SUPPORTING INFORMATION

LIFE CYCLE ASSESSMENT OF LEACHATE TREATMENT STRATEGIES

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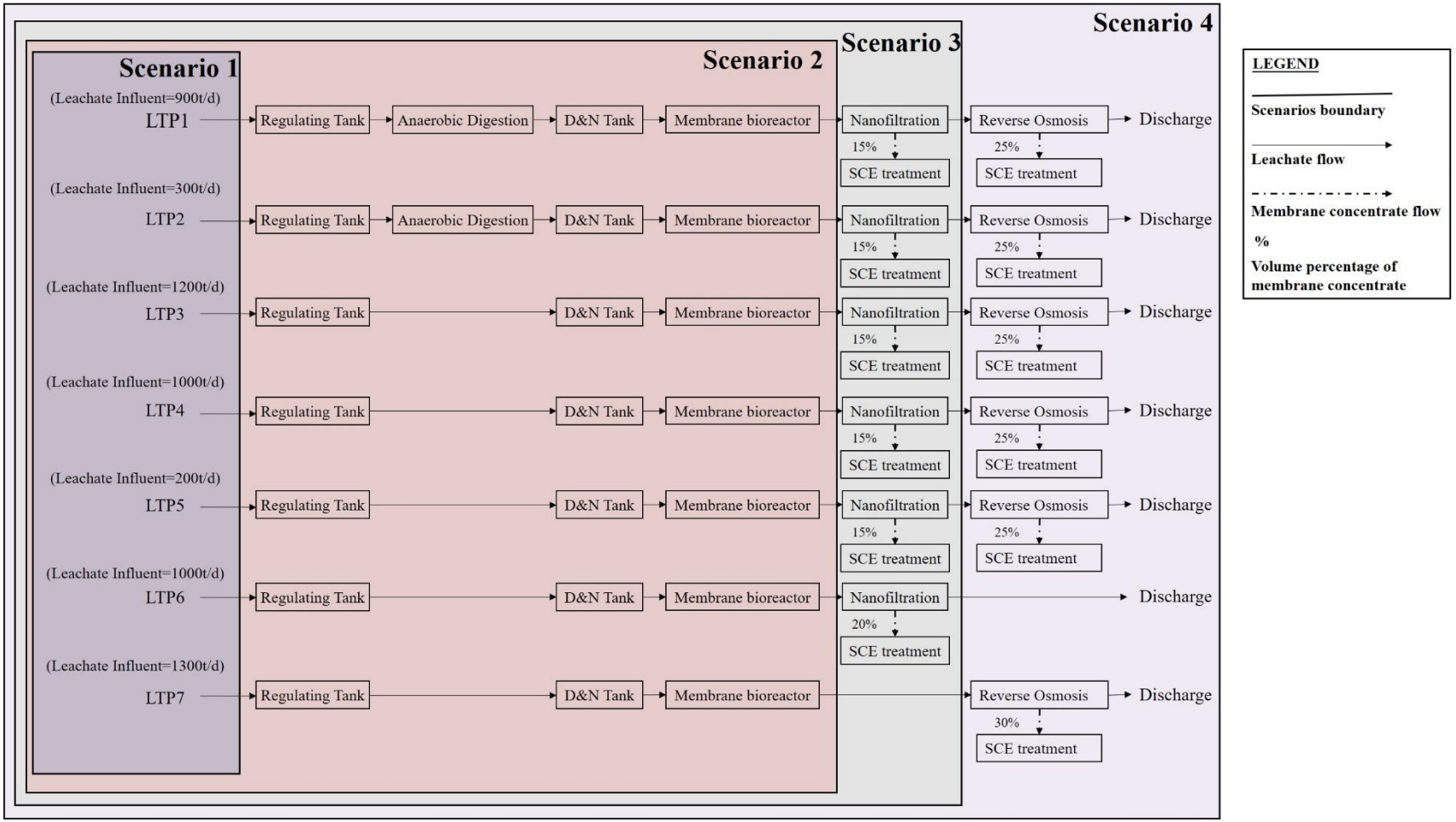

Figure S1. Description of specific processes and scenarios.

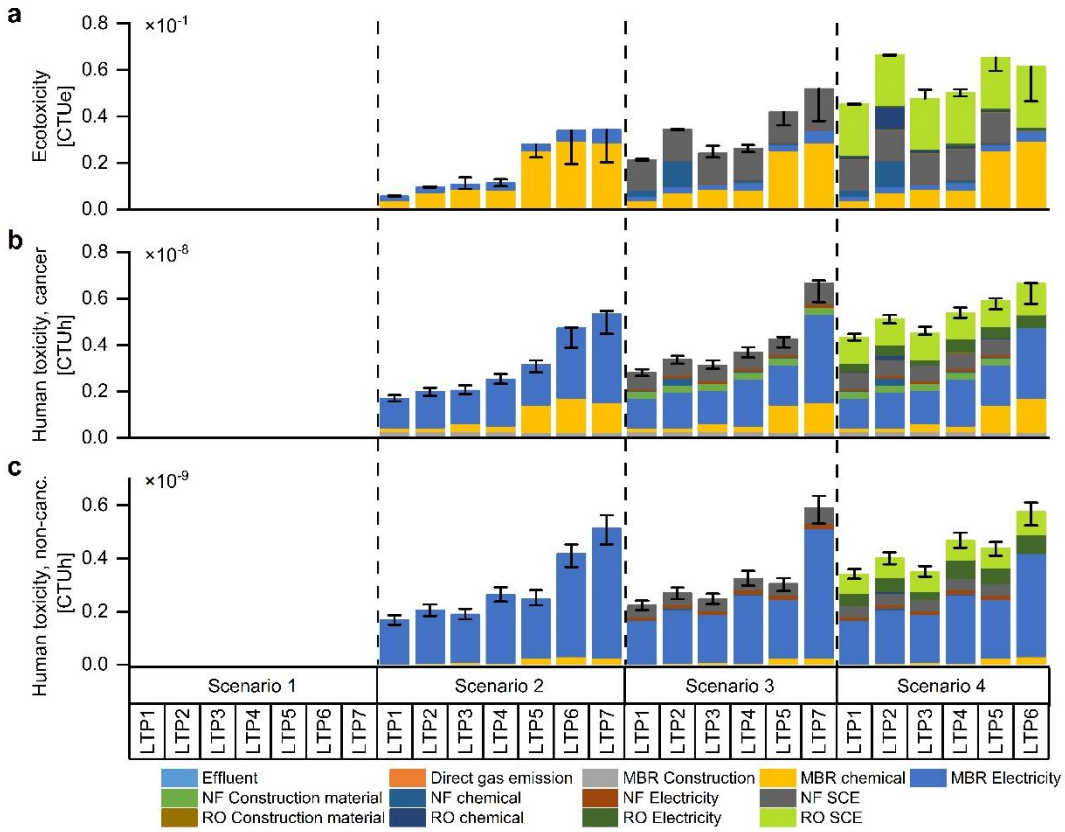

Figure S2. Ecotoxicity(a), human toxicity, cancer (b), human toxicity, non-cancer (c) of 4 scenarios.

Table S1. Brief description of 7 representative leachate treatment plans (LTPs) surveyed in this study.

Name	Type	MSW* treatment methods	Location	Carbon Source	Capacity	Raw leachate				Effluent from MBR			Effluent from NF			Effluent from RO		
						COD	NH_3-N	NO_3-N	BOD/COD	COD	NH_3-N	NO_3-N	COD	NH_3-N	NO_3-N	COD	NH_3-N	NO_3-N
					t/d	mg/l	mg/l	mg/l	--	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
LTP1	Raw leachate	Waste-to-energy	Beijing	Glucose	900	40000	1800	0	0.3	500	14	900	420	7	900	3	5	30
LTP2	Raw leachate	Landfill	Beijing	Glucose	600	10235	3063	0	0.32	1478	17	900	475	8	900	12	0.3	2
LTP3	Raw leachate and aged leacahte	Landfill	Beijing	Glucose	1200	5999	2157	5	0.29	1662	6	967	409	4	800	17	1	200
LTP4	Raw leachate and aged leacahte	Landfill	Beijing	Methanol	1000	4454	1210	0	0.21	2130	12	100	333.2	0.97	100	17.7	0.05	20
LTP5	Aged leacahte	Landfill	Shanxi	Glucose	200	2500	2200	0	0.1	900	14	200	700	8	200	35	0	40
LTP6	Aged leacahte	Landfill	Sichuan	Glucose	1000	10862	2109	10	0.05	1100	5	250	-	-	-	14	2	10
LTP7	Aged leacahte	Landfill	Sichuan	Glucose	1200	11715	2159	10	0.05	1500	5	100	43	1	100	-	-	-

*: Municipal Solid Waste

Table S2. Inventory for operation phase.

Inputs for Operation Phase									(per tonne influent leachate)
Treatment Process	**Materials**	**Unit**	**Plants Code Name**						
			LTP1	**LTP2**	**LTP3**	**LTP4**	**LTP5**	**LTP6**	**LTP7**
Direct Discharge	No inputs	kg	--	--	--	--	--	--	--
Biochemical processes coped with Membrane Bio-reactor (AO+MBR)	Glucose	kg	--	--	3.54	--	8.90	18.20	15.70
	Methnol	kg	--	--	--	3.23	--	--	--
	HCl 32%	kg	1.00	0.90	0.13	2.72	0.32	0.48	1.59
	Antifoaming agent	kg	0.12	--	--	0.08	0.55	0.10	0.05
	NaClO	kg	--	--	--	--	0.34	--	--
	$NaHCO_3$	kg	0.06	--	0.02	--	0.09	--	--
	NaOH	kg	0.05	--	0.58	--	0.08	0.89	0.57
	Na_2CO_3	kg	--	6.75	2.11	0.60	--	--	--
	Electricity	MJ	39.13	47.50	43.20	61.53	52.84	92.70	116.00
Nanofiltration (NF)	HCl 32%	kg	--	--	0.06	--	0.32	--	--
	NaClO	kg	--	0.72	--	--	--	--	--
	NaOH	kg	0.04	--	0.03	0.27	0.08	--	--
	Electricity	MJ	2.51	3.04	3.30	3.94	3.39	--	4.63
	NaHSO4	kg	0.04	0.17	--	--	0.01	--	--
	H_3PO_4	kg	0.25	0.97	0.01	0.11	0.01	--	--
	Operation Inputs for NF concentrate								
	Natural gas	kg	7.53	7.53	7.53	7.53	7.53	--	10.04
	Antifoaming agent	kg	0.0023	0.0023	0.0023	0.0023	0.0023	--	0.0031
	Electricity	MJ	8.64	8.64	8.64	8.64	8.64	--	11.52

Reverse Osmosis (RO)	HCl 32%	kg	--	--	0.06	--	0.32	0.12	--
	NaClO	kg	0.05	0.70	--	--	--	--	--
	NaOH	kg	0.05	--	0.03	0.03	0.32	--	--
	Electricity	MJ	10.56	12.82	6.76	16.61	14.26	16.60	--
	NaHSO4	kg	0.05	--	--	--	0.01	--	--
	H_3PO_4	kg	0.10	0.96	0.02	0.11	0.01	--	--
	H_2SO_4	kg	--	--	0.24	--	--	--	--
	Operation Inputs for RO concentrate								
	Natural gas	kg	12.55	12.55	12.55	12.55	12.55	15.07	--
	Antifoaming agent	kg	0.0039	0.0039	0.0039	0.0039	0.0039	0.0047	--
	Electricity	MJ	14.40	14.40	14.40	14.40	14.40	17.28	--

Table S3. Inventory for construction phase.

			Inputs for Construction Phase*						**(per tonne influent leachate per day)**
Treatment process	**Materials**	**Unit**	**Plants code name**						
			LTP1	**LTP2**	**LTP3**	**LTP4**	**LTP5**	**LTP6**	**LTP7**
Direct Discharge	No inputs	mg	--	--	--	--	--	--	--
Membrane Bio-reactor (MBR)	**Construction inputs for major infastructure and equipment**								
	Concrete C20-25	mg	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	Aluminium	mg	0.49	0.49	0.49	0.59	0.43	0.30	0.39
	Cast iron	mg	423.14	423.14	399.34	479.20	401.49	315.34	409.94
	Steel section	mg	3.52	3.52	3.52	4.23	3.07	2.17	2.82
	Stainless steel (304)	mg	143.66	143.66	143.66	189.53	186.19	145.55	223.50
	Fiberglass	mg	--	--	--	--	25.27	21.98	28.57
	Copper	mg	0.60	0.60	0.60	0.72	0.52	0.37	0.48
	Nitrile rubber	mg	0.003	0.003	0.003	0.003	0.002	0.002	0.002
	Styrene-butadene-rubber (SBR)	mg	0.22	0.22	0.22	0.26	0.15	--	0.17
	Steel rebar	mg	--	--	--	--	200.00	200.00	200.00
	Crude oil	mg	0.32	0.32	0.32	0.39	0.28	0.20	0.26
	Polyester resin	mg	0.03	0.03	0.03	0.04	0.03	0.02	0.02
	Stainless steel (316)	mg	297.14	297.14	11.14	9.14	8.09	7.03	--
	Structural steel	mg	2381.00	2381.00	--	--	--	--	--
	Construction inputs for membranes								

	Stainless steel (304)	mg	1193.08	1193.08	1193.08	714.04	750.83	824.18	714.29
	Polytetrafluoroethylene (PTFE)	mg	16.70	16.70	16.70	10.00	10.51	11.54	10.00
	Polyvinylchloride film (PVC)	mg	100.22	100.22	100.22	99.97	99.99	100.00	100.00
Nanofiltration (NF)	**Construction inputs for major infastructure and equipment**								
	Aluminium	mg	300.00	300.00	300.00	300.00	300.00	--	300.00
	Copper	mg	300.00	300.00	300.00	300.00	300.00	--	300.00
	Steel rebar	mg	2310.00	2310.00	2310.00	2310.00	2310.00	--	2310.00
	Polyvinylchloride film (PVC)	mg	870.00	870.00	870.00	870.00	870.00	--	870.00
	Stainless steel (316)	mg	125.00	125.00	125.00	68.86	66.57	--	64.29
	Construction inputs for membranes								
	Stainless steel (316)	mg	4.77	4.77	4.77	5.71	7.20	--	8.69
	Structural steel	mg	110.24	110.24	110.24	131.83	166.25	--	200.68
	Polypropylene (PP)	mg	300.66	300.66	300.66	299.61	301.84	--	304.06
	Polyester resin	mg	501.09	501.09	501.09	499.35	503.06	--	506.77
	Epoxy Resin (EP)	mg	100.22	100.22	100.22	99.87	100.61	--	101.35
	Fiberglass	mg	11.93	11.93	11.93	14.27	17.99	--	21.72
	Isopropanol	mg	100.22	100.22	100.22	99.87	100.61	--	101.35
	Phosphoric acid	mg	100.22	100.22	100.22	99.87	100.61	--	101.35
	Polyvinylchloride film (PVC)	mg	300.66	300.66	300.66	299.61	301.84	--	304.06
	Construction inputs for NF concentrate								
	Cast iron	mg	977.14	977.14	977.14	977.14	977.14	--	1302.86
	Stainless steel (304)	mg	2571.45	2571.45	2571.45	2571.45	2571.45	--	3428.60
	Stainless steel (316)	mg	2575.50	2575.50	2575.50	2575.50	2575.50	--	3434.00

	Construction inputs for major infastructure and equipment								
	Stainless steel (316)	mg	142.85	142.85	142.85	211.14	303.37	395.60	--
	Steel rebar	mg	4390.00	4390.00	4390.00	4390.00	4390.00	4390.00	--
	Cast iron	mg	33.00	33.00	33.00	33.00	33.00	33.00	--
	Construction inputs for membranes								
	Stainless steel (316)	mg	9.54	9.54	9.54	17.17	11.88	6.59	--
	Structural steel	mg	220.37	220.37	220.37	396.65	274.48	152.31	--
Reverse Osmosis (RO)	Fiberglass	mg	23.85	23.85	23.85	42.92	29.70	16.48	--
	Epoxy resin	mg	11319.87	11319.87	11319.87	11318.58	11309.29	11300.00	--
	Ethylene propylene diene (EPDM)	mg	5008.79	5008.79	5008.79	5008.22	5004.11	5000.00	--
	Polyester resin	mg	8014.06	8014.06	8014.06	8013.16	8006.58	8000.00	--
	Polypropylene (PP)	mg	2003.52	2003.52	2003.52	2003.29	2001.64	2000.00	--
	Construction inputs for RO concentrate								
	Cast iron	mg	1628.57	1628.57	1628.57	1628.57	1628.57	1954.29	--
	Stainless steel (304)	mg	4285.75	4285.75	4285.75	4285.75	4285.75	5142.90	--
	Stainless steel (316)	mg	4292.50	4292.50	4292.50	4292.50	4292.50	5151.00	--

***Lifetime of all plants are set as 20 years.**

Table S4. Direct gas emissions on nitrification and denitrification processes and gas combustion.

Energy alternatives 1											
			AO+MBR			NF			RO		
Scenarios	Name	Unit (per tonne influent leachate)	Leachate anerobic digestion (Biogas combustion)		AO (N&D* processes)	SCE treatment (Natural gas combustion)			SCE treatment (Natural gas combustion)		
			N_2O	CH_4	N_2O	CO_2	N_2O	CH_4	CO_2	N_2O	CH_4
Scenario 2	LTP1	g	14.37	315.43	26.6	--	--	--	--	--	--
	LTP2	g	2.24	49.06	64.4	--	--	--	--	--	--
	LTP3	g	--	--	35.7	--	--	--	--	--	--
	LTP4	g	--	--	32.9	--	--	--	--	--	--
	LTP5	g	--	--	59.6	--	--	--	--	--	--
	LTP6	g	--	--	55.9	--	--	--	--	--	--
	LTP7	g	--	--	61.9	--	--	--	--	--	--
Scenario 3	LTP1	g	14.37	315.43	26.6	20958.25	0.04	0.37	--	--	--
	LTP2	g	2.24	49.06	64.4	20958.25	0.04	0.37	--	--	--
	LTP3	g	--	--	35.7	20958.25	0.04	0.37	--	--	--
	LTP4	g	--	--	32.9	20958.25	0.04	0.37	--	--	--
	LTP5	g	--	--	59.6	20958.25	0.04	0.37	--	--	--
	LTP7	g	--	--	61.9	27944.33	0.05	0.5	--	--	--
Scenario 4	LTP1	g	14.37	315.43	26.6	20958.25	0.04	0.37	34910.45	0.06	0.62
	LTP2	g	2.24	49.06	64.4	20958.25	0.04	0.37	34910.45	0.06	0.62
	LTP3	g	--	--	35.7	20958.25	0.04	0.37	34910.45	0.06	0.62
	LTP4	g	--	--	32.9	20958.25	0.04	0.37	34910.45	0.06	0.62
	LTP5	g	--	--	59.6	20958.25	0.04	0.37	34910.45	0.06	0.62

	LTP6	g	--	--	55.9	--	--	--	41916.49	0.07	0.75

Energy alternatives 2

Scenarios	Name	Unit (per tonne influent leachate)	AO+MBR			NF		RO	
			Leachate anerobic digestion (Biogas combustion)		AO (N&D* processes)	SCE treatment (Biogas combustion)		SCE treatment Biogas combustion)	
			N_2O	CH_4	N_2O	N_2O	CH_4	N_2O	CH_4
Scenario 2	LTP1	g	14.37	315.43	26.6	--	--	--	--
	LTP2	g	2.24	49.06	64.4	--	--	--	--
	LTP3	g	--	--	35.7	--	--	--	--
	LTP4	g	--	--	32.9	--	--	--	--
	LTP5	g	--	--	59.6	--	--	--	--
	LTP6	g	--	--	55.9	--	--	--	--
	LTP7	g	--	--	61.9	--	--	--	--
Scenario 3	LTP1	g	--	--	26.6	14.37	315.43	--	--
	LTP2	g	--	--	64.4	13.22	290.02	--	--
	LTP3	g	--	--	35.7	13.22	290.02	--	--
	LTP4	g	--	--	32.9	13.22	290.02	--	--
	LTP5	g	--	--	59.6	13.22	290.02	--	--
	LTP7	g	--	--	61.9	17.62	386.69	--	--
Scenario 4	LTP1	g	--	--	26.6	13.22	290.02	22.01	483.09
	LTP2	g	--	--	64.4	13.22	290.02	22.01	483.09
	LTP3	g	--	--	35.7	13.22	290.02	22.01	483.09
	LTP4	g	--	--	32.9	13.22	290.02	22.01	483.09
	LTP5	g	--	--	59.6	13.22	290.02	22.01	483.09
	LTP6	g	--	--	55.9	--	--	26.43	580.03

Energy alternatives 3															
			AO+MBR			NF					RO				
Scenarios	Name	Unit (per tonne influent leachate)	Leachate anerobic digestion		AO	SCE treatment					SCE treatment				
			Biogas combustion		(N&D* processes)	Natural gas combustion			Biogas combustion		Natural gas combustion			Biogas combustion	
			N_2O	CH_4	N_2O	CO_2	N_2O	CH_4	N_2O	CH_4	CO_2	N_2O	CH_4	N_2O	CH_4
Scenario 2	LTP1	g	14.37	315.43	26.6	--	--	--	--	--	--	--	--	--	--
	LTP2	g	2.24	49.06	64.4	--	--	--	--	--	--	--	--	--	--
Scenario 3	LTP1	g			26.6	--	--	--	14.37	315.43	--	--	--	--	--
	LTP2	g			64.4	17412.9	0.03	0.31	2.24	49.06	--	--	--	--	--
Scenario 4	LTP1	g			26.6	12410.13	0.02	0.22	5.39	118.29	20663.58	0.04	0.37	8.98	197.15
	LTP2	g			64.4	19628.75	0.03	0.35	0.84	18.4	32694.62	0.06	0.58	1.4	30.66

*Nitrification and denitrification

Table S5. Comparison of three energy supply alternatives.

Scenarios	Name	AP		FAETP		MAETP		Ecotoxicity		Human cancer		Human non-canc.	
		kg SO2 eq.		kg DCB eq.		kg DCB eq.		CTUe		CTUh×10^{-9}		CTUh×10^{-9}	
		Alternative 1	Alternative 2	Alternative 1	Alternative 2	Alternative 1	Alternative 2	Alternative 1	Alternative 2	Alternative 1	Alternative 2	Alternative 1	Alternative 2
Scenario 2	LTP1	0.05	0.05	0.12	0.12	2136.46	2136.46	0.01	0.01	1.71	1.71	0.17	0.17
	LTP2	0.11	0.11	0.15	0.15	2674.10	2674.10	0.01	0.01	1.99	1.99	0.21	0.21
	LTP3	0.08	0.08	0.25	0.25	2554.83	2554.83	0.01	0.01	2.05	2.05	0.19	0.19
	LTP4	0.09	0.09	0.19	0.19	3426.97	3426.97	0.01	0.01	2.53	2.53	0.26	0.26
	LTP5	0.09	0.09	0.47	0.47	3340.11	3340.11	0.03	0.03	3.15	3.15	0.25	0.25
	LTP6	0.15	0.15	0.89	0.89	5880.62	5880.62	0.03	0.03	4.74	4.74	0.42	0.42
	LTP7	0.18	0.18	0.88	0.88	7020.79	7020.79	0.03	0.03	5.33	5.33	0.51	0.51
Scenario 3	LTP1	0.08	0.07	0.18	0.16	2861.94	2995.71	0.02	0.01	2.81	2.68	0.22	0.22
	LTP2	0.16	0.16	0.23	0.26	3630.83	5461.51	0.03	0.06	3.37	12.15	0.27	0.40
	LTP3	0.10	0.10	0.32	0.35	3278.95	5355.88	0.02	0.06	3.13	13.72	0.25	0.40
	LTP4	0.12	0.12	0.26	0.29	4219.74	6436.99	0.03	0.06	3.68	14.27	0.33	0.48
	LTP5	0.12	0.12	0.53	0.56	4081.26	6298.51	0.04	0.08	4.26	14.85	0.30	0.46
	LTP7	0.21	0.21	0.96	1.01	7988.10	10944.43	0.05	0.10	6.68	20.80	0.59	0.80
Scenario 4	LTP1	0.13	0.12	0.30	0.33	4350.66	7977.39	0.05	0.09	4.33	20.90	0.34	0.58
	LTP2	0.23	0.23	0.37	0.44	5391.57	10673.88	0.07	0.15	5.12	30.40	0.40	0.77
	LTP3	0.15	0.15	0.42	0.51	4549.16	10319.33	0.05	0.14	4.50	32.73	0.35	0.76
	LTP4	0.18	0.18	0.40	0.48	6024.81	11935.30	0.05	0.15	5.39	33.61	0.47	0.88
	LTP5	0.17	0.17	0.66	0.75	5766.58	11677.07	0.07	0.16	5.91	34.13	0.44	0.85
	LTP6	0.21	0.21	1.05	1.11	7845.20	12279.61	0.06	0.13	6.66	27.84	0.58	0.89

Scenarios	Name	EP		GWP		AP		FAETP		MAETP		Ecotoxicity		Human cancer		Human non-canc.	
		kg P eq.		kg CO2 eq.		kg SO2 eq.		kg DCB eq.		kg DCB eq.		CTUe		CTUh×10^{-9}		CTUh×10^{-9}	
		Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3
Scenario 1	LTP1	1.47	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	LTP2	1.24	1.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Scenario 2	LTP1	0.12	0.12	32.28	32.28	0.05	0.05	0.12	0.12	2136.46	2136.46	0.01	0.01	1.71	1.71	0.17	0.17
	LTP2	0.16	0.16	43.62	43.62	0.11	0.11	0.15	0.15	2674.10	2674.10	0.01	0.01	1.99	1.99	0.21	0.21
Scenario 3	LTP1	0.12	0.12	63.66	36.36	0.08	0.07	0.18	0.16	2861.94	2793.95	0.02	0.01	2.81	2.68	0.22	0.22
	LTP2	0.14	0.14	79.08	74.47	0.16	0.22	0.23	0.23	3630.83	3619.36	0.03	0.03	3.37	3.35	0.27	0.27
Scenario 4	LTP1	0.03	0.03	117.28	87.59	0.13	0.23	0.30	0.28	4350.66	4276.71	0.05	0.03	4.33	4.19	0.34	0.33
	LTP2	0.04	0.04	135.45	129.18	0.23	0.40	0.37	0.37	5391.57	5372.88	0.07	0.06	5.12	5.08	0.40	0.40

Table S6. Ranges of parameters for uncertainty analysis.

Ranges of input parameters for uncertainty analysis																	
Scenarios	Name	Antifoam		Glucose		Methanol		Electricity (AO+MBR)		Electricity (NF)		Electricity (RO)		Electricity (NF SCE)		Electricity (RO SCE)	
		kg/t		kg/t		kg/t		MJ/t		MJ/t		MJ/t		MJ/t		MJ/t	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Scenario 2	LTP1	0.10	0.14	--	--	--	--	31.31	46.96	--	--	--	--	--	--	--	--
	LTP2	--	--	--	--	--	--	38.00	57.00	--	--	--	--	--	--	--	--
	LTP3	--	--	0.93	6.89	--	--	34.56	51.84	--	--	--	--	--	--	--	--
	LTP4	0.07	0.10	--	--	0.00	6.30	49.22	73.84	--	--	--	--	--	--	--	--
	LTP5	0.44	0.66	3.89	9.63	--	--	42.27	63.41	--	--	--	--	--	--	--	--
	LTP6	0.08	0.12	3.70	19.11	--	--	74.16	111.24	--	--	--	--	--	--	--	--
	LTP7	0.04	0.06	3.52	16.49	--	--	92.80	139.20	--	--	--	--	--	--	--	--
Scenario 3	LTP1	0.10	0.14	--	--	--	--	31.31	46.96	2.01	3.01	--	--	7.78	9.50	--	--
	LTP2	--	--	--	--	--	--	38.00	57.00	2.43	3.65	--	--	7.78	9.50	--	--
	LTP3	--	--	0.93	6.89	--	--	34.56	51.84	2.64	3.96	--	--	7.78	9.50	--	--
	LTP4	0.07	0.10	--	--	0.00	6.30	49.22	73.84	3.15	4.73	--	--	7.78	9.50	--	--
	LTP5	0.44	0.66	3.89	9.63	--	--	42.27	63.41	2.71	4.06	--	--	7.78	9.50	--	--
	LTP7	0.04	0.06	3.52	16.49	--	--	92.80	139.20	3.70	5.56	--	--	10.37	12.67	--	--
Scenario 4	LTP1	0.10	0.14	--	--	--	--	31.31	46.96	2.01	3.01	8.45	12.67	7.78	9.50	12.96	15.84
	LTP2	--	--	--	--	--	--	38.00	57.00	2.43	3.65	10.26	15.38	7.78	9.50	12.96	15.84
	LTP3	--	--	0.93	6.89	--	--	34.56	51.84	2.64	3.96	5.41	8.11	7.78	9.50	12.96	15.84
	LTP4	0.07	0.10	--	--	0.00	6.30	49.22	73.84	3.15	4.73	13.29	19.93	7.78	9.50	12.96	15.84
	LTP5	0.44	0.66	3.89	9.63	--	--	42.27	63.41	2.71	4.06	11.41	17.11	7.78	9.50	12.96	15.84

LTP6	0.08	0.12	3.70	19.11	--	--	74.16	111.24	--	--	13.28	19.92	--	--	15.55	19.01

Ranges of emission parameters for uncertainty analysis

Scenarios	Name	CH_4 emission (AO+MBR)		N_2O emission (AO+MBR)		COD Emission		Ammonia Emission		Nitrate Emission	
		g/t		g/t		kg/t		kg/t		kg/t	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Scenario 1	LTP1	--	--	--	--	30000	50000	1600	2200	0	0
	LTP2	--	--	--	--	8100	13500	2150	3350	0	0
	LTP3	--	--	--	--	4750	7000	1650	2500	0	10
	LTP4	--	--	--	--	3000	6000	1000	1550	0	0
	LTP5	--	--	--	--	2000	3500	1750	2500	0	0
	LTP6	--	--	--	--	8000	14000	1700	2200	5	20
	LTP7	--	--	--	--	8000	15000	1700	2300	5	20
Scenario 2	LTP1	227.32	403.54	24.61	60.24	425	600	5	25	800	1100
	LTP2	30.25	77.83	32.13	79.90	1000	1650	5	25	800	1100
	LTP3	--	--	16.20	51.27	1250	2000	1	10	800	1100
	LTP4	--	--	25.80	43.95	1650	2500	5	20	80	120
	LTP5	--	--	42.75	70.35	700	1200	5	25	150	300
	LTP6	--	--	41.85	60.57	900	1300	1	10	200	300
	LTP7	--	--	46.35	67.17	1200	1800	1	10	80	150
Scenario 3	LTP1	227.32	403.54	24.61	60.24	350	550	1	15	800	1100
	LTP2	30.25	77.83	32.13	79.90	350	550	1	15	800	1100
	LTP3	--	--	16.20	51.27	350	550	1	15	700	1000
	LTP4	--	--	25.80	43.95	255	400	0.5	5	80	120
	LTP5	--	--	42.75	70.35	550	800	1	15	150	250

	LTP7	--	--	46.35	67.17	25	60	0.5	5	80	120
Scenario 4	LTP1	227.32	403.54	24.61	60.24	1	10	1	10	15	40
	LTP2	30.25	77.83	32.13	79.90	5	25	0.1	5	1	20
	LTP3	--	--	16.20	51.27	5	25	0.05	5	150	250
	LTP4	--	--	25.80	43.95	10	25	0.01	5	10	30
	LTP5	--	--	42.75	70.35	25	40	0	0	20	50
	LTP6	--	--	41.85	60.57	5	25	0.05	5	5	25