+ Supporting Information

Comparative life cycle assessment of energy consumption, pollutant emissions and cost analysis of coal/oil/biomass to ethylene glycol

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+ For publication in *ACS Sustainable Chemistry & Engineering*

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Table S1. Primary fossil consumption factor

	Coal (GJ/GJ)	NG (GJ/GJ)	Oil (GJ/GJ)	Total (GJ/GJ)
Fuel coal	1.06	0	0.11	1.17
Diesel	0.18	0.03	1.12	1.33
Gasoline	0.18	0.03	1.12	1.33
Electricity	2.86	0.03	0.37	3.26

Table S2. Direct factors of pollutions

	D-CO_2 (kg/GJ)	D-CH_4 (kg/GJ)	D-N_2O (kg/GJ)	D-CO (kg/GJ)	D-NOx (kg/GJ)	D-SO_2 (kg/GJ)	D-PM_{10} (kg/GJ)	D-VOC (kg/GJ)
Coal	8.16E+01	1.00E-03	1.00E-06	1.20E-02	5.17E-03	2.31E-02	4.30E-03	3.46E-04
Gasoline	7.26E+01	4.00E-03	2.80E-05	1.70E-02	2.00E-02	6.50E-03	3.30E-03	7.59E-03
Diesel	6.79E+01	8.00E-02	2.00E-06	1.11E-02	6.92E-03	3.44E-03	5.50E-03	1.50E-02

Table S3. Indirect factors of pollutions

	I-CO_2 (kg/GJ)	I-CH_4 (kg/GJ)	I-N_2O (kg/GJ)	I-CO (kg/GJ)	I-NOx (kg/GJ)	I-SO_2 (kg/GJ)	I-PM_{10} (kg/GJ)	I-VOC (kg/GJ)
Coal	5.73E+00	4.30E-01	1.70E-04	5.14E-04	1.59E-02	1.44E-02	1.79E-02	2.81E-04
Gasoline	2.79E+01	8.00E-02	4.40E-04	4.25E-02	9.06E-03	4.25E-02	1.00E-03	1.89E-02
Diesel	2.88E+01	9.00E-02	4.70E-04	7.89E-02	1.67E-02	7.72E-03	1.85E-03	3.49E-02
Electricity	2.48E+02	2.16E+00	1.60E-04	3.57E+00	7.45E-01	9.92E-02	7.22E-01	4.09E-03

Table S4. Environmental impact factors

	CO_2	CH_4	N_2O	CO	NO_X	SO_2	VOC	PM_{10}
GWP	1	23	296	0	0	0	0	0
AP	0	0	0	0	0.7	1	0	0
POCP	0	0.01	0	0.03	0	0	0.6	0
NE	0	0	0	0	1.35	0	0	0
SA	0	0	0	0	0	0	0	1

Table S5. Assumptions for the estimation of product cost

Component	Basis
(1) Raw material	coal 350 CNY/t, C_2H_4 6000 CNY/t, biomass 800 CNY/t, C_2H_4 5000 CNY/t; O_2 500 CNY/t; methanol 1800 CNY /t, HNO_3 2000 CNY /t; NaOH 2300 CNY/t
(2) Utilities	water 4.5 CNY /t, fuel coal 200 CNY/t; electricity 0.67 CNY /kWh
(3) Operating & Maintenance	
(a) Operating labor	OtEG 240 labors, CtEG 500 labors, BtEG 400 labors 120,000 CNY/labor/year
(b) Direct supervisory & clerical labor	20 % of operating labor
(c) Maintenance and repairs	2 % of fixed capital investment
(d) Operating supplies	0.7 % of fixed capital investment
(e) Laboratory charge	15 % of operating labor
(4) Depreciation	Life period 20 years, salvage value 5%
(5) Plant overhead cost	60 % ((a)+(b)+(c))
(6) Administrative cost	2 % of production cost
(7) Distribution and selling cost	2 % of production cost
(8) Product cost	(1) +(2) +(3) +(4) +(5) +(6) +(7)