

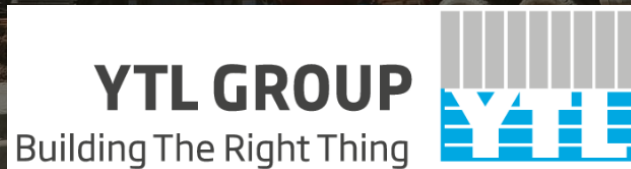
Cementing Malaysia's Future

By

Ralph Dixon & Issac Liew

Sustainability Division

YTL Corporation Berhad



Malaysia's Daily Waste Generation

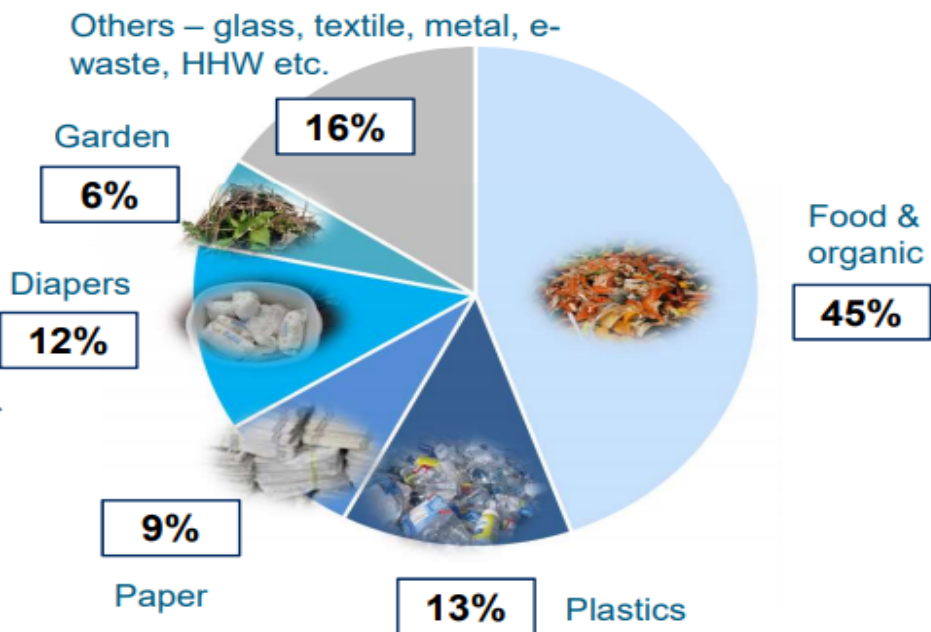
Solid waste generation in Malaysia (2012)



Total of 33 kT solid waste generated per day

- 1.17 kg of solid waste generated per capita
- GKL/ KV generate 1.35 kg waste per capita

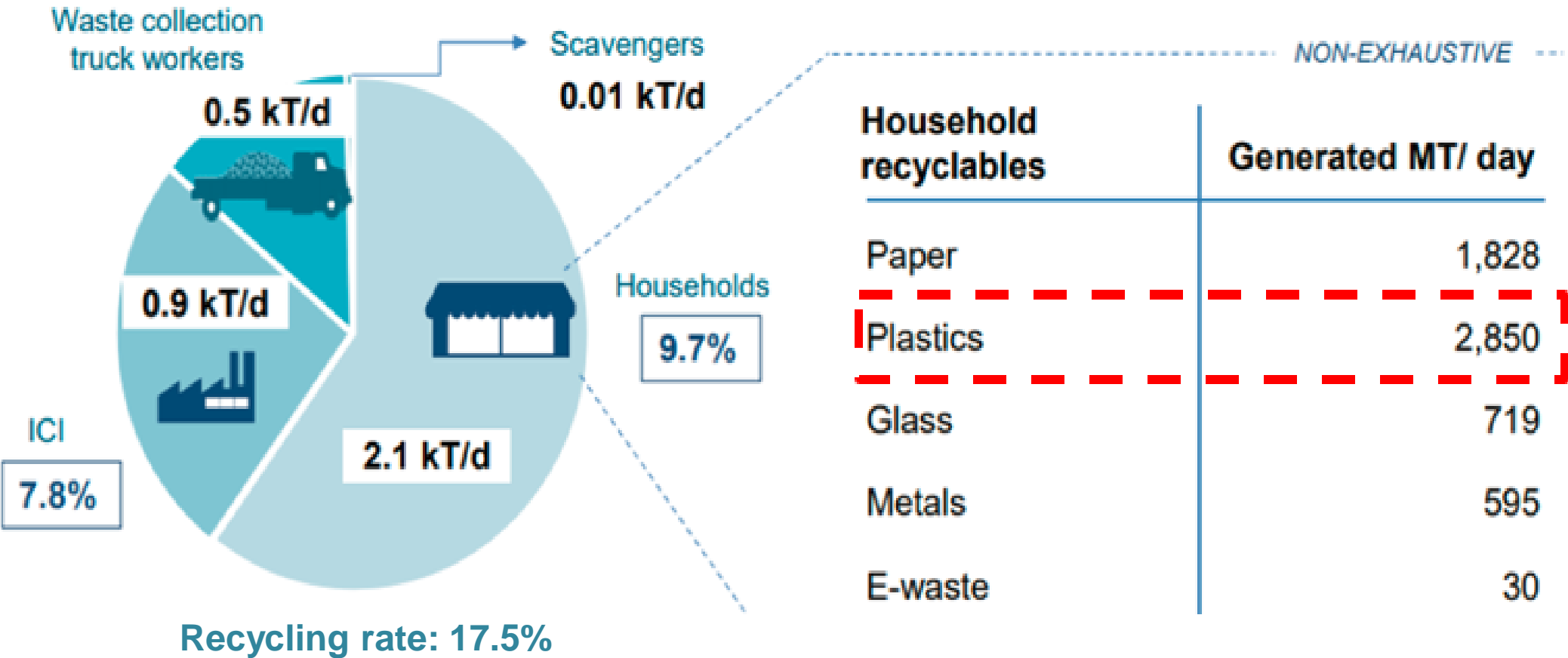
Household waste composition, as generated (2012)



- Organic waste is the largest chunk at 45%
- Paper & plastics form 22% of total waste

Source: Survey on Solid Waste Composition, Characteristics & Existing Practice of Solid Waste Recycling in Malaysia (2012), JPSPN, pre-lab discussions

Recycling Rate in Malaysia 2017



Source: Solid Waste Recycling in Malaysia (2017), JPSPN

Malaysia ranked 8th in Ocean Plastic Pollution in 2015

Rank	Country	Econ. classif.	Coastal pop. [millions]	Waste gen. rate [kg/ppd]	% plastic waste	% mismanaged waste	Mismanaged plastic waste [MMT/year]	% of total mismanaged plastic waste	Plastic marine debris [MMT/year]
1	China	UMI	262.9	1.10	11	76	8.82	27.7	1.32–3.53
2	Indonesia	LMI	187.2	0.52	11	83	3.22	10.1	0.48–1.29
3	Philippines	LMI	83.4	0.5	15	83	1.88	5.9	0.28–0.75
4	Vietnam	LMI	55.9	0.79	13	88	1.83	5.8	0.28–0.73
5	Sri Lanka	LMI	14.6	5.1	7	84	1.59	5.0	0.24–0.64
6	Thailand	UMI	26.0	1.2	12	75	1.03	3.2	0.15–0.41
7	Egypt	LMI	21.8	1.37	13	69	0.97	3.0	0.15–0.39
8	Malaysia	UMI	22.9	1.52	13	57	0.94	2.9	0.14–0.37
9	Nigeria	LMI	27.5	0.79	13	83	0.85	2.7	0.13–0.34
10	Bangladesh	LI	70.9	0.43	8	89	0.79	2.5	0.12–0.31
11	South Africa	UMI	12.9	2.0	12	56	0.63	2.0	0.09–0.25
12	India	LMI	187.5	0.34	3	87	0.60	1.9	0.09–0.24
13	Algeria	UMI	16.6	1.2	12	60	0.52	1.6	0.08–0.21
14	Turkey	UMI	34.0	1.77	12	18	0.49	1.5	0.07–0.19
15	Pakistan	LMI	14.6	0.79	13	88	0.48	1.5	0.07–0.19
16	Brazil	UMI	74.7	1.03	16	11	0.47	1.5	0.07–0.19
17	Burma	LI	19.0	0.44	17	89	0.46	1.4	0.07–0.18
18*	Morocco	LMI	17.3	1.46	5	68	0.31	1.0	0.05–0.12
19	North Korea	LI	17.3	0.6	9	90	0.30	1.0	0.05–0.12
20	United States	HIC	112.9	2.58	13	2	0.28	0.9	0.04–0.11

*If considered collectively, coastal European Union countries (23 total) would rank eighteenth on the list

Source: Jamebeck et al., 2015

Challenges in Combating Plastic Pollution



HUMAN - Main generators of waste

AWARENESS - Low public participation in environmental issues

ATTITUDE – No segregation at source



ENFORCEMENT - Lack of bold enforcement to tackle plastic pollution

BUSINESS - Most waste managers normally aim for 'just enough' attitude to comply with the regulations



TECHNOLOGY - Slow pace of technological upgrading at the operation sites

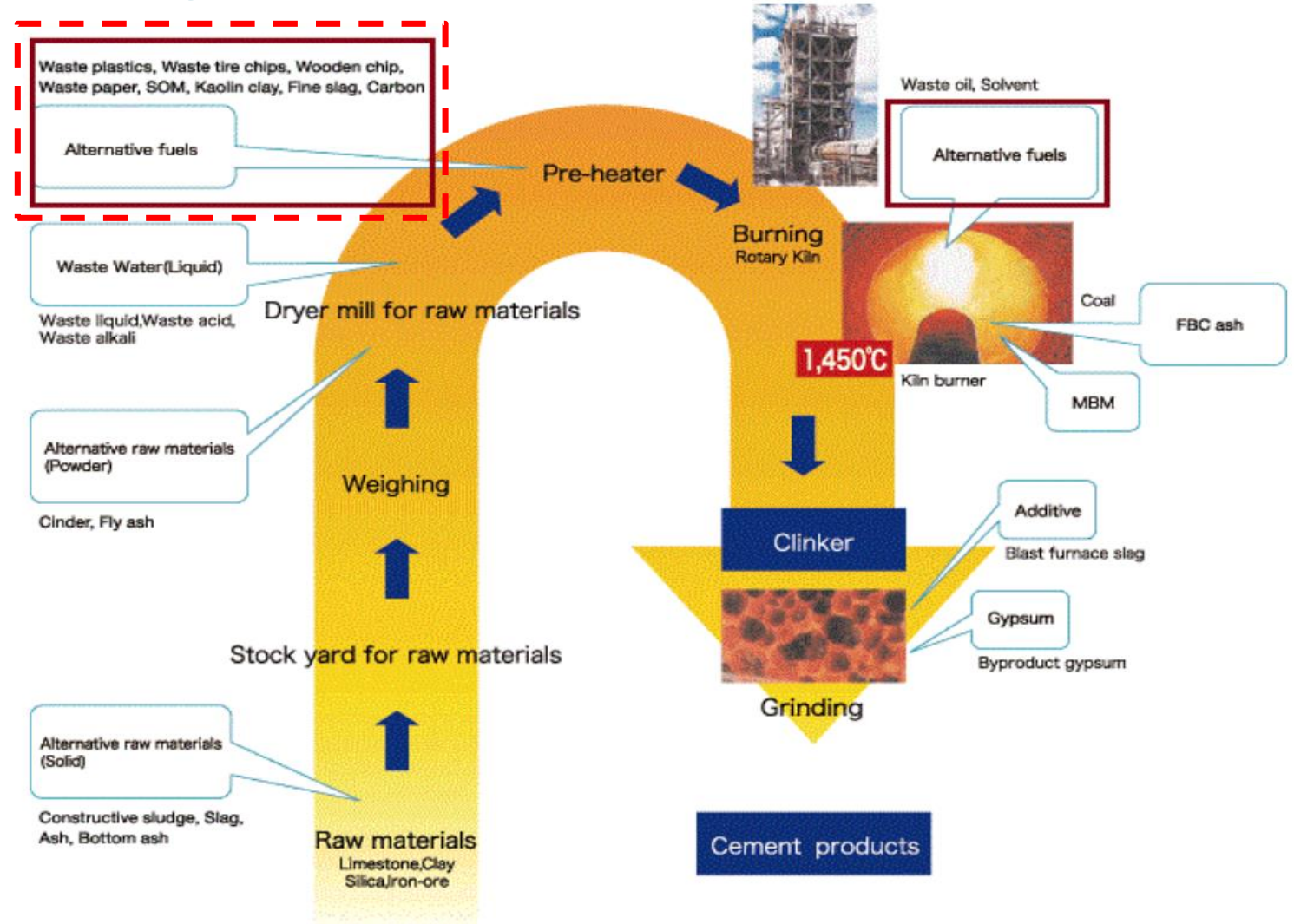
FACILITIES - Lack of sorting facilities; complex mold design

INFRASTRUCTURE – Appropriate collection, licensing, transportation, tipping fees, etc. required

Co-Processing in Cement Kilns

Co-processing –

“The use of suitable waste materials in manufacturing processes for the purpose of energy and/or resource recovery and resultant reduction in the use of conventional fuels and/or raw materials through substitution.”



Some Suitable Waste As Alternative Fuels



Municipal Solid Waste (RDF)



Hazardous Waste



Used Tires



Industrial Plastic Waste

Alternative Fuels which can be used to Increase Thermal Substitution Rate (TSR) in Cement Industry

No.	Fuel	Calorific Value (kcal / kg)
1	Municipal Solid Waste (RDF)	2,800 – 3,800
2	Used Tires	6,700 – 7,700
3	Hazardous Waste	4,000 – 9,500
4	Industrial Plastic Waste	4,070 – 6,620
5	Biomass	2,500 – 3,800
6	Slaughter House Waste	700 – 1,400
7	Poultry Litter	2,700 – 3,800
8	Dried Sewage Sludge	1,700 – 1,900

Source: Holtech & CPCB

Alternative Raw Materials used as Aggregates for Blending or SLAG Cement

No.	Alternative Raw Material
1	Fly Ash (cement blending mat.)
2	Blast Furnace Slag from Steel Industry
3	Lime Sludge (Paper, Carbide, Sugar Industry Sludge)
4	Red Mud from Aluminum Industry

No.	Alternative Raw Material
5	Foundry Sludge / Sand
6	Chrome Sludge as mineraliser
7	Lead Zinc Slag
8	Phosphate Chalk

Source: Holtech & CPCB

Alternative Raw Materials currently used by YTL Cement



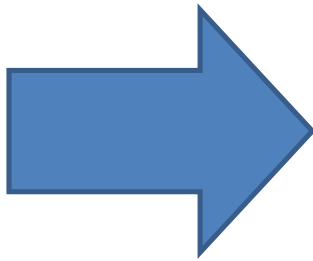
Fly Ash



Blast Furnace Slag



Copper Slag



MRT Tunnel
Lining with 20% Fly Ash



MRT Pier Support:
50% OPC : 30% GGBS : 20% PFA

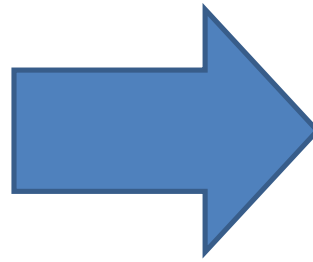


The Exchange 106
using High Strength
Grade 75 concrete
with 50% OPC + 30%
GGBS + 20% PFA



2nd Penang Bridge:
50% OPC : 30% GGBS : 20% PFA

Waste Material from Quarry currently used by YTL Cement, Buildcon and Building Industry

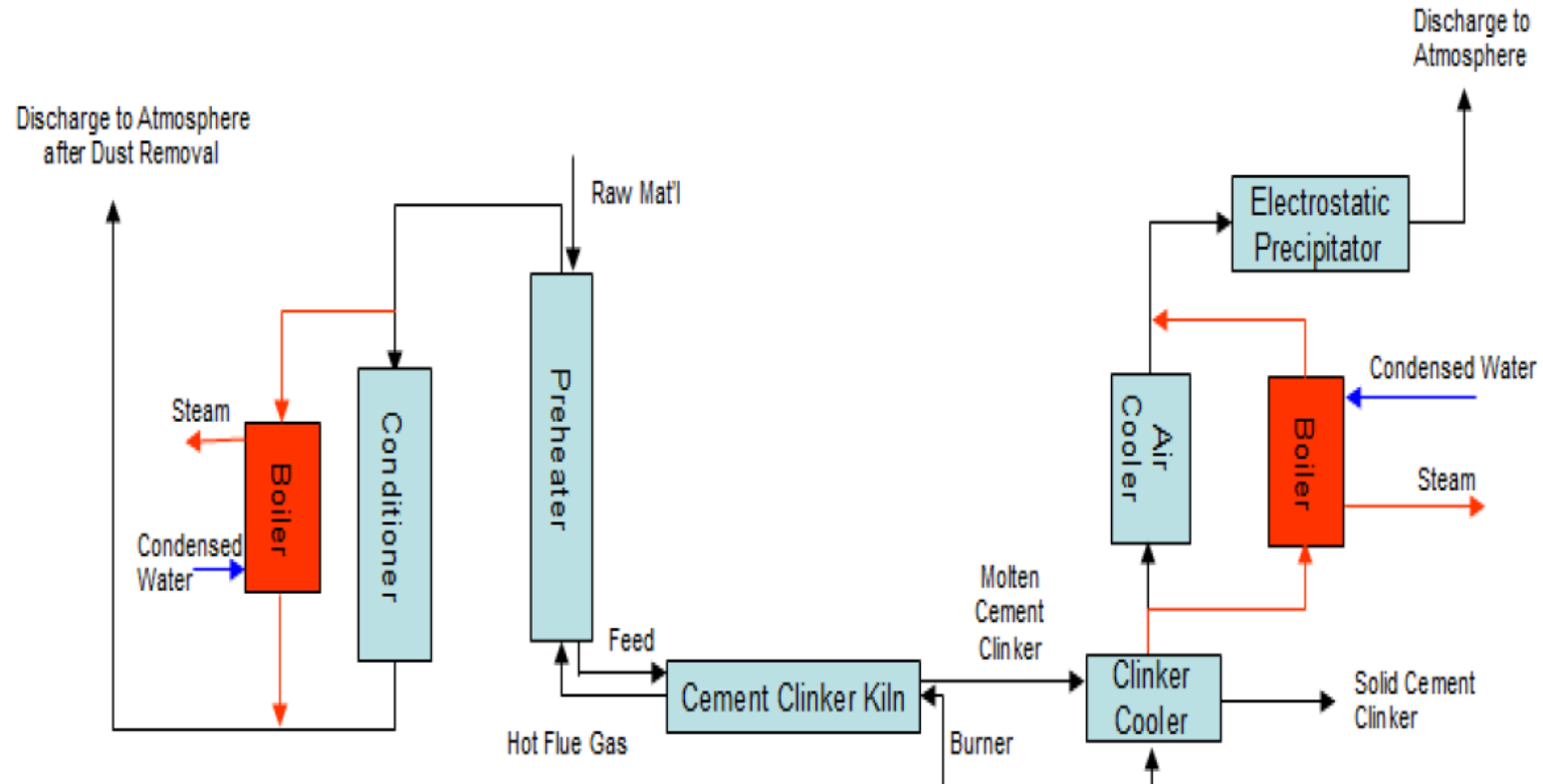


M-Sand

Crushed and screened aggregates from hard granite rocks to the correct grading and shape

Project using **100% M-Sand**

Waste Heat Recovery Plants (WHR) in Cement Plants



Currently, YTL Cement has two WHR plants in Malaysia and China with capacity of around **10 MW** and **9 MW** respectively

Waste Material from Coal-fired Power Plant

- YTL Jawa Timur, Indonesia, reuse fly and bottom ash generated as power plant waste to produce paving blocks **0.24% fly ash** and **8.96% bottom ash**
- Total number of blocks produced reached **1,243,078** since March 2016



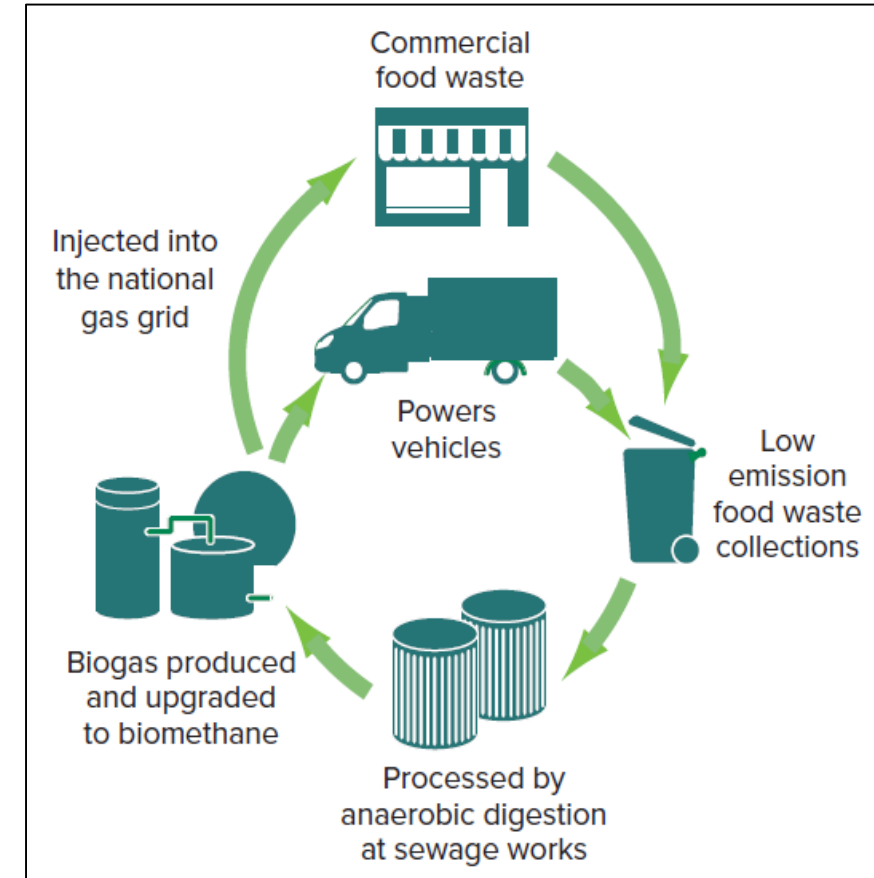
Blocks used for road paving, as well as a substrate for reef blocks



Food Waste and the Circular Economy

GENeco, UK subsidiary of YTL introduced Bio-Bee, a truck that both collects and runs on commercial food waste

GENeco processes 45,000 tonnes of food waste per year for biogas and fertiliser



Bio-Bee Waste to Energy Process

Plastic Waste Used as Construction Material



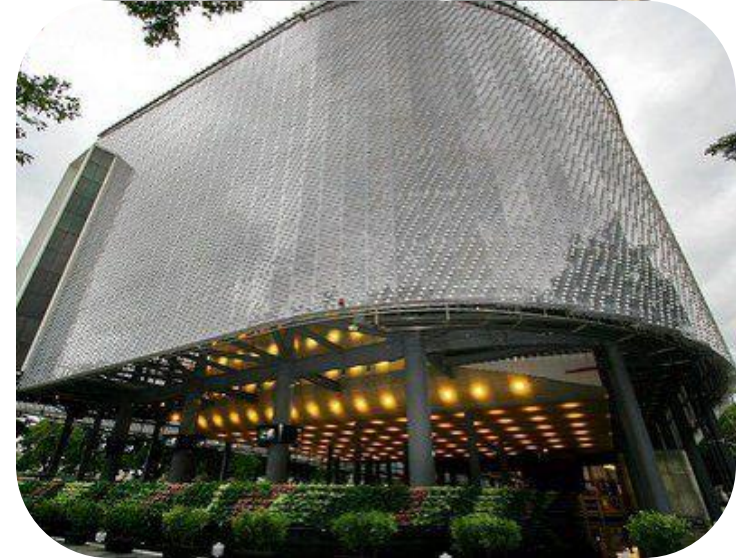
Building Blocks

Combined with OPC or blended cement “freezing” the plastic in the blocks



Recycled Plastic Road Surface

Asphalt made from recycled plastics replacing bitumen



Taipei EcoARK Pavilion

Nine storey building made from 1.5 million POLLI Bricks

YTL Cement's Circular Industry Vision

