

Table S 1: Previous work on Environmental and Economic assessments of plastic waste chemical recycling

S/No	Plastic waste type	Recycling technology	LCA/TEA	Functional unit	System boundary	Method	GWP (reported)	Normalised GWP (kgCO <sub>2</sub> -eq/kg MPW)	Cost (\$)	Ref
1	PE, PVC, PP,PS,PET, others (MPW1)	Gasification supported by MR*	LCA	822,200 t MPW	cradle-to-gate	Recipe	370 kgCO <sub>2</sub> -eq/t MPW	0.37		[1]
		Pyrolysis				Recipe	650 kgCO <sub>2</sub> -eq/t MPW	0.65		
2	Mixed plastics (PET, PP, PE (including films), PVC) (MPW2)	Gasification	LCA	1 t	cradle-to-gate	IPCC, (2006)	400 kgCO <sub>2</sub> -eq/t	0.4		[2]
	Mixed plastics (HDPE, LDPE, PP) (MPW3)	Gasification	LCA	1 t	cradle-to-gate	GHG	880 kgCO <sub>2</sub> -eq/t	0.88		[3]
3	PE	Pyrolysis	LCA	1 t of bank notes	gate-to-grave	CML, USEtox	870 kgCO <sub>2</sub> -eq/t	0.87		[4]
4	MP(PE,PP,PS,PVC, others) (MPW4)	Pyrolysis	LCA	1 kg	cradle-to-gate	GHG	490 kgCO <sub>2</sub> -eq/t	0.49		[5]
5	HDPE, LDPE, PP, PET, PVC, PS(MPW5)	Pyrolysis	LCA	1 kg	cradle-to-gate	GHG	600 kgCO <sub>2</sub> -eq/t	0.6		[6]

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6	PET (trays)	Pyrolysis*	LCA	1 t PET	cradle-to-gate	CML 2001	GWP = 305330 kgCO <sub>2</sub> -eq; AP= -10.36 kgSO <sub>2</sub> -eq; ADP = 43.15 kgSB-eq; EuP = 2.93 kgNO <sub>x</sub> -eq	3.053		[7]
							80% Monomer recovery 2019 kgCO <sub>2</sub> -eq	2.019		
							50% Monomer recovery 468 kgCO <sub>2</sub> -eq	0.468		
							w/O EG recovery =1660 kgCO <sub>2</sub> -eq	1.66		
7	HDPE	Fast pyrolysis	LCA/TEA	1 t HDPE	cradle-to-gate	GHG	CLCA = 3.66 tonCO <sub>2</sub> -eq/ton waste HDPE	3.66	NPV of \$220.3/ton waste HDPE	[8]
	HDPE						ALCA = 4.22 tonCO <sub>2</sub> -eq/ton waste HDPE	4.22		

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8	PET/PE	Low Temp. Pyrolysis	LCA	1kg PET flakes	cradle-to-gate	-	LTP + MR = 1.7kgCO <sub>2</sub> -eq;	1.7		[9]
		Hydrocracking					HC+MR = 2.02 kgCO <sub>2</sub> -eq	2.02		
9	PLA (PCPW)	Solvent based & Chemical Recycling	LCA	1 t PLA waste	cradle-to-gate	PEF, Recipe, IPCC	Chem (PLA to dilactide) = 700 kg CO <sub>2</sub> -eq	0.7		[10]
							Solvent-based = 521 kgCO <sub>2</sub> -eq	0.521		
10	MPW (PE, PP, PS,PU,PET) (MPW6)	Pyrolysis-Gasification	LCA	1 kg material	gate-to-gate	CML baseline	GWP = 2.6 kgCO <sub>2</sub> -eq/kg; AP = 0.0006 kgSO <sub>2</sub> -eq/kg	2.6		[11]
11	PE(LDPE,HDPE),PP,PVC,PS & others(MPW7)	LTP & Hydrogenstion	LCA	1000 tpa	cradle-to-gate	CML	GWP: LTP1 = 1.2 kgCO <sub>2</sub> -eq	1.2		[12]
					cradle-to-gate	CML	LTP0.5 = 3 kgCO <sub>2</sub> -eq	3		
					cradle-to-gate	CML	LTP0 = 4.0 kgCO <sub>2</sub> -eq	4		
					cradle-to-gate	CML	VCC1 = 5.0 kg CO <sub>2</sub> -eq	5		

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					cradle-to-gate	CML	VCC0.5 = 7 kgCO <sub>2</sub> -eq	7		
					cradle-to-gate	CML	VCC0= 12 kg CO <sub>2</sub> -eq	12		
12	Hard plastics(PP,PE, PS,PET,PVC, others(MPW1))	FR(via pyrolysis)	LCA-TEA	1 t	gate-to-gate	IPCC; EASETEC H	374 kg CO <sub>2</sub> eq/FU	0.374	16 €/FU	[13]
13	PET	Back-to-oligomer &	LCA	1 t	cradle-to-gate	CML 2 baseline	GWP: Chemical, BHET=2.59 tCO <sub>2</sub> -eq; [BHET= POCP = 0.6 kg C <sub>2</sub> H <sub>4</sub> - eq; AP=14 kgSO <sub>2</sub> -eq]	2.59		[14]
		Back-to-monomer	LCA		cradle-to-gate		GWP: Chemical, DMT=3.08 tCO <sub>2</sub> -eq	3.08		
		Virgin plastic (PET fibre)	LCA		cradle-to-gate		4.06 tCO <sub>2</sub> -eq	4.06		
14	MPW1	Mechanical Recycling	LCA	822,200 t MPW	cradle-to-gate	Recipe	400 kgCO <sub>2</sub> -eq	0.4		[1]
15	MPW5	Mechanical Recycling	LCA	1 kg	cradle-to-gate	CML 2001	400 kgCO <sub>2</sub> -eq	0.4		[6]
16	Polyolefins - PP,PE (MPW9)	Virgin plastic production	LCA	1 kg	cradle-to-gate	CML	2.5 kgCO <sub>2</sub> -eq	2.5		[15]

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17	Polyolefins - PP,PE,PET (MPW9)	Virgin plastic production	LCA	28kg	cradle-to-gate	CML 2	130 kgCO <sub>2</sub> -eq	4.6		[16]

MR=Mechanical recycling; BHET= bis-hydroxyethylene terephthalate; DMT:

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