycling performance as a whole can be categorized into 3 main focuses as summarized as follows:

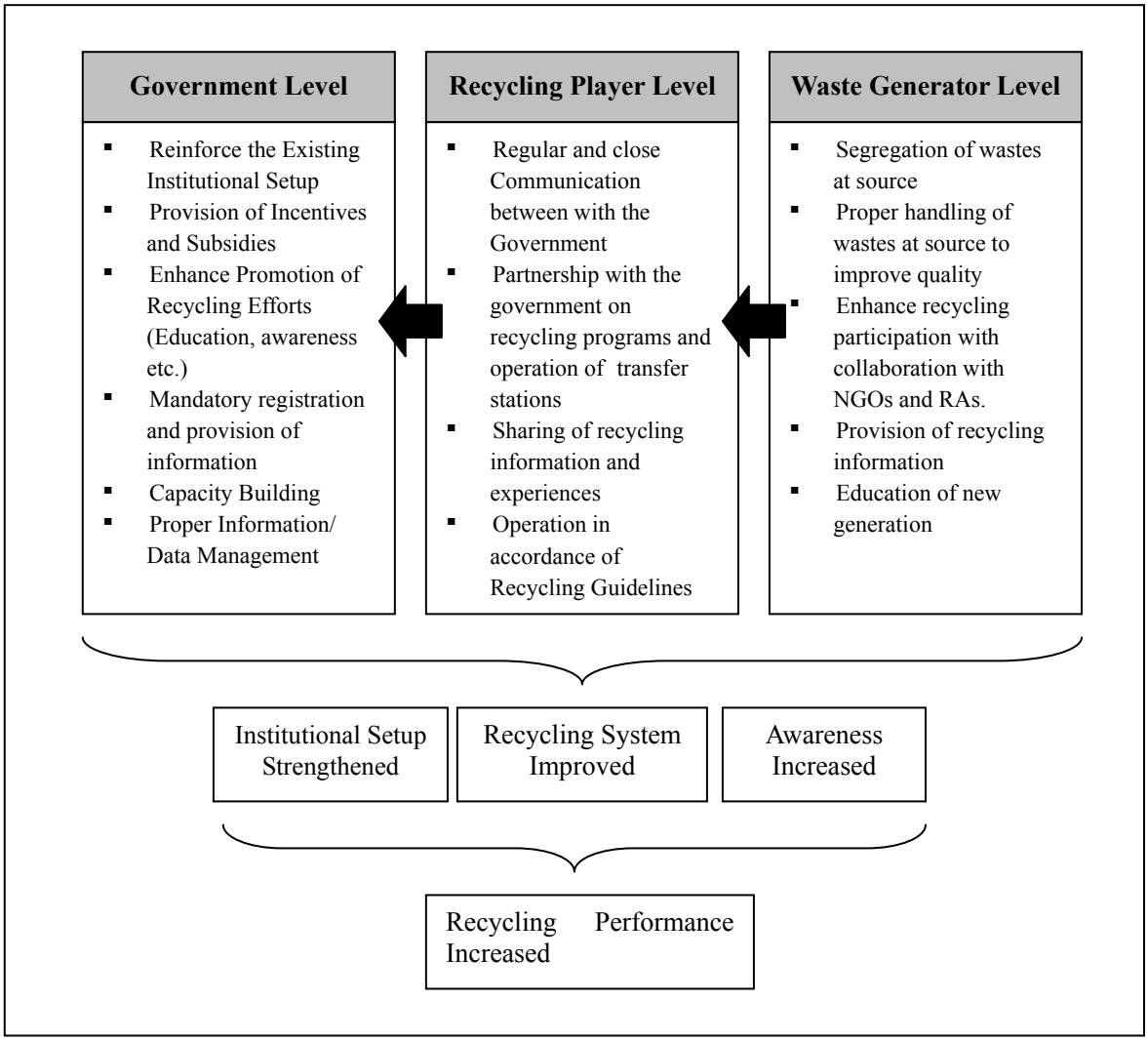



Figure 4.4.2 Basic Strategies for Increasing the Recycling Performance in the Philippines

# 5. Action Plan on Recycling Industry Development By Sectors

## 5.1 Introduction

The Action Plan on Recycling Industry Development is formulated for each sector of recycling industries including:

1) Paper & Pulp Industry
2) Iron & Steel/Non-Ferrous Metal Industry
3) Glass & Glass Products Industry
4) Plastic Industry

The Action Plan for each sector consists of the following contents:

1) Current Status of Recycling Performance by the Industry
2) Issues on Promotion of Recycling
3) Actions to be taken by Recycling Industry

This Action Plan was prepared by the TWGs composed of representatives from corresponding industry associations and the JICA study team. The members of the TWGs are listed in the table below.

Table 5.1.1 Philippine Members of Technical Working Groups

| Name | Affiliation |
|---|---|
| **1. Pulp and Paper Industry** | |
| Mr. Rolando Peña | PULPAPEL/ Trust International Paper Company |
| Ms. Geronima Domingo | PULPAPEL/ Noah's Paper Mills |
| Mr. Reynaldo Gomez | PULPAPEL/ Container Corporation of the Philippines |
| **2. Iron and Non-ferrous metal Refining Industry** | |
| Mr. Napoleon Tanganco | Philippine Metalcasting Association Inc. |
| Mr. Henry Tañedo | Tin Can Makers Association of the Philippines |
| Mr. Wellington Tong | Philippine Iron and Steel Institute |
| Mr. Aquino Dy | Scrap Collectors Recycling Association of the Philippines |
| Atty. Edilberto Ferrer | Consolidated Aluminum Smelter, Extruder and Kitchenware Manufacturers Association of the Philippines |
| **3. Glass/glass products Manufacturing Industry** | |
| Mr. Benjamin Gregorio | San Miguel Packaging Specialist Inc. |
| **4. Plastics Industry** | |
| Mr. Cripian Lao | Philippine Plastics Industry Association |
| Mr. Henry Gaw | Polysterene Packaging Council of the Philippines/ Packaging Institute of the Philippines |

| Name | Affiliation |
|---|---|
| Ms. Carmencita Abelardo | PET Recycling Association of the Philippines |
| Mr. Benson Tang | Metro Plastics Recycling Association |
| **5. E-Waste** | |
| Mr. Antonio Daria | HMR Envirocycle Philippines |
| Ms. Ditas Malit | Philippine Appliance Industry Association |
| Mr. Juan Chua | Computer Manufacturers, Dealers and Distributors Association of the Philippines |
| Ms. Orange Galindo | Association of Electronics and Semiconductors for Safety and Environmental Protection/ Intel Philippines |

Under the initiative of each sector of recycling industry, this Action Plan is expected to be regularly reviewed and revised to further enhance its recycling performance.

## 5.2 Sector-by-Sector Priority of Recycling Industry Development

Each recyclable material and industry discussed in this Action Plan has its own unique potential and issues to overcome for its realization. Some of the recyclable materials and industries have larger potentials and prospective while the others have limited potentials or more difficult issues to solve for realizing the potential recycling market.

Based on the current conditions of recyclable materials and existing industries, the recycling potentials of each recyclable materials and industry are evaluated from the following viewpoints in the table below.

- Existing potential of recyclable materials (Stock of recyclable materials)
- Existing capacity of the industry receiving the recyclable materials

Following table shows the results of evaluation for each industry based on above perspectives.

Table 5.2.1 Evaluation of Recycling Potential by Sector

| Recycling Industry | Availability of Materials | Capacity of Domestic Industry |
|---|---|---|
| Paper and Pulp | ▪ Many domestic sources still can be utilized.<br>▪ Many still goes to landfill. | ▪ Still have enough room to accept domestic recyclable materials.<br>▪ New development may also be possible. |
| Metal scrap | ▪ Well collected, but most of them exported. | ▪ Still have enough room, but weak competitive capacity in comparison with foreign industry (high production cost due to electricity and transportation of materials). |
| Glass bottles | ▪ Many still goes to landfill or not utilized for recycling. | ▪ Still have room to accept domestic recyclable materials.<br>▪ New development may also be possible. |

| Recycling Industry | Availability of Materials | Capacity of Domestic Industry |
|---|---|---|
| Plastic Industry | ▪ Many still goes to landfill | ▪ Still have enough room to accept various domestic recyclable materials.<br>▪ Potential new development of industry may also be high. |

From the table above, the plastic industry has the largest potential of recycling in the Philippines, followed by Paper and Pulp as well as glass industries. As to the metal scrap, promotion of domestic recycling will be difficult unless strong policy supports are provided to the relevant industry because the currently collected materials are largely exported to overseas due to limited competitive capacity of existing industry in the Philippines.

Considering the above potentials of recyclable materials and receiving industries, the sections below discusses the current status and issues of recyclable materials and their recycling with the required actions for their development by sector.

## 5.3 Paper & Pulp Industry

### 5.3.1 Current Issues of Promotion of Paper Recycling in the Philippines

The following sections summarize current issues in the promotion of paper recycling industry in the Philippines based on the trend of the pulp and paper industry that is the end-user of waste paper.

#### (1) Procurement of Raw Materials (Waste Paper)

The following two points would be identified as issues for the waste paper recycling industry.

##### 1) Increase in domestic supply ratio of recyclable materials through the improvement of waste paper collection

The Philippines depend about 40% of raw materials for paper production on imported waste paper (about 390,000 t/yr). On the other hand, about 960,000 tons of paper and paper products consumption is estimated to be uncollected. Since this amount includes books and magazines that are used or stay in the market for a long time, it is unlikely that all of them are disposed of landfills. However, the areas distant from the end-users of waste paper (i.e. pulp and paper mills) cannot help disposing of waste paper because waste paper is not collected or taken by anyone if collected due to high transportation costs and unstable supply. The areas like Northern Luzon and Visayas (Cebu) are facing such conditions; it is necessary to take measures to reduce transportation costs from generators to end-users of waste paper.

For example, it costs about 3.3 PhP (8.5 JPY) per kg to transport waste paper in a container by ship (tramp ship), which is six to eight times as much as the transportation costs (1 - 1.5 JPY/kg) for waste paper to be shipped from Japan to China. Since paper manufactures using waste paper buy white paper at 11 to 14 PhP/kg at the high end and mixed paper at 2.4 to 3.5 PhP/kg at the low end,

the 3.3PhP/kg seems extremely heavy cost burden.

To overcome such issue, introducing measures to improve the efficiency of marine transport in which foreign investment is regulated and which enjoy oligopoly situation, which would contribute to the reduction of transportation costs. At the same time, it is necessary to promote locating manufactures that use waste paper as raw materials to the areas where waste paper generation is stable and its collection is feasible. However, it should be noted that the reason why many of pulp and paper manufactures are located in the Metro Manila and its surroundings is because there are also companies processing the paper and paper products to the final products are located in these areas. Amount of waste paper supply itself cannot be a determining factor for paper manufactures to be able to establish in the said area; other factors such as existence of demands for and actual consumption of recycled paper and its products should be considered. In this sense, paper mills manufacturing the final products such as sanitary paper (tissue paper and toilet paper) can be established if there is a stable supply of waste paper. However, it is difficult to promote locating paper manufactures whose products need the final users such as newspaper and book publishers.

There is a limited number of paper manufactures whose annual production exceeds several hundreds of tons in the Philippines. These large paper manufactures cannot help depending their raw materials on imported waste paper which can be a stable supply for their stable operation and production. Taking this situation into account, it is very difficult to locate large-scale paper mills in the areas other than the Metro Manila and its surroundings.

#### 2) Quality Improvement of Domestically Generated Waste Paper

One another issue for domestically generated waste paper is its quality. Especially in the Philippines where electricity price and fuel costs are higher than in adjacent countries, it is important to minimize the production costs of paper and paper products. In this sense, reduction of costs for pretreatment of waste papers such as removing foreign materials and washing contributes to that purpose, which is necessary for enhancing corporate competitiveness. Therefore, separate sorting and collection of waste paper pays off in terms of supply of high quality recyclable materials. In practice, paper manufactures, including SMEs and LEs, set higher prices for well-sorted waste papers. One should note that stable supply of waste paper is prerequisite for stable operation of paper mills; therefore, a certain scale of waste paper separation and collection systems can enjoy its merit.

### (2) Reduction of Production Costs in the Pulp and Paper Industry Utilizing Waste Paper

Reduction of production costs is a crucial issue for the pulp and paper industry utilizing waste paper in the Philippines since they are fighting against foreign competitors regardless of market location (international or domestic). As stated above, because the electricity and fuel prices in the Philippines are relatively higher than in other countries, saving energy and materials is an important issue.

Given that the customs duty is going to be reduced or eliminated according to the conclusion of free trade agreement (FTA), competition at the both international and domestic markets is expected to be harder. The Philippine paper manufactures are required to take prompt actions to improve production efficiency.

### (3) Technology and Product Development for the Promotion of Waste Paper Utilization

The most pressing issue for the pulp and paper industry in the Philippines is the improvement of production efficiency and saving of energy and materials. In a short-run, the development and dissemination of energy and material saving technologies at the plant operation stage is most needed in the Philippines.

Since the Philippines depend their copying and printing paper on import, introduction of production technology for quality paper using waste paper is most expected in future. However, not only in the Philippines but also in other countries, people tend to think non-white copying or printing paper has lower quality. Changing people's awareness should be tackled first before technology transfer, and a market for recycled paper should be created.

## 5.3.2 Action Plan for the Development of Paper Recycling Industry

Based on the identification of current situation and issues of waste paper recycling, the TWG on Paper Recycling has prepared an action plan for the development of paper recycling industry. The actions are listed by stakeholder such as governments, industries, and general public.

Table 5.3.1 Action Plan for the Development of Paper Recycling Industry

| Stakeholder | Actions to be taken |
|---|---|
| Government | 1. Short term actions (1 to 3 years from now)<br>[IEC Activity]<br>• Identification and publicizing current status (quantitative and including geographical information) of waste paper and paper recycling industry in the Philippines<br>• Campaign on waste paper separation and collection targeting waste paper generators (dissemination of the recycling guideline)<br>• Promotion of recycled products (eco-label, green purchasing/procurement)<br>[Preparation of Industrial Infrastructure Development Plan]<br>• Formulation of measures for improvement of distribution efficiency of recyclable materials<br>• Examination of locating recycling industry in the areas other than Metro Manila and its surroundings and preparation of a plan to attract recycling industry<br>[Examination of Incentives]<br>• Development of a hub for distribution of recyclable materials<br>• Locating new recycling industries<br>• Investments in energy/material-saving for recycling industry<br>• Development of recycling technology and new products using recycled materials |

| Stakeholder | Actions to be taken |
|---|---|
| | 2. Medium-term actions (3 to 5 years from now)<br>[IEC activities]<br>• Continuation of the short-term action<br>[Implementation of Industrial Infrastructure Development Plan]<br>• Development of a hub for distribution of recyclable materials<br>• Implementation of a model project for improvement of distribution efficiency<br>• Locating new recycling industries<br>[Reform and Introduction of Incentives]<br>• Reform and introduction of incentives based on the examination of the above actions |
| Industry (Pulp and Paper) | 1. Short term actions (1 to 3 years from now)<br>• Examination of measures to improve production efficiency by changing operation, energy efficiency and resource efficiency<br>• Guidance and campaign for stable supply of domestically generated recyclable materials in terms of quantity and quality to stakeholders (junkshops, dealers, generators)<br>• Campaign for promotion of use of recycled products<br>2. Medium-term actions (3 to 5 years from now)<br>• Implementation and monitoring of operation improvement<br>• Improvement of domestically generated recyclable materials in terms of quantity and quality<br>• Examination of a possibility of capital investments<br>• Development of new technology and products (high value-added products) |
| General public | 1. Short term actions (1 to 3 years from now)<br>• Understanding of material recycling and recycled products<br>• Voluntary implementation of waste separation<br>• Purchase giving preference to recycled products |

## 5.4 Iron & Steel/Non-Ferrous Metal Industry

### 5.4.1 Issues for Recycling of Iron Scrap and Iron and Steel Industry in the Philippines

The following sections summarize current issues in the promotion of iron scrap recycling industry in the Philippines based on the trend of the iron and steel industry that is the end-user of iron scraps.

#### (1) Iron Scrap with High Value as Resources

Because of the high market value, most of the iron scraps in the Philippines are likely to be collected. On the other hand, about 70% of the collected iron scraps is exported, and domestic utilization remain at about 30% of the total collection. The major reasons for that is the price of iron scraps is higher in overseas markets such as China. Iron and steel industry in the Philippines has fallen behind in the competition of iron scrap as raw materials.

Outflow of a large amount of iron scraps from the Philippines pressured the iron and steel industry, and many factories were forced to close, stop or lower the operation. In 2006, the Philippine Association of Iron and Steel Manufactures sent a letter to the Ministry of Trade and Industry asking

the government to take measures to prevent the outflow of domestically collected iron scraps such as guiding dealers of iron scraps. While trade liberalization is getting to a major trend in the ASEAN and the Asian region, it is difficult for the government of the Philippines to take measures of protecting its own industry; therefore, the request from the Association has not been realized yet. Annual production of crude steel has been declined to 400,000 tons from one million tons in the past, and this trend cannot be stopped by the existing competitiveness of the domestic iron and steel industry.

### (2) Iron and Steel Industry in the Philippines and Limitation of Iron Scrap Recycling

Production of crude steel has been exposed to severe price competition for purchasing iron scraps as well as selling their products such as crude steel and billet against foreign companies. Unless the existing market conditions change, it is extremely difficult to develop the iron and steel industry in the Philippines.

In addition, higher electricity prices and transportation costs compared to other countries further put a hurdle to the international competition.

On the other hand, it is said that the steel-making industry such as rolling mills using crude steel and billets as raw materials in the Philippines has the production capacity of six million tons. Their industry scale is large, and they occupy about 50 to 60 % of the needs for steel making in the country. From the point of view to promote the iron and steel industry as a whole, the promotion of growth of the steel-making industry, which has competitiveness, should be prioritized.

It is true that the current market price of iron scrap has been largely influenced by the expansion of the construction demands in China. Therefore, forecasting the future demands for iron scraps will be an important issue, and the government should pay attention to how to maintain the ratio of domestic production of crude steel and billets in the future. Utilization of domestically generated iron scraps should be examined from the viewpoint of macro policy on the iron and scrap industry.

### (3) Action Plan for the Development of Iron Scrap Recycling Industry

Based on the identification of current situation and issues of iron scrap recycling, the TWG on Iron Scrap Recycling has prepared an action plan for the development of iron scrap recycling industry. The actions are listed by stakeholder such as government, industry, and general public.

Table 5.4.1 Action Plan for the Development of Iron Scrap Recycling Industry

| Stakeholder | Actions to be taken |
|---|---|
| Government | 1. Short term actions (1 to 3 years from now)<br>[IEC Activity]<br>• Identification and publicizing current status (quantitative and including geographical information) of iron scrap and its recycling industry in the Philippines<br>• Campaign on iron scrap separation and collection targeting iron scrap generators (dissemination of the recycling guideline)<br>[Preparation of Industrial Infrastructure Development Plan]<br>• Formulation of measures for the development of iron and steel industry for the medium to long time span<br>• Examination of measures to improve efficiency of distribution of recyclable materials<br>[Examination of Incentives]<br>• Investments in energy/material-saving for recycling industry |
| | 2. Medium-term actions (3 to 5 years from now)<br>[IEC activities]<br>• Continuation of the short-term action<br>[Implementation of Industrial Infrastructure Development Plan]<br>• Target setting for recycling of iron scrap based on the measures to develop the iron and steel industry and implementation of the relevant measures to achieve the targets<br>• Development of a hub for distribution of recyclable materials<br>[Reform and Introduction of Incentives]<br>• Reform and introduction of incentives based on the examination of the above actions |
| Industry (Iron and Steel) | 1. Short term actions (1 to 3 years from now)<br>• Examination of measures to improve production efficiency by changing operation, energy efficiency and resource efficiency<br>• Examination of improvement of production efficiency by capital investments (plant renewal)<br><br>2. Medium-term actions (3 to 5 years from now)<br>• Implementation and monitoring of operation improvement<br>• Modernization and efficiency improvement of the production by the capital investments |
| General public | 1. Short term actions (1 to 3 years from now)<br>• Understanding of material recycling and recycled products<br>• Voluntary implementation of waste separation |

### 5.4.2 Aluminum Scraps and Aluminum Industry

#### (1) Issues of Aluminum Scrap Recycling

The following sections summarize current issues in the promotion of aluminum scrap recycling industry in the Philippines based on the trend of the aluminum industry that is the end-user of aluminum scraps.

##### 1) Aluminum Scrap with High Value as Resource and High Collection Rate

Aluminum scraps have higher market value than iron scraps, and it is likely that they are collected to the maximum extent in the Philippines. While about 40 % of the collected aluminum craps is

exported overseas, the rest is recycled in the Philippines. This is because the price of aluminum scraps is higher in the foreign markets and because there is a limited number of aluminum plants that can conduct the secondary aluminum smelting.

### 2) Limitation of Aluminum Industry and Aluminum Scrap Recycling

In the Philippines, there is no primary aluminum smelter, and only a limited number of secondary aluminum smelters, which are small, conduct production of utensils. As in the case of the iron scrap recycling industry, the aluminum scrap recycling industry has been exposed to price competition against imported aluminum goods.

Although the scale of the aluminum industry is small, its position should be discussed not only from the viewpoint of repeated utilization of resources but also from the macro viewpoint of industrial policy.

## (2) Action Plan for the Development of Aluminum Scrap Recycling Industry

Based on the identification of current situation and issues of aluminum scrap recycling, the TWG on Aluminum Scrap Recycling has prepared an action plan for the development of aluminum scrap recycling industry. The actions are listed by stakeholder such as government, industry, and general public.

Table 5.4.2 Action Plan for the Development of Aluminum Scrap Recycling Industry

| Stakeholder | Actions to be taken |
|---|---|
| Government | 1. Short term actions (1 to 3 years from now)<br>[IEC Activity]<br>• Identification and publicizing current status (quantitative and including geographical information) of aluminum scrap and its recycling industry in the Philippines<br>• Campaign on iron scrap separation and collection targeting waste aluminum scrap generators (dissemination of the recycling guideline)<br>[Preparation of Industrial Infrastructure Development Plan]<br>• Formulation of measures for the development of non-ferrous metal industry for the medium to long time span |
| | • Examination of measures to improve efficiency of distribution of recyclable materials<br>[Examination of Incentives]<br>• Investments in energy/material-saving for recycling industry |
| | 2. Medium-term actions (3 to 5 years from now)<br>[IEC activities]<br>• Continuation of the short-term action<br>[Implementation of Industrial Infrastructure Development Plan]<br>• Target setting for recycling of aluminum scrap based on the measures to develop the aluminum industry and implementation of the relevant measures to achieve the targets<br>• Development of a hub for distribution of recyclable materials<br>[Reform and Introduction of Incentives]<br>• Reform and introduction of incentives based on the examination of the above actions |

| Stakeholder | Actions to be taken |
|---|---|
| Industry (Aluminum Smelting) | 1. Short term actions (1 to 3 years from now)<br>• Examination of measures to improve production efficiency by changing operation, energy efficiency and resource efficiency<br>• Examination of improvement of production efficiency by capital investments (plant renewal)<br>2. Medium-term actions (3 to 5 years from now)<br>• Implementation and monitoring of operation improvement<br>• Modernization and efficiency improvement of the production by the capital investments |
| General public | 1. Short term actions (1 to 3 years from now)<br>• Understanding of material recycling and recycled products<br>• Voluntary implementation of waste separation |

## 5.5 Glass & Glass Products Industry

### 5.5.1 Current Issues of Scrap Glass Recycling in the Philippines

The following sections summarize current issues in the promotion of glass scrap recycling industry in the Philippines based on the trend of the glass industry who is the end-user of glass bottles.

#### 1) Improvement of Glass Scrap Collection Rate

More than half of the glass bottles consumed annually are not collected. Although the uncollected glass bottles include those reused by consumers and recycled informally, there are many cases in which glass bottles are not collected. This is because there are glass bottles that cannot be recycled such as wine bottles and because the collection of glass bottles as glass cullet does not make any business sense due to difficulty in handling (volumes and danger from possible break) and high transportation costs. Efforts are necessary to overcome these difficulties and increase collection and recycling ratios of glass bottles.

#### 2) Limited Usage and Users

Under the environment that one company produces most (about 80%) of the glass bottles in the country, the development of glass bottle recycling industry is largely influenced by such company's performance. Development of new users (locating a glass bottle manufacturing company) and new use could be one of the mid to long-term challenges.

### 5.5.2 Action Plan for the Development of Glass Recycling Industry

Based on the identification of current situation and issues of glass scrap recycling, the TWG on Glass Scrap Recycling has prepared an action plan for the development of glass scrap recycling industry. The actions are listed by stakeholder such as government, industry, and general public.

Table 5.5.1 Action Plan for the Development of Glass Scrap Recycling Industry

| Stakeholder | Actions to be Taken |
|---|---|
| Government | 1. Short term actions (1 to 3 years from now)<br>[IEC Activity]<br>• Identification and publicizing current status (quantitative and including geographical information) of glass scrap and its recycling industry in the Philippines<br>• Campaign on iron scrap separation and collection targeting glass scrap generators (dissemination of the recycling guideline)<br>[Preparation of Industrial Infrastructure Development Plan]<br>• Formulation of measures for improvement of distribution efficiency of recyclable materials<br>• Examination of locating recycling industry in the areas other than Metro Manila and its surroundings and preparation of a plan to attract recycling industry<br>[Examination of Incentives]<br>• Development of a hub for distribution of recyclable materials<br>• Technology contributing to the increase in transportation efficiency<br>• Locating new recycling industries<br>• Investments in energy/material-saving for recycling industry<br>• Development of recycling technology and new products using recycled materials (technology to recycle glass bottles that are not currently recycled such as wine bottles, development of new usage other than production of glass bottles) |
| | 2. Medium-term actions (3 to 5 years from now)<br>[IEC activities]<br>• Continuation of the short-term action<br>[Implementation of Industrial Infrastructure Development Plan]<br>• Development of a hub for distribution of recyclable materials<br>• Implementation of model projects for improving efficiency of distribution<br>• Locating recycling industry<br>[Reform and Introduction of Incentives]<br>• Reform and introduction of incentives based on the examination of the above actions |
| Industry (Glass Bottle Recycling) | 1. Short term actions (1 to 3 years from now)<br>• Examination of measures to improve production efficiency by changing operation, energy efficiency and resource efficiency<br>• Guidance and campaign on stabilizing quantity and quality of domestically collected recyclables to relevant stakeholders<br>• Campaign for the promotion of recycled products |
| | 2. Medium-term actions (3 to 5 years from now)<br>• Implementation and monitoring of operation improvement<br>• Improvement of quantity and quality of domestically collected recyclable resources<br>• Examination of a possibility of new capital investments (modernization)<br>• Examination of a possibility of locating new recycling industry<br>• Development of technology and products (high value added products) |
| General public | 1. Short term actions (1 to 3 years from now)<br>• Understanding of material recycling and recycled products<br>• Voluntary implementation of waste separation<br>• Giving preference to purchasing recycled products |

## 5.6 Plastic Industry

### 5.6.1 Current Issues of Plastic Scrap Recycling in the Philippines

The following sections summarize current issues in the promotion of plastic scrap recycling industry in the Philippines based on the trend of the plastics industry who is the end-user of plastic scraps.

#### (1) Improvement of Collection Rate of Plastic Scraps

While market value of plastics is rising due to increase in oil prices, the collection rate of plastics still stay in low in the Philippines. It is necessary to enhance a potential of plastic recycling industry by securing quality plastics in an efficient manner through the promotion of separation and collection of plastic scrap.

#### (2) Limited Use of Plastic Scrap by Domestic Industry

Most of the waste plastics domestically collected and processed is still exported overseas. On the other hand, the domestic plastic industry in the Philippines still depends on imported plastics. It is necessary to make efforts to enhance the utilization rate of recyclable resources at the plastic manufacturing industry.

#### (3) Development of Plastic Recycling Industry

Although there are many plastic recycling industries in the Metro Manila, the coverage of the plastic recycling industry in the other areas is still limited. Since plastic recycling industry does not required large-scale facilities, there exists a possibility of expansion of the plastic recycling industry.

#### (4) Development of Recycled Products

Most of the plastic recycling industry in the Philippines focuses the production of pre-products. There is a large room to develop and expand final products made from recycled plastics, which should be promoted as a challenge for the mid to long term.

### 5.6.2 Action Plan for the Development of Plastic Recycling Industry

Based on the identification of current situation and issues of plastic scrap recycling, the Technical Working Group on Plastic Scrap Recycling has prepared an action plan for the development of plastic scrap recycling industry. The actions are listed by stakeholder such as government, industry, and general public.

Table 5.6.1 Action Plan for the Development of Plastic Scrap Recycling Industry

| Stakeholder | Actions to be taken |
|---|---|
| Government | 1. Short term actions (1 to 3 years from now)<br>[IEC Activity]<br>• Identification and publicizing current status (quantitative and including geographical information) of plastic scrap and its recycling industry in the Philippines<br>• Campaign on iron scrap separation and collection targeting waste plastic generators (dissemination of the recycling guideline)<br>• Promotion of use of recycled products (eco-label, green purchasing/procurement)<br>[Preparation of Industrial Infrastructure Development Plan]<br>• Formulation of measures for improvement of distribution efficiency of recyclable materials<br>• Examination of locating recycling industry in the areas other than Metro Manila and its surroundings and preparation of a plan to attract recycling industry<br>[Examination of Incentives]<br>• Development of a hub for distribution of recyclable materials<br>• Locating new recycling industries<br>• Investments in energy/material-saving for recycling industry<br>• Development of recycling technology and new products using recycled materials (product development) |
| | 2. Medium-term actions (3 to 5 years from now)<br>[IEC activities]<br>• Continuation of the short-term action<br>[Implementation of Industrial Infrastructure Development Plan]<br>• Development of a hub for distribution of recyclable materials<br>• Implementation of model projects for improving efficiency of distribution<br>• Locating recycling industry<br>[Reform and Introduction of Incentives]<br>• Reform and introduction of incentives based on the examination of the above actions |
| Industry (Plastic) | 1. Short term actions (1 to 3 years from now)<br>• Examination of measures to improve production efficiency by changing operation, energy efficiency and resource efficiency<br>• Guidance and campaign on stabilizing quantity and quality of domestically collected recyclables to relevant stakeholders<br>• Promotion of use of pre-products by domestic industries<br>• Campaign for the promotion of recycled products |
| | 2. Medium-term actions (3 to 5 years from now)<br>• Implementation and monitoring of operation improvement<br>• Improvement of quantity and quality of domestically collected recyclable resources<br>• Examination of a possibility of new capital investments (modernization)<br>• Examination of a possibility of locating new recycling industry<br>• Development of technology and products (high value added products) |
| General public | 1. Short term actions (1 to 3 years from now)<br>• Understanding of material recycling and recycled products<br>• Voluntary implementation of waste separation<br>• Giving preference to purchasing recycled products |

## 5.7 Used Electric/Electronic Home Appliances and E-Waste Recycling

### 5.7.1 Issues of Recycling Used Electric/Electronic Appliances

Based on the current recycling of used electric/electronic appliances in the Philippines, the major issues are outlined as follows:

#### (1) Identification of the use, disposal and treatment of used electric/electronic appliances

Due to complex distribution of second-hand appliances by informal dealers, it is very difficult to trace the process of use, disposal and treatment of used electric/electronic appliances in the Philippines. It also makes it difficult to identify the potential recycling market scale of electric/electronic appliances, that may disturb proper recycling policies and programmes for such E-appliances in the future, when a large number of used ones are generated.

In this regard, the current stock of new and used electric/electronic appliances must be properly identified for future projection of E-waste in terms of quantity as well as types.

#### (2) Potential health and environmental impacts arising from improper treatment and disposal of the used E-appliances

Currently in the Philippines, most of the used e-appliances are imported from abroad while there is no rules, regulations or standards for their proper treatment, which may result in arising of the following potential negative impacts upon human health and environment.

a Environmental Impacts resulting from improper disposal non-recyclable materials such as cell phone batteries, printing circuits and refrigerant, and other potentially hazardous substances

b Safety risk arising from improper adjustment or replacement of spare parts for resale

Although there is no significant amount of used E-appliances generated in the Philippines, the amount will increase in the near future, taking into account the dissemination of E-appliances with economic growth and ratio of second-hand ones held by users. Therefore, it is important to prepare the future E-waste recycling policies and programmes based on accurate identification and estimation of the current stock of E-appliances.

In addition, the existing second-hand dealers and repair factories should be normalized in terms of its safety and environment protection, as well as utilized at its utmost to maximize the available resources for proper E-waste recycling with the minimum incremental investment in the Philippines.

### 5.7.2 Action Plan for E-Waste Recycling

Based on the current status and issues of E-waste recycling, the actions to be taken by each stakeholder for further development of E-waste recycling are shown in the table below.

Table 5.7.1　Action Plan for E-Waste Recycling

| Stakeholder | Actions |
|---|---|
| Government | **1. Short-term actions（1 to 3 years）**<br>**（Establishment of laws and regulations）**<br>▪ Rules and regulations for handling, resale and import/export of second-hand electric/electronic appliances<br>▪ Rules and regulations for handling of hazardous substances in second-hand electric/electronic appliances<br>**（IEC）**<br>▪ Collection and dissemination of the information and data on the stock and disposal of the used/second-hand electric/electronic appliances<br>▪ Identification of dealers, repair shops, disassemblers, and recyclers of used/second-hand electric/electronic appliances<br>▪ Application of rules and regulations to the relevant stakeholders |
| | **2. Mid-term actions（3 to 5 years）**<br>**（IEC）**<br>▪ Continuation of the short-term actions<br>**（Development of E-waste recycling industry）**<br>▪ Formulation of national recycling policy on E-waste<br>▪ Implementation of E-waste recycling model projects<br>▪ Development of E-waste recycling industrial area<br>▪ Establishment of E-waste recycling industry |
| Industry（Electric/electronic appliance manufacturers） | **1. Short-term actions（1 to 3 years）**<br>▪ Provision of data on production and sales of electric/electronic appliances<br>▪ Provision of other information required for proper E-waste recycling.<br>▪ Examination for application of EPR for proper E-waste recycling |
| | **2. Mid-term actions（3 to 5 years）**<br>▪ Campaign for collection and recycling of E-waste<br>▪ Implementation of model collection and recycling of E-waste under the initiative of industrial group |
| Industry（Second-hand dealers, and recyclers） | **1. Short-term actions（1 to 3 years）**<br>▪ Formal registration as dealers<br>▪ Participation in formulation of rules and regulations<br>▪ Compliance with the rules and regulations |
| | **2. Mid-term actions（3 to 5 years）**<br>▪ Implementation of model collection and recycling of E-waste in cooperation with industries and citizen |
| General public | **1. Short and mid-term actions（1 to 5 years）**<br>▪ Proper understanding and implementation on handling of E-waste |

# 6. Recycling Guidelines

The Recycling Guidelines are prepared for proper handling of recyclable materials at all levels of relevant players ranging from waste generators to collectors, various dealers (MRF, middleman, junkshop, and consolidators) and recycling industries that finally receive them to produce semi-finished or finished recycled products. The Recycling Guidelines have to be designed to meet specific needs and requirement of local recycling industry in terms of quantity and quality so that domestic use of recyclable materials can be maximized.

## 6.1 Scope of Recycling Guidelines

The recycling guidelines are prepared for 3 categorized key recycling players, i.e.

- Waste Generators including household, business entities, institutions, and any other sources or source activities of waste generation;
- Dealers of recyclable materials including junkshops, MRFs, middleman, consolidators, and other agents dealing with recyclable materials; and
- Recycling Industry that finally receives recyclable materials to produce semi-finished or finished recycled products.

## 6.2 Key Contents of Recycling Guidelines

The key contents to be included in the recycling guidelines for each of 3 categorized key players are as follows:

### 6.2.1 Recycling Guidelines for Waste Generators

(Key Contents)

- **Introduction**, in which the necessity of recycling must be well presented through clear explanation about the seriousness of solid waste management issues and scarcity of available natural resources in the Philippines. The importance of proper handling of recyclable materials such as separation at sources should also be better explained.
- **Handling method of recyclable materials**, in which the guidelines must clarify how the recyclable materials need to be handled to maximize their use as raw materials by the final users. The handling method includes how to separate, maintain the good quality of recyclable materials as well as how to increase efficiency of their transport from the sources to the final users, e.g. volume reduction at sources, proper baling, and so forth. The

handling method must be specified for each type of recyclable materials in accordance with its unique characteristics. It also needs proper consideration on the existing recycling system in the relevant localities.

### 6.2.2 Recycling Guidelines for Dealers of Recyclable Materials

(Key Contents)

- **Introduction**, in which the important roles of the dealers of recyclable materials should be clearly stated. Such roles include efficient transfer of recyclable materials from the generation sources to the end-users, increasing the value of recyclable materials through primary processing, creation of job opportunities for socio-economically weak people through expansion of their business, contribution to realization of environmentally sustainable society through proper circulation of recyclable materials, and so forth.

- **Acceptance criteria for recyclable materials**, that specifies the standard for recyclable materials to be accepted by the dealers. Materials that are forbidden to transact should be specified under this criteria. Such materials include stolen items, items containing hazardous and/or toxic substances, and so forth.

- **Storage standard for recyclable materials,** which specifies how the collected recyclable materials are properly stored in the premises of dealers. The items to be specified include the height limit of stacking the collected materials at warehouse or storage, facility standard for warehouse or stockyard of materials, and so forth.

- **Guidelines for data management of recyclable materials handled by the dealers**, that specify how the daily transaction of recyclable materials should be recorded and kept at premises of the dealers.

- **Guidelines for primary processing of collected recyclable materials**, which provide the information about the primary processing technologies of recyclable materials to increase their value as raw materials. Such technologies include segregation, washing, bleaching, shredding, baling, dismantling, and so forth. The technological information also includes proper treatment of residues that are generated from primary processing of recyclable materials at the premises of the dealers. Occupational safety of the workers should also be addressed in the guidelines.

### 6.2.3 Recycling Guidelines for Recyclers

(Key Contents)

- **Introduction**, in which current conditions of recycling in the Philippines are clarified by items. The potential of recyclable materials generated in the Philippines should also be presented to show the potential market of recycling industry.

- **Material specific recycling guidelines**, in which the latest available information about

recycling technologies are provided for each target recyclable material. Such information should also include pollution control measures required in the recycling process.

- **Facility and facility operation standard for recycling**, in which the basic requirement for the installation of recycling facilities, machinery, and equipment as well as their operations should be clarified.

- **Guidelines for data management of recyclable materials utilized by recyclers**, that specify how the daily operation of recyclers should be recorded and kept at their premises.

# 7. Case Study I

## 7.1 Outline of Case Study I (Recyclables Collection)

The outline of the Case Study I is summarized in the table below.

Table 7.1.1 Outline of Case Study I

| | |
|---|---|
| **Title of the Study** | Recyclables Collection Case Study |
| **Study Period** | 6 months (July to December 2007) |
| **Study Area** | ▪ Residential area: Gawad Kalinga Pinagsama Villages (Western Bicutan, Taguig), Bgy. UP Campus (Quezon City)<br>▪ Office building: Benpres Building (Bgy. San Antonio, Pasig City), Commission on Human Rights (Bgy. UP Campus, Quezon City)<br>▪ Commercial establishment: SM City Sta. Mesa Food Court (Bgy. Santol, Quezon City)<br>▪ School: New Era High School (Bgy. New Era, Quezon City) |
| **Target stakeholders** | Awareness raising: communities, business establishments (private / public), and schools<br>Collection/recycling: collection/transportation agents, dealers, and industries utilizing recyclable materials |
| **Target recyclables** | Papers, Plastics (general types of plastics), Metals (tin and aluminum cans), and Glass |
| **Purpose of the Case Studies** | (1) Analysis on the impact/result of the proper segregation practice among the target parties through awareness raising activities using the materials developed under the study.<br>(2) Review and assess the possibility of developing 'segregation at source/ collection/ recycling system' in urban areas. |
| **Main activities** | (1) Identification of actual recyclable collection practices in the study areas.<br>Identify amount of collected recyclables, which will be used as the base line data in the study areas.<br>(2) Development of educational / publicity materials for awareness raising.<br>Develop "educational / publicity materials" to promote proper segregation of recyclable materials for target communities, business establishments, and schools.<br>(3) Conduct awareness raising activities using the educational/publicity materials developed.<br>By using the educational / publicity materials developed, carry out awareness raising activities for 'proper segregation' for communities, business establishments, and schools in the study areas.<br>(4) Development of a recyclables collection plan based upon 'waste segregation at source" in the study areas.<br>Develop and review the recyclables collection plan, and determine the 'methods of waste segregation at source', 'collection methods', and 'recycling methods or finding final user of the material'.<br>(5) Implementation of the recyclables collection plan.<br>Based upon the recyclables collection plan developed, carry out recyclables materials collection. Record the cost and/or volume of collection / transportation / processing. Data will be used for analysis / evaluation of possibility of development of the recycling system. Duration of this activity is 3 months. |

| | |
|---|---|
| | (6) Analysis and evaluation of the recyclables collection activity.<br>Based on the data collected, compare and evaluate the waste segregation practices or recyclable materials collected from the target entities before and after the awareness raising activities. Furthermore, analyze and evaluate the conditions, issues, and/or economic feasibility of the recycling system. |
| **Expected Outcomes** | (1) Proper waste segregation at source will be promoted through awareness raising.<br>(2) Conditions and feasibility of recycling system development in urban area will be identified. |
| **Other information** | When implementing the case study, obtain cooperations from industrial associations that include TWG members in each recyclable material type, as well as barangays and LGUs. |

## 7.2 Recyclables Collection in Gawad Kalinga Pinagsama

### 7.2.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 7.2.1 Expected Outcomes and Activities in GK Pinagsama Village

| Expected Outcome | Activity |
|---|---|
| The GK Pinagsama residents are conducting waste segregation at a household level | • Provide the residents with one waste segregation frame including a pail for food wastes and hooks for bags to contain dry wastes (recyclables and residuals) per 4 housing units.<br>• Provide the residents with a poster indicating proper waste segregation per 4 housing units, integrated in the frame.<br>• Give the residents instructions on proper waste management.<br>• Provide the residents with a handbook on solid waste management (management of recyclables). |
| The GK Pinagsama Village has a facility to store segregated recyclables at a community level | • Confirm the construction of a recyclable storage facility (RSF) with the GK caretakers.<br>• Provide the GK Pinagsama Village with a weighing scale and cabinets for waste paper storage.<br>• Put posters reminding the residents of places for each type of recyclables in RSF. |

Wastes in GK Pinagsama will be handled as follows:

Table 7.2.2 Ways to Handle Wastes at GK Pinagsama Village by Waste Type

Ways to Handle Wastes at GK Pinagsama Village by Waste Type

| Type of Solid Waste | Kitchen Waste | Biodegradable Waste (leaves, plants) | Recyclables | Residuals |
|---|---|---|---|---|
| **Intermediate Container** | Compostables container in common area | - | - | Residuals container in common area |
| **Person Responsible for placing waste in correct container** | Assigned collector | Household | Household | Assigned Collector |
| **Schedule of Intermediate Collection** | Daily; and immediately as needed | Immediately as needed | Immediately as needed | Daily; and immediately as needed |
| **End Destination of Solid Waste** | Compost pit near creek | Compost pit near creek | Recyclables storage area | Municipal residuals waste truck; future proposed community residual bin (locked) |
| **Person Responsible for Transfer of Waste to End Destination** | Assigned collector | Household | Household | Assigned collector |
| **Schedule of End Collection** | Daily | Daily | To be coordinated with GK administration for selling to junkshop | Upon arrival of Municipal Truck |

(2) Structure for implementation

The solid waste management committee, which is based on the existing GK Kapitbahayan or the neighborhood association, implements the segregation/collection of recyclables. The Regional Director and the Project Director, also known as Caretakers, are members of Couples for Christ, while the Kapitbahayan President and the Bayanihan Action Team (BAT) are from the beneficiaries or residents. The Regional Director will serve as the Solid Waste Management Committee Head. The Project Directors will be the coordinators of each of the villages, and they will be assisted by their respective Kapitbahayan Presidents. The BAT leaders will be the coordinator to the residents; each BAT handles 5-7 households.

The set-up of the houses of the GK Pinagsama Village is that four houses or a cluster share a common area which is use for laundry. The segregation bins will be placed within the common areas. As participation for the residents, an "Assigned Collector" will be selected every week and will be responsible for the segregation bins. The assignment will be in rotation so that each household will participate. The Aviary / RSF Caretaker will also be in rotation and shall be in-charge of the Aviary and Recyclables Storage Facility.

### 7.2.2 Achievement

#### (1) Implementation Schedule

The activities were implemented by the following schedule.

Table 7.2.3 Activity Schedule in GK Pinagsama Village

| Schedule | Activities |
|---|---|
| 23-29 Sep. 2007 | • Finish Solid Waste Management and Collection Plan proposals, and discuss with key persons for approval<br>• Finished construction of Recyclables Storage Facility |
| 30 Sep.-14 Oct. 2007 | • Design, procurement and preparation of IEC materials and infrastructure |
| 21-27 Oct. 2007 | • Approval of a prototype waste segregation bins |
| Nov. 3, 2007 | • Delivery of cabinets for RSF |
| Nov. 5, 2007 | • Training of residents regarding proper waste segregation via segregation activity (game) during the launching<br>• Installation of waste segregation frames and posters<br>• House to house visits<br>• Implementation of Solid Waste Management and Collection Plan in GK Pinagsama Village<br>• Start of monitoring. |
| 05-17 Nov. 2007 until the end of December | • Monitoring<br>• Documentation |

#### (2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed are summarized in Table 1.2.6.

Table 7.2.4 IEC materials and Equipment Distributed in GK Pinagsama Village

| Area | Container / IEC Material | No. of Units | Notes |
|---|---|---|---|
| Common area of the cluster (4 housing units) | Waste segregation frame | 20 | Includes a kitchen waste pail and hooks for garbage bags, recyclables net bag |
| | Poster on waste segregation | 20 | Part of the waste segregation frame |
| Recyclables Storage Facility (Located at Poveda Village) | Paper cabinet (papers, newspapers, cartons) | 2 | One shelf per village |
| | Sacks (for other recyclables) | 7 | |
| | Weighing Scale | 1 | |
| Poveda and Fuji Xerox Village offices | Program poster | 2 | |

#### (3) Outcomes

All the residents have moved into the new houses by the end of November 2007. Each of the four units has been provided with a segregation frame with a pale for food waste and hooks for bags. The community has established a recyclable storage facility (RSF) in their premises, and each household takes turn to transferring the recyclables from the unit courtyard to the RSF every week.

Although there is a plan to compost organic wastes generated from the residents in the community, and the composting box has already been constructed, actual composting has not started. The organic waste has not been collected for composting but disposed separately from residual waste for municipal waste collection.

The following table shows the breakdown of the various types of recyclables that the GK community sold. These covered a period of 4 months and were sold thrice to the junkshop located beside the creek. However, most of the recyclables are still in the MRF and have yet to be weighed, waiting for bulk selling. Some residents were also observed to sell their recyclables directly to the junkshop, which is not part of the GK policy, but some BAT leaders allow it since they know that some households are in dire need of added income. Note that the prices of the junkshop sometimes varied throughout the course of the 4-month period.

Table 7.2.5 Volume and Value of Recyclables Collected at GK Pinagsama Village during the Case Study (in 4 months)

| Item | Weight (kg) | Unit Price (PhP/ kg) | Value (PhP) |
|---|---|---|---|
| Cartons | 32.75 | 3-4 | 32.00 |
| PET | 8 | 21.25 | 170.00 |
| HDPE "Sibak" | 3.75 | 16.00 | 216.80 |
| Tin cans | 11 | 3-4 | 42.00 |
| Bottles (lump) | 143 | - | 158.00 |
| Shards "bubog" | 10.75 | - | 6.34 |

## 7.3 Recyclables Collection in UP Bliss

### 7.3.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 7.3.1 Expected Outcomes and Activities in UP BLISS

| Expected Outcome | Activity |
|---|---|
| The Eco-aides (waste collectors) are conducting safe waste collection and segregation | • Prepare a handbook on solid waste management and health and safety risk.<br>• Train the Eco-aides on safe and proper waste collection and segregation with the above handbook.<br>• Provide the Eco-aides with gloves and aprons. |
| The Libis MRF keeps recyclables at good condition and records of recyclables sold | • Provide the Libis MRF with a weighing scale, a blackboard, and a storage crate for recyclables.<br>• Train the representative of the People'S Organization to keep records. |
| A system to monitor waste segregation at source (household level) is established | • Educate the Eco-aides on the importance of waste segregation at source.<br>• Authorize the Eco-aides as a personnel to inform the UP BLISS residents of proper waste segregation.<br>• Formalize the Eco-aide organization by formulating Guiding Rules & Regulations. |

Wastes in UP Bliss will be handled as follows:

Table 7.3.2 Ways to Handle Wastes in UP Bliss

| Type of Solid Waste | Kitchen Waste | Biodegradable Waste (Leaves, plants) | Recyclables | Residuals |
|---|---|---|---|---|
| **Intermediate Container** | Compostables container in kitchen area per household | - | - | |
| **Person Responsible for placing waste in correct container** | Household | Household | Household | Household |
| **Schedule of Intermediate Collection** | Daily; and immediately as needed | Daily | Daily | Tuesdays and Fridays only |
| **End Destination of Solid Waste** | Pig dealers/ compost pit at Barangay Village A MRF | Pig dealers/ compost pit at Libis or Barangay Village A MRF | Recyclables storage area at Libis MRF | QCEPWMD truck to dumpsite |
| **Person Responsible for Transfer of Waste to End Destination** | Eco-aides | Eco-aides | Eco-aides | Eco-aides |
| **Schedule of End Collection** | Daily | Daily | Libis MRF will sell directly to accredited junkshop after sorting and weighing | Tuesdays and Fridays |

### (2) Structure for implementation

Barangay Captain shall be the head of the organization to implement the activity. Various stakeholders involved in solid waste management shall be represented. These include the Kagawad for Solid Waste Management, Libis MRF Management, Eco-aide Representative, Bliss Coordinator and the Representative from the Quezon City Environmental Protection and Waste Management Department.

## 7.3.2 Achievement

The Eco-aides started using gloves and aprons for waste collection. The Libis MRF started keeping records (weight and price by type) of recyclables sold. All the Eco-aides have been given the ID authorized by the Barangay Captain as personnel to monitor waste segregation at segregation level. Although it is not a part of the case study activities, the Barangay to which the UP BLISS belongs has also started awareness raising activity for the promotion of waste segregation and recycling at household level.

The following table shows the volume and price of recyclables collected at Libis MRF and Barangay MRF before the case study.

Table 7.3.3 Volume and Price of Recyclables Collected at UP BLISS before the Case Study

| Recyclable | At Libis MRF | |
|---|---|---|
| | Volume* (monthly collection) | Value** |
| White Paper | 1 sack | 6.00/ kg |
| Newspaper/ Colored | 12 sacks | 0.50 – 2.00/ kg |
| Cartons | | |
| Assorted waste paper | 1 sack | |
| Plastic PET | 4 sacks | 18 (dirty), 20 (clean)/ kg |
| Plastic hard | 3 sacks | 12/ kg |
| Aluminum Cans | | |
| Tin Cans | 10 sacks | 3/kg |
| Glass | | 0.50 – 3/ piece |

* All recyclables gathered at Libis MRF given to larger MRF to sell; no weights measured.

** Prices based on personal knowledge of segregator

The Libis MRF was able to sell their recyclables roughly every 3-4 weeks. All transactions were properly documented, and the data are based on actual selling prices of the junkshops they have done business with. The following table shows the breakdown of the different types of recyclables collected by the Libis MRF.

Table 7.3.4 Volume and Price of Recyclables Collected at Libis MRF during the Case Study

| Item | Weight (kg) | Unit Price (PhP/ kg) | Revenue (PhP) | Daily Avg. (kg/day) |
|---|---|---|---|---|
| White paper | 89.5 | 8.00 | 694.00 | 0.79 |
| Newspaper | 65.5 | 5.00 | 327.50 | 0.57 |
| Cartons | 423 | 4.00 | 1,692.00 | 3.71 |
| Assorted paper | 760 | 1.00 | 777.00 | 6.67 |
| PET | 56 | 18.00 | 1,008.00 | 0.49 |
| HDPE "Sibak" | 138.5 | 15.00 | 2,077.50 | 1.21 |
| Plastic cups | 77.5 | 10.00 | 775.00 | 0.68 |
| Aluminum cans | 5 | 55.00 | 275.00 | 0.04 |
| Tin cans | 462.5 | 5.00 | 2,312.50 | 4.06 |
| Bottles (lump) - assorted pcs | 342 | | 142.40 | |
| Shards | 161 | 0.50 | 80.50 | |

## 7.4 Recyclables Collection in Benpres Building

### 7.4.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 7.4.1 Expected Outcomes and Activities in Benpres Building

| Expected Outcome | Activity |
|---|---|
| Recyclables are recovered from waste bins with higher quality (not contacted with food waste) | • Issue a policy to promote waste segregation at the tenant offices from the Benpres Building Administration.<br>• Put posters calling for waste segregation in the offices. |
| Food leftovers are segregated from recyclables and residuals at offices pantries | • Same as above.<br>• Provide office pantries with waste segregation bins. |
| Recyclables are collected and brought daily to common storage areas | • Hold meetings with janitors for the change of the recyclables collection and storage practices.<br>• Activate the use of existing waste segregation bin in the parking lot (for cans, plastic and glass bottles).<br>• Establish a storage for waste paper in the basement.<br>• For proper accounting of the "ownership" of these recyclables, a representative of the junkshop would be there daily to weigh record and monitor proper sorting of said recyclables. |

(2) Structure for Implementation

Within Benpres Building, the Benpres Building Administrator coordinates activities under the case study with relevant stakeholders. Benpres Building Coordinating Committee (BBCC), which is an existing organization of Benpres Building composed of representatives from different offices and convenes on a monthly basis, coordinates with tenant offices. Southbend Janitorial Services dispatch janitors to the tenant offices and coordinates with the junkshop. The cafeteria concessionaires have their own contract with other junkshop for selling recyclables. Pasig CENRO/SWMO is in charge of collection and treatment of household wastes and contracts out the management to Ortigas Center Association, Inc. (OCAI). OCAI then contacts the Bagayawa garbage collection trucks and schedules the collection within the Ortigas Center. Bagayawa is under the larger IPM collection company servicing Pasig City.

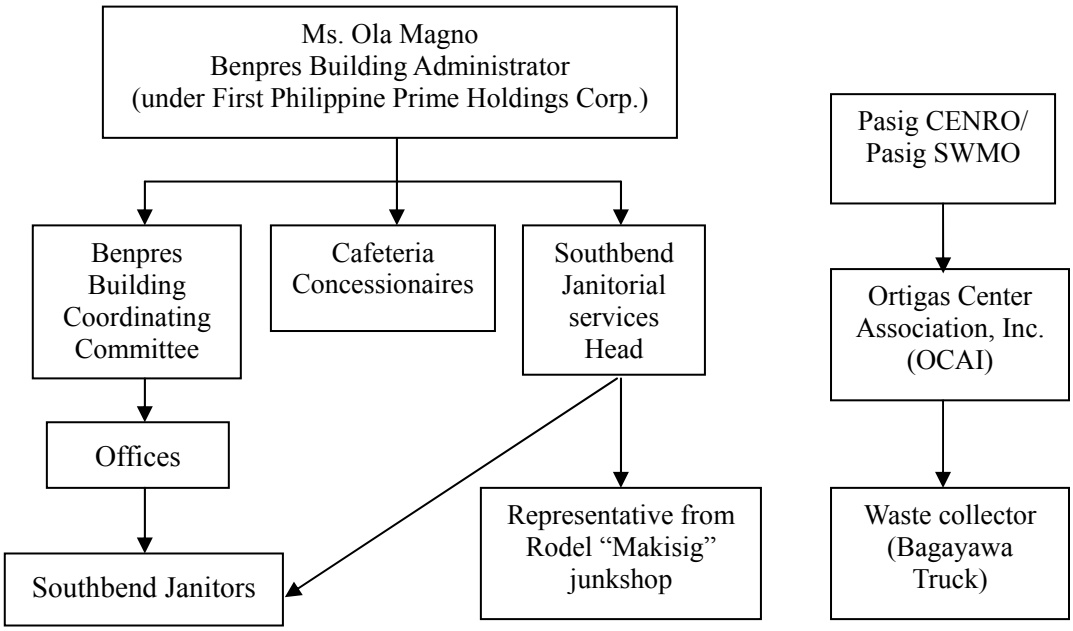



Figure 7.4.1 Implementation Structure in Benpres Building

### 7.4.2 Achievement

Benpres Building has adopted the following policy for solid waste management, and Benpres Building Administrator has informed the tenant offices of the policy to follow.

1. No littering within and around the Benpres building.
2. Waste materials should be placed on their proper containers.
3. Waste materials should be segregated before disposal.
4. Drink containers (PET Bottles, aluminum cans) should be emptied in sinks before disposal.
5. Paper should not be crumpled.
6. No smoking near the paper boxes or in the storage area.
7. Segregation bins should be secured against vandalism or damage.
8. Personal trashcans are encouraged to contain only residuals.

Quality of the recyclables recovered from waste bins after the start of the case study will be evaluated later with the data on volume and value of the recyclables. Recyclable segregation bins and food waste bins in the office pantries have been installed. Waste papers are collected and brought to a junkshop every day; this works as a part of fire prevention. The common storage areas for recyclables have been established (use of the existing waste bin has been activated, and a storage for collected waste paper is newly established).

The following table shows the volume and value of recyclables collected in Benpres Building before the case study (one full week in May 2007).

Table 7.4.2 Volume and Value of Recyclables at Benpres Building before the Case Study

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) | Daily Avg. (kg/d) |
|---|---|---|---|---|
| White paper | 84 | 8.00 | 672.00 | 12.00 |
| Newspaper | 70 | 4.00 | 280.00 | 10.00 |
| Cartons | 58 | 2.00 | 116.00 | 8.29 |
| Assorted paper | 7 | 1.00 | 7.00 | 1.00 |
| Shredded white | 72 | 9.00 | 648.00 | 10.29 |
| PET | 4 | 15.00 | 60.00 | 0.57 |
| HDPE | 16 | 10.00 | 160.00 | 2.29 |
| Aluminum cans | 1.3 | 1 peso/pc | 72.00 | |

*Volume is calculated based on a weekly volume.

The following data were gathered in two separate selling periods, each covering seven days of collection. While volumes did not vary significantly from those prior to the start of the case study, it should be noted that the interventions for Benpres were more on improving the quality of the recyclables being received, as well as having a communal storage area for paper and wet recyclables.

Table 7.4.3 Volume and Value of Recyclables Collected at Benpres Building during the Case Study

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) | Daily Ave. (kg/d) |
|---|---|---|---|---|
| White paper | 60.5 | 8.00 | 484.00 | 8.64 |
| Newspaper | 40 | 4.00 | 160.00 | 5.71 |
| Cartons | 55.5 | 2.00 | 111.00 | 7.93 |
| Assorted paper | 34 | 1.00 | 34.00 | 4.86 |
| Shredded white | 12 | 9.00 | 108.00 | 1.71 |
| PET | 8.5 | 15.00 | 127.50 | 1.21 |
| HDPE | 4 | 10.00 | 40.00 | 0.57 |
| Aluminum cans | 3.69 | 1 peso/pc | 203.00 | 0.53 |

## 7.5 Recyclables Collection in Commission on Human Rights of the Philippines

### 7.5.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 7.5.1 Expected Outcomes and Activities in Commission on Human Rights

| Expected Outcome | Activity |
|---|---|
| CHRP employees segregate wastes according to the instructions | • Develop a policy on solid waste management.<br>• Give the employees and the janitors instructions on waste segregation.<br>• Install segregation frames on each floor and waste paper bins for each office.<br>• Take out individual trashcans from the offices. |

Wastes in CHRP will be handled as follows:

Table 7.5.2 Ways to Handle Wastes in CHRP

| Type of Solid Waste | Leftover Food | White paper (both sides used) | White paper (with confidential information) | Newspaper | Waste paper (Scratch, Cartons) | Recyclables (PET, Aluminum Cans) | Residuals | Yard waste (leaves and branches) |
|---|---|---|---|---|---|---|---|---|
| Intermediate container | Food Receptacles in office then food waste bin in corridor | White paper boxes in office | Shredder in office | Newspaper Boxes in office | Wastepaper Boxes in office | Recyclables Bin in corridor | Residuals Bin in corridor | |
| Person responsible for placing waste in correct container | Office employees | Office employees | Office employees | Office employees | Office employees (assistance from janitor as needed when transferring contents to wastepaper bin in corridor) | | | Janitor |
| Schedule of intermediate collection | Daily; and immediately as needed | Daily | Daily | Daily | Daily | Daily | Daily | Daily |

| Type of Solid Waste | Leftover Food | White paper (both sides used) | White paper (with confidential information) | Newspaper | Waste paper (Scratch, Cartons) | Recyclables (PET, Aluminum Cans) | Residuals | Yard waste (leaves and branches) |
|---|---|---|---|---|---|---|---|---|
| End destination of solid waste | Pet Food Collector (office employees); Composting area for spoiled, inedible and uncollected leftovers | Recyclables storage area | Recyclables storage area | Recyclables storage area | Recyclables storage area (for immediate sorting of recyclables collected) | Recyclables storage area (for immediate sorting of recyclables collected) | Garbage Storage Facility; for eventual collection by EPWMD residuals waste truck | Yard; Composting Area |
| Person responsible for transfer of waste to end destination | Janitor | | | | | | | |
| Schedule of end collection | Daily | To be coordinated with junkshop | | | | | Monday, Wednesday, Friday | NA |

## (2) Structure for Implementation

The waste segregation and recycling is implemented by the structure as indicated in Figure 7.5.1. The General Service Division supervises the program. Representatives from each floor (floor leaders) are responsible for the dissemination of information and education regarding the solid waste management on their corresponding floors. Administrative officer is responsible for the dissemination of information and education regarding the solid waste management within the building to ensures that solid waste segregation and collection measures adopted for offices, restrooms, and yard areas are effectively implemented in coordination with the floor leaders and the maintenance supervisor.

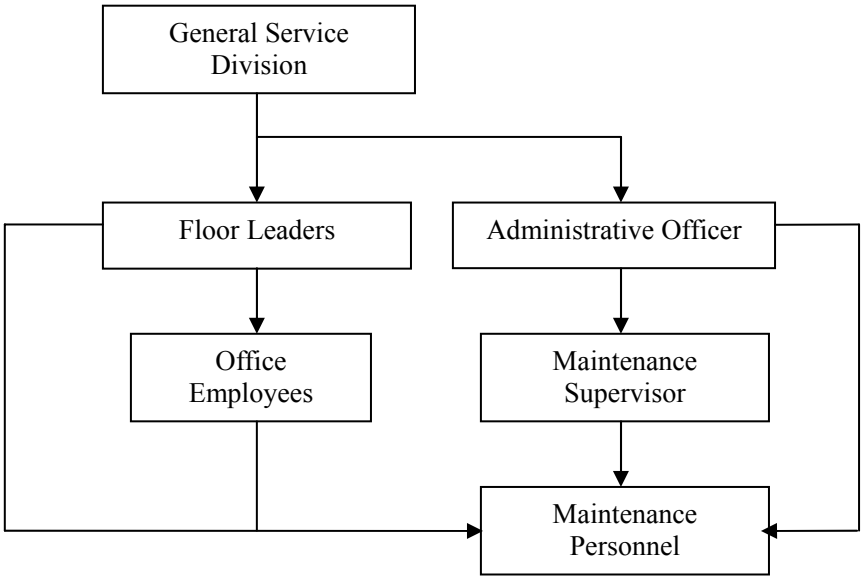



Figure 7.5.1 Structure for Implementation in Commission on Human Rights of the Philippines

### 7.5.2 Achievement

CHRP has adopted the following policy on solid waste management.

1. No Littering within and around the CHRP building premises.
2. Waste materials should be placed in their proper containers.
3. Waste materials should be segregated before disposal.
4. Non- confidential white paper should be used on both sides before disposal.
5. Paper should not be crumpled.
6. Drink containers such as mineral water bottles, and aluminum cans should be emptied of its contents before putting in the bins to avoid pests.
7. No smoking near the paper boxes or in the storage area.
8. Segregation bins should be secured against vandalism or damage.
9. Personal trash cans will be removed so that garbage segregation and collection will be centralized at the office level.
10. Employees are encouraged to participate in segregation through IEC and orientation sessions.

By the early December 2007, two waste segregation frames have been installed in the corridor of each floor, and individual trashcans have been removed from the offices except one that has lots of visitors. There are only waste paper bins for collecting used white papers within the office space. Employees have started following the waste segregation rule.

The following table shows the volume and value of recyclables collected at CHRP before the case study. These data will be compared with the same kind of data after the case study period to see the impact of the activities under the case study.

Table 7.5.3 Volume and Value of Recyclables Collected at Commission on Human Rights before the Case Study

| Recyclable | At Primary Collection (Sold by Collectors to Junkshop) | | At Consolidator (Sold by Junkshop to Consolidator) | |
|---|---|---|---|---|
| | Volume (per month) | Unit Price* | Volume (per month) | Unit Price |
| White Paper | 208 kg | P7.00/kg | 1 ton | P7.00/kg |
| Newspaper/ Colored | 42 kg | P4.50/kg | | P5.00/kg |
| Cartons | 6.5 | 3.00/ kg | 2 tons | |
| Assorted paper | 26 kg | | 2 tons | |
| Plastic PET | 3 kg | P17.00/kg | | P18 (unprocessed)<br>P22 (processed)<br>P12/ kg (colored PET) |
| Plastic hard | 1.5 kg | P10.00/kg | | P10.00/kg |
| Residual plastics | | | | P0.10/ kg |
| Aluminum Cans | 1.6 kg | P60/kg | 10-25 kg | P60/kg |
| Tin Cans | | | | |
| Glass bottles | | | Small volume | |

The following table reflects the total volume of recyclables collected at CHRP and sold by the janitors. This covers two transactions that they were able to record during the case study period; however, the exact length of time this covers was indeterminate. The junkshop they sell to (Ben Almaden's Junkshop) is located within Bgy. UP Campus, is a member of the Linis Ganda network, and has been in operation for at least 10 years.

Table 7.5.4 Volume and Value of Recyclables Collected at Commission on Human Rights during the Case Study

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) |
|---|---|---|---|
| White paper | 96 | 7-8 | 717.00 |
| Newspaper | 109 | 4.5 - 5.00 | 499.50 |
| Cartons | 20 | 3.00 | 60.00 |
| Assorted paper | 15 | 1.00 | 15.00 |
| PET | 28 | 15-20 | 452.50 |
| HDPE | 1 | 10.00 | 10.00 |
| Aluminum cans | 4 | 52.00 | 208.00 |

## 7.6 Recyclable Collection in New Era High School

### 7.6.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs assessment, expected outputs and corresponding activities are planned as in the following table.

Table 7.6.1 Expected Outcomes and Activities in New Era High School

| Expected Outcome | Activity |
|---|---|
| Students are conducting waste segregation according to the instructions | • Hold meetings with school administrators and teachers to: (1) establish and coordinate efforts aimed at improving state of waste management, and (2) determine specific plans of action that may be implemented to improve state of waste management at NEHS.<br>• Hold seminars for teachers (class advisers) for effective communication or instruction of waste segregation topics to students.<br>• Hold seminars for canteen personnel for proper wet vs. dry waste segregation.<br>• Provide NEHS with segregation frames and posters.<br>• Each class prepares waste paper bin.<br>• Hold school wide competitions for the cleanest classroom. |

Wastes in NEHS will be handled as follows:

Table 7.6.2 Ways to Handle Wastes at New Era High School (Classroom)

| Type of Solid Waste | Paper Waste | Food Waste | Liquid Waste | Recyclables | Residuals |
|---|---|---|---|---|---|
| **Intermediate container** | Waste paper bin | Food waste container | Liquid waste container | Recyclables container | Residuals container |
| **Person Responsible for placing waste in correct container** | To be ensured and supervised by all teachers. | | | | |
| **Schedule of Intermediate Collection** | Daily; and immediately as needed | | | | |
| **End Destination of Solid Waste** | Recyclables storage area (for immediate sorting of recyclables collected) | Food waste container (in canteen area), to be eventually collected by food waste collector | Drainage | Recyclables storage area (for immediate sorting of recyclables collected) | Dumpsite area within school grounds, for eventual collection by EPWMD residuals waste truck |
| **Person responsible for transfer of saste to end destination** | Utility personnel assigned to classroom area. | | | | |
| **Schedule of End Collection** | Coordinated with barangay junkshop | Daily collection by canteen staff | As needed | Coordinated with barangay junkshop | As scheduled by EPWMD |

(2) Structure for Implementation

The recyclables segregation/collection is implemented by the following entities.

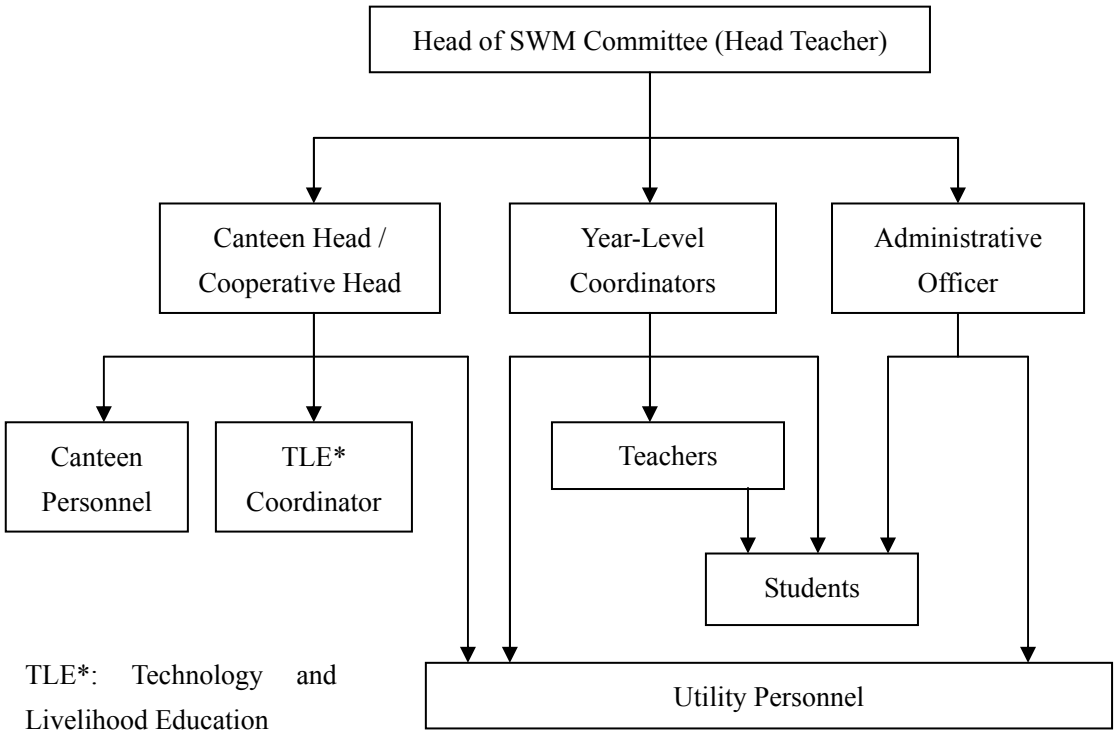



Figure 7.6.1 Structure for Implementation in New Era High School

### 7.6.2 Achievement

Segregation frames have been installed in the canteen and each floor of the school buildings, and the students have started segregating waste to food waste, liquid waste (leftover drinks), recyclables (plastics and cans) and residuals. A large poster to explain waste types and proper segregation practices has been put on the wall of the school building near the school gate so that all the students can see it. In addition, there is a poster on recyclables collection campaign to inform students of the activities in the case study as school wide activities. Although there are some classes that have not prepared a waste paper bin, most of the classes have prepared and started waste paper segregation.

NEHS has integrated recyclables collection as a school activity, and started to hold cleanest classroom competitions. According to the teacher in charge of coordinating the recyclables collection, there used be a pile of waste in the classrooms, but the environment has been much improved since the recyclables collection campaign.

The following table shows the volume and price of recyclables collected at NEHS before the case study.

Table 7.6.3 Volume and Value of Recyclables Collected at New Era High School before the Case Study

| Recyclable | At Primary Collector (sold by collector to junkshop) | |
|---|---|---|
| | Volume*(per month) | Unit Price** |
| White Paper | (wet) 49 kg | Wet: P1/kg<br>Dry: P7/kg |
| Cartons | 25 kg | P4/kg |
| Plastic PET | Bottles only, cleaned and stripped of labels – 33 kg | P23/kg |
| Other Plastics | Plastic cups + mineral bottle caps – 34 kg | Plastic cups + mineral bottle caps: P20/kg |

*Amounts only reflect 2 weeks' worth of collection.
** Price/kg indicated are as set by direct junkshop buyer; no middleman involved.

The table below shows the volumes and values of the recyclables sold by one of the janitors after a three-week period. This does not reflect, however, the total recyclables that were actually recovered, since the other janitor who also collects these recyclables has not yet sold her share. There are also reports of teachers who are now beginning to sell the paper collected from the classrooms although no monitoring data of this was obtained.

Table 7.6.4 Volume and Value of Recyclables Collected at New Era High School during the Case Study

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) | Daily Avg. (kg/d) |
|---|---|---|---|---|
| White paper | 14 | 10.00 | 140.00 | 0.67 |
| Cartons | 20 | 5.50 | 110.00 | 0.95 |
| PET | 8 | 24.00 | 192.00 | 0.38 |
| HDPE | 83 | 20.00 | 1,660.00 | 3.95 |
| Spoon & fork | 26 | 10.00 | 260.00 | 1.24 |
| Tin cans | 14 | 5.50 | 77.00 | 0.67 |

During the Waste Analysis and Characterization Survey (WACS) conducted by the QC EPWMD for this site under the case study baseline data gathering, it was discovered that over a one-week period, the school generates about 24 kg of paper, 26 kg of plastic, and nearly 2 kg of tin cans. The rates calculated under the recorded selling are still less than the potential rates as determined in the previous WACS. Still, there have been improvements observed – littering has noticeably reduced in the corridors and the classrooms. One classroom that used to have a small garbage pile in the back corner was given the "Most Improved Classroom" citation since it started practicing segregation after the project implementation.

Recent visits after the Christmas vacation, however, revealed that some students have reverted back to their old habits of littering and not segregating. Constant reiteration therefore is crucial in a school set-up, since every year there are new students coming in, and school breaks take away some of the momentum established by cleanliness campaigns.

## 7.7 Recyclables Collection in SM Sta. Mesa Food Court

### 7.7.1 Recyclables Collection Plan

#### (1) Expected Outcomes and Activities

Based on the needs and concerns assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 7.7.1 Expected Outputs and Activities in SM St. Mesa Food Court

| Expected Output | Activity |
|---|---|
| Recyclables are collected from tables and sold to junkshops in an efficient manner | • Conduct discussions involving concerned mall administrators and hauler to determine: (1) what other types of recyclables may be accepted aside from the ones already being collected; (2) steps that may be taken by administrators to increase value of recyclables being collected.<br>• Develop standard orientation/training program for maintenance staff and busboys regarding proper enforcement of wet vs. dry waste segregation policies.<br>• Conduct training on the proper enforcement of waste segregation policies.<br>• Find buyers of used plastic straws. |
| Tenants practice proper waste segregation | • Prepare and put on posters reminding of proper wet vs. dry segregation to be placed in conspicuous spots in common areas.<br>• Prepare and disseminate a booklet containing proper classification of wet vs. dry waste materials, and proper segregation methods for these. |

Wastes in SM St. Mesa Food Court will be handled as follows:

Table 7.7.2 Ways to Handle Wastes at SM Sta. Mesa Food Court by Waste Type

| Type of Solid Waste | Food Waste | Recyclables (plastic cups, PET bottles, tin cans, straws) | Residuals |
|---|---|---|---|
| **Intermediate Container** | Busboy Carts | | |
| **Person Responsible for placing waste in correct container** | Busboy personnel | | |
| **Schedule of Intermediate Collection** | Daily; and immediately as needed | | |
| **End Destination of Solid Waste** | Food waste collector | Recyclables collection and segregation area; and junkshop/recycler buyers | Residuals bin for eventual collection by EPWMD residuals waste truck |
| **Person Responsible for Transfer of Waste to End Destination** | To be coordinated by Operations Supervisor | To be coordinated by Operations Supervisor and Food Court Manager | To be coordinated by Operations Supervisor and Food Court Manager |
| **Schedule of End Collection** | To be coordinated with contact food waste collector | To be coordinated with buyers | As scheduled by EPWMD |

(2) Structure for Implementation

The recyclables segregation/collection is implemented by the following entities.

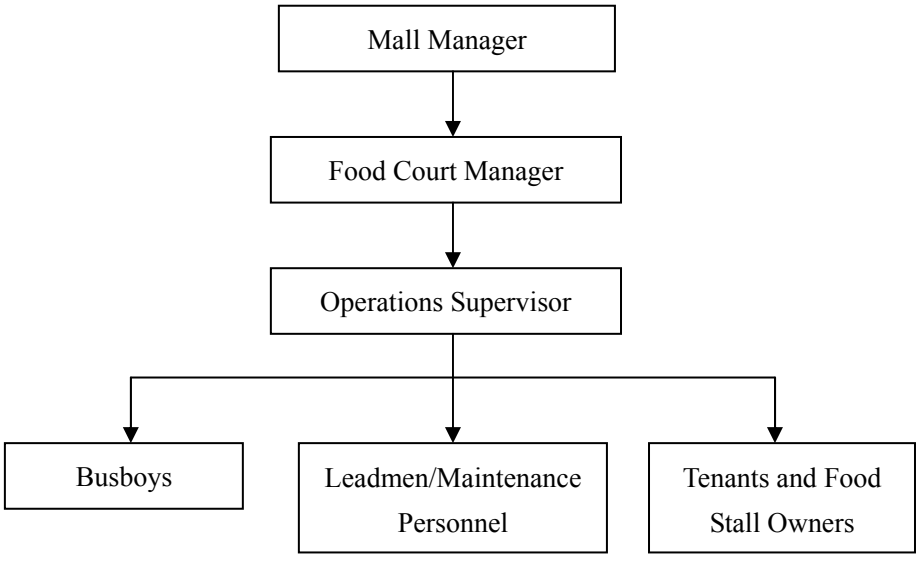



Figure 7.7.1 Structure for Implementation at SM Sta. Mesa Food Court

### 7.7.2 Achievement

After the training of busboys on waste segregation and collection, they started collecting used plastic straws as an additional recyclable. Although the existing waste hauler does buy used plastic straws, the Food Court has found a buyer of the straws at the monthly held Waste Market at SM Sta. Mesa shopping center.

A sign to inform customers in the food court how the collected wastes are recycled is attached to a pushcart that the busboy uses for waste collection, which is expected to increase awareness of the general public towards recycling.

The following table shows the volume and price of recyclables collected at SM Sta. Mesa Food Court before the case study. The date will be compared with the same kind of data after the case study period to see the impact of the activities under the case study.

Table 7.7.3 Volume and Value of Recyclable Collected at SM Sta. Mesa Food Court before the Case Study

| Month | Plastic Cups | | Plastic Bottles | | Cans | |
|---|---|---|---|---|---|---|
| | Quantity (kg) | Peso equivalent | Quantity (kg) | Peso equivalent | Quantity (kg) | Peso equivalent |
| May 2007 | 721 | 7,210 | 279 | 5,580 | 35 | 1,750 |
| June 2007 | 773 | 7,730 | 352 | 7,040 | 43 | 2,150 |
| July 1-15, 2007 | 418 | 4,180 | 192 | 3,840 | 24 | 1,200 |

SM Sta. Mesa Food Court was able to sell other types of recyclables, aside from those being collected daily by Bagayawa (PET bottles, aluminum cans and plastic cups), in two Waste Markets. These events are being held in SM and Ayala malls for more than a year, wherein the public could bring their recyclables and E-waste to the malls and sell them to recyclers and consolidators. During the two Waste Markets held in SM Sta. Mesa on Oct. 27 and Dec. 8, the Food Court was able to sell various types of recyclables, listed in the Table below.

The volumes listed here reflect 66 days of collection, except for the PET, aluminum cans, and plastic cups, which are regularly sold to Bagayawa. During the days leading to the Waste Markets however, the Food Court stores these three recyclables over a few days and opts to sell these during the Waste Markets. The volumes of PET, aluminum cans and plastic cups reflect six days of collection. Plastics and aluminum cans are sold to Polytrader Plastic Products, with recycling facility in Valenzuela, while the rest were sold to EJM Junkshop, operating under the QC Multi-purpose Cooperative.

Table 7.7.4 Volume and Value of Recyclable Collected at SM Sta. Mesa Food Court during the Case Study

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) | Daily Avg. (kg/d) |
|---|---|---|---|---|
| Newspaper | 60 | 5.50 | 330.00 | 0.91 |
| Cartons | 13 | 4.50 | 58.50 | 0.20 |
| PET | 61.5 | 18.00 | 1,107.00 | 10.25 |
| HDPE | 188.5 | 12.00 | 2,262.00 | long storage |

| Recyclable | Weight (kg) | Unit Price (PhP/kg) | Value (PhP) | Daily Avg. (kg/d) |
|---|---|---|---|---|
| Plastic Straws | 160.5 | 5.00 | 802.50 | 2.43 |
| Plastic cups | 161 | 10.00 | 1,610.00 | 26.83 |
| Assorted plastics | 9 | 5.00 | 45.00 | 0.14 |
| Aluminum cans | 15 | 55.00 | 825.00 | 2.50 |
| Metal scraps | 26 | 11.00 | 286.00 | long storage |
| Fender/ mudguard | 18 | 10.00 | 180.00 | |
| Bottles (lump) - assorted pcs | 826 | 0.50 | 482.20 | 12.52 |
| Shards | 39 | 0.50 | 19.50 | 0.59 |

The following tables summarize the total amount and value of collected recyclables after the case study interventions in all the case study sites.

Table 7.7.5 Total Amount of Collected Recyclables after Interventions

| Study Site | Study Phase | Period Covered | Selling Frequency | Amount of Collected Recyclables | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Paper (kg) | Plastic (kg) | Metal (kg) | Subtotals (kg) | Glass # bottles |
| GK | Before | No monitored selling | | | | | | |
| | After | 4 months | 3 | 34.25 | 22.05 | 11.00 | 67.30 | 173 |
| Libis MRF | Before | Recyclables turned over to other barangay MRF for selling with profit sharing | | | | | | |
| | After | 4 months | 4 | 1,338.00 | 272.00 | 467.50 | 2,238.50 | 342 |
| CHRP | Before | 4 months | 1 | 282.50 | 4.50 | 1.60 | 288.60 | 0 |
| | After | 2 months | 2 | 240.00 | 29.00 | 4.00 | 273.00 | 0 |
| Benpres | Before | 7 days | 1 | 291.00 | 20.00 | 1.30 | 312.30 | 0 |
| | After | 7 days | 1 | 196.00 | 1.50 | 1.18 | 198.68 | 0 |
| | After | 7 days | 1 | 190.00 | 12.50 | 3.69 | 206.19 | 0 |
| NEHS | Before | No monitored selling | | | | | | |
| | After | 3 weeks | 1 | 34.00 | 117.00 | 14.00 | 165.00 | 0 |
| SM Sta. Mesa | Before | Regular selling of PET, Aluminum cans, Plastic Cups only | | | | | | |
| | After | 3 months | 2 | 73.00 | 358.00 | 44.00 | 475.00 | 828 |
| **Subtotals per Material after Interventions** | | | | **2,105.25** | **812.05** | **545.37** | **3,462.67** | **1,343** |

Table 7.7.6 Total Value of Collected Recyclables after Interventions (PhP)

| Study Site | Study Phase | Period Covered | Selling Frequency | Value of Collected Recyclables (PhP) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Paper | Plastic | Metal | Glass | Subtotals |
| GK | Before | No monitored selling | | | | | | |
| | After | 4 months | 3 | 113.75 | 386.80 | 42.00 | 164.34 | 706.89 |
| Libis MRF | Before | Recyclables turned over to other barangay MRF for selling with profit sharing | | | | | | |
| | After | 4 months | 4 | 3,490.50 | 3,860.50 | 2,587.50 | 222.90 | 10,161.40 |
| CHRP | Before | 4 months | 1 | 1,690.50 | 66.00 | 96.00 | | 1,852.50 |
| | After | 2 months | 2 | 1,291.50 | 462.50 | 208.00 | 0.00 | 1,962.00 |
| Benpres | Before | 7 days | 1 | 1,075.00 | 220.00 | 72.00 | | 1,367.00 |
| | After | 7 days | 1 | 1,001.00 | 20.00 | 65.00 | 0.00 | 1,086.00 |
| | After | 7 days | 1 | 789.00 | 167.50 | 203.00 | 0.00 | 1,159.50 |
| NEHS | Before | No monitored selling | | | | | | |
| | After | 3 weeks | 1 | 250.00 | 2,112.00 | 77.00 | 0.00 | 2,439.00 |
| SM Sta. Mesa | Before | Regular selling of PET, Aluminum cans, Plastic Cups only | | | | | | |
| | After | 3 months | 2 | 388.50 | 5,826.50 | 1,291.00 | 501.70 | 8,007.70 |
| **Subtotals per Material after Interventions** | | | | **7,324.25** | **12,835.80** | **3,182.50** | **888.94** | **18,875.99** |

# 8. Case Study II: Cellular Phone Waste Collection

## 8.1 Case Study Goals and Objectives

The Case Study on Cellular Phone Waste Collection in the Philippines was conducted to:

- increase public awareness on proper disposal of cell phone waste especially among cell phone users; and
- assess the feasibility of developing cell phone waste collection in shops or drop-off points

This Case Study aimed to explore the impact of raising awareness on proper disposal of cell phone units, batteries, chargers and accessories in three areas in Metro Manila by monitoring the volume and corresponding value of collected waste. Furthermore, it sought to establish baseline data on collection rates given the spatial and temporal parameters of the study, and to determine the net value of the collected cell phone waste.

### 8.1.1 Stakeholders Involved

#### (1) Composition of the Steering Committee

The Steering Committee was composed of the Department of Industry - Board of Investments (BOI), the National Solid Waste Management Commission (NSWMC), the NSWMC Secretariat through the Department of Environment and Natural Resources – Environmental Management Bureau (EMB), and the JICA Study Team. The Steering Committee met regularly to discuss direction and strategy of the Case Study.

#### (2) Composition of the Technical Working Group

The Technical Working Group (TWG) is a 21-partner organizations team composed of the Steering Committee members, Cellular Phone Manufacturers, Network Service Providers, Malls, and the E-waste collector/ recycler.

This is the first time in the Philippines that the different stakeholders within the highly competitive Cellular Phone Industry have come together to work on a common undertaking.

The Technical Working Group met four times prior to the launching of the pilot project and once after the end of the case study period to ensure a smooth implementation of the project.

#### (3) Target Stakeholders for collection

Primarily, the target stakeholders identified were the product consumers, particularly the population that purchases cell phones and subscribers of the local service providers. The secondary target stakeholders identified were the cellular phone retail and repair shop owners and staff for their frequent interaction with the consumers. Finally, the third set of targeted audience were the janitors and maintenance personnel specifically in malls where there is a high concentration of cellular phone retail and repair shops, since wastes discharged from those retail or repair shops are handled

by the maintenance staffs of the malls.

### 8.1.2 Scope and Duration

#### (1) Timeframe and Locations

The case study had a six-month implementation period, spanning from June through December 2007, which eventually extended to mid-January of 2008. This six-month period was inclusive of planning, development stages and actual program execution. Actual collection was done over a 16-week period, from September 14, 2007, to January 9, 2008.

Collection was primarily implemented in three Metro Manila cities, particularly only within identified areas of the following three malls: Glorietta and Greenbelt under the Ayala Malls (Makati City); SM Megamall (Mandaluyong City); and Greenhills Shopping Center (San Juan City). Six collection bins were positioned within each of the three malls, totaling eighteen bins deployed in commercial establishments.

Collection was also implemented within two government offices, namely the DTI-BOI and DENR. These two offices had one bin each, generally located in the lobby or first floor of the building.

#### (2) Cellular Phone Waste Types

Initially, the cellular phone waste to be collected was confined to cellular phone batteries, which were perceived to be the most hazardous and problematic in terms of disposal. However, after a series of discussions with the stakeholders and meetings at the TWG, it was decided that the cellular phone waste types to be collected were to be expanded to include the cellular phone unit, batteries, charges and other accessories such as, but not limited to, housing / casings and headsets.

#### (3) IEC Tools

Campaign materials were limited to posters which were distributed to the partners for deployment and display in their respective shops, offices or malls. Three informative installations or mini-exhibits were produced to give customers an idea of the advantages of recycling cell phone waste. The Case Study was featured in a few news articles in major dailies which covered the launching of the pilot projects in September.

Initially, the number of collection bins was limited to around 3 bins per mall. Fortunately, additional funds from a previous DTI-BOI project with the United Nations Development Programme (UNDP) allowed construction of ten more bins. A total of twenty bins were produced.

There was no incentive program implemented in the case study. The consumers dropped their cellular phone waste on a purely voluntary basis.

#### (4) Logistics

Prior to collection by HMR Envirocycle, the cell phone waste deposited in the bins have to be retrieved and stored temporarily until such time that a sufficient amount has been accumulated that would warrant transportation from Metro Manila to the facility in Laguna. The collected cell

phone wastes were temporary stored at either malls or SAGIP-Environment office after retrieval from the bins, which usually occurred every four weeks.

## 8.2 Outcomes and Analyses

### 8.2.1 Collection Data and Results

The collection data were processed and analyzed using seven iterations:

- Collection volume per bin location, in number of pieces
- Total collection volume across sites, in number of pieces and weight
- Collection rate per site, in number of pieces
- Collection trends in the malls
- Cell phone waste distribution per site, in number of pieces
- Distribution of cell phone waste types in number of pieces and weight
- Distribution of battery types per site and per type, by weight

These iterations give insights on consumer participation and behavior, collection rates and trends, and the nature of waste collected.

#### (1) Collection volumes

##### 1) Collection volumes per bin location

The amounts of collected waste vary across the different types of bin locations in the malls. The most collected waste in across all of the sites was predictably the Cell Phone "*Tiangge*" or "flee market" in the second floor of the Greenhills Shopping Center main building. This is where almost all the cell phones retail and repair stalls are located. These stalls, numbering almost 750 during peak season, could be as small as 1.2 x 1.2 meters in floor area. During monitoring activities, it was discovered that the high collected volumes in these areas are not mainly due to customer or stall tenant participation, but were instead due to the janitors who would deposit E-waste accumulated from the stalls. These wastes are sometimes given by the stalls but more often than not these were still coming from mixed waste receptacles.

The collected volumes outside the Greenhills Cell Phone *Tiangge* area and those from other study sites would be more reflective of public participation to the project. For Glorietta-Greenbelt, highest participation was noted in the Activity Center while in SM Megamall, the entrances/exits and the Cyberzone bin yielded the highest collection.

#### 2) Total collection volumes across sites

Greenhills Shopping Center contributed the highest collection in terms of pieces and weight, comprising 82% and 62% respectively.

## 8.3 Conclusions and Recommendations

### 8.3.1 Achievements and Lessons Learned

#### (1) Accomplishments vis-à-vis general objectives

This Cell Phone Waste Collection Case Study has proven that of cell phone waste through drop-off points in commercial areas is a feasible and worthwhile endeavor. Public response has been positive and indicated increased awareness on recycling and proper disposal of electronic waste.

This Case Study led to several milestones towards addressing the problem of increasing cell phone waste:

- It established baseline public participation and collection rates given minimal interventions;
- It developed IEC materials and a blueprint for bins that entice participation without sacrificing functionality;
- It devised and tested a monitoring and collection protocol for cell phone waste;
- It provided preliminary values and costs to be considered towards program sustainability; and
- It showed that a joint collection program by the government and the private sector, composed of stakeholders within the highly competitive communications industry, is possible.

#### (2) Bin design, Location and Maintenance

The design of the bin could be improved by taking into consideration the weak points observed during collection. The opening size may have to be increased to accommodate bulk deposits, such as batteries wrapped in plastic.

Since the bin and its contents serve as an IEC material in itself, maintaining its cleanliness cannot be over-emphasized. Miscellaneous trash such as paper or food wrappers deposited in these bins should be constantly removed, since these allow others to use it as a trash bin. In conjunction to this, bins should not be placed near food stalls, kiosks selling prepaid cards, or sales representatives giving away fliers.

#### (3) Establishments with high concentration of cell phone shops

IEC activities for cell phone retailers and repair technicians should be a pursued in future collection projects. Considering that majority of the gathered waste were sourced from these shops but were

deposited by mall maintenance crew, true segregation at source would entail the formers' active participation.

### 8.3.2 Project Continuity

During the last TWG meeting, it was agreed upon that cell phone waste collection will continue after this case study, spearheaded by the participating malls in coordination with HMR Envirocycle. This will cover the same types of cell phone wastes, since sustainability would be dependent on recoverable recyclables to offset disposal of batteries. It will now include other branches, increasing the geographic coverage to include northern and southern Metro Manila, where residential areas are concentrated.

The cell phone and telecommunications industry players will continuously be involved through an ad-hoc committee that will meet regularly with the Steering Committee, which will still be chaired by DTI-BOI, for policy discussions and possible formation of a recycling association for cell phone waste.

### 8.3.3 Recommendations and Future Challenges

#### (1) Insights for Policy

Increased involvement of the cell phone manufacturers in addressing the waste produced by the industry would be an ideal approach consistent with the Extended Producer Responsibility (EPR) principle. While there are a few take-back programs being conducted by individual manufacturers locally in consolidation with international corporate social responsibility policies, the impact of these programs is still to be felt.

A major difficulty in tackling proper cell phone waste disposal would be the inclusion of so-called "gray" items, such as generic/competition/imitation cell phone units, batteries, chargers and accessories, which dominate the market. Major manufacturers cannot be held responsible for products that do not carry their legitimate brand name. This would be where government and an industry-based recycling committee should step in.

### 8.3.4 Expanding Publicity Efforts

The reach of the publicity materials in the case study was limited mainly to customers who frequent the malls where the bins were deployed. Connecting with the waste generators at the household level could be achieved by print and broadcast media, capitalizing on the momentum established by the pilot project. Thus cooperation among not only government agencies but industries is also neccessary in their respective roles in advancing publicity effort and thus cell phone waste recycling in the Philippines. TWG organized under this Case Study has a significant function that can permit a joint effort on achiving commong goals among public and private entities, and continious meetings to discuss further actions would cultivate the fruits.

# 9. Case Study III

## 9.1 Background of the Project (Mobile Plastic Collection And Recycling)

The JICA Study Team and DTI-BOI, in coordination with relevant government agencies and the private sector, identified pilot projects to test the viability of recycling guidelines for plastics, paper, glass bottles, metals and electronic wastes as well as prepare Information and Education Campaign (IEC) materials to promote awareness on recycling.

For plastics, the Philippine Plastics Industry Association, Inc. (PPIA), a non-profit industry association, was contracted to implement a six-month pilot project entitled "Mobile Plastic Collection and Recycling".

### 9.1.1 Project Objectives

The main objective of this project is to:

- Enhance the recycling rate of plastics with focus on "plastic bags" through a mobile plastic collection and recycling approach, and
- Establish a mechanism for operational sustainability.

### 9.1.2 Project Concept

(1) With the emergence of recyclers of post-consumer plastic bags and films, there is a need to link up the generators of scrap plastics especially post-consumer plastic bags with the recyclers to develop a recycling market and to significantly reduce the volume of residual wastes.

(2) The Mobile Plastic Collection/ Recycling Project will serve as a showcase of the present capabilities for recycling plastic scraps and to increase awareness on the proper handling of waste plastics as prescribed in the Recycling Guidelines to increase their recovery and recycling.

(3) The project involves the lease of a modified truck equipped with:

- Plastic Melting Oven and Grinder for processing on-site the plastic "sando" bags and PS scrap (only when collected recyclables are contaminated).
- Bins for carrying plastic recyclables and to serve as visual aids for barangays, households and schools that such plastic types are being collected and recycled. The bins are segregated into:
    1) Polyethylene Terephthalate (PET)
    2) Polyethylene Rigids (PE Rigids)
    3) Polyethylene Flexibles (PE Flexibles)
    4) Polypropylene (PP)

5) Polystyrene (Foam PS, EPS)

### 9.1.3 Plastic Bag Recycling

There are recyclers of plastic film bags located in Metro Manila. These firms either source their raw materials from post-industrial plastic films from bag manufacturers or post-consumer bags from dumpsite and other sources.

Table 9.1.1 Types and Use of Plastic Bags

| Types of Plastic Bags | Examples |
|---|---|
| High Density Polyethylene (HDPE) | Grocery, wet market bags or sando bags, and trash bags |
| Low Density Polyethylene (LDPE) | Bags for sugar, rice, toys, shopping bags in department stores |
| Polypropylene (PP) | Packaging for T-shirt or clothing |

Post-industrial plastic films particularly those made into plastic bags are 100% being recycled or converted into pellets. Once recycled, films can be used to manufacture a variety of products. For example, it is used in applications, such as trash bags and construction films. It is also used in household products, like garbage cans, wastebaskets and recycling bins.

Recyclers accept post-consumer plastic bags from LGUs as long as they can collect by the truckload or at least 500 kg per hauling on a regular basis. Payatas junkshops currently supply these recyclers.

For purposes of this study, PPIA partnered with the Metro Plastic Recycling Association, Inc. (MPRAI) for the recycling of plastic bags collected from the plastic sites. MPRAI cooperated by way of accepting non-commercial quantities of post-consumer plastic bags from the pilot sites.

There is a lot of potential for developing the recycling market for post-consumer plastic bags in Metro Manila which requires the cooperation by LGUs cascading to the barangays and the households. By collecting the recyclables from the households, they not only reduce the volume of waste going to the dumpsite but also derive income from trading additional recyclables with the junk shop operators. Recyclable materials sorted at source and kept clean and dry sell higher than when they are stained by garbage. This becomes an incentive for the Eco-aides to teach households to properly segregate and/or even clean the recyclables themselves.

### 9.1.4 Foam Polystyrene Recycling

Foam PS is currently sourced directly from fast food restaurants. PPIA is currently linking up with Polystyrene Packaging Council of the Philippines (PPCP) for the processing of Foam PS.

## 9.2 Operational Procedure

PPIA developed an operating procedure for the dispatch and collection of the Mobile Truck which accompanied the MOA signed with pilot sites. PPIA evaluates the quality of recyclables whether they are in conformance with recycling guidelines. If in conformance with recycling guidelines, PPIA was supposed to contact the recycler for pick-up from PPIA; however, in actual operation, PPIA delivered the recyclables to the recycler after collecting from the pilot sites.

In the three (3) months of implementation, the plastic bags and Foam PS collected from the pilot sites were all found to be in conformance with the recycling guidelines and thus, were delivered to the recycler instead of processing on-site through the melting machine.

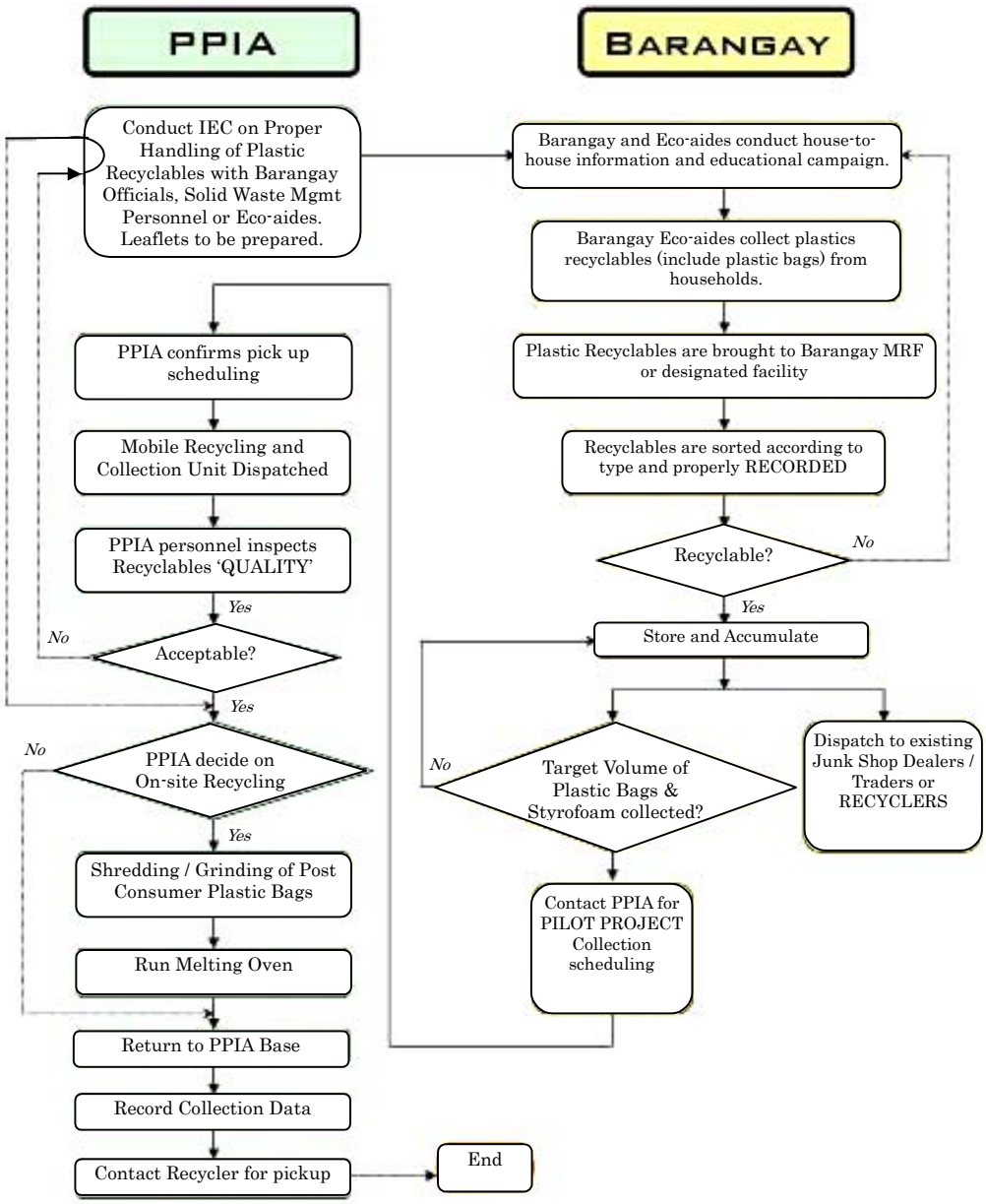



Figure 9.2.1 Process Flowchart

At Brgy. Greater Lagro, Holy Spirit and New Era plastic bags were already cleaned when given to the Brangay Eco-aides while in Brangay Greater Fairview, there were instances that Eco-aides have to clean and dry the plastic bags. In Caloocan, plastic bags picked up from households were already clean. Lack of awareness and discipline at the household level remains an issue in the implementation of the project.

## 9.3 MOA with Barangays

PPIA entered into a Memoranda of Agreement with the pilot sites in time for the formal launch of the pilot project.

### 9.3.1 Role of Barangays

- Conduct a house-to-house Information and Education Campaign on the proper handling of plastic recyclables including plastic bags and Foam Polystyrene (PS);
- Collect recyclables and store inside the Material Recovery Facility (MRF) until the preferred volume for collection are reached. The preferred volume for the collection of plastic bags and Foam PS are 25 kilograms each bundled in such weight;
- Record all collected plastic recyclables before discharging to junk shops; and
- Contact PPIA for the collected plastic sando bags and Foam PS during the pilot project and eventually make arrangements with the existing accredited junk shops or plastic recyclable dealers operating within the area.

### 9.3.2 Role of PPIA

- Conduct an orientation on the Guidelines on Proper Handling of Plastic Recyclables and provide IEC materials (e.g. leaflets, etc.) to Eco-aides;
- Schedule and dispatch the PPIA Mobile Plastic Recycling and Collection Truck to the respective barangay upon its advise when the preferred volume for collection are reached; and
- Operate the melting oven only when deemed necessary.

## 9.4 MOA with Schools

PPIA met with Miriam College and Claret School of Quezon City to formalize the partnership on the implementation of the pilot project. The outcome is as follows:

Table 9.4.1 Status of Pilot Schools

| PILOT SCHOOL | STATUS |
|---|---|
| **MIRIAM COLLEGE** | • MOA signed on 6 November 2007<br>• Conduct of orientation for school personnel<br>• PPIA donated 5 collection bins for the ff academic units:<br>✓ Grade School<br>✓ High School<br>✓ College Building<br>✓ Child Study Center<br>✓ Southeast Asian Institute of the Deaf<br>• PPIA donated 3 drums for the MRF<br>• Provision of paper for 3,000 letters to parents<br>• Collection of Plastic bags is 28 kg. and Foam PS is 49 kg. |
| **CLARET SCHOOL OF QUEZON CITY** | • Existing informal agreement with School administration<br>• School's collection of plastic bags generated inside the campus started on September 3<br>• PPIA donated 3 Glutton bins and 2 drums to further promote collection<br>• Total plastic bag collected as of 11 Dec is 196.5 kg. |

## 9.5 Information and Education Campaign

### 9.5.1 Flyers Promoting the Recycling Guidelines

PPIA developed a flyer informing the households on the various types of plastic recyclables and encouraging them to properly segregate.

During the orientation meeting with Eco-aides, it is emphasized that recyclable materials sorted at source and kept clean and dry sell higher than when they are stained by garbage. This becomes an incentive for the Eco-aides to teach households to properly segregate and/or even clean the recyclables themselves.

At the meeting with Eco-aides, PPIA discussed the background of the pilot project, the types of plastics, the proper handling of plastic recyclables at the household level and the PPIA arrangements for the pickup of plastic bags and Foam PS at the Barangay MRF. At the end of the orientation, PPIA distributed copies of the flyers to the representatives of the pilot areas as follows:

Table 9.5.1 PPIA Flyer Distribution to Pilot Sites

| Pilot Area | Copies |
|---|---|
| **Quezon City** | |
| Brgy. Greater Fairview | 1,500 |
| Brgy. Greater Lagro | 1,500 |
| Brgy. Holy Spirit | 1,500 |
| Brgy. New Era | 1,500 |
| Miriam College | 1,000 |
| Claret School of QC | 1,000 |
| **Caloocan City** | |
| Brgy. 82-85 Cluster | 1,000 |
| Brgy. 126-131Cluster | 1,000 |
| Total | 20,000 |

### 9.5.2 Tour of Plastic Recycling Plants

PPIA organized a plant tour for QC EPWMD, Caloocan ESS and pilot barangays and schools of two plastic recycling facilities in Valenzuela City on 19 December 2007.

Table 9.5.2 Recycling Plant Visited in the Tour

| Plant | Type of Plastics |
|---|---|
| Phil-Ecoplast Recycling Industries Company, Inc.<br>1150 Oliveros Cmpd., F. Bautista St., Ugong, Valenzuela City | Plastic Bags |
| New Foundland Plastic Manufacturing Corp.<br>#73 B. Maysan Rd., Valenzuela City | Rigid Plastics |

The purpose of the plant visit is to provide the barangays with an appreciation of the actual recycling process for plastic scraps, especially the plastic bags which are the target recyclables in our project.

This activity was likewise intended to strengthen the link-up between the barangays and the recyclers in order to make the project sustainable and continue beyond the project schedule.

### 9.5.3 Radio Plugging for the Pilot Project

PPIA held two radio plugs for the pilot project on November 17 and 24, 2007 at DZXL Radio Mindanao Network hosted by Ariel Fernandez. The topic of the discussion is Plastic Recyclables as Livelihood for Barangays. PPIA was headed by Ms. Mary G. Ng, PPIA president; Crispian Lao, PPIA vice president; Benson Tang, MPRAI president; Alfred Chan, Commissioner NSWMC and Mark Delumen, PPIA Secretariat. Two representatives from the barangays were Brgy. Chairman Rommel L. Carreon, Brgy. 738, Zone 80 (San Andres, Manila) and Brgy. Chairman Rodolfo G. Peña, Brgy. 699, Zone 76 (Malate, Manila).

### 9.5.4 Point-Reward System

As an incentive to barangays and schools, PPIA rewards them a pack of trash bags (25 pcs.) for every 25 kg of collected plastic bags and Foam PS.

This barter system is well-received by the pilot areas. The trash bags are made from 100% recycled HDPE material sourced from the pilot sites.

## 9.6 Dispatch and Collection Status

As of 15 January 2008, PPIA diverted a total of 1,206.81 kilograms of plastic bags and 46 kilograms of scrap PS coming from Quezon City and Caloocan City.

Plastic bags collected per Barangay are pre-weighted in the Barangay MRF and recorded in the PPIA Truck Collection Logbook and duly countersigned by a Barangay representative. Once this is brought to Phil-Ecoplast Recycling Industries Company, Inc., the plastic bag recycling plant, located in Ugong, Valenzuela City, it is again weighed for verification.

Table 9.6.1 Waste Diversion as of 15 January 2008

| | BRGY/SCHOOL | Collection Date | LGU | Scrap Plastic Bag (Kg.) | Scrap Foam PS (Kg.) |
|---|---|---|---|---|---|
| 1 | Brgy. 82-85 Cluster | 8-Oct-07 | CAL | 62.00 | |
| 2 | Brgy. 126-131 Cluster | 8-Oct-07 | CAL | 24.00 | |
| 3 | Brgy. Greater Lagro | 16-Oct-07 | QC | 42.00 | |
| 4 | Brgy. Greater Fairview | 16-Oct-07 | QC | 40.00 | |
| 5 | Brgy. Holy Spirit | 16-Oct-07 | QC | 15.00 | |
| 6 | Brgy. South Triangle c/o Brgy. Holy Spirit | 16-Oct-07 | QC | 55.00 | |
| 7 | Brgy. 82-85 Cluster | 23-Oct-07 | CAL | 20.00 | |
| 8 | Claret School of QC | 13-Nov-07 | QC | 75.00 | |
| 9 | Brgy. New Era | 13-Nov-07 | QC | 4.50 | 21.00 |
| 10 | Brgy. Holy Spirit | 13-Nov-07 | QC | 19.00 | |
| 11 | Brgy. Greater Fairview | 13-Nov-07 | QC | 166.00 | |
| 12 | Brgy. 82-85 Cluster | 14-Nov-07 | QC | 61.36 | |
| 13 | Brgy. 126-131 Cluster | 14-Nov-07 | CAL | 36.95 | |
| 14 | Brgy. 82-85 Cluster | 10-Dec-07 | CAL | 48.00 | |
| 15 | Brgy. Greater Fairview | 11-Dec-07 | QC | 158.50 | |
| 16 | Brgy. New Era | 11-Dec-07 | QC | 5.00 | 25.00 |
| 17 | Miriam College | 11-Dec-07 | QC | 11.00 | |
| 18 | Claret School of QC | 11-Dec-07 | QC | 118.50 | |
| 19 | Brgy. 82-85 Cluster | 15-Jan-08 | CAL | 168.00 | |
| 20 | Brgy. 126-131 Cluster | 15-Jan-08 | CAL | 77.00 | |
| | **TOTAL** | | | **1,206.81** | **46.00** |

Foam PS is temporarily stored inside the PPIA building until such time that it accumulates to a truckload before delivering to the Polystyrene Packaging Council of the Philippines or a PPCP-endorsed recycler.

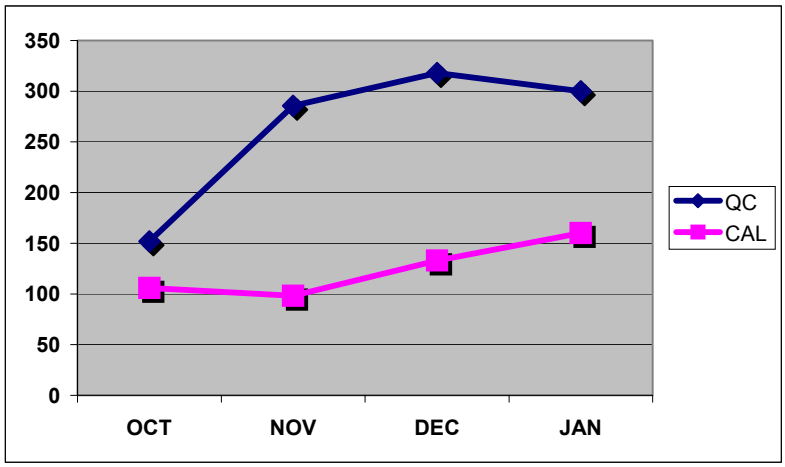



Figure 9.6.1 PPIA Collection Graph

In the first three months of project implementation, the collection drive steadily increased. The level of awareness by the households improved during the second month of IEC when Eco-aides viewed the Mobile Plastic Collection and Recycling Truck accompanied by LGU Solid Waste Management and PPIA representatives. The Eco-aides realized that the proponents are serious in their efforts to implementing the project and increase waste diversion. The information relayed by the Eco-aides enthused households to practice segregation of plastic bags and Foam PS (in the case of Barangay New Era) in the succeeding months which explains the increase.

For January, PPIA collected 245 kg from Caloocan City, 85 kg of which were supposed to be collected last December. PPIA expects to collect 300 kg from Quezon City.

Table 9.6.2 Total Collection Per LGU in Kgs. as of 15 January 2008

| | OCT | NOV | DEC | JAN | TOTAL |
|---|---|---|---|---|---|
| QUEZON CITY | 152 | 285.5 | 318 | 300* | 1055.5 |
| CALOOCAN CITY | 106 | 98.31 | 133 | 160 | 497.3 |
| TOTAL | 258 | 383.81 | 451 | 465 | 1557.81 |

*Projected

## 9.7 Factors Affecting the Success of the Project

The result of collection in pilot barangays indicated that a prerequisite for effective collection of plastic recyclables are the followings:

| Factor | Effect on the Project |
|---|---|
| Political | Changes in political leadership can disrupt project implementation regardless of the MOA executed with a predecessor as successor is not bound to the MOA. This is the case for Barangay Lagro. |
| Infrastructure | There is a need for an operational MRF which is a storage space with roofing and partitioned areas to hold recyclable materials in separate cells for plastic, glass, metal, aluminum, paper, etc. Brgy. Marulas in Valenzuela does not have a MRF and is incapable of recovering recyclables as a source of waste diversion. Brgys. 126-131 in Caloocan has a small MRF and does not have enough space to store collected plastic bags and relies on Brgys.82-85 MRF for storage.<br>Eco-aides with push carts or karitons are necessary for the IEC and collection drive at the household level. |
| Economic | Barangays consider the economic benefit they will derive from participating in the project. All of the barangays agreed on a barter system for the collection of plastic bags and Foam PS except one barangay which prefers selling their collected scraps. |
| Social | Income classes have a bearing on the project. Although a thorough survey is required to verify this, the higher income class tends to consume and generate more scrap. Brgy. Fairview, Brgy. Lagro and Brgys. 82-85 in Caloocan which are inhabited by subdivision dwellers tend to contribute more scrap collection for the project.<br>Education is important as indicated by schools which significantly contributed to the waste diversion efforts. Schools are suitable |

| Factor | Effect on the Project |
|---|---|
| | sites for project replication because training the students to properly segregate their wastes is an effective way of preparing the future generation as stewards of the environment. |
| Legal | Ordinances that accredit Eco-aides or junk shops operating in the barangay help ensure recovery of recyclables from the households. This is practiced by Brgy. Fairview and Brgy. Lagro which accounted for 90 percent of the collection in Quezon City Barangays. |

## 9.8 Conclusion

Considering that the project started from zero to 1.5 MT waste diversion of plastic bags and Foam PS in the pilot areas, the project succeeded in introducing a new source for increasing the waste diversion target for LGUs, barangays and schools.

On the one hand, Quezon City Barangays is continuing the collection of target recyclable materials beyond the project duration. Caloocan City is expanding segregation of target recyclables as a city-wide project covering 188 barangays. According to the Caloocan Environmental Sanitation Services (ESS), they are targeting 50 percent of the barangays to implemented segregated collection which would already include plastic bags starting July 1, 2008 as part of its waste diversion efforts for the city.

Claret School of Quezon City and Miriam College are now segregating plastic bags. Miriam is also collecting Foam PS which is relatively more than the sando bags.

The success in the two pilot schools indicate that schools are suitable sites for project replication because training the students to properly segregate their wastes is an effective way of preparing the future generation as stewards of the environment.

The result of collection in pilot barangays indicated that a prerequisite for effective collection of plastic recyclables are:

- Support and political will of the barangay chairman,
- Operational MRF, and

- Household level collection mechanism (i.e. Eco-aides with karitons or sidecars), and clustering of barangays to ensure minimum collection.

The linkage between the barangays and recyclers will have a snowball effect on neighboring barangays as the recycling market for post-consumer plastic bag expands.

## 9.9 Project Sustainability

Some pilot sites have already been turned over to MPRAI. This is the case for Caloocan City.

PPIA will continue the collection operation on pilot areas not yet turned over to MPRAI. PPIA will proceed with the collection and dispatch once new areas are identified based on set criteria namely:

1) Support and political will of the barangay chairman

2) Operational MRF

3) Household collection mechanism (i.e. Eco-aides with karitons, sidecars)

4) Clustering of barangays to ensure maximum collection

PPIA recommends ordinances or measures to ensure success and continuation regardless political leadership, i.e. accrediting Eco-aides so that recyclables fall in the hands of barangay.