SUPPORTING INFORMATION

Table S1: Comparison of optimization models for solid waste management

References	Treatment	Objective function		Decision variables							
		Max profit	Others	ResAlloc	SysCost	Location	PreTr	TechCap	Divert	GWP	ProdDem
Badran & El-Haggar (2006)	TS, C, L		Min collection /transport cost	✓	✓	✓	✓	✓			
Dai et al. (2011)	TS, C, I, L	✓	Facility expansion	✓	✓	✓	✓	Calc	✓		
Rodionov & Nakata (2011)	C, R, I, AD, RDF, LFGRS		Min net cost	✓	✓	✓		✓	✓	✓	
Ng et al. (2013)	I, AD, L	✓		✓	✓	✓		✓		✓	
Santibañez-Aguilar et al. (2013)	R, I, G	✓	Max MSW consumption		✓	✓	✓		✓		Rec
Tan et al. (2014)	C, R, I, LFGRS	✓		✓	✓			Calc		✓	WTE
Yousefloo & Babazadeh (2020)	TS, R, I, G, AD, LFGRS	✓	Risk minimization	✓	✓	✓	✓	✓		in USD	

Note: **TS**- Transfer station, **C**- Composting, **L**- Landfill, **I**- Incineration, **R**- Recycling, **G**- Gasification, **AD**- Anaerobic digestion, **RDF**- Refuse-derived fuel, **LFGRS**- Landfill gas recovery system, **ResAlloc**- Waste source separation rate of 100% is set for the total waste, **SysCost**- MSW management system cost, **Location**- Transportation and facility location, **PreTr**- Waste separation and pretreatment, **TechCap**- Processing technology capacity, **Divert**- Waste diversion target or landfill disposal constraint, **GWP**- Global warming potential (in CO_2-eq.), **ProdDem**- Maximum MSW by-product demand, **Calc**- Calculated, **Rec**- Recyclables, **WTE**- Renewable energy demand from MSW.

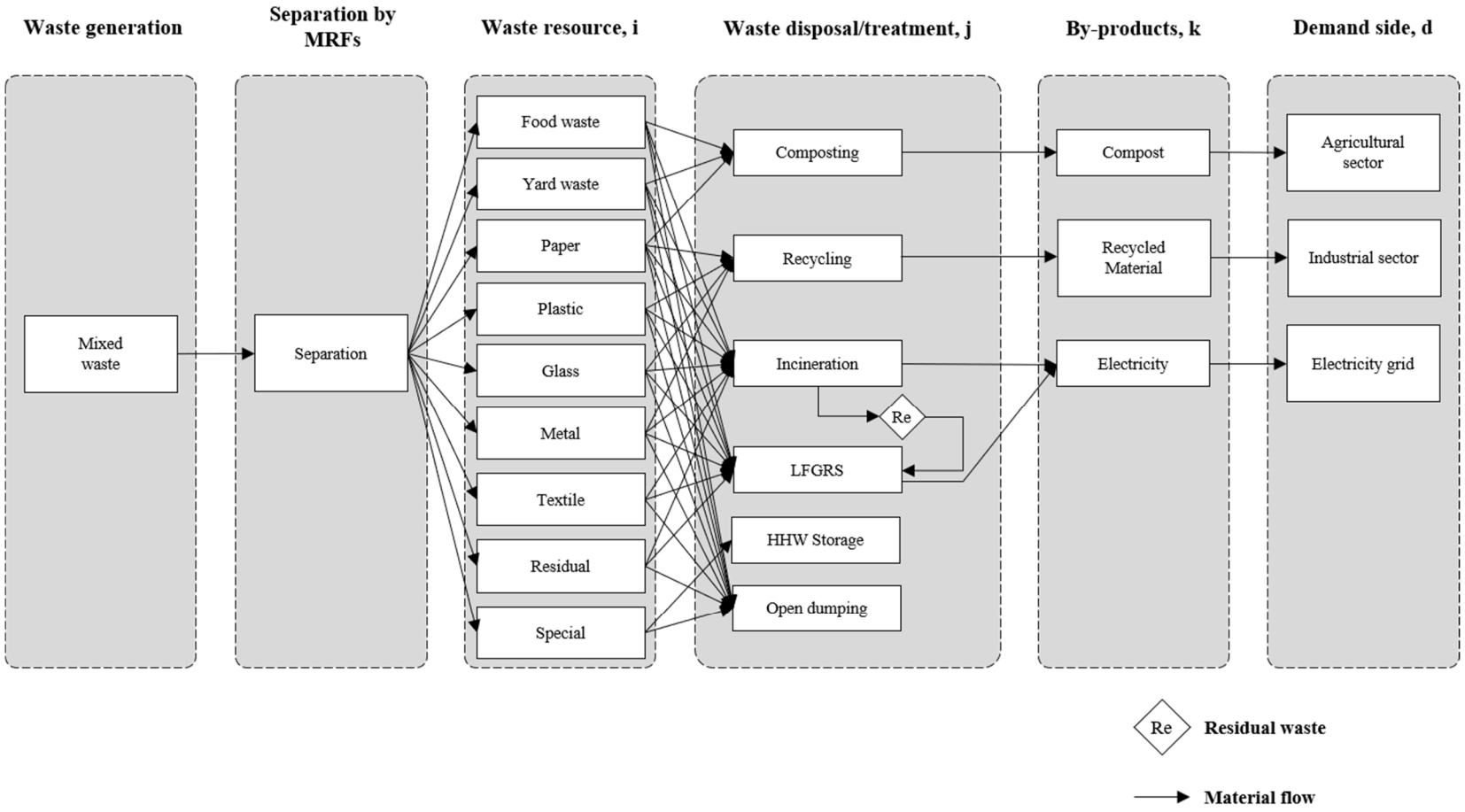
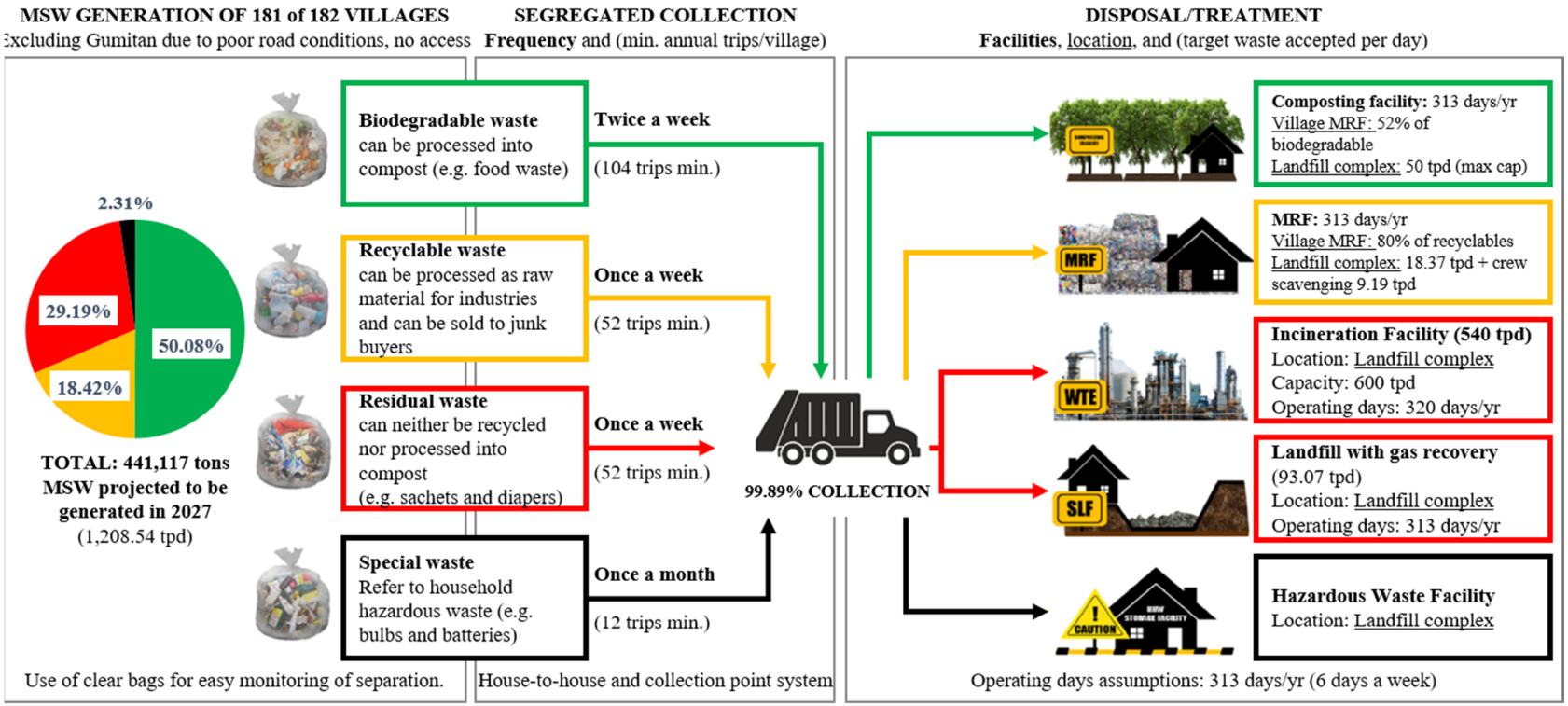
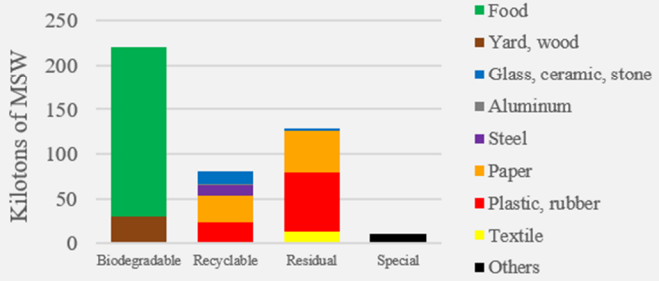


Figure S1: Process network of MSWM for 2027 in Davao City, Philippines



2027 MSW composition, assuming constant 2017 values



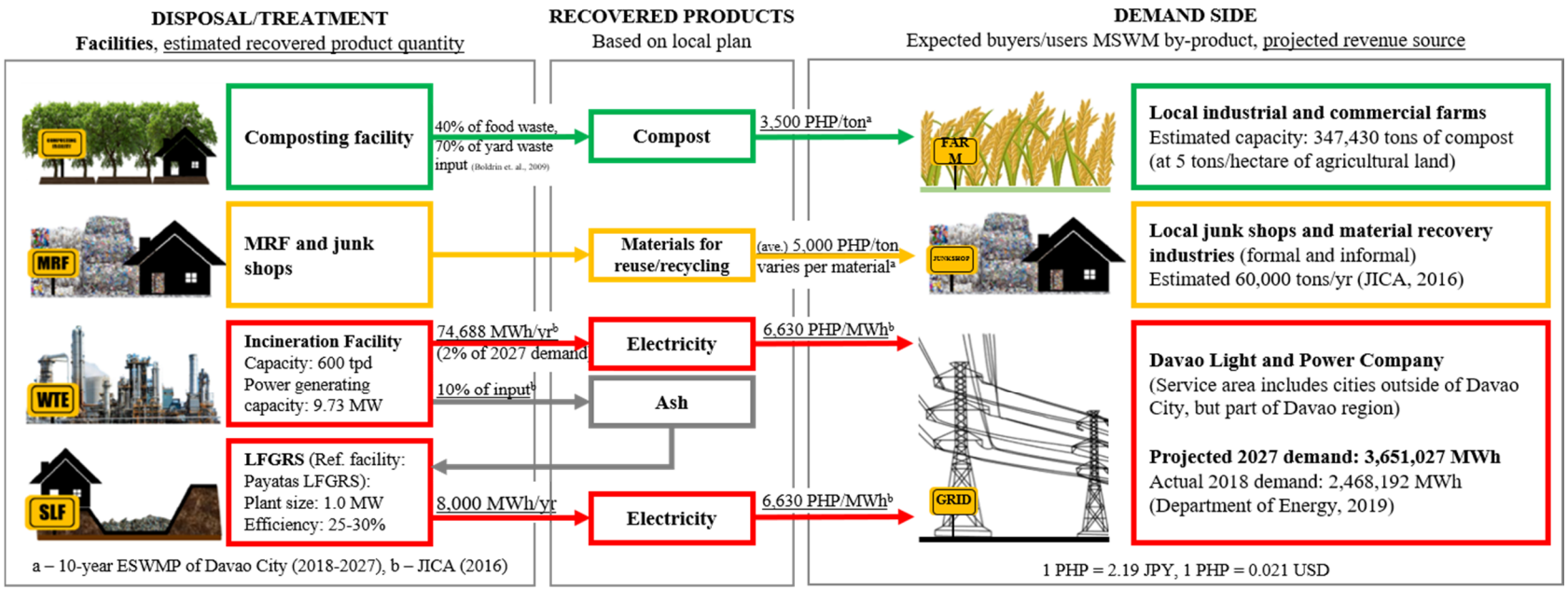
Planned 2027 waste diversion scheme, in tpd

Facility	Waste type	2027
Waste Generation		1,208.54
Source separation, village-level	Biodegradable	314.22
	Recyclable	183.70
Municipal Collection to landfill complex (a + b + c + d + e)	Residual	710.62
Composting Facility (a)	Biodegradable	50.00
MRF (b)	Recyclable	18.37
Crew scavenging (c)	Recyclable	9.19
Incineration (d)	Residual	540.00
LFGRS (e)	Residual	93.07

Modifications considered:

- Alterations in daily waste allocation to treatment facility to **accommodate operating days** (< 365 days)
- Specific **disposal of special waste** was not considered in daily plan
- **Collection less than 100%** due to non-existent roads for one village, assumed to be mismanaged (open dumping)
  - % target of source separation used instead of amount

Figure S2: MSW collection, separation, and treatment/disposal options of the 2027 scenario



Price of recyclables (unit: PHP/ton): glass (2000), steel (5000), aluminum (35,000), plastic (25,000) (City Government of Davao, 2017), and paper (3000) (Asian Development Bank, 2013)

The demand for the recovered products was projected assuming that the current status of the agricultural land use and recyclables demands would not change until 2027, whereas the projection of the future power demand was cited from the Department of Energy (2019).

Figure S3: Supply and demand for the recovered MSWM products of the 2027 scenario

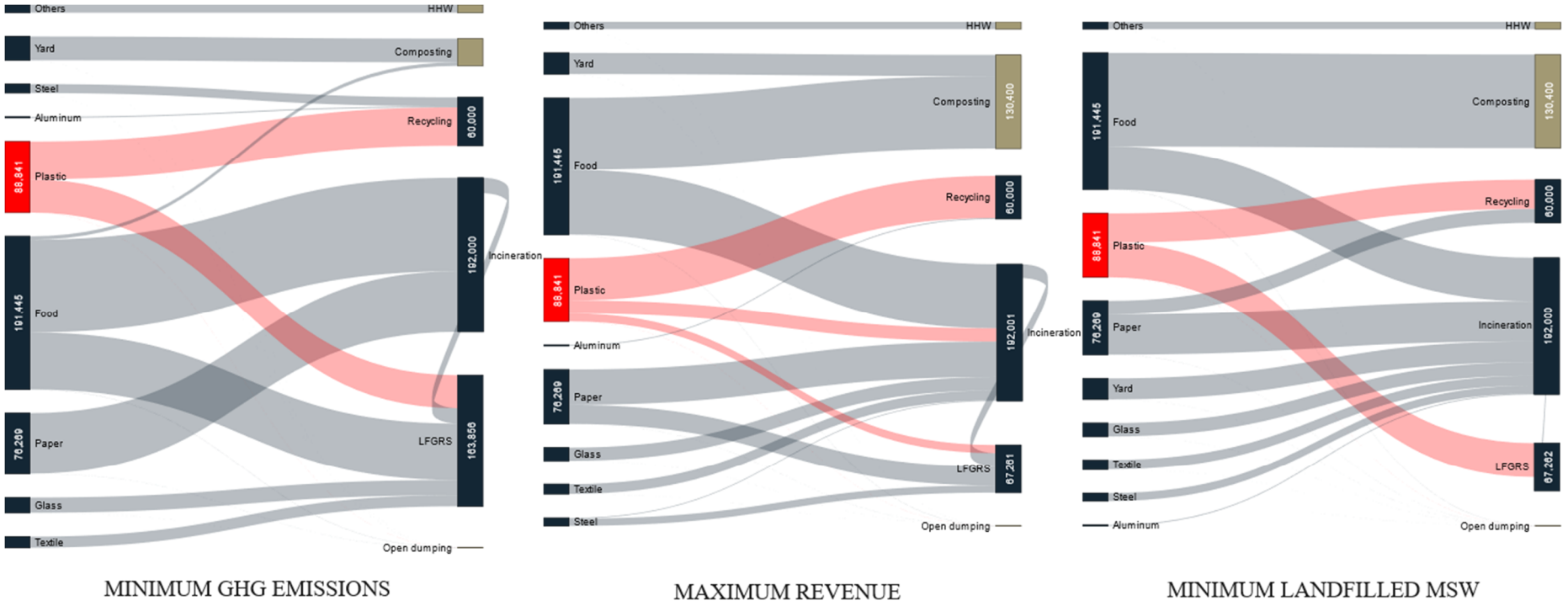


Figure S4: Changes to the material flow in optimization scenarios when availability coefficient is disabled

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