Chapter 3

Study on Recyclables Collection Trends and Best Practices in the Philippines

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CHAPTER 3

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1. Introduction

In the Philippines today, the annual solid waste generation rate is about 10 million tons (36,000 cum), which translates to approximately 0.3 - 0.7 kg daily of garbage for each Filipino, which the World Bank estimates to grow by 40 percent by the end of the decade (Philippine Environment Monitor 2004, World Bank). Much of this is concentrated in the urban areas where up to 44 percent of this waste is recyclable. Recycling thus offers some of the most pragmatic solutions to reduce the volume of generated waste.

The Philippine Ecological Solid Waste Management Act of 2000, defines recycling as "the treating of used or waste materials through a process of making them sustainable for beneficial use and for other purposes, and includes any process by which solid waste materials are transformed into new products in such a manner that the original products may lose their identity…"[2] It is differentiated from *Reuse* in which there is no alteration of the physical or chemical characteristics of the recovered material.

Though not yet quite a pervasive practice, organized recycling in the Philippines has picked up in recent years. According to the National Solid Waste Management Commission (NSWMC), recycling rates have been increasing, particularly in Metro Manila, from 6% in 1997; 13% in 2000; and 28% in 2006 (Andin, Z; NSWMC, 2007)[3] . Among the major reasons for this improvement are the following: the implementation of RA 9003, the grassroots SWM/ recycling movement, and the market forces.

2. Drivers for Recycling

Many members of the older generation claim that recycling is not new to the Filipino. This is true at the individual household level where food jars are reused, old furniture are refurbished/transformed to other uses, and even leftover lunch is "recycled" into new dinner fare. The advent of modern day lifestyles and a consumer

[2] Ecological Solid Waste Management Act of 2000 – Implementing Rules and Regulations of Republic Act 9003, Department of Environment and Natural Resources – Environmental Management Bureau.

[3] Atty. Zoilo Andin, Jr., Executive Director, NSWMC. *Philippine National Strategy on 3R*, paper presented at The 3R Workshop on Effective Waste Management and Resource se in Southeast Asia, February 15, 2007, Asian Development Bank, Manila.

/convenience– oriented society has however spawned a throw away mentality. But recycling is making a comeback.

2.1. The Legal Basis

One of the reasons for recycling is that the government has finally laid down a clear policy on solid waste management through the Republic Act 9003. This act essentially upgraded the cleanliness and anti–littering ordinances into a more cohesive national law to deal with the growing garbage crisis in the country. It defined a 3R Policy, Framework and Strategy for a systematic, comprehensive and ecological solid waste management program based on the waste management hierarchy which, in a nutshell, can be described as: Waste Avoidance, Reduction, Reuse, Recycling, Treatment and Disposal (Andin, Z; NSWMC, 2007).

The NSWMC, established under the Office of the President, is tasked to oversee the implementation of SWM plans for which the lead agencies are the LGUs, starting with the barangays (i.e., the smallest unit of government at the village level). The LGUs are mandated to develop their own Local Government SWM plans, based on the assessment of their local SWM situation and a characterization of their waste. They are required to achieve an initial 25% waste diversion target, through a combination of waste reduction, recycling and composting programs.

2.2. Grassroots SWM and Recycling Movements

While the law is not yet fully enforced and huge gaps exist with its implementation, grassroots movements driven by local governments and environmental organizations have helped provide impetus for community–level waste segregation, collection and recycling activities. The Department of Environment and Natural Resources (DENR) and the NSWMC lists fourteen government agencies and NGOs offering training on integrated solid waste management (ISWM) in its 2004 ISWM Source Book for Local Government Units[4]. In addition to this, the outreach activities of LGU–ESWM units, corporate foundations, and environmental groups such as the Recycling Movement of the Philippines, the Solid Waste Management Association of the Philippines (SWAPP), the Eco Waste Coalition and other school/church–based programs which conduct advocacy activities for sustainable

[4] Integrated Solid Waste Management Source Book for Local Government Units, Volume 2: Organizations Offering Training on ISWM, DENR – Philippine Environmental Governance Program, 2004.

waste management and community–level programs also provide livelihood opportunities from the transformation of post–consumer waste into functional as well as decorative items, like bags, belts, containers/ baskets, desk items, bricks/ hollow blocks. There is no comprehensive listing available for smaller, local level counterparts operating in the regions who conduct ISWM training on a continuing basis.

2.3. Waste Trade and Market Forces

A 2008 Japan International Cooperation Agency (JICA) Study on Recycling Industry Development in the Philippines[5] analyzed the macro scale material flow of scrap paper (newspaper, cardboard), scrap metals (iron, aluminum), glass bottles/ cullets, scrap plastic and electronic/electrical waste (i.e. cellphones, personal computers, junk TVs and refrigerators) for the period 2000–2004, using data from the Department of Trade and Industry (DTI) and the Bureau of Customs. The import/ export trend and recycling rate for these recyclables are summarized in Table 1.

The table above, shows high export volume for scrap iron/ steel, despite high domestic consumption requirements. This could be due to the relatively favorable buying price of scrap metals in the region, although actual export earnings are not indicated. Export of waste plastic is also high, possibly because there was not enough local capacity to recycle plastic during the period indicated. Hence the low importation and recycling rate for waste plastic at only 8.4%. High importation of waste paper and glass cullets help to meet the local recycling requirements which for paper is at 41.2%; and for glass at 48.5%. Low import volume of aluminum scrap may suggest that much of the aluminum recycling requirement scrap needed for local recycling may come from finished or semi-finished products.

Table 1. Macro Scale Material Flow of Selected Recyclables

	Import Volume (tons/yr)	Import Cost (million Pesos)	Export Volume (tons/yr)	Export Earnings (million Pesos)	Domestic consumption rate		Current recycling rate
					tons/ yr	(kg/cap/ day)	

[5] Study on Recycling Industry Development in the Philippines, Board of Investments – Department of Trade and Industry, and Japan International Cooperation Agency, 2008 .

Waste paper	388,553	2,446	7,542	51.6	1,559,510	0.049	41.2 %
Scrap iron/steel	22,000	not given	862,000	not given	3,137,000	not given	not given
Scrap aluminum	2,000	not given	19,000	not given	97,000	not given	not given
Glass cullet	2919	33,9	73	8.1	427,192	0.013	48.5%
Waste plastic	14,900	194	44,476	676.7	691,911	0.022	8.4%

**note: figures for imported finished products from which some of the waste is derived are not reflected in this table.*

Table 2, on the other hand, summarizes the major countries to which the recyclable wastes are exported to, or imported from.

Table 2. Recyclables Trade for the Philippines[6]

	Countries from which the Philippines Imports Recyclables	Countries to which the Philippines Exports Recyclables
Waste paper	Australia 22.7% Japan 17% Others: USA, HK, Germany, UAE, New Zealand, Netherlands, Singapore	Indonesia 46.2% China 22.7% Singapore 10.2 % Others: VN, India, Thailand, Taiwan, South Korea
Scrap iron	China 51.3% Others: Taiwan, Palau, HK, Singapore, Korea, VN, Japan	Taiwan 47% Thailand 14.2%, Singapore 13.8% Others: China, India
Scrap aluminum	Malaysia, 38.1%; Korea 21.7% Others: China, Japan, Taiwan, India, Thailand, Singapore, HK	Japan 45.7%; UAE 27.7% Others: Singapore, China, VN, India, Thailand, Korea, Italy, Australia
Glass bottles	China, 88% Others: Japan, Australia, Taiwan, Malaysia, UK	Japan 99.8% and UK 0.2%
Waste plastic	Germany 33.7%, India 13.75, Japan 12.5% Others: S Korea, Netherlands, S Africa, Singapore, Taiwan, USA, Malaysia	HK 44.8% China 35.2 % Others: Taiwan, Malaysia, S Korea, Tanzania, Nigeria, S Africa, VN

[6] Study on Recycling Industry Development in the Philippines, Board of Investments – Department of Trade and Industry, and Japan International Cooperation Agency, 2008

In most cases, the biggest export market of the Philippines for recyclable wastes appears to be to its neighbors in the region. Whereas the biggest source of its imports for waste paper and waste plastic are Western countries.

The global trade for recyclable material dipped considerably during the economic downturn in the past two years due to slowed down demand from manufacturers. Although this resulted in depressed buying prices and stockpiles of recyclables, the market has slowly begun to improve, and business has picked up for those involved in various aspects of recyclables trading, such as collectors, consolidators, bulk buyers, waste traders/ exporters.

Aside from its global market potential, more successful community–based recycling programs have shown that there is really money from recycling waste even by the small entrepreneur, and that a smaller yet promising market exists for finished products made from post–consumer waste. These entrepreneurs can take advantage of existing available technologies such as for laminates/ doy pack recycling, aluminum can/ tetra pak recycling, tarpaulin recycling, mixed waste recycling (e.g. into hollow blocks/ bricks) and others. Sales outlets for finished products tend to be limited (e.g. regional trade fairs, eco– products fair) and that large–scale marketing and commercialization, as well as quality control, continues to present challenges.

3. Overview of the Recycling Market and Recycling Industry

The 3Rs – Reduce, Reuse, Recycle – are strategies for dealing with generated waste, to reduce the volume that is needlessly thrown away and which takes up space in landfills. A sustainable SWM system however assumes that waste avoidance and reduction is priority before the 3Rs. In the Philippines, more headway is being achieved with the 3Rs than with waste avoidance since the latter requires an almost monumental shift in paradigm of the Filipino society and of the industry as a whole. While not ideal, this is welcome nonetheless, as recycling in itself brings many benefits.

3.1. Types and volumes of household and commercial recyclables

In Metro Manila, more than 50% of waste collected is organic/ biodegradable, and 44% is recyclable or factory–returnable. The latter is comprised mostly of scrap

paper (19%), plastics (17%), iron/metals (3%), aluminum (2%) glass (3%) and special hazardous waste (1%). [7]

The JICA 2008 Study on Recycling Industry Development in the Philippines projected the volume of total recyclable materials based on its percentage in the waste stream, as follows:

There are some variances with data from Mindanao in Southern Philippines, where five major types of recyclables are traded: glass, plastic, paper, lead acid batteries and metals, with the latter as the largest in terms of volume traded as well as income generated (i.e. 94% out of 70 junk shops included in a REECS survey). [8] These, however, rarely come from households. Waste paper and plastics are the least traded and thus more likely to end up in the landfills/ dumps, suggesting that collection and recycling opportunities for these materials (such as PET plastics) remain untapped.

The volume of e-waste in the country (whether as post–consumer waste or imported as e–waste) is less discernable due to the abundance of cell phones, cell phone batteries, personal computers/ computer parts brought in as secondhand items, through surplus shops or through the black market (i.e. smuggled). Major sources are from Japan, Korea, Taiwan, China, Hongkong, United States, and Australia either legitimately or illegally imported.[9]

[7] denr.gov.ph/nswmc/cbeswmp
[8] N. C. Lasmarias and R. S. Junio. "The Market for Recyclable Solid Waste Materials in Mindanao," Resources, Environment and Economics Center, 2006.
[9] Study on Recycling Industry Development in the Philippines, Board of Investments – Department of Trade and Industry, and Japan International Cooperation Agency, 2008.

Table 3. Recyclables Projection, 2006–2010

Materials	%	2006	2008	2010
Paper	19	3,601,317	3,856,274	4,129,280
Plastic	17	3,222,231	3,450,350	3,694,619
Iron	3	568,629	608,885	651,992
Aluminum	2	379,086	405,924	434,661
Glass	3	568,629	608,885	651,992
Total	44	8,339,891	8,930,318	9,562,544

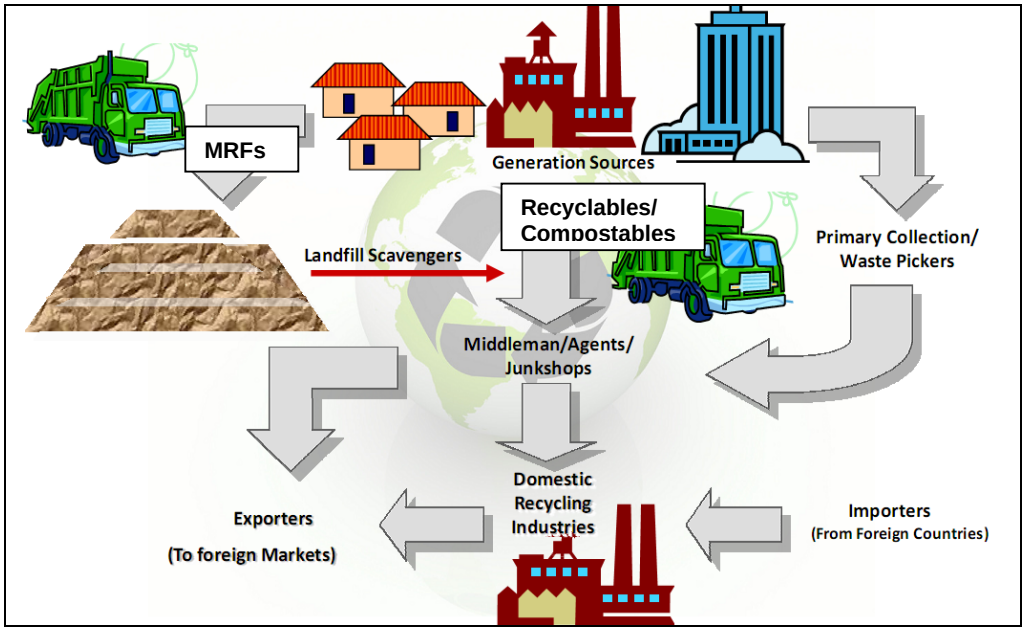
3.2. Methods/ mechanics of collection: LGU Collection and Voluntary Collection Schemes

Municipal solid waste from households is collected by garbage trucks either owned or contracted by the LGU through a bidding process. Waste are either disposed in the landfills or brought to waste facilities where they may be further sorted manually (by organized groups of scavengers as in the case of the Payatas, Clark and Montalban waste facilities) so that recyclables in the waste stream can be temporarily stored for eventual sale to private recyclers or for further processing or re- use. The most common practice is house-to-house collection and/or curbside collection of wastes placed in plastic bags or bins provided by the residents. Ironically, RA 2003 has resulted in negative impact to the organized waste picker groups, due to reduced volume of recyclables that reach the landfill and thus lowered their income too. . Nevertheless, landfill management is mandated to fully implement the law, but social preparation is needed to provide the waste pickers with alternative livelihoods when the landfills/ dumpsites finally close.

For some commercial–industrial waste, the collection service is tailored to individual requirements using large trucks/containers, or outsourced to accredited waste haulers. According to the NSWMC, average waste collection efficiency is 75% in urban areas and 40% in rural areas.

Segregated waste, including recyclables, is either collected separately (in some areas) or by junk shop cooperatives/ eco–aides and brought to barangay/ city MRFs. The MRF serves as a form of mini solid waste transfer or sorting station/ drop center, ideally having composting and recycling facilities. To date, there are 2,312 MRFs across the country, as mandated by RA 9003, with others still in the process of being set up by the majority of barangays.

Figure 1. Current Flow of Recyclables Collection



Source: Study on Recycling Industry Development in the Philippines, Board of Investments – *Department of Trade and Industry, and Japan International Cooperation Agency, 2008.*

At present, many informal, community-based and private sector collection and recycling projects also exist. The 2003 ADB Study surveyed existing community–based SWM activities in Metro Manila at that time. Its principal activities included the following:

- Recycling of non–biodegradable materials;
- Composting of bio–degradable materials; and
- Livelihood Projects;

Table 4. Surveyed CBSWM Initiatives, 2003 DENR-ADB SWM Project[10]

City/Municipality	CBSWM Pilot Site (Barangay)	Involved Organization*
Caloocan	Barangay 52	Barangay, MMDA,
Makati	Bel Air	Barangay, ZWRMPFI
	Forbes Park	Barangay, ZWRMPFI, ZKK
Manila	Barangay 833 (Pandacan-Shell)	Barangay, PiliPiñas Shell, ZWRMPFI
Mandaluyong	Barangka Itaas	Barangay
Muntinlupa	Tunasan: Sto. Nino/Park Homes	Homeowners, Barangay, City
Navotas	Tanza	Kaunlaran sa Kalikasan, Elem. School
Paranaque	Sun Valley	Barangay
	San Antonio	Barangay, City
Pasig	Ugong	Barangay, Kilus Kaunlaran
Quezon City	Bagumbuhay	Barangay
	Blue Ridge	Mother Earth, Barangay
	Escopa	Barangay, Mother Earth, ADB Staff
	Holy Spirit	Barangay
	Philam	PHAI, Barangay, Parish Church
	Talayan	Barangay, Mother Earth

*MMDA=Metro Manila Development Authority. ZWRMPFI=Zero Waste Recycling Movement of the Philippines Foundation, Inc. ZKK=Zero Kalat sa Kapaligiran Foundation. INC=Iglesia ni Cristo. PHAI= Philam Homeowners Association, Inc.

Voluntary waste collection schemes help to fill in the collection gap by capitalizing on the economic incentives to both waste generators and waste buyers and combining a business model with community livelihood projects. Many of these schemes are launched by NGOs, often in partnership with LGUs, and intended not only to recover recyclables but also to increase environmental awareness through public participation and partnerships. The examples of these activities are as follows:

3.2.1. For Household Collection

- *Households to Junk Shops* occur through LGU collection schemes which use *mobile MRFs* (in the city of Makati), or *eco–aides* (i.e., former street scavengers or cart–pushers/ *cariton boys* who have been organized and accredited by barangays or by the Metro Manila Federation of Multipurpose Cooperatives under the *Linis Ganda* Foundation to collect recyclable materials. The Federation includes 17 individual member multipurpose cooperatives representing the 17 local governments of Metro Manila; at least 572 junk shops, 2,500 junk shop workers, 1200 eco- aides and 132 waste truck drivers).[11] Outside Metro Manila, household collection is still most commonly

[10] Metro Manila Solid Waste Management Project, Department of Environment and Natural Resources/ Asian Development Bank, September 2003.
[11] The Garbage Book - Solid Waste Management in Metro Manila, Department of Environment and Natural Resources and the Asian Development Bank, 2004

done by individual cart–pushers who bring their collected recyclables to the junk shops.

- *Households to Junk Shops/ Recyclers* occur through *mall–based Waste Markets/Recyclables Collection Fairs* conducted regularly by two of the largest mall operators in the country, the SM Supermalls and the Ayala Malls. At these Waste Markets/ Recyclables Fairs, buying stations/ covered tents are set up to receive scrap paper or cardboard/ plastics/aluminum or tin cans; used ink/ toner cartridges, electronic waste/ "white" waste (such as junk appliances); and used lead acid batteries. Those who bring their recyclables are paid on the spot for the assessed value, based on prevailing market prices.

  These Waste Markets are part of the Corporate Social Responsibility (CSR) programs of the malls, who voluntarily provide portions of their commercial parking areas for the venue. Malls do not derive any profit or commission from the participating junk shops/ recyclers. The Ayala Malls hold their Recyclables Fair every Friday on a rotating basis at five of their malls in the Metro Manila area. The SM Supermalls hold their Waste Markets under their "Trash to Cash" program every first Friday and Saturday of the month at their 26 malls nationwide. Since they began their Waste Markets in 2007/ 2008, the Ayala Malls Group reported a collection of 46 tons equivalent to P267,000.00, and the SM Supermalls has collected 417 tons equivalent to P2.6 million.

  In addition, annual *Recyclables Collection Fairs* are held on Earth Day (April 22) and/or during Environment Month (June) in various parts of the country. These are part of environmental advocacy efforts of business groups/ chambers of commerce/ companies (e.g. Davao City Chamber of Commerce, MetroBank Group/ Manila Doctors' College, SMART Communications, Rockwell Land/ Lopez Group of Companies, ABS–CBN Broadcasting Network) in partnership with the Philippine Business for the Environment (PBE). To date, these Recyclables Collection Events (RCEs) have collected 2336 cu m. of recyclable materials worth P3,434,769.67 since they began in 2002, and channeled these to the local recycling industry. Extrapolated environmental benefits for the RCE collections thus far, are as follows:

Table 5. Summary of Environmental Benefits of RCEs

RCE Environmental Benefits	*2002-2009*
Number of trees saved:	3,154.20
Lead recovered (kgs)	329,134.78
Sulfuric acid treated (liters)	65,826.96
Base metals recovered (kgs)	88,165.82
Precious metals recovered (gms)	11,020.73
Toxic substances treated:	14,694.30
PET recovered (kgs)	6,502.76
Aluminum recovered (kgs)	2,835.02
Total Landfill space avoided (cu.m)	*2,336.32*
Total Equivalent (10 ton) dump trucks	*234*

Households to Manufacturing Companies –it mainly involves retrieval of special waste like used lead acid batteries, old/ broken cellphones / electronic devices, and used ink toners and cartridges.

The Philippine Recyclers Inc. (PRI), the only ISO 14001 certified used lead acid battery recycling operation in the Philippines, linked up in 2000 with the non-profit *Bantay Kalikasan* (Nature Watch) Foundation and the DENR for the *Bantay Baterya* (Battery Watch) program. This activity allows people to either turn in their used batteries for new ones at a discounted rate, or to donate the trade–in value to the *BK* Foundation for its environment projects, such as watershed protection and anti–smoke belching. The Program aims "to sustain public awareness on the health and environmental hazards posed by indiscriminate junk battery disposal, provide a long –term mechanism for reducing the number of improperly disposed junk batteries, and ensure a steady supply of raw materials for the production of new batteries. It targets to recover 20% of the estimated 200,000 batteries consumed each month nationwide, which goes underground to illegitimate smelters with limited lead recycling capabilities and improper handling of battery acid and powder form lead.[12] As of 2008, a total of 400,000 kilos of used lead acid batteries and

[12] 2008 Accomplishment Report, ABS CBN Foundation. www.abs-cbnfoundation.com

60,000 litres of sulfuric acid have been recovered through Bantay Baterya. This has also avoided 586 m^3 of landfill space.

Companies such as Globe Telecommunications, SMART Communications and Nokia Philippines have also organized *Used Cellphone Collection Programs* to enable the public to dispose their used units in cellphone collection bins in the malls and in Nokia Centers. These units are then shipped abroad for recycling. There is however competition with a thriving trade in used cellphones by which one can trade in an old unit for a newer model at over the counter cellphone repair shops that proliferate in commercial centers throughout the country and refurbish/ dismantle the old units for resale as secondhand mobile phones.

Ink Remanufacturers also abound in the cities nationwide, offering to buy empty cartridges and toners for refill or resale, at stalls they set up in public areas or during waste markets/ recyclable collection fairs.

3.2.2. For School–based Collection

- *Schools to Junk Shops/ MRFs* occur through one–shot RCEs similar to the one mentioned above. This is initiated by student councils, faculty or parent associations as part of their environment awareness campaigns; or through LGU-assisted continuing schemes such as those by the Makati City, Marikina City and Quezon City governments.
  - In Makati City, all of its 29 public schools have established their MRFs, and both public and private schools have partnered with the San Miguel Corporation for aluminum can and PET plastic bottle collection for a total of close to 2 million pieces from 2006–2008. The city government also organized a *"3B sa Pasko Program" (Bawasan, Balik – Gamitin at Baguhin ang Anyo*/ Reduce- Recycle and reuse) working with schools and livelihood cooperatives to recycle waste into holiday décor and gift items which are sold at Christmas bazaars. This

has raised about P200,000 from 2006–2008 and diverted more than 25,000 kg of garbage from the landfill.[13]

- Marikina City's Waste Management Office, in coordination with the Department of Education, introduced the Eco-Savers program in June 2004. This requires students to bring recyclable garbage from their respective households during an assigned Eco Day—the day when the garbage is going to be weighed and credited to their issued eco passbooks. Each of the 18 public elementary schools in the city is assigned a once a week Eco Day.

  Accredited junk shops weigh the recyclables, record these in the passbooks and haul all the recyclables collected. The recyclables are then valued according to the prevailing market price and reflected in the individual passbooks using a point system (PhP1.00 = 1 point). Points earned entitle the eco-saver to shop in the Eco-Savers Mobile Store, which visits the school twice within the school year. This mobile store carries educational materials such as dictionaries, books, school supplies and educational toys. An eco-saver only needs to present the passbook to purchase school supplies.[14]

  Records show that individual savings or points earned, within a school year period, ranged from PhP50.00 to PhP1,800.00, which helped reduce household expenses on school supplies. The Eco-Savers rogram has also decreased the cost incurred in the disposal of local solid waste. The 50 truckload-trips a day to the dumpsite went down to an average of 30 trips a day and has also contributed to traffic decongestion, less air pollution, and energy conservation. Moreover, the program has provided junk shops within the city with a regular supply of recyclable materials. Through this program, a total of 238,000 kilograms of waste with a monetary value of P1.3 million have been diverted from dumpsites. In 2007, the Eco–Savers Program of Marikina was recognized with a Galing Pook (Good Governance) Award, a joint

[13] Villas, D., Department of Env Services, City Govt of Makati, Presentation at SWAPCONN 2008

[14] www.galingpook.org/awardees/2007/2007_outstanding_marikina.htm

initiative of the Local Government Academy–Department of the Interior and Local Government (LGA-DILG), the Ford Foundation, and other individual advocates of good governance from the academe, civil society and the government.

- *Schools with Manufacturing Companies* – companies also partner with some schools to take back their used packaging/ discarded products in keeping with the concept of Extended Producer Responsibility (EPR), as follows:
  - The Coca Cola Bottlers Philippines, Inc.: launched several school–based schemes in partnership with the Department of Education (DepEd) and the DENR for the collection of both aluminum cans and PET bottles, using redemption schemes, school contests and trade–in programs.

    One such previous program dubbed as "Give a Can, Give Hope" involved a tie up of the Coca Cola Bottlers Philippines, Inc. (CBPI) (for the widespread collection of aluminum cans) with the Department of Education and the WG&A shipping company which shipped these cans from donors in the Visayas and Mindanao to Manila using its Superferry vessels. The cans were then turned over to the Reynolds Recycling Corporation, for conversion into aluminum tubings and sheets used for manufacturing low cost wheelchairs by the non–profit *Tahanan Walang Hagdan* / THC (House With No Steps) Foundation for Persons with Disabilities (PWDs).

    Another program was an incentives scheme in which schools racked up points for every kilo of PET bottles collected, which they could swap for school equipment (such as garden tools, school supplies, office equipment such as copiers and computers) from a pre– prepared menu of items. However, both Programs only ran for a limited period and were discontinued after CCBPI turned over the collection process to accredited consolidators.

  - Tetra Pak Philippines tied up with the non–profit *Linis Ganda Foundation* for the collection of used tetra pak cartons; and has also

donated collection bins to about 100 partner schools for pre– arranged pick up by consolidators for delivery to partner paper manufacturers such as the Trans National Paper Corp which recycle these into composite boards. These boards are either donated to Habitat for Humanity Philippines to be used as doors/ furniture for housing units, or given to THC whose resident craftsmen turn these into furniture, home and office accessories and gift items. The schools which collect the most volume of used tetra pak cartons are awarded cash prizes or chipboard items. Tetra Pak also partners with Global Paper Corp to recycle the used cartons into brown paper.[15]

3.2.3. For Commercial/ Business Collection

Companies to Junk Shops: The Ayala Foundation, which is the corporate foundation arm of the Ayala Group of companies, initiated a Partnership Project with Junkshops in Makati City where it owns and leases out 26 commercial and residential buildings. They partnered with the Metro Manila Federation of Environment Multi-Purpose Cooperatives (MMFEMPC) which designated authorized junk shop members to collect recyclable materials from specific assigned cluster of buildings using 4-wheel vehicle such as jeep or pick-up at specified hours. Use of carts and pedicabs was strictly prohibited. Collectors are required to wear T- shirt uniforms provided for them, carry duly signed authorization papers, and attend monthly progress update meetings. Building managers kept a detailed record of collection days and volumes, and payment for collected recyclable materials is done on a cash basis using a standard minimum price list that was regularly updated. The Program organized training and orientations for both the Building Managers and MMFEMPC members, and resulted in the publication of a SWM Instructional Manual for Building Administrators.[16]

- *Companies to NGOs* - as part of their CSR, many companies have found ways to deal with wastes from their marketing activities like banners and tarpaulins,

[15] www.tetrapak.com.
[16] Licos, A. Building Partnerships with Junk Shops. Presentation at SWAPCONN 2008.

while at the same time providing livelihood opportunities for communities and NGOs who turn these into functional materials like shopping bags, folders and envelopes. Examples of these tie ups are: Globe Telecommunications to Bantay Kalikasan, SMART Communications and the Earth Day Network; Unilever Philippines and the Smoky Mountain Foundation, Cebu Furniture Industries with RIBA/ Recycling Initiative of Bais City (Negros Oriental); Ayala Corp and Shangri – la Hotels with the Gifts and Graces Foundation. The latter, for example, aims to "improve the quality of life of marginalized members of society by providing product development and global market access to livelihood communities under the Gifts and Graces brand."

Companies to companies: Since 1996, the PBE has been managing the Industry Waste Exchange Program (IWEP), which operates as an Information Clearinghouse that matches waste generators and waste buyers, and promotes resource recovery through orientation sessions, company in–house seminars, Environmental exhibit/ trade fairs, case studies /publications, Waste Markets and RCEs, and IWEP ads in its quarterly *Business and Environment Magazine*. Manpower constraints make it difficult to track all possible waste exchange referrals, or offer services beyond referrals and promotion. Nevertheless, there have been several documented case studies of successful waste exchanges also being implemented as a geographic – specific program by the Davao City Chamber of Commerce and Industry in the Mindanao area, and the Eco-Industrial Exchange Network (Eco – Index) of industrial estates in the Laguna- Batangas area (north of Manila).

3.3. Recycling Technologies and Facilities

Upon reaching the recycling facility, the recyclables are transformed into useful raw materials or finished products through a variety of locally available technologies. There are large recycling facilities for paper, plastics, used lead acid batteries, scrap metals, electronics waste and glass. Cement plants also collect used tires for use as substitute fuel for their kilns (i.e. co–processing). Smaller, community recycling that are less capital–intensive also occur for laminates ("doy" packs) recycling and spent ink and toner cartridges. The Department of Science and Technology (DOST) – Industrial Technology Development Institute (ITDI) has

helped to promote many of these technologies with help from the ADB. Other residuals are processed into non – load bearing concrete materials (e.g. hollow blocks, benches, perimeter walls, traffic barriers) – palingenesis, hydromex technologies. [17]

New business opportunities have resulted in more environment service providers for the treatment of special and hazardous materials such as fluorescent lamps and bulbs and industrial waste like sludge and spent solvents. However, there is still much room for expansion here, and treatment costs are not always within the reach of smaller companies, especially those in the regions outside of Metro Manila / Luzon where such facilities may be sparse or non–existent. Thus, the uptake for these environment technologies needs to be hastened through information sharing, technical and financial assistance, incentives and, most importantly, political will.

A Recyclers' Directory at the NSWMC website lists 56 recyclers as follows:

Table 6. Recyclers Locations (based on NSWMC database)[18]

Type of Recyclables	No. of Recyclers[19]	Locations (in Luzon / around MetroManila)	Locations (other than MetroManila/ Luzon)
Plastics (HDPE, LDPE, PP, PS, PET, HIPS, PVC, Others	24	Valenzuela (14) Manila (2) Quezon City (2) Caloocan Laguna Mandaluyong Muntinlupa Parañaque	Cebu
Paper (newsprint, office paper, other White grades, corrugated cartons, paper boxes)	14	Makati (2) Pasig (2) Quezon City (2) Caloocan Cavite Laguna Malabon Marikina Pampanga	Davao

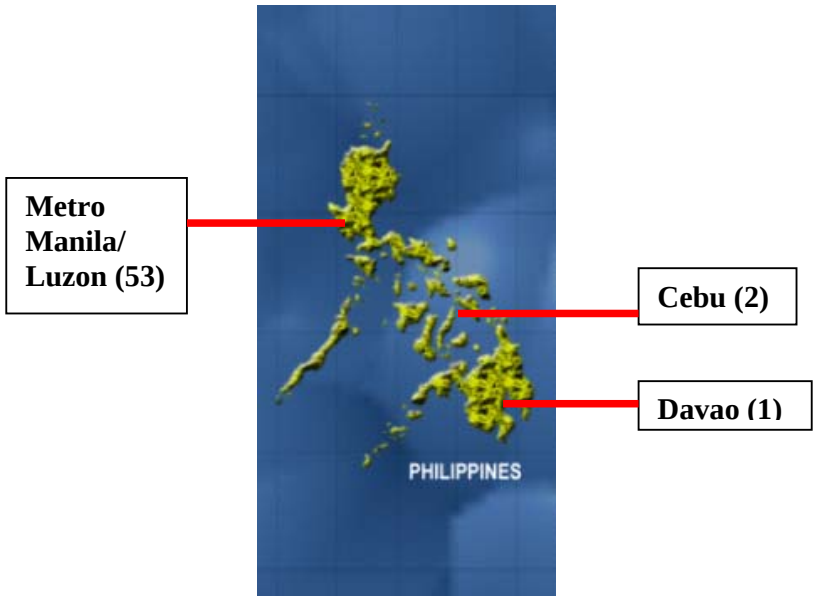
[17] www. denr.gov.ph; **www.dost.gov.ph**
[18] www.denr.gov.ph/nswmc**.**
[19] The PBE database lists 1 additional PET recycler in Pampanga, 2 additional electronics recyclers in Bulacan and Caloocan; and one additional tin can recycler.

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

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

The locations are visually depicted in the map below:

Figure 2. Location Map of Recyclers (from NSWMC database) - Philippines



The 2003 ADB Metro Manila SWM Study however states that there are about one hundred recycling companies and organizations in Metro Manila alone, with

Valenzuela City in the Bulacan province (north of Manila) having the largest concentration (as similarly reflected in the NSWMC database), mostly of plastics recylers.[20] This excludes junk shop operations which do more of waste segregation and trade rather than on–site recycling, with little investments in equipment, technology or trained personnel.

Some of these recyclers may have collection agents in the regions. However, the costs of transportation and shipping of recyclables from the provinces to Metro Manila where the recycling plants are located, can be a deterrent to sustained recycling programs in these areas. Also, many of the local recycling industries, in particular of paper, scrap metal, plastics are faced with stiff competition in the foreign market, especially China, which imports these at higher buying prices, and devours such materials to meet the demands of their growing economy.

4. Stakeholder Roles

From the reports mentioned above, we can summarize the various stakeholders in the recycling sector as follows:

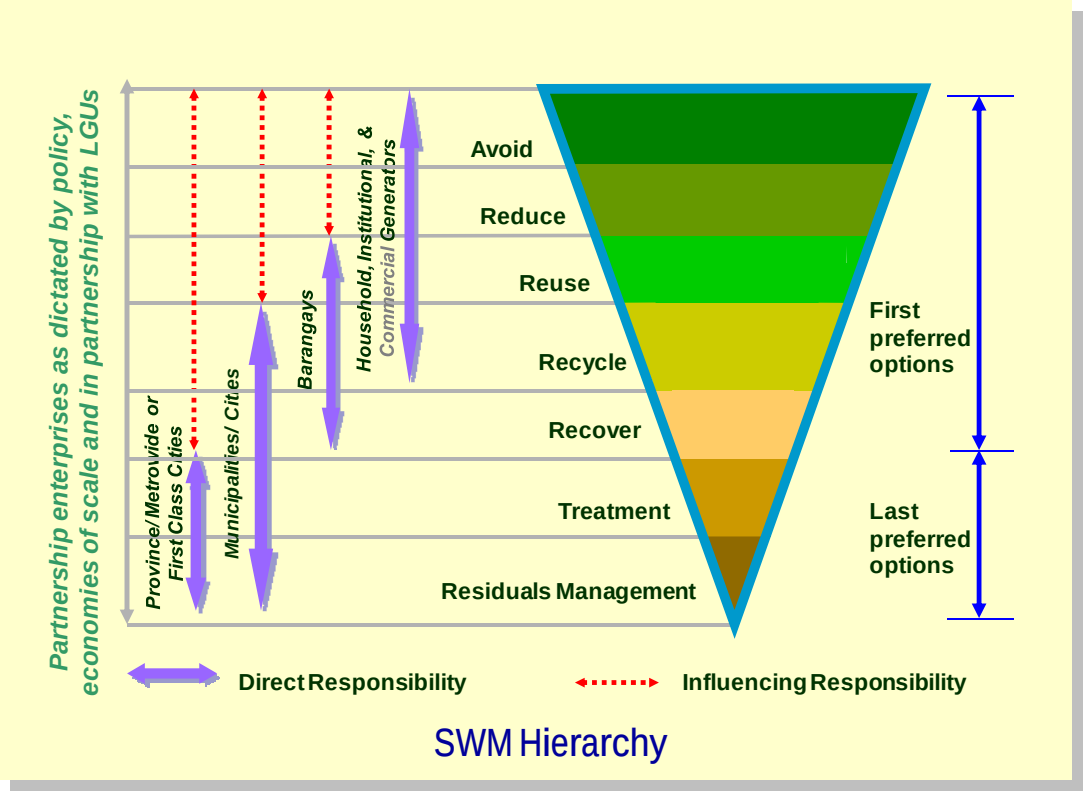
- *Consumers/Institutional & Commercial Waste Generators* – whether households; institutions like schools, offices; commercial/ business establishments including restaurants and malls where large numbers of people tend to congregate;
- *Collectors/ Consolidators* - whose role is to collect the waste generated at various collection points;
- *LGUs* - who are mandated by law to implement efficient SWM programs and to promote the 3Rs to achieve the minimum required waste diversion rate; and to enact and enforce the necessary local ordinances and policies to ensure compliance by domestic and commercial establishments;
- *Producers/ Manufacturers* – with the potential to help reduce waste through product/ packaging redesign; economic incentives, take back programs and process changes;

[20] Metro Manila Solid Waste Management Project, Department of Environment and Natural Resources/ Asian Development Bank, September 2003.

- *Buyers/ Traders* – who take advantage of domestic and global market forces to trade recyclables that can be used as raw material by major manufacturing industries;
- *Recyclers* – who invest in the technologies, facilities and infrastructure to make recycling a viable industry using a business model approach; and
- *Environmental/ Recycling Organizations/ Associations* - who mount advocacy programs and information programs to increase general awareness on the benefits of recycling and generate public support and participation; and who initiate/ provide technical assistance for community–based livelihood programs.

Using the SWM hierarchy as a guiding framework, the most preferred behavior is for consumers and waste generators to avoid creating waste by reducing at source (e.g. of packaging, leftovers, over spending on consumer goods), and then subsequently segregating/ sorting waste into reusables/ recyclables / non – recyclables, for which barangays establish MRFs where further manual sorting takes place. LGUs have the direct responsibility for collection of waste bound for the landfills, and for building treatment and disposal facilities for residuals. Municipalities/ cities (or, in the case of Metro Manila, the Metro Manila Development Authority). These roles are summarized in the figure below:

Figure 4 Stakeholder Roles and Responsibilities in the Solid Waste Management Hierarchy (NSWMC)



5. Continuing Issues and Lessons Learned

There are issues and concerns for the recycling industry as a whole and for each specific type of recyclable materials.

5.1. The general concerns of the recycling industry include

o Lack of consistent ***enforcement of environmental laws***, allowing unregistered and unregulated competition from informal recyclers who not only unfairly compete with legitimate investors and businessmen, but also pose public health and safety risks in areas where they operate, particularly with respect to special recyclable wastes like electronic / electrical waste;

o Absence of ***clear market data for the regions***, recycling facilities tend to be concentrated in Metro manila or Luzon urban areas, making it difficult to

sustain recycling programs in the provinces due to the large transportation/ shipping costs;

- ***Vulnerability of prices to world market fluctuations*** brought about by global economic situation; and competition between the export market and the local recycling market sometimes leading to a decrease in locally available recyclables as production input for the local recyclers, notably with paper, scrap iron/ metals and PET plastics;
- Lack of clear ***industry standards for recyclables*** – e.g. though tetra pak are 74% food grade paper board (4% aluminum, and 22% others), most paper recyclers remove them from the scrap paper pile, and they end up virtually discarded thus adding to the SW problem and losing out on commercial opportunities; and
- Lack of ***investments*** to upscale/ commercialize some of the recycling technologies to bring down costs, such as for recycling of tetra pak cartons into fiberwood.

5.2. Some concerns of selected recycling industry sectors are

5.2.1. Paper

- For many existing paper millers, there is need to update old or inefficient equipment and machinery**;** and to adapt newer technology (e.g. for the recycling of Tetra Pak into carton/ cardboard);
- Related to the above concern is also the higher costs of water and electricity in relation to the efficiency of the equipment, as well as the operations itself; and
- Domestic paper collection still needs to be improved, especially in the regions, not only with respect to volume but also with the handling process to ensure the quality of the used paper supply for the production of new paper (and to minimize "contamination" with other mixed waste).

5.2.2. Plastics

- The use of scrap plastic for plastic production is very low compared to that of paper, glass and metals. Hence, waste plastics comprise a major part of the waste stream throughout the country. In part, this is due to

the difficulty of separating plastic waste from mixed waste, for which more public education is needed;

- On the other hand, some types of plastic waste such as PET bottles, are being exported in large quantities where they fetch higher buying prices, thus affecting the local supply of the local plastics manufacturers; and
- For processing of PVC scraps to produce PVC flakes, there are some technology limitations (e.g. need to manually sort 28 types of scraps of PVC before crushing/ shredding); and no suitable size of extruder).

5.2.3. Metals

- There is severe competition between local scrap metals buyers (e.g. for iron, tin and aluminum) and the buyers for foreign markets due to the large export demand and higher export prices for them;
- The materials is also highly vulnerable to extreme price fluctuations; and
- Higher operating costs for local metals recycling result from the high cost of electricity (for electric furnaces in steel making), and shipping/ transport.

5.2.4. Glass

- Scrap glass fetches comparatively lower prices than the other recyclables due to its handling bulk (thus requiring large collection and storage areas); wide range of specifications (e.g. color, thickness, opacity); and high transport cost; and
- In the Philippines, there are also few glass recyclers and domestic users of scrap glass. Existing ones tend to be concentrated in one area (i.e., Laguna).

5.2.5. Used Lead acid batteries

- Informal backyard ULAB recyclers abound, creating unfair and unregulated competition to the legitimate business investor, giving the ULAB industry a negative image, as well as posing public health and safety risks. Also, despite ISO 14001 certification and strict

importation guidelines and monitoring protocols by the DENR, some local environmental NGOs continue to oppose the importation of used lead acid batteries which can affect the optimal operating capacity of the ULAB recycling facility. PRI's tie–up with both the DENR and the *Bantay Kalikasan (BK)* has helped lend a measure of credibility to their ULAB retrieval program and influence positive public perception, to some degree.

5.2.6. Electronic Waste

- The sector is poorly regulated and many backyard operations exist which create problems for worker health, community safety and environmental contamination. This also gives the industry a bad reputation, to the detriment of the legitimate recyclers;
- Many mall – based electronics retail / repair shops are based in malls and commercial shopping centers that have no e- waste segregation; thus resulting in their inclusion with mixed waste. Very few (possibly none) have generalized or bulk disposal systems (e.g. for cell phone battery wastes or non – working units/ parts). In areas outside Metro Manila, disposal is via municipal waste, open dumping or burial, which makes retrieval difficult;
- While the e- waste stream is increasing in the country (e.g. junk computers and cellphones/ cellphone batteries), collection is hampered by the Filipino penchant to retain their old units for their perceived "residual" value or to pass these on to other users when they upgrade their own; and
- More public awareness is needed on the hazardous materials in these equipment and the need for proper recycling and/or disposal.

6. Recommendations

Recycling in the Philippines is in a relatively infant stage, but has a large potential for growth if the various stakeholders examine the lessons learned from the industry's experience or achievement so far.

For the collection process, in particular, this study suggests the following recommendations:

6.1. Improving the collection volume

- Although the collection schemes today are better organized today than in the past, ***LGUs should continue to support and strengthen*** the existing informal networks of collectors/ junkshops/ waste pickers as a ***secondary materials recovery system***, for both environmental and social reasons. The experiences of Payatas, Clark and Quezon City, as well of private sector schemes like those of the Ayala Group demonstrate that such successful schemes help to alleviate both the garbage problem and the collection burden of LGUs without additional costs to the taxpayer.
- The success of voluntary collection schemes, especially those jointly organized by the LGUs, private sector and NGOs, demonstrate that ***practical, convenient channels are needed to encourage more participation from the public***. Some of these schemes offer ***monetary incentives*** (such as trade–in value, or points –systems). Others offer ***non–tangible incentives*** (e.g. protecting the environment) such as polystyrene/ cellphone collection which does not give monetary incentives.
- A common denominator for successful collection appears to be with the use of ***widespread promotions*** which includes the benefits of recycling and feedback to the public of the value of their contributions; ***accessibility*** (e.g. at malls, schools or public places) and ***reliability*** (i.e. regular collection/ redemptioin schedules). Thus, collection channels should be well– publicized.
- In addition, more such ***collection points / collection sites need to be set up in places outside Metro Manila,*** although this, of course, can be seriously limited by the location of the recycling facilities themselves, due to the prohibitive costs of transporting the recyclable goods.

6.2. Improving the collection process

- It is equally important to provide proper guidance and training, to junk shops and secondary level collectors on the proper handling of recyclable materials to assure ***better quality of the supply to the recycling industries***, and avoid rejects. Thus, ***guidelines*** are needed not only for recycling but also for collection. These can be developed in consultation/ with the help of the different stakeholders.
- Assistance for ***start–up financing from the government or private sector*** (e.g. for small trucks, warehouses/ collection stations, payroll) would also help encourage small collection businesses.
- Collectors and consolidators appear capable of quickly networking with waste buyers and recyclers, but government can still provide further help in ***establishing market linkages***, especially for new such opportunities in the regions

Since the underlying assumption for improving collection is that the market for recyclables will continue to grow, the current study also offers some **recommendations for improving recycling practices as a whole.**

- Need for more ***reliable and comprehensive information on the recyclables market***, especially to attract more private sector investment to build recycling facilities or to commercialize recycling technologies;
- ***Importance of meeting environmental standards and of highlighting good industry practices*** - Recycling industries are generally perceived to be “dirty” and “unsanitary” in part because some did start out as such and many informal activities continue to operate. But new technologies and appropriate skills training can elevate recycling into a respectable industry, and the economic and environmental benefits they offer should be highlighted by the industry. Having local industry standards as well can improve the export chances of local recyclable materials;
- ***Importance*** of improving enforcement and regulation, to level the playing field and encourage legitimate investments in environmentally

safe, proper recycling operations; as well as to protect existing legitimate and environmentally compliant investors;

- ***Promoting community – level adoption and technology transfer of recycling technologies*** - examples of successful community – level collection and recycling efforts cited in this paper had a good start with support from foreign assisted donor projects which helped to establish the proper community–level structure, initial funding, technical assistance/ technology transfer and documentation of the project to serve as replicable models in other parts of the country. The availability of relatively newly developed ***recycling technologies which are not capital–intensive*** (such as doy pack/ laminates / mixed waste recycling into chipboards/ hollow blocks) created demand for waste materials that would otherwise merely have been discarded;
- ***Policy incentives and Economic incentives to recycling industries*** – Experience from other countries suggest that having national recycling targets can significantly boost the growth of recycling efforts and investments. In addition, some of the existing recycling facilities benefited from pioneer status accorded them by the Board of Investments (BOI) of the Department of Trade and Industry (DTI) to allow them to bring in equipment with lower/ no tax; and enjoy a tax holiday for initial years of operation to be able to establish a foothold and recover some of their initial capital investment;
- ***Partnership with other stakeholders*** – notably government (e.g. DOST/ DENR/ LGUs) and reputable NGOs (e.g. PBE/ BK) to help add credibility to company recycling efforts/ environmental programs, with the added benefit of having an advocacy/ education objective and, where possible, to find ways to integrate the informal sector so as to avoid social displacement and livelihood loss;
- ***Organized effort by the recycling industry***- Local recycling industries can band together and form a professional association that can dialogue with government and other stakeholders, educate the public on the benefits of industry recycling and pursue programs to promote support for the recycling industry as a whole; and

- ***Stimulating demand for recycled products and promoting benefits of post–consumer recycled products*** – provides a larger market for recycling businesses and encourages the growth of more eco–entrepreneurs, noting that in the Philippines, as in many other countries, more than 90% of industry is small and medium in size. The success of the most recent eco–products fair held in Manila in early 2009, with plans already afoot for another one in 2010, suggest that these, combined with green procurement programs, are effective vehicles for generating interest and support for eco products, including recycled products. The government can further stimulate demand by enacting policy in favor of green public procurement. An example is the Executive Order 301, issued by the Office of the President in March 2004, requiring all departments, bureaus, offices and agencies of the executive branch to establish their Green Procurement Programs. Although implementation has been slow, one outcome of this is the inclusion of environmentally preferred criteria in the procurement guidelines of the Department of Budget and Manage

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