

Supplementary Information for

Enhancing Circularity of Polyolefins via Gasification: Techno-economic and environmental evaluation of variant processes

Benjamin Caudle, Thuy T.H. Nguyen, Sho Kataoka

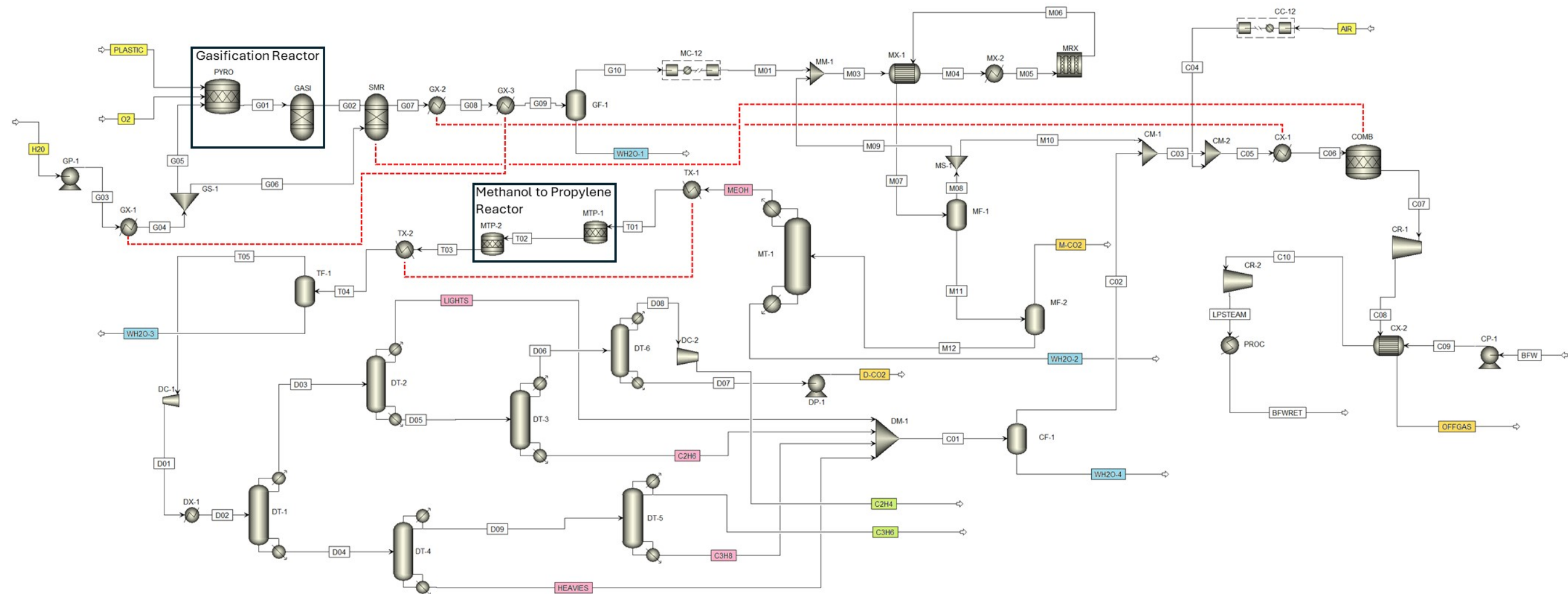


Figure S1: Aspen flowsheet of the gasification base case with certain streams highlighted yellow for process inputs, pink for intermediates, green for products, blue for wastewater, and orange for waste gas. These colors correspond to highlighted columns in Table S1. The gasification and methanol to propylene reactors have two stages of reaction and so are modeled with two reactor blocks (the energy consumption is balanced between them). Important heat integration – reactors or heat exchangers that are functionally the same unit – is indicated with red dashed lines within and across units.

Table S1 (1/3): Base Case stream tables

		AIR	C01	C02	C2H4	C2H6	C03	C3H6	C3H8	C04	C05	C06	C07	C08	D01	D02	D03	D04	D05	D06	D07	D08
From	To	CC-12	DM-1	CF-1	DC-2	DT-3	CM-1	DT-5	DT-5	CC-12	CM-2	CX-1	COMB	CR-1	DC-1	DX-1	DT-1	DT-1	DT-2	DT-3	DT-6	DT-6
Phase		Vapor	Mixed	Vapor	Vapor	Liquid	Mixed	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Mixed	Vapor	Liquid	Liquid	Vapor	Liquid	Vapor
Temperature	C	25.0	-29.2	30.0	121.6	-10.9	19.5	41.0	51.9	265.9	216.1	890.0	1117.0	726.5	259.3	35.0	-32.6	59.2	-22.9	-33.3	-159.9	-156.7
Pressure	bar	1.013	18.0	18.0	1.0	18.1	18.0	17.0	18.0	10.0	10.0	10.0	10.0	1.0	20.0	20.0	19.123	19.123	18.6	18.0	0.01	0.01
Mol Vapor Frac.		1	0.505	1	1	0	0.999	0	0	1	1	1	1	1	1	0.903	1	0	0	1	0	1
Mol Liquid Frac.		0	0.495	0	0	1	0.001	1	1	0	0	0	0	0	0	0.097	0	1	1	0	1	0
Mass Vapor Frac.		1	0.487	1	1	0	0.999	0	0	1	1	1	1	1	1	0.949	1	0	0	1	0	1
Mass Liquid Frac.		0	0.513	0	0	1	0.001	1	1	0	0	0	0	0	0	0.051	0	1	1	0	1	0
Molar Density	kmol/m ³	0.04	1.91	0.81	0.03	14.53	0.79	11.52	10.18	0.22	0.25	0.10	0.09	0.01	0.46	1.05	1.18	13.45	15.69	1.20	33.01	0.00
Mass Density	kg/m ³	1.18	57.64	26.74	0.86	439.00	22.24	484.7	449.2	6.41	7.05	2.97	2.50	0.35	15.88	36.02	34.74	523.13	474.89	36.34	1419	0.03
Mole Flow	kmol/hr	778.42	56.04	44.98	15.24	21.35	127.60	37.77	2.79	778.42	906.02	906.02	900.77	900.77	111.74	111.74	54.82	56.92	39.28	17.93	2.69	15.24
Mass Flow	kg/hr	22458	1691	1492	428	645	3605	1589	123.3	22458	26062	26062	26062	26062	3824	3824	1609	2215	1189	543.6	115.7	428
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH4	kg/hr	0	14.58	14.58	0.245	0	50.54	0	0	0	50.54	50.54	0	0	14.83	14.83	14.83	0	0.245	0.245	0	0.245
CH3OH	kg/hr	0	0.786	0.152	0	0	20.86	0	0	0	20.86	20.86	0	0	0.786	0.786	0	0.786	0	0	0	0
O2	kg/hr	5231	0	0	0	0	0	0	0	5231	5231	5231	249.1	249.1	0	0	0	0	0	0	0	0
CO	kg/hr	0	398.8	398.8	0.001	0	526.9	0	0	0	526.9	526.9	0	0	398.8	398.8	398.8	0	0.001	0.001	0	0.001
CO2	kg/hr	0	1.833	1.833	1.89	3E-05	1863	7E-05	0	0	1863	1863	6057	6057	113.6	113.6	113.6	7E-05	111.8	111.8	109.9	1.89
H2	kg/hr	0	0.333	0.333	0	0	66.5	0	0	0	66.5	66.5	0	0	0.333	0.333	0.333	0	0	0	0	0
H2O	kg/hr	0	201	2.133	0	0	2.999	0	0.015	0	2.999	2.999	2529	2529	201	201	0	201	0	0	0	0
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	17227	0	0	0	0	0	0	0	17227	17227	17227	17227	17227	0	0	0	0	0	0	0	0
C2H4	kg/hr	0	8.467	8.467	425.8	4.306	8.467	0.016	0	0	8.467	8.467	0	0	434.7	434.7	434.7	0.016	430.6	426.2	0.426	425.8
C2H6	kg/hr	0	630.2	630.2	0.003	629.1	630.2	1.624	0	0	630.2	630.2	0	0	637.2	637.2	635.6	1.624	634.5	5.391	5.388	0.003
C3H6	kg/hr	0	20.64	20.64	0	11.31	20.64	1579	7.936	0	20.64	20.64	0	0	1600	1600	11.31	1589	11.31	0	0	0
C3H8	kg/hr	0	113.6	113.6	0	0.234	113.6	8.328	113.1	0	113.6	113.6	0	0	121.9	121.9	0.234	121.7	0.234	0	0	0
C4H8	kg/hr	0	84.45	84.45	0	8E-05	84.45	0	1.599	0	84.45	84.45	0	0	84.45	84.45	8E-05	84.45	8E-05	0	0	0
C4H10	kg/hr	0	199.6	199.6	0	1E-04	199.6	0	0.653	0	199.6	199.6	0	0	199.6	199.6	1E-04	199.6	1E-04	0	0	0
C5H10	kg/hr	0	16.92	16.92	0	0	16.92	0	0	0	16.92	16.92	0	0	16.92	16.92	0	16.92	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m ³ /sec	5.288	0.008	0.015	0.139	4E-04	0.045	9E-04	8E-05	0.973	1.027	2.44	2.898	20.8	0.067	0.029	0.013	0.001	7E-04	0.004	2E-05	4.097

Table S1 (2/3):

		D09	D-CO2	G01	G02	G03	G04	G05	G06	G07	G08	G09	G10	H2O	HEAVIES	LIGHTS	M01	M03	M04	M05	M06
From		DT-4	DP-1	PYRO	GASI	GP-1	GX-1	GS-1	GS-1	SMR	GX-2	GX-3	GF-1		DT-4	DT-2	MC-12	MM-1	MX-1	MX-2	MRX
To		DT-5		GASI	SMR	GX-1	GS-1	PYRO	SMR	GX-2	GX-3	GF-1	MC-12	GP-1	DM-1	DM-1	MM-1	MX-1	MX-2	MRX	MX-1
Phase		Liquid	Liquid	Mixed	Vapor	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Mixed	Vapor	Liquid	Liquid	Vapor	Mixed	Mixed	Vapor	Vapor	Vapor
Temperature	C	43.9	-159.9	600.0	600.0	25.3	206.8	206.8	206.8	900.0	457.1	50.0	50.0	25.0	81.3	-126.2	85.0	54.0	220.0	230.0	230.0
Pressure	bar	18.00	1.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1.00	19.00	18.50	80.00	80.00	80.00	80.00	80.00
Mol Vapor Frac.		0	0	0.564	1	0	1	1	1	1	1	0.662	1	0	0	1	0.998	0.998	1	1	1
Mol Liquid Frac.		1	1	0.436	0	1	0	0	0	0	0	0.338	0	1	1	0	0.002	0.002	0	0	0
Mass Vapor Frac.		0	0	0.548	1	0	1	1	1	1	1	0.611	1	0	0	1	0.997	0.998	1	1	1
Mass Liquid Frac.		1	1	0.452	0	1	0	0	0	0	0	0.389	0	1	1	0	0.003	0.002	0	0	0
Molar Density	kmol/m³	11.26	33.01	0.24	0.14	47.10	0.26	0.26	0.26	0.10	0.16	0.56	0.37	47.11	21.41	1.83	2.68	3.12	1.94	1.90	1.97
Mass Density	kg/m³	475.4	1419	2.814	3.404	848.6	4.723	4.723	4.723	1.601	2.575	8.768	5.376	848.7	657.3	49.62	38.58	67.21	41.73	40.84	52.42
Mole Flow	kmol/hr	40.56	2.691	781.5	364.8	755.2	755.2	76.67	678.6	1360	1360	1360	900.6	755.2	16.36	15.54	900.6	2470	2470	2470	1995
Mass Flow	kg/hr	1712	115.7	9043	9043	13606	13606	1381	12224	21267	21267	21267	12987	13606	502.2	420.8	12987	53131	53131	53131	53131
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH4	kg/hr	0	0	0	2583	0	0	0	0	42.07	42.07	42.07	42.07	0	0	14.58	42.07	725.3	725.3	725.4	725.4
CH3OH	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0.786	0	0	393.5	393.5	393.5	8001
O2	kg/hr	0	0	3028	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO	kg/hr	0	0	0	2765	0	0	0	0	5639	5639	5639	5639	0	0	398.8	5639	8072	8072	8072	2566
CO2	kg/hr	7E-05	109.9	0	3555	0	0	0	0	6011	6011	6011	6011	0	0	1.833	6011	41371	41371	41371	39572
H2	kg/hr	0	0	543.7	37.61	0	0	0	0	1108	1108	1108	1108	0	0	0.333	1108	2365	2365	2365	1325
H2O	kg/hr	0.015	0	1381	102	13606	13606	1381	12224	8467	8467	8467	187.7	13606	200.9	0	187.7	204.2	204.2	204.2	940.8
C	kg/hr	0	0	4090	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C2H4	kg/hr	0.016	0.426	0	0	0	0	0	0	0	0	0	0	0	0	4.161	0	0	0	0	0
C2H6	kg/hr	1.624	5.388	0	0	0	0	0	0	0	0	0	0	0	0	1.047	0	0	0	0	0
C3H6	kg/hr	1587	0	0	0	0	0	0	0	0	0	0	0	0	1.394	7E-05	0	0	0	0	0
C3H8	kg/hr	121.4	0	0	0	0	0	0	0	0	0	0	0	0	0.325	0	0	0	0	0	0
C4H8	kg/hr	1.599	0	0	0	0	0	0	0	0	0	0	0	0	82.85	0	0	0	0	0	0
C4H10	kg/hr	0.653	0	0	0	0	0	0	0	0	0	0	0	0	199	0	0	0	0	0	0
C5H10	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	16.92	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m³/sec	0.001	2E-05	0.893	0.738	0.004	0.8	0.081	0.719	3.691	2.294	0.674	0.671	0.004	2E-04	0.002	0.094	0.22	0.354	0.361	0.282

Table S1 (3/3)

		M07	M08	M09	M10	M11	M12	M-CO2	MEOH	O2	OFFGAS	PLASTIC	T01	T02	T03	T04	T05	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From		MX-1	MF-1	MS-1	MS-1	MF-1	MF-2	MF-2	MT-1		CX-2		TX-1	MTP-1	MTP-2	TX-2	TF-1	GF-1	MT-1	TF-1	CF-1
To		MF-1	MS-1	MM-1	CM-1	MF-2	MT-1		TX-1	PYRO		PYRO	MTP-1	MTP-2	TX-2	TF-1	DC-1				
Phase		Mixed	Vapor	Vapor	Vapor	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid
Temperature	C	108.1	40.0	40.0	40.0	40.0	25.1	25.1	74.5	40.0	150.0	40.0	390.0	400.0	400.0	121.3	48.0	50.0	116.4	48.0	30.0
Pressure	bar	80.00	80.00	80.00	80.00	80.00	2.00	2.00	1.50	10.00	1.00	10.00	1.50	1.50	1.50	1.50	1.00	10.00	2.00	1.00	18.00
Mol Vapor Frac.		0.917	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0
Mol Liquid Frac.		0.083	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1
Mass Vapor Frac.		0.907	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0
Mass Liquid Frac.		0.093	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1
Molar Density	kmol/m³	2.97	3.49	3.49	3.49	23.51	23.39	0.08	0.05	0.39	0.03	3.72	0.03	0.03	0.03	0.05	0.04	46.31	42.52	46.36	46.86
Mass Density	kg/m³	79.11	89.28	89.28	89.28	745.2	693.6	3.434	1.709	12.37	0.823	176.1	0.876	0.586	0.636	1.094	1.292	834.2	779.5	835.3	845.4
Mole Flow	kmol/hr	1995	1652	1570	82.62	343.1	286.7	56.44	235.4	83.18	900.8	105.7	235.4	346.6	319.2	319.2	111.7	459.6	51.25	207.4	11.06
Mass Flow	kg/hr	53131	42256	40143	2113	10875	8501	2374	7561	2662	26062	5000	7561	7561	7561	7561	3824	8280	939.7	3737	199.5
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	1200	0	0	0	0	0	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	1750	0	0	0	0	0	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	950	0	0	0	0	0	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	1100	0	0	0	0	0	0	0	0	0
CH4	kg/hr	725.4	719.2	683.3	35.96	6.181	0.026	6.155	0.026	0	0	0	0.026	0.026	14.83	14.83	14.83	4E-04	0	4E-05	6E-05
CH3OH	kg/hr	8001	414.2	393.5	20.71	7587	7468	119.2	7431	0	0	0	7431	31.21	1.644	1.644	0.786	0	37.34	0.858	0.634
O2	kg/hr	0	0	0	0	0	0	0	0	2662	249.1	0	0	0	0	0	0	0	0	0	0
CO	kg/hr	2566	2561	2433	128	5.28	0.004	5.277	0.004	0	0	0	0.004	398.8	398.8	398.8	398.8	0.005	0	1E-04	2E-04
CO2	kg/hr	39572	37221	35360	1861	2350	113.6	2237	113.6	0	6057	0	113.6	113.6	113.6	113.6	113.6	0.559	0	0.004	1E-04
H2	kg/hr	1325	1323	1257	66.16	2.216	0.001	2.215	0.001	0	0	0	0.001	57.41	0.333	0.333	0.333	0.003	0	0	0
H2O	kg/hr	940.8	17.32	16.45	0.866	923.5	919.4	4.05	17.08	0	2529	0	17.08	3921	3937	3937	201	8279	902.4	3737	198.8
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	0	0	0	0	0	0	0	0	0	17227	0	0	0	0	0	0	0	0	0	0
C2H4	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	1029	434.7	434.7	434.7	0	0	0.002	6E-05
C2H6	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	637.2	637.2	637.2	0	0	0.003	0.003
C3H6	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	1716	1600	1600	1600	0	0	0.004	4E-05
C3H8	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	121.9	121.9	121.9	0	0	8E-05	6E-05
C4H8	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	277.1	84.45	84.45	84.45	0	0	2E-05	1E-05
C4H10	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	199.6	199.6	199.6	0	0	2E-05	0
C5H10	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	16.92	16.92	16.92	16.92	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m³/sec	0.187	0.131	0.125	0.007	0.004	0.003	0.192	1.229	0.06	8.799	0.008	2.398	3.587	3.303	1.92	0.822	0.003	3E-04	0.001	7E-05

Table S2(a): Significant stream information for Alternative 1: Omitting Ethylene

In this case, the combined LIGHTS flow from the top of column DT-01 directly to mixer DM-1. Columns DT-2, -3, & -6, compressor DC-2, pump DP-1 and their intermediate streams are excluded.

		AIR	C3H6	C3H8	H2O	HEAVIES	LIGHTS	M-CO2	MEOH	O2	OFFGAS	PLASTIC	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From	To	CC-12	DT-5	DT-5 DM-1	GP-1	DT-4 DM-1	DT-1 DM-1	MF-2	MT-1 TX-1	PYRO	CX-2	PYRO	GF-1	MT-1	TF-1	CF-1
Phase		Vapor	Liquid	Liquid	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid
Temperature	C	25	40.98	51.85	25	81.33	-32.6	25.07	74.53	40	150.1	40	50	116.4	48	30
Pressure	bar	1.013	17	18	1	19	19.12	2	1.5	10	1	10	10	2	1	18
Mol Vapor Frac.		1	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mol Liquid Frac.		0	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Mass Vapor Frac.		1	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mass Liquid Frac.		0	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Molar Density	kmol/m ³	0.041	11.52	10.18	47.11	21.41	1.183	0.082	0.053	0.386	0.028	3.723	46.31	42.52	46.36	46.87
Mass Density	kg/m ³	1.18	484.7	449.2	848.7	657.3	34.74	3.434	1.709	12.37	0.823	176.1	834.2	779.5	835.3	845.4
Mole Flow	kmol/hr	1010	37.77	2.793	755.2	16.36	54.82	56.44	235.4	83.18	1150	105.7	459.6	51.26	207.4	11.01
Mass Flow	kg/hr	29128	1589	123.3	13606	502.2	1609	2374	7561	2662	33277	5000	8280	939.7	3737	198.6
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	1200	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	1750	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	950	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	1100	0	0	0	0
CH4	kg/hr	0	0	0	0	0	14.83	6.154	0.026	0	0	0	4E-04	0	4E-05	4E-05
CH3OH	kg/hr	0	0	0	0	0.786	0	119.2	7431	0	0	0	0	37.34	0.858	0.587
O2	kg/hr	6784	0	0	0	0	0	0	0	2662	323.1	0	0	0	0	0
CO	kg/hr	0	0	0	0	0	398.8	5.277	0.004	0	0	0	0.005	0	1E-04	1E-04
CO2	kg/hr	0	7E-05	0	0	0	113.6	2237	113.6	0	7522	0	0.559	0	0.004	0.005
H2	kg/hr	0	0	0	0	0	0.333	2.215	0.001	0	0	0	0.003	0	0	0
H2O	kg/hr	0	0	0.015	13606	200.9	0	4.05	17.08	0	3088	0	8279	902.4	3737	198
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	22344	0	0	0	0	0	0	0	0	22344	0	0	0	0	0
C2H4	kg/hr	0	0.016	0	0	0	434.7	0	0	0	0	0	0	0	0.002	0.002
C2H6	kg/hr	0	1.624	0	0	0	635.6	0	0	0	0	0	0	0	0.003	0.002
C3H6	kg/hr	0	1579	7.936	0	1.394	11.31	0	0	0	0	0	0	0	0.004	3E-05
C3H8	kg/hr	0	8.328	113.1	0	0.325	0.234	0	0	0	0	0	0	0	8E-05	4E-05
C4H8	kg/hr	0	0	1.599	0	82.85	8E-05	0	0	0	0	0	0	0	2E-05	1E-05
C4H10	kg/hr	0	0	0.653	0	199	1E-04	0	0	0	0	0	0	0	2E-05	0
C5H10	kg/hr	0	0	0	0	16.92	0	0	0	0	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m ³ /sec	6.859	9E-04	8E-05	0.004	2E-04	0.013	0.192	1.229	0.06	11.24	0.008	0.003	3E-04	0.001	7E-05

Table S2(b): Significant stream information for Alternatives 2 & 3: Adding H₂

In this case, stream H2 is added as a feed into mixer MM-1. The source of H₂ (SMR or Green electricity) does not affect process operations.

		AIR	C2H4	C2H6	C3H6	C3H8	D-CO2	H2	H2O	HEAVIES	LIGHTS	M-CO2	MEOH	O2	OFFGAS	PLASTIC	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From	To	CC-12	DC-2	DT-3 DM-1	DT-5	DT-5 DM-1	DP-1	MM-1	GP-1	DT-4 DM-1	DT-2 DM-1	MF-2	MT-1 TX-1	PYRO	CX-2	PYRO	GF-1	MT-1	TF-1	CF-1
Phase		Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Vapor	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid
Temperature	C	25	113	-11	40.98	51.86	-159	25	25	82.87	-127	37.24	74.8	40	150	40	50	118.1	48	30
Pressure	bar	1.013	1	18.1	17	18	1	80	1	19	18.5	2	1.5	10	1	10	10	2	1	18
Mol Vapor Frac.		1	1	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0
Mol Liquid Frac.		0	0	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1
Mass Vapor Frac.		1	1	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0
Mass Liquid Frac.		0	0	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1
Molar Density	kmol/m ³	0.041	0.031	14.53	11.52	10.19	32.44	3.133	47.11	21.27	1.845	0.078	0.053	0.386	0.028	3.723	46.31	42.92	46.36	46.86
Mass Density	kg/m ³	1.18	0.877	439	484.7	449.3	1380	6.317	848.7	654.7	49.95	3.092	1.702	12.37	0.802	176.1	834.2	781.5	835.3	845.4
Mole Flow	kmol/hr	1019	19.21	26.94	47.65	3.523	2.246	205.9	755.2	20.51	19.59	21.83	297	83.18	1147	105.7	459.6	106.8	262.9	13.82
Mass Flow	kg/hr	29395	539.7	813.8	2005	155.4	95.56	415.2	13606	631.2	530.2	861.2	9507	2662	32365	5000	8280	1945	4737	249.3
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1200	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1750	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	950	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1100	0	0	0	0
CH4	kg/hr	0	0.309	0	0	0	0	0	0	0	18.41	4.424	0.052	0	0	0	4E-04	0	6E-05	7E-05
CH3OH	kg/hr	0	0	0	0	0	0	0	0	0.983	0	78.77	9372	0	0	0	0	47.1	1.088	0.791
O2	kg/hr	6847	0	0	0	0	0	0	0	0	0	0	0	2662	326	0	0	0	0	0
CO	kg/hr	0	0.002	0	0	0	0	0	0	0	503.1	1.302	0.003	0	0	0	0.005	0	2E-04	2E-04
CO2	kg/hr	0	2.385	2E-05	6E-05	0	88.57	0	0	0	1.723	769.6	92.69	0	5942	0	0.559	0	0.003	1E-04
H2	kg/hr	0	0	0	0	0	0	415.2	0	0	0.42	2.65	0.005	0	0	0	0.003	0	0	0
H2O	kg/hr	0	0	0	0	0.053	0	0	13606	251.1	0	4.478	42.21	0	3549	0	8279	1898	4736	248.5
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	22549	0	0	0	0	0	0	0	0	0	0	0	0	22549	0	0	0	0	0
C2H4	kg/hr	0	537	5.43	0.02	0	0.538	0	0	0	5.329	0	0	0	0	0	0	0	0.003	7E-05
C2H6	kg/hr	0	0.003	794	2.015	0	6.451	0	0	0	1.235	0	0	0	0	0	0	0	0.003	0.004
C3H6	kg/hr	0	0	14.03	1992	10.01	0	0	0	1.774	9E-05	0	0	0	0	0	0	0	0.005	5E-05
C3H8	kg/hr	0	0	0.288	10.51	142.6	0	0	0	0.395	0	0	0	0	0	0	0	0	1E-04	7E-05
C4H8	kg/hr	0	0	1E-04	0	1.968	0	0	0	104.5	0	0	0	0	0	0	0	0	3E-05	2E-05
C4H10	kg/hr	0	0	2E-04	0	0.763	0	0	0	251	0	0	0	0	0	0	0	0	2E-05	1E-05
C5H10	kg/hr	0	0	0	0	0	0	0	0	21.34	0	0	0	0	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m ³ /sec	6.921	0.171	5E-04	0.001	1E-04	2E-05	0.018	0.004	3E-04	0.003	0.077	1.551	0.06	11.21	0.008	0.003	7E-04	0.002	8E-05

Table S2(c): Significant stream information for Alternative 4: Pre-sorted waste feed

In this case, the different composition of stream PLASTIC affects downstream operations.

		AIR	C2H4	C2H6	C3H6	C3H8	D-CO2	H2O	HEAVIES	LIGHTS	M-CO2	MEOH	O2	OFFGAS	PLASTIC	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From	To	CC-12	DC-2	DT-3 DM-1	DT-5	DT-5 DM-1	DP-1	GP-1	DT-4 DM-1	DT-2 DM-1	MF-2	MT-1 TX-1	PYRO	CX-2	PYRO	GF-1	MT-1	TF-1	CF-1
Phase		Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid
Temperature	C	25	121.6	-10.9	40.98	51.86	-160	25	82.2	-127	30.39	74.67	40	149.8	40	50	117.7	48	30
Pressure	bar	1.013	1	18.1	17	18	1	1	19	18.5	2	1.5	10	1	10	10	2	1	18
Mol Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mol Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Mass Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mass Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Molar Density	kmol/m³	0.041	0.031	14.53	11.52	10.19	32.76	47.11	21.33	1.84	0.08	0.053	0.386	0.028	3.723	46.31	42.81	46.36	46.86
Mass Density	kg/m³	1.18	0.858	439	484.7	449.3	1402	848.7	655.8	49.81	3.337	1.705	12.37	0.817	122.8	834.2	781	835.3	845.4
Mole Flow	kmol/hr	883.2	17.18	24.08	42.59	3.15	2.483	926.6	18.39	17.51	46.01	265.5	102	1015	151.6	613.3	81.51	234.5	12.41
Mass Flow	kg/hr	25481	482.5	727.4	1792	138.9	106.3	16692	565.2	474.2	1915	8512	3265	29157	5000	11050	1487	4225	223.8
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	2000	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	2900	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
CH4	kg/hr	0	0.276	0	0	0	0	0	0	16.44	4.38	0.022	0	0	0	4E-04	0	5E-05	7E-05
CH3OH	kg/hr	0	0	0	0	0	0	0	0.883	0	121.2	8379	0	0	0	0	42.1	0.97	0.711
O2	kg/hr	5935	0	0	0	0	0	0	0	0	0	0	3265	282.6	0	0	0	0	0
CO	kg/hr	0	0.001	0	0	0	0	0	0	449.7	3.071	0.003	0	0	0	0.006	0	1E-04	2E-04
CO2	kg/hr	0	2.132	3E-05	7E-05	0	99.89	0	0	1.804	1778	103.8	0	6387	0	0.741	0	0.004	1E-04
H2	kg/hr	0	0	0	0	0	0	0	0	0.375	2.282	0.002	0	0	0	0.005	0	0	0
H2O	kg/hr	0	0	0	0	0.048	0	16692	225.4	0	5.778	29.19	0	2942	0	11049	1445	4224	223.1
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	19546	0	0	0	0	0	0	0	0	0	0	0	19546	0	0	0	0	0
C2H4	kg/hr	0	480.1	4.854	0.018	0	0.481	0	0	4.73	0	0	0	0	0	0	0	0.003	7E-05
C2H6	kg/hr	0	0.003	709.6	1.815	0	5.91	0	0	1.141	0	0	0	0	0	0	0	0.003	0.003
C3H6	kg/hr	0	0	12.64	1781	8.949	0	0	1.586	8E-05	0	0	0	0	0	0	0	0.004	5E-05
C3H8	kg/hr	0	0	0.261	9.391	127.5	0	0	0.352	0	0	0	0	0	0	0	0	9E-05	6E-05
C4H8	kg/hr	0	0	9E-05	0	1.759	0	0	93.46	0	0	0	0	0	0	0	0	3E-05	2E-05
C4H10	kg/hr	0	0	2E-04	0	0.682	0	0	224.4	0	0	0	0	0	0	0	0	2E-05	1E-05
C5H10	kg/hr	0	0	0	0	0	0	0	19.07	0	0	0	0	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m³/sec	6	0.156	5E-04	0.001	9E-05	2E-05	0.005	2E-04	0.003	0.159	1.386	0.073	9.911	0.011	0.004	5E-04	0.001	7E-05

Table S2(d): Significant stream information for Alternative 5: Mechanical + Gasification

In this case, the different composition of stream PLASTIC affects downstream operations.

		AIR	C2H4	C2H6	C3H6	C3H8	D-CO2	H2O	HEAVIES	LIGHTS	M-CO2	MEOH	O2	OFFGAS	PLASTIC	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From																			
To		CC-12	DC-2	DT-3 DM-1	DT-5	DT-5 DM-1	DP-1	GP-1	DT-4 DM-1	DT-2 DM-1	MF-2	MT-1 TX-1	PYRO	CX-2	PYRO	GF-1	MT-1	TF-1	CF-1
Phase		Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid
Temperature	C	25	121.6	-11.3	40.49	51.85	-159	25	79.44	-125	12.89	74.25	40	150	40	50	104.5	48	30
Pressure	bar	1.013	1	18.1	17	18	1	1	19	18.5	2	1.5	10	1	10	10	2	1	18
Mol Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mol Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Mass Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mass Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Molar Density	kmol/m³	0.041	0.031	14.55	11.55	10.19	33.42	47.11	21.62	1.816	0.085	0.053	0.386	0.028	3.723	46.31	37.68	46.36	46.86
Mass Density	kg/m³	1.18	0.858	437.8	485.1	449.3	1448	848.7	660.6	49.2	3.625	1.716	12.37	0.837	485.3	834.2	751.2	835.3	845.4
Mole Flow	kmol/hr	629.3	12.23	16.8	30.68	2.246	3.502	503.4	13.29	12.49	69.44	190.1	55.44	733.8	38.36	242.3	6.832	166.1	9.03
Mass Flow	kg/hr	18155	343.4	505.2	1289	99.09	151.7	9068	406.1	338.5	2955	6125	1774	21613	5000	4366	136.2	2992	162.9
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	2250	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	2650	0	0	0	0
CH4	kg/hr	0	0.197	0	0	0	0	0	0	11.74	12.1	0.044	0	0	0	3E-04	0	3E-05	5E-05
CH3OH	kg/hr	0	0	0	0	0	0	0	0.638	0	84.62	5968	0	0	0	0	29.99	0.682	0.517
O2	kg/hr	4229	0	0	0	0	0	0	0	0	0	0	1774	201.4	0	0	0	0	0
CO	kg/hr	0	1E-03	0	0	0	0	0	0	320.3	29.4	0.018	0	0	0	0.004	0	1E-04	1E-04
CO2	kg/hr	0	1.515	6E-05	0.019	0	146.7	0	0	1.933	2827	150.1	0	5645	0	0.284	0	0.005	1E-04
H2	kg/hr	0	0	0	0	0	0	0	0	0.267	1.503	5E-04	0	0	0	0.002	0	0	0
H2O	kg/hr	0	0	0	0	0.034	0	9068	164	0	0.454	6.96	0	1841	0	4366	106.2	2992	162.4
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	13926	0	0	0	0	0	0	0	0	0	0	0	13926	0	0	0	0	0
C2H4	kg/hr	0	341.7	3.455	0.42	0	0.343	0	0	3.248	0	0	0	0	0	0	0	0.002	5E-05
C2H6	kg/hr	0	0.006	500.2	5.887	0	4.724	0	0	0.917	0	0	0	0	0	0	0	0.002	0.002
C3H6	kg/hr	0	0	1.541	1276	6.411	0	0	1.139	1E-05	0	0	0	0	0	0	0	0.003	2E-05
C3H8	kg/hr	0	0	0.013	6.765	90.91	0	0	0.249	0	0	0	0	0	0	0	0	6E-05	5E-05
C4H8	kg/hr	0	0	0	0	1.25	0	0	66.58	0	0	0	0	0	0	0	0	2E-05	1E-05
C4H10	kg/hr	0	0	0	0	0.484	0	0	159.8	0	0	0	0	0	0	0	0	1E-05	0
C5H10	kg/hr	0	0	0	0	0	0	0	13.59	0	0	0	0	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m³/sec	4.275	0.111	3E-04	7E-04	6E-05	3E-05	0.003	2E-04	0.002	0.226	0.992	0.04	7.169	0.003	0.001	5E-05	1E-03	5E-05

Table S2(e): Significant stream information for Alternative 6: Better MTP

In this case, the improved conversion in the MTP reactor affects downstream operations.

		AIR	C2H4	C2H6	C3H6	C3H8	D-CO2	H2O	HEAVIES	LIGHTS	M-CO2	MEOH	O2	OFFGAS	PLASTIC	WH2O-1	WH2O-2	WH2O-3	WH2O-4
From																			
To		CC-12	DC-2	DT-3 DM-1	DT-5	DT-5 DM-1	DP-1	GP-1	DT-4 DM-1	DT-2 DM-1	MF-2	MT-1 TX-1	PYRO	CX-2	PYRO	GF-1	MT-1	TF-1	CF-1
Phase		Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Vapor	Vapor	Vapor	Vapor	Vapor	Liquid	Liquid	Liquid	Liquid	Liquid
Temperature	C	25	121.6	-11	40.98	50.86	-160	25	12.18	-124	25.07	74.53	40	150	40	50	116.4	48	30
Pressure	bar	1.013	1	18.1	17	18	1	1	19	18.5	2	1.5	10	10	10	10	2	1	18
Mol Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mol Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Mass Vapor Frac.		1	1	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Mass Liquid Frac.		0	0	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1
Molar Density	kmol/m³	0.041	0.031	14.54	11.52	10.27	32.64	47.11	26.51	1.798	0.082	0.053	0.386	0.285	3.723	46.31	42.52	46.31	46.14
Mass Density	kg/m³	1.18	0.858	439.5	484.7	450.8	1394	848.7	739	48.7	3.434	1.709	12.37	8.278	176.1	834.2	779.5	835	840.7
Mole Flow	kmol/hr	642.9	20.68	17.42	40.02	2.285	2.743	755.2	15.17	12.69	56.44	235.4	83.18	753.6	105.7	459.6	51.25	210	11.14
Mass Flow	kg/hr	18549	581.1	526.7	1684	100.2	117.1	13606	422.8	343.7	2374	7561	2662	21852	5000	8280	939.7	3786	203
PP	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	1200	0	0	0	0
PE	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	1750	0	0	0	0
PS	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	950	0	0	0	0
PET	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	1100	0	0	0	0
CH4	kg/hr	0	0.2	0	0	0	0	0	0	11.88	6.155	0.026	0	0	0	4E-04	0	4E-05	7E-05
CH3OH	kg/hr	0	0	0	0	0	0	0	6.176	0	119.2	7431	0	0	0	0	37.34	6.901	5.24
O2	kg/hr	4320	0	0	0	0	0	0	0	0	0	0	2662	205.7	0	0	0	0	0
CO	kg/hr	0	9E-04	0	0	0	0	0	0	324.8	5.277	0.004	0	0	0	0.005	0	1E-04	2E-04
CO2	kg/hr	0	2.702	7E-05	1E-04	0	109.5	0	0	1.381	2237	113.6	0	5262	0	0.559	0	0.004	1E-04
H2	kg/hr	0	0	0	0	0	0	0	0	0.271	2.215	0.001	0	0	0	0.003	0	0	0
H2O	kg/hr	0	0	0	0	0.053	0	13606	199.4	0	4.05	17.08	0	2156	0	8279	902.4	3779	197.8
C	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	kg/hr	14228	0	0	0	0	0	0	0	0	0	0	0	14228	0	0	0	0	0
C2H4	kg/hr	0	578.2	5.843	0.03	0	0.579	0	0	4.677	0	0	0	0	0	0	0	0.003	1E-04
C2H6	kg/hr	0	0.003	509.5	1.653	0	7.04	0	0	0.732	0	0	0	0	0	0	0	0.002	0.004
C3H6	kg/hr	0	0	11.2	1674	12.71	0	0	29.42	6E-05	0	0	0	0	0	0	0	0.004	2E-04
C3H8	kg/hr	0	0	0.184	8.427	86.75	0	0	3.942	0	0	0	0	0	0	0	0	7E-05	8E-05
C4H8	kg/hr	0	0	0	0	0.119	0	0	5.603	0	0	0	0	0	0	0	0	0	0
C4H10	kg/hr	0	0	2E-04	0	0.605	0	0	162	0	0	0	0	0	0	0	0	2E-05	2E-05
C5H10	kg/hr	0	0	0	0	0	0	0	16.26	0	0	0	0	0	0	0	0	0	0
C6H12	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Flow	m³/sec	4.367	0.188	3E-04	1E-03	6E-05	2E-05	0.004	2E-04	0.002	0.192	1.229	0.06	0.733	0.008	0.003	3E-04	0.001	7E-05

Table S3: Flow across the process boundary with associated CO₂-equivalent emissions and cost for alternative gasification processes.

		(1) Omit Ethylene			(2) Add H ₂ (SMR)			(3) Add H ₂ (Green)		
Metric		Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]	Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]	Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]
Material Inputs	Waste Feed	5000 kg/hr	0.38	0.50	5000 kg/hr	0.24	0.31	5000 kg/hr	0.24	0.31
	Oxygen	2662 kg/hr	1.86	0.09	2662 kg/hr	1.16	0.06	2662 kg/hr	1.16	0.06
	Hydrogen	-	-	-	415 kg/hr	2.16	0.21	415 kg/hr	0.14	1.28
Material Outputs	Polypropylene	1589 kg/hr	-2.01	-1.49	2005 kg/hr	-1.58	-1.14	2005 kg/hr	-1.58	-1.14
	Polyethylene	-	-	-	540 kg/hr	-0.43	-0.34	540 kg/hr	-0.43	-0.34
	Direct CO ₂ Emissions	9759 kg/hr	6.14	-	6800 kg/hr	2.67	-	6800 kg/hr	2.67	-
Energy Inputs/ Outputs	Process Heating	9211 kW	-	-	11557 kW	-	-	11557 kW	-	-
	Heat Generation	10608 kW			12005 kW			12005 kW		
	Electricity	6232 kW	0.11	0.03	6636 kW	0.12	0.03	6636 kW	0.12	0.03
	Electric. Generation	5834 kW			5921 kW			5921 kW		
	Cooling Water	12739 kW	0.04	0.01	18970 kW	0.03	0.01	18970 kW	0.03	0.01
	Refrigerant	444 kW	0.07	0.02	1088 kW	0.26	0.07	1088 kW	0.26	0.07

		(4) Pre-sorted*			(5) Mechanical + Gasification*			(6) Better MTP		
Metric		Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]	Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]	Flow across boundary	Emissions [kg CO ₂ -eq/ kg product]	Cost [\$ /kg product]
Material Inputs	Waste Feed	5000 kg/hr	2.44	0.68	5000 kg/hr	0.19	0.25	5000 kg/hr	0.27	0.35
	Oxygen	3265 kg/hr	1.59	0.08	1774 kg/hr	1.21	0.06	2662 kg/hr	1.30	0.06
	Hydrogen	-	-	-	-	-	-	-	-	-
Material Outputs	Polypropylene	1792 kg/hr	-1.58	-1.14	1289 kg/hr	-1.58	-1.14	1684 kg/hr	-1.58	-1.07
	Polyethylene	483 kg/hr	-0.43	-0.34	343 kg/hr	-0.43	-0.34	581 kg/hr	-0.43	-0.42
	Direct CO ₂ Emissions	8264 kg/hr	3.64	-	8618 kg/hr	5.30	-	7608 kg/hr	3.36	-
Energy Inputs/ Outputs	Process Heating	10459 kW	-	-	6939 kW	-	-	8890 kW	-	-
	Heat Generation	11533 kW			7979 kW			10713 kW		
	Electricity	8531 kW	0.87	0.22	4703 kW	0.26	0.07	5585 kW	0.95	0.24
	Electric. Generation	3978 kW			3718 kW			624 kW		
	Cooling Water	17501 kW	0.04	0.01	11201 kW	0.03	0.01	14591 kW	0.03	0.01
	Refrigerant	1106 kW	0.28	0.07	867 kW	0.31	0.08	992 kW	0.26	0.07

* These values are for the gasification process alone. Emissions of the parallel process (thermal recovery or mechanical recycling) are applied to the feed stream for presentation in this table.