Appendix 7

Brochure for 3Rs (MPPP, MPSJ and MBM)

7.1 MPPP Brochures

7.1 3Rs Brochures in 3 Languages (MPPP)

3R Brochure in English (page 1)

3R Brochure in English (page 2)

3R Brochure in Malay

3R Brochure in Chinese

7.2 MPSJ Brochures

7.2.1 3Rs Brochure (General)

Where can you bring your recyclable materials?

Recycling Bins
For smaller amounts of recyclable items, bring them to over 100 recycling bins all over MPSJ. Brown bins are for glass, blue bins for paper and orange bins for plastic/steel/aluminium. Find them in schools, petrol stations, religious institutions, shopping complexes, government complexes, bus stations and several public areas.

Collection Centre / Recycling Centre
For bigger size and larger amounts of recyclable items, there are many collection centres at strategic centres around MPSJ to receive them. Find them in residential areas, shopping complexes or community centres.

Where Do They Go From There?
Collected recyclable items from recycling bins and collection centres are then sorted, cleaned and sold to factories that will in turn put them through manufacturing processes which transform them into another product or the same product.

If you have enquiries, kindly contact us:

Recycling Network Unit
Majlis Perbandaran Subang Jaya
Persiaran Perpaduan, Jalan USJ 5
47610 Subang Jaya

Tel : 03-8025 1749
Fax: 03-8026
www.mumpsi.net

3Rs Guide

Waste prevention, or "source reduction," means consuming less, reusing and recycling products and therefore disposing less. It includes:

REDUCE
- To buy long life products
- To use products as long as possible
- To select products with the least unnecessary packaging
- To reduce the amount of plastics bags by using reusable bag when shopping

REUSE
Reusing items -- by fixing them, donating them to charity and community groups, or selling them -- also reduces waste. Reusing products, when possible, is even better than recycling because the item does not need to be reprocessed before it can be used again.

RECYCLE
Recycling transforms materials that would become waste into valuable resources. Glass, metal, plastics, and paper are the type of materials that can be collected, separated and sent to facilities that can process them into new materials or products.

How to recycle?

In an ideal scenario one will separate his/her recyclable materials at home by having different recycling bins - one for paper, one for glass & metal and one for plastics. Most importantly, recyclables materials have to be separated from the usual food waste.

Tips before to separate your recyclable materials:

Plastic
- Remove leftover contents/caps
- Clean and dry plastic bottles/dirty bags
- Throw into orange recycling bins or bring to a collection centre

Paper
- Bundle newspapers and books separately
- Open cardboard boxes and flatten
- Bundle neatly
- Throw into blue recycling bins

Glass
- Remove leftover contents, caps, any plastic or metal appendages and labels
- Clean and dry bottles or jars
- Throw into brown recycling bins or bring to a collection centre

Aluminium Can
- Remove leftover contents
- Clean and dry cans or tins
- Crush cans
- Throw into orange recycling bins or bring to a collection centre

or bring to a collection centre

What can be recycled?

Plastics	All coloured and non-coloured plastics like shopping bags, supermarket bags, drink plastic bottles, mineral water bottles, clean food containers, detergent bottles and vitamin containers, EXCEPT paint containers, toxic containers, laboratory apparatus and Styrofoam.
Glass	All coloured and non-coloured glass like drink bottles, food jars, vitamin and cosmetic bottles, EXCEPT crystal, mirrors, window panes, vehicle screens, porcelain, ceramic, bulbs, laboratory apparatus and toxic containers.
Paper	All coloured and non-coloured paper such as newspapers, magazines, books, paper scraps (A4, A3 and F4 sizes), catalogues, pamphlets, calendars, cards, envelopes, and carton boxes, EXCEPT tissue paper, carbon paper, aluminium foil/waxed paper, plastic laminated paper and contaminated paper.
Metal / Aluminium	All types of aluminium and steel cans like drink and food cans. EXCEPT paint containers, toxic containers, glue containers and solvent containers
Others	**E-waste / Clothes / Furniture**

7.2.2 3Rs Brochure (De Palma Condominium)

WHY RECYCLING ?

HELP THE ENVIRONMENT:

Recycling promotes the reuse of materials produced. This ultimately leads to less consumption of virgin materials. Thus conserving our natural resources. Recycling contributes also in limiting the amounts of waste in landfills which are becoming bigger over time. Badly managed landfill contribute to negative impact on the environment as well as health & safety of the local population.

Income from the sale of the recyclable materials collected will be channeled back to De Palma's resident committee

JICA STUDY TEAM
c/o Majlis Perbandaran Subang Jaya
Persiaran Perpaduan, Jalan USJ 5
47610 Subang Jaya

Tel: 03-8025 1749
Fax: 03-8023 7673

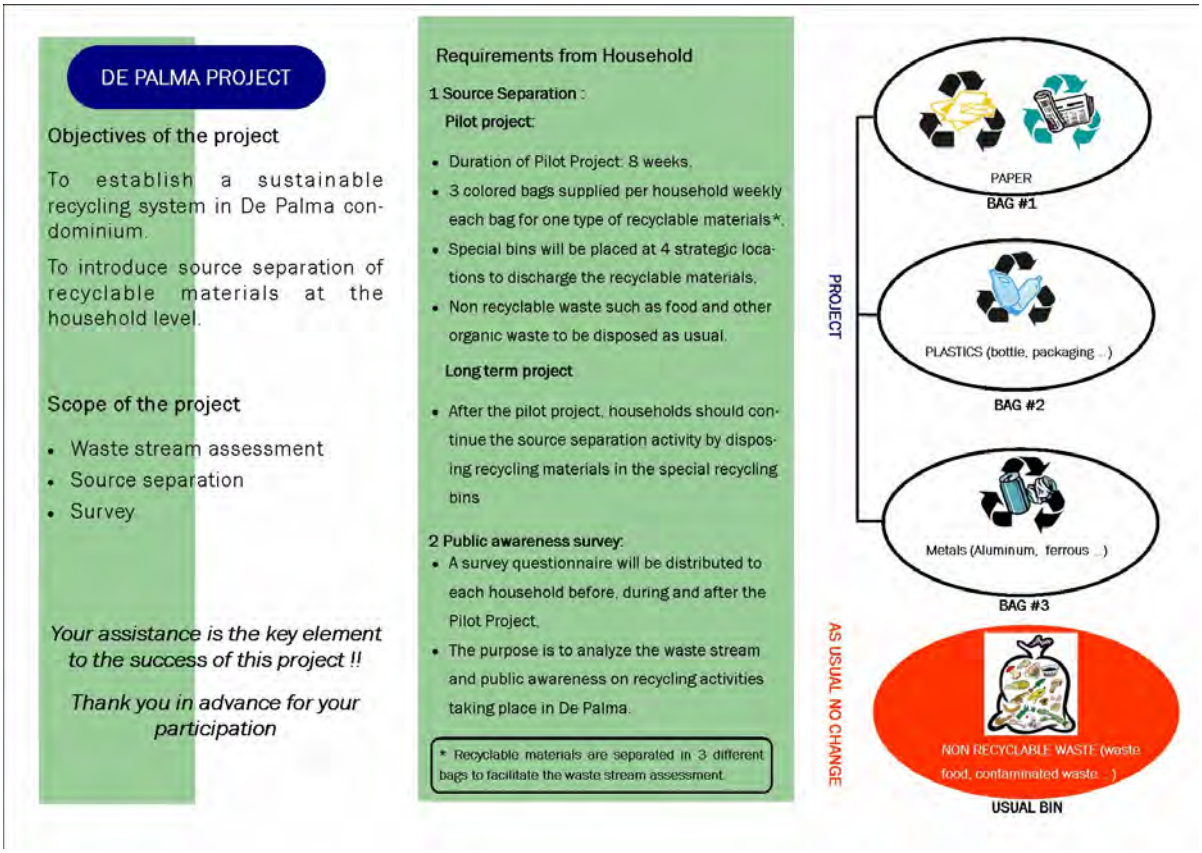
Kindly contact us for queries or other information

SOURCE SEPARATION PROJECT

DE PALMA Condominium

JICA STUDY TEAM

EXPLANATORY MEETING
Thursday 18 August



DE PALMA PROJECT

Objectives of the project

To establish a sustainable recycling system in De Palma condominium.

To introduce source separation of recyclable materials at the household level.

Scope of the project

- Waste stream assessment
- Source separation
- Survey

Your assistance is the key element to the success of this project !!

Thank you in advance for your participation

Requirements from Household

1 Source Separation :

Pilot project:

- Duration of Pilot Project: 8 weeks.
- 3 colored bags supplied per household weekly each bag for one type of recyclable materials*.
- Special bins will be placed at 4 strategic locations to discharge the recyclable materials.
- Non recyclable waste such as food and other organic waste to be disposed as usual.

Long term project

- After the pilot project, households should continue the source separation activity by disposing recycling materials in the special recycling bins

2 Public awareness survey:

- A survey questionnaire will be distributed to each household before, during and after the Pilot Project.
- The purpose is to analyze the waste stream and public awareness on recycling activities taking place in De Palma.

* Recyclable materials are separated in 3 different bags to facilitate the waste stream assessment.

PROJECT

PAPER
BAG #1

PLASTICS (bottle, packaging ...)
BAG #2

Metals (Aluminum, ferrous ...)
BAG #3

AS USUAL NO CHANGE

NON RECYCLABLE WASTE (waste food, contammated waste ...)
USUAL BIN

7.2.3 3Rs Brochure (MPSJ Complex)

3Rs Paper Campaign - MPSJ Complex

Recycling Agents:

	Jabatan / Unit	Nama urusetia
1	Perancangan Korporat	Nazri Faiz Zainal Fazilah Mohd Johari
2	Perpustakaan Hipermedia	Mohamat Ali Othman Khairul Azran Abdullah
3	Jabatan Perbendaharaan	Nohaslizawati abd. Karim Mohd Haznizam Ramly
4	Penilaian & Pengurusan Harta	Shezri Hezrin abu bakar
5	Audit Dalam	Rizal Razali
6	Bangunan	Azmi Maricar Ahmad Hambiah Daros
7	Khidmat Masyarakat	Mohd Yunus Baharom Norrah Azza Abd Rahman
8	Pelesenan	Jamaludin Anuar Hishan Mohammed
9	Penguathuasaan	Tarmidi Kadri Mohd Zabidi Mohd Ali
10	Penasihat Undang -Undang	Aziana Mohd Aripin Intan Rozlina Hani
11	Khidmat Pengurusan	Asri Kamarudin Malisa Jamaludin
12	Pembangunan & penyelenggaraan	Adnan Derhman Nurhasima Mohd Shariff
13	Perancangan Pembangunan	Mohd Azvil

3Rs Paper Campaign - MPSJ Complex

MPSJ Pilot Project:
Majlis Perbandaran Subang Jaya (MPSJ) has been chosen to develop a pilot project as part of *the national waste minimization study* in cooperation with the Ministry of Housing and Local Government and Japan International Cooperation Agency (JICA)

The Pilot Project has 2 mains components:

- Establishment of a recycling Network Unit (RNU) in MPSJ
- Source separation of Municipal Solid Waste:
  - In a condominium: De Palma
  - In a shopping complex: South City Plaza
  - In an institution : MPSJ Complex

For the source separation we are trying to develop a sustainable society who adopts the 3Rs attitude:

Reduce - Reuse - Recycle

One of the main elements of the source separation is a paper separation campaign within the MPSJ complex. That is why each department have been equipped with a set of 3 bins where staff can dispose used paper and others recyclable materials.

Please remember, MPSJ has started several recycling programme within its locality. **MPSJ complex has to lead by example and practice what we preach!**

Waste management is a really expensive for MPSJ so kindly participate in our 3Rs effort

PAPER CAMPAIGN

How can you participate in the 3Rs paper project in MPSJ?

Reduce:

- Use lighter weight paper when possible
- Reduce the number of copies of documents by establishing a centralized filing system
- Eliminate deedless form
- Eliminate blank space & reduce the print size when appropriate
- Use electronic or computer mail
- Share documents
- Use bulletin boards instead of sending individual memo

Reuse:

- Use dual -sided copying whenever possible
- Use obsolete forms for drafts and to make memo pads
- Reuse interoffice envelopes, file folders & corrugated boxes

Recycle:

- Dispose used paper in the recycling bins installed in your department.

Computer, White paper	Newspaper, Coulored	Others recyclables metals/plastics/glass

3Rs Paper Campaign - MPSJ Complex

What is asked from you?

Adopt a 3Rs attitude

A recycling agent has been appointed in each department. (He/she is the contact person if you have questions. You can also contact the recycling network unit located in the department of Health and Urban service).

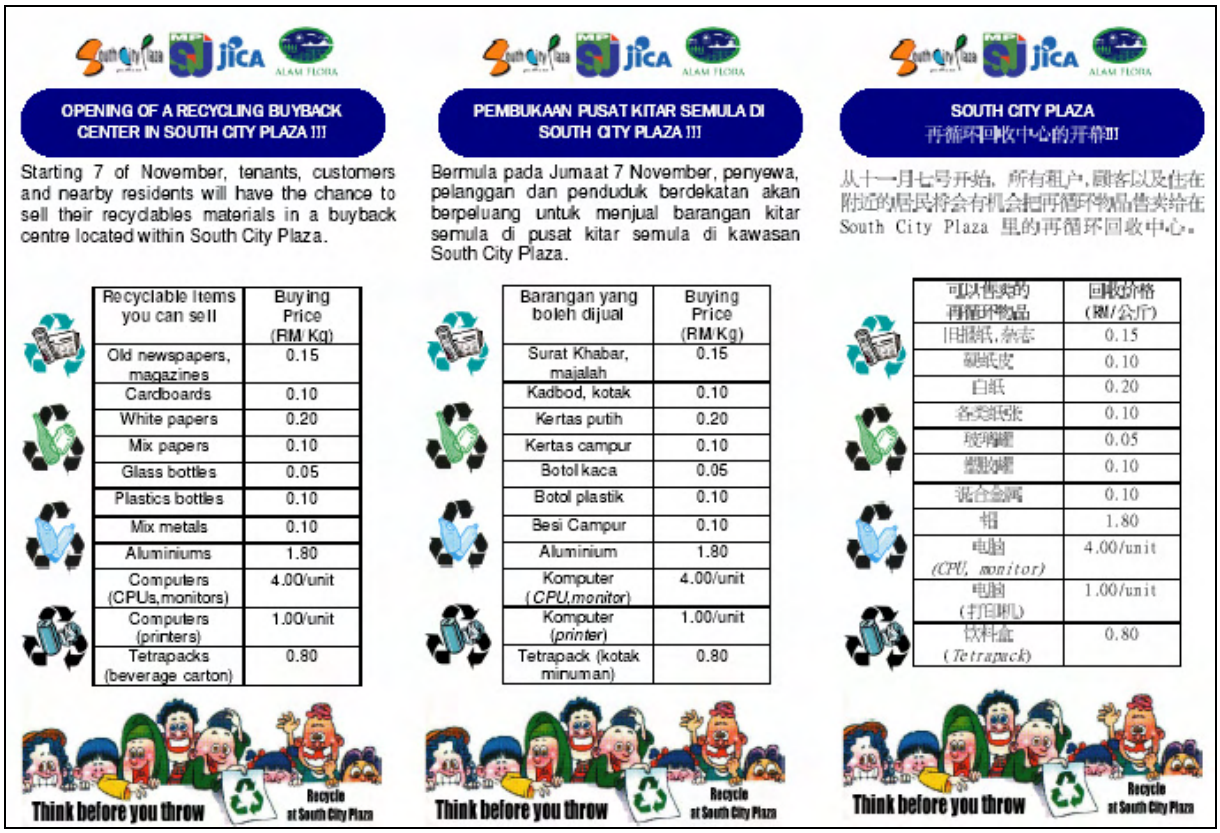
The recycling agent has to make sure the paper bins are brought every **Thursday between 10 AM & 2 PM** at the recycling station (nearby the car park). There the used paper will be weighed and the data collected (You can rotate among the staff to bring the used paper or ask the cleaners to do it for you).

The next used paper collection will be Thursday 13 OCTOBER

What about the competition?
The recycling competition as you knew it no longer exist. We are working at the moment to find a way to reward the staff of the department which has adopted a 3 Rs attitude and Reduce, Reuse and Recycle its paper consumption.

AT MPSJ, WE RECYCLE!

7.2.4 3Rs Brochure (South City Plaza)



OPENING OF A RECYCLING BUYBACK CENTER IN SOUTH CITY PLAZA !!!

Starting 7 of November, tenants, customers and nearby residents will have the chance to sell their recyclables materials in a buyback centre located within South City Plaza.

Recyclable Items you can sell	Buying Price (RM/Kg)
Old newspapers, magazines	0.15
Cardboards	0.10
White papers	0.20
Mix papers	0.10
Glass bottles	0.05
Plastics bottles	0.10
Mix metals	0.10
Aluminiums	1.80
Computers (CPUs,monitors)	4.00/unit
Computers (printers)	1.00/unit
Tetrapacks (beverage carton)	0.80

Think before you throw — Recycle at South City Plaza

PEMBUKAAN PUSAT KITAR SEMULA DI SOUTH CITY PLAZA !!!

Bermula pada Jumaat 7 November, penyewa, pelanggan dan penduduk berdekatan akan berpeluang untuk menjual barangan kitar semula di pusat kitar semula di kawasan South City Plaza.

Barangan yang boleh dijual	Buying Price (RM/Kg)
Surat Khabar, majalah	0.15
Kadbod, kotak	0.10
Kertas putih	0.20
Kertas campur	0.10
Botol kaca	0.05
Botol plastik	0.10
Besi Campur	0.10
Aluminium	1.80
Komputer (*CPU,monitor*)	4.00/unit
Komputer (*printer*)	1.00/unit
Tetrapack (kotak minuman)	0.80

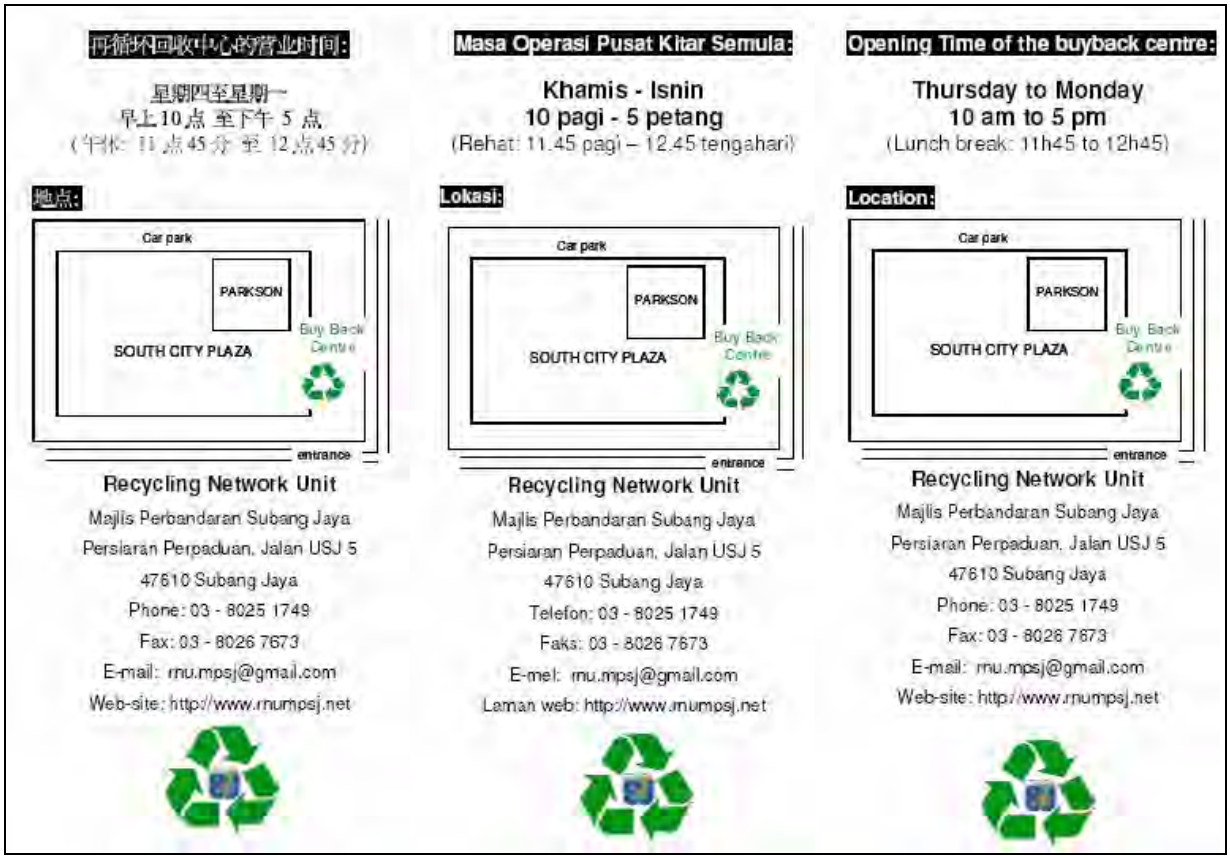
Think before you throw — Recycle at South City Plaza

SOUTH CITY PLAZA
再循环回收中心的开幕!!!

从十一月七号开始，所有租户，顾客以及住在附近的居民将会有机会把再循环物品售卖给在 South City Plaza 里的再循环回收中心。

可以售卖的再循环物品	回收价格 (RM/公斤)
旧报纸，杂志	0.15
硬纸皮	0.10
白纸	0.20
各类纸张	0.10
玻璃罐	0.05
塑胶罐	0.10
混合金属	0.10
铝	1.80
电脑 (*CPU, monitor*)	4.00/unit
电脑 (打印机)	1.00/unit
饮料盒 (*Tetrapack*)	0.80

Think before you throw — Recycle at South City Plaza



再循环回收中心的营业时间:

星期四至星期一
早上10点 至下午 5 点
(午休: 11点45分 至 12点45分)

地点:

Recycling Network Unit
Majlis Perbandaran Subang Jaya
Persiaran Perpaduan, Jalan USJ 5
47610 Subang Jaya
Phone: 03 - 8025 1749
Fax: 03 - 8026 7673
E-mail: rnu.mpsj@gmail.com
Web-site: http://www.rnumpsj.net

Masa Operasi Pusat Kitar Semula:

Khamis - Isnin
10 pagi - 5 petang
(Rehat: 11.45 pagi – 12.45 tengahari)

Lokasi:

Recycling Network Unit
Majlis Perbandaran Subang Jaya
Persiaran Perpaduan, Jalan USJ 5
47610 Subang Jaya
Telefon: 03 - 8025 1749
Faks: 03 - 8026 7673
E-mel: rnu.mpsj@gmail.com
Laman web: http://www.rnumpsj.net

Opening Time of the buyback centre:

Thursday to Monday
10 am to 5 pm
(Lunch break: 11h45 to 12h45)

Location:

Recycling Network Unit
Majlis Perbandaran Subang Jaya
Persiaran Perpaduan, Jalan USJ 5
47610 Subang Jaya
Phone: 03 - 8025 1749
Fax: 03 - 8026 7673
E-mail: rnu.mpsj@gmail.com
Web-site: http://www.rnumpsj.net

7.2.5 Poster for South City Plaza Buy-back Centre

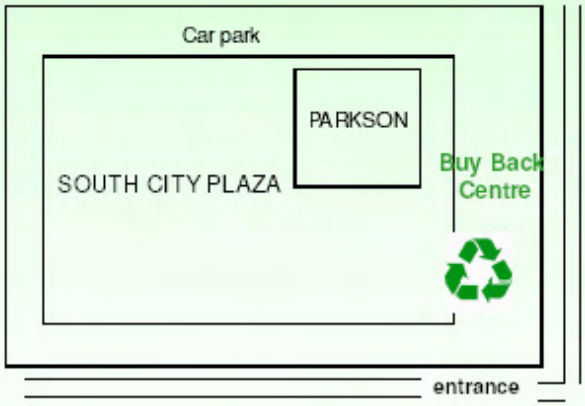
OPENING of a BUY-BACK CENTRE in SOUTH CITY PLAZA

Starting 7 of November tenants, customers and nearby residents will have the chance to sell their recyclables materials in a buyback centre located within South City Plaza.

Recyclable Items you can sell	Buying Price (RM/Kg)
Old newspaper, magazines	0.15
Cardboard	0.10
White paper	0.20
Mix paper	0.10
Glass bottle	0.05
Plastics bottle	0.10
Mix metal	0.10
Aluminum	1.80
Computer (CPU,monitor)	4.00/unit
Tetrapack (beverage carton)	0.80

Advantages of recycling for business:

- It can reduce waste volume and disposal cost,
- It provides revenue from the sale of recyclable materials & reduces operating costs,
- It enhances company's image



Advantages **of recycling for public:**

- It protects our environment
- Get money from the sale of recyclable material

Buy-Back Centre will be opened **Thursday to Monday from 10 am to 5 pm** (lunch break from 11h45 to 12h45)

7.3 MBM Brochures

7.3.1 General 3-R Brochure for Public Awareness

What you can recycle?

✓ Aluminium cans

Tin cans / scrap metal
Aluminium cans

✓ Paper and cardboard

Books
Magazines
Black and white paper
Mixed paper

✓ Newspapers

Old newspaper

✓ PET plastic soft drink bottles

Mineral water bottles
Soft drink bottles
PET, HDPE, PE, PP,
Polystyrene etc.

✓ Glass

Maggi tomato/ chili sauce, soya sauce, sesame sauce, Guinness, vinegar, wine (cooking), beer, and Nescafe & peppermint green tea.

For more information contact:

Miri City Council
Public Services Section/
Recycling Network Unit (RNU)
Jalan Kingsway, 98000 Miri
Ms. Chen Saw Ling, Ms. Chang Siow Yen
or Mr. Jackson
085-426984
Email: rnu.mbm.gmail.com

The Study on National Waste Minimisation in Malaysia Pilot Project in Miri

Mini City Council

Ministry of Housing and Local Government

JICA
Japan International Cooperation Agency

3Rs

Conserves valuable resources, reduces your waste, and saves money & the environment!

Miri obtained City Status in May 2005. Today its population has grown to 250,000. Everyday, the city produces 130 tonnes of solid wastes. 20% of the waste consists of newspaper, magazines and other paper products. The rest includes plastics, glass, aluminium cans and textiles. All these wastes go to landfill. But not all of them need to go to landfill. You can help reduce the amount of wastes that have to be disposed. How?

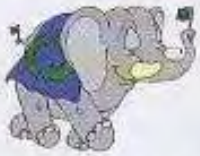
When you use things more than once and recycle whatever you can, you will save money and help the environment too!

Easy ways to Reduce, Reuse & Recycle waste:

- Buy products such as flour, rice, nuts in bulk (it costs less per kg)

- Reduce disposables, and buy things you can use many times
- Buy things that can be used more than once like cloth napkins, handkerchiefs, and food storage containers.

- Recycle whatever you can (see back for list of things that can be recycled.
- Use tupperware or empty food containers to store leftovers or to carry your lunch.
- Walk, ride your bike, or take the bus: save fuel and keep the air cleaner.



- Share magazines and books with others and use the library.
- Teach your children how to recycle and protect the environment.

- Participate recycling programmes that will help you cut down on the amount of material you throw into a garbage can.

- Use both sides of paper because you save trees, energy and water, which are all used to make paper.

7.3.2 Example of Information Leaflets to Encourage Source Sorting

How to handle the recyclable items? 怎样处理回收物品?

Paper Product 纸张

Recycling Box for paper product
回收纸盒

Black and white paper 黑白纸

Mixed Paper (Phone Book, Text Book, Magazines etc.), 杂纸 (电话簿, 书本, 杂志等等)

Aluminium Cans/ Plastic Product/ Glass Bottles铝罐/塑胶/玻璃瓶

Empty content, rinse before entering the green bag. 清洗干净, 然后放进青色塑胶袋

Plastic Bottles 透明瓶

Aluminium cans 铝罐

Glass bottles 玻璃瓶

Plastic bags is for plastic product, glass and aluminium cans 透明瓶, 铝罐, 和玻璃瓶装进塑胶纸袋

Newspaper/ Old Corrugated Cardboard旧报纸/旧盒子

Old Newspaper 旧报纸

Old Corrugated Cardboard 旧盒子

Tie up neatly 整齐的绑起来

Collection of the recyclables will be carried out every Saturday from 7am to 10am. Please kindly place your recyclable items beside your normal bins and do not mix the recyclables with the garbage.

7.3.3 Door to door collection schedule for Krokop distributed

Tentative date for recyclables collection

回收时间表

oor-to-door collection (Krokop 10 & Tadika Road)

Collection frequency – fortnightly (two week)

Collector - MCC and Buddhist Tzu-Chi Association

All collection will be donated to Buddhist Tzu-Chi Association

The tentative date for collection as shown below

上门收集边(珠芭十号路与幼稚园路)

- 收集次数 – 每两个星期
- 收集单位 – 美里市政局和慈济功德会
- 全部收集品将捐献给慈济功德会
- 收集时间如下:

SEPTEMBER 九月						
Sun	Mon	Tue	Wed	Thurs	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

OCTOBER 十月						
Sun	Mon	Tue	Wed	Thurs	Fri	Sat
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

NOVEMBER 十一月						
Sun	Mon	Tue	Wed	Thurs	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Miri City Council (MCC) 美里市政局

Buddhist Tzu-Chi Association 慈济功德会

ollection Centre (Krokop 5 & Bulatan Park)

Open on every Sunday from 9.00am until 11.00am

(造湖公园)

时开放

收集时间若有任何更换, 将以报纸通知

ease refer to press release if have any changes of the collection

te

7.3.4 Background information for Krokop 6

Source Separation (Door to door collection) Pilot Project in Krokop 6, Miri

Miri has been selected as one of the three cities (Penang & Subang Jaya as the other two) in Malaysia to undertake a pilot project focusing on waste minimization and recycling. The project is funded by the Japanese International Cooperation Agency (JICA) and will be implemented through the Miri City Council with the participation of all the other stakeholders i.e. NGOs, schools, recycling agents and so forth.

The project will include the introduction of source separation system for recyclable items in residential area. This will an important part of 3R (Reduce, Reuse & Recycling) activities The selected area for source separation is Krokop housing area.

Source separation and door to door collection has already been implemented along Krokop Lorong 10 since August 2005. As a step to extend the pilot project to gain more experiences, **Krokop Lorong 6** is selected as a new target area to implement a new collection system. Recyclable items will be collected every Saturday by the ordinary garbage truck together with the collection of garbage from 7am to 10am. The participation of the residents in this area is crucial to ensure the success of the project.

NOTE:

Please kindly place your recyclable items beside your normal garbage bins and do not mix the recyclables with the garbage.

Further Information, Please contact

Ms. Chang/Ms. Chen/Mr. Jackson Agan

Contact: 085-426984

Address: Public Cleansing Maintenance/
Recycling Network Unit

Miri City Council
Jalan Kingsway, 98000 Miri.
Email: rnu.mbm.gmail.com

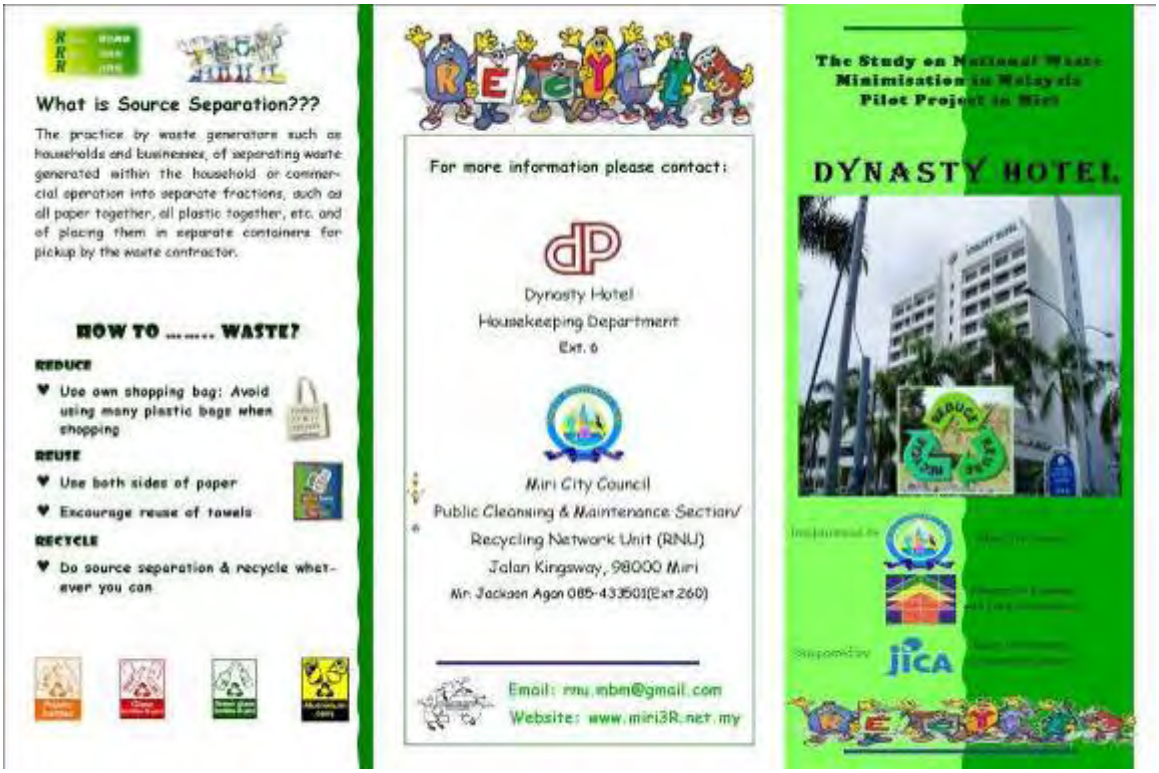
Miri City Council

Ministry of Housing and Local Government

JICA

Japan International Cooperation Agency

7.3.5 Brochures for Dynasty Hotel



What is Source Separation???

The practice by waste generators such as households and businesses, of separating waste generated within the household or commercial operation into separate fractions, such as all paper together, all plastic together, etc. and of placing them in separate containers for pickup by the waste contractor.

HOW TO ..... WASTE?

REDUCE

- Use own shopping bag: Avoid using many plastic bags when shopping

REUSE

- Use both sides of paper
- Encourage reuse of towels

RECYCLE

- Do source separation & recycle whatever you can

For more information please contact:

Dynasty Hotel
Housekeeping Department
Ext. 6

Miri City Council
Public Cleansing & Maintenance Section/
Recycling Network Unit (RNU)
Jalan Kingsway, 98000 Miri
Mr. Jackson Agon 085-433501(Ext.260)

Email: rnu.mbm@gmail.com
Website: www.miri3R.net.my

The Study on National Waste Minimisation in Malaysia Pilot Project in Miri

DYNASTY HOTEL

Background of Pilot Project on Waste Minimisation in Miri

With the fast development pace in Miri, the generation of waste is expected to increase and there is a need to address the issue urgently.

Miri has been selected as one of the three cities (Penang & Subang Jaya as the other two) in Malaysia to undertake a pilot project focusing on waste minimization and recycling. The project is funded by the Japan International Cooperation Agency (JICA) and will be implemented through the Miri City Council (MCC) with the participation of all the other stakeholders i.e. NGOs, schools, recycling agents and so forth.

The project will include setting up a Recycling Network Unit (RNU) to coordinate the recycling effort in Miri, introduction of source separation as well as 3Rs (Reduce, Reuse & Recycling) activities for schools in Miri. The selected area for source separation includes Krokop housing area (Lorong 10), **Dynasty Hotel** and selected schools.

Reduce then Recycle

What thing can be recycle in Dynasty Hotel?

- Papers
  - old newspapers
  - black & white
  - Old corrugated cardboard
  - magazine /mixed paper
- Plastics
  - mineral water / soft drink bottle
  - other plastic container
- Glass Bottles
  - coloured bottle
  - clear bottle
- Aluminium Cans/ Metals
  - aluminium can
  - metal tin

How to handle?

Please bring your recyclables to Dynasty drop-off point

* Only available in 3rd & 4th floor

APPENDIX 8

"RECYCLING WHEEL" IN PENANG ISLAND

“RECYCLING WHEEL” IN PENANG ISLAND

THE PENANG MUNICIPAL COUNCIL EXPERIENCE IN SOLID WASTE MANAGEMENT

CONTENTS

ABSTRACT

The Penang Island Municipal Council is essentially the body providing local authority services on Penang Island and is one of the largest public sector employers in the state with more than 3,000 employees. It has an administration area of about 299.65 sq km with 1 nautical mile off the shore inclusive. One of its priority functions is the collection and disposal of waste, which is under the jurisdiction of the Urban Services Department.

Penang Island generates about 690 tons of garbage a day. The Penang Island Municipal Council is responsible to collect transfer and dispose waste. This service covers 95% of the population. The collection and disposal of waste include domestic, industrial as well as waste in the sea and rivers. This paper discusses the structure, roles and activities of the Council, the infrastructure and mechanisms for waste collection, its complexities, issues and challenges faced by the Council in the daunting task of servicing a modern and thriving city.

The paper also highlights the successful recycling programmes implemented by the State Government with the help Penang Environmental Working Group (PEWOG) under the auspices of the Penang Local Government Consultative Forum (PLGCF). This is a voluntary working group (LA 21 styled) that is actively involved in both planning and implementing such programmes on the ground with the Penang Island Municipal Council. Programmes implemented by PEWOG also include the community organization, setting up networks for recycling agents, buyers and factories and developing mechanisms so that the recycling programme works smoothly and efficiently as well as in a sustainable manner. Through this effort, numerous communities have started recycling activities. This is a Public-Private Partnership (PPP) between the Government, community groups, private businesses and volunteers to tackle the waste problem through recycling and composting.

The recycling programme has gone from merely recycling into the collection of household hazardous waste (fluorescent lamps, dry cell and mobile phone batteries and aerosol cans) by supermarkets, which is a first in the country.

This collection will be extended to wet markets that are under the purview of the Penang Island Municipal Council.

Ongoing and future programmes include the separation of wet and dry waste at household level and its collection, community composting as well as the establishments of community resource recovery centres. Penang is also the first State to publish a recycling guide book as well as a manual for household composting. We are looking into big scale commercial composting to help remove around 40% of wet, organic waste from the waste stream.

The Penang Island Municipal Council has also commissioned a survey of e-waste (electronic waste comprising computer and peripherals, electrical appliances), and will be working out mechanisms for effective collection and safe disposal of these with the collaborative efforts from civil society and private enterprises.

Penang's SWM Strategy for waste minimization and diversion from its landfill are finally:
Clean Production with the use of non-toxic, recyclable, biodegradable components in manufacturing and packaging of products, emphasize on Corporate Producer Responsibility; and Resource Recovery. Resource Recovery would include waste separation at source composting of organic materials and removal of household hazardous waste from the waste stream. It is hoped that with the implementation of proper strategies, Penang will move towards "ZERO WASTE". We are not there yet but we are on our way!

1. INTRODUCTION :

Penang is one of the thirteen states of Malaysia situated north of the Peninsular with the total area of 299.65sq/Km. It has a multi racial population of 660,000 people. The ethnic group distributions on the island are Chinese 68%, Malay 24%, Indian 4%, others 4%.

Penang Island is a tourism island nicknamed as Pearl of The Orient. The island is also known as the Silicon Island of Malaysia due the large number of electronic industries available. The island economy depended mainly on tourism, manufacturing, construction, agricultural, fishing and services respectively.

Being a tourist island, solid waste management are constantly monitored and discussed by many authorities including Ministry of Culture and Tourism.

The large number of industries and opportunity available has attracted many migrants locally and foreign immigrants to migrate to the island thus causing quite a challenge on social and solid waste management.

2. PENANG ISLAND MUNICIPAL COUNCIL:

Local Government is the third tier in the Malaysia Government structure. In Penang Island, the origins of local government can be traced as far back as 1856. Today the Municipal Council of Penang Island has a local administration area of about 299.65 sq/km with 1 nautical mile off the shore inclusive.

Prior to 1.7.1974 there were two Councils in Penang Island i.e. City Council of Georgetown and the Rural District Council. The two councils were integrated on 1.7.1974 and known as the Municipal Council of Penang Island. The council is financially autonomous and is essentially an organisation providing

local authority services on Penang Island and is one of the largest public sector employers in the state with more than 3,000 employees.

The council executive body comprises a President and 24 Councilors appointed by the State Government under the Local Government Act 1976.

The Full Council meets every fortnightly. There are several standing committees concerned with the primary functions of Council.

The main source of income of the Council is derived from rates levied on all properties except places of religious worship, licensed burial ground or crematoria, public schools, public places for charitable purposes or for the purpose of science, literature or fine arts.

Management control devolves from the President through the Municipal Secretary to the 10 departments as follows:

1. Secretariat
2. Engineering Department
3. Finance Department
4. Public Health Department
5. Building Department
6. Valuation Department
7. **Urban Services Department**
8. Town Planning And Development Department
9. Legal Department
10. Licensing Department

In this context, we will focus on the Urban Services Department. The main functions of the Department are managing the collection, transport and disposal of solid waste as well as maintaining the cleanliness of public areas such as roads, drains, markets, food complexes, hawker sites, public toilets, beaches, rivers and sea. The Department also handles Recycling Programme as well as assist *gotong royong* activities which are frequently held during the year by providing materials, equipment and vehicles.

The Urban Services Department was established on 16 January 1992 following the Council's to decision to restructure its organisation in order to create specialisation of functions based on the study by Japan International Cooperation Agency (JICA). The Urban Services Department is divided into 2 sections, i.e. Administration Section and Cleansing Section.

3. THE GOVERNMENT SET UP

As mentioned earlier, the Local Government is the third tier government. It is important to know the role of each tier of government and its role.

3.1 The First Tier: The Federal Government.

The major roles are to provide and formulate national policies or laws related to solid waste management including recycling and relevant environmental issues. The agency involved at the federal level is Ministry of Housing and Local Government.

The Ministry of Housing and Local Government is directly in charge of all the Local Authorities in Malaysia. It will direct policies passed by the parliament to all relevant Local Authority through the second tier government known as the State Government.

3.2 The Second Tier Government: The State Government

The State Government will study and deliberate issues or policies passed by the Ministry of Housing and Local Government. Related matters are brought for

deliberation to the EXCO members. In the case of Penang Island Municipal Council, the EXCO involved is the Local Authority and Traffic Standing Committee.

There are 147 Local Authorities in Malaysia. Each of them has a different set of by-laws that suits the local scenario.

Although each of the Local Authority has different sets of law but all by-laws created must be based under the main law i.e. Local Government Act 1976 and approved by the state Government.

If the state EXCO member agrees with the policy or policies passed down by the Ministry of Housing and Local Government, it will then be directed to the Local Authority involved for it to be executed.

3.3 The Third Tier Government: The Local Authority.

The Local Authority upon receiving the policy or policies will have to execute it. There is no much room for deliberation or discussion given at the Local Authority level. Sometimes these situations create a non-conducive relation between the State Government and the Local Authority. Basically the Local Authority has to carry out whatever policies given upon. Normally policies or issues forwarded by the Ministry of Housing and Local Government will then be deliberated at the Council level. As far as solid waste matters are concerned the matters will be brought forward to the Cleansing Health and Public Education Standing Committee. As mentioned earlier, the standing committee can deliberate the matter but most of the time it carries no weight.

4. LAW AND POLICIES

Currently there is no national policy on solid waste management. However the government is formulating the National Solid Waste Act. It is in the process of tabling to the parliament for approval. The Ministry of Housing and Local Government has

been given the task to formulate the mentioned act. The secrecy and the silence of it have caused restlessness among the NGOs and environmental activist.

Most of the NGOs and environmental activist viewed that public input should be considered before drafting the act.

The National Solid Waste Act will incorporate an integrated solid waste management system that covers the collection to disposal of waste in a more systematic and standardised manner.

The Federal Government intended to privatised the solid waste management to most of the west coast of the country under the national privatization programme.

Under the act, the nation will be sectionalized into 3 zones. The Northern, The Central
and Southern Zone. Currently the Central and Southern Zones is already being privatised and operational.

The Northern Zone will include 3 more states under the national privatisation programme.

Among other reasons the government decided to privatised the solid waste management is to curb the irregular practices by local councils. It is also meant to solve the critical problem of manpower faced by most council in the country due to the government policy to downsize the public services sector.

Most of the local council in the country does have a sanitary landfill. It is hope that with the integration of solid waste management to the local councils through this privatization programme will help to solve the problems in the long run.

The present law which most of the Local Authority in Malaysia is applying on solid waste management is:

- LOCAL GOVERNMENT ACT 1976 (National Law)
- STREET DRAINANGE AND BUILDING ACT 1974 (National Law)
- PUBLIC CLEANSING AND SAFETY BY-LAWS 1980 (Applicable to Penang Island Municipal Council)

Note that it was mentioned earlier that each Local Authority has its own set of by-laws. Some of the by-laws may be identical, as Local Councils duplicate each other's law where applicable. Some may be modified to suit the local needs. Most of the time small Local Authority learned and duplicate laws from the bigger Local Authority.

By-laws are essential to Local Authorities as they provide more enforcement powers. Most of the national acts provide power to enable Local Authority to take legal matters to court whereas by-laws provides power to compound the offender. The acts have the proviso to compound but it is only to certain offences. Therefore the Local Government Act provides a clause to enable Local Authority to create its own by-laws.

Most Local Authority in Malaysia prefers to compound the offender as it fast and effective. Legal matters taken to court takes time, sometimes years to settle due to large number of other unrelated cases.

Several Local Authorities had built their own court i.e. Municipal Court to settle all the municipal cases without involving non-municipal cases. The Federal Government encourages Local Authorities to set up their own Municipal Court.
Even though the encouragement is well received by some Local Authority but many could not build their own court due to unavailability of magistrates, staff, lands, space and funds. Other factors are that the Magistrate appointed must be from the Federal Government but the paycheck will be borne by the Local Authority involved. Whatever fines imposed upon the offender will go to the Federal Government.

5. THE PRESENT SITUATION ON SOLID WASTE MANAGEMENT

5.1 THE COLLECTION

The Penang Island generates about 650 tons a day of garbage. The Penang Municipal Council is responsible to collect transfer and dispose them.

The Penang Municipal Council covers about ***95% of the population*** on garbage collection as major portion of the Island is well developed. 5% are the premises that are not within reach. These are premises situated on hills and isolated. It is not economical to provide services to such extend. The residents of the premises mentioned are mostly involved in market garden businesses and plantations. They normally burn or bury their garbage. Few depended on composting for their plantations and market gardens due to readily available of chemical and organic fertilizers. However, composting is practiced by some of them at a small scale.

The Council has privatised its collection since the early 80's. It covers only the city of Georgetown. In 1984, 6 contractors were appointed to cover greater part of the Island. Council later made a decision to appoint only 4 contractors to cover 80% of the Island in 1993. The private contractors covers 80% of the Island collection and the remainder 20% is by the Penang Municipal Council. The Council keeps the remainder 20% as a back up service in case any of the contractors fail to carry out their duty or terminated.

In the beginning, the Council pays the contractors by weight but there were some misconduct on the side of the contractors. They begin to cheat the Council by adding water, rocks, planks, concrete or whatever available to increase the weight of the garbage. The Council saw this and optioned to pay by flat rate.

A new problem arose from this flat rate system. As mentioned earlier development in Penang Island is rapid. More high rise buildings erected, more industries emerged, more commercial areas developed but the same number of contractors involved. Consequently the contractors are facing quite a pressure. The contractors are

operating with an extended workforce but gets the same amount as agreed in the agreement. This has caused the contractors to slack down on services.

Another problem encountered was, in the agreement, the Council clearly stipulated the use of compactor lorries and the roro bins. The contractors have to use 100% compactor lorries for collection. The roro or multi-lift as it is called in Penang are only allowed for commercial areas with high generation of garbage i.e. markets, supermarkets and hypermarkets.

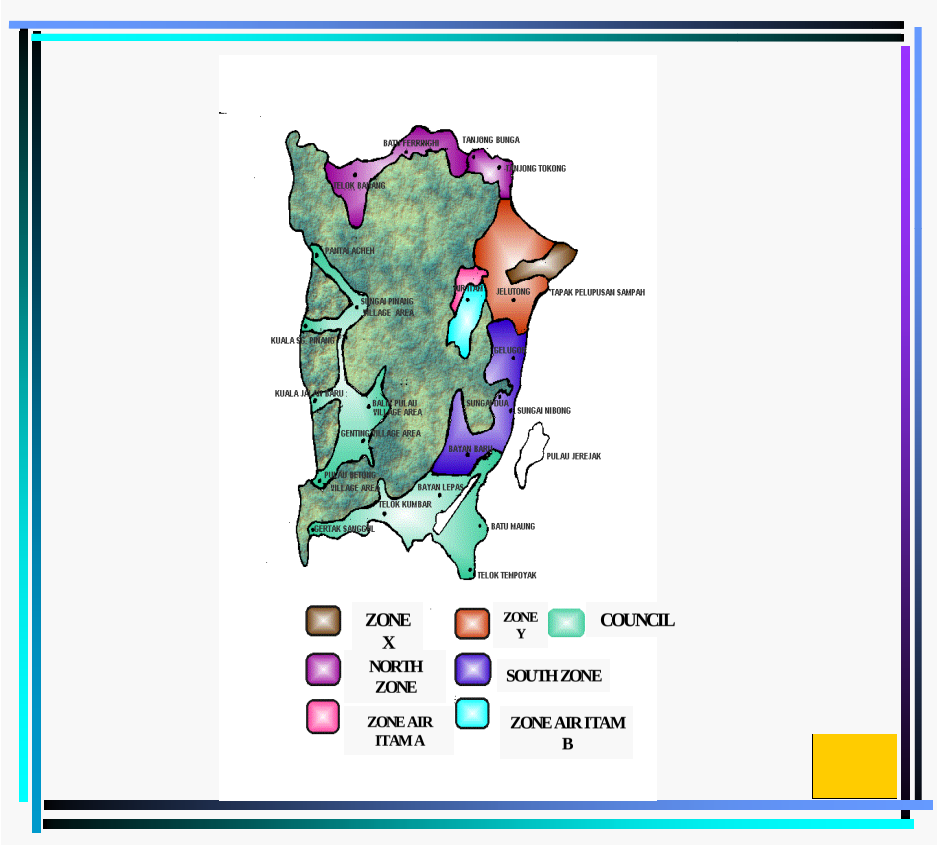
This arose from the habit of contractors creating little dumpsites all over the Island. The contractors were then practicing double-handling system, which is against the Council's policy. Garbage collected by the labourers from premises is dumped at little dumpsites. The lorries will then pick it up to the landfill. This has stirred up media and public outcry. Objections from political sectors came pouring in. Not to mention from the tourism sector. Under pressure, the Council came out with the ultimatum for the contractors to practice single-handling system i.e. house to house collection.

Development may be rapid in Penang but there are still underdeveloped areas on the Island. The existence of illegal squatter areas is one of the problems although not a major one. These areas are mostly inaccessible by lorries or even mini compactors. The way out is to place roro bins or multi-lift bins. Again it goes back to double-handling system but the problems of little dumpsites are taken care of. Please note that the Council also serviced the illegal squatters.

Penang Island Municipal Council practices "A People Friendly Council" approach. Since 1995 to the end of 2002 the Council supplied 57,692 units of free 80 liter HDPE bins to all landed property premises. Henceforth, started its first alternate day collection services with the 4 appointed contractors.

Collections are free of charge. Assessment charge is levied on ratepayers. The assessment rate covers all the services rendered by the Council but did not specify the amount for collection services. The assessment rates are determined by the Valuation Department of the Council.

The Council divided the Island into 7 zones for collection services. 6 zones by the contractors and 1 zone were by the Council.



The map above shows the distribution of the 7 zones. Note that the Council controls a large portion of the Island. However, this portion is not highly developed.

Table 1: Penang State Waste Composition Data

Composition	Total Waste (%)	Municipal Waste (%)	Difference (%)
Food	39.51	53.24	(13.73)
Paper	12.64	13.49	(0.85)
Greens	5.59	1.75	3.84
Wood	1.96	1.31	0.65
Plastics	10.73	10.54	0.19
Textiles	2.16	2.87	(0.71)
Rubber	0.04	0.04	-
Glass	1.77	2.35	(0.58)
Metals	5.79	4.79	1.00
Bulk	1.25	1.75	(0.50)
Aggregates (Construction & Demolition)	12.70	0.87	11.83
Water	5.86	6.99	(1.13)
Total	**100.00**	**99.99**	0.01

Source: NWI Technical Masterplan for Privatisation of Solid Waste Management: Northern Region, 1996

Table 2: Penang: Sectoral Share of Gross Domestic Product (%)

	1990	1995	2000	2001	2002	2003(f)
Agri, forestry, fishing	2.9	1.6	1.3	1.6	1.6	1.5
M&Q	0.3	1.2	1.1	1.2	1.1	1.1
Manufacturing	43.1	43.9	45.7	41.3	41.3	41.6
Construction	3.1	3.3	2.4	2.4	2.1	2.1
Tertiary	50.6	50.0	49.5	53.5	53.8	53.7
Total	100.0	100.0	100.0	100.0	100.00	100.00

Source: Penang Strategic Development Plan 2 (PSDP2) & SERI

The main contributors to Penang's GDP are the manufacturing sector (41.6%) and the tertiary sector (53.7%). These figures indicate the presence of many multinational companies as well as small and medium industries in Penang. Penang's tertiary sector comprises mainly of services, which cater for the tourism sector.

The garbage collected are categorized into 4 different types currently:

1. Domestic Waste
2. Industrial Waste
3. Bulk Waste
4. Sea Waste
5. River Waste – effective in 2004, 21 rivers in the Island will be surrendered to the Council.

The vehicles used for the collection are as follows:

TYPES OF VEHICLES USED FOR COLLECTION

TYPE	COUNCIL	CONTRACTORS
COMPACTOR (12 Cu.M)	7	50
COMPACTOR (6 Cu.M)	5	
SIDE LOADER (7.5 Cu.M)	3	2
RORO (12 Cu.M)	7	3
RORO (6 Cu.M)	7	
HIGH SIDE TIPPER	10	
UTILITY VAN	3	2
TOTAL	**42**	**57**

TYPES OF VEHICLES USED FOR COLLECTION AND CLEANSING SERVICES

TYPE	COST (RM)
COMPACTOR (12 Cu.M)	208,800
COMPACTOR (6 Cu.M)	111,200
SIDE LOADER (7.5 Cu.M)	
RORO (12 Cu.M)	110,000
RORO (6 Cu.M)	96,200
HIGH SIDE TIPPER	163,000
4 X 4 PICK UP VAN	77,742.88
UTILITY VAN	48,685.35
ART GULLY EMPTIER	347,000
ALL LITTER VACCUM (RS)	99,800
ROAD SWEEPER (4.5 Cu.M)	349,500
ROAD SWEEPER (6 Cu.M)	550,000
RUBBER / DRYERS	36,000
STREET WASHER	96,000
SKID STEER LOADER	108,000
MINI MOBILE HIGH PRES. JET	208,000

Note: 1USD = RM3.80

Certain premises such as industries and hotels have their own contractor to collect their garbage. The Council allows the practice but the contractors appointed must be notified to the Council including their vehicle registration numbers. This is essential to monitor the garbage collected and disposed.

All garbage vehicles will be registered at the weighbridge (Transfer Station) for data collection purposes and to ensure that all garbage vehicles dump their garbage at the Council's transfer station.

The Council has made it mandatory for all organic, domestic and industrial waste to be dumped at the Council's Transfer Station. Non-organic waste is prohibited at the Council's Transfer Station.

Bulk waste and non-organic waste is dumped at the Jelutong Landfill. Bulk waste consists of furniture, construction debris, refrigerators, other bulky appliances, bulk metals, trees and such.

Dumping of organic waste at the Jelutong Landfill is strictly prohibited.

The Council does not levy any charge to any public who wants to dump their waste at the Jelutong Landfill or the Council's Transfer Station. This practice started in the early 2002 to curb the problem of public dumping their garbage at public or hidden places. However, the public needs to inform the Engineering Department of their intention for administrative purposes.

Before this practice, the Engineering Department levied a charge of RM10.00 for a permit to dump. It is not the charge that hinders the public but the hassle of having to go through the administrative procedures. Knowing this being a problem, the Council decided to do away with the charge.

It is hoped that by making things simple for the public, it will encourage them to stop disposing their waste indiscriminately but the dump continues, very minimal though.

5.1.1 Frequency of Collection

Domestic Waste:

Prior to 1995 the Council practice a daily collection through out the Island. Under the recommendation of Japanese International Cooperation Agency, the frequency was altered to alternate day collection. It was advised that a daily collection incurs a lot of expenditure. Consequently it had been change to the present system – the alternate day collection.

Nevertheless the people of Penang accepted daily discharge of waste as a "way of life". To date there are still people that could not accept the alternate day collection system thus continues to dump their garbage outside the collection day.

The alternate day collection system is applicable to landed property premises only. For the high rise residential, a daily collection has to be carried out due to high generation of waste.

The total cost for the various services are found in the table below:

Table 3: Costs for Waste Collection, Transfer and Disposal at Landfill

Operation	Cost per Ton (RM)
Collection	70.00
Transfer	35.90
Landfill	27.00
Total	132.90
USD	35.00

Industrial Waste:

Most of the industrial premises have their own contract with contractors. The frequency of collection depends on the demand and needs of the particular industry.

Majority of the industries prefer the Roro bin system due to heavy generation of garbage and availability of space to place the Roro bin. It is being a preference because it is convenient and fast. It is easy to remove and replace without much labour force and the capacity suits the generation of waste.

Bulk Waste:

The Council provides a free weekly bulk waste to the public. Nevertheless, if the public needs an urgent service outside the collection day, he or she will have to pay RM 50.00 for a trip of clearance.

The charge levied is a subsidised rate at RM50.00 per trip compare to private lorry company that charges around RM220.00 per trip.

Sea Waste:

Since Council is also the authority within 1 nautical mile off the coast, the task of sea cleaning is the responsible of the Council. Following that, on January 2001 the State Government appointed 2 contractors to clean the sea under the supervision of the Council. Boats and nettings are used in carrying out the job. The frequency of sea cleaning is 4 times a week. Garbage collected is dumped at demarcated landing points and later collected by tippers to the Transfer Station.

Beach cleaning is incorporated in the sea cleaning programme. A separate contractor was appointed by the Council to carry out the job. The beach cleaning is carried out daily except Sunday.

Table 4: Costs of Waste Collection

YEAR	MPPP	CONTRACTOR	PRIVATE	TOTAL DIS-POSED	AVERAGE @DAY	AMOUNT PAID	COST/TON
	(TON)	(TON)	(TON)	(TON)	(TON)	(RM)	TON (RM)
1998	45,813	127,319	1,554	174,686	479	8,413,597	66.08
1999	47,580	127,715	2,778	178,073	487	9,323,409	73
2000	49,595	146,091	3,499	199,185	545	9,860,719	67.49
2001	44,656	146,310	8,912	199,878	547	10,227,267	69.9
2002	47,901.29	152,875.10	37,206.81	237,983.20	652	10,568,943	69.13

5.2 THE TRANSFER STATION

The Council has a transfer station located at Batu Maung, Southeast of the Island. It was built and operated by a private contractor appointed by the Council.

The Council pays the company RM660.000 per month basing on the formula A x D x R. as agreed upon. A = Average Daily Tonnage For The First Six Month Of Commencement Of Services, D = Days 30.42, R = Rate of RM 35.90 per ton.

On August 2001, Council had instructed all organic waste to be disposed at the Batu Maung Transfer Station. The Transfer Station opens daily from 6.30 am to 10.00 pm. However, the Council has the right to instruct the Transfer Station to be opened to the desired time. On festive seasons, the Transfer Station will operate 24 hours.

The Transfer Station occupies an area of 1.295 hectares inclusive of ingress and egress of vehicles, a weighbridge, an office, lorries parking bays and a jetty.

The weighbridge belongs to the Council and it is equipped with computers to record daily activities on site.

The Transfer Station provides 8 bays for garbage vehicles to dump the garbage into metal containers readily available. Each container could contain 12 to 15 tons of garbage.

Fully laden containers are transported onto barges by lorries. Each barge could load up 15 to 20 containers depending on the size of the barge. There are 4 barges operating currently.

Containers are taken to a sanitary landfill on the mainland via sea 22 nautical miles off Penang Island. Transportation by sea takes about 3 1/2 to 4 hours to reach the sanitary landfill depending on tides and current.

The containers are fully covered to avoid garbage falling into the sea due to strong winds at times.

The barges are designed in such manner that traps all leachate from the containers into the hull thus avoiding the pollution of sea. Leachate from the barges as well as from the Transfer Station are pumped into tanks and transported to the sanitary landfill for treatment. Vectors and odour control are being carried out through the operation.

5.3 THE LANDFILL

Presently the Council is using 2 landfills. The 2 landfill are :

1. Jelutong Landfill situated in outskirt of Georgetown City, Penang Island
2. Pulau Burong Landfill situated in mainland Seberang Perai

Jelutong Landfill - is not a sanitary landfill. It is basically a dumping ground.
It has a land area of 20 hactares. Currently the landfill caters for non-organic waste only. The Council planned to upgrade the landfill to level 1 by the year 2004. The Council owns and operates the landfill. It was a reclaimed land that belonged to the State Government.

The Pulau Burong Sanitary Landfill – It is a level 3 sanitary landfill. A private company appointed by the State Government operates the sanitary landfill. It has an area of 66 hectares with an operational area of 33 hectares. Currently the operator is upgrading the landfill to level 4. It is expected to be at level 4 by the end of this year (2003)

The Penang Municipal Council bought a portion of the landfill from Seberang Perai Municipal Council and shared the landfill. A designated spot is reserved specially for garbage from Penang Municipal Council. Although Penang Municipal Council shares the ground with Seberang Perai Municipal Council, garbage from both council are not mixed.

The Pulau Burong landfill has a jetty to receive garbage from the Island of Penang but there is no weighbridge as weighing is being done at the Batu Maung Transfer Station. The sanitary landfill is of the Fukuoka Type known to be first of its kind outside Japan when it was constructed in August 2001.It is equipped with primary and secondary leach ate treatment plant.

Since the sanitary landfill is by the sea, constant monitoring of sea pollution is being carried out. The monitoring is conducted by the Department of Environment, University of Science Malaysia and the company's lab.

The landfill handles about 1500 tons per day from both local councils. The life span of the landfill is expected to last for another 4 year with present 33 hectares. The Penang Municipal Council pays a tipping fee of RM32 per ton for industrial waste and RM27 per ton for domestic waste. An average of more than half a million ringgit is being paid monthly to the company.

5.4 RECYCLING PROGRAMME

Malaysia launched its first recycling programme in the early 80's with the caption "Guna Semula" which means REUSE. It was later changed in the early 90's to "Kitar Semula" which means RECYCLE.

Waste Recycling Programme in Penang, Malaysia

The solid waste management strategy of the State Government of Penang, Malaysia, revolves around Waste Recycling and Resource Recovery, a strategy which has been frequently announced by Y.B. Dato' Dr. Teng Hock Nan, the State Exco Member in charge of Local Government, Traffic Management, Information and Community Relations.

Waste Recycling in Penang and Malaysia dates back a long time – from the days of the "ting-ting botol man", the man who went house to house to collect bottles and metal containers.

When the Federal Ministry of Housing and Local Government, Malaysia, launched its first waste recycling campaign in 1993, the Penang State Government faithfully followed with a kerb-side recycling programme in Hillside, Tanjong Bungah.

In 2000, the Federal Ministry implemented the 3-coloured bin system – brown for glass, blue for paper and orange for plastic and metal. The Penang State Government followed in 2001.

In 2002, the Federal Ministry provided funds to local governments to build waste recycling collection centres. Penang was lucky to receive these funds and has built several centres.

On 12th October 2002, Y.A.B. Tan Sri Dr. Koh Tsu Koon, Chief Minister of Penang, launched Penang's Community Recycling Programme, after a 2-year pilot project proved successful.

Today, Penang's waste recycling and safe disposal programme includes (1) waste recycling of inorganic general waste, (2) safe disposal of hazardous waste, (3) composting of organic waste and (4) recycling and safe disposal of e-waste (electrical and electronic waste).

Like in other parts of the country, recycling and safe disposal of chemical and healthcare waste are supervised by the Department of Environment (DOE).

In Penang, the Chief Minister of Penang launched the recycling programme in 1993 as pilot projects in 2 housing areas. The programme started well but without a proper Public Private Partnerships for the Urban Environment (PPPUE) approach. The programme is still surviving but hardly living. The parties involved in the programme are the residents of the housing area, a recycling vendor and Penang Municipal Council.

Penang Municipal Council took a different approach. We got the NGOs and the public involved. The Council campaigned for more recycling vendors to register with the Council. The Council started with only 6 vendors, 4 from Penang itself and 2 from the capital city, Kuala Lumpur.

Today the Council has 28 vendors involved in the Penang Municipal Council recycling programme. The use of the vendor system is workable and sustainable. Through the system the Council is being kept free from the collection jobs and able

to concentrate more on the education and promotion part of it. It also creates a win-win situation to all parties involved.

The Council provides freedom for the public to choose whichever vendors they feel comfortable with to do the collection of recyclables.

Penang registered a ***recycling rate of 8.25% in the Year 2003 but in 2004 leaped to 15.56%***, unofficial rates put this figures higher at up to 20% (based on estimated weight of recyclables by Itinerant Waste Buyers not captured by MPPP's survey) This higher than the national average of 3-5%.

The other approach used is through the involvement of Penang Environmental Working Group known as PEWOG. PEWOG is under the auspices of Penang Local Government Consultative Forum (PLGCF), which is directly under the authority of the State Government. This is a voluntary working group (LA 21 styled) that is actively involved in planning and implementing programmes with Penang Island Municipal Council.

Table 5: Recycling Tonnage from 1993 - 2004

Year	Waste (metric tons) Per Year	Waste (metric tons) per day	Recycling Weights (Metric Tons)	Total Waste Generated (Metric Tons)	Recycling Rates %
	(A)	(B)	(C)	(A+C=D)	(C/D)
1992	184,812	505			
1993	205,973	564	40.83	206,013.83	0.02%
1994	232,625	637	91.89	232,716.89	0.04%
1995	192,016	526	126.74	192,142.74	0.07%
1996	187,921	515	300.41	188,221.41	0.16%
1997	184,776	506	85.25	184,861.25	0.05%
1998	174,686	479	74.60	174,760.60	0.04%
1999	178,073	487	75.20	178,148.20	0.04%
2000	199,185	545	57.54	199,242.54	0.03%
2001	199,878	547	319.63	200,197.63	0.16%
2002	237,983	652	3,844.74	241,827.74	1.59%
2003	252,215	691	22,669.29	274,884.29	8.25%
2004	239,242	655	44,093.17	283,335.17	15.56%

To achieve this is no easy feat and different approaches were used to increase public awareness and education. The following approaches were employed.

1. ***Direct Approach: (A package: Talks + Recycle Bin Supply)***

   MPPP conducts it's own campaign directly with the target group through talks, briefings and exhibitions.

   Target groups are normally Schools, Higher Learning Institutions, Kindergarten, Organisations, Factories, Private Firms, Hospitals, Government Agencies, Associations, NGOs etc.

   Target groups were taught in detail the Dos and Don'ts and what material can be recycled and what cannot be recycled

   Public education campaigns were conducted through KAP (Knowledge, Attitude, Practice), 3 P (Passion, Patience, Patient) 3 R (Reduce, Reuse, Recycle)

   AVA is widely used in this approach. Samples and displays are very essential to demonstrate what waste separation is all about.

   More of motivating approach used during talks and briefing

2. Vendors Approach:

The Vendor System was introduced to the community to ensure a sustainable and more systematic collection. This System leaves a free hand for MPPP to focus on future planning, new strategies and other environmental programmes. There is little need for the local authority to focus on the collection issue as this is self sustaining.

24 companies are listed as recycling vendors presently. Vendors list in the form of a Recycling Directory is distributed to public / community normally after the talks

The Public are given the right to choose whichever company (vendor) they feel comfortable to work with .

3. Networking Approach:

a) Vendors Networking –

The Vendors Networking concept was introduced to all the listed vendors through workshops or meetings. Vendors are required to collect all kind of recyclables with no exceptions. They were introduced to each other during workshops or meetings

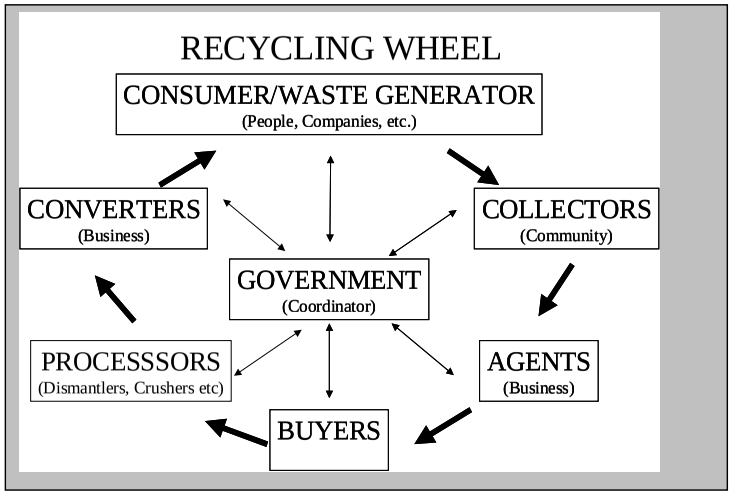
Vendors are required to state their preferences and specialty in the items thye collect e.g. glass, plastic e-waste etc. Vendors are then able to either exchange their recyclables or trade with each other

b) Public - Private Networking:

Approach used is through a structure introduced by United Nation Development Programme (UNDP) which is known as PPPUE (Public Private Partnership for Urban Environment)

c) PEWOG Networking:

PEWOG was established under the Penang Local Government Consultative Forum (PLGCF) by the Penang State Government. Members of PEWOG – MPPP, MPSP, DOE, NGOs, Environmental Activists, CAP, MNS, National Poison Centre, Recycle Companies, and individuals. Strategies are planned and implemented through this networking taking into consideration the comments and demands by the public.



Dato Dr Ong hean Tee, Chairman of PEWOG aptly summarizes the roles of the various stakeholders in the Recycling Wheel diagram above.

6. PEWOG – A SMART PARTNERSHIP BETWEEN LOCAL GOVERNMENT, PRIVATE SECTOR & COMMUNITIES

The Penang Environment Working Group (PEWOG) is a consultative, planning and coordinating environmental body set up by the State Local Government Committee of Penang, Malaysia.

PEWOG is a working group set up by the Penang Local Government Consultative Forum when the Forum was formed in Year 2000 by Y.B. Dato' Dr. Teng Hock Nan, State Executive Council Member and Chairman of the Local Government, Environment and Traffic Management Committee, State Government of Penang.

(The Committee was renamed the Local Government, Traffic Management, Information and Community Relations Committee after the country's General Elections in March 2004).

6.1 PEWOG's Vision

To be a contributing and internationally recognized environmental body.

6.2 PEWOG's Mission

To assist the Penang State Government and the Malaysian Federal Government to achieve a clean and safe living environment for the people of Penang and Malaysia.

6.3 Objective

To be a clearing house of environmental issues in the State of Penang, particularly in local government, environment, agriculture and eco-tourism.

6.4 Working mode

A consultative and cooperative tripartite (LA21) forum for community, government and private sector to work together on environmental matters concerning Penang, Malaysia and the World. PEWOG's projects are funded partially by the Penang State

Government with contributions from private sectors and volunteer efforts from its members. The Chairmanship is headed by Dato Dr Ong Hean Tee who is also currently the State Recycling Programme Coordinator.

6.5 Membership

PEWOG is made up of 25 and more individuals and bodies from the community, government and private sector in Penang.

Community members include:

1. Island Park Rukun Tetangga (Neighbourhood) Movement (RTIP)
2. Malaysian Nature Society (MNS), Penang Branch
3. Penang Inshore Fishermen's Welfare Association (PIFWA)
4. Consumers'Association of Penang (CAP)
5. Dalat International School
6. Green Lane Community Centre (GLCC)
7. Sahabat Alam Malaysia (SAM)
8. Individuals from the community.

Government members include:

1. Majlis Perbandaran Pulau Pinang (MPPP, Municipal Council of Penang Island)
2. Majlis Perbandaran Seberang Perai (MPSP, Municipal Council of Seberang Perai)
3. Jabatan Alam Sekitar (Department of Environment, DOE)
4. Jabatan Pengairan dan Saliran (Drainage & Irrigation Department, DID)
5. Pusat Racun Negara, Universiti Sains Malaysia (National Poisons Centre).

Private sector members include:

1. Ee Sheng Huat Sdn. Bhd.
2. Eurasia Express Sdn. Bhd.
3. Idaman Bersih Sdn. Bhd.
4. LHT Kitarsemula Sdn. Bhd.
5. Muda Holdings Bhd.
6. NKH Cartridges Trading
7. Pinang Resources Sdn. Bhd.
8. Sinaran Matahari (SIMA)
9. Alif Teknologi (M) Sdn. Bhd.

10. Central Malaya Paper Sdn. Bhd.
11. Elizar Enviro Consult Sdn. Bhd.
12. OK Scrap Trading

International Linkages
1. Global Alliance for Incinerator Alternatives (GAIA)
2. Waste Not Asia.

They are seeking linkages to:
3. Health Care Without Harm (HCWH)
4. Toxic Links.

The Community Programme is coordinated by the Environment Working Group of the Penang Local Government Consultative Forum, under the patronage of the Penang Exco Committee on Local Government, Environment and Traffic Management.

The Recycling Programme in Penang has three phases:

(1) Phase One: Pilot Project of the Community Recycling Programme and Awareness Campaign from 31st July 2001 to 30th July 2002 (one year)
(2) Phase Two: Information Collection and Dissemination Programme from 31st July 2002 to 30th July 2003 (one year), and
(3) Phase Three: Expansion of the Community Recycling Programme from 31st July 2003 to 31st December 2005 (two and a half years).

PEWOG has also organized awareness campaigns, seminars, workshops and exhibitions to promote recycling. Appreciation Certificates have also been awarded to recycling agents, organisations and individuals who are active in recycling in the State.

Through PEWOG's Awareness Campaign, about 150 communities and other bodies have started their recycling programmes with or without assistance from the government.

Ongoing and future programmes include the separation of wet and dry waste at household level and its collection, community composting as well as the establishments of community resource recovery centres. Penang is also the first State to publish a recycling guidebook as well as a manual for household composting. We are looking into ***big scale commercial composting*** to help remove around 40-50% of wet, organic waste from the waste stream.

7. PRESENT SWM SCENARIO IN PENANG

The following scenarios from the community, private sector and local authorities should be taken into account to provide an overall view of existing efforts and programmes:

7.1 Community

- Active recycling in communities going on and growing with the participation of 175 communities such as RTs, RAs, JKKKs, NGOs, Institutions (such as schools, universities, hospitals), commercial bodies (such as private businesses, trading companies and factories) and Government agencies
- Penang registered a recycling rate of 15.5% (2004)
- Awareness of recycling among the public and willingness to recycle is high but the lack of infrastructure support and legislation causes a high level of frustration that verges on cynicism.
- Reliance on (the same group of) volunteers leaves community recycling programmes vulnerable to collapse
- Household composting efforts being promoted and have gained strong acceptance among the people of Penang

7.2 Private Sector

- Strong recycling networks have been established for certain commodities such as paper and metal, however, other linkages need to be further strengthened to cover commodities such as plastic, glass, wood etc.
- Competition and under cutting exist among recycling agents and buyers
- Dell has introduced a Home PC Recycling Programme that offers take back of computers and peripherals. In conjunction with this, several permanent collection centers have been set up with the aid of the 2 local authorities.
- The sector is overwhelmingly commodities-oriented and prices are highly volatile often resulting in non-collection of certain recyclables when the price drops.
- A few far-sighted entrepreneurs are setting up resource recovery centers and working with shopping complex to offer rebates for parking for the collection of recyclables.
- There is adequate end-use market demand to support the recycling activities in Penang.
- Many MNCs have inbuilt into their management a proper and systematic waste disposal system, however, this does not hold true for many SMIs in Penang

7.3 Municipal

- Local authorities are very effective solid waste managers
- Solid waste collection is privatized out to contractors
- The waste contractors are already exceeding the collection efficiency achieved by the concessionaires in the Central and Southern regions.
- Waste collection fees to the contractors have been raised only once in 10 years.
- At RM 27 per ton (RM 32 for industrial waste), the landfill cost is probably being subsidised.
- No costs for waste disposal and management are currently passed along to residents in the form of a direct fee;

- The Penang waste management system is in the process of modernization,
- Bulk waste and non-organic waste are dumped at the Jelutong Landfill. These consist of furniture, construction debris, refrigerators, other bulky appliances, bulk metals, trees etc
- All collected organic, domestic and industrial waste are transported to the Council's Marine Transfer Station at Batu Maung then transferred by barrage to the Pulau Burung Sanitary Landfill
- The Pulau Burung Sanitary landfill is presently being upgraded from a Class III to a Class IV landfill with the addition of leachate treatment facilities.
- Lifespan of landfill is limited and diminishing rapidly.
- There is much difficulty in getting new site for landfill
- The Penang Island Municipal Council has initiated household hazardous waste collection points in several supermarkets and wet markets

8. DECIDING ON THE APPROPRIATE TECHNOLOGY

There are various technologies and options available to solve the problem of municipal solid waste, however, these should not be treated as stand alone solutions but must be integrated with other factors that affects the overall situation of solid waste management.

Some primary considerations to look into in the process of decision-making are:

8.1 ISWM Hierarchy

The ISWM hierarchy of source reduction, recycling, waste transformation and landfilling provides a general guide to solid waste management practices and should be adhered to. Selection of appropriate technologies should consider the programmes and activities that are already being implemented at each level of the hierarchy.

8.2 Appropriate Mix of different Technologies and Alternatives

There is a wide variety of alternative programmes and technologies that are available for an Integrated Solid Waste Management. Some of the considerations to be taken into account in the choice of appropriate technologies that are :

1. Amount of waste generated
2. Recycling Rate
3. Amount of compostable waste
4. Amount of residual waste to landfill.
5. Environmental friendliness
6. Social acceptability

8.3 Flexibility of chosen technologies to meet future challenges and changing scenarios

Selected ISWM technologies should also address future challenges and changing scenarios and also be flexible enough to adapt to them. Some of the important factors that need to be taken into serious consideration are:

1. Changes the composition of the waste stream such as the effect of recycling programmes and separation at source
2. Changes in the amount of the waste stream
3. Changes in the market situation of recyclable items such as prices of paper, metal etc
4. Changes in solid waste management technologies

8.4 Regular Monitoring and Evaluation

Regular monitoring and evaluation is necessary to maintain a dynamic solid waste management system. This feature must be inherent in the systems so that timely changes can be made to the system to reflect the changes in the amount and type of waste, market volatility of recyclables and future changes in technology.

8.5 Other Influencing Factors

In order to provide a dynamic and more integrated solid waste management system for the State, factors that affect the community, private businesses and local authorities must be addressed. Further support to existing programmes and efforts need to be implemented to tie-in with the appropriate choice of technology. Some actions that need to be taken in the community, private business and municipal areas are:

8.5.1 Community Factors

- Practice the 3Rs in order to reduce waste
- Incorporate recycling activities as part of the activities for all RTs, RAs and JKKKs
- Introduce Community Composting Programmes as the next step following the success of the Household Composting Programmes. These will focus on housing estates, community gardens in multi-family dwellings (e.g. apartments and condos) and other institutions such as universities and schools with adequate space.
- Introduce waste separation at source in tandem with the Community Recycling Programmes to make resource recovery more efficient and effective
- Change attitudes and mindset of people to support the Government's programmes on recycling through continuous public awareness and education programmes
- Organize Training of Trainers' courses to recruit new "champions" and enlarge the pool of existing resource persons
- Encourage further outreach to the community to increase public awareness
- Consider providing incentives to communities practicing recycling since the Government saves money on transportation costs and tipping fees from waste diversion away from the landfill.

8.5.2 Private Sector Factors

- Establish new networks to meet future challenges
- Establish more drop off recycling programmes in shopping complexes
- Expand existing PC Recycling Programme into a Household Electronic and Electrical Appliances Collection Programme involving more private sector participation
- Provide incentives for private companies practicing recycling and installing environmental protection equipment
- Encourage private businesses to collect and purchase bulk items such as furniture and obsolete equipment
- Setup a mechanism to monitor highly volatile market prices of recyclable items
- Provide subsidies as a form of Government intervention in the case of sharp price drops of recyclables resulting in non-collection.
- Derive win-win solutions and reduce undercutting practices in order for recycling businesses to remain sustainable
- Introduce tax incentives for purchase of equipment for processing recyclables
- Provide soft loans to businesses involved in recycling and material recovery

8.5.3 Municipal Factors

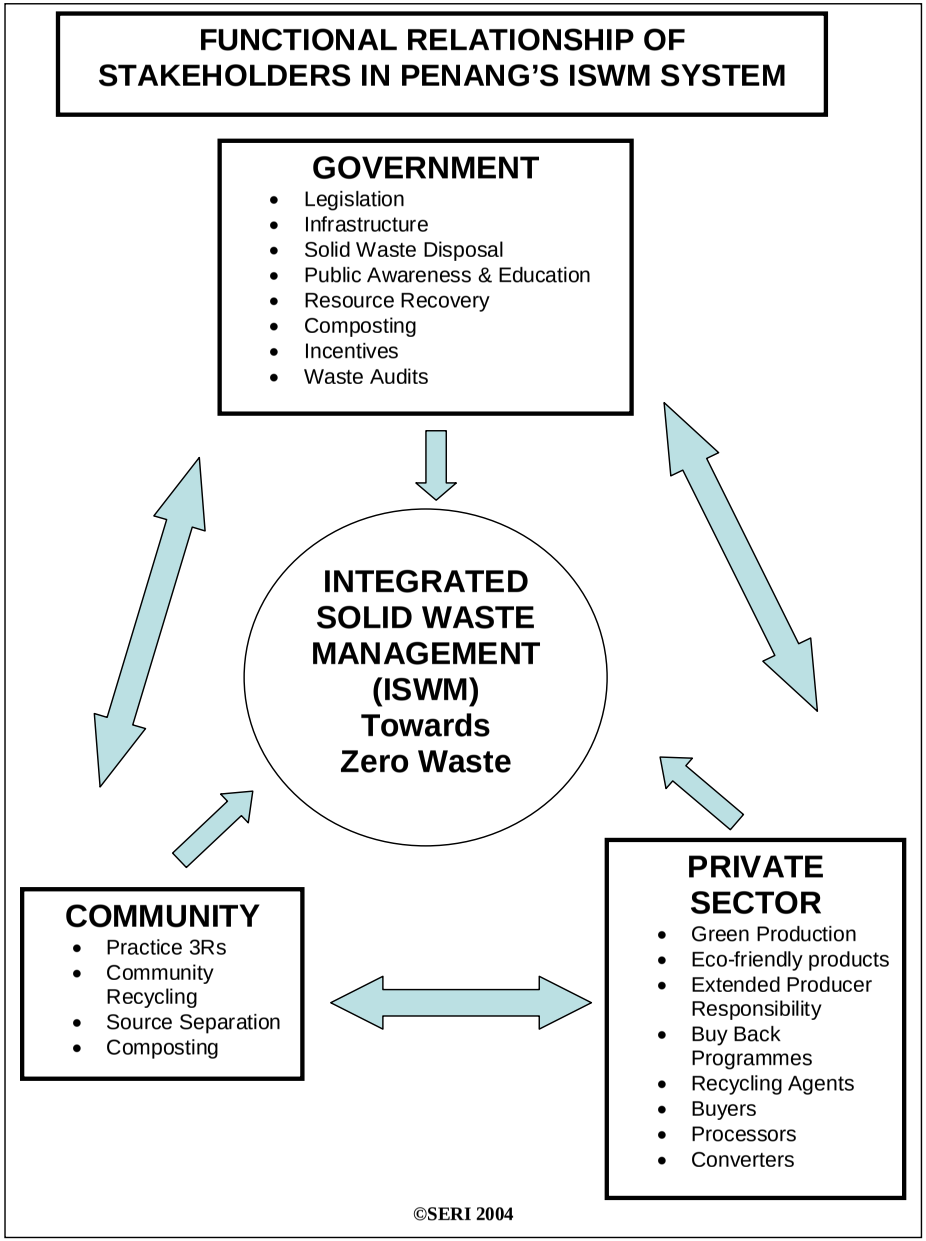
- Establish a sound legislative basis for waste minimization and management
- Infrastructure support for recycling is still lacking and needs to be further strengthened e.g. collection centres, collection of household hazardous materials etc.
- Expand present household hazardous waste collection points throughout Penang
- Set up a Hazardous Waste collection depot for other household hazardous items such as paints, oil, acids, aerosol cans, etc.
- Expand the present e-waste collection programme into Household electronic & Electrical Appliances (e.g. refrigerators, washing machines, TVs, toasters,

electric ovens, radios etc) programme in collaboration with private recycling businesses

- Set up a mechanism for the collection of bulk furniture.
- Select appropriate technologies for material/ resource recovery and composting at the municipal level

The above-mentioned factors and action must be integrated with the primary concerns to promote material recovery and to extend the lifespan of the existing landfill when selecting the correct technological solution to the municipal solid waste problem.

The functional tripartite inter-relationships between the Government, Community and Private Sector and their primary roles towards achieving an Integrated Solid Waste Management System can be summarized in the chart below.



9. RECYCLING AS A VIBRANT ECONOMIC ACTIVITY IN PENANG

HOUSEHOLD HAZARDOUS WASTE

The State Government is particularly concerned about the safe disposal of household hazardous waste that is presently being dumped into the normal domestic waste bins and these will ultimately end up in the landfill. This will cause environmental pollution. The collection of household hazardous waste (fluorescent lamps, dry cell and mobile phone batteries and aerosol cans) by supermarkets, hypermarkets and shopping complexes, is the first of its kind in the country. This collection will be extended to wet markets that are under the purview of the Penang Island Municipal Council.

Each day, an estimated 10,000 tonnes of garbage (also known as Municipal waste) is produced and sent for disposal nationwide. The prevailing practice is still disposal in landfills while processing of solid waste before disposal is rarely performed in Malaysia. However, due to land scarcity, landfills are increasingly becoming an obsolete option and the government is looking at incineration as an alternative instead. If the wastes are processed or recycled, it can be taken out from the waste stream, which means less waste will end up in dumpsites or landfills. This translates not only to financial savings from waste disposal costs but also profits for those engaged in processing of the waste, in particular recycling activities.

Indeed, there are vast potentials in waste. This may come in the form of direct economic benefits, for instance, in sales receipts and profits for establishments engaged in the recycling business, wages paid to workers in these establishments and other “ripple effects” such as companies and people involved in collection, sorting and transportation of recyclables. According to a study in the US, recycling creates ten times more jobs than landfills! Indirect monetary benefits, meaning money saved from the costs of disposal and treatment of higher volumes of waste if recycling is not practised, can also be substantial.

More than that, the environmental and health benefits of recycling far outweigh the burdens of collection, processing and transportation of recycled materials. Both landfills and incinerators make for poor neighbours as they can potentially emit toxic chemicals known to cause health problems. Recycling, moreover, substantially reduces green house gases that cause global warming as well as preserves natural resources such as trees, energy and water.

It was the above considerations that spurred this investigation into the recycling industry in Penang. The purpose of this article is to document the economic activities generated by Penang's recycling and reuse industry and explore how its benefits can be maximised. As there is no secondary data available, the research is carried out through a rapid survey that involves the gathering of primary data from direct interviews and field visits. The findings of the rapid survey only provides a partial picture because the majority of the establishments are involved in the early stages of the recycling loop, i.e. collection and processing. The manufacturers that use these recovered materials to produce finished products are mostly located outside of Penang, which is beyond the coverage of this article.

The survey revealed that recycling could be a potentially viable business and income generator. The bigger players include regional agents who are acting on behalf of the producers of recyclable products. They may also act as traders who perform the middle-person role in marketing and logistics functions.

There are also small time operators who are functioning as backyard industries: buy back centres, wholesalers, collectors to the waste pickers, sorters and cleaners. In terms of location, they are scattered all over the state, with significant concentration in the Batu Maung area, industrial areas in Seberang Perai and in enclaves the inner city of George Town, such as in Armenian Street and Victoria Street.

Besides the strictly commercial undertakings, the economic dimensions of recycling are also manifested in numerous charitable causes. Penang is witness to various community organizations that are using recycling as a

means to raise funds for their activities, such as providing jobs for the disabled or giving free medical treatment to the needy. This, of course, is feasible only because labour cost can be taken out from the calculations when recycling for charity is carried out through volunteers. This article will, however, limit itself to discussing the potential economic benefits from recycling as a business concern.

The only solid waste composition survey available for Penang, which was carried out by JICA in 1995, showed that organic waste is the highest component of our waste stream with 44% being paper and cardboard (21%), followed by plastic and rubber (17%), glass & stone (6%), textile (4%), wood (4%), and metal (2.8%). Although the study is no longer very up to date, it gives us an idea of how much resources we could potentially recovered if we process these wastes.

The discussion in this article is based on the above categorization. However, we would like to highlight another emerging waste category - `e-waste', which is increasingly becoming significant in our modern daily living.

9.1 Paper

Paper waste is the most heavily collected item in the waste stream. There are various types of waste paper collected, including double liner craft, pure white, old newspapers, old corrugated carton, mixed colour, paper cores, etc. Prices of the different types of paper vary according to their quality. For instance, pure white paper fetches RM0.60 - RM0.70 per kg, while mixed coloured paper is priced at RM0.15 to RM0.18 per kg. These are just indications of prices paid for waste paper delivered to the premise of the agent.

Waste paper is collected by scavengers, small agents, charity groups or municipal workers. They are then sold to an agent, who would process the waste paper before shipment. In Penang, there are only a handful of big agents. Usually, these agents have storage facilities and employ workers to do sorting and shredding in their plant. From our observations, the workers consist mostly of foreign nationals. Local elderly women are also taken on as part time sorters. One of the paper agents in Penang places open trucks in strategic locations, e.g. charity organization, hotels, factories and schools.

When the trucks are full, the load will be transported back to the plant. To attract the corporate sector, the agent also provides shredding machines for external use free of charge.

The wastepaper is packed into 500kg or 1-tonne bails. Once packed, they are delivered to paper mills for the pulping process whereby waste paper is mixed with water and agitated in a pulping vat to make a lush. Impurities like staples and binding materials are removed by screens. The recycled paper, rolled into jumbo reels are then delivered to consumers. The only paper manufacturer in Penang is Muda Paper Mills. The biggest paper mill that uses waste paper is Malaysian Newsprint Industries (MNI), located in Temerloh. Both are major paper manufacturers in Malaysia and invest heavily in R & D of recycling technologies. It takes 1.2 tonnes of waste paper to make 1.0 tonne of new paper. Most paper manufacturers face problems of low supply, i.e. there is simply not enough waste paper to recycle; so much so that waste paper has to be imported.

Unlike other paper mills, Muda Paper, which operates a 50-acre plant in Simpang Empat, is able to get 100% of its raw recyclable paper locally, as it has established a long history of networking with the local suppliers. It employs more than 420 workers and has a production capacity of 300,000 tonnes of recycled paper per year. According to Muda Paper, in terms of price, the recycled paper is quite competitive compared with paper produced from raw materials.

Besides paper mills, which are the key consumer of waste paper, there are also agents who deal with `refurbishment' of waste paper boards. One of them is located at Batu Muang. Carton boxes and paperboards are reconverted to new products in customized sizes. Sources of the material come from used corrugated cartons boxes from supermarkets or factories. The agent would customize new carton boxes from the old boards, employing simple manual processes such as cutting, stapling, printing of new logos and packing. They are then sold locally to food/textile/stationery/electronic outlets.

9.2 Plastic

The general perception has been that plastics are the least recyclable products. After conducting visits to several recycling plants in Penang, our perceptions have somewhat changed. In fact, most plastics can be recycled in one way or another, though their prices are not comparable to that of paper and aluminum cans. Post consumer plastics include plastic bags, mineral water and soft drink bottles, polystyrene packaging and cups, plastic cutlery and plates, containers, shampoo and detergent bottles.

Presently, it is estimated that there are only 11-12 plastics recyclers in Penang. Plastic products are collected either from scavengers or through contractual waste collection from factory outlets. Plastics are either processed locally or bailed for export. The factories recycle an assortment of plastics, ranging from ABS plastics, Nylon, polyamide, PC, PE, PP, Poly(polypropylene oxide), PS, Styrene-acrylonitrile plastic and other plastics made from mixing different resins and other materials. These plastic recyclers are mainly located in Seberang Perai, with some larger operations in the Kulim Industrial area, which also obtain their post consumer plastics stock from Penang. A few other companies melt down the plastics such as PE and PP, and remanufacture them into lower grade plastic resins which are sent to China.

One particular company that operates in the Kulim area obtains its plastic scraps, especially LDPE, from scavengers in the municipal dumps. The owners, however, complain of not having enough feedstock for melting and are currently operating at only 50-60% capacity. They complain also of low quality and highly contaminated plastics from local sources. To supplement the inadequate local supply, they have been importing higher quality and less contaminated stock from Europe (odds and ends of supermarket bags). However, this practice was stopped when the Department of Environment (DOE) recently reclassified such feedstock as Scheduled Waste.

Ironically, while some plastics manufacturers have to import recyclable plastics, local plastic waste is shipped to foreign markets. One recycling plant in Batu Maung, for instance, which is supposedly the `biggest player' and dealing with all kinds of plastics, has been exporting plastics to overseas markets. The volume processed per month ranges from 20 to 25 tonnes. The processes involved in this plant include sorting, removal of stickers, crushing,

and bailing, before transportation to the harbour and shipping to Thailand and Indonesia.

9.3 Glass bottles

Generally, glass is 100% recyclable. However, there are various types of glass products, the most common ones being glass bottles and flat glass. There is a low volume of glass material in the municipal waste stream because the glass is usually collected by waste pickers before the waste reaches the dumpsite. However, there are also recycling agents who contract with hotels, sport clubs, and supermarkets to collect glass bottles from them periodically. Even though physically glass bottles are 100% recyclable, some recyclers in Penang feel that it is not feasible as it incurs high costs in transportation and space for storage. These glass bottles need to be stored until a certain volume is reached before being returned to the producers, which are often located outside Penang. The key manufacturer that uses recyclable glass is KL Glass located in central Peninsular Malaysia.

There are also small traditional `botol' shops, which have existed as small backyard industries in Penang for decades. They operate in junkyards and buy from scavengers or small time collectors. These operations involve sorting, washing, scraping off the labels, drying and packing in gunnysacks before the bottles are collected by agents for factories such as Carlsberg and Guinness Stout. Prices vary according to types of bottles and whether they are processed. For instance, for beer bottles, the buying price is RM0.05 per bottle; and selling price is RM0.15 after washing and pack. For sauce bottles, the buying price is RM0.15 and they are sold at RM0.40 after cleaning.

9.4 Metals, aluminium cans, tin containers, etc

Together with waste paper, aluminum products are one of the highest priced recyclables. The price paid to a collector can be as high as RM2.50 per kg. Although cans are 100% recyclable, the recycling technologies are only available overseas, where bauxite is available and where there is economy of scale. Hence the recyclables are being exported overseas. In turn, can manufacturers in Malaysia use imported aluminum coils as raw material.

Recycling of aluminum cans in Penang and Malaysia generally, are limited to collection, processing and export. The major players involved in this exercise include waste pickers, dumpsite collectors, small dealers, and overseas buyers. Post consumer aluminum waste may come from a network of collectors, dealers and traders. They usually get their supply from organized sourcing or from small time collectors.

There are also smaller collectors, concentrated in Victoria and Armenian Street, who depend on junkyard activities to source their materials. They buy aluminum cans, scrap metals, iron, copper, tap heads, pipes from individuals or scavengers. These metals are then sorted into various categories and sold to bigger agents, who will then sell to Malayawata. Other items such as biscuit tins and Milo tins are kept and sold to walk-in customers during festivals. Apart from metal and aluminium, these junkyard operators also deal with all sorts of other recyclable items, such as gunnysacks, wood, old clocks, small machine equipments, etc. Some of the products can even be customized according to specifications. These include wood planks, old doors, glass louvers and zinc roof, which are salvaged from house demolition/renovation. They are systematically displayed according to types.

9.5 E-waste

Malaysia aims to be the IT hub for the region and in its effort to pursue this vision, the Government has embarked on a programme to encourage IT literacy among its people. Each household is encouraged to own at least a computer with the target of “one house one PC” to promote an IT culture. It is hope that this will eventually boost up the number of skilled IT workers for Malaysia’s future workforce. Penang’s Chief Minister who chairs the Penang K-ICT (Knowledge Information And Communication Technology) Council has developed a K-ICT Masterplan to turn Penang into an I-Land (Intelligent Island). However, the Council is concerned about the safe disposal of computer and its peripherals. In addition to this, there are also other types of e-waste such as electronic equipment and home appliances to be dealt with. The influx of cheap short-lived electrical and electronic appliances has further aggravated the problem.

In order to address this issue, the Penang Island Municipal Council has commissioned a survey of e-waste (electronic waste comprising computer and peripherals, electrical appliances), and will be working out mechanisms for effective collection and safe disposal of these with the collaborative efforts from civil society and private enterprises.

E-waste encompasses a broad and growing range of electronic devices ranging from large household appliances such as refrigerators, air conditioners, hand-held cellular phones, personal stereos, and consumer electronics to computers. E-waste has become a problem of crisis proportions because of two primary characteristics: it is hazardous; it is generated at alarming rates due to obsolescence as technology progresses.

Discarded computers, televisions and other electronic devices are becoming a significant disposal problem in Penang. E-waste contains over 1,000 different substances, many of which are toxic, and create serious pollution upon disposal. With the advance in information and communication technology, electronic product life spans become increasingly shorter. New models of some electronic products are being produced every 3 months. There is a trend towards shorter useful lives of electronic equipment, particularly PCs and cell phones.

The main sources of e-waste found in Penang are OEMs, individuals, businesses, institutions, government and community. Presently, e-waste is mainly discarded as garbage and collected by the Municipal Councils. Large corporations and manufacturers of new equipment tend to have a much higher rate of electronic waste recycling than individuals and small businesses whereby most of the e-waste from the latter concerns would end up in the Pulau Burong landfill as there is presently no mechanism for recycling or safe disposal for community-generated e-waste. Existing collection/disposal systems are inappropriate and inadequate to handle these materials. Many facilities are unable to handle electronic waste due to constraints in space and handling problems.

At present, there are a number of firms, both on Penang Island and Seberang Perai, which are collecting and recycling e-waste. Smaller operations along Armenian Street and Victoria Street buy directly from customers for a minimal price and sell them to people who are looking for spare parts for repair work or to operations that refurbish computers for reuse. These are often collected in small quantities from individuals who either give them free of charge or for a token sum to the buyers. Such small operations are often not well organized and do not really dismantle or process e-waste for proper recycling.

Larger operations also exist on both the Island and Seberang Perai. They are better organized as they receive the e-waste stocks from factories. Many of these set-ups are also vendors of manufacturing firms in the Bayan Lepas Free Trade Zones. They are usually assured of a stable volume and quantity from OEMs, who either sell them their defective products or scraps from the manufacturing process. Vendors are engaged as contractors to scrap such items and not selling them as second-hand products. Such operations also accept electronic waste from other countries. These are then dismantled and separated into various parts and components, packed for resale locally or exported to other countries such as China and Indonesia. Operations are mainly manual with the aid of some machines.

There also exist well-organized vendors that collect computers from the community and even suppliers from overseas for refurbishment and resale. One particular example is Dell, which has started a voluntary “PC Recycling Programme” to collect e-waste. Under this programme, the public can call up Dell representatives to collect from households and offices upon request at zero costs. The PCs are then handed over to a company, which will dismantle and distribute the parts to other companies for reuse. Besides Dell, a few more companies have also voiced interest in collecting e-waste.

Perhaps it is time for Penang to emulate the example of the European Union, which is looking into passing a directive on Waste from Electrical and Electronic Equipment (WEEE), based on principle of “extended producers responsibilities”, which demands take back of electronic equipment at the end of its life and bans the use of toxic heavy metals in its production.

The total amount of e-waste collected is shown in the table below:

Company	2004	2005	Total
	(kg)		
NKH e-Waste Trading	22,521	44,673	67,194
Dell	26,667	14,092	40,759
Total	**49,188**	**58,765**	**107,953**

9.6 Old Clothes

When a society becomes richer economically, it is often reflected in the consumptive lifestyle of its people. Penang is one such case. This is manifested in the discarded fashion and clothing items, many of which are still usable and fairly new. Usually these old clothing are donated to charity homes. However, due to the high volume that these charity organizations have been receiving, they usually sell them to generate funds.

Our visit to old clothes recyclers has revealed that the unpretentious recycling of old clothes could actually be a viable business venture. There is a company which operates its plant in Perai, which is perhaps the only old clothing trader that is carrying out its operation as an “industrial” activity, it is perhaps the only `factory' that deals in the trading of old clothes on a large scale. It operates using 6 to 7 lorries daily and employs 20 to 30 workers in its plants. Other clothing recyclers are mainly run as family businesses and sold in local markets.

They have a systematic collection system to collect old cloths from charity organizations and other collectors. The recyclable items are bought at a price (RM0.70 to RM0.80 per kg). The company also imports old clothing from Taiwan, Korea, Japan and Germany. The imported clothing is sorted together with the local ones by employing women workers from East Malaysia. Comparatively, the imported clothing fetch higher prices compared to local ones. Manual labour is used to separate the clothing according to type and quality. They are then packed in 50-kg and 100-kg bails and exported again to countries such as Indonesia, Thailand and Cambodia. Some of the better quality ones are sent to other states in Malaysia where the items will be sold in Pasar Malam or in bundle shops in rural areas. According to the boss, “As world population grows, proportionately, there will be more poor people

compared to rich people, so the old clothing business has a huge potential market".

9.7 Kitchen/household appliances

Second-hand kitchen or household appliances can usually be found in roadside stalls and flee markets in Lorong Kulit or Armenian Street. But large scale specialized shops or furniture warehouses are still new in Penang. We found out that there is at least one of these shops that function as an All-in-One second-hand household items warehouse in Penang. It is located in Victoria Street and deals with all kinds of household appliances such as kitchen utensils, mattress, and computer peripherals, precious antiques, fax machines, video recorder, wooden furniture, etc. It is not an exaggeration to say that one can equip a new industrial kitchen just by sourcing the necessary items from this shop. Its supply is mainly obtained through barter trade or cash transactions. Usually the items will be sent to them directly and this is how the cost of transportation is saved. Workers are employed to repair and refurbish some of the products before they are resold. The only problem faced by the operator is lack of space for storage.

Issues arising

The recycling activity in Penang is basically run in an open market system without any form of control or support. It is thus entirely a "survival of the fittest" business. There is no supporting mechanism or effort in coordination and networking either from the government or from the industry players themselves. As a result, there is a lot of overlap and unnecessary waste of resources stemming from unhealthy competition, lack of information, and weak infrastructure support.

The main sources of discarded material for recycling are presently from the industrial and household sectors. The industrial recyclable waste is well taken cared of, i.e. firms often contract out their waste to specific vendors and the vendors enjoy a constant and steady supply of materials as frequency and quantity is often assured. There are a lot of bidders in this sector and it is often hard for new players to break into established networks. The second source is from households and communities. They are often unpredictable

and low in volume. Included in this category is the discarded material from the municipal waste stream but these are often highly contaminated and hard to access as much of it goes to the sanitary landfill at Pulau Burong.

Due to the unpredictable nature of the supply, many recyclers often resort to importing discards from other countries. This is often true for plastic and paper recycling industries where operations are always short of materials for recycling. It was reported that every month, 100 tonnes of plastics need to be imported for recycling. Similarly, Malaysia is importing 25,000 tonnes of old newspaper for recycling, but it was said that 60% of old newspaper ends up in landfills (NST, 12/8/03).

The importing of plastic waste has been banned by the DOE recently due to concerns over imported hazardous waste. Many plastic recycling operations have closed down and our interviews with major plastic recycling operations indicate that there are hardly any left in the KL region and only about 4-5 left in the country. There are, however, many traders who crush, compact and bale the plastics and then export them to countries like China, Indonesia and Thailand.

Another major issue affecting the recycling industry is the rising cost of labour. The recycling industry is labour-intensive, but due to the highly manual and tedious nature of the job, there are few locals who are willing take it up. As such, most of the established recyclers have no choice but to employ foreign labourers. Labour is one of the major problems faced by the recycling industry. Although the application procedures for foreign labour has been relaxed to include a wider range of nationalities, responses from the recyclers and traders showed that they still face problems and delays in their application process.

Recycling technologies requires high capital investment. This is needed in both product development and processing technologies. Machinery is often expensive to import and different types of machinery are required for recycling of different types of plastics, for instance. Perhaps, if it is better consolidated and organized, i.e. if there are some form of mergers and sharing of resources, the industry can then operate as conglomerates and reap the benefits from the economy of scale.

The rapid study has revealed that there is indeed wealth in waste, if we know how to optimise it and if the above-mentioned problems can be resolved. In fact, the viability of the industry depends on how well the players and stakeholders can work in synergy. Networking is a crucial part of the recycling chain. The network loop comprises waste generators, collectors, agents, buyers and factories that perform the actual recycling. The recycling wheel will not function well if there is a break or disruption in this chain. Thus, some kind of mechanism needs to be established to ensure this chain is complete and runs efficiently. The recycling industry is an industry that is worth public support and private sector resource investments. The Government is crucial in providing the catalytic role in ensuring that the wheel runs smoothly.

Since landfills are no longer an option for future handling of wastes, there is an urgent need to look into various alternative technologies available. In charting the new strategies for the future solid waste management in Penang, the government needs to take resource conservation and long-term economic viability as two important criteria in its decisions. It should strive to create a win-win situation where all sectors could benefit from an integrated and coordinated mechanism. The government needs to seriously look into integrated and organized resource recovery technologies or facilities, as it is not only an option that could solve the waste management problem, but also contribute towards protection of environment and generation of economic opportunities. These support mechanisms could take many forms, such as provision of a centralized space for storage; logistics and infrastructure; enabling laws; as well as providing incentives to make sure that the recycling business is viable to all stakeholders in the components of the wheel.

10. CONCLUSION & LESSONS LEARNT

Results indicated that the amount of recyclables diverted from the Sanitary Landfill jumped from ***58 metric tons in 2000 to 44,094 metric tons in 2004***. The savings from this diversion is RM133 X 44,093 which is about ***RM5.86 million (US$1.54 million) in 2004***. This does not take into account the intangible benefits. The programme to reduce waste and divert waste to the landfill is sustainable as all the stakeholders are involved in the programme and not dependent only on the Government's efforts. Community awareness and involvement is a crucial factor to this self sustaining effort.

To further improve the diversion rate to the landfill, composting at household, community and municipal level is being planned. e-waste is also being collected by recycling agents and processors for resource recovery. The State Government is considering the establishment of resource recovery centres at the existing Transfer Station and Sanitary Landfill.

Other substantial results and intangible benefits include:

- Complementing the Government's efforts to promote recycling and composting
- No additional staff needed to be employed by Municipal Council
- Active involvement of Neighbourhood Watch Groups
- Formation a network of recycling agents and stakeholders in the recycling industry
- Information and database on SWM in Penang started.
- 1-stop reference point for people on SWM
- Increased awareness of the citizens regarding recycling and composting
- Employment creation through recycling and resource recovery.
- Website: www.pewog.org created and maintained through private sector efforts.

The PPP model and the establishment of PEWOG to involve the various stakeholders is a low cost mechanism that is based on smart partnerships and win-win approach. The tripartite relationship between Government,

Community and Private Businesses puts equal emphasis on the importance of the roles and responsibilities of each partner. This model is sustainable and can be easily replicated at the local government level.

The Penang Municipal Council and PEWOG is continuing its efforts to improve the situation. The Solid Waste Management programme proposed for Penang is a strategy for further resource recovery utilizing Waste Management Centres that incorporate waste separation processes coupled with the recycling of inorganic waste, composting of organic waste at municipal level. This is works in tandem with the efforts for recycling and composting at community level. The will be a significant diversion of waste entering the landfill as recyclables and compost is taken away from the waste stream. The residue that finally enters the landfill will be as low as 15-20%. This prolongs the lifespan of the landfill from 4 - 6 years to longer.

The functional tripartite inter-relationships between the Government, Community and Private Sector and their primary roles towards achieving an Integrated Solid Waste Management System can be summarized in the chart below.

International agencies have also identified Penang Island for implementation of projects on Solid Waste Management:

2003/04 UNDP-PPPUE Public Private Partnerships in Community Waste Recycling and Waste Management.

2005 JICA Study on National Waste Minimization in Malaysia – Pilot Project for Local Recycling Network and Source Separation of Municipal Solid Waste in the Penang Municipal council (PP-II)

2005 Green Productivity Demonstration Program In Malaysia - Solid Waste Management and Greening of The Hotel Belt in Batu Ferringhi and Universiti Sains Malaysia, Penang

The Penang Island Municipal Council and State Government is very optimistic that its recycling programme will further grow and expand with the continuing

collaboration of community, civil society organisation, private sector and the Federal Government. Penang's SWM Strategy for waste minimization and diversion from its landfill are finally; Clean Production with the use of non-toxic, recyclable, biodegradable components in manufacturing and packaging of products, emphasize on Corporate Producer Responsibility; and Resource Recovery. The Recycling Wheel shown below shows role of the different players in the recycling process. The development of Penang's recycling network is based on this process of material flow and the different approaches are also developed around this model.

Resource Recovery would include waste separation at source composting of organic materials and removal of household hazardous waste from the waste stream. It is hoped that with the implementation of proper strategies, Penang will head towards "ZERO WASTE". We are not there yet but we are on our way!

APPENDIX

CASE STUDIES:

Case Study 1 : ESH Resource Management Sdn Bhd
Case Study 2: Hospital Lam Wah Ee
Case Study 3: ASE Electronics (M) Sdn Bhd
Case Study 4: Sekolah Menengah Kebangsaan Sungai Ara

CASE STUDY 1: ESH RESOURCE MANAGEMENT SDN BHD

From waste picker to paper recycling giant - a personal success story

Since 14, Leslie Lim Yu Chin has vowed to become a successful entrepreneur. Leaving school was a natural choice for him and he has since held various jobs such as a hawker, waiter, furniture apprentice and popcorn seller. His sheer determination and involvement in the business world at a very young age helped to pave the way for his success later. At the age of 18, while walking on the road one day, he discovered that rubbish was dumped at the roadside indiscriminately. That gave him an inspiration, he thought, “Why don’t I turn the waste to money?” With this brilliant idea, he started to collect newspapers from house to house in Kuala Lumpur, using a small van. Later, he decided to move to Penang as he felt that Penang has a bigger potential market.

At a time when nobody talked about recycling, Mr. Lim was already a pioneer in this potentially lucrative but unknown territory. Today, at 38, Mr. Lim is the proud owner of ESH Resource Management Sdn Bhd., a major recycling trader in Penang. ESH has plants in Juru and Batu Maung, owns more than 20 trucks and lorries and employs more than 80 workers.

ESH Resource Management Sdn Bhd today, is company that specializes in recyclable waste. They have been offering this service since 1985. Currently, they are based in Penang with their Head Office at Juru (mainland) and Branch Office at Batu Maung (island). They are also an ISO9001 certified company since 2003. They have been working together with many MNCs, SMIs, Governmental / Non-governmental agencies and individuals in the effort to promote “A Lifestyle of Recycling.”

Their philosophy is to provide reliable, confidential and professional service to their customers; having the flexibility of using small trucks, trailers and roll-off containers which allows them to accommodate the requirements of each individual customer.

The company accepts various grades of paper, plastics, metals, wood, textiles, glass, tin, aluminium cans, rubber, electrical and electronic scraps as well as other emerging recyclables. It provides handling and processing services for the recovery of all types of materials and resources.

ESH also provides waste management and recycling consultancy services such as collection, sorting, transportation, recycling and resource recovery and waste disposal. Services are also available to aid customers in disposing their unusable waste to the landfill is also available. This unique service comes as part of a total waste management solution to their customers.

ESH will also provide bins to customers upon request for recyclable items to make it hassle free for customers. Its ability to provide confidential and professional services in handling P&C (Private and Confidential) documents disposal has earned all round praises. The company also provides regulatory assistance, laboratory services, analytical support, project management and professional advice for recycling and resource recovery.

Recently, ESH has embarked on a very unique attempt to aid small time waste pickers and collectors at the community level by providing them with motorised tricycles so that they are able to collect recyclables in their neighbourhood to sell and generate some income.

CASE STUDY 2 – HOSPITAL LAM WAH EE

The idea of setting up a community health care centre in Penang was first mooted by a few Chinese community leaders in 1876 and a fund-raising campaign was subsequently launched. A traditional-style building was completed in 1883 on a plot of land about 10,600 sq. ft. at Muntri Street. This was known as the Lam Wah Ee Hospital. “Lam Wah” means “Chinese in the South” and “Ee” means “medicine”.

After the War, another campaign was launched to collect donations for rebuilding as the traditional-style building in Muntri Street was destroyed by air raids during the War. In 1955, the present two-storey building was completed. The Beach Street branch was moved to Green Lane in order to benefit the people in the Jelutong and Green Lane areas. The Green Lane branch is situated on a piece of land donated to the Hospital by the British East India Company much earlier. This land is to become the site for the new hospital today.

The Lam Wah Ee Hospital at first relied upon the services of experienced traditional physicians or “sinsehs” who came from China. Later a system of examinations conducted by a committee of master “sinsehs” was introduced as a selection device to maintain standards and to encourage younger people to take up the study of traditional medicine. This system is still being practiced today.

The advent of Western medicine came about in 1983, a century later.

The CORE VALUES practices by the hospital are Caring for the patient, community and the environment.

Their recycling project started in 2003 with the following objectives:

1. To protect the environment.
2. To generate funds for staff welfare.
   e.g. - Terminally ill/Long term illness.
   - Death of staff.
   - Staff encounter with natural disasters such as flood/fire/landslides, etc.

A brief history of the events that brought them to the present stage of recycling activities is as follows

1997-2002 - Tzu Chi Buddhist Merit Society & Eden Handicap for paper and cardboard

Other staff from a few wards also practised recycling

1st Talk by Mr Donat Theseria and Ms Mylene Ooi on 18/06/2002

Recycling Committee formed on 28/06/2002

2nd talk on "Recycling" by Tuan Haji Zulkifli, Senior Health Inspector from MPPP, 22/10/02

The Recycling Project Committee was set up on 28 June 2002 with 19 Committee Members and their duties include:

Bimonthly meetings are held

All Committee Members take turns to do sorting and verifying

Sorting - Sort out the recyclable items according to their categories one day before the sale.

Verifying - Verify the weight of recyclable items.

RM30 penalty will be enforced upon any member who failed to serve on the day rostered for his/her duty. But if the member is able to find replacement to fulfill this duty, the RM30 penalty is waived.

The following items are collected by the hospital.

- Old Newspapers

- Books/Magazines/Loose Papers
- Cardboards
- Clear Plastic Bottles
- Coloured Plastic Bottles
- Drip Bottles
- Glass Bottles
- Tins/Cans /Cooking Oil Bottles
- Aluminum Cans
- Plastic Bags
- Wearable Old Clothes
- Old Car Batteries

Sources of these items come from hospitals and household recyclables brought in by the staff members. Upon receipt of the recyclables, they are being sorted out and verified.

Challenge trophies are also handed out for:

Best Management in categorising recyclable items collected

Best Performance in household recyclable items collected

Highest Weight in household recyclable items collected: -

Up till the end of 2004, the hospital has managed to recycle a total of 160,531kg and collected a revenue of RM 36, 289.49.

Date	Total Weight	Sales
July-Dec 2002	21,017.90 kg	RM3,653.19
Jan-Dec 2003	56,929.20 kg	RM13,503.18
Jan-Dec 2004	82,583.90 kg	RM19,133.12
Total	**160,531.00 kg**	**RM36,289.49**

They believe that they have achieved the following:

- Fulfill our objectives
- Able to help more unfortunate staff
- Foster better relationship among wards and departments
- Able to motivate the whole hospital to participate in the recycling programme

CASE STUDY 3: ASE ELECTRONICS (M) SDN BHD

ASE Malaysia established in 1991, provides a full range of IC packaging, testing and ' turnkey ' services in one convenient location.

In March 1997, ASE Test Limited, the world's largest independent integrated Circuit Testing house acquired 100 % equity interest in ASE Malaysia.

ASE Malaysia serves a large customer base in the communications, computing, industrial and automotive markets.

Through highly automated manufacturing processes and state-of-the-art equipment, we have developed capabilities to assemble and test packages such as QFPs, TQFPs, BGAs, SOICs, SOJs, PDIPs and Flip Chip.

ASE Malaysia obtained ISO 9002 & QS 9000, certifications from NV Kema (Holland) in April 1993 & June 1998 respectively and ISO 14001 certification from SIRIM in October 1999. Revenue has grown from USD 1.5 million in 1992 to USD 302 million in 2004.

ASE has been recycling some of their discards as scraps since 1997.

ITEMS ALREADY BEEN RECYCLE UNDER VALUE SCRAP

i. CARTON (BOX) - SINCE 1997
ii. TUBE - SINCE 2000
iii. TRAY - SINCE 2000
iv. COPPER - SINCE 1996
v. DAMAGED UNIT / SCRAP (content gold wire) - SINCE 1996
vi. PAPER - SINCE 2000

Proper recycling activities were started at the 24 October 2002. ASE recycling committee was set up on 22nd January 2003 with 15 members. Up till now, members have increased to 26 members from every department.

The program was first launched at plant 1 on 05th February 2003 followed by plant 2 & plant 3. The concept of having one department with one recycle bin for recycle paper is a simple but yet effective. Their objective is to segregate the waste for recycle from the beginning. All office paper must be recycled. as this forms up to 40% of solid waste in ASE. The programme is under the responsibility of the ASE recycling programme committee members

Total Weight And Value Of Recyclables Collected 2003-2005

Year	Weight (kg)	Value (RM)
2003	16,118	6,384.40
2004	15,785	6,314.00
2005 (Jan-July)	4,939	2,963.40
Total	**36,842**	**15,661.80**

Staff of ASE is encouraged to bring in their recyclable items once a month. These are then sorted, weighed and sold to a recycling vendor. All proceeds go into the account of the recycling committee for environmental activities. They collected over RM15661.80 worth of recyclables weighing around 36.8 tonnes from 2003 -2005 (Jan-July).

The recycling team also makes its own recycling bins from old cardboard boxes. These are then painted green with a biodegradable organic paint made from plant dye. Such bins are placed in all offices for the collection of papers, newspapers and magazines.

In implementing the 1 Department, 1 recycling bin programme and also by going

as paperless to reduce the usage of paper, ASE has been able to achieve a 20% cost saving sin paper. This is done by going online with their training requests and records, storing data electronically instead of hard copies and going online with their application process. They also provide paperless circulation of information by going online and this contributes towards a paperless office.

ASE has also a separate bay for the collection of scheduled waste. These are kept in a secured area and collected by Kualiti Alam who is the contractor for scheduled waste.

The Recycling Committee is as shown in the picture below.

CASE STUDY 4: SEKOLAH MENENGAH KEBANGSAAN SG ARA

Sekolah Kebangsaan Sungai Ara is one of the exemplary schools in Penang that has developed a very comprehensive and holistic programme to further improve the environment of the school.

Vision

The Vision is to transform the school into a beautiful garden school and to keep the environment clean and beautiful by practicing 3R (Reduce, Reuse & Recycle)

Mission

The Mission objectives of the school are:

- to transform the SMK Sungai Ara into a Garden School in response to the country's aspiration of becoming a Garden nation
- to carry out activities for the 3r Programmes (Reduce, Reuse, Recycle)
- to take care of the environment
- to win the chief Minister's Green Award

Objectives and goals

The Committee believes that the objectives and goals for fulfilling the mission can be achieved through gotong royong, Garden Beautification, Tree Planting Campaigns and Recycling Competitions, Clean and Cheerful classroom conditions.

Recycling is aimed at keeping the school clean and saving natural resources through the collection of recyclables that the school students and staff bring from home every last Friday of the month. These recyclables are faithfully weighed before a recycling agent collects them on the same day. this methods ensures that the school does not have to provide storage space for recyclables.

Reuse is being practiced to reduce the amount of fertilizer use through the practice of composting to produce organic fertilizer by suing all food and garden waste collected from the school canteen. This also prevents pollution of the environment and indiscriminate dumping of leftover food.

Another way is to reduce the amount of water and electricity consumption. This helps cuts down the costs and the saving of natural resources. Stickers to save water and electricity are being placed at strategic places in the school to remind both staff and students to switch off the electricity after use and to make sure that water is not wasted by turning off taps and repairing leakages.

Chemical waste from the school science laboratories are being disposed off following strict guidelines set by the school.

Noise and air pollution is kept to a minimum by not allowing school buses to enter the school compound and also through the planting of more trees.

Publicity to arouse the awareness of the school staff and students of the objectives of keeping the environment clean, green and beautiful is by organizing awareness activities through out the year.

The following table shows the environmental issues, objectives and goals that the school organizing committee has devised for a holistic and comprehensive programme.

No	Environmental Issues Addressed	Objectives	Goals
1	Paper Waste	Recycling & Reuse	No wastage, reduce the amount of rubbish
2	Canteen Waste	Reuse	Composting, reduce the amount of food waste
3	Laboratory Waste	Cleanliness	Toxic waste are separated, treated and disposed off safely
4	Electricity	Reduce	Cut down its usage and save natural resources
5	Water	Reduce	Cut down its usage and save natural resources
7	Toilet Cleanliness	Cleanliness	Proper cleaning, prevent air pollution, clear blockages
8	School Ground Beautification	Cleanliness & beautification	Plant more gardens and trees through gotong-royong
9	House keeping	Cleanliness	Gotong royong and recycling to keep classrooms clean
10	School buses	Cleanliness	No bus ins school compound to cut down on air and noise pollution
11	Odour	Cleanliness	No indiscriminate dumping of rubbish in school compound and keeping toilets clean
12	Soil erosion	No soil erosion	Plant more gardens, trees and plants.

The amount of recyclables collect in year 2004 and 2005 are as listed in the table below.

Items	Weight (kg)
Newspaper	3,709.00
Cardboard	3,400.00
Aluminum tins	13.70
Other Metal tins	124.50
Coloured Plastic Bottles	65.00
Clear Plastic Bottles	213.00
Bottles	321.00
Total	7,846.20

The School should be congratulated for its outstanding efforts in coming up with a very innovative and practical programme. Efforts have been taken to reduce the usage of electricity, water, printing paper, ink and chemicals. good records are being kept to monitor the usage of these items that are ultimately aimed at further financial savings for the school and prudent use o valuable resources.

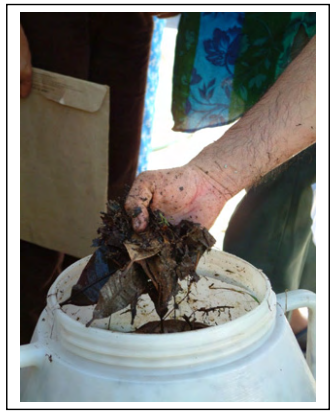
Efforts on the collection of recyclables are very commendable and the participation from both the staff and students very encouraging. Such a programme will definitely inculcate the good habit of resource conservation and recycling among young people that is being nurtured in the school. The school is first to use the 4 compartment system for composting canteen and garden waste which is a very a new and bold attempt toward community composting.

The school has also done very well in terms of improving its gardens and landscape over the years. Good attempts have been made to plant ornamentals and fruit trees in the school compound, the once barren hill slopes have been rejuvenated with shrubs and ornamentals.

INSTRUCTIONAL GUIDES

COMPOSTING INSTRUCTIONS

This set of instructions is intended for laymen and is not meant to be a scientific discourse on composting. Its main objective is to give a general overview of the composting process and biology as well as to introduce the bin method for use in the average household. Households are encouraged to experiment, adapt and modify the various methods for their own use bearing in mind the few simple rules needed for composting. All composting systems will eventually produce compost. It is only the time taken for compost to be produced and quality that differs.



The 4 essential ingredients for composting to happen are:

Browns + Greens + Air + Water

“Browns” and “greens” are biodegradable organic matter which forms the main ingredients for composting.

“Browns” are dry woody material, such as dry leaves, twigs and sticks, saw dust etc. They are rich in carbon.

“Greens” are moist green materials such as vegetable scraps, fruit peelings and manure. Greens are rich in nitrogen. Compost piles can also be supplemented with nitrogenous fertilizers to hasten the decomposition process.

The things that you can use at home for your composting bin are:

Type	
➢ Kitchen Waste These include: ▪ Fruit and vegetable wastes - skins, peels, seeds, leaves, roots, corn cobs etc. ▪ Entails, innards ▪ Meat and diary products, egg shells ▪ Leftover food – rice, curries, prawn shells, bones and other leftover cooked food etc ▪ Tea bags, coffee grounds	➢ Newspaper and cardboard ▪ Paper towels ▪ Toilet paper ▪ Tissue paper ▪ Cardboard boxes
➢ Garden or Yard Waste ▪ Grass clippings ▪ Leaves ▪ Weeds ▪ Dry Leaves ▪ Woody materials (twigs and branches) ▪ Straw ▪ Saw dust ▪ Soil	➢ Other Household Items ▪ Other organic products

Materials

- Empty Compost Bins
- Soil
- Kitchen Waste
- Shovel
- Water

Method

Lay a layer of gravel or stones at the bottom of the compost bin for aeration. Put a layer of soil (about 2 inches) on top of this. Put in the biodegradable

waste (greens), followed by browns. Remember to remove all inorganic materials like plastic. The finer you chop your materials the faster decomposition will take place.

· All biodegradable waste (greens) should be completely covered with a layer of browns to avoid vermin and animals such as flies, cockroaches, cats and dogs from digging up the food. Covering with browns also prevents odour.

· Do this everyday until the bin is full. Use the next compost bin when the first one is full.

· Your compost for the first bin will be ready in about 4-6 weeks' time (depending on type and quantity of your household waste), leave it to mature for about a week and then your compost can be used as fertilizer for plants, trees or lawn.

· You can use the bin again to bury your waste or use a new bin to continue. The contents must be kept moist at all times.

Toubleshooting

Compost piles using only biodegradable plant material usually do not stink or attract vermin. However, biodegradable material consisting of food scraps may pose a problem if not handled correctly. The most common problems and solutions are given below:

Problems	Cause	Solutions
Compost pile stinks and attract flies	Food scraps are exposed.	Cover food scraps with soil or browns or bury and mix it into the pile.
	Too wet or too much food scraps in pile.	Add more soil or browns and turn pile.
Pile infested with rodents and vermin	Exposed food scraps or holes larger than ¼ inch.	Cover exposed food scraps. Use rodent proof bins or containers or traps and baits.
Composting process is slow or not composting	Too dry	Add water until moist and mix thoroughly.
	Too much browns	Add more greens or organic fertilizer or manure and mix thoroughly.

SIMPLE 3Rs (Reduce, Reuse, Recycle) FOR THE HOME

Reduce

Buying Wisely

- Do not go shopping without a shopping list; avoid impulse buying.
- Bring along your own grocery or shopping bags.
- Avoid buying items that are packaged in non-recyclable materials.
- Buy products with less packaging.
- Buy in bulk to reduce packaging as well as to save money.
- Avoid the temptation of requesting for new or extra plastic bags.
- Buy durable items that will last.
- Buy products that are refillable.
- Bring your own food containers (Tiffin carriers) when buying take-away food; avoid plastic bags and containers, and Styrofoam.

Activities At Home

- Avoid using disposable cutlery made of plastic and Styrofoam.
- Use reusable utensils instead of disposable ones.
- Use cloth instead of paper or tissue for cleaning.
- Minimize the use of disposable items that cannot be recycled; use cloth diapers, handkerchiefs and napkins instead.
- Do not cook more than you need; cook just sufficient food for meals.
- Store perishable food eg. bread, fruits in the refrigerator.
- Borrow, share and/or hire things that you only need occasionally.
- Share newspapers, magazines and books, if possible, to save costs and paper.
- Reduce junk mail by writing to companies and organizations to omit you from their mailing lists.
- Use rechargeable batteries that are more friendly to the environment.

Saving Energy & Natural Resources

Electricity

- Use the fan instead of air-conditioning whenever possible.
- Set air-conditioning to an appropriate temperature to avoid under cooling or over cooling.
- Seal all air leaks around windows and doors.
- Use energy saving bulbs whenever possible.
- Switch off lights and electrical appliances when not in use.
- Close the refrigerator door immediately after taking out necessary items.

Water

- Avoid using the hose to wash the car; use a pail instead.
- Clean floors with a mop instead of a water hose.
- Don't keep the tap running when brushing your teeth; use a cup instead.
- Install dual flush toilets to save water.
- Switch to low flow faucets and shower heads. Can save up to 50% of water used.
- Take a shower instead of a foam bath.
- Wash only with a full load when doing laundry.
- Check for faulty taps and pipes to prevent water leakage.
- Turn off the water tap tightly immediately after use.

Creative Reuse

- Reuse old Styrofoam boxes and old tin cans to store things or as plant pots.
- Reuse used glass and plastic containers as receptacles.
- Reuse old toothbrushes for cleaning around faucets, between bath tiles, etc.
- Save 'grey' water (water left from washing hands and plates) for washing floors, toilets and watering plants whenever possible.
- Use old supermarket plastic bags for shopping.
- Use old clothing as rags for cleaning.
- Donate old but usable clothes to the needy.
- Convert scrap paper into memo pads.
- Pass old textbooks, story books, and toys to others.
- Donate good quality but unwanted items to old folks' homes, charitable organizations, etc.
- Repair and recondition faulty electronic appliances to extend their useful lives.
- Clean and reuse ornaments for the next festive celebration.
- Clean and reuse washable cutlery and crockery for the next party.

Recycle

- Buy green labelled products.
- Buy and use recycled products or products made of recycled material.
- Set aside boxes, containers and storage space for your household recyclable items.
- Bundle books, newspapers, magazines and cardboard for easier handling and storing.
- Keep your plastic ware to be recycled separately.
- Rinse your recyclable beverage containers to keep away pests and insects.
- To save space, crush or flatten plastic bottles and aluminium cans.
- Separate clear glass and coloured if possible. Be careful not to break them.
- Be creative and use your unwanted items for art and craft.
- Collect old newspapers, colourful magazines, wrapping paper, candy and gum wrappers to use as collage cards, gift-wrapping material and tags.
- Use both sides of printing paper.
- Participate in recycling programmes in your neighbourhood or office.
- Segregate recyclable items for collection by waste collectors.
- Electrical and electronic (E&E) items such as audio-visual equipment, household appliances, office equipment, computers and peripherals can be given away to dealers or electrical shops for refurbishing, spare parts or safe disposal.
- Contact recycling agents that collect E&E items.
- Keep batteries and fluorescent lamps separately for collection by the Municipal Council or place them in specially provided containers at wet markets or participating supermarkets that collect these items for safe disposal. These cannot be recycled.
- Bulk waste such as furniture and renovation waste can be taken away by the Municipal Council for safe disposal.
- Send your recyclables to the nearest recycling agent or center, charitable or community organization, etc.
- Arrange for your recyclables to be collected if you are unable to send them to a collection center.
- Compost your organic waste (food scraps, vegetable trimmings, garden clippings) wherever possible.

RECYCLING TABLE

MATERIALS THAT CAN BE RECYCLED	MATERIALS THAT ARE DIFFICULT TO RECYCLE
PAPER Newspapers, books, magazines, loose paper, cardboard, cartons.	Glossy or waxed paper, carbon paper, ammonia paper, tissue paper, toilet paper, envelopes with plastic windows, dirty or oily paper, coffee and tea sachets, PVC wrapping.
PLASTIC Plastic drinking bottles & ice-cream containers. Milk, water, juice, cosmetic, shampoo, dish and laundry detergent bottles; yogurt and margarine tubs; cereal box liners, grocery, trash and retail bags, CDs, DVDs.	Styrofoam (polystyrene) boxes and cutlery, boxed drinks and beverage containers (containing plastic lining etc). Toys (mixture of plastic and other materials). Medicine tablet wrapping foil, coffee and tea sachets, PVC wrapping.
METAL Aluminium soft drink cans, biscuit and milk tins, preserved food cans, scrap iron, brass, copper, etc.	
GLASS Clear (flint) glass, coloured glass (amber, blue, green).	Bulbs, ceramic mugs, cups, jugs, mirrors, window panes.
CLOTH & OLD CLOTHES Clean usable clothes.	Undergarments, dirty or torn clothes and dirty cloth.
	OTHER MATERIALS Aluminium foil, toothpaste tubes. Batteries, handphone batteries, handphones, fluorescent tubes, etc. Badly broken furniture, fans, lamps, mattresses, refrigerators, washing machines. Computers, some inkjet cartridges, remanufactured or refilled toner cartridges, torn printer ribbons.

PRACTICE THE 3RS IN YOUR HOME TO SAVE MONEY, RESOURCES, ENERGY AND SAVE THE ENVIRONMENT!

STARTING A RECYCLING COMMUNITY

1. How to Start A Recycling Community

1.Contact the community leaders from the JKKK, RT, RA or Taman residents.

Convince the leaders that recycling is beneficial to the environment as well as the community.

2. Hold meetings or discussions with the leaders and residents to explore the idea and explain the programme in order to obtain support from them. Evenings and weekends are usually good times to hold such meetings.

3. Seek out allies or champions – it is important to identify key persons who are interested and willing to spend time and effort to promote recycling activities. They can act as catalysts to champion the cause in their own community.

4. Organize a recycling talk or training with the aid of the RT or RA committee or the Municipal Council.

Get experts to give a talk on how to carry out waste separation.

5. After the talk, form a working committee from amongst the participants who are willing to oversee and coordinate the recycling programme.

2. Deciding on the Method

1.After the initial rapport, you can start to plan out the details of the programme with the Committee. One of the critical areas is to determine the method of collection most suitable in your area.

2.There are basically two types of collection methods.

A) Kerbside collection - residents place their recyclables in front of their houses and these are collected by appointed members of the recycling committee or agent.

Advantages:

1.Residents do not need to go far to deposit their recyclable items.

2.No need to build a permanent collection place if recyclables are taken way on the collection day itself.

Disadvantages:

1.More effort needed for door-to-door collection.

2.May be stolen or taken away by outsiders if these are not collected on time.

3.Need a place for collection or storage if not collected by recycling agent on the same day.

B) Drop-off centres– residents drop off their recyclables at a designated area for collection.

Advantages:

•Saves on labour costs/time.

•No need of a permanent storage place for recyclables if all residents bring the recyclables on an appointed day and they are then taken away by recycling agent on the same day.

•If a storage facility is built then some sort of security has to be provided.

•Less chance of being stolen.

Disadvantages:

•Storage space needed if not collected by the recycling agent on the same day.

•It may be hard to identify a suitable place.

•Residents may not be free on the appointed day.

3. Organise a Recycling Day

Organize and plan a Recycling Day - this means identifying suitable day to kick-start the recycling activities. Get your Recycling Committee to plan and designate duties to each person such as who should be responsible for:

•Publicity - distributing pamphlets, putting up banners.

•Sorting, tying, weighing & recording
•Contact the agent or collector to inform and remind him of the day and time for collection
•Accounting – a treasurer must be appointed to keep the accounts in proper order and to disburse the accounts according to the Committee's directives. He needs to check out the market prices of the recyclables and liaise with the buyer for payment.
•Security personnel - to ensure that the recyclables are not stolen from the storage facilities.

Prepare information pamphlets for distribution. Information such as the dos and don'ts of recycling, how to separate recyclables, frequency of collection, time and date, etc.

The main activities on recycling day are sorting, tying and weighing. Some cleaning may be needed to if tins bottles etc. are not rinsed beforehand. To attract participation, you can include other items in your programmes such as fun games, art competition, lucky draws, mini-concert etc.

Evaluate setbacks and weaknesses. In every projects there will be setbacks and weaknesses. These need to be taken note off by members of the Recycling Committee.

Modify the procedures to make the programme more efficient. Every community is different. Things that works for other communities need not necessarily work for your community. Adapt, modify and improve as you go along.

Determine with the committee what to do with the proceeds. Different communities have different opinions on what to do with the proceeds collected. Some communities may also offer to give the recyclables away to charitable organizations instead of selling them. Some examples of how the proceeds may be used are:
•Community development such as refurbishing the community hall, landscaping, build a children's library, etc.

•Pay workers who help to collect and sort the recyclables or for providing security. The recycling activity can actually provide job opportunities for the less fortunate individuals in your own community.
•Donate to charitable organizations
•A combination of the above

Whichever ways that the Recycling Committee choose to utilize the funds, you should always keep a record of your collections and proceeds.

Building trust and confidence in the community is key to greater support and success in the long run!

4. Record Keeping

Keep proper records of:
1.Time and date of collection
2.Weight each type of item collected eg. newspaper, cardboard, glass, plastic, old clothes, etc.
3.Keep a record of cash flow, containing information on:
•Money paid out to buy recyclable items from community (if not collected free)
•Money paid out to collectors, sorters or helpers (if any)
•Money collected from the sale
A proper record can show the progress from month-to-month and year-to-year. The Recycling Committee can produce colourful charts that summarizes the progress and achievements of the recycling programme. This is a good way to acknowledge and motivate the members/residents to work harder for common goals.

6. Practical points to remember

1. For publicity, prepare banners and hang them out one or two weeks before the collection day to remind people to bring out their recyclables.
2.Ensure that the collection is regular so that people make it a habitual practice to bring out their recyclables.
3. Ensure that the agent comes on the appointed time and day to collect the items so that people do not have to wait long.

4. Ensure that the community engages an agent that collects everything and not only specific items such as paper or aluminium cans and leaving uneconomic items behind.

5. Report regularly to the community the programme details. This will ensure that funds are not misused and that the community knows where the funds go to.

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