

## Municipal Solid Waste Management in Metro Manila: Challenges and Options

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### Abstract

Disposal and recycling of Municipal Solid Waste (MSW) in Metropolitan Manila is tackled. The waste landscape of the Metropolis is characterized by limited disposal capacity and low rates of reduction, reuse, and recycling. Dumping sites serve merely as a sink without adequate engineering controls to ensure safety of communities. Potential of landfill gas for energy is high but has yet to be fully harnessed. Legislations are in place but require serious political will to implement them. Private enterprises should be provided with additional responsibility in recycling. Comprehensive database on MSW is also wanted for planning purposes. This can be realized through partnership among the national government, local government units, civil society, and the private sector. This entails that monitoring and evaluation is a shared responsibility.

Community-based recycling is emerging with handicraft-making and composting as key features. Composting needs markets and sustainable organic farming should be pushed with vigor. Best practices should be pursued by the government and NGOs so that ecological waste management at the local level is attractive. On the social dimension, the role of waste pickers needs to be mainstreamed in the formal recycling to avoid social and economic displacement.

**Keywords:** Recycling, Municipal Solid Waste, Energy Recovery, Composting, Incineration, Partnership

### マニラ首都圏における一般廃棄物の管理：挑戦と選択

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### 要 旨

マニラ首都圏の廃棄物処理能力はすでに限界であり、増え続けるごみの排出が抑制できず、リサイクル率も低い。また、適正な埋め立てが行われておらず、環境汚染や安全な管理ができないまま、単に捨てられたごみを埋めるだけである。埋立地から発生するメタンガスは、エネルギー回収の可能性が高いものの、まだそのポテンシャルが十分に生かされていない。これらの問題を解決するためには、廃棄物の適正管理、リサイクル制度の整備が重要である。廃棄物処理に関する情報管理も必要であり、リサイクルに関する生産者責任を求めることも一つの選択肢であろう。そして、今後中央政府と地方自治体、市民、NGOのパートナーシップが重要であり、情報の共

有、モニタリング、政策評価によって、それぞれの役割と責任の所在を明確にしていくことが重要である。

現在、マニラ首都圏で行われているリサイクル方法のうち、地域の特徴を生かしたものとしては、廃棄物を用いた手工芸品の制作、堆肥化、メタンガスによるエネルギー回収（パイロットプロジェクト）などがあげられる。しかし、これを成功させるためには、コンポスト製品および手工芸品の市場構築と有機農業の持続的な推進が必要であろう。メタンガスの利用は地球温暖化防止に繋がり、CDMの案件としても注目されている。地域環境に配慮した廃棄物管理を成功させるためには、政府と NGO のパートナーシップ構築によってそれぞれのプロジェクトを推進していくことが望ましい。殊にマニラ首都圏の場合、埋立地の適正管理と有効利用が必要であり、廃棄物で生計を立てている周辺住民（Waste Picker）も配慮しつつ、今後新しい廃棄物管理政策を策定していくことが望まれる。

キーワード：リサイクル、固形廃棄物、エネルギー回収、コンポスト、焼却、パートナーシップ

## 1. Introduction

This paper tackles the disposal and recycling of MSW<sup>i</sup> in Metropolitan Manila which serves as the National Capital Region <sup>ii</sup>(NCR) of the Philippines. As of year 2003, the population count of Metro Manila is 11,989,297 or approximately 12 million with an average family size of 4.63 persons. Total land area is 636 square kilometers which accounts for approximately 0.02 percent of the country's total land area<sup>iii</sup>.

Metropolitan Manila is composed of 17 Local Government Units<sup>iv</sup> (LGUs), 14 of which are classified as cities while 3 are classified as municipalities. Economically, it is the center of trade, commerce and industry in the Philippines. Amidst the economic development that is happening in the Metropolis, it is also faced with the daunting challenge on how it will solve its escalating garbage problem. The Asian Development Bank (ADB) in its report<sup>v</sup> describes Metro Manila as a "Metropolis in Crisis." The lack of environmentally-sound disposal facilities and the low rates of waste reduction and recycling are two major reasons for the crisis. Appropriate environmental legislations have been put into effect but serious implementation is still lacking.

## 2. MSW disposal and recycling

MSW constitutes a large chunk of the environmental problems that Metro Manila is faced with. The figure below shows the waste composition of Metro Manila:

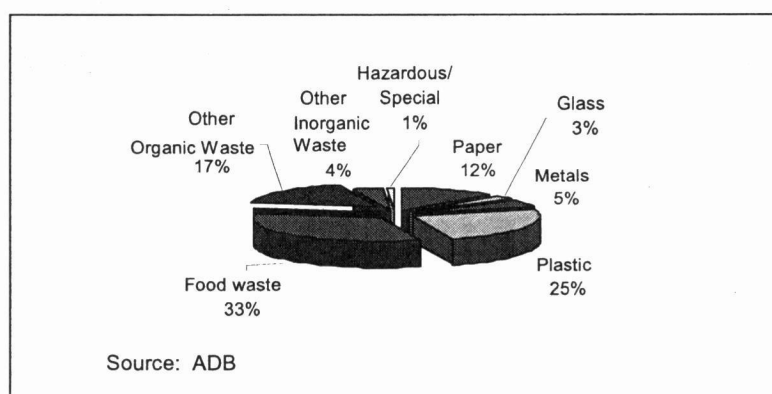


Fig . 1. Metro Manila Waste Composition (2003)

The daily garbage generation in Metro Manila is 6,600 tons with a per capita waste generation of 0.56 kg/person/day. The mode of collection is through house-to-house collection either by contract or by administration. About Php3.54 billion (\$64 million) or an average of about Php1, 450 (\$26.50) per ton is spent on garbage collection and disposal. LGUs spend from 5% to 24% of their total expenditures on garbage collection and disposal with an average of approximately 13%. Collection efficiency in urban areas is 70% while 40% in rural areas. <sup>vi</sup>

Daily waste generated in the Metropolis is thrown or handled in various means. Figure 2 shows the volume of waste thrown into controlled dumpsites, thrown into streets or burned, recycled and composted.

The figure below shows that the percentage of waste that is recycled and composted constitutes only 11% of the daily waste generation. About 84% goes to controlled dumpsites<sup>vii</sup> and 5% is illegally disposed.

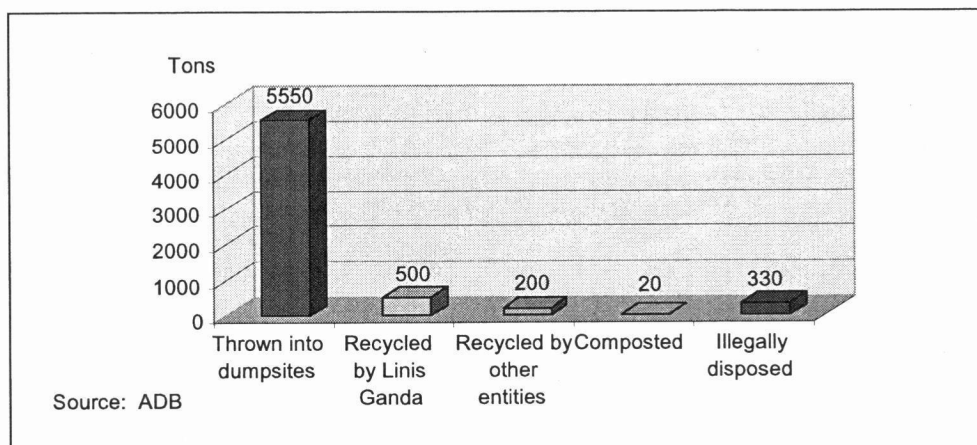


Fig. 2. Handling Methods for Metro Manila's MSW

On the other hand, the figure below shows the waste generation forecast for the period 1997-2025:

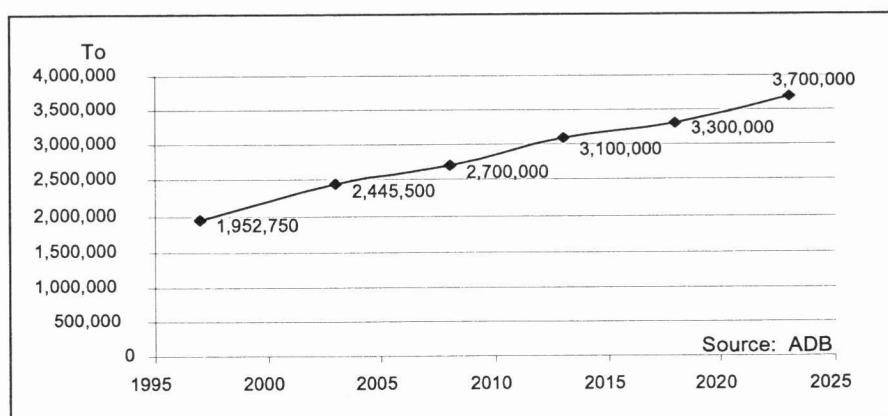


Fig. 3. Waste Generation Forecast

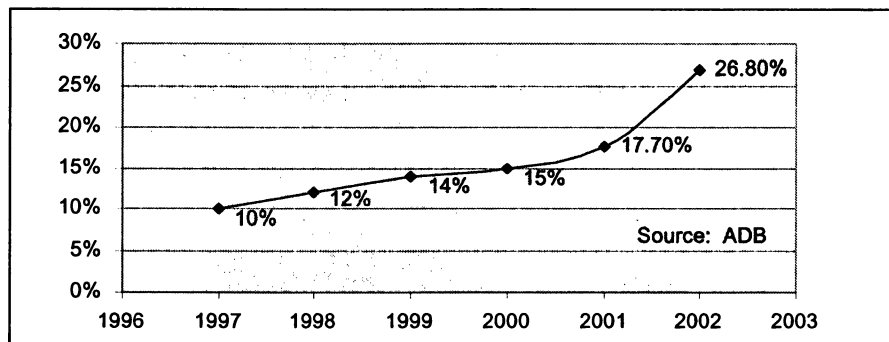
The volume of waste is expected to go up vis-à-vis the increase in population of Metro Manila. It is projected that Metro Manila generates more than 2 million tones of potentially recyclable household materials yearly. However, only 26.8% was recovered in 2002 by the Linis-Ganda<sup>viii</sup> network at a cost of Php230 million (US\$4,181,818). Based on records, Linis-Ganda recovered recyclable materials (e.g. paper, glass/bottle and plastic) from 1997 to 2002 with the following figures:

Table 1 Recycling Rate<sup>ix</sup>

Year	Volume (in tons)	Cost in Philippine Peso	Recycling Rate
1997	69,406	P95,231,700.00 (US\$1,731,485)	10%
1998	78,601	P105,811.00 (US\$1,924)	12%
1999	95,569	P124,631.00 (US\$2,266)	14%
2000	101,850	P132,530,500.00 (US\$2,409,645)	15%
2001	120,162.37	P157,188,155.00 (US\$2,857,966)	17.7%
2002	182,051	P231,600,000.00 (US\$4,210,909)	26.8%

Source: ADB

Figure 4 below shows, in graphical figure, the recycling rate of Metro Manila for the period 1997-2003:



**Fig. 4. Recycling Rate**

The notable increase in the recycling percentage in year 2002 can be attributed to the increased collection efficiency of Linis-Ganda brought about by its intensive house-to-house buying operations<sup>x</sup> and the increased participation of households.

### 3. Current regulations and measures for recycling and reuse

The Philippines is abound with laws in the area of environment and sanitation.<sup>xi</sup> There are at least 23 issuances specifically executive orders, department orders, presidential decrees, circulars and ordinances. Aside from these, LGUs also have their own issuances which form a complex web of laws on waste management. The ADB report cited the fact that, in some ways, the large number of issuances tended to be confusing and complicated for the stakeholders. However, it also recognized that the issuances were implemented over time as a result of changing needs and situations.

There are major legislations governing solid waste in the Philippines. They are worth to be highlighted in view of the fact that they act as triggers in the pursuit of the policy on reduction, reuse and recycling. These are:

#### (1) Local government code of 1991 (Republic Act 7160)

This code devolved a lot of functions from the national government down to the local government units in areas such as of solid waste collection and disposal. Cities and municipalities are responsible for solid waste disposal while barangays take care of collection. It also provides LGUs with the power to levy fees and collect taxes such as solid waste management fees or “user fees.” These refer to fees usually collected by the LGU from the residents and enterprises for solid waste collection and disposal.

#### (2) Clean air act of 1991 (Republic Act 8749)

This law addresses air pollution in the Philippines. Its salient provisions are prohibition of incineration of MSW, biochemical and medical wastes and phase out of incinerators by July 2003.

#### (3) Metropolitan Manila development authority act of 1995 (Republic Act 7924)

Metropolitan Manila Development Authority (MMDA) was created to oversee the management and implementation of metro-wide services such as traffic, flood control and solid waste management, among others. Specifically, it is tasked to formulate programs and projects related to sanitary waste disposal, establishment of sanitary landfills and related facilities. It also promotes reduction, reuse and recycling.

#### (4) Ecological solid waste management act of 2001 (Republic Act 9003)

This is the most comprehensive piece of legislation on solid waste management in the Philippines. Its major provisions are mandatory segregation of waste, recycling and composting; prohibits use of open dumpsites<sup>xii</sup> and requires establishment of sanitary landfills for final disposal; requires recycling centers to be set up in every barangay and requires LGUs to come up with ten-year SWM plans. It also establishes the National Solid Waste Commission (NSWMC) to

provide policy and technical support to the national solid waste management program. Among other things, its specific functions <sup>xiii</sup>include:

- Prepare the national solid waste management framework;
- Approve local solid waste management plans in accordance with its rules and regulations;
- Review and monitor the implementation of local solid waste management plans; and
- Coordinate the operation of local solid waste management boards in the provincial and city/municipal levels.

In addition, this Act has specific timetable for the compliance of the following requirements:

**Table 2 RA 9003 Requirements**

Requirement	Date
Reclamation centers & buyback centers for recyclables	January 2002
Inventory of markets for composts	July 2002
Inventory of waste disposal facilities	July 2002
National SWM Status Report	July 2002
Inventory of existing markets for recyclables	July 2002
National SWM framework	July 2002
List of non-environmentally acceptable products	January 2003
Mandatory 25% SWM diversion	January 2007
No new open dumps	January 2002
Convert open to controlled dumpsites	January 2005
No controlled dumps	January 2007

Source: ADB

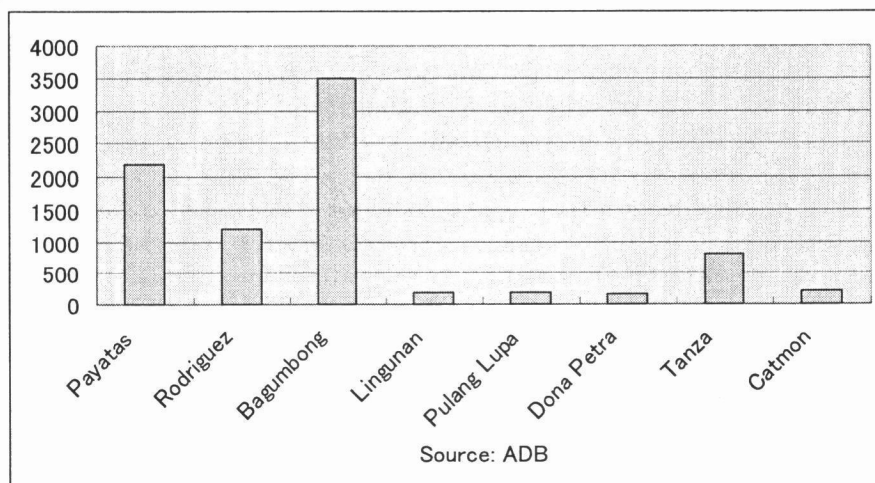
Some of the targets have passed without meeting adequately the requirements and some are fast approaching without clear “catching up plans.”<sup>xiv</sup> There is, thus, a need for the government to allocate political will and finances for the speedy compliance of RA 9003 requirements.

#### 4. Main issues on solid waste management in Metropolitan Manila

##### (1) Uncontrolled dumping

MSW disposal remains a critical problem in Metro Manila. The absence of sanitary landfills is worsening the situation with residents, communities and even industries throwing their garbage in the streets and water bodies indiscriminately. Open burning is also a common practice among households and it is contributing significantly to greenhouse gas emission. In the dumpsites, hazardous wastes are present which pose danger to around 4,000 <sup>xv</sup>waste pickers living within the vicinity. The ADB study reported that Rodriguez and Payatas dumpsites generate an estimated 26 kilograms of lead and 76 kilograms of arsenic annually.

Previously, there were two existing landfills for Metro Manila – Carmona and San Mateo landfills. Both were closed in 1998 and 2000, respectively, due to public opposition as a result of poor maintenance of the facilities. Now, the Metropolis is operating eight (8) controlled dumpsites whose life will end in 2006, as per facility design. As there are limited identified areas for



**Fig. 5. Metro Manila Dumpsite Capacity, 2004**

new disposal sites, the plan of the government is to convert some of these dumpsites into sanitary landfills for continuous use. Figure 5 shows the dumpsites of Metro Manila and corresponding capacities in tons.

Currently, a sanitary landfill is being constructed within the Rodriguez facility which will serve Metro Manila. Another site on the horizon is in Quezon Province. Clark sanitary landfill in Pampanga is now operational serving few cities in Metro Manila.

## (2) Opposition to incineration

The passage of the Ecological Waste Management Act of 2001 is a milestone in the struggle of NGOs and environmental groups (e.g. religious and academe-based groups) to do away with incineration. Their arguments come from the perspective of ecological waste management which skips burning as a treatment method for solid waste. Rather, recycling and composting are promoted as environmentally acceptable methods. Main arguments <sup>xvi</sup>against incineration are the following:

- Incineration is the most costly of all waste management options;
- It has detrimental impact on recycling level (e.g. plastic, paper and yard debris will be burned for BTU value which can be otherwise used as raw materials);
- It precludes economic development and job creation;
- It causes pollution; and
- It prevents implementation of less costly and less polluting alternatives.

But opposition to incineration is also countered by some quarters, like some Metro Manila Mayors, who argue that it will solve the limited space of Metro Manila for dumpsites. Likewise, it can also be argued that MSW in the Metropolis have high calorific value due to increase in the volume of plastic disposed of. Thus, it is suitable for incineration. Moreover, there are limited appropriate recycling technologies for plastic. Adopting incineration, however, requires amendment to the law.

## (3) Low recycling technology

In Metro Manila, Community-based Solid Waste Management Projects (CBSWM) have been operational even before the passage of RA 9003. To date, there are at least 16 major CBSWM doing recycling and composting. These projects were initiated by NGOs and people's organizations with little support from the government.<sup>xvii</sup> Specific activities range from recycling, which involves manufacturing of handicrafts using recyclable materials, and composting which refers to the processing of biodegradable waste materials into fertilizer for gardens and plants.

### a. Recycling

Material Recovery Facilities <sup>xviii</sup>(MRFs) exist in barangays where recyclable materials such as glass, paper, plastic and metal are segregated and stored until such time that they are sold to junkshops or buyers. Other communities convert recyclable materials into new products. The income derived from selling these products serves as local revenue for the community. Table 3 shows the list of communities in Metro Manila having recycling projects.

Out of 16 CBSWM Projects, 5 of them undertake recycling of non-biodegradable materials. There may be smaller communities or individuals doing recycling but remains unaccounted in the absence of monitoring mechanisms.

Worth highlighting in this report is the handicraft-making enterprise of Barangay Ugong in Paig City where recycled tetra packs are converted into bags and other handicraft products. It is an initiative of an NGO named KILUS Foundation based in Barangay Ugong, Pasig City in partnership with the local government unit. Their project was showcased in the World Trade Exhibition Center in 1999. Currently, the project employs 150 employees including 44 cleaners and 7 staff.<sup>xix</sup>

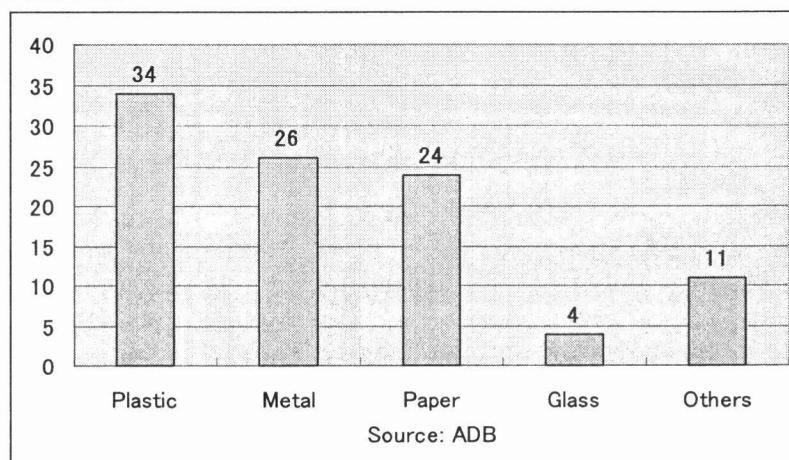
**Table 3 Community-based recycling projects in Metropolitan Manila**

City/Municipality/Barangay	Livelihood Project	Market
Mandaluyong (Barangay Barangka Itaas)	- Gardening in pots using recycled coke and mineral water containers	Local
Pasig (Barangay Ugong)	- Bag production out of recycled packs	Denmark, Belgium, Japan, USA, Netherlands & Holland
Quezon City (Barangay Blue Ridge A)	- Gardening in pots using recycled containers	Local
Quezon City (Barangay Bagumbuhay)	- Propagation of ornamental plants using compost and recycled containers	Local
Quezon City (Barangay Holy Spirit)	- Bag production out of tetra packs; vulcaseal from Styrofoam; vinegar from banana peelings; ropes from grocery bags; charcoal from wastepaper; decorative masterpieces from soft drink straws	Local
Quezon City (Barangay Talalwan)	- Rug making using old clothes	Local

Source: ADB

**b. Recycling markets**

As mentioned previously, there is a network in Metro Manila which buys recyclable materials from households. Linis Ganda, in turn, sells these materials to companies. Some like Barangay Ugong use recycled materials as raw materials in livelihood projects. As per the report of the ADB, Linis Ganda coordinates with recyclers' association such as the Pulp and Paper Manufacturing Association (composed of 18 paper mills) for its recovered paper materials; Metro Manila Plastic Recyclers Association (composed of 16 plastic companies) for its recovered plastic materials. It is also planning to establish partnership with glass factories like San Miguel Corporation and steel mills like Cathay Steel and Milwaukee Corporation. Figure 6 shows the number of recycling companies in Metro Manila:



**Fig. 6. Number of Recycling Companies in Metro Manila**

Plastic companies dominate the recycling arena followed by metal, paper and glass. The ADB report also found out that the market for wastepaper is large. However, only 10% could be met and the rest is imported as locally collected wastepaper is not acceptable to companies due to contamination. Other private sector initiatives <sup>xx</sup> include the following:

- Coca Cola Bottlers Philippines Inc. recycles soft drinks containers into aluminum sheets and tubes for various consumer products including mobility aids for people with disabilities. It

has also begun recycling PET bottles which are turned into flakes and exported to China for processing into garments and carpet. The program has recovered 4.1 million aluminum cans and 3 million PET containers.

- Polystyrene Packaging Council of the Philippines, composed of 21 foam polystyrene producers, has set up a recycling plant for packaging waste. So far, it has recovered 8,000 cubic meters of used packaging materials in 2003.
- The Philippine Recyclers, Inc., Bantay Kalikasan and DENR have started a campaign to recover used lead-acid batteries. It has recovered 204 tons in 2003 and 340 tons in 2004.
- San Miguel Corporation plans to set up three PET recycling plants in partnership with the government.

### c. Composting

Composting projects in Metro Manila use two types: a) Mechanical type or electrically-operated and b) Natural type with natural process of decomposition.<sup>xxi</sup> There are 7 communities using the former and 4 communities using the latter. Table 4 shows the compost production capacity and the reported average actual volume of production from the 7 communities:

**Table 4 Compost production capacity and actual average volume of production**

Barangay	No. & Capacity of Composting Drum	Estimated Production (kg/Day)	Reported Actual Average Production
1. Bagumbuhay	1 unit 2 ton capacity	200	24 sacks/month
2. Barangka Itaas	3 units 2 ton capacity	600	700/1,000 kg/week
3. Escopa	20 units 12 kg. capacity	24	12 sacks/month
4. Philam	4 units 2 ton capacity	800	2,000 kg/week
5. San Antonio	2 units 2 ton capacity	400	100 kg/day
6. Sun Valley	2 units 2 ton capacity	400	2,500 kg/week
7. Ugong	1 unit 2 ton capacity	200	60 sacks/month
<b>TOTAL</b>	<b>13 units 2 ton capacity</b>	<b>2,600</b>	<b>898</b>
	<b>12 units 12 ton capacity</b>	<b>14</b>	<b>5</b>

Assumptions: Composting facilities are utilized at full capacity; composting period before compost is harvested is 5 days; 50% is the biodegradable material to compost conversion rate; per sack equivalent is 12kgs.

Source: ADB

Markets for compost products remain low compared to the potential supply from Metro Manila. Currently, the composting facilities can only process around 20 tons/day of waste for composting and produce a total of 10 tons/day. <sup>xxii</sup> Based on the computation of ADB, a total of 2,143 tons of biodegradable household waste is estimated to be generated daily with a potential daily production of 1,074 tons of compost. This figure is too high compared to the demand for compost product in the Metropolis.

## 5. Waste management options

### (1) Energy recovery

As can be gleaned from the waste composition of Metro Manila, solid waste in the dumpsites are high in organic and moisture content but low in calorific value.<sup>xxiii</sup> Therefore, the most appropriate treatment is composting and sanitary land filling. But existing dumpsites in Metro Manila can also be harnessed to provide energy through landfill gas collection and use. It will also be beneficial in reducing greenhouse gases in compliance to the Kyoto Protocol via the Clean Development Mechanism (CDM). In the Philippines, several CDM-based projects are in the pipeline, including the Payatas Landfill Gas to Energy Project in Payatas, Quezon City. Now, the Payatas energy project is operational with an estimated annual greenhouse gas emission reduction of 35,843 MT.<sup>xxiv</sup>

The Payatas controlled dumpsite receives 1,470 tons or 7,000 cubic meters tons of MSW from Quezon City and other cities, on a daily basis. It has a total land area of 22 hectares. As of October 2002, there are about 2.46 million cubic meters of MSW and will have 52.3 million cubic meters of potential landfill gas (LFG) by the time it closes in 2007. <sup>xxv</sup> The project is a pioneering endeavor in the Philippines in utilizing LFG for electricity generation on a commercial basis. The plan is to build a 1MW power plant in Payatas.



**Table 5 Payatas Landfill Gas to Energy Project**

Plant Size	1.0 MW
Total Plant Cost	USD 2,250,000
Electricity Price	USD0.04/k/kWH
Project Life	10 years
Plant Efficiency	25-30%
Heating value of Gas	500 BTU/standard feet <sup>3</sup>
Operating Hours	8000 hours/year
No. of beneficiaries	2,000

Currently, what has been installed is a 100kw test plant which commenced operation in March 2004. An estimated 427,314 tons of CO<sub>2</sub> emission reduction over 10 years will be generated from the project. <sup>xxvi</sup>

### **(2) Metropolitan Manila towards a recycling-oriented metropolis**

The goal towards a recycling-oriented society, in the case of Metropolitan Manila, cannot be done overnight. Developed countries like Japan and Korea underwent a long transformation process until time came that recycling became an institution. Similarly, the Philippines will pass the same stage. Right now, what is necessary is the strict implementation of RA 9003 which calls for the eventual implementation of the following:<sup>xxvii</sup>

- Reduction of MSW volume
- Improve recycling consciousness
- Inventory of existing markets for recyclable materials
- Eco-labeling
- Reclamation programs and buy-back centers
- Identification of non-environmentally acceptable products
- Prohibition on the use of non-environmentally acceptable products

To facilitate its implementation, an integrated approach towards MSW management is necessary combining education, enforcement, incentives and engineering as key ingredients.

### **(3) Partnership and communication**

The keyword nowadays in the field of sustainable development is partnership<sup>xxviii</sup> among stakeholders. To achieve success, waste management strategies should be viewed from various angles depicting the needs and aspirations of players such as waste pickers, NGOs, community organizations, private enterprises and LGUs. Each has an important role to play and the mode of partnership varies. It is important that for MSW management to be attractive and sustainable, the spirit of entrepreneurship should be further stimulated as finances will be required. Thus, partnership among the stakeholders can be made through the following:<sup>xxix</sup>

- Joint ventures
- Local sustainable development projects
- Multi-stakeholder initiative
- Alliances and relationship of mutual trust

The government cannot do it alone. Technical capability requirements and resources are overwhelmingly lacking on its side such that private sector participation is most welcome. The involvement of the academe is also needed in research and development. Now, their participation is quite weak and so the government must open its window to them. In the area of monitoring and evaluation, there should be a mechanism whereby private sector and civil society have a hand in assessing the progress of solid waste management initiatives. A monitoring system done solely by the government is certainly one-sided and does not invite ideas and innovations.

### **(4) Post-closure maintenance of dumpsites**

The mandatory conversion of open dumpsites into sanitary landfills poses additional requirements for the existing dumpsites. It entails post-closure measures to ensure that dumpsites do not put to risk the health and safety of residents. It also includes grading, final cover

materials and protective vegetation, drainage, environmental monitoring of groundwater and surface water, fencing, security and access roads.<sup>xxx</sup> Closed disposal sites can be aesthetically improved such as its conversion to forest areas or parks. Better still, they can be tapped as waste to energy zones where electricity is generated. The potential of the existing disposal sites at 100% for electricity generation is 50mW power plant at 80,000 operating hours.<sup>xxxi</sup> In addition, waste pickers can also be accommodated by taking them in as workers of MRFs. It will provide them decent livelihood and income. They can also be organized into recycling-based cooperatives which are self-sustaining organizations.

## 6. Conclusions

In this paper, the overall situation of disposal and recycling in Metro Manila was discussed. Emerging innovations were briefly tackled such as the Payatas project. It is seen that recycling in the Metropolis is moving at a phase where there is so much things to do. The need to adhere to the stipulations of RA 9003 will spell success. For one, waste segregation should be strengthened and adhered to by residents and institutions. Companies will have to gradually accommodate responsibility of their used products. Similarly, opportunities abound such as utilization of methane gas from dumpsites for electricity generation and the promising use of organic fertilizers in sustainable farming. On the social dimension, waste pickers can be organized to sustain their living. Certainly, formal recycling has a place for them. Figures matter too. The database of the government requires improvement. A program with inadequate data will not realistically move due to lack of baseline information. To achieve this, the monitoring and evaluation aspect should be a shared task of the private sector, civil society and LGUs. In that way, information is transparent, shared and cross-checked.

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<sup>i</sup> Refers to non-hazardous waste generated in households, commercial and business establishments, institutions and non-hazardous industrial process wastes, agricultural wastes and sewage sludge. Philippines Environment Monitor 200, p. 28.

<sup>ii</sup> The Philippines is composed of 17 Administrative Regions divided according to cultural and ethnological characteristics.

<sup>iii</sup> National Statistics Office

<sup>iv</sup> The Philippines is divided into a hierarchy of local government units consisting of provinces, cities, municipalities and barangays with the latter as the smallest local government unit.

<sup>v</sup> Asian Development Bank, Metro Manila Solid Waste Management Project (September 2003) TA 3848-PHI, ADB Philippines.

<sup>vi</sup> Department of Environment and Natural Resources (DENR), National Solid Waste Management Commission

<sup>vii</sup> A controlled dump refers to a disposal site at which solid waste is deposited in accordance with the minimum prescribed standards of site operation. Ecological Solid Waste Management Act of 2003, Section 3.

<sup>viii</sup> Linis-Ganda Foundation, which means clean and beautiful in Filipino, is a federation of recycling cooperatives in Metro Manila with 17 multi-purpose cooperative members representing 17 cities of Metro Manila; 572 member junkshops; 2,500 junkshop workers; 1,200 eco-aides and 132 drivers.

<sup>ix</sup> Recycling rate is computed by multiplying the estimated tons of recycled waste of 678,773 tons/year with the volume of recyclable waste recovered by Linis Ganda. ADB Report.

<sup>x</sup> ADB, Study of Markets for Recycled Solid Waste, Report No. 5c, (2003), p. 7.

<sup>xi</sup> ADB, Laws and Regulations, Report No. 6 (2003), p. N.

<sup>xii</sup> Refers to a site used to dispose of municipal solid waste without management and/or environmental controls. Philippine Environment Monitor 2001, p. 28.

<sup>xiii</sup> Republic Act 9003, <http://www.psdn.org.ph/pcsdnet/ra9003.htm>.

<sup>xiv</sup> ADB, Laws and Regulations Report No. 6 (2003), p. NM.

<sup>xv</sup> ADB, Metro Manila Solid Waste Management Project, Summary Report No. 1(2003), p. aaa

<sup>xvi</sup> The Institute for Local Self-Reliance, Wasting and Recycling in Metropolitan Manila, Philippines (October 2000), pp. 6-7.

<sup>xvii</sup> ADB, Assessment of Community-Based Recycling Report No. 5a (2003), p. 2.

<sup>xviii</sup> Facility that processes residentially collected mixed recyclables into new products (Philippines Environment Monitor Report 2001), p. 28.

<sup>xix</sup> ADB, Assessment of Community-Based Recycling, Report No. 5a (2002), p. 38.

<sup>xx</sup> Philippines Environment Monitor 2004, p. 20.

<sup>xxi</sup> Ibid, p. 5.

<sup>xxii</sup> ADB, Study of Markets for Recycled Solid Waste, Report No. 5c (2003), p. 2.

<sup>xxiii</sup> Philippines Environment Monitor 2001, p. 8.

<sup>xxiv</sup> Joyceline A. Goco, "The CDM-DNA in the Philippines," presentation delivered during the Japan Carbon Investors Forum, Tokyo, Japan, 24 March 2005.

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- <sup>xxv</sup> Mitsubishi Securities, Project Document for the Payatas Landfill Gas to Energy Project in the Philippines (March 2004), p. 3.
- <sup>xxvi</sup> Ibid, p. 11.
- <sup>xxvii</sup> Section 26-29 of RA 9003.
- <sup>xxviii</sup> Defined as "people and organizations from some public, business and civil constituencies who engage in common societal aims through combining their resources and competencies sharing both risks and benefits. UNEP, The Stakeholder Engagement Manual (July 1995), Glossary of Terms.
- <sup>xxix</sup> Ibid, p. 14
- <sup>xxx</sup> ADB, The Garbage Book (March 2004), p.49.
- <sup>xxxi</sup> Pascual Ricky Beltran, Landfill Gas to Energy CDM Projects – Barriers and Solutions to Financing, presentation made during the Financing Modalities of CDM Conference, Jakarta, 27 June 2005.