Mesyuarat Jawatankuasa Bandar Selamat, Local Agenda 21 &
Pembangunan Mampan, Majlis Perbandaran Sepang Bil.1/2018

WASTE PROCESSING DETAIL SITE SUITABILITY STUDY AND BUSINESS MODEL IN CYBERJAYA
FINAL REPORT

Presentation To Sepang Municipal Council (MPSepang)
13th September 2018

Mensilin Group Of Companies Sdn Bhd

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1.1. Introduction

- The commencement of this study has been part of the recommended Action Plans under Cyberjaya Smart & Low Carbon City 2025 (CSLC 2025), prepared and launched by Majlis Perbandaran Sepang (MPS) in November 2017.
- Leveraging on the GTALCC Program, this Waste to Wealth project is one of the low carbon initiatives to showcase a clear and integrated approach to solving municipal solid waste in Cyberjaya particularly, and everywhere in general.
- Waste to Wealth project is a project to recycle or reuse municipal solid waste into useful product and at once generating income from waste. The overall concept of Waste to Wealth project is to change from environmental liability to economic assets, moving from landfill to Eco-Industrial Park and moving from Cost Centre to Profit Centre (in terms of managing waste).

1.2 Study Area

- Confined to Cyberjaya area.
- Makes up about 4.6% of total size area of Sepang district or approximately 7,036 acres or 2,847 hectares.
- Total population - estimated at 42,253 people @ 2016 or 15.5% and 18.2% of total population of Sepang district and of Mukim Dengkil respectively.
- Population density - 6 Persons Per Acre Or 24 Persons Per Hectare

Facts On Waste Management :

- 100% dependency on landfill
- 0% composting rate
- Unknown recycling rate

Source : CSLC 2025

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2.1 Cyberjaya MSW Baseline

- All MSW from Cyberjaya are sent to Tanjung 12 landfill. The data based on the daily, monthly and annually weight of MSW being disposed at the landfill has been collected, recorded analysed.
- Actual collection of waste in Cyberjaya dated from 02nd January 2017 until 30th December 2017 are recorded below :

	Daily	Monthly	Annually
Total MSW Collected For Year 2017	26.44 MT/day	668.56 MT/ month	8,022.75 MT/year

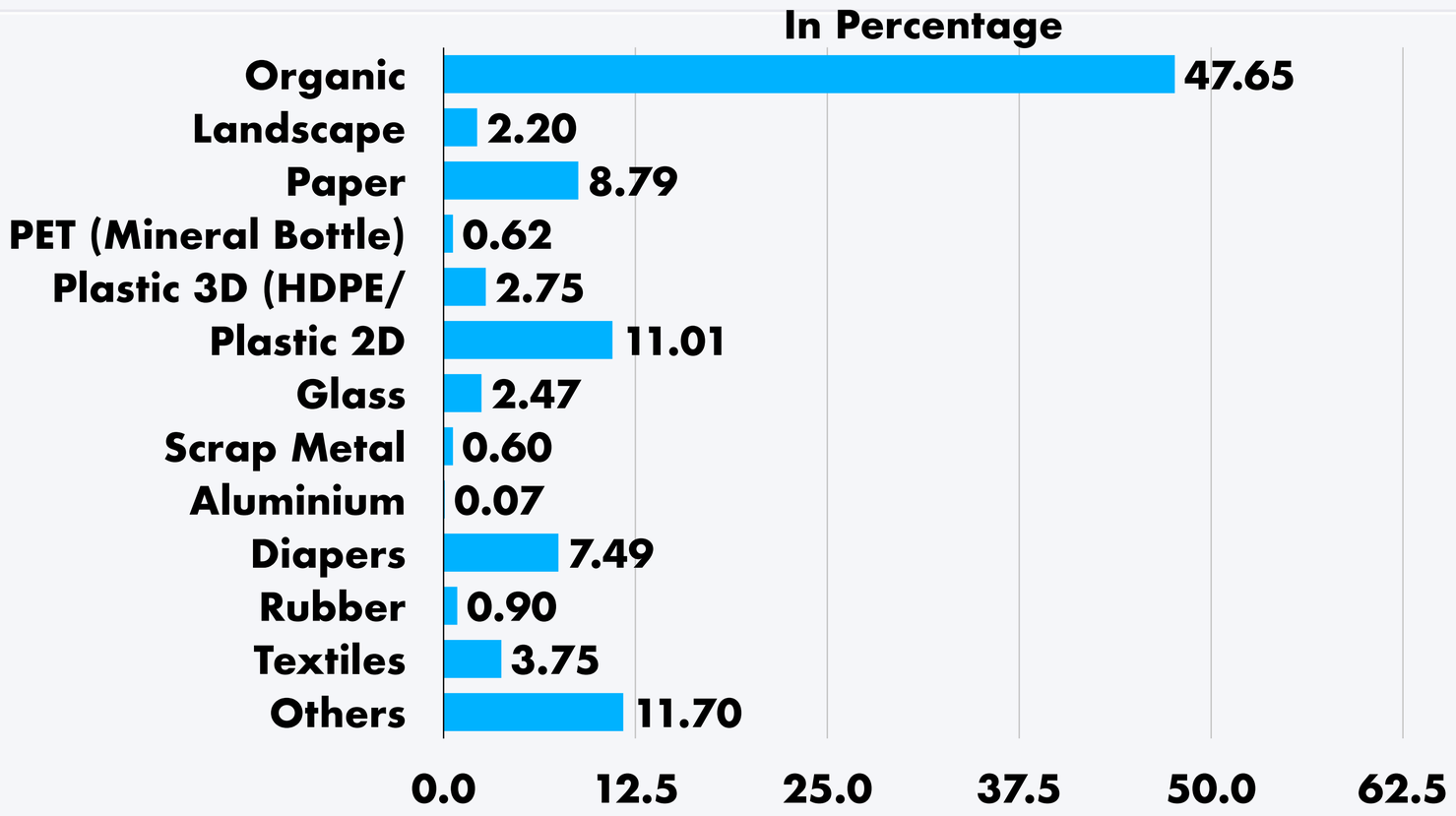
2.2 MSW Cost Structure

- A baseline position for Cyberjaya is as follows :

No	Type Of MSW Management Cost	Monthly Cost (RM)	Annual Cost (RM)
1	Tipping Fees	24,068.16	288,819.00
2	Transportation Cost	15,900.00	190,800.00
3	Garbage Collection Contract	223,861.01	2,686,332.12
	Total MSW Management Cost	263,829.17	3,165,951.12

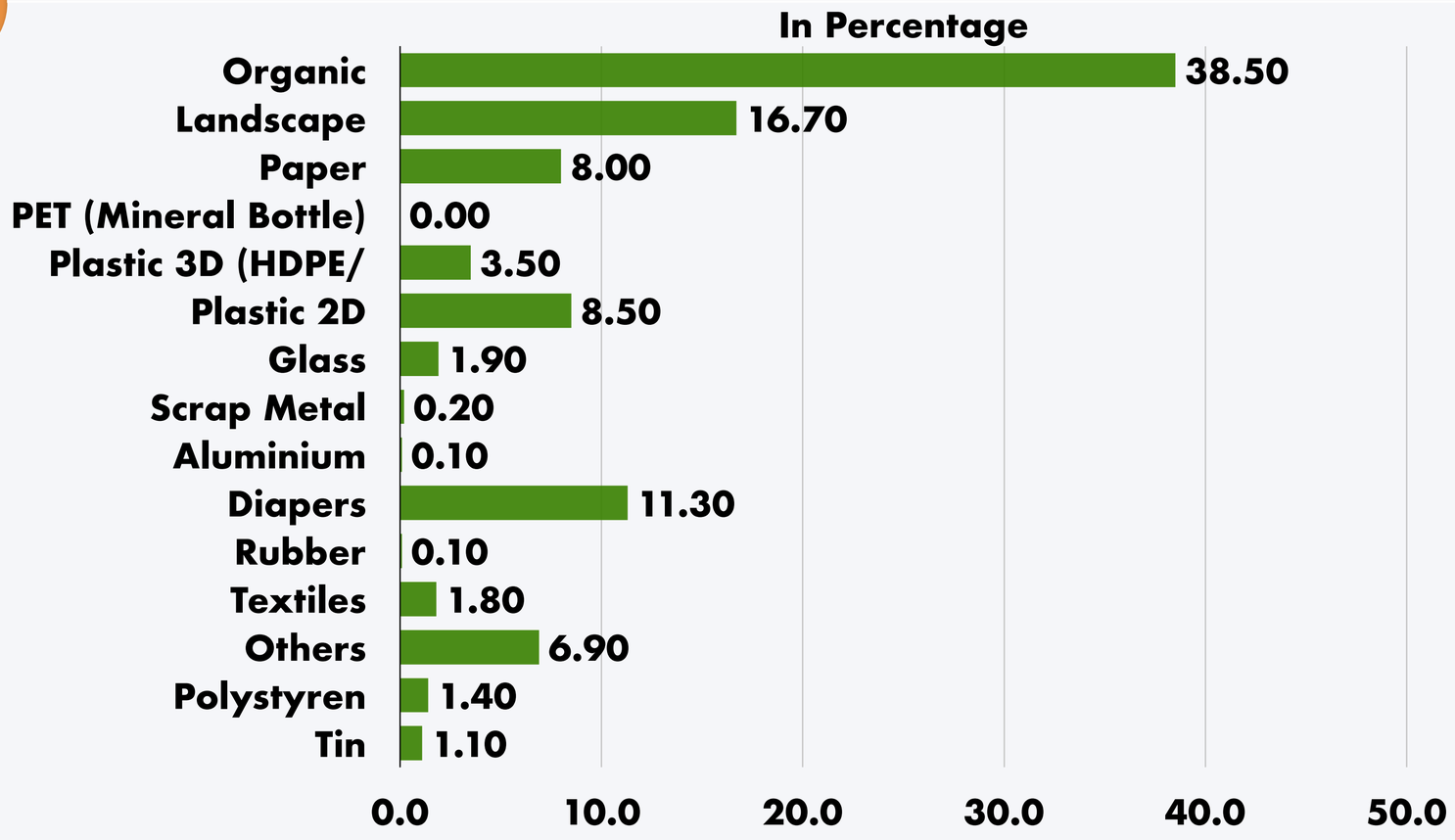
- MP Sepang spent more than RM3.1 million annually for managing waste in the area of Cyberjaya alone (Cyberjaya area is about 4.6% of total size area of Sepang district or approximately 7,036 acres or 2,847 hectares).

2.3 Cyberjaya Waste Characteristic Profile



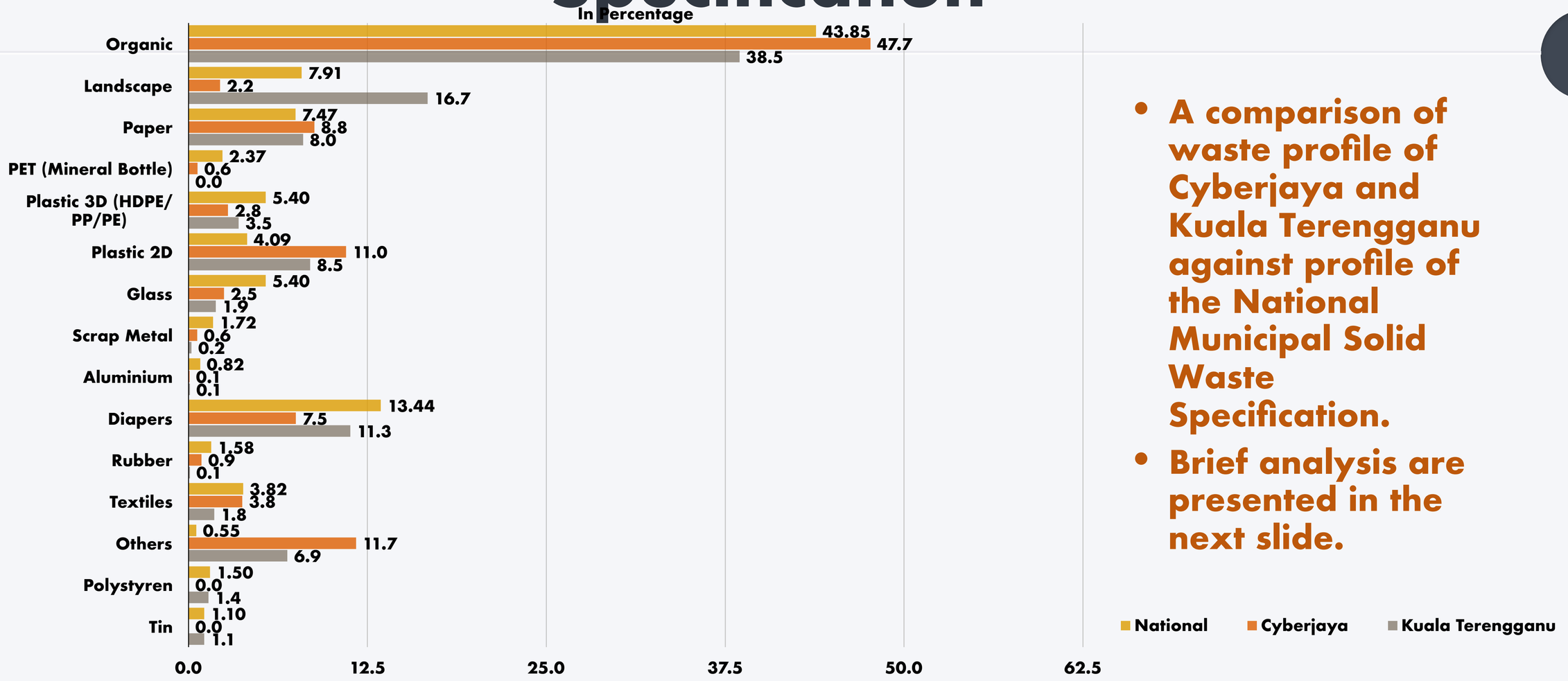
- Based on the diagram, Organic Waste is the biggest tangible component of waste followed by Plastic 2D and Paper.
- Organic Waste accounted for almost 50% of total waste in Cyberjaya.
- The least amount of waste present is aluminium can.

2.4 Kuala Terengganu Waste Characteristic Profile



- A waste characterisation profile had been carried out by the company for Kuala Terengganu.
- The comparison is made just to show the similarities and dissimilarities between 2 urban areas in terms of waste composition's characteristic.
- It is interesting to note that there were a presence of components Polystyrene and Tin in Kuala Terengganu's profile. This is may be due to the lack of recycling policy and activities in the city as compared to Cyberjaya.

2.5 A Comparison Against National Specification



- A comparison of waste profile of Cyberjaya and Kuala Terengganu against profile of the National Municipal Solid Waste Specification.
- Brief analysis are presented in the next slide.

2.6 Summary Of Analysis

- Organic Waste, Paper and Plastic 2D component in Cyberjaya's Waste Profile have been exceeded that of the national standard. The highest being Plastic 2D (+6.91%), Organic Waste (+3.85%) and Paper (+1.33%) respectively.
- The presence of high quantity of Plastic 2D and Paper suggested that more pro-active steps and measures need to be intensified to reduce this recyclable material from the system. The same can be said for Paper component too.
- Even though figures in Organic Waste shows minimal differences compared to the national data, an effort to reduce this food waste should be initiated. This is because a large portion of waste came from this category.
- The component "Others" in the profile is largely referred to as "leachate".

2.7 Cyberjaya Waste Characteristic Baseline

Component	Weight %	Weight Assumption Per Day (MT)	Weight Assumption Per Month (MT)	Weight Assumption Per Year (MT)
Organic Waste	47.65	12.60	318.57	3,822.84
Landscape Waste	2.20	0.58	14.71	176.50
Paper	8.79	2.32	58.77	705.20
PET (Mineral Bottle)	0.62	0.16	4.15	49.74
Plastic 3D (HDPE/PP/PE)	2.75	0.73	18.39	220.63
Plastic 2D	11.01	2.91	73.61	883.30
Glass	2.47	0.65	16.51	198.16
Scrap Metal	0.60	0.16	4.01	48.14
Aluminum	0.07	0.02	0.47	5.62
Diapers	7.49	1.98	50.08	600.90
Rubber	0.90	0.24	6.02	72.20
Textiles	3.75	0.99	25.07	300.85
Others	11.70	3.09	78.22	938.66
Total	100.00	26.44	668.56	8,022.75

3.1 Top Level Solutions

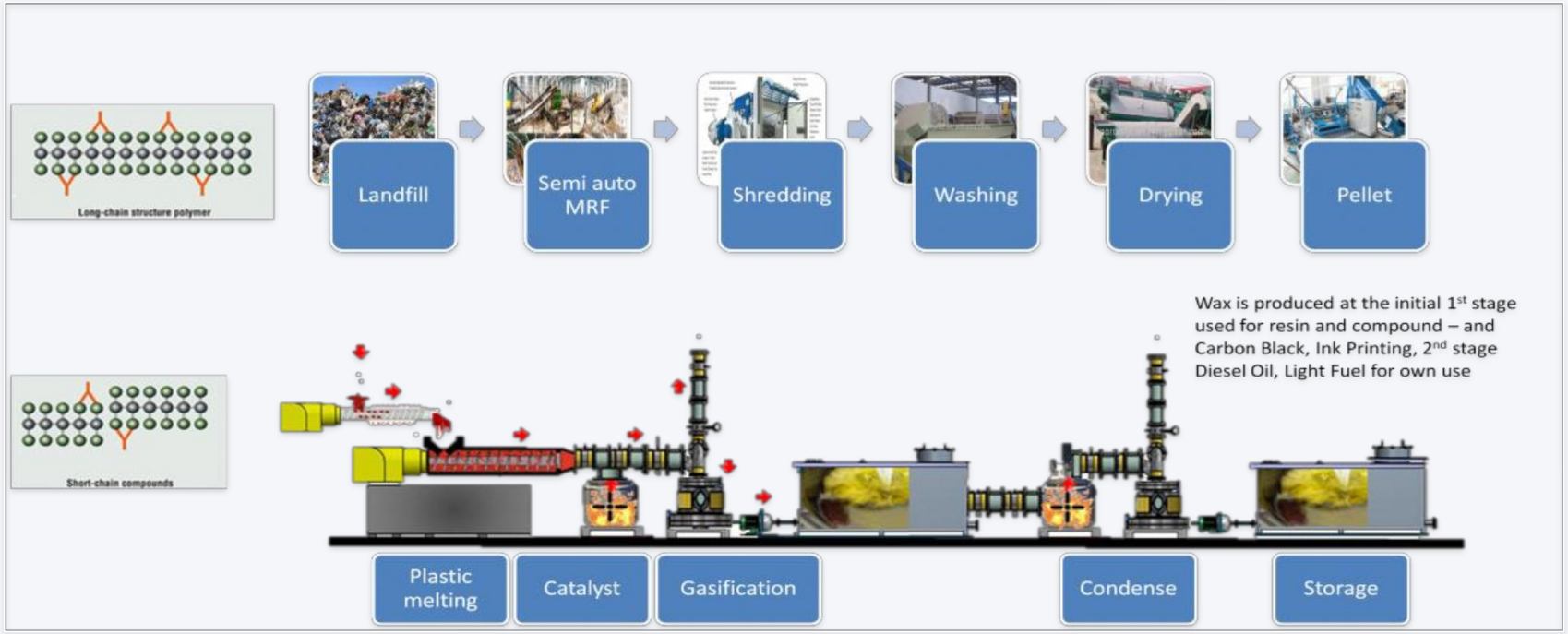
- Currently, MSW in Cyberjaya is managed and disposed through landfilling method. However, landfilling method has arising multiple practical issues including contamination of groundwater. Apart from that, the arising production of MSW nowadays is causing a huge amount of money spent for managing solid waste without gaining benefits.

- As such, 4 top level solutions are suggested to reduce the huge volume of solid waste dumping into Tanjung 12 Landfill, which consist of the followings :
  - Plastic to Fuel (PTF)
  - Organic Composter (Composting)
  - Semi-Auto Material Recovery Facility (Commercial Recycling)
  - Waste Eco Park (Long Term)

  *can be done separately (by phases) or holistically (integrated)

3.2 Plastic to Fuel (PTF)

- **Plastic waste is very useful and can be converted into fuel with the innovative technology known as "Syngas Plastic to Fuel Conversion System".**



As the system managed to convert 80% feedstock into oil, the issue of plastic generation can no longer be a problem as it reduces landfill waste and turnover the abundant of feedstock into product that is useful and cost generated.

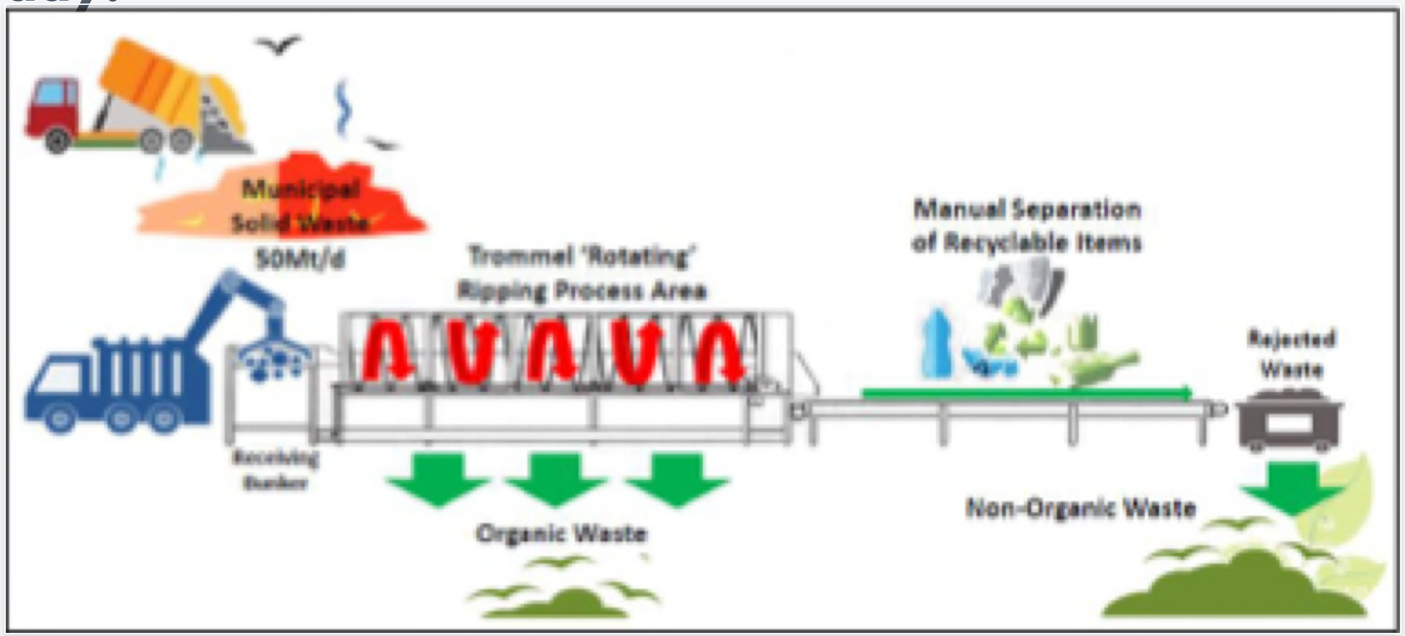
3.3 Organic Composter (Composting)

- Anaerobic digestion is the best method for food water recycling, landscape waste and sewage sludge.
- Anaerobic digestion has several advantages - it can generate clean energy, produce valuable fertilizer for farmland and reducing greenhouse gas emissions. The methane rich biogas is used for generating electricity and power. The left over material can be used for fertilisers and save the usage of fossil fuel for fertilisers (Biogen, 2018).

- Other method to treat food waste is by using Black Soldier Flies (BSF). The larvae of black soldier flies eat almost any organic matter and can stomach up to four times their weight a day. They convert the waste they eat into plant fertiliser - making them efficient food-waste recyclers.

3.4 Semi-Auto Material Recovery Facility (Commercial Recycling)

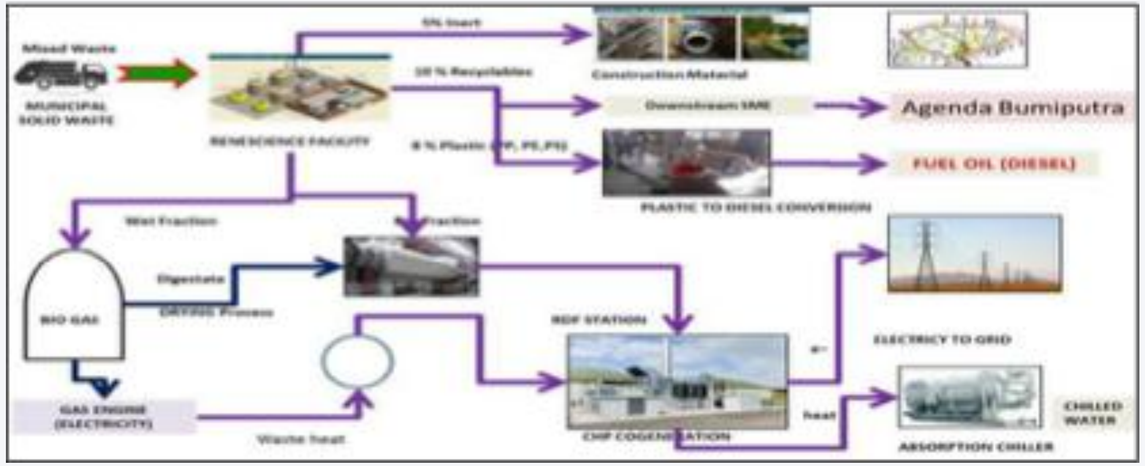
- The system is able to process 50 tons worth garbage from garbage trucks per day.



The MRF processing facility is rather compact and small, which can be put in an area of 150m2 to 200m2 along with all machinery, collection bins and resting area. The final section is where all the final collection bins, composting area and end waste shall be located.

3.5 Waste Eco Park (Long Term)

- This is a project to recycle or reuse municipal solid waste into useful product and at once generating income from waste. The overall concept of Waste to Wealth project is to change from environmental liability to economic assets, moving from landfill to Eco-Industrial Park and moving from Cost Centre to Profit Centre (in terms of managing waste).



Waste to Wealth project will give advantages in term of creation of circular economy; i.e. improvement of environmental performance and conversion of cost centre into self sustaining operations. Waste to Wealth project is a project that is expected to be continuously generating income as amount of waste produced everyday is increase time by time due to a fast growing population, rapid economic development as well as urbanization.

4.1. Feedstock Analysis & Investment Cost

- The summary of feedstock analysis and investment cost is described in the table.
- Generally, 49.85% of organic waste goes to organic composter or Black Soldier Flies (BSF) bioconversion, 12.83% of waste is being recycled and 11.01% of plastic 2D waste is being feedstock of Plastic to Fuel (PTF).

Top Level Solution	Feedstock Analysis			Investment Cost (RM)
	Daily (MT)	Monthly (MT)	Annually (MT)	
Plastic To Fuel (PTF)	2.91	73.61	883.30	4,000,000.00
Material Recovery Facility (MRF)	3.39	85.78	1,029.32	1,000,000.00
Organic Composter	13.18	333.28	3,999.34	668,000.00
Total	19.48	492.67	5,911.96	5,668,000.00

4.2. Cost & Gross Profit

- Infrastructure requirement includes land, cost of electricity, water supply bills and cost construction or rental of building.
- Meanwhile, each top level solution should consider these other costs in order to operate the technology for managing municipal solid waste.

Technologies	Operation Cost (RM/Annum)	Revenue (RM/Annum)	Gross Profit (RM/Annum)
Plastic To Fuel (PTF)	843,274.21	1,364,551.88	521,277.67
Material Recovery Facility (MRF)	897,182.07	1,053,233.67	156,051.60
Organic Composter	471,829.21	721,623.62	249,794.41
Total	2,212,285.49	3,139,409.17	927,123.68

4.3 Plastic to Fuel (PTF)

- The implementation strategy for each type of proposed technology solution along with its potential partners and collaborators are described below :

Technologies	Proposed Partner/ Collaborator	Implementation Strategy
Plastic To Fuel (PTF)	RF TEMS Sdn Bhd	• MP Sepang to provide needed infrastructure and location for plastic to fuel technology. • MP Sepang to provide segregated plastic 2D to RF TEMS Sdn Bhd as feedstock for PTF conversion system. • The diesel produced could be used by MP Sepang for the usage of transportation in collecting MSW's garbage.

4.4 Organic Composter (Composting)

- The implementation strategy for each type of proposed technology solution along with its potential partners and collaborators are described below :

Technologies	Proposed Partner/ Collaborator	Implementation Strategy
Organic Composter	**Shence Greentech Sdn Bhd**	• MP Sepang is to provide necessary infrastructure and location for bioconversion activity. The proposed land area for managing organic waste is 0.5 acre for 5 MT/ day. • MP Sepang to provide and deliver the segregated, sorted and shredded organic waste to Shence Greentech Sdn Bhd at its own cost. • Shence Greentech Sdn Bhd is to charge RM 8.00/MT of segregated, sorted and shredded organic waste input for bioconversion process. • Shence Greentech Sdn Bhd is to be responsible for operating and managing the bioconversion process at its own cost. • Shence Greentech Sdn Bhd will be responsible for bio-security hazard of BSF. • MP Sepang is to collect, pack and market the compost at 50% of selling price as sales profit. • MP Sepang is to promote the compost for marketing purposes at its own cost.

4.5 Semi-Auto Material Recovery Facility (Commercial Recycling)

- The implementation strategy for each type of proposed technology solution along with its potential partners and collaborators are described below :

Technologies	Proposed Partner/ Collaborator	Implementation Strategy
Material Recovery Facility (MRF)	DRB Hicom Environmental Services Sdn Bhd	• MP Sepang to invest for the construction and installation of MRF. The segregated waste that can be recycled is sold to the buyers.

4.6 Waste Eco Park (Long Term)

- The implementation strategy for each type of proposed technology solution along with its potential partners and collaborators are described below :

Technologies	Proposed Partner/ Collaborator	Implementation Strategy
Waste Eco Park	Nusa Suriamas Sdn Bhd	• Nusa Suriamas Sdn Bhd will discuss with related government agency to implement on wider scale. • MP Sepang is to provide about a 10 acre land area for the location of waste to wealth industrial park. • MP Sepang is to provide reasonable fees to make the project viable.

5.1 Proposed Work Plan

No	Activities
1	Develop Memorandum of Understanding (MOU) with potential collaborators and partners. The potential partners are : • RF TEMS Sdn Bhd • Nusa Suriamas Sdn Bhd • DRB Hicom Environmental Services Sdn Bhd • Shence Greentech Sdn Bhd
2	Outline of collaboration work plan : • The implementation plan is expected to begin at the end of the year 2018 (November or December 2018). • The potential location is at Cybersouth, Dengkil. • The estimated total land area is 12 acre (PTF - 0.5 acres, MRF - 1.0 acres, Organic Composter - 0.5 acres and Waste to Wealth - 10 acres).
3	Monitor implementation plan
4	Others : Recommendation i) There is a need to be diverse sampling of parameter for Waste Characteristic Study. ii) The study area can be expanded to many other areas.

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Thank You